Dual Degree major **Adam Dunn** worked with Amphipoda this summer at the National Museum of Natural History in Washington, DC. More about Adam’s work and summer research on page 13.

Shown right: *Hyperia sp.* (Photo by Adam Dunn)

**ANNOUNCEMENTS AND AWARDS**

**Dr. Ryan Taylor** (shown right with his lab) received the Outstanding Research Mentor Award for 2012-2013 at the SUSRC in April.

**Ryan J. Protzko** is the winner of the **C.E. McClung Award** for the best research paper published in *BIOS*, vol. 83. The C.E. McClung Award is presented each year to the Tribetan who wrote the most outstanding research paper published in *BIOS* for that year. The award consists of $150 and an inscribed plaque for the Lambda Psi Chapter at Salisbury University. The award is named in honor of Dr. C.E. McClung, second president of Beta Beta Beta, who was a strong advocate of undergraduate research as a teaching method.

BIOLOGICAL SCIENCES MEET AND GREET

On Saturday, October 12th (Homecoming Weekend) we will be having our Biological Sciences Alumni Meet and Greet at the Wildfowl Expo at the Ward Museum – 10:00 am to noon. Join the Biology faculty, staff and alumni for a morning of conversation and friendship while enjoying the many activities of the Chesapeake Wildfowl Expo at the Ward Museum, Salisbury (close to the SU campus). For more details please see the home pages for the Department of Biological Sciences (http://www.salisbury.edu/biology/) and the Ward Museum (http://www.wardmuseum.org/SpecialEvents/WildfowlExpo/tabid/116/Default.aspx).

BIOLOGICAL TRAVEL AND RESEARCH FUND

The Department of Biological Sciences is very appreciative to those who contributed to our Biological Travel and Research Fund. To date we have raised approximately $3000.00 for students to attend scientific conferences and workshops. This is a wonderful opportunity for students to present their research findings, meet possible employers and other scientists in related fields of interest.

If you would like to contribute to this campaign in the future you can do so during the upcoming alumni phonathon.

We at SU have always put our students first and we appreciate your support in this effort.

Stephen C. Gehnrich, Chair
Biological Sciences

OPPORTUNITIES

Winter Term 2014 in Costa Rica
There are still a few spots open for the Winter 2014 class The Economics of Biodiversity in sunny warm Costa Rica. This is a fantastic opportunity to study biodiversity in one of the most beautiful regions of the world. Students will spend two days at SU for orientation and then travel to Costa Rica for ten days of exploration while earning three college credits. The course is open to all majors. Registration and deposit are due by the end of September. For details visit the International Studies website:

(http://www.salisbury.edu/intled/StudyAbroad/programs/single.asp?pid=231)
Mary Roman Gunther - mrgunther@salisbury.edu
Dr. Eric Liebgold - ebliebgold@salisbury.edu
OPPORTUNITIES cont.

American Lung Association: Senior Research Training Fellowships
Web Site: http://www.lung.org/finding-cures/grant-opportunities/grant-offerings.html
Approximately 8–10 grants are available to support the training of MDs and PhDs seeking further academic training as scientific investigators with the goal of pursuing a career in pulmonary medicine and lung biology research. Deadline: 11/12/2013

American Society for Pharmacology and Experimental Therapeutics: Drug Discovery and Development Young Investigator Award
Web Site: http://www.aspet.org/awards/, Program URL: http://www.aspet.org/awards/DDD/
The American Society for Pharmacology and Experimental Therapeutics (ASPET) give an award to a young scientist (student, postdoctoral) for the best abstract submitted to Experimental Biology. Applicants must be members of ASPET in good standing to access the application form. Applicants do not need to hold a PhD or MD. Deadline: 11/13/2013

Smithsonian Institution: SERC Internship Program in Environmental Studies
Web Site: http://www.serc.si.edu/pro_training/internships/internships.aspx
The Smithsonian Environmental Research Center's (SERC) Internship Program offers undergraduate and beginning graduate students a unique opportunity to gain hands-on experience in the fields of environmental research and education. This program enables students to work on specific projects under the direction of SERC's professional staff and is tailored to provide the maximum educational benefit to each participant. Deadline(s): 11/15/2013, 02/01/2014, 06/01/2014

Society for Experimental Biology and Medicine: Young Investigator Award at Annual Experimental Biology Meeting
Up to 8 grants of $500 each will be awarded to undergraduate/graduate students and/or individuals within 5 years of receiving doctoral degrees who are regular, associate or student members of SEBM who have paid current dues. Deadline: 12/13/2013

