

PLEASE DO NOT PRINT THIS.

Sandy Ramses, Jessica Clark and her daughter enjoying the Homecoming Barbeque in October. See more pictures on page 10.



ANNOUNCEMENTS

If you would like to make a donation to the Biology Travel and Research Fund please go to the website <https://salisbury.site-ym.com/donations/donate.asp?id=7399>

Thank you! We greatly appreciate your support of our students!

Salisbury University's **BioEnvirons Club** volunteers assisted the Maryland Coastal Bays Program with cage and bagworm removal at their Lizard Hill Atlantic White Cedar restoration site near Bishopville. Pictured right are Adam Dunn, Caitlin Nicodemi (Club President), and Andrew Gerber.



OPPORTUNITIES

Animal Behavior Society: E.O. Wilson Conservation Award

Web Site: <http://www.animalbehaviorsociety.org/web/awards.php>

Program URL: <http://www.animalbehaviorsociety.org/web/awards-student-grants.php>

The ABS Edward O. Wilson Conservation Award seeks to encourage graduate students of animal behavior to participate in meaningful conservation-related research. This single award of up to US \$2000 is given in recognition of a research proposal considered meritorious for its integration of behavior and conservation. Deadline: 12/05/2014.

Mount Desert Island Biological Laboratory:

NSF Research Experience for Undergraduates at MDIBL

Web Site: <http://www.mdibl.org>

Program URL: http://www.mdibl.org/undergraduate_application_process.php

The Mount Desert Island Biological Laboratory provides in-residence summer fellowships for undergraduate students with a minimum of one semester of undergraduate biology. Deadline: 01/09/2015.

Baylor College of Medicine: Summer Medical and Research Training (SMART) Program

Web Site: <https://www.bcm.edu/education/schools/graduate-school-of-biomedical-sciences/diversity/smart>

The Summer Medical and Research Training (SMART) Program was developed to provide frontier-level, biomedical summer research projects for undergraduates in a supportive environment with supplemental educational activities. The program offers: nine paid weeks of biomedical related research in a broad range of areas; daily seminars designed for undergraduates; free SMART GRE prep workshops; career development activities; and, housing at Rice University dorms. Applications are due January 10, 2015. Transcripts and letters of recommendation are due February 1, 2015.

Cold Spring Harbor Laboratory: Undergraduate Research Program

Web Site: <http://www.cshl.edu/Education/Application-Guidelines.html>

Program URL: <http://www.cshl.edu/Education/Undergraduate-Research.html>

CSHL's Undergraduate Research Program (URP) provides one of the few places where young people are instructed in the techniques of modern biology while becoming integrated members of a vibrant scientific community. Each year, approximately 25 students from around the world are accepted to the fully subsidized, 10-week summer program to work with senior Laboratory staff members on independent research projects in: Molecular biology and cancer; Neuroscience; Plant biology; Genetics and Genomics; Quantitative Biology. Deadline: 01/15/2015.

Hutchinson (Fred) Cancer Research Center: Summer Undergraduate Research Program

Web Site: <http://www.fredhutch.org/en.html>

Program URL: <http://www.fredhutch.org/en/education-training/undergraduate-students.html>

The Summer Undergraduate Research Program (SURP) is an intensive, nine-week internship designed to provide research experience and mentorship for undergraduate students who are interested in biomedical research. Under the guidance of a faculty mentor, students will complete an independent research project and present their findings at a competitive poster session. The application deadline is Friday, January 16, 2015. Letters of recommendation for up to two references are due by Friday, January 23, 2015.

German Academic Exchange Service (DAAD): Research Internships in Science and Engineering

Web Site: <http://www.daad.de>; Program URL: <https://www.daad.de/rise/en/11638/index.html>

The German Academic Exchange Service (DAAD) – in cooperation with science organizations in North America and Germany - is pleased to invite undergraduate students from the US, Canada and the UK in the fields of biology, chemistry, physics, earth sciences and engineering to apply for a summer research internship in Germany. RISE summer placements take place with research groups at universities and top research institutions across Germany. The RISE interns are matched with a doctoral student whom they assist and who will also serve as their mentor. Deadline: 01/15/2015.

