PLEASE DO NOT PRINT THIS.

SCIENCE



Dr. Ryan Taylor has published a second paper in SCIENCE. See page 13 for more information.

Halfwerk, W., Jones, P. L., Taylor, R. C., Ryan, M. J., and Page, R. A. 2014. Risky Ripples Allow Bats and Frogs to Eavesdrop on a Multisensory Sexual Display. Science 343(6169): 413–416.

http://www.sciencemag.org/

ANNOUNCEMENTS

Ann Ascot, senior biology major, has been accepted for admission to the College of Veterinary Medicine at Ohio State University for the fall of 2014.

Krystal Donaldson, senior biology major, has been accepted into the University of Maryland School of Dentistry for the fall of 2014. Krystal was also awarded a \$5,000 recruitment scholarship for the 2014-2015 academic year, which is renewable yearly based on certain stipulations.

Laura Hopkins was accepted into the Virginia-Maryland Regional College of Veterinary Medicine for fall 2014. She completed an Associate of Applied Science degree in Veterinary Medicine from Delaware Technical and Community College in May 2012, and then took several other general education classes at Wor-Wic Community College before transferring to Salisbury University as a Biology major in the Spring of 2013. She is currently a junior at SU.

Syeda Jaffrey, senior biology major, has been accepted into both MidWestern and Case Western for Dentistry.

Dana Short, senior biology major, has been accepted into the Dentistry program at Temple University.

Zach Rathbun, senior biology major, has been accepted into both UPenn and Cornell for veterinary Medicine.

ANNOUNCEMENTS cont.

Salisbury University Student Research Conference

The Salisbury University Student Research Conference (SUSRC) committee announces the SUSRC on Friday, April 25, 2014. Presentations are organized into themed sessions, ranging from molecular biology to music composition, from education to economics. The conference culminates in a poster reception where the Outstanding Research Mentor Award is presented to a faculty member for excellence in guiding student research. The submission process involves three required steps: (1) the deadline for a student to submit her or his intent to present is March 15, (2) the faculty mentor must approve the student's work, and (3) the deadline to submit final abstracts is Tuesday, April 1, 2014, by midnight. The conference is free and the public is invited. For more information visit http://www.salisbury.edu/susrc

SALISBURY UNIVERSITY STUDENT RESEARCH CONFERENCE



ANNOUNCEMENTS cont.

Call for Volunteers: Science Olympiad

Volunteers are needed for the upcoming Eastern Shore Regional Tournament of the Maryland Science Olympiad, which will take place on Saturday, March 8th at Salisbury University. I need volunteers from 6:30 AM–6:30 PM. If you need service/volunteer hours, this is the perfect opportunity to earn them (You don't have to work the whole 12 hours unless you want to—I can use people for as little as an hour)! All volunteers will also receive a t-shirt and meals (breakfast and/or lunch, depending on when they are volunteering) and have the opportunity to network with people from local employers such as NASA Wallops Flight Facility and Orbital Sciences.

Information about the tournament may be found at

http://www.salisbury.edu/henson/stem/scienceolympiad_judging.html — there is a list of events that tells a little about each event, a full event schedule, and a page where you can see who has signed up for particular events. If there is an event you are interested in judging, I will send you the full rules for that event; don't worry about set-up or materials, or where the tests will come from — for the most part, the set-up will be done for you (with a few small exceptions), and if there is a test for the event, I will provide it to you the day of the tournament.

If judging an event isn't your thing, there are a *ton* of other things I need help with that day. From helping with registration to making sure people know where they're going, if you'd like to help out, I can find something for you to do!

If you are interested in volunteering, or have any questions, please contact **Kristen Paul, SU STEM Coordinator**, at kapaul@salisbury.edu. Please send the following information: Timeframe you would like to work, event(s) you are interested in judging (if applicable – if you have no preference, just say "No preference"), t-shirt size, and whether you have an SU meal plan.

Women in Technology Event

SU and NetApp host Women in Technology Thursday, February 27. This event is designed to provide students with the opportunity to connect with female IT/STEM professionals, learn about tech jobs, and network with like-minded students and professionals. The event is free of charge; there will be a drawing at the end of the event – prizes include an iPad! For more information, please visit http://www.salisbury.edu/henson/stem/Women_in_Technology.html.

