

UD biology graduate program leads to alumni success

The Department of Biology offers a vibrant and multidisciplinary graduate program which has a rich history and a long list of accomplishments. Some of the outstanding accomplishments of our recent UD biology graduate student alumni are grant-funding, postdoctoral fellowships in top labs, published papers, a pending patent and jobs in leadership roles.

“In the last five years, students that have graduated from our program have achieved in a variety of ways, from basic research to policy planning. The diverse array of achievements of our students, and their success in top-tier research labs, is a testament to our training program and the hard work of the faculty-student team,” commented Dr. Amit Singh, director of the graduate program in biology.

While the field of science is a challenging process of trial and error, the graduate program in biology provides pillars that aid students in overcoming these challenges to progress onward to successful endeavors.

Faculty-student team

The foundation for students’ success is the opportunity for them to work with researchers who are pioneers in their field and serve as mentors. UD graduate alumni describe the profound impact their mentors have had on their careers as scientists.

Venkateshwar Mutyam, a UD graduate program alumnus (Ph.D. ’12) and a postdoctoral fellow in the Gregory Fleming James Cystic Fibrosis Research Center at the University of Alabama at Birmingham, is a co-principal investigator on a project that recently received a \$7.5 million award from Cystic Fibrosis Foundation Therapeutics. He is also part of a research team with a pending patent.

“My mentor Dr. Carissa Krane had a great impact on the way my career shaped up. Her constant encouragement helped me in presenting my research both at national and international avenues,” Mutyam said.

William Rogers (Ph.D. ’14), now a postdoctoral research associate in the lab of Dr. Mike Levine at the Lewis-Sigler Institute for Integrative Genomics at Princeton, said the best part of the graduate program at UD was the shoulder-to-shoulder tutelage he received from adviser Dr. Thomas Williams and working with fellow graduate students in the lab. “I learned much about what it means to be a scientist and how to run a lab from Dr. Williams and hopefully I can utilize these lessons if I ever open my own lab,” said Rogers.

Continued on next page



Experiential learning: Doctoral student Nathan Wallace and undergraduate student Ashley Zani in the research lab.

Meghana Tare (Ph.D. '13), a postdoctoral fellow at the Molecular, Cell and Cancer Biology center at UMass Medical School, credited her success to her graduate training at the University of Dayton. She is pursuing her passion of cancer biology research at a premier research institution and has published multiple journal papers since graduating from UD.

Shilpi Verghese (Ph.D. '14), now pursuing her postdoctoral training at the University of Colorado Boulder with Dr. Tin Tin Su, gave credit to her mentors. "My mentor Dr. Kango-Singh and my committee members Dr. Singh, Dr. Wright, Dr. Tsonis, Dr. Lopper and Dr. Bergmann from UMass have all been my pillar of strength all throughout. Their continued support and guidance has helped me at every step in my career," said Verghese.

Teaching opportunities

Graduate students gain teaching experience by working as teaching assistants in courses offered by the department and through training undergraduates in the research labs.

Graduate director Dr. Singh explained: "The graduate students trained by mentors get the opportunity to mentor undergraduates in research. It is a win-win situation where more undergraduate students get the opportunity to participate in experiential learning and get training in cutting-edge research, whereas the graduate students get the opportunity to hone their skills in mentoring."

This component of the graduate program is one that many graduate program alumni attribute to their growth and development as scientists and leaders.

"Mentoring the undergrads in labs taught me to improve my leadership skills," said Venky Mutyam. "Being a TA has helped me in mastering my communication skills." Meghana Tare agreed: "One of the things I enjoyed the most was working with the undergrads. I enjoyed teaching them and miss it at times. This experience along with other experiences while at UD contributed to who I am today as a person and researcher."

Experiential learning

A key strength of the program is the opportunity to gain real-world skills inside and outside of the classroom.

Jessica Davis (M.S. '14), who is the director of the Indiana University-Purdue University Indianapolis (IUPUI) Office of Sustainability, cited the diverse hands-on experiences she gained at UD as fundamental to her career success. As a graduate student, Davis was given the freedom to explore her interests, like sustainability, while working on her thesis. With fellow graduate student

Rachel McNeish, she planned and managed the 2014 Midwest Ecology and Evolution Conference at UD.

