

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.MiamiOH.edu/undergradresearch. This publication presents a sample of undergraduate research activities at Miami this summer.

Boreal owls give clue to environmental change

“Ever since my first time out with Dr. Russell, following him through the woods in the pitch black at 5 a.m. setting up mist nets and then seeing the amazing birds we could catch with them, I was hooked,” explained senior zoology major Aaron Anderson. That first time working with David Russell, lecturer of zoology, was one of Anderson’s first days at Miami.

Anderson has worked with Russell at the Avian Research and Education Institute (AREI) bird banding station at Hueston Woods State Park twice a week since that first meeting three years ago.

This summer Anderson is working in the wilderness of Fairbanks, Alaska, with Russell, as a Miami-Hughes intern. They are researching owllet behavior and provisioning rates of adults in the boreal owl, a small owl that is relatively common, although rarely seen, in the interior of Alaska.

“Impacts on northern forests by climate change appear to be accelerating and boreal owls are an important bio-indicator of environmental change in the sub-arctic boreal forests,” Anderson said.

The research is part of an on-going study of boreal owls in Alaska by scientists from the College of Mount St. Joseph, Miami and the Alaska Department of Fish and Game.

Anderson is president of Birdwatchers of Miami University. He has been training with Russell to complete his North American Banding Council bird banding certification, and he hopes to operate his own banding station in the future. ■



Miami-Hughes intern Aaron Anderson

Gaelic language revitalization through music



Mentor Leighton Peterson and undergraduate summer scholar (USS) Molly Greger

“There is currently a revitalization of Gaelic language through music,” said senior Molly Greger, and “not much is written yet about Irish language and music together.” Greger, an undergraduate summer scholar, is spending her summer in Dublin, Ireland, exploring how language and music reflect the identity of the Irish people.

Using anthropology research methods, Greger – an anthropology and music double major – is conducting interviews, visiting traditional Irish music schools, attending formal performances, and of course, observing, as well as participating in, informal music performances in local pubs, to observe “real” Irish music, explained Greger. She is mentored by

Leighton Peterson, assistant professor of anthropology

She will present a formal paper on her USS project at the College Music Society (CMS) national conference next spring. Greger is president of Miami’s newly established CMS chapter.

She will be a campus tour guide this fall, and wants to “let people know that there are lots of opportunities available at Miami.” She has taken advantage of many of them – including completing two majors within two different divisions; studying abroad through Miami’s Luxembourg program; singing with the Choraliers and the Chamber Singers and directing the student a capella ensemble, Treblemakers. ■

Preparing special educations majors for new teacher performance assessment

Student teachers at all Ohio public universities must take the new edTPA (formerly the Teacher Performance Assessment) beginning this fall. The assessment is tied to teacher licensure in Ohio, and more than 20 states have implemented it, according to Leah Wasburn-Moses, associate professor of educational psychology and project manager for Miami Connections.

Since the edTPA is so new, no research has been conducted on how to prepare future teachers for the assessment. Wasburn-Moses is mentor to undergraduate summer scholar Ana Tanner, who is spending this summer reviewing data and writing a research paper that will address the issue of preparing students, in particular special education majors, for

the edTPA.

Tanner will use data collected by Wasburn-Moses during a junior year practicum for special education students. Wasburn-Moses, who was trained in grading the edTPA, designed an assignment that involved pairs of students who worked on one of the three sections of the edTPA.

Tanner, a senior educational psychology major, has conducted undergraduate research with Wasburn-Moses since her first year at Miami. She assisted in the evaluation of the Miami Connections program – an on-campus, half-day alternative school that assists local ninth and 10th graders in their transition to high school.

Her USS project will connect with her own student teaching next spring as she prepares for the edTPA. ■



Mentor Leah Wasburn-Moses and Ana Tanner, USS

All in the Timing – directing comedy



Robert Stimmel, USS, and mentor Bekka Eaton Reardon

Senior theater major Robert Stimmel has acted in or worked behind the scenes in more than 12 theatre productions since his first year at Miami. He “fell in love” with acting in his first show (“West Side Story”) in high school. Coincidentally, his faculty mentor Bekka Eaton Reardon, associate professor of theatre and director of the theatre program on Miami’s Hamilton campus, graduated from that same high

school (Fairfield High School).