SU Undergraduate chapter of the American Society for Biochemistry and Molecular Biology

Students from the fall Contemporary Genetics (Biol440) class, the undergraduate chapter of the American Society for Biochemistry and Molecular Biology, and those interested in research related to Dr. Miriel's research visited Virginia Commonwealth University Medical School in Richmond last November. The group toured the labs of *C. elegans* researchers Drs. Young You and Leon Avery, as well as that of vascular biologist Dr. Paul Ratz, all of whom are professors in the Departments of Biochemistry & Molecular Biology and Pediatrics in the VCU School of Medicine.



From left to right: Amanda Biederman, Patti Erickson, Meagan Jezek, Lylie Hinh, Luke Redden, Zach Rathbun and Mike Robben.

Atlantic Estuarine Research Society Conference Spring 2014

Back to the Future: Ecological Synthesis and Data Integration to Address Current and Emerging Issues in Coastal Science

March 27th - 29th, 2014 Carousel Hotel Ocean City, MD

The Atlantic Estuarine Research Society (AERS) brings together students, scientists, managers, and educators from the states of DE, MD, NC, NJ, PA, and VA, and Washington, DC to discuss estuarine and coastal environmental issues and policies.

The Spring 2014 AERS meeting's synthesis theme is focused on a synoptic approach to estuarine data infrastructures/integration. This society is extremely student-friendly, and the conference is a great way to meet scientists from around the region and beyond. Presentations on any subject related to estuaries are invited.

Students interested in attending can join AERS (\$10), and find registration (\$20 cheaper for members) and abstract submission information at their website, www.aers.info.

If you have any questions, contact the local host, Dr. Judith Stribling (jmstribling@salisbury.edu).





FEB. **22**

9:30

CONTINENTAL BREAKFAST & LUNCH!

GUEST PRESENTER
ELION MADDOX JR, DDS

LOCATION
HENSON LOBBY

ADMISSION IS

FREE FOR USNDA ACTIVE MEMBERS

\$5 FOR NON-MEMBERS

SPONSORED BY

UNDERGRADUATE STUDENT NATIONAL DENTAL ASSOCIATION (USNDA) STUDENT NATIONAL DENTAL ASSOCIATION (SNDA) AT UMSOD THE HEALTH PROFESSION ADVISING PROGRAM (HPAP)

February 2014 Newsletter

ANNOUNCEMENTS cont.

Taylor/Hunter Labs officially merge

Drs. Taylor and Hunter have long shared similar interests in ecology and evolutionary biology and each has developed their own approach to solving problems in biology (Taylor-behavior/bioacoustics and Hunter-population genetics). Contemporary biology increasingly requires an integrated approach, both for advances in knowledge and providing students the skills to be competitive in 21st century science. Currently, our lab is investigating frogs, specifically female mate choice and the intersection of that choice with population genetic dynamics.

Grants submitted by Taylor/Hunter

1) NSF Advancing Informal Science Learning Grant Submitted 1/2014 (\$2.4 million)

Title: Innovations in Development: Animal Behavior Consortium (ABC): Partnerships Connecting Rural Informal Science Centers using a Science Mobile. PIs: Kim Hunter, Ryan Taylor, and Marlyn Barrett. The goals of this proposal are to develop: 1) museum-quality exhibits focusing on animal behavior at Assateague National Seashore, Salisbury Zoo, and Crisfield Library/Janes Island State Park; 2) a science mobile equipped to connect the three science centers including the vacation town of Ocean City, MD; and 3) research focusing on the impact of young scientists and K-12 teachers on STEM learning and interest in science careers in informal settings.

- 2) NSF Division of Integrative Organismal Systems (IOS): Pre-proposal Submitted 1/2014 Title: When signals collide: the role of inter-signal interaction, individual variation, and population genetics in multimodal signaling. PIs: Ryan Taylor (SU), Barrett Klein (University of Wisconsin, Lacrosse), and Kim Hunter (SU). The aim of this proposal is to examine processes that influence the evolution of complex animal communication signals.
- 3) NSF Major Research Instrument (Development): Submitted 1/2014. (\$1.3 million). Title: Developing the next-gen robofrog for research in animal behavior. PIs: Barrett Klein (UW-Lacrosse), Joey Stein (Moey Inc.), and Ryan Taylor (SU). The aim of this proposal is to develop a sophisticated robotic frog system that is programmable and responsive to external stimuli. This system will be shared among seven labs world-wide and employed in experiments designed to elucidate evolutionary processes responsible for shaping complex animal communication signals.