Marine Biological Laboratory: Nikon Fellowship
Web Site: http://hermes.mbl.edu/research/summer/awards_general.html
Program URL: http://hermes.mbl.edu/research/summer/steps.html
A summer fellowship at the Marine Biological Laboratory is available to a young investigator for research in an area of biology in which they can make extensive use of advanced microscopy or micro-manipulation systems provided by Nikon, Inc., and also benefit from technical expertise offered by Nikon to support these instruments. Deadline: 12/15/2013

American Society for Engineering Education: National Defense Science and Engineering Graduate Fellowships
Web Site: https://ndseg.asee.org/about_ndseg;
Program URL: https://ndseg.asee.org/application_instructions
The NDSEG Fellowship is a highly competitive, portable fellowship that is awarded to U.S. citizens and nationals who intend to pursue a doctoral degree in one of fifteen supported disciplines. Deadline: 12/20/2013. DEADLINE NOTE: Applicants must sit for a GRE examination by November 2, 2013 to meet the NDSEG's application deadline of December 20, 2013 5:00 PM EST.
FEATURED FACULTY

DR. ELIZABETH EMMERT

Courses taught at SU:  Biology: Concepts and Methods (BIOL 210), Microbiology (BIOL 211), Immunology (BIOL 333), Environmental Microbiology (BIOL 433/533), Research in Biology (BIOL 415/416/515), Senior Seminar (BIOL 418), Readings in Biology (BIOL 420)

Research Interests:  I am broadly interested in the interactions of bacteria with their environment. My PhD research was in a plant pathology lab and focused on the bacterium, Bacillus cereus, which has the ability to protect plants from oomycete pathogens. At SU I have investigated the predatory bacterium Bdellovibrio bacteriovorus, which is unique among bacteria in that it can only grow inside other prey bacteria. Initially my research students and I examined its ability to preferentially prey on some bacteria over others. More recently we investigated the use of Bdellovibrio as a therapeutic agent to control Gram negative bacterial infections in the nematode, Caenorhabditis elegans. Since Bdellovibrio lyses its prey bacteria as it multiplies, many have suggested it may see future use as an alternative to antibiotics. Indeed, we determined that Bdellovibrio has the ability to protect C. elegans nematodes from E. coli and Salmonella infections.

Current Research:  Along with Drs. Geleta and Briand, I have been a recipient of a grant to investigate the effect of the GreatGrow soil amendment on corn yield and soil quality (see the April 2013 newsletter). My lab is examining the effect of GreatGrow on soil microbial activity. The project does not involve culturing of microbes in the soil, but rather analyzing the bulk activities of the microbes in the soil through a variety of tests such as microbial biomass carbon, sediment basal respiration, substrate-induced respiration, fluorescein diacetate hydrolysis, dehydrogenase activity, nitrogen mineralization, and community level physiological profiling. In August we sampled soil from both of our corn field plots and we are currently analyzing the activities of the microbes in the soil. From these measurements we should be able to determine what effect GreatGrow has on the soil microbial community compared to untreated soil as well as conventionally fertilized soils.

Graduate student Chelsi Rose is supported with a Graduate Assistantship through the GreatGrow grant.

Photo by Heather Wilson (www.captureaglimpse.com)
**Other Interests:** In 2011–12, I chaired an American Society for Microbiology (ASM) committee to develop biosafety guidelines for teaching labs using microorganisms. This year-long effort involved many discussions and consultations with biosafety experts, CDC and Health Canada officials, and other microbiologists. It was time consuming, interesting, and very gratifying work, which resulted in the publication of biosafety guidelines in 2013.

**Outside of SU:** I am married to Dr. Jeffrey Emmert in the physics department and we have three children. In addition to the satisfaction of working at SU, I also thoroughly enjoy hanging out with my kids. In my leisure time I enjoy reading and baking. You can also find me playing clarinet with the Salisbury Community Band in the summertime.