University of Notre Dame: Department of Biological Sciences - NSF Summer Undergraduate Research Program - Integrative Cell and Molecular Biology

Program URL: <http://www3.nd.edu/~biosreu/apply.html>

The Department of Biological Sciences at the University of Notre Dame is sponsoring a NSF Research Experience for Undergraduates (REU) program during the summer of 2015. The focal point of the proposed projects is Integrative Cell and Molecular Biology. Deadline: 02/03/2015.

University of Texas Southwestern Medical Center at Dallas: Summer Undergraduate Research Fellowship (SURF) Program

Web Site: <http://www.utsouthwestern.edu>; Program URL:

<http://www.utsouthwestern.edu/education/graduate-school/programs/non-degree-programs/surf.html>

The SURF Program is an intensive summer research experience designed for college students who are preparing for Ph.D. or M.D./Ph.D. careers. Fellows spend 10 weeks pursuing individual research projects in the laboratories of Graduate School faculty members. Deadline: 02/09/2015.

California Academy of Sciences: Biological Illustration Internship

Web Site: <http://www.calacademy.org>

Program URL: <http://www.calacademy.org/biological-illustration-internship>

The internship is open to currently enrolled undergraduate students interested in developing illustration techniques related to biological specimens. Deadline: 02/13/2015.

Smithsonian Institution: Natural History Research Experience (NHRE)

Program URL:

<http://www.mnh.si.edu/NHRE/about.htm>

NHRE is a 10-week summer internship program hosted at the National Museum of Natural History, Smithsonian Institution in Washington, DC. Deadline: 01/27/2015.

NATURAL HISTORY RESEARCH EXPERIENCES

This summer carry out your own original research at the National Museum of Natural History, Smithsonian Institution in Washington D.C.

- Paid
- Free Housing
- 10 weeks
- Geology, Biology, Anthropology, and Museum Education

NSF REU site
EAR-1062692
<http://www.mnh.si.edu/nhre/>

FEATURED FACULTY

DR. MARK GARCIA

Courses Taught: This fall 2014 I am teaching Introductory Biology: Concepts and Methods (BIOL 210). I am slated to continue teaching BIOL 210 in spring 2015. At the University of Alabama, I taught a battery of courses including Anatomy & Physiology, Introductory Biology, and Entomology.

Previous Research: I have received broad training in evolutionary, ecological, and physiological approaches to animal behavior, which is reflected in my past and current research efforts. My master's research focused on the effects prior fighting experiences have on future contest performance and success (winner and loser effects), and their underlying behavioral and physiological mechanisms. What we discovered is that individuals utilize their prior fighting experiences to reassess their perceived fighting abilities. Furthermore, changes in metabolic physiology did not correlate with experience-induced changes in contest performance and success indicating that changes in metabolic physiology are an unlikely mechanism underlying experience effects. A manuscript detailing the full study has been published in the journal *Animal Behaviour*. For my PhD research I decided to broaden the scope of my research and began investigating the evolution of complex, integrated phenotypes. Specifically my study sought to understand the correlations among behavioral and life-history traits, the physiological processes (i.e. steroid hormones) that generate and/or maintain these correlations and, ultimately, how genetic covariance among fitness-related traits may dictate the evolution of complex phenotypes. Funding for this study was awarded through the *National Science Foundation's Doctoral Dissertation Improvement Grant*, which I authored and submitted in collaboration with my advisor, Dr. Ryan L. Earley. This study is in its final stages with the authoring of manuscripts for publication currently in progress. I have several other manuscripts either in review or in progress, which stem from collaborations and research projects performed independently of my dissertation research. During my graduate career I have been quite active in developing a collaborative network through attending multiple research conferences such as *Animal Behaviour* and the *Society of Integrative and Comparative Biology*.