"Being trained as a system thinker was easily the most valuable aspect of my graduate education. Implementing sustainability initiatives in higher education requires a zoomed-out view of the university system. We have to anticipate how one change will cause the whole system to respond," Davis said. At IUPUI, Davis has implemented a recycling program that has increased the campus' recycling rate to 67 percent.

Specific experiential skills acquired during UD graduate program training provide paybacks for the alumni.

"Putting together summer research proposals as a graduate student has laid the foundation for my grant writing skills," said Mutyam. "The constructive criticism during my 'brown bag' seminar talks has greatly benefited me in honing my presentation skills."

Verghese's extensive experience with fruit flies during her UD graduate thesis research carried over to her postdoctoral fellowship. "The training I got in Dr. Kango-Singh's lab immensely helped me to smoothly transition into the new lab," explained Verghese.



Jessica Davis (M.S. '14), left, and Julia Chapman, doctoral student, measure decaying trees in Lilley Cornett Woods in Kentucky, the location of an old-growth forest research site.

Building a community that can transform

The community atmosphere at UD that forms the fabric for the program's identity fosters faculty-student teams and experiential learning opportunities, which are all aspects that contribute to the success of the graduate program. Whether it's at events like Christmas on Campus, the Stander Symposium, department picnics or biology Crockpot Cook-offs, graduate students get to experience the University's unique sense of community, which plays an integral role in their graduate training.

"Community is what initially drew me to UD over other institutions, and I was not disappointed! Although I came

from a different undergraduate institution, I still feel like I was able to live the full UD experience as a grad student. I greatly value, and continue to value, the relationships I developed at UD," said Davis.

The transformative effect of the UD biology graduate program can be seen in the outstanding success of these alumni, said Singh. "We are accomplishing our goal to train the best group of the next generation of scientists, teachers, researchers and thinkers in STEM disciplines."

Join us to cultivate the success of the UD biology graduate program!

Our program is in an exciting phase where we can increase our footprint on the success of our students and faculty. UD alumni have been of great help in fostering the success of our program by sponsoring summer research fellowships to undergraduates.

As our graduate program is growing in leaps and bounds, it is a perfect time for alumni to move shoulder to shoulder with us to make our dream of having modern cutting-edge infrastructure and core facilities become a reality. The graduate program needs shared facilities, such as microscopy core including real-time imaging capability, tissue culture core including a cell sorter, and a field station for environmental research, to address the increasing needs and demands of present-day science.

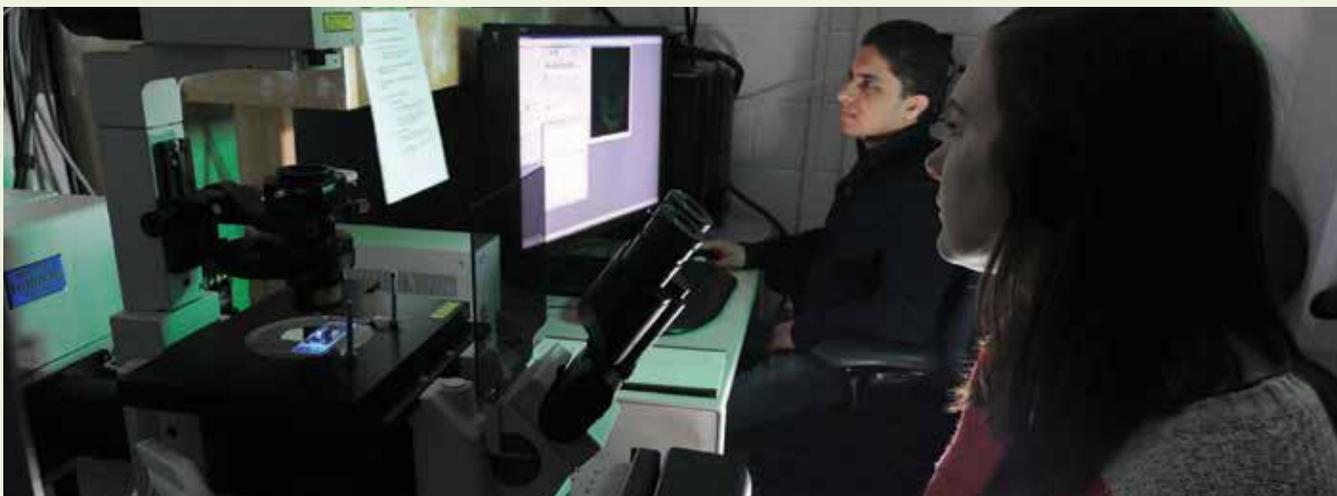
Through the UD Alumni Association we can strengthen the ties of goodwill and communication between the graduate program, its alumni and current students, and promote programs to serve the students' needs.

