

BIOFEEDBACK

Winter 2014-2015

Newsletter of the Andrews University Department of Biology



Major Renovation of Biology Spaces

The plaque outside Price Hall shows a date of 1974. Now, forty years later, many parts of the building have received a much-needed facelift, thanks in large part to the generous financial support of our alumni and friends.

So what has changed? Well, pretty much every part of the building has seen some change.

- The carpets have been replaced throughout all three floors.
- The 70's era brick planters that we have grown to love over the years have been removed from the Biology lobby area. They have been replaced with an assortment of tables and chairs for student study, as well as a refreshment stand and faux fireplace as a focal point for relaxation and socialization (see photo above).
- The walls of the Biology lobby have been beautifully decorated with a variety of biologically-themed im-

ages to encourage reflection upon the goodness of the creation that we are so blessed to study.

- A large-screen monitor has been installed to present important announcements and for regular cycling of departmental news.
- Student study areas with desks or granite counter tops have been strategically placed throughout the department, either within nooks that used to hold coat racks or in front of stairwell windows. We hope that these window views will inspire A+ work in every student who uses them!
- The amphitheater projection system has been upgraded from one central screen and projector to a screen on either side, making the entire chalkboard available for use in the center.
- The two major lab spaces used for Anatomy and Physiology and Foundations of Biology labs have had a floor to ceiling overhaul: durable epoxy floors and new drop ceilings, along with new front counterspace.

Each one of these changes has been well utilized by the students this semester, with rave reviews! If you have not been by the department recently, we highly recommend a visit. However, we are so pleased with how our department looks, we would like to share some of it with you right now. On page 2 you can find a "virtual tour" highlighting some of the new elements of our department.

Future Plans

We've spent some time planning and visioning what the department could look like in the future. Of course, there is always much to be done. So we've set some priorities. Check out page 8 for our ideas... and if you have any ideas to share, we're always interested.

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IN THIS ISSUE: - A major renovation - A tour of the department - Future improvements on the way - Retirees honored - Seabird Ecology team funded for 5 years - Spring break trip to Florida Everglades - Fossil collecting in Ohio - New degree program in Biotechnology - Research highlights - Publications - Alumni calling songs



Some of the artwork displayed on the walls of the Biology Commons.

A Virtual Tour of the Department of Biology



The Chobatar Biology Commons, enjoyed by students both for studying and socializing.



New front desks have been installed in the two introductory biology labs.



The Steen Biology Honors Hall displays student research on the second floor. The third floor hall directly above this will soon display posters presenting course-specific research projects.



A number of study spaces have been created throughout the department. These have become well-used by many students.

Retired faculty honored with named spaces and awards.

Two years ago Biology experienced a mass retirement. These retirees contributed much to the department over the years.

David Steen served on the Biology faculty from 1986 to 2012 and was chair of the department from 2000 to 2012. His passion for biology and commitment to excellence, especially displayed in the first semester of Foundations of Biology,

awakened a love for biology and a spirit of inquiry in many students. Thus, the David A. Steen Biology Honors Hall was named and currently holds a number of posters displaying student research. Notably, Dr. Steen also handcrafted the poster frames used in this display.

Bill Chobatar served on the Biology faculty at Andrews University from 1968 to 2012. Dr. Chobatar's commitment to students as teacher, research mentor, academic advisor, spiritual role model, and Biology's favorite baker has benefited thousands of students during his long career. The Bill Chobatar Biology Student

Commons was designed to foster continued development of community between students and faculty.

Dennis Woodland served as Professor of Botany at Andrews from 1979 to 2012. He has been the department's champion of field-based research for many years. He has taken many students into the outdoors to experience nature through field-based research projects and study tours. The Dennis Woodland Field Research Fund will support small grants to current and future students who are engaged in field-based investigations in biology.