Current Research: I am currently working on a collaborative effort with Dr. Ryan Taylor and Dr. Kimberly Hunter to investigate the evolutionary and molecular mechanisms underlying the evolution of anuran communication systems. We work in a number of anuran systems including the Tungara frog (*Engystomops pustulosus*), spring peepers (*Pseudacris crucifer*), and green treefrog (*Hyla cinerea*). Our focus in the Tungara system is to investigate whether among-population variance in anthropogenic disturbances and/or the prevalence of a lethal, fungal infection (*Chytrid* sp.) contribute to variation in male communication, female mate choice, and epigenetic signature among-populations. Planned future works will focus on the green treefrogs and the costs/benefits of males who utilize alternative reproductive tactics (i.e. satellite behavior).



About Me: I am a California native who is a very, VERY, long way from home. I come from a rural community in the central valley where agriculture is the most prominent industry. For my undergraduate degree I attended California State University of Fresno where I earned my Bachelors of Science with an Ecology & Evolution option in 2008. From there, I was accepted into the graduate program at the University of Alabama where I earned both my Masters in 2012 and PhD in 2014. At current I am a Post-Doctoral Fellow with the Department of Biological Science at Salisbury University (the University's first ever post-doc). My future prospects are to remain in academia, obtain a tenure-track faculty position, and build an integrative, animal behavior research program. Besides work I am huge football fanatic. My team is, of course, the Crimson Tide (ROLL TIDE!). Come fall you can usually find me either watching and/or playing football. Outside of football I am an avid naturalist and enjoy hiking nature trails or spending my time along the ocean shore.



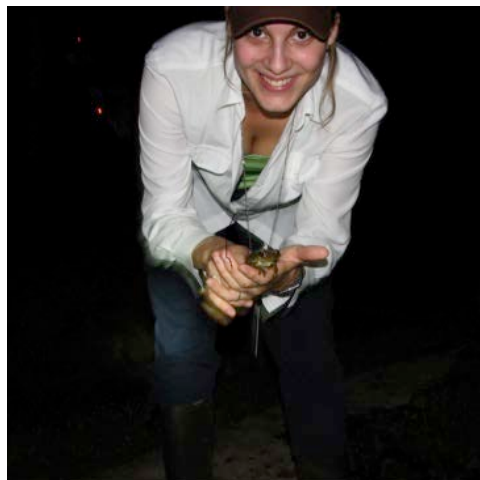
Recent Publications:

- Hoss SK, **Garcia MJ**, Earley RL, & Clark RW. 2014. Fine-scale hormonal patterns associated with birth and maternal care in the cottonmouth (*Agkistrodon piscivorus*), a North American pitviper snake. *General and Comparative Biology*. 208:85-93
- **Garcia MJ**, Wilson J, Murphree J, & Earley RL. 2014. Mechanisms of decision-making during contests in green anole lizards: prior experience and assessment. *Animal Behaviour*. 92:45-54

GRADUATE RESEARCH STUDENT

KELSEY MITCHELL

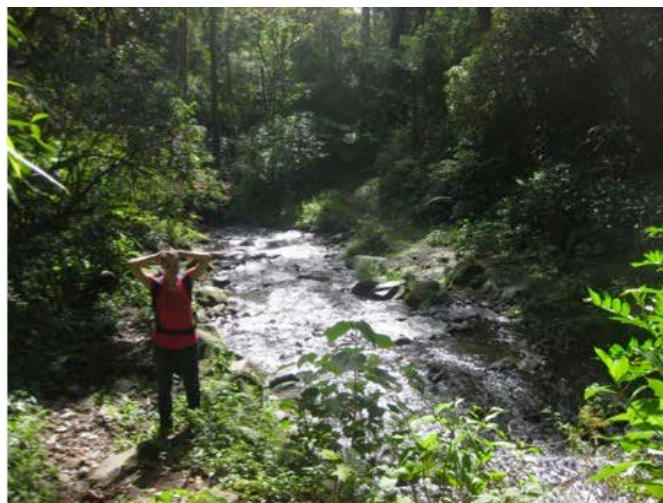
Photo right: Kelsey holding a gladiator frog, *Hyla rosenbergi*.