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**Recent Publication:**


**Recent Presentations:**


GUERRIERI UNDERGRADUATE SUMMER RESEARCH PROGRAM

Left to Right: Brady Travis, Matt Bowler, Dr. Ron Gutberlet, and Joey Gutkoska

Graduate student Jackie Darrow worked with Matt Bowler and Dr. Ron Gutberlet to examine populations of the Carpenter frog *Lithobates virgatipes*. The carpenter frog (*Lithobates virgatipes*) is a “Watchlist” species in Maryland and is due for population status reassessment. During this study, in collaboration with Scott Smith of the Maryland Department of Natural Resources, Jackie Darrow and Matt Bowler (shown below) revisited all known carpenter frog localities to determine if populations persist at these sites. Habitat variables, including surface water pH, canopy cover, hydroperiod, and vegetation structure, were measured at each site. These variables will be used to build a prediction model that in conjunction with GIS tools may help identify additional carpenter frog localities. Phylogeographic analysis will then be used to identify the degree of genetic variation among carpenter frog populations and to address questions about Delmarva biogeography.
Brady Travis, Joseph Gutkoska and Dr. Ron Gutberlet worked with Marshall Boyd to help conduct his graduate field research on forest interior dwelling bird species. Sample points from Robbins et al. (1989) on the Lower Delmarva Peninsula were resurveyed using the same methods as the original study to understand changes in bird populations and their habitats. The research team put in many early hours in the field, but Joey and Brady also completed projects individually under the supervision of Dr. Gutberlet. Brady assessed change using the Maryland Breeding Bird Atlases while Joey evaluated data from eBird; both data sets were combined with Marshall’s project to study the trends in forest bird populations throughout the last 30 years. Many of the once forested points resurveyed in the study have been altered directly by agriculture and residential development or indirectly by sea level rise and invasive species; some points, on the other hand, have been virtually unaffected by humans in 30 years.
Drs. Eric Liebgold and Tami Ransom worked with Jared Lausen on a project titled: “Factors that affect Body Weight and Nest Success of Ground-Nesting Birds”

We were looking for a correlation between the decline in species such as the Ovenbird and Worm-eating Warbler and the presence of invasive earthworm species. Earthworms that had been introduced to areas where they did not historically occur have been shown to alter the makeup of the forest floor and leaf litter, having a negative effect on ground-nesting bird species. Similar studies had not been conducted where there were populations of native earthworms, and we were seeking a possible relationship between invasive vs. native species, or the presence of earthworms in general compared to areas with very low to no earthworm population.
Kaitlyn Mitchell and Joseph Restein worked with graduate student Mallory Hagadorn and Dr. Dana Price on a project titled: “Dung Beetles on Organic and Conventionally Managed Farms.”

*Left to right: Kaitlyn Mitchell, Dr. Dana Price, Mallory Hagadorn, and Joseph Restein*

They examined dung beetle assemblages on sixteen (10 beef and 6 dairy) organic and conventionally managed cattle pastures throughout Maryland. Data collected will allow them to create a fact sheet that will be distributed to farm managers enabling them to analyze their own pastureland health. In addition, they collected *Onthophagus taurus* individuals from 28 farms throughout Maryland to examine their gut microbiota. The ultimate goal is to determine if *O. taurus* has a core set of endosymbionts in populations throughout the state.
Drs. Hunter and Taylor’s lab group worked on a project titled:
Genotypic variation among *Pseudacris crucifer* populations: a behavioral genetics approach

*Left to right:* Austin Bryant, Christina Bell, Dr. Kimberly Hunter, and Nicholas Egan

*Amanda Biederman* (shown below) worked with *Dr. Gene Williams*, Junior Mondstein, Anna Schurschkow, and Andrea Korell on a project titled: “LDH Activity Shifts with Temperature in *Fundulus heteroclitus*”

This summer, we studied how enzyme activity changes with temperature in the killifish, *Fundulus heteroclitus*. We tested lactate dehydrogenase in muscle and liver in fish that had been subjected to different temperature conditions in the laboratory. Because LDH plays a critical role in anaerobic respiration, we predict how the species might respond metabolically to rising global temperatures in the future.
SUMMER TRAVEL AND RESEARCH

Experimental Biology Conference
Sean James (Biology, ’12) and Dr. Patti Erickson braved the Boston bomber manhunt to attend the annual meeting of the American Society for Biochemistry and Molecular Biology (ASBMB) at the Experimental Biology conference in Boston, MA this April 19-25th. Sean competed with more than 250 other students in the 17th Annual Undergraduate Research Poster Competition, followed by another presentation of his poster during the general conference session. His poster, entitled “Identifying interaction partners of the Arabidopsis thaliana deubiquitinase-associated WD40-repeat proteins LRS1 and WDR20,” attracted the attention of ubiquitin specialist Dr. David Komander, from Cambridge University, who spoke with Sean at length about his results.

Sean also had the exciting experiences of meeting two Nobel Laureates: Linda Buck and Craig Mello (above right). Dr. Buck discovered the olfactory sensing receptors, and Dr. Mello elucidated the mechanism of RNA interference (RNAi) gene silencing. Meeting Dr. Mello was particularly meaningful since Sean had spent the fall semester using RNAi to ‘knock down’ the homologs of the LRS1 and WDR20 genes in C. elegans, the same nematode worm studied by Mello. The outstanding science, set in a city reeling from tragedy, made for a most memorable meeting. Sean is currently adjusting to his new role as a PhD student in the Molecular Plant Sciences program at Virginia Tech.