Taylor/Hunter Lab: MS Students Passed Oral Exams during Fall 2013 Kelsey Mitchell Krispen Laird

Louisiana Field Work – January 2014 – Kyle Wilhite, Kelsey Mitchell and Dr. Ryan Taylor spent two weeks in Lafayette, LA studying spring peepers.

February 2014 Newsletter

OPPORTUNITIES

University of Washington, Seattle:

Research Experiences for Undergraduates in Physics

Web Site: http://www.int.washington.edu/REU/index.html;

Program URL: http://www.int.washington.edu/REU/apply14.html

The Research Experiences for Undergraduates (REU) Physics program at the University of Washington in Seattle is a 10-week summer program. All of the major groups in the Department of Physics are participating: astrophysics and cosmology, atomic physics, condensed matter physics, nuclear physics, particle physics, physics education, biological physics, and computational physics. Deadline: 02/28/2014

Boise State University:

NSF-REU Program in Mathematics: Complexity Across Disciplines (CAD)

Program URL: http://math.boisestate.edu/reu/

The program is a nine week summer program in which undergraduate students experience independent research in mathematics motivated by applications to information security or genome biology. The program aims to immerse undergraduate students of diverse backgrounds in all facets of research in mathematics, and in applications to information security or the life sciences in a culture of close and daily collaboration with faculty. The nature of computing and complexity is the central unifying focus of the program. Deadline: 03/01/2014

Boston Foundation: Research Experience for Undergraduates: Fundamental Research in Chemistry Addressing Problems in Biology

Program URL: http://chemhelp.bu.edu/reu/

The Research Experiences for Undergraduates (REU) program supports active research participation by undergraduate students in any of the areas of research funded by the National Science Foundation. REU projects involve students in meaningful ways in ongoing research programs or in research projects specifically designed for the REU program. This solicitation features two mechanisms for support of student research: REU Sites are based on independent proposals to initiate and conduct projects that engage a number of students in research. REU Sites may be based in a single discipline or academic department or may offer interdisciplinary or multi-department research opportunities with a coherent intellectual theme. Proposals with an international dimension are welcome; and REU Supplements may be included as a component of proposals for new or renewal NSF grants or cooperative agreements or may be requested for ongoing NSF-funded research projects. Deadline: 03/01/2014

University of Kentucky:

Summer Program in the Biochemical Sciences

Web Site: http://biochemistry.med.uky.edu/nsf-reu-site-summer-program-biochemical-sciences;

Program URL: http://biochemistry.med.uky.edu/applying-nsf-reu

This REU Site Program is targeted at undergraduates who are residents of Appalachia and/or underrepresented minorities. Applicants should be majoring in biochemistry, chemistry, biology or a related subject, and should be seriously considering pursuing a graduate degree and/or career in biochemical research. Deadline: 03/07/2014

February 2014 Newsletter

OPPORTUNITIES cont.

University of Wisconsin-Milwaukee:

Summer Internships in Aquatic Sciences

Web Site: http://home.freshwater.uwm.edu/reu/;

Program URL: http://home.freshwater.uwm.edu/reu/summer-program-announcement/

This research experience program will provide undergraduate students with laboratory and field training in aquatic science (including lake and ocean systems) with extensive shipboard field research opportunities. The goal of this activity is to develop, through hands-on experience, future scholars to pursue Interdisciplinary research toward an understanding of the aquatic environment.

Deadline: 03/10/2014

University of Cincinnati:

National Science Foundation Research Experience for Undergraduates in Sensory Ecology

Web Site: http://www.artsci.uc.edu/departments/biology/undergrad/REU.html

The UC Department of Biological Sciences will host a research experience for undergraduate (REU) program for 10 weeks during the Summer of 2014 with a focus on sensory ecology. Deadline: 03/15/2014

American Society of Naturalists:

Sewall Wright Award

Web Site: http://www.asnamnat.org/awards;

Program URL: http://www.asnamnat.org/awards#Wright

The Sewall Wright Award is given annually and honors a senior but still active investigator who is making fundamental contributions to the Society's goals, namely, promoting the conceptual unification of the biological sciences.

