

UD Now an NSF ADVANCE Institution

The University of Dayton is one of four universities in the region that have joined together to improve the representation of women in STEM fields (science, technology, engineering and math) through a grant awarded by the National Science Foundation.

Wright State University, the Air Force Institute of Technology, Central State University and UD have formed the Launching Equity in the Academy across the Dayton Entrepreneurial Region (LEADER) consortium. These institutions will share \$2.86 million from the NSF ADVANCE grant to recruit, retain and promote women in STEM.

The five-year program will begin with an assessment of the current climates for women at each institution. From there, initiatives have been developed to improve those climates at the individual, departmental and institutional levels.

Dr. Peggy DesAutels, a philosophy professor at UD, has gender research experience and will lead the effort with STEM faculty on gender schema education. People all have a way of thinking, or a schema, when it comes to gender. The ultimate goal is to adjust any biases faculty may have within those schemas, and identifying and acknowledging them - what DesAutels aims to do - is the necessary first step.

A second initiative focuses on that active change in thinking, an effort that will be led by Dr. Tamera Schneider, a

psychology professor at Wright State. She will also be working with faculty, using persuasion theory to counteract any negative gender schemas that prevent women from advancing in the academy.

Along with DesAutels and Schneider, the project's partners include David Goldstein at Wright State; Joseph Saliba, Malcolm Daniels, and Jayne Robinson at UD; Kimberly Kendrick at Central State; and Heidi Ries at AFIT.

Each institution will utilize ongoing efforts to hire more STEM women, working with diversity directors to focus on all aspects of the hiring process and implementing social contracts to openly track progress. STEM departments will also provide equity advisors and mentors to create a more comfortable environment for faculty, according to biology department chair Dr. Jayne Robinson.

Robinson also said the attractiveness of the region and the participating institutions' diversity will hopefully be additional selling points to bring more STEM women and their families to the area.

"We live in a region that is very family-friendly and has a lot of resources," Robinson said. "We're hoping this combination of a critical mass of STEM professionals in the area as well as the cultural and environmental landscape will draw career couples."

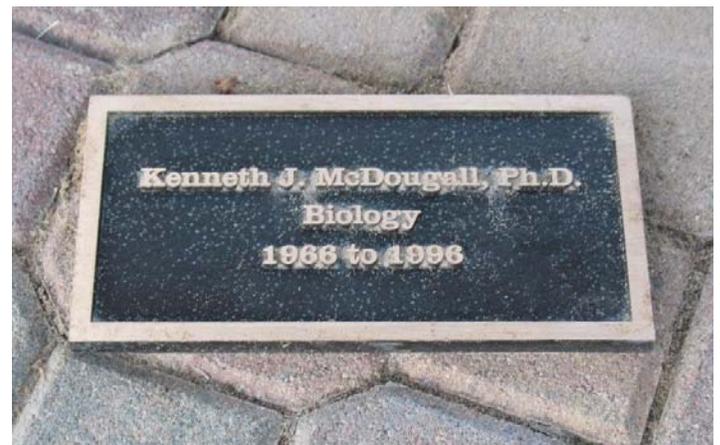
Ken McDougall Honored

Thanks to the initial efforts of Cliff Siporin and Charles Chantell and the generosity of donors, a memorial bench for Dr. Ken McDougall was installed on the

walkway outside of Sherman Hall. The bench, which overlooks the green area in front of the Science Center, has an identifying name plate set in the paving stones beneath it. The memorial and its setting constitute an appropriate acknowledgement of Ken's dedication to the Department of Biology and to the students who passed through his classes.



Dr. Ken McDougall memorial bench.



Memorial bench plaque.

McEwan: Seeing the Forest and the Trees

As a kid, Dr. Ryan McEwan's summers were spent working on his uncle's Kentucky farm, where being surrounded by plants became ingrained in him. Now an assistant professor of environmental ecology, McEwan is bringing that passion to the University of Dayton.

McEwan received his bachelor's and master's degrees in forestry and forest ecology and his Ph.D. in environmental and plant biology. He considers himself first and foremost an ecologist, however, and his research goals reflect that role.

"At the most basic level," McEwan said, "my research is about plants, plant communities and ecosystems - how they change through time, what causes those changes, and particularly, how human manipulation of ecosystems creates feedback."

Research topics such as invasive plants and prescribed fire each have a unique goal, McEwan said, but a central theme runs through all of them - observing the dynamics of the resource base as the system changes.

Although he's been in Dayton for only a short time, McEwan has already explored the new geographic area and its particular assets and challenges.