Join us by:

- Promoting a sense of University pride among all graduates.
- Providing financial support to the University and its programs.
- Developing alumni programs that foster fellowship among alumni and encourage the physical, moral and spiritual growth of the University community.

The University fulfills several functions through graduate programs which are vital to a healthy society. By fostering research, it advances human knowledge; by educating scholars and teachers, it preserves and transmits our cultural heritage; by training professionals, it makes information and help available to the various sectors of the public; and, by virtue of all of these, it contributes to the resolution of the problems and needs of society.

To discuss how you can foster the success of the graduate program, contact Dr. Amit Singh, director, graduate program in biology at asingh1@udayton.edu or 937-229-2894.



Doctoral student Sumant Grover and senior biology major Victoria Spradling work at the confocal microscope.

Schuellein Chair in the Biological Sciences

“Learn, lead and serve” is a mission that the University invites every member of its community to embrace. Alumnus Robert Schuellein (Ph.D. ’44) exemplified this expression.

As a Marianist brother, Schuellein graduated with an undergraduate degree in biology. After obtaining his master’s and doctoral degrees from the University of Pittsburgh, he returned to UD as a faculty member. While working at the University, Schuellein assisted with developing the biology graduate program, which offered the first master’s degree in the College of Arts and Sciences. He also served as a mentor to many of the program’s first graduates.

While an offer to conduct research at the National Institutes of Health in 1963 directed him toward a different path, Schuellein’s fond memories of the University never diminished. When Schuellein passed away in 2011 at the age of 91, he illustrated the “serve” component of the University’s outlook by bequeathing \$2.5 million for a faculty research endowment within the biology department.

Thus, the Schuellein Chair in the Biological Sciences endowed by Dr. Robert Schuellein was created. In a letter composed to the University, Schuellein addressed how his time at NIH shaped his perspective on research. NIH demonstrated to him that a keen faculty research team is vital for ongoing academic success. He observed that training programs with strong research components funded through NIH were most successful in attracting highly qualified trainees. He also wrote that it was apparent that research mentors with notable achievements were more successful in recruiting top students.

Dr. Carissa Krane, professor in biology and the first Schuellein Chair in the Biological Sciences, embodies these qualities as a scientist and mentor. Krane earned her honors B.S. degree in biochemistry/molecular biology from Marquette University and her Ph.D. degree in molecular genetics from Washington University.

Throughout her years at UD, Dr. Krane has conducted research on aquaporins — membrane proteins that control the water content of cells — and has received significant funding from the National Science Foundation, the National Institutes of Health and the American Lung Association. She has mentored scores of students and contributed to interdisciplinary research and teaching efforts.

In 2008, she received the College’s award for outstanding teaching. In 2014, UD’s Chapter of Sigma Xi awarded her the George B. Noland Award for Research. Additionally, the American Physiological Society has formally recognized her service as a research mentor to undergraduate student summer research fellows.

Outside the classroom and laboratory, Dr. Krane has brought significant leadership to the University. She just served a second term as president of the academic senate and has served as



Carissa Krane, Ph.D.

associate director of the University Honors Program, where she supervised honors thesis research and developed the Berry Summer Thesis Institute. She is currently in the third year of a three-year term of national service on the American Physiological Society’s Education Committee.

Installed as the Schuellein Chair on September 25, 2015, Krane intends to continue her successful aquaporins research and expand experiential learning opportunities for undergraduates. She also plans to create new research and professional opportunities for graduate students in biology and across the natural sciences.

“As scientists we have the opportunity to create, imagine, design, test, inquire and rigorously pursue knowledge as we attempt to understand the natural world around us. The research we do is both important and fulfilling, and societally relevant. Science is a team sport,” emphasized Krane.

“It is also our responsibility, as stewards of the scientific disciplines that we represent, to invite, welcome, invigorate, inspire and support our students who will be the next generation of scientists, and to remind ourselves that in the end, we are scientists because doing science is fun,” she continued. “It is a way to engage people of all ages in the joy of exploration, discovery and understanding.”