Brown and Caldwell:

Minority Scholarship

Web Site: http://brownandcaldwell.com

Program URL: http://brownandcaldwell.com/scholarships.asp

The program consists of three elements designed to increase student interest in the environmental profession and to support them in defining career goals. Deadline: 04/15/2014

profession and to support them in defining career goals. Deadline, 04/13/2

Brookhaven National Laboratory:

Science and Engineering Programs for Women and Minorities

Program URL: http://www.bnl.gov/diversity/programs.asp#Science_and_Engineering

The sponsor provides as internship program in which undergraduate women and minority students are employed for ten to twelve weeks during the summer. This on-the-job training program is a paid position. Deadline: 04/30/2014

Bigelow Laboratory for Ocean Sciences:

Maureen D. Keller Undergraduate Scholarship

Web Site: http://www.bigelow.org;

Program URL: http://www.bigelow.org/education/scholarships/

Each year, Bigelow Laboratory for Ocean Sciences awards The Maureen D. Keller Undergraduate Scholarship to a promising Maine student who intends to pursue a Bachelor's degree in the biological or earth sciences. Deadline: 05/23/2014

OPPORTUNITIES cont.

Bermuda Institute of Ocean Sciences: Research Experiences for Undergraduates (REU) Program - Undergraduate Marine & Oceanographic Research Internships in Bermuda

Web Site: http://www.bios.edu/education/reu/

Program URL: http://www.bios.edu/uploads/REU_2014.pdf

The Bermuda Institute of Ocean Sciences has received National Science Foundation (NSF) Research Experiences for Undergraduates (REU) funding to support 8 fellowships for undergraduate student research at BIOS during the fall 2014. Deadline: 05/30/2014

SOME FALL COURSE OFFERINGS

Advanced Cell Biology (Biol 465/565)

Dr. Eugene Williams will be teaching an advanced cell course exploring the biology, physiology, and biochemistry of the cells of eukaryotes. Topics include detailed examinations of organelle function, cell movement, protein turnover, cell adhesion, apoptosis, cell cycle regulation, and the cellular and molecular basis of cancer. The evolution of cells and organelles is also explored. Lectures and discussions are drawn principally from the latest primary literature. Prerequisites: BIOL 350. Three hours lecture each week.

GRANTS AND RESEARCH

Drs. Samuel Geleta, Chris Briand and Elizabeth Emmert recently obtained the Maryland Industrial Partnerships (MIPS) award for their Phase II project "Impact of Soil Amendment GreatGrow on Corn Yield" - \$153,575 in conjunction with GreatGrow Maryland LLC. The grant will fund the second year for MS student Chelsi Rose (see research on page 10).

Photo Right: Dr. Elizabeth Emmert taking soil samples.



GRADUATE STUDENT RESEARCH CHELSI ROSE

I got my Bachelors degree in Biology-Chemistry with a minor in Nanofabrication Manufacturing Technology from Lock Haven University in Pennsylvania. After graduating I got married and moved to Salisbury with my husband, Kyle Rose (area director for Severn, Chester and Choptank halls). After moving here I was accepted into the Masters in Applied Biology program here at SU. My research as a graduate student focuses on the effects that GreatGrow, an organic soil amendment, has on soil microbial activity in comparison to inorganic fertilizer and no fertilizer. My research began spring 2013 when corn was planted at two field sites on the Eastern Shore of Maryland. Samples of soil were collected from both field sites in late August with the assistance of Dr. Elizabeth Emmert and Nicholas Demino. During the fall seven tests were performed on the soil samples, including nitrogen mineralization, dehydrogenase, fluorescein diacetate, sediment basal respiration, substrate induced respiration, community level physiological profiling, and biomass carbon. The combination of all of these tests will allow us to gain an accurate representation of the microbial activity. More importantly it will allow us to determine if microbial activity is enhanced or reduced based on the fertilizer/amendment applied. Three undergraduate students assisted with the lab research: Amanda Evans, Abigayle Mrozinski and Gloria Seho-Ahiable. Each of them performed one of the aforementioned tests on all the soil samples. Currently all of the data has been collected from the first year of samples and is being statistically analyzed to see if there are any significant impacts on microbial activity based on treatment type. This research is funded through a Maryland Industrial Partnerships (MIPS) grant that was obtained by Dr. Sam Geleta, Dr. Chris Briand, and Dr. Elizabeth Emmert. This grant also provides the funding for my coursework through a research assistantship. MIPS has just funded our second year of research that will begin soon. During the summer, after the different fertilizers and soil amendments are applied, soil samples will be collected and analyzed every two weeks to test microbial activity throughout the growing season. I plan to complete my M.S. degree in December 2014 and apply to medical school for fall 2015.