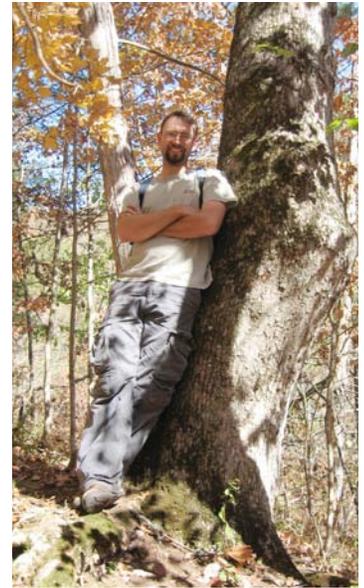
"Dayton owns 14,000 acres of largely forest in their metroparks," McEwan said. "Right here in Dayton. There are great resources and major, major challenges. So the region strongly supports this research focus of mine."

Since coming to UD, McEwan has taken on a project in restoration ecology at the Shawnee State Forest in southern Ohio. By studying the role of fire in the history of the forest, he said, prescribed fire can hopefully be used to help manage the forest's resources and restore its ecosystem.

Honeysuckle, an invasive species in the region, has also sparked McEwan's research interests. He is investigating why the species has been so successful at invading habitats and how it is changing ecosystem processes.

While new projects and students occupy his energy, McEwan is grateful for the community and collegiality at UD.

"I've found it incredibly supportive," he said. "The senior faculty have really taken a lot of time in helping me get organized."



Dr. Ryan McEwan standing next to a 400-year-old chinkapin oak in central Kentucky.

Alum Looks at Past, Present and Future at UD

Dr. Eric Benbow has returned to the University of Dayton this year as an assistant professor of biology, doing what many UD alumni can only dream about - coming back to make his alma mater his home.

Since completing his Ph.D. here in 1999, Benbow has co-taught UD biology field courses as an adjunct assistant professor with Dr. Albert Burky, but Benbow said he considers himself lucky to return to Dayton full-time.

As a UD student, Benbow looked up to Burky as a mentor, working in his lab as an undergraduate and having Burky as his doctoral advisor.

"He really springboarded my research career," Benbow said. "And it's neat to come back as an independent researcher, scientist and professor, but still have that background with him."

Since continuing that role of mentor is important to Benbow as a professor, he is particularly grateful for the healthy balance UD offers between research and teaching.

Benbow's research focuses on the structure and function of ecosystems as they relate to human interactions. Most of his projects have an applied aspect, a goal that allows him to see his research used for the common good.

His most recent collaborative project, made possible by grants from the NIH and the UBS Optimus Foundation, examines how aquatic ecological processes affect the transmission of Buruli ulcer disease in West Africa. The "mysterious disease," whose transmission is unknown, begins with skin lesions that can lead to massive disfigurement if left untreated.

"We have determined there are landscape factors that are important to the disease," Benbow said, "but there is a yet to be identified interaction with a human behavioral component. We are studying this interaction over the next three years."

Benbow is also active in forensic entomology, which involves using insects to aid in criminal investigation. He is working with graduate student Andy Lewis on a carrion decomposition study, and he is a founding member of the North American Forensic Entomology Association.

"It's a really interesting field," Benbow said. "Once again, it's applying science toward the common good."



Dr. Eric Benbow with some friends in Ghana, West Africa.

Interdisciplinary Bio-Research: Learn, Lead and Serve – in the Laboratory

Using UD's motto to "learn, lead and serve," Dr. Carissa Krane (biology) and Dr. Margaret Pinnell (mechanical engineering) have built a unique cross-campus research team.

In 2006, Ethicon Endo-Surgery wanted to further characterize performance features of one of their surgical tools. Recognizing that solutions would take more than one expert, Krane and Pinnell teamed up to meet the challenge and haven't looked back since.

The team has grown to include Dr. Bob Wilkens (chemical engineering) and Dr. Wiebke Diestelkamp (mathematics). The project has also offered unique research opportunities to over 10 students from biology, premedicine, and mechanical, materials and chemical engineering.

Team diversity keeps things interesting, but can also present unique challenges. Interdisciplinary researchers must have confidence in their own expertise, but also enough humility to learn new perspectives.

"The tools and approaches we use to address a problem are quite different, yet amazingly complementary," Krane said. "A chemical engineer views a blood vessel as a cylindrical pipe carrying liquid under laminar flow conditions. A mechanical engineer views the same vessel as a composite material with mechanical properties of stress, strain, and axial tension. A physiologist sees the vessel as a dynamic living tissue, comprised of multiple cell types changing in response to physiological cues."