Biology and Mathematics departments awarded major NSF grant funding

Support will extend 28 years of continuous investigation of the seabird colony on Protection Island National Wildlife Refuge, Washington, and provide more opportunities for student research

James Hayward (Professor of Biology) and Shandelle Henson (Professor and Chair of Mathematics) have been awarded five years of funding from the National Science Foundation for a project entitled "Climate Change, Cannibalism, and Reproductive Synchrony: The Effect of Food Shortages on Life History Strategies of Marine Organisms." The award, totaling \$660,000, will be shared between Andrews University (lead institution, \$360,000) and collaborators at the University of Arizona (\$300,000). The project began in September 2014 and will continue until August 2019.

A clear strength of the proposal and this long-standing collaboration between researchers is the bridging of biological and mathematical sciences to answer questions in marine ecology. One anonymous reviewer of the proposal called the proposed work a "beautiful piece of new and insightful interdisciplinary research."



In its funding, NSF further validated this approach, with half of the award distributed by its Division of Mathematical Sciences, and the other half distributed by its Population & Community Ecology Program of the Division of Environmental Biology. Andrews University's emphasis on undergraduate research and its diverse student body are other factors that likely contributed to this funding success.

Hayward and Henson first received NSF funding in 2003; the current award is their fourth, consecutive award through the Foundation. Long-term support, these researchers note, has allowed them to develop ideas and apply them effectively to their system of study. Because research often requires trial-and-error for discovery, this support has given them space to readjust their plans to follow the unexpected and identify promising new directions.

The Hayward-Henson collaboration has provided many research opportunities for students. Known collectively as the Seabird Ecology Team, approximately 50 students have been supported in their research with this team. In this new grant, a significant portion of funds are earmarked for student research and travel, with opportunities for stipends and for presentation of findings at professional meetings (see article below). The Seabird Ecology Team will continue to serve as a home for students who want

Left. This gull cannibal just returned to its territory with an egg which will now be devoured. One egg supplies nearly half the nutrients an adult gull needs during a typical day. Right. WayAnn Watson, Ashley Reichert, and Sumiko Wier (top to bottom) collected data on the Protection Island gull colony in 2014. Here they take a break to pose on the elevated blind.

to develop their research skills, and as a model for faculty who are seeking external grant funding to build new programs of research at Andrews.

In the current project, Hayward and Henson will shift their research focus to explore the effects of climate change on life history strategies of colonial seabirds. Specifically, this study will field-test two hypotheses based on mathematical modeling: 1) Cannibalism among colonial seabirds is an adaptive response to decreased food supply associated with rising seas surface temperatures, and 2) reproductive synchrony among colony seabirds is an adaptive response to cannibalism. By examining data from El Niño events, which mimic features of long-term climate change on short time scales, the Seabird Ecology Team will be able to test climate-related hypotheses in this marine system.

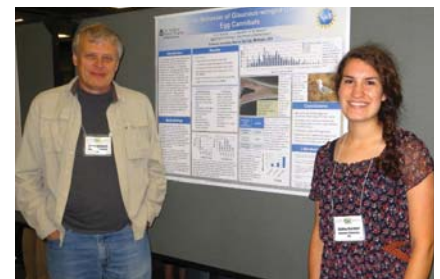


Andrews biologists at American Ornithologists' Union meeting

Five Andrews University biologists and alumni of the Seabird Ecology Team participated in the 2014 joint meeting of the American Ornithologists' Union/Cooper Ornithological Society/Society of Canadian Ornithologists in Estes Park, Colorado. All five participants gave oral presentations or presented a poster. Shandelle Henson, Professor of Mathematics, talked on a possible tradeoff between seasonal and daily reproductive synchrony in gulls. Alumnus Amanda Sandler gave a talk on ovulation synchrony in Ring-billed Gulls. Alumnus Libby Megna, now at the

University of Wyoming, presented on hybridization in birds. Undergraduate Ashley Reichert (top right) presented a poster describing her research on the behavior of cannibalistic gulls. Jim Hayward, professor of biology, gave a talk on cannibalism in gulls and its possible relation to ovulation synchrony.

