

At Miami, undergraduates take advantage of research opportunities year-round. Summer, especially, provides time for in-depth research. Students in every discipline can pursue independent research through Miami-funded programs supported by the office for the advancement of research and scholarship (OARS). Students present their research to the Miami community at an annual forum in April. For more information, go to [www.muohio.edu/undergradresearch](http://www.muohio.edu/undergradresearch). This publication presents a sample of undergraduate research activities at Miami this summer.

## Becoming a classical tradition



*Undergraduate summer scholar (USS) Tyler Gau*

“I am 20 years old, it interests me! I like elegiac poetry; these poems were scribbled on fertility statues and not a lot of work has been done on it,” explained Tyler Gau about his undergraduate summer scholar’s project, *An Intermediate Latin Reader of the Carmina Priapea* — a collection of ancient erotic poems dedicated to the god of fertility from classical mythology.

“One of the goals of the project is to get younger students interested in learning and reading Latin,” Gau said. The junior mathematics and classical languages double major is working with mentor Steve Nimis, chair and professor of classics (originally a math major himself), to produce an intermediate Latin reader of the text.

For his reader, Gau uses a computer program developed by Evan Hayes (Miami ’11) initially through his USS research in 2009. Hayes went on to become the 2011 Goldman Prize winner (the prize

enables a graduating senior to pursue a “dream” project for a year). One outcome of Hayes’ Goldman Prize project was the creation, with Nimis, of a publishing company — Faenum Ltd. — to make available inexpensive volumes of Greek and Latin texts that are not readily available, such as the *Carmina Priapea*.

After glossing the ancient text using

Hayes’ computer program, Gau then selects the most appropriate interpretation of the words (some words can have multiple definitions depending on context) for the reader.

Denise McCoskey, associate professor of classics, encouraged Gau, originally just a mathematics major, to add a classics major after she taught him in her freshman honors course in classical mythology.

He is interested in pursuing classics in graduate school and finds his undergraduate research “a really good experience, especially for when I apply to graduate school. Undergraduate research in the humanities is rare,” Gau explained.

Gau has a wide range of other interests: He was a member of the organizing committee for the 2012 Classics Conference at Miami; he is a member of the math honorary Pi Mu Epsilon; a student manager at the Shriver Center bookstore, and he frequently performs in community theatre in the Oxford and Cincinnati area. ■

## Effects of light and nutrients on damselfly larvae foraging behavior

Undergraduate summer scholar Erin VanTine is investigating the foraging behavior of damselfly larvae that have been exposed to varying conditions of light and nutrients in the field. The senior zoology and environmental science double major and Spanish minor is working with mentor Maria Gonzalez, professor of zoology, and doctoral student Ann Showalter on the project.

Using a set of small mesocosms (experimental water enclosures) at Miami’s Ecology Research Center (ERC), VanTine and Showalter will raise damselfly larvae,

controlling the levels of light (shaded/unshaded) and nutrient composition.

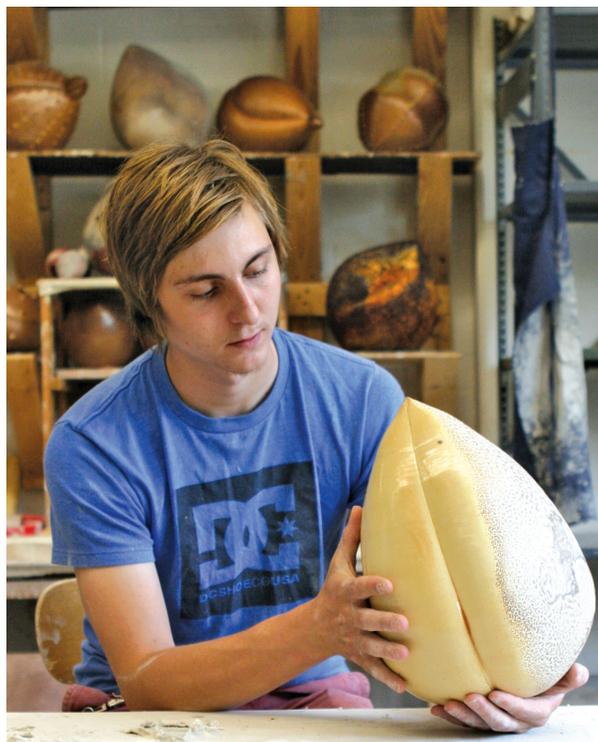
Light and nutrient supply can affect ecosystems on many levels. Gonzalez was part of the first study that tested experimentally whether light and nutrients interactively regulate food chain efficiency across three trophic levels — plants, herbivores and carnivores.