The greatest challenge in conducting this type of research

can be communication. Diestelkamp learned this when the team approached her to address some complex statistical questions.

"Clearly, Carissa and Margie had a good idea of what they were trying to find out," Diestelkamp said. "Translating that into the right statistical question is not all that easy; we had to learn to communicate and explain to each other what we were trying to accomplish."

How do students respond to cross-campus laboratory learning? Eric Whitney, a chemical engineering major with aspirations for medical school, is especially well-suited to the team.

"This collaboration could not have been more appropriate," Whitney said. "I feel like I've been given a special privilege to work in such an academically diverse environment. Over the past year and a half I've learned a tremendous amount from both students and faculty in each department."

The team has continued to provide research for the development of surgical devices, Krane said. Their collaborative efforts also address central questions in cardiovascular systems research.

The learning community Krane and her collaborators have established allows faculty and students to come together in a dynamic research environment. The group brings humility to learn new things, confidence to lead others with their knowledge, and a commitment to serve others through biomedical research. Learn, lead and serve – in the laboratory.

Confocal Microscope is Asset to Department

UD researchers have been taking advantage of the Olympus Fluoview 1000 Laser Scanning Confocal Microscope, housed in the biology department.

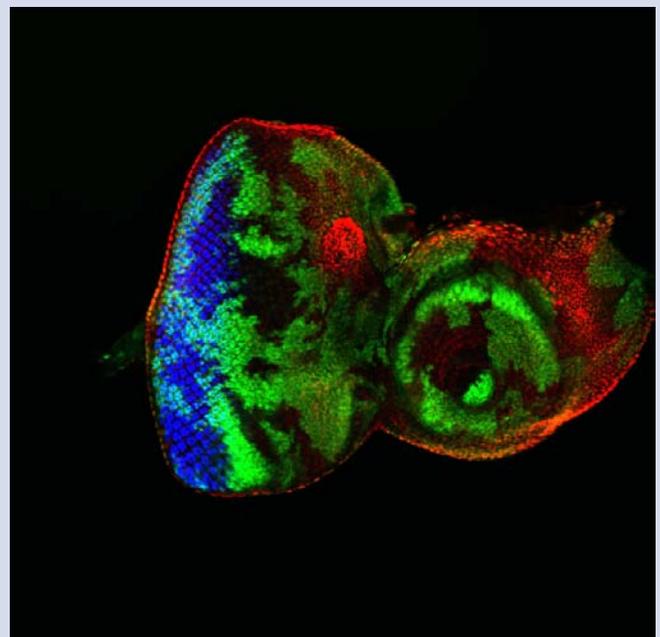
The Fluoview 1000 is an inverted epifluorescence microscope that can be used to scan three different wavelengths. It also is capable of FRET analysis.

Biology professor Dr. Amit Singh employs the confocal microscope for protein localization and gene regulation studies to investigate the development of the eye. His lab's focus is to understand the molecular genetic basis of birth defects in the eye and age-related neurodegeneration.

Biology department chair Dr. Jayne Robinson is also drawing on the microscope's capabilities.

"We are using the confocal microscope to determine the fate of bacterial cells in their symbiotic host plant," Robinson said. "We can track the movement of the bacteria in the roots and their position and gene expression in the root nodule that is formed."

Researchers outside UD's biology department who are interested in using the confocal microscope are welcome to do so. For more information, they should contact Dr. Singh at (937) 229-2894 or by email at singhami@notes.udayton.edu.



Eye imaginal disc of *Drosophila* (fruit fly), stained for a Meis class of transcription factor Homothorax (red) and neuronal marker ELAV (blue). *Drosophila* eye imaginal disc gives rise to the adult eye.

Roots & Shoots Furthers Goodall's Goal in Dayton

When two biology students began the University of Dayton chapter of Roots and Shoots in 2007, they wanted to do locally what Jane Goodall's organization has vowed to do globally: educate the next generation about caring for their communities and the environment.

With the encouragement of biology professors Dr. Carl Friese and Dr. Mark Nielsen, Carly Wingert ('07) and Elizabeth White ('07) began Roots and Shoots at UD after each receiving Learn, Lead, Serve grants that helped them get the organization off the ground.

"I hope Roots and Shoots will be able to spread more awareness about both environmental and humanitarian issues that we face today," Wingert said. "I also hope that it gets more students active in some way with these problems."