The group also came away from the meeting with several awards: Libby Megna received one of 11 Student Presentation Awards for her talk on avian hybridization (bottom right). Libby Megna, Amanda Sandler, and a student from University of Washington won second place in the 2014 Student Quiz Bowl. And Shandelle Henson won second place for her age group in the Ostrich Run, a 5-kilometer foot race.



Students on the Move!

Spring break trip to Florida Everglades

In March, 13 students and two faculty loaded into a 15-passenger bus for the 1350-mile drive to Ochopee, Florida, initiating our tenth Spring Break trip to south Florida. Although the trip was typical in many ways, we also had some less-than-usual experiences.

For starters:

- We had the bus in the shop twice, once on the way down and once in the keys.

- The bus had no functioning AC. Imagine 15 people in a closed space in south Florida without air conditioning...!

- Our canoe trip required us to paddle against the tide—and against a stiff wind that produced some significant waves. Talk about a workout guaranteed to develop upper-body strength.



Top. The sawgrass marsh at Pay-Hay-Okee Overlook in Everglades National Park. Bottom Left. Lucyna Krzywon and Yoona Kang show off some cool shells at Bahia Honda State Park in the Florida Keys. Middle. Dr. Atkins and students Christine Lee, Andrew Chirachevin, and Kyungje Sung pose for a picture on the boardwalk at Pay-Hay-Okee Overlook. Bottom Middle. A canoe exploration of the Ten Thousand Islands in Everglades National Park. Bottom Right. A Cypress dome located near Mahogany Hammock, Everglades National Park.

Despite these challenges, the 15 biologists had a great trip. We visited a cypress swamp, investigated nearshore marine life on Lulu Key and Bahia Honda Key, snorkeled above the reef at Looe Key Marine Sanctuary, and explored Everglades ecosystems as diverse as a cypress dome and sawgrass prairie. We saw lots of alligators, and this year we

What stands out? An intimate reptilian adventure of senior Lucyna Krzywon, taking a Sabbath afternoon nap outside the tent in Long Pine Key Campground. Lucyna felt something lightly brush up against her arms, awoke, and saw a large, Eastern diamondback beside her! She calmly



called the rest of the group over, and we enjoyed good looks of this remarkable creature, who seemed as leery of us as we were of it.

We anticipate that the tradition will continue in 2016; one student is already planning to go again, and siblings of this year's class are lining up to go. It provides a remarkable opportunity for students to experience biology in the field, and to appreciate

some of the challenges that arise in our efforts to maintain wild ecosystems while also meeting human needs.

Paleobiology Class and Biophilia club travel to Ohio for fossil collecting.

Ten students and three faculty (Goodwin, Gonzalez, and Lyons) traveled to Caesar Creek State Park in Ohio on Friday, October 10.

Following a brisk night of camping, the group visited the Creation Museum just outside of Cincinnati on Sabbath afternoon. Many good conversations were stimulated by the quality presentations at

the museum.

On Sunday, after an even more brisk night of camping, we headed for the Emergency Spillway near the Caesar Creek Dam to collect Ordovician fossils. In the brief time there, all were rewarded by many excellent specimens of brachiopods and bryozoans. Andre Moncrieff even discovered a beautiful complete trilobite!

But brunch awaited, and so we loaded up and headed to the nearby home of Bob and Jeanette Smith, both alumni of AU Biology. A feast was enjoyed by all, with all

manner of sweet and savory food! Many thanks to Bob and Jeanette!

However, our fossil collecting was not finished. To burn off (a few) calories, we walked 5 minutes to a local community park, where many specimens of horn coral and brachiopods could be found in the creek bed. A short drive took us to another fossil site alongside a creek within Sugarcreek Park. By the end of the day, all were tired and happy, with many fossils in their pouches.