As a graduate student in the field of biology I'm often presented with the question *What kind of biologist are you?* My favorite response, one I've picked up from my advisor Ryan Taylor, is "a nighttime biologist". Let me explain. For my Master's thesis I am studying the behavior, communication and population genetics of a tropical frog species, the túngara frog (*Physalaemus pustulosus*). Because these frogs are nocturnal, I too have become nocturnal during the summer months while I research them at the Smithsonian Tropical Research Institute (STRI) in Panama. I've undoubtedly been fortunate that my days for the past three summers have started with the evening chatter of red-lored parrots as they find roosts at dusk and ended at sunrise, hopefully with data.



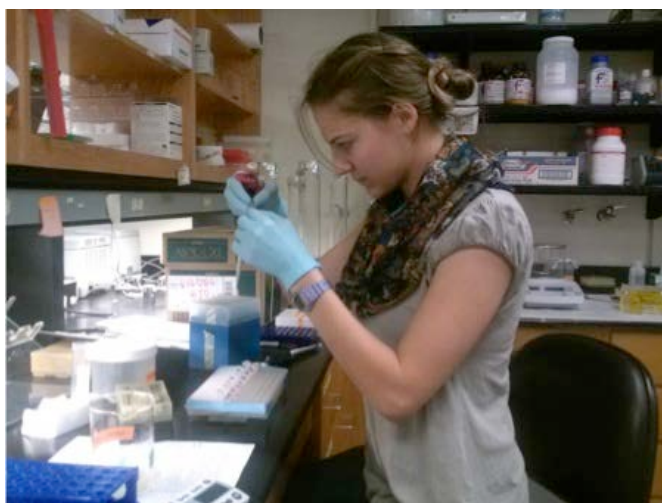
The grad students and interns of Team Túngara 2014 in Panama City, Panama.



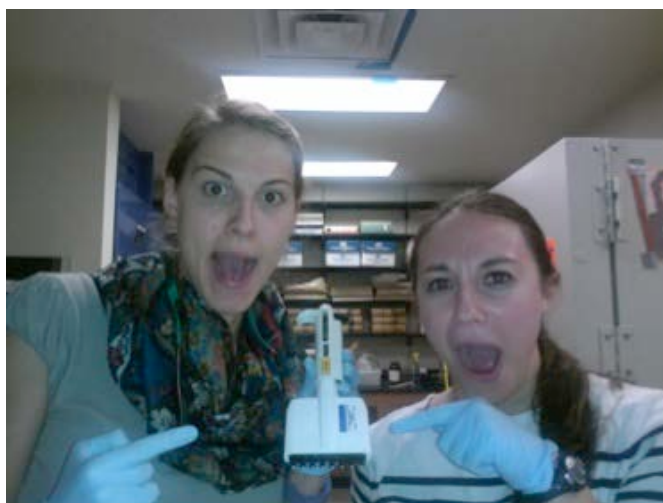
Kelsey hiking in Panama.

With over 30 years of research, Mike Ryan and his team at the University of Texas have established túngara frogs as a model system for investigating sexual selection. Females have strong preferences for specific male call characteristics and choose mates based on these preferences. In this manner, female preferences act as a selective pressure on male traits. We know from observations and experiments involving túngara frogs and other systems where female choice occurs, that females rarely have unanimous preferences. Generally, there is variation among individuals' behavior even when significant patterns are found at the population level. This individual variation is often ignored as noise. I caution against this because variability among individuals appears to have important evolutionary implications,

such as maintaining variation among traits within a population and contributing to speciation. My thesis questions aim to answer whether inter-individual variation in preference exists among female túngara frogs and if there is a potential genetic mechanism underpinning behavioral variation. To answer my questions, I collected túngara frogs from two distinct field locations near STRI facilities and then conducted a series of repeated measures mate choice experiments on each female to determine how consistently she exhibited preferences for male calls. I also obtained a genetic sample from each individual.



Kelsey at the University of Texas, Austin processing túngara samples for ddRAD Sequencing.



Kelsey and Laurie amazed by the high-tech lab equipment at UT Austin.