This year's president, sophomore environmental biology major Amy Hruska, plans to continue Wingert and Whites' aims while developing Roots & Shoots' name on campus. Getting the student body more involved and helping the organization grow is her main goal for the year, she said.

Roots and Shoots members volunteer at Adventure Central, an after-school program that teaches inner city Dayton kids about nature and the environment. The group is also supporting new Roots and Shoots chapters at Kiser Elementary School and the Dayton Early College Academy.

Anyone in the UD community is welcome to join Roots and Shoots, and senior education major Nora Jennings said she liked the idea of addressing environmental issues while doing service in her field of study.

"I think it's wonderful that there is a group interested not only in how we can help the environment ourselves, but more importantly how we can educate others, especially children, about what they can do," Jennings said.



Roots and Shoots members joined Kiser Elementary students on an overnight nature immersion camp at Glen Helen Nature Preserve, Yellow Springs, Ohio.

INSS Students Practice Science in the Field

The Appalachian Mountains became an outdoor classroom and a lesson in collaboration this summer during the new Mountain Lake Field Course created for UD's non-science majors in the Integrated Natural Science Sequence (INSS).

Students and faculty spent a week at the Mountain Lake Biological Station in southwest Virginia, "doing" science they would otherwise learn in the classroom. During the first three days, students caught bullfrog tadpoles, listened to talks by researchers and hiked to a waterfall in nearby Pembroke.

For the last half of the trip, students teamed up in small groups and worked on research projects integrating biology and geology. They presented their work on the last night of the course. Mary Ellen Dillon, the biology field instructor for the course, said she was impressed by the breadth of the students' ideas.

"It's just great to have an experience where the whole outdoors is your classroom," Dillon said. "It's nice to bring students to biology rather than trying to bring biology to students."

Development for the course, funded by the College of Arts and Sciences, began in fall 2006 and culminated with the pilot course in May.

Dr. Carl Friese, Kelly Bohrer and Dillon from biology teamed up with Dr. Allen McGrew, Heidi McGrew and Katie Schoenberger from the geology department to offer non-science majors an integrated field experience. Steve Roberts, also from geology, joined the group in the field as the camp manager and cook.

While the course satisfied the two lab credits required of non-majors, one biology and one geology, the experience offered students much more than just a week of science.

"I learned a ton about what it means to truly be 'in the field' of study," said sophomore Leigha Nettleton. "Plus, I love the outdoors and going on adventures, so I thought this would be the best thing for me."



Dr. Carl Friese and a team of students enrolled in the new INSS field course measure the decrease in the water level height of Mountain Lake in Virginia with meter tapes and GPS. The water level of the lake used to be just below the top of the boulder they are measuring.

Routley Retiring After Years of Dedicated Service

While her official job title is “Biology Programs Coordinator,” those who know Lynda Routley will remember her as a devoted colleague, an unending fountain of support, a daily dose of enthusiasm and a loyal friend.

After 32 years at the University of Dayton, Routley will be retiring in June 2009 from her position at the biology department and a community that she said “treated her like family.”

When she first came to UD, Routley worked in the dean’s office and the pre-med office before settling down in biology. There, she has mastered the ins and outs of the department and her level of dedication is praised by those who have worked with her.

“Lynda has a first class temperament and ability to solve challenges in a creative and caring manner,” said Dr. Jayne Robinson, chair of the biology department. “She will be sorely missed.”

Over the years, Routley has seamlessly carried out many of the behind-the-scenes jobs in the biology department, but she left her mark with the strength of her personality.

“She is very, very friendly and enthusiastic,” said Dr. John

Rowe, who worked closely with Routley as department chair for 14 years. “She aims to please, really. She would go the extra mile for you.”

Routley’s favorite aspect of her job, she said, has been the daily interactions with people: department chairs, undergraduates, and student office workers alike. Seeing the dedication of the students to their studies and the faculty to their careers has allowed Routley to realize the high caliber of the university’s biology department.

“The faculty have given me an unflagging respect for science,” she said, “and I recognize in them the ability to inspire others, including myself.”

During her time at UD, Routley earned her bachelor’s degree and gained a faithful following as a yoga instructor on campus. After retiring, however, she plans to take a year off and “just be.”

“I know that sounds zen-like,” she said. “Yet, I’m really feeling called to do that.”

Routley has undoubtedly left an impression after decades with the biology department, and Rowe’s words capture best what many will say when they think of her:

“She was always there for me.”