As part of his undergraduate summer scholar’s project, Stimmel directed and produced “All in the Timing,” a collection of one-act comedies by David Ives. The show was performed over two weekends in June at the Ernst Nature Theatre on Miami’s Western campus.

“As a director you have to worry about the whole big picture,” Stimmel explained. “All the parts have to fit – you have to make it work.”

His project also involved studying the history of comedic theatre from vaudeville through contemporary theater. He gave brief presentations about his research during the performances of “All In the Timing.”

Stimmel has been selected to direct the theatre department’s fall 2013 SecondStage production of “Gruesome Playground Injuries” by award-winning playwright Rajiv Joseph (Miami ’96). ■

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.

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 six 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.

Flamenco – reviving a musical tradition of Gypsy passion



Timothy "T. Jordan" McCarthy, USS

“I was fortunate to stumble across a gem of a subject that is unique and shrouded, yet extremely relevant,” said undergraduate summer scholar Timothy “T. Jordan” McCarthy about his project to research the “mystical music culture of Spanish Flamenco singing” - and document and reflect upon its rich history.

“The amount of classical music that Flamenco has influenced is enormous,” McCarthy explained. “But little has been written in English about Flamenco vocal music — most of the sources are in Spanish or German and are rather obscure.” Many performers were Romani (Gypsies), and their culture is based on oral, not written, history. The cultural impacts upon Flamenco music include Sephardic, Arabian, Romani, French and nationalist Spanish music.

As part of his project McCarthy is studying Flamenco literature and learning Spanish, guitar and selections of Flamenco vocal works under the instruction of Audrey Luna, voice faculty member. It will culminate in a research paper and a lecture and recital of Flamenco vocal selections to be presented during fall semester.

After spending his first two years at Miami as a music performance and chemical engineering double major, McCarthy, now a senior music and music performance major, found his passion in ethnomusicology. “I could not have found a better person for my mentor,” he said, referring to Thomas Garcia, associate professor of ethnomusicology and Latin American studies.

This year McCarthy will serve the Men’s Glee Club as a student conductor and an elected officer. ■

EPR studies of protein transport

Senior zoology major Rachel Mann has been conducting independent study research in faculty mentor Carole Dabney-Smith’s Protein Transport Lab for the past two years, after being encouraged by her brother (Nolan Mann, Miami ’11) who was a Miami-Hughes intern with Dabney-Smith.

Now an undergraduate summer scholar, Mann is conducting electron paramagnetic resonance (EPR) studies of the topology and structure of the Tha4 protein, involved in a protein transport pathway found in the chloroplasts of plants – the twin arginine transport (Tat) system.

Chloroplasts are organelles in plant cells responsible for photosynthesis. Most proteins needed for photosynthesis chloroplast function are formed in the cytoplasm of the cell outside of the chloroplast and must be transported across the chloroplast membrane to get to their proper location for assembly into photosynthesis complexes.

Dabney-Smith’s lab investigates how the proteins responsible for photosynthesis are transported across the chloroplast membrane – and then how they orient in the proper position after crossing the membrane, in order to do their work of light capture and photosynthesis.

When Mann is not working in the Protein Transport Lab, she is an Adopt-a-School volunteer at Marshall Elementary School. ■



Rachel Mann, USS, and mentor Carole Dabney-Smith

Long-term effects of childhood abuse in young women

Senior psychology major Hannah Espeleta was recruited during her sophomore year to join the Trauma and Emotion Regulation Lab of Terri Messman-Moore, associate professor of psychology and director of clinical training. Espeleta is one of eleven undergraduate students, in addition to five graduate students, who assist Messman-Moore with ProjectWISE, a three-year, multi-site longitudinal study funded by the National Institute of Mental Health.



Mentor Terri Messman-Moore and Hannah Espeleta, USS

ProjectWISE is designed to help identify how experiences of childhood sexual abuse can lead to emotion dysregulation and revictimization in emerging adult women.

Espeleta, an undergraduate summer scholar, is now working on her own project mentored by Messman-Moore. She is analyzing data collected by Messman-Moore from an earlier, one-time study of approximately 800 college-age women.