Beloved biology professor will be missed

Patient. Passionate. Witty. These are just some of the adjectives that students utilized to characterize Dr. Robert Kearns, a microbiologist and immunologist who, after 32 years at the University of Dayton, officially retired on May 15, 2016.

"Words cannot describe the thanks I have for him guiding me to an academic medical career, particularly when that was not my initial plan," said former student Michelle Michel, M.D., (B.S. '87), a professor of radiology and otolaryngology and chief of head and neck neuroradiology at the Medical College of Wisconsin. "I often try to channel his calm demeanor and patience when I am working with medical students and residents in my daily practice. Bob was a fantastic teacher. He had a great way of getting the message across and I loved his somewhat dry sense of humor."

Dr. Kearns became interested in the field of science while growing up with a father who was a family physician. It was during his undergraduate studies and while working with his adviser, microbiologist Dr. Elizabeth Hall, that he developed a real zeal for the subject of microbiology. "Understanding the power of an organism that is too small to be seen with the unaided human eye and its capacity to bring the human completely to their knees is what motivated me towards the areas of microbiology and immunology," Dr. Kearns commented.

During his early years at UD, Kearns used an infectious disease model to understand the role of both innate and acquired immunity in the genesis of infectious disease. In 1995, he began a collaboration with the Iams Company that continued through 2013. His research with Iams investigated the role of antioxidants and dietary supplementation on the regulation of immune function in companion animals.

During his time at UD, Kearns served as director of the graduate program in biology (1993-2003), as well as the Premedical Programs director (2005-2012), and on many key University committees including the academic senate, ECAS, academic affairs, graduate council, IACUC and the Stander Symposium board.

Researcher. Program director. Committee member. While these are all accomplished roles, to Kearns his most important role was that of academic adviser and professor. "For me, it is more about the students than anything else. I don't think that there have been any two days that were the same in the 30-plus years I have been here because of the different personalities that students bring every time they come into your office, so it has been a rewarding experience for me from that standpoint," said Kearns.



Robert Kearns, Ph.D.

Through his ability to connect with students, Dr. Kearns has demonstrated that one person can make an impact on a vast number of lives.

"My interest in and ultimate decision to pursue a career in microbiology was absolutely impacted by Bob," said Duane Newton (B.S. '88, Ph.D. '93), director, Clinical Microbiology Laboratory, University of Michigan Health System; associate professor of pathology, University of Michigan Medical School; and associate professor of epidemiology, University of Michigan School of Public Health. "I think it is natural for people to migrate towards activities or interests involving people that they look up to and that was certainly true for me with Bob. He was and still remains a tremendous mentor to me: He taught me how to be a scientist, a teacher, a friend, mentor and colleague."

"The University of Dayton is a superior school in so many ways, but I cannot imagine how incomplete my experience at UD would have been without Dr. Kearns. His classes were by far my favorite. His immunology class was vastly superior to the one I had in medical school," said Kathleen DiNicola M.D., (B.S. '00), FAAP, a pediatrician at Akron Children's Hospital. "I think a big reason why I was accepted to medical school was because of the research I did with Dr. Kearns. I feel highly indebted to him and would not be where I am today if it were not for him."

In his retirement, Dr. Kearns looks forward to spending more time with his family and continuing his valued friendships with his former students, who are now his colleagues.

Dr. Kearns' former students have established an endowment for student scholarships in his name. To contribute, send a check made out to UD to: University of Dayton, 300 College Park, Dayton, OH 45469-7053. Attn: Dahlinghaus – Kearns Scholarship.

Student award winners discover new career paths through undergraduate research

Three University of Dayton biology majors were selected as recipients for prestigious awards and fellowships during the 2015-2016 academic year.

“These awards are a testament to the hard work and dedication of our students and of our outstanding faculty who mentor and support them,” said Dr. Mark Nielsen, biology department chair. “By providing our students with meaningful experiential learning in the research lab, we help cultivate the next generation of outstanding scientists.”

The award winners have vastly different research focuses, but they all share something in common: Their undergraduate research inspired them to change their career goals in pursuit of research.

American Physiological Society Undergraduate Research Fellow



Raphael Crum

In 2015, 107 contenders internationally vied for undergraduate research positions through the American Physiological Society. Raphael Crum, a senior biology major, was selected as one of 24 students to participate in the APS 10-week summer fellowship program. Each fellow receives a \$4,000 stipend and a full travel grant to present his or her research at the Experimental Biology 2016 conference in San Diego, which attracts almost 14,000 attendees.