ASBMB UAN chapter and journal club
Our (American Society for Biochemistry and Molecular Biology Undergraduate Affiliate Newtork) (https://www.asbmb.org/page.aspx?id=114) chapter will be hosting a weekly journal club, as well as planning other activities, again this semester. If you are interested in joining the discussions or have a great idea about a potential topic or paper, contact Zach Rathbun (zr76126@gulls.salisbury.edu), the group’s president. If you would like to benefit from membership in the chapter, contact Dr. Patti Erickson (pterickson@salisbury.edu), since the chapter will be renewed at the end of October.
Graduate Student Teaches a Course in California
Krispen Laird taught marine biology for three weeks at Mid-Peninsula High School in Menlo Park, CA. Krispen has had experience teaching field marine courses in the Bahamas and at Catalina Island, CA.

Laurie Adler had an internship in Florida where her work on a beached pygmy sperm whale was in The Palm Beach Post newspaper.

Graduate Student Kristin Zuravnsky was a co-director of the Guerrieri Summer Research Program at SU for the second consecutive summer. Thirty undergraduate researchers participated in the program this summer. They presented lunch seminars, participated in fun activities, toured Wallops Island NASA Facility, and presented their work in a poster session at the end of the summer. Kristin began undergraduate research in this program and she will be completing her MS this semester. Her thesis seminar is scheduled for October 17!

Katelyn Blondino did two internships on Maternal Fetal Medicine (genetic counseling) in Annapolis and Baltimore.

Paige Brown worked in an animal hospital during the summer of 2013.
This past summer **Lyle Cook** (Dual Degree Major) coordinated the Wicomico Creekwatchers student volunteers, and worked at UMES on a Photo Bioreactor team. Our team focused on the ecological engineering behind a photo bioreactor and the uses cultured algae would provide for the environment.

The algae has mainly been used for nitrogen recycling, and is planned to be used for bio diesel, charred fertilizer, and other algal bio products. We also performed experiments filtering certain undesired portions of the light spectrum to maximize the growth of algae effectively and in an environmentally friendly way. We also ran a Summer Institute that welcomed professors and teachers from other schools to come and learn basic methods of our research to teach and present at their schools to spread awareness of green energy and green bio product production.

Dual Degree major **Adam Dunn** (shown right) worked this summer under Karen J. Osborn, Ph.D. in the Smithsonian National Museum of Natural History, Department of Invertebrate Zoology. He was fascinated by his work as he updated taxonomic, morphological, and geographic data on the known 260+ species of Amphipoda of the suborder Hyperiidea, gathered specimens from the Museum Support Center to make dorsal and wet mounts for each available species (most notably Holotypes and Allotypes), edited photographs of each species available, and created webpages for each species which were then uploaded to the Encyclopedia of Life website.

Adam said, “I worked, and HAD A BLAST meeting people and opening myself up to further research ideas based on my education here at Salisbury.”
Field Work in Gamboa, Panama on Túngara Frogs

Graduate students, Kyle Wilhite and Kelsey Mitchell (shown below) spent almost three months at the Smithsonian Tropical Research Institute in Panama studying the túngara frog (*Physalaemus pustulosus*). Kyle and Kelsey worked on a nocturnal schedule with their field work beginning at 7:00PM and ending around 5:00AM. They collected túngara frogs at two sites and then conducted behavioral phonotaxis on females in a sound chamber. Some of their experiments involved a robotic frog to address fundamental questions about female mate choice and sexual selection. In addition to the phonotaxis experiments, Kelsey extracted DNA from amplexed pairs. The DNA was brought back to SU to begin microsatellite analysis. Kyle and Kelsey both have a component of their master’s thesis that involves the data collected. Another graduate student in the lab, Krispen Laird (bottom right), worked hours on preparing catheters to act as vocal sacs in the robofrog. Their advisors Ryan Taylor and Kim Hunter (bottom left) also spent a month conducting research in Panama.
Dr. Eric Liebgold presented at the International Congress for Conservation Biology in Baltimore, July 2013. His research was titled “The effects of heterozygosity on growth & territory size in a salamander with limited dispersal" which included the work of 3 undergraduates including Christian Kramer and Gina Sorce, who graduated SU in the spring. Authors: Eric B. Liebgold, Christian F. Kramer, Tamar C. Roomian, Gina M. Sorce, and Paul R. Cabe.