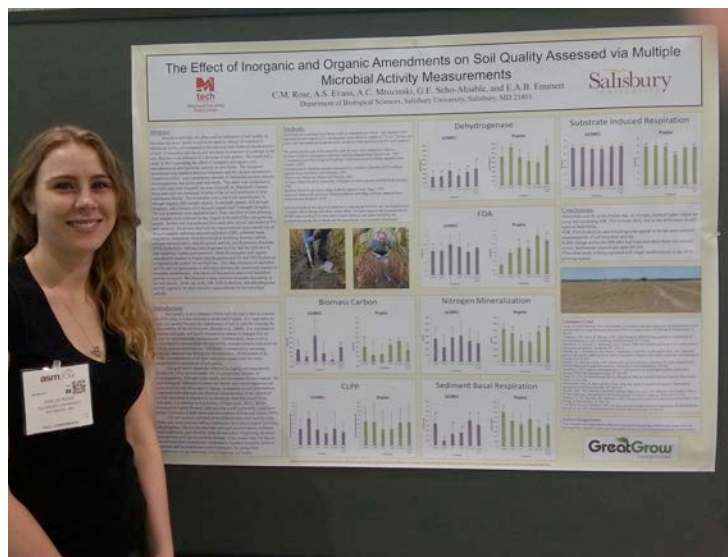
Thus far, my data is really exciting! Individual female túngara preferences have never been examined using as many repeated measures as my experimental design. This design elucidated distinct differences among individual female's preferences. Females that chose a call consistently in one experiment also chose consistently in their second experiment and vice versa for females that chose inconsistently. This correlation suggests that differences among individual females account for more variation in response than experimental contexts. From a genetic perspective, information from microsatellite markers shows that the females I tested share a homogenous genetic structure. No patterns arise between genetic and behavioral variability and there are no differences between the two populations I sampled. However, these results are based on only three microsatellite loci so my ability to identify differences among individuals and populations is quite limited. Instead, our team is turning to next generation sequencing techniques, specifically ddRAD sequencing, to develop a library of hundreds to thousands of SNP-based genetic markers. This cutting edge technique, which has never been used on the túngara system, drastically increases our ability to understand the role of genetics and individual differences in behavior. As I finish this article I am sitting in the Ryan Lab in Austin, Texas preparing túngara samples for final analysis with the help of SU senior Laurie Adler. For an update on ddRAD Sequencing and more interesting results check out my thesis defense, coming to a seminar near you in April!

Kelsey Mitchell
Salisbury University Graduate Student

CONFERENCES, MEETINGS AND PRESENTATIONS

Chelsi Rose and Dr. Elizabeth Emmert attended the American Society for Microbiology Meeting in May in Boston, MA. Chelsi was the presenting author, **Amanda Evans** and **Gloria Seho-Ahiabile** were May 2014 graduates and **Abigayle Mrozinski** continued her research on the project this past summer as a Guerrieri Summer Research student.

Poster title: "The effect of inorganic and organic amendments on soil quality assessed via multiple microbial activity measurements." **Authors C.M. Rose, A.S. Evans, G.E. Seho-Ahiabile, A.C. Mrozinski, E.A.B. Emmert.**



Drs. Sam Galeta, Chris Briand, Chelsi Rose and Elizabeth Emmert (shown right) went to the International Annual Meeting of these three societies: American Society of Agronomy, Crop Science Society of America, and Soil Science Society of America. The three societies come together for a joint annual meeting. It was held Nov 2-5, 2014, in Long Beach, CA.