Crum has been working with adviser Dr. Carissa Krane, biology professor and Schuellein Chair in the Biological Sciences, in the area of cardiovascular research.

Crum's project examines factors that may be involved in the premature failure of human saphenous vein grafts used in coronary artery bypass graft procedures. Vessel damage, called intimal hyperplasia (IH), develops in the grafts, which compromises vessel function. Crum is investigating the effects of changes in shear stress on the early development of IH by evaluating the genetic regulation of the protein aquaporin 1 in the endothelial cells that line the interior of blood vessels under different shear stress conditions.

Through his undergraduate research experiences, Crum has developed a passion for the experimental side of science.

“Undergrad research is a big independent project which I really like; you learn a lot about yourself and what motivates you,” explained Crum. “Before I had conducted my own research I wasn't sure if it was something I wanted to pursue as a career path but as a result of it, it has changed my entire outlook on life and future career aspirations.”

In the future, Crum hopes to earn an M.D.-Ph.D. and find a balance between research and medicine, combining fundamental research in the lab with patient interaction at the bedside.

National Science Foundation Research Experiences for Undergraduates awardee

Jesse Hughes '16, a biology major who worked in the lab of associate professor Dr. Thomas Williams, was awarded a \$6,000 Research Experiences for Undergraduates (REU) Award from the National Science Foundation (NSF) for summer 2015. The REU program supports undergraduate participation in NSF-funded research.

Hughes' interest in conducting undergraduate research in genetics was sparked while taking the General Genetics course (BIO 312) and through conversations about heredity with his academic adviser and genetics instructor Dr. Williams.

A long-standing question that has fascinated evolutionary biologists is: What are the genetic changes and molecular mechanisms underlying nature's diversity? Hughes' research investigated the pigmentation patterns adorning the abdomens of various fruit fly species and the underlying genes that shape pigmentation diversity. The goal of this research is to determine the pigmentation pattern and gene function for the extinct last common ancestor of these contemporary fruit fly species. This inference will reveal the direction of evolutionary change at the levels of coloration and gene function, and this project will help advance a leading model for the evolution of an animal trait.

Conducting undergraduate research has made a significant impact on Hughes' future plans. "At first, I was on a premed track with the plan to go to medical school but after doing research and realizing how much I enjoyed research, genetics particularly, I shifted my interest from the medical school route to a scientific research route," said Hughes.

Hughes plans to pursue his doctorate in biology at UD while continuing research alongside Williams. The meaningful relationships he has formed with his biology professors and his experience with undergraduate research solidified this decision.



Jesse Hughes

Barry Goldwater Scholar

The Barry Goldwater Scholarship is a nationally competitive program that was created by Congress to stimulate and support excellent students intending to pursue careers in science, mathematics and engineering.

In 2015, the 260 Goldwater Scholars were selected from a pool of 1,206 undergraduates nationwide who were nominated by faculty of their colleges and universities. One of the awardees was Jonathon Sens '16, a biology and biochemistry double major, who received a \$7,500 award from the Barry Goldwater Scholarship and Foundation for Excellence in Education. Of note, nine scholarships were awarded in the state of Ohio in 2015; Sens is the third Barry Goldwater Scholar to be named in UD's history and the first in the College of Arts and Sciences and the Department of Biology.

Sens learned about the neuropsychopharmacology research conducted in Dr. Pothitos Pitychoutis' lab in the UD biology department and asked to join his research team. With his newfound passion in neuroscience, Sens quickly became a founding member of the Pitychoutis lab where he then pursued his Honors thesis.

Sens' research revolved around elucidating the sex-dependent neurobiological effects underlying the rapid-acting antidepressant actions of the psychedelic drug ketamine with in vivo brain microdialysis in mice. "Although women experience major depression at a much greater rate than men, research has largely focused only on the male sex. So, there's a call for us to investigate how this novel antidepressant, ketamine, affects both sexes in the hope of developing more effective, rapid-acting antidepressant drug therapies for both men and women," said Sens.

Since finding his muse in research, Sens decided to pursue a Ph.D. in neuroscience to study the neurobiology of debilitating neuropsychiatric disorders. His ultimate dream is to enter the world of academia and establish his neuroscience lab.