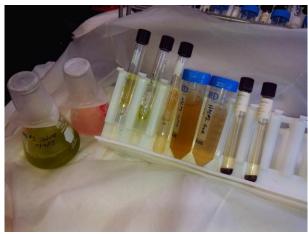
Chelsi and Nick Demino

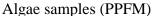


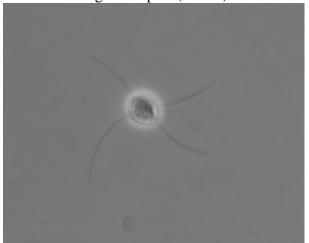
Chelsi on the Combine

GRADUATE STUDENT RESEARCH STEPHEN KELLY

Dr. Holland's research lab studies pink pigmented facultatively methylotrophic bacteria (PPFM), which live symbiotically on plants. PPFM feed on plant metabolic wastes and produce growth regulators and nutrients vital for plant development. One strain of vitamin B12 over-producing PPFM has been previously isolated and several patents have been filed for the use of PPFM in the improvement of plants. My research, funded by a Technology & Economic Development Corporation of Maryland (TEDCO) grant, involves using B12 over-producing PPFM to attempt to improve growth rates and nutritional qualities for unicellular algae used as feedstock and biofuels. Some of the algae strains that I am testing were provided by the oyster hatchery at Horn Point Laboratory where oysters are grown for Chesapeake Bay restoration projects. Other strains were provided by The Culture Collection of Algae at The University of Texas at Austin for their potential use in algal biofuels.







HPL 2 Chaetoceros muelleri x 400 magnification

The enhancement of algal growth rates and nutritional quality could have a great economic impact. The culture of microalgae for aquaculture is valued at more than \$1 billion worldwide, and algae culture is estimated to account for 40% of costs in bivalve hatcheries. Other uses for microalgae include the production of food additives, nutritional supplements, chemical extracts, feedstock, and cosmetics. Extensive research has also been done on algal biofuels. All of these fields could benefit from an increase in algal growth rates, and feedstock algae could be improved by an increase in nutritional quality.

To explore the possibilities of improving algal growth rates and nutritional qualities, I am conducting experiments that track the growth of algae cultures with and without added B12-overproducing PPFM bacteria when grown in standard media formulations. I am also examining the effects of the B12 overproducing PPFM upon algae when grown in media that is not supplemented with B12. Other aspects of my research will include assaying final products for vitamin levels, analysis of cultures for economically important algal nutritional profiles, and DNA identification of PPFM strains used in the experiments and isolated from stock samples.

TRAVEL AND PRESENTATIONS

The Economics of Biodiversity – Winter 2014

Adjunct Instructor Mary Gunther led a class in Costa Rica during Winter term 2014. The focus of the course was the economic impact of ecotourism and the relationship to the country's biodiversity. Activities included hikes and boat trips in national parks, a class on the history of chocolate, zip-lining, kayaking, walks on suspension bridges; a visit to a banana plantation, a hike to view the Continental Divide, a visit to a big cat rescue center and free time on the beach. It was a great learning experience as well as a great deal of fun! **See pictures below.**





PUBLICATIONS

Drs. Samuel Geleta, Chris Briand, Michael Folkoff (Geography and Geosciences) & Brent Zaprowski (Geography) recently had an article accepted to Human Ecology: "Cemeteries as Indicators of Post-settlement Anthropogenic Soil Degradation on the Atlantic Coastal Plain."

Abstract

Over the past ca. 350 years, anthropogenic activities on the Mid-Atlantic Coastal Plain have caused considerable soil erosion and degradation due to deforestation, intensive agriculture, and poor if any soil conservation practices. Early colonial descriptions indicated rich soils suitable for agriculture supported by the rapid deforestation for cultivation. Small, undisturbed family cemeteries on the Lower Eastern Shore of Maryland provided valuable markers for assessing these changes. Continued cultivation around the cemeteries has left many of them as isolated remnant knolls, elevated above the surrounding fields. Four cemetery sites were sampled in Wicomico Co., on Maryland's Lower Eastern Shore. Topographic data for the four sites was collected using a laser-guided total station and 3-D topographic models were generated. Composite soil samples were collected from each cemetery and two locations in the adjoining field. The physical and chemical properties indicated that the cemeteries were left in situ largely undisturbed by human activities for a prolonged period. The fields surrounding the cemeteries, however, exhibited 0.43 to 0.52 m of surface soil depletion, lower organic matter, soil carbon, total nitrogen, but higher level of cations such as Ca and K, the result of liming and fertilization. Our results were consistent with our hypothesis that land clearance and farming practices have considerably eroded and altered the chemistry and structure of soils on the Lower Eastern Shore of Maryland.