VanTine will record and videotape foraging behavior experiments in the laboratory to determine if the behavior of larvae is different among the various treatments. ■



*Erin VanTine, USS (left) and Maria Gonzalez*

## Exploring the flames: A journey into wood-fired ceramics



Neil Simak, USS, with his wood-fired ceramics

Senior art major Neil Simak has “always been fascinated” by wood-fired ceramics. The undergraduate summer scholar — who once built a wood-fired kiln in his back yard — is pursuing his fascination by learning from professional ceramic artists around the country.

This summer he will participate in several workshops at professional studios known for their wood-fired ceramics, including the Baltimore Clayworks and studios in Montana and New Jersey. While Simak’s home-built kiln was kept fired for 24 hours, the professional studio workshops Simak will attend will keep their kilns fired for four days.

“It takes a community to keep the kiln stoked,” Simak said. “For instance, at the Baltimore Clayworks workshop, there are 12 artists who will tend the kiln in teams of four: six hours on, three hours off; three hours on, six hours off; over the four days.”

Simak cites his mentor Dennis Tobin, associate professor of art, who says that people move too fast in the world today and wood-fired ceramics make one slow down. Its appeal is partly in its primitive nature, said Simak— its beginnings are at the very root of civilization.

Wood-fired kilns create ash; a design is created by the ash melting on the ceramic piece, Simak said. Look for Simak’s wood-fired ceramics at his senior capstone exhibition next spring in Hiestand Galleries. ■



## An Organic Synthesis

Senior biochemistry majors Ryan Sarkisian and Ross Zaenglein became involved in undergraduate research with Hong Wang, assistant professor of chemistry and biochemistry, during their sophomore years. They both describe Wang’s lab as a “perfect fit.” They both are undergraduate summer scholars mentored by Wang.

Sarkisian’s project, “Multi-Component Diels-Alder Reaction of Ketones,” involves

developing a new concise catalytic method for the synthesis of 1,4-dihydropyridines, a structural motif often found in natural products and pharmaceuticals (e.g. calcium channel blockers), Wang said.

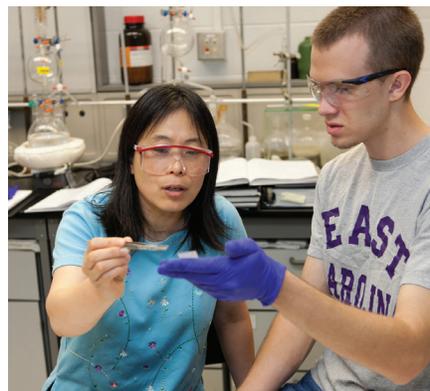
Zaenglein’s project involves developing methods to synthesize water soluble ionic benzoporphyrins. The molecules, which are “very difficult to prepare due to limited synthetic methods,” have huge potential in

various applications including photodynamic therapy (PDT) and as DNA cleavage catalysts, biosensors and organic light-emitting diodes, Wang said.

The projects are part of Wang’s research, which is supported by a CAREER grant from the National Science Foundation, awarded to top young faculty in their field. ■



Mentor Hong Wang with Ryan Sarkisian, USS



Hong Wang with Ross Zaenglein, USS

### Miami-Hughes internships

Miami-Hughes internships in the biological sciences provide a \$3,000 stipend and a \$750 research expense account to work on independent research with a faculty mentor. Interns also receive 12 hours of academic credit with tuition waived.

Up to 15 students are selected each summer for the Miami-funded program.

## Verbal irony and sarcasm use in families

“I became involved in undergraduate research at Miami because I knew I wanted lab experience. I saw a posting for Dr. Luebbe’s lab and applied,” said Natalie Daumeyer, junior psychology and individualized studies double major and Spanish minor.

Aaron Luebbe, assistant professor of psychology, hired Daumeyer as his first research assistant. It was the first semester at Miami for both of them, as Luebbe joined the psychology faculty in 2010.

Daumeyer is now an undergraduate summer scholar working with Luebbe on a research project that focuses on verbal irony and sarcasm use in families.

“I’m interested to see if there is a difference between families that use sarcasm and families that don’t,” Daumeyer said. “Also, I want to look at the ways verbal irony is perceived and how it potentially affects an interaction.”



Natalie Daumeyer, USS, and mentor Aaron Luebbe

She examines videorecordings and other data collected from 150 families pertaining to conflict resolution and interactions between parents and children. She codes interactions, levels of family warmth and cohesion, and use and perception of sarcasm

as critical, verbal irony or as humor.

“Natalie has taken the lead in developing her own coding system for sarcasm and training others (in the lab) who use it,” Luebbe said. ■

## “GeoGebra Presentations, Analysis and Design”



Mentor Todd Edwards with Bethani Scott, USS

Undergraduate summer scholar Bethani Scott began her research project by giving a presentation at a GeoGebra conference in Maine earlier this summer, at which her mentor, Todd Edwards, associate professor of teacher education, was the keynote speaker.