Jonathon Sens and faculty adviser Pothitos Pitychoutis, Ph.D.

Environmental biology program expanding through new opportunities



The UD environmental biology program (EVB) is evolving to meet the needs of students, the community and future employers through curriculum revisions, community engagement and networking opportunities.

Since becoming the new EVB program coordinator on July 1, 2015, Associate Professor Dr. Ryan McEwan has been working diligently on key areas to build upon the past successes of the program.

McEwan's effort to connect with students and provide a successful learning environment for them builds upon the legacy of former EVB Program Coordinator Dr. Kelly Williams.

"The thing that I think really distinguished Kelly was his connection to the students. He is a very motivated, student-first person. He embraces the UD motto of educating the whole person and I am definitely going to try to carry that teaching method on," said McEwan.

The modification of the EVB curriculum has been a collaborative effort. The entire biology department, the College of Arts and Sciences, a biology steering committee, the Undergraduate Curriculum Committee and parties outside of the biology department have all contributed to the process.

The B.S. in environmental biology is a specialized degree based on the fundamentals of biology and ecology, and it provides students with the skills needed to address current environmental issues. The EVB curriculum revision provides more flexibility for students to intern, minor in another area of interest or study abroad. McEwan is also working on developing informal track ways, which allow students to make the curriculum more individualized based on their interests and career goals.

"The tracks enable students with a vocational vision to express that vision through the advising and curriculum that they take so it becomes a more specialized program," said McEwan.

One feature of the EVB degree is that all those majoring in EVB must complete an internship. This experiential learning requirement enables students to develop a marketable skill set. One new internship opportunity includes the Keck internship, which is being created to support students interested in research in environmental biology.

McEwan has also been working closely with a number of community partners including Five Rivers MetroParks, the Boonshoft Museum of Discovery, Aullwood Audubon Center and Farm, the city of Dayton and the Dayton Foodbank to cultivate internship opportunities for students. Engagement with community partners also gives McEwan feedback about the EVB program and insight about the skills companies are seeking in future employees.

"I am working to create a constellation of organizations around the environmental biology program, all of which are ready to provide internship opportunities for students. My aim is that in the end there will be an internship buffet of options that our students can pick from," said McEwan.

EVB students can also make connections to alumni through the new EVB alumni database that McEwan is developing. Through the database, students can reach out to EVB program alumni, giving the opportunity to network and gain professional development advice. McEwan also fosters camaraderie through frequent outings for the students including hiking, kayaking and zoo trips, and he has created an EVB announcements bulletin board. The motto of the UD EVB program, "Science that serves our common home," is emblazoned on T-shirts that each EVB major receives.

Building a strong and enthusiastic sense of community for the EVB program is a key goal for McEwan and he is well on his way.

Ron Konopka donates generous gift to the Department of Biology

Venerable UD alumnus Dr. Ron Konopka '67 has bequeathed close to \$1.1 million to the UD biology department.

While the scientist who brought circadian biology into the realm of molecular genetics passed away in his Pasadena, California, home on February 14, 2015, his legacy still lives on.

Konopka's development as a researcher and scientist was heavily influenced by Brother Don Geiger, UD biology professor emeritus. Konopka and Geiger first met when Geiger taught high school biology to Konopka at Cathedral Latin School in Cleveland, where Geiger taught biology from 1955 to 1960. It was during this time that Geiger said he first recognized Konopka's talent. As an undergraduate at UD, Konopka attended Geiger's first plant physiology class which solidified their student-teacher mentoring relationship.

Additionally, Geiger served as Konopka's mentor for his UD research project studying the role of the duration of the night in regulating flowering in the Japanese morning glory, showing Konopka's early interest in biological timing mechanisms.

It was later, as a graduate student in Seymour Benzer's laboratory at the California Institute of Technology, that Konopka isolated the famous period (*per*) mutants of *Drosophila melanogaster*, in which normal 24-hour circadian rhythm was drastically changed. His seminal findings were published in an influential paper in the *Proceedings of the National Academy of Sciences (PNAS)* in 1971 (Konopka and Benzer, *PNAS* 68(9), 2112–2116) that is considered a cornerstone of modern circadian neuroscience and behavioral genetics.