Dr. Les Erickson presented a research poster at the annual conference of the Mid-Atlantic Plant Molecular Biology Society in August held in Laurel, MD. Title: Lateral Root Stimulator 1 functions in a Deubiquitinase Complex

Drs. Mark Holland and Les Erickson and graduate students Anna Miller and Stephen Kelly attended the 14th Plant Biology Symposium at the University of Maryland, College Park on May 23, 2013. Dr. Erickson gave a talk on his sabbatical research titled LRS1, WDR20, and UBP3 function in a Deubiquitinase Complex in Arabidopsis.

Society for the Advancement of Biology Education Research (SABER)
In July, Dr. Kim Quillin presented a poster at the 3rd annual meeting of SABER in Minneapolis, MN. This relatively new conference creates a much-needed forum for the rapidly growing field of Biology Education Research. You can check out abstracts from the meeting and other info at http://saber-biologyeducationresearch.wikispaces.com/
Taylor/Hunter Lab Attended the Animal Behavior Society Meeting in Boulder, CO
Graduate students Kyle Wilhite, Kelsey Mitchell and Krispen Laird presented a poster at the ABS Meeting. Title: “Geographic call variation, mate choice and genetic influence in the spring peeper, *Pseudacris crucifer*.”

Ryan Taylor presented a talk with co-author Mike Ryan from the University of Texas. Title: “Non-linear interactions among multimodal signal components result in perceptual rescue”

**PUBLICATIONS**

**Nelson** Dyer (Biology graduate May 2012) published a paper in the Coleopterists Bulletin.


**Dr. Kim Quillin published a letter to the journal Science.**


**You’re an animal!**

As biology majors know, our species represents one tiny twig on the tree of life, located within the animal branch of eukaryotes. Humans are animals. Yet “humans and animals” language slips into the scientific literature regularly, creating the impression that humans and animals are separate groups. Kim Quillin argued in a letter to the journal *Science* in June that we should take care to avoid “humans and animals” language because:

1. It undermines the concept that is fundamental to all of biology—evolution.
2. It propagates an old misconception. The learning literature shows that once such misconceptions are entrenched, they are very difficult to dislodge.
3. A sustainable future relies on a “humans are animals” point of view of the world, where humans are members of complex ecosystems.
Dr. Ryan Taylor published a paper in the journal Science. The paper was selected to be published in Science Express on June 6, 2013. The full paper was published in July on Dr. Taylor’s birthday. The best birthday present, ever!!


Abstract: Sexual signals are often complex and perceived by multiple senses. How animals integrate signal components across sensory modalities can influence signal evolution. Here we show that two relatively unattractive signals that are perceived acoustically and visually can be combined in a pattern to form a signal that is attractive to female túngara frogs. Such unanticipated perceptual effects suggest that the evolution of complex signals can occur by alteration of the relationships among already-existing traits.

ALUMNI NEWS

Lauren (Leonard) Abell (May 2009 graduate) recently received her D.V.M. from the Virginia Maryland Veterinary School. Lauren was class valedictorian and will be practicing at Atlantic Veterinary Services in Berlin.

Michelle Rhodes (May 2013 graduate) has been accepted into the physician assistant program at Eastern Virginia Medical School.

Allison Ross graduated from Duke University Physician Assistant Program (5/12/13 and 8/9/13), has taken and passed the PANCE to become a Certified Physician Assistant (PA-C), received her NC Medical License, accepted a job in Raleigh, NC, and is currently waiting on her DEA license. She'll be working in psychiatry and family medicine. Throughout this journey, she has been “grateful for my time, education, and experiences at Salisbury University. While I enjoyed the PA program at Duke, I am so thankful that I chose to go to Salisbury University a smaller, but student-focused university for undergrad.”
Lauren Brenneman (May 2010 Dual Degree graduate) recently graduated from the Baltimore County Fire-Rescue Academy. Right: Lauren in full gear.

Aisha Ullah (above left) was accepted to WVU School of Medicine. Sarah Ullah (above right) recently graduated from the University of Maryland School of Medicine and is starting her ophthalmology residency at Penn State College of Medicine. This picture was taken at the "oath of integrity ceremony" for the class of 2017 at WVU School of Medicine.

Above left to right: Sarah Ullah, Skyler Lentz (now a resident in emergency medicine at Chapel Hill), and Pat Fadden.

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

Editor: Dr. Dana Price
Coeditor: Dr. Ronald Gutberlet