Graduate School Alumnus is Authority on Human Papillomavirus and Cervical Cancer

University of Dayton alum Dr. Wayne Lancaster has established an extensive research career since his time at UD. An international expert on the human papillomavirus (HPV), Lancaster’s achievements in the field paved the way for the science community to make important advances in HPV research.

Lancaster said his research began “in the right place at the right time.” When given the choice of two research problems at a postdoctoral fellowship at the Scripps Research Institute in 1974, he decided on the papillomavirus.

“When I studied the literature, it was clear that very few laboratories were working on the papillomavirus,” Lancaster said. “That’s the reason I chose that. No one was working on it because you couldn’t grow it in a tissue culture like you could other viruses, so you had to use newly emerging molecular biology techniques to investigate the virus.”

That state-of-the-art technology was being developed at Scripps at the time, available for Lancaster’s use.

After research at Scripps and the University of Wisconsin, Lancaster traveled to Case Western Reserve University, where he collaborated on a number of landmark discoveries.

One of their most important findings was the first detection of the papillomavirus in pre-malignant lesions of the cervix, which had been thought to lead to cancer of the cervix.

Lancaster moved to Georgetown University in 1982, where he continued his research on the papillomavirus and its relation to cervical cancer. There, he worked with another research team to develop and refine Hybrid Capture 2, today’s standard in HPV testing for women.

Now a professor at Wayne State University’s School of Medicine, Lancaster is researching independent risk factors related to cervical cancer and is also studying ovarian cancer.

Throughout his career, Lancaster has published more than 120 articles and has received six U.S. and international patents. He received his master’s degree in biology from UD in 1969 and his doctorate in microbiology from Wayne State University in 1973.



Dr. Wayne Lancaster

Faculty Highlights (in alphabetical order)

- Dr. Eric Benbow was awarded an NIH grant in collaboration with Emory University scientists to generate spatial disease models to better understand and predict disease dynamics for Lyme disease and Buruli ulcer. He also received a subcontract from the UBS Optimus Foundation for a multidisciplinary study of Buruli ulcer disease in three countries of West Africa: Ghana, Benin and Cameroon. Benbow and collaborators at Michigan State University are funded by the NIH to study the ecology of *Mycobacterium ulcerans* infections.
- Dr. Jeff Kavanaugh received funding from the SEE (Sustainability, Energy, Environment) Program to investigate management strategies for wetland restoration.
- Dr. Bob Kearns was awarded a research contract with Iams to examine the effect of probiotics on cytokine levels in adult dogs.
- Drs. Carissa Krane (BIO), Margie Pinnell (MEE) and Bob Wilkens (CME) received 2008 Graduate School Faculty Fellow appointments for their collaboration to develop synergistic opportunities for graduate and undergraduate research projects in bioengineering. This project was jointly funded by the Graduate School, the College of Arts and Sciences, and the VP for Research. Krane and Wilkens were also awarded a 2008 Learning Teaching Center Innovations Grant for the development of an undergraduate/graduate bioengineering course that they will team-teach in spring 2009.
- Drs. John Rowe (principal investigator), Mark Nielsen, and Yiling Hong received an NSF grant to determine manufactured nanoparticle toxicity using novel rapid screening methods.
- Dr. Amit Singh's proposal: A *Drosophila* model to study the role of the Notch ligand Serrate (Jagged-1) in growth and cancer was funded by the Ohio Cancer Research Associates. Singh received a UD Learning Teaching Center award to develop a video imaging microscopy lab for undergraduate and graduate biology students. He was awarded a UD Research Council Grant to use the *Drosophila* eye model to study the genetic basis of congenital eye defects in Aniridia. Singh also received an SEE Grant for innovative learning/teaching approaches in biomedical sciences.
- The Center for Tissue Regeneration and Engineering at Dayton, or TREND Center, was established at UD in 2006 to promote collaborative research in tissue regeneration and bioengineering. During the past year, the TREND Center attracted over \$2 million in research funding, supported over 30 undergraduate, graduate and post-doctoral researchers in multiple departments, and raised the profile of the University through 15 peer-reviewed publications in international scientific journals. Keep current with TREND news at www.trend.udayton.edu.

Acknowledgements

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Thank you for your gifts!

Many of the experiences we are able to offer our students are possible only because of the generosity of those who have made donations designated to the Department of Biology. If you would like to designate your future donations to UD directly to the biology department, you may donate online at the UD alumni site (<http://www.udayton.edu/Alumni/>). Select "a special designation" in the designation box and type in "Donation to the Biology Department" in the comments section, and your gift will reach us.



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