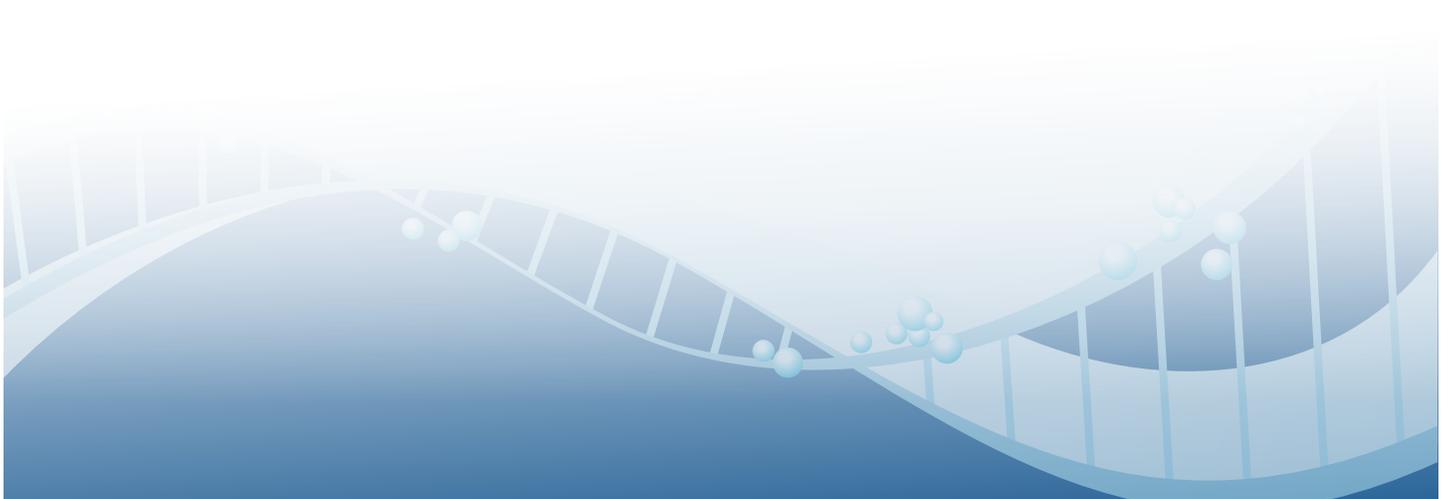
It is noteworthy that Dr. Konopka's research had far-reaching implications since period is a functionally conserved clock throughout the animal kingdom and mutations in this gene underlie human circadian rhythm disorders.

"The demonstration that clocks are located throughout the brain to regulate virtually all physiological processes is largely attributed to the molecular analysis conducted by Dr. Konopka and for this reason he has ensured a rightful place in the pantheon of science," said Dr. Pothitos Pitychoutis, assistant professor in the UD biology department.

In addition to his work in chronobiology, Konopka was also hired as the first scientific director of the organization that eventually became the Hereditary Disease Foundation, and he helped solicit funds for research on Huntington's disease.

"Dr. Konopka has honored us with his incredibly generous gift. It is a reflection of the quality of education he earned while at UD, and a challenge to us to pass it on to the next generations of students at UD," said Dr. Mark Nielsen, biology department chair.

Carrying on UD connections and its values of community is a hallmark of the UD biology faculty and alumni. "The experience relating to Ron taught me the value of staying in touch," Geiger emphasized. "I have done so with a number of the undergrad, grad and research students, which helps me to support them in regards to their professions. Clearly [Ron] valued the education he received at UD. Ron demonstrates the value of UD and its biology program."



Biology department welcomes new faculty member



Richard Carter, Ph.D.

The University of Dayton's new lecturer in biology, Dr. Richard Carter, a native of South Africa, spent his childhood exploring the outdoors, discovering wildlife biology at a young age.

"As a child growing up in South Africa, I was always interested in animals," said Carter. "That part of the world has all sorts of creepy-crawlies to catch and for as long as I can remember, I was out there catching these animals. And it stayed with me until now; I guess in a way I was born into it."

When Carter was 15, he relocated to the United States. He later attended Ohio University, receiving a Bachelor of Science in wildlife biology, followed by a Master of Science in environmental studies. Carter continued his studies at the University of Northern Colorado, graduating with a Ph.D. in biology.

During his graduate work, Carter began to develop an interest in the anatomy of humans and animals. His passion for anatomy grew as he taught anatomy courses and conducted research on bats with his master's adviser Dr. Donald Miles.

Carter not only assisted Miles with the study of bats, he also ended up adopting the project and continued to pursue it in depth.