What is GeoGebra? Free, and open-source software for learning and teaching mathematics at all levels for people all over the world, explained Edwards, who is co-founder of the GeoGebra Institute in Ohio — the first GeoGebra institute in North America.

Scott then presented at the Midwest GeoGebra Conference at Miami in June.

“Presenting has reassured me that I am in the right major,” said Scott, a senior integrated mathematics education major. “I loved it and believe that every pre-service teacher should take

advantage of conferences to present.”

Scott’s research will continue through next year, during her student teaching at Tri Valley High School. “The purpose is to provide mathematics educators with insight regarding students’ attitude towards GeoGebra-centered lessons,” Scott explained.

“I am thankful for the opportunity to not only conduct research as an undergraduate but also to work with such an influential professor, Dr. Edwards. He has opened a world of experiences for me. The impact of my student teaching experience will be

heightened as I will be using GeoGebra to gain knowledge of its value in the classroom and will implement my findings into my future classroom.”

Scott is involved with education-related extracurriculars: She is an officer for the Miami University Teachers Council of Mathematics; an executive board member and volunteer of Miami’s Adopt-A-School program; and is a member of the advisory board for the dean of the School of Education, Health and Society. ■

### Summer Scholars program

More than 100 Miami students do research or creative projects each year through the Undergraduate Summer Scholars program (USS). Each scholar receives three hours of academic credit with tuition waived, a \$2,600 fellowship, a \$400 project allowance and the opportunity to pursue in-depth research one-on-one with a faculty mentor.

Administered by the office for the advancement of research and scholarship (OARS), the program is open to any student in any major who has completed his or her sophomore or junior year.

## Algorithms and DNA code



Michele Flowers, USS

Senior Michelle Flowers connected with her faculty mentor John Karro, through her combination of a mathematics and statistics major and a computer science minor.

Karro, associate professor of computer science and software engineering, was looking for a student strong in math to work with him: He found Flowers. She is now an undergraduate summer scholar working on his National Science Foundation CAREER grant project. Karro's research involves developing software to aid biologists in understanding genome evolution, particularly focusing on transposable elements.

Flowers is writing algorithms to compress the text of a software utility, Kaboom, to make it run fast enough to run a program loaded with DNA sequence code.

Originally a chemistry major, she switched to mathematics and statistics. Her new major required a computer science course; Flowers enjoyed it so much she added it as a minor. She is such a fan that she encourages "every student to take a computer science course."

When she is not writing algorithms she plays flute in Miami's pep bands. ■

## Patterns and levels of genetic diversity

"When I was in high school, I did extensive science research and I knew I wanted to do research when I got to Miami," said senior Kevin Hawkins, a zoology and Latin American studies double major and botany minor.

As a freshman, "I did a rotation in Dr. Richard Moore's lab and realized that it was the type of research I wanted," he said. Hawkins is a Miami-Hughes intern this summer with Moore, associate professor of botany.

Moore's research focuses on understanding plant evolutionary biology. Hawkins' Miami-Hughes project involves analyzing DNA sequences from the papaya plant,

investigating a correlation between DNA recombination and genetic diversity.

Hawkins' activities at Miami reflect his many interests and evolution as a Miami student: president of Miami's chapter of MEDLIFE; technology director for the Association of Latin American Students; math and science tutor; and coach/referee for a local Oxford community boys soccer team, among other activities.

Hawkins, who volunteered at a hospital in Granada, Nicaragua, as part of a Spanish immersion class last summer, is interested in law school since "being a science major has taught me the importance of evidence," he said. ■



Kevin Hawkins, Miami-Hughes Intern

## The Contact Hypothesis



Tricia Neu, USS

Tricia Neu, junior nursing major at Miami Middletown, is a founding member of PRISM, a group that promotes opportunities for individuals with developmental disabilities. She is also a

founding member and president of SERVE, helping to spearhead several community events for people with disabilities. Her involvement supports the focus of her undergraduate summer scholar research.

Neu's research, with mentor Virginia (Ginger) Wickline, assistant professor of

psychology, is on "The Contact Hypothesis: meeting people with disabilities reduces students' fear and discomfort." Neu presented results of their research at a symposium on service-learning for the Association of Psychological Science in May.

Neu first became involved as a student in Wicklines' psychology 111 course in spring 2010. Wickline proposed holding a dance for people with developmental disabilities as a service-learning event. Neu has since helped with the dance now held each semester at the Middletown campus.

The dances also serve as opportunities for data collection. Students are surveyed

before and after to determine if a two-hour service learning event and contact with people with developmental disabilities reduce fear and discomfort? Their findings have shown that students' discomfort tends to decrease; and fear decreases significantly, after participating in one of the events. ■

### The Miami University Report

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