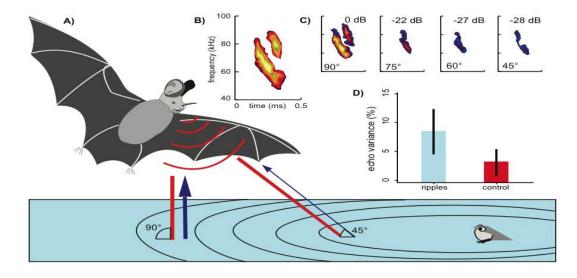
PUBLICATIONS cont.

Dr. Ryan Taylor recently had a second paper published in SCIENCE.

Halfwerk, W., Jones, P. L., Taylor, R. C., Ryan, M. J., and Page, R. A. 2014. Risky Ripples Allow Bats and Frogs to Eavesdrop on a Multisensory Sexual Display. Science 343(6169): 413–416. (http://www.sciencemag.org/content/343/6169/413.short)

Abstract

Animal displays are often perceived by intended and unintended receivers in more than one sensory system. In addition, cues that are an incidental consequence of signal production can also be perceived by different receivers, even when the receivers use different sensory systems to perceive them. Here we show that the vocal responses of male túngara frogs (*Physalaemus pustulosus*) increase twofold when callinduced water ripples are added to the acoustic component of a rival's call. Hunting bats (*Trachops cirrhosus*) can echolocate this signal by-product and prefer to attack model frogs when ripples are added to the acoustic component of the call. This study illustrates how the perception of a signal by-product by intended and unintended receivers through different sensory systems generates both costs and benefits for the signaler.



Halfwerk, W., Dixon, M., Ottens, K., **Taylor, R.C.** Ryan, M.J., Page, R.A., & P.L. Jones. Risks of multimodal signalling: bat predators attend to dynamic motion in frog sexual displays. Submitted to *Proceedings of the Royal Society of London, B*.

Halfwerk, W., Page, R.A., **Taylor, R.C.** & M.J. Ryan. Submitted. Frogs can attend to distance-dependent cues of aggressive signals through comparison of cross-modal arrival times. Submitted to *Nature*.

Shelby Bunting, Emily Burnett, Richard B. Hunter, Richard Field, & **Kimberly L. Hunter**. Incorporating molecular genetics into remote expedition fieldwork: Submitted to *Tropical Conservation Science*.

PUBLICATIONS cont.

Whitney B. Smith, Christopher T. Frye, Ericka Veliz, Shandi Hiebler, & Kimberly L. Hunter. Genetic variability of the federally endangered plant *Ptilimnium nodosum*: Maryland and West Virginia Populations. Submitted to Northeastern Naturalist.

Holmgren, C.A., Betancourt, J.L., Peñalba, M.C., Delgadillo, J., Zuravnsky, K., Hunter, K.L., Rylander, K.A., & Weiss, J.L. Evidence against a Pleistocene desert refugium in the Lower Colorado River Basin: Submitted to Journal of Biogeography.

ALUMNI NEWS

Gabriella (Gabby) David (class of 2013) is working toward a Masters degree in Therapeutic Herbalism at the Maryland University of Integrative Health (http://www.muih.edu).

Nelson Dyer (class of 2012) has been accepted into University of Kentucky Dentistry School.

Sarah Rubin (class of 2009) has a new position as the Education and Exhibit Coordinator at Mote Marine Laboratory in Sarasota, Florida.

Jocelyn (Anderson) Tuttle (class of 2005) continues in her education position with the Chesapeake Bay Foundation, which includes leading trips on the Patapsco River in Baltimore. Her students range from 4th graders to college students as well as teachers taking professional development courses in summer. Jocelyn and husband Leamon are thrilled and busy with their first child, Amos, born last September. With all this, Jocelyn still has time to keep acting; she recently played Dorothy in a recent Wizard of Oz production at a community theater.



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