Her project “looks at potentially normative behaviors” among college-aged women with a history of childhood sexual or physical abuse, explained Espeleta, “such as anxiety, avoidance, difficulty in maintaining relationships and interpersonal conflicts.” This is a good set of questions for college women, explained Messman-Moore, to examine if they can handle college life, or a job, with the negative outcomes that may result from childhood abuse.

Espeleta is a member of the university honors program, a resident assistant at Heritage Commons, a summer tour guide and participates in club volleyball. ■

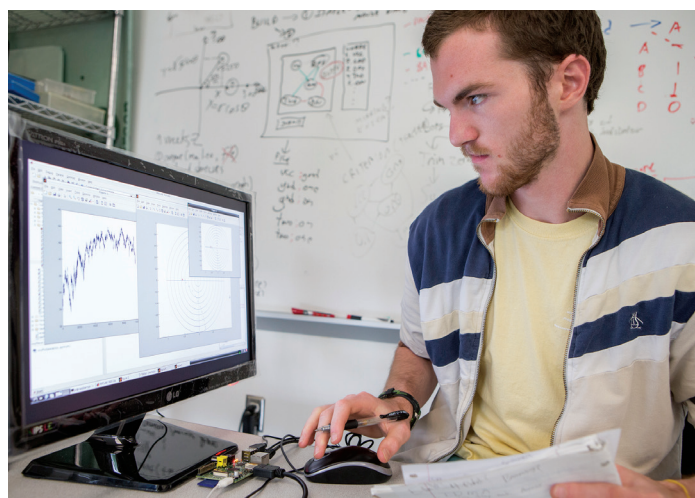
Studying how scintillation scuttles satellite signals

Different space weather events can have a huge impact on the electron content in the ionosphere, and thus impact Global Navigation Satellite Systems (GNSS) and Global Positioning Systems, said senior Brian Breitsch, an undergraduate summer scholar working with mentor Jade Morton, professor of electrical and computer engineering.

Breitsch, a senior computer engineering and math double major, is developing a computer program to help predict and profile “scintillation events” – disruptions in the ionosphere that occur after a solar coronal mass ejection (CME). He explained that “scintillation events can affect satellite signals as the signals pass through the ionosphere in ways that seriously impact satellite receiver performance.” The effects can interfere with GNSS signals from minutes up to hours.

Morton – an expert in GNSS receiver signal processing – has installed GNSS satellite receivers worldwide, including Singapore, Ascension Island, Peru, Alaska and Hawaii. GNSS receives signals from satellites for navigation and timing.

Using data collected by Morton’s satellite receivers – a data set so large that it is stored on servers – Breitsch looks for indicators of scintillation events. If the parameters of the indicators he is searching for pass a threshold limit, he then selects the data set at five minutes before and five minutes after the event. This streamlines the process, so that “there is higher throughput, for less human work, more computer work,” Breitsch said.



Brian Breitsch, USS

Breitsch is a member of the 2013-2014 Scholar Leader program, the Institute of Electrical and Electronics Engineers, the computer science programming team, the running club and the triathlon club. Last fall he was selected to present a TEDxYouth talk in Columbus based on research he conducted during the Year-At-The Edge (YATE) and Summer-At-The-Edge (SATE) programs through a scholarship with the Air Force Research Laboratory. ■

Emerald ash borer effects in a deciduous forest ecosystem



Miami-Hughes intern Matt Higham

“The main purpose of my project is to assess how ash tree mortality due to the emerald ash borer (EAB) affects the amount of coarse woody debris (CWD)” on the forest floor, explained Matt Higham, a Miami-Hughes intern working with mentor David Gorchov, professor of botany.

Emerald ash borer, first seen in Ohio in 2003, is an invasive insect species that can kill mature ash trees within one to four years.

Higham, a senior botany and environmental science co-major, will quantify the CWD in deciduous forest ecosystems in sites in western Ohio that are in different stages of ash tree mortality due to EAB. This assessment “will help predict how the forest ecosystems in Ohio will respond to the EAB invasion,” Higham said.

A member of the university honors program, Higham participated in the First Year Research Experience (FYRE) program with mentor Henry Stevens, associate professor of botany. He is a statistics tutor at the Rinella Learning Center and participated in the Scholar Leader Program. ■



Matt Higham

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