Poster title: "The Effect of an Organic Soil Amendment on Soil Microbial Activity and Corn Performance." **Authors: Chelsi Rose, Elizabeth A. B. Emmert, Chris Briand, Robert J. Kratochvil, and Samuel Geleta.**

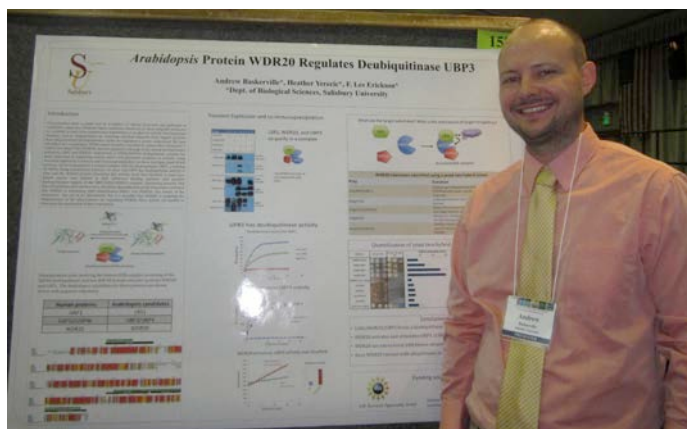


Dr. Kim Quillin attended three events in Minneapolis, MN:

- CourseSource writing workshop. She submitted a manuscript entitled *Helping students to overcome STUMPS: Scientific Terms Undermined by Meanings Peripheral to Science*
- Statistics Workshop: *Making Sense of Regressions with Student Outcome Data*
- SABER conference: The Society for the Advancement of Science Education Research

CONFERENCES, MEETINGS AND PRESENTATIONS cont.

Both SU's Chemistry and Biological Sciences Departments were well represented at the 17th Annual Undergraduate Research Symposium in the Chemical and Biological Sciences at UMBC on Saturday, October 25th. Erickson lab members **Heather Yerecic** (shown below left), who won second place in her Biological Sciences session, and **Andrew Baskerville** (shown below right) presented posters, while **Andrea Korell** also attended. **Sarah Gregory** and **Stephanos Gozali**, members of **Dr. Dewald's** laboratory, won first and second prizes, respectively. They were supported by co-author Mark Culver. **Drs. Patti Erickson and Gene Williams** served as judges for the poster competition.



PUBLICATIONS

Christopher H. Brian, D. W. Schwilk, S. Gauthier, and Y. Bergeron. 2014. Does fire regime influence life history traits of jack pine in the southern boreal forest of Québec, Canada? *Plant Ecology*:1-8.

Kumudini A. Munasinghe, Jurgen G. Schwarz and Anthony K. Nyame. 2014. Chicken collagen from low market value by products as an alternate source. *Journal of Food Processing*. 1:1-6.

PUBLICATIONS cont.

Ellen Lawler and Sarah Rubin. 2014. “A Dissertation on Swallows” with comments on their migration by the eighteenth-century Maryland naturalist, Henry Callister. *Archives of Natural History* 41: 280–293.

ABSTRACT: In 1761, Maryland merchant and amateur naturalist, Henry Callister wrote “A Dissertation on Swallows” in response to five questions posed by a Dr. Chandler. His accounts of eight Maryland species include accurate descriptions of behaviour as well as external anatomy. His brief description of the tree swallow (*Tachycineta bicolor*) may be one of the earliest accounts of this species. On the disappearance of swallows in winter, a topic of debate in the eighteenth century, Callister cited a number of reasons why he concluded that migration rather than hibernation was the explanation for this phenomenon. He noted differences in the habits of similar species in America and Europe and commented on the use of chimneys for nesting by chimney swifts (*Chaetura pelagica*), and the fact that some birds incorporated human-made fibres in their nests. These observations led him to conclude that, similar to humans, non-human species are capable of adapting to their environment, an idea remarkably advanced for his time. There is no evidence that Callister’s dissertation reached its intended destination which may have been Reverend Dr. Samuel Chandler, a Fellow of the Royal Society of London at that time. But this document demonstrates that Henry Callister was an enthusiastic and perceptive observer of nature and that he had the ability to use his observations to develop general concepts and a deeper understanding of the world around him.

ALUMNI NEWS

Below are some pictures from our Alumni Meet and Greet during the Homecoming Barbeque.





If you have announcements to add or general comments regarding the Newsletter, please email dlprice@salisbury.edu.

Editor: Dr. Dana L. Price; **Coeditor:** Dr. Ronald Gutberlet