"After adopting the project, I began researching bats and realized very quickly that they are fascinating creatures. They're mammals that fly and use very sophisticated sonar to move around the landscape. They do amazing things from both a behavioral and anatomical point of view," he said.

Carter studies the development of bats from an evolutionary perspective, focusing on how a nonflying ancestor evolved into a flying one throughout the course of time. This investigation involves studying a colony of breeding bats and then extracting data into an evolutionary standpoint.

Carter and his former Ph.D. adviser Rick Adams, Ph.D., a professor at the University of Northern Colorado, are still collaborating and publishing their work. Their future plans include extending their research in this particular field of mammalian anatomy.

As an anatomy instructor for the lecture and lab sections during the fall 2015 semester, Carter commented that his research has had an influence on his teaching style.

"My research with bats involves a thorough understanding of their anatomical structuring. These structures are relatively complicated to understand and by having a thorough understanding of them, I feel that when I teach similar aspects of the human anatomy, I can explain them to students in a nice, clear way. If I am able to take a topic or subject that is difficult and convey it to students in a way that they understand it, I find that to be very rewarding."

Carter taught physiology lecture and laboratory during the spring 2016 semester and also teaches human anatomy lecture and lab. Both the UD faculty and students have made Carter's transition to UD a smooth one.

"I have found the faculty here very welcoming and I have found the student body to be highly motivated and, generally speaking, a pleasure to teach. They are enthusiastic about the material and they work hard," he said.

In his leisure time, Carter enjoys hiking with his two dogs, listening to music, reading autobiographies and cooking with his wife.

Acknowledgments

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American toad (*Anaxyrus americanus*) in Lilley Cornett Woods in Kentucky, the location of an old-growth forest research site.

Faculty and staff highlights

- **Dr. Karolyn Hansen** was promoted to associate professor.
- **Dr. Madhuri Kango-Singh** was promoted to associate professor.
- **Dr. Carissa Krane** was promoted to professor and was installed as the Schuellein Chair in the Biological Sciences.
- **Dr. Ryan McEwan** received a contract with the city of Dayton to analyze biological and chemical parameters of “outfalls,” where storm water flows from the city into rivers, to understand how urban land use impacts aquatic systems.
- **Dr. Mark Nielsen** was promoted to professor.
- **Dr. Yvonne Sun**, along with co-investigator Dr. Oleg Paliy at Wright State University, won a grant from the American Heart Association to determine if the intestinal chemistry in elderlies can be safely changed as a preventative strategy against foodborne *Listeria* infections.
- **Dr. Thomas Williams** was promoted to associate professor.
- **Dr. Shirley Wright** was promoted to professor.

New vivarium will enhance research in College of Arts and Sciences

Construction is underway on a new, state-of-the-art University vivarium, designed to the highest laboratory standards with the flexibility to meet the needs of current researchers as well as new personnel into the foreseeable future.

The most exciting aspects of the new facility are the additional research capabilities it will provide.

“By more than doubling our space we can strengthen the biomedical program to include biosafety level 2 studies, behavioral research and studies requiring a precise range of environmental controls,” said Dr. Jeff Kavanaugh, vivarium director. The new facility will have the ability to control parameters including temperature, humidity and lighting much more precisely than before and on a room-by-room basis.

“New barrier rooms will enable our biomedical program to investigate topics that include immunology, cancer development and tissue transplantations,” explained Kavanaugh.

One of the most important improvements will be increased safety for both personnel and research animals. Multiple laminar flow hoods, biosafety

cabinets and an autoclave will provide levels of protection not possible before. Floors, walls, even ceilings are designed to be easily disinfected.

Three separate aseptic surgery sites are included in the design, each with anesthetic gas scavenging and LED surgical lights. The efficient arrangement of the new surgeries will allow for enhanced student teaching experiences compared to the old facility.

The entire vivarium planning process has been a paradigm of efficiency and teamwork among the stakeholders. For nearly two years, Kavanaugh worked together with research faculty in multiple departments, UD Facilities Management and Planning, the College of Arts and Sciences, and the architectural design firm Perkins and Will to plan and design the new facility.

“Our common goal has been designing the best possible facility for current and future research needs, and we did this through constant communication allowing everyone’s ideas and concerns to be handled effectively,” said Kavanaugh.

The new vivarium will be complete by July 2016.



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