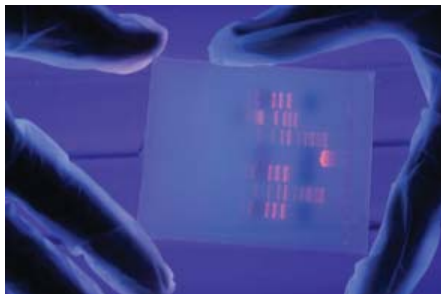
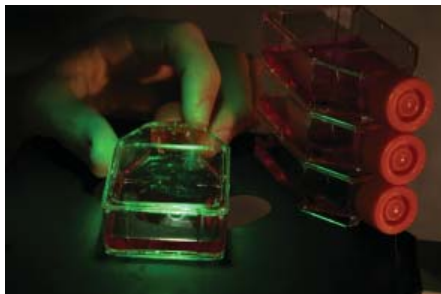
Some retain a small bit of envy, however, for Andre's awesome trilobite find...



Left. Fossils. Andre Moncrieff shows off his trilobite find... already bagged and well-protected.

Center. Food. Following a delicious brunch hosted by Bob and Jeanette Smith, trip participants pose for a group photo.

Right. Fun. A hike through Sugarcreek Park took us to another fossil site as well as a 550-year-old tree.



New Degree Program in Biotechnology

Biotechnology involves the use of living organisms and biological materials in the development of useful products. The field of biotechnology began in the late 1970s as the field of molecular biology emerged and tools for the modification of DNA became available. An early demonstration of biotechnology was the production of human insulin by genetically-engineered bacteria by Genentech in 1982, something many diabetics benefit from to this day.

Over the last 10-20 years, particularly since the development of DNA sequencing technologies, the biotechnology industry has grown dramatically. In fact, it is one of the few market sectors that saw an increase in employment during the years of 2001-2010 (see figure, top panel). In 2012, 1.62 million people were employed by more than 73,000 US bioscience companies. There is a great need for people trained in the techniques of biotechnology, as well as the soft skills such as communication and teamwork that are necessary to do science well, and a large number of jobs exist for bachelor's degree-trained workers (see figure, bottom panel), something that Andrews University does well.

The above description of employment opportunities in biotechnology should be welcome news to students and parents alike. Many of today's students, and even more parents, are particularly concerned that a job will be available at the end of college. Most of our biology majors are on a pre-med or other pre-professional track. These are good tracks to be on because they provide a good job at the end (after extended post-college professional education). However, other students are looking for alternate career pathways, including pathways that don't include extended post-college training.

Beginning in the Fall of 2015,

the Biology and Chemistry & Biochemistry Departments will begin offering a joint program in Biotechnology, with the goal to educate young people in the skills and technologies necessary to enter the growing biotechnology workforce. This program will draw on expertise present in both departments as well as a number of areas outside our departments. The Biotechnology faculty will consist of 14 faculty, 6 from Biology, 5 from Chemistry, and one each from Computer Science, Engineering, and Agriculture. Here at Andrews we have the benefit of a strong culture of research and a wide spectrum of academic interests. The program will be unique in its interdisciplinary nature, its high academic standards, and its clear aim to develop practical skills that can be applied in the job setting. It will culminate in a required internship or research experience. Such a course of study will

address a critical need within a significant segment of our current student population and is likely to be popular with prospective students with an eye for employment.

Mission:

To transform the student of science into a scientist of the highest caliber and ethical standard.

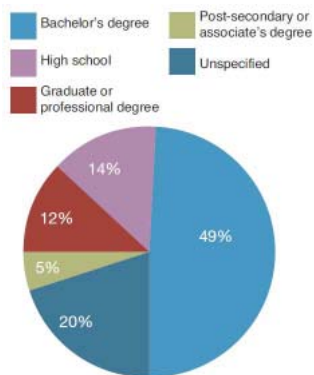
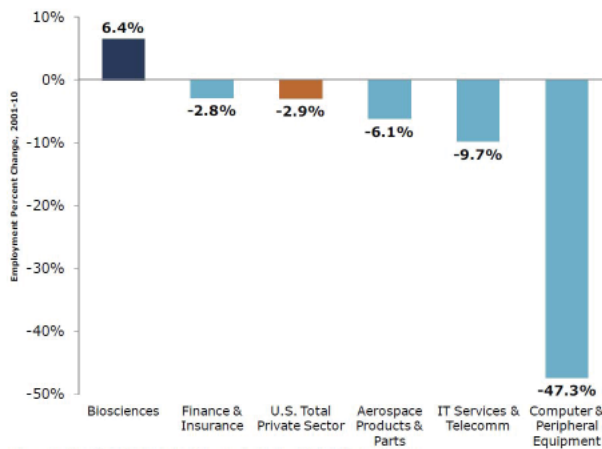
Program Goals:

The Biotechnology program aims to

- 1) Provide a broad and interdisciplinary training in the biosciences.
- 2) Educate students in the communication of science and the ethical use of scientific knowledge and skills.
- 3) Foster the development of practical scientific skills necessary for employment in the biotechnology sector.
- 4) Introduce students to the workforce through internship opportunities.

Program Outcomes:

- 1) Knowledge: Students will demonstrate a comprehensive knowledge and understanding of the properties and interrelationships of materials relevant to biological and chemical analysis.
- 2) Communication Skills: Students will effectively communicate biotechnology information to a diversity of audiences using a variety of formats. Students will obtain relevant biotechnology information from web-accessible databases.
- 3) Technical Skills, Safety, and Environmental Stewardship: Students will demonstrate competency in common biotechnology lab activities and instrumentation. Students will demonstrate commonly accepted laboratory safety and waste management practices.
- 4) Interdisciplinary Teamwork: Students will utilize positive team behaviors to accomplish interdisciplinary tasks.
- 5) Ethical Use of Biotechnology Information and Techniques: Students will execute the highest standards of integrity and ethics during their professional training.



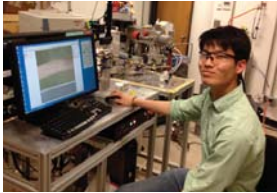
The Biotechnology Industry. Top. Employment Trends in the Biosciences and Other Leading Knowledge-based Industries, 2001-10. From Battelle/BIO State Bioscience Industry Development 2012 report. Bottom. Degree required (% of US life sciences job posting). Taken from Nugent and Kulkarni. (2013) Nat Biotech. 31:853-4.

Research Highlights

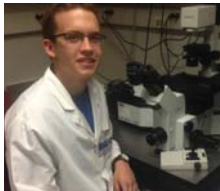
Dr. Marlene Murray and students Joanne Lee and Bomi Kim (pictured) attended the Yeast Genetics Meeting in Seattle, WA from July 29 to August 3 of 2014. They presented a poster entitled *The Effects of Omega-3-Fatty Acids on Intracellular Inositol Levels in Saccharomyces Cerevisiae*.



Luke Kang, senior Biology major, spent a week with his research advisor, Dr. Tom Goodwin, in the Stable Isotope Lab of Dr. Ben Passey at Johns Hopkins University. Luke was collecting data for his Honors project, which involved serially sampling incisors of fossil ground squirrels from a site in the Colorado Rockies to determine if the proportion of C3 and C4 plants in the diet varied seasonally in the Ice Age. This has implications for understanding the nature of the environment in the past.



Zach Reichert participated in the Summer Undergraduate Research program at the Mayo Clinic, in the lab of Dr. John R. Henley. During this time he used the zebrafish model system to investigate the cellular and molecular mechanisms underlying neural regeneration. The title of his project was *The Functional Role of Acute Inflammation in Zebrafish Spinal Cord Regeneration*.

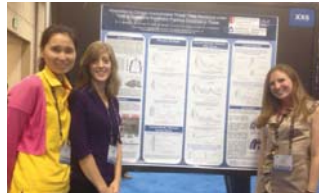


A number of Biology faculty and students

participated in the 2014 annual meeting of the Michigan Academy of Sciences, Arts, and Letters, held on February 28th at Oakland University, Rochester, MI. Presentations were made in Biochemistry and Molecular Biology, Environmental Science and Ecology, Microbiology, and Zoology sections of the meeting. We look forward to the 2015 annual meeting, which will take place on the campus of Andrews University!



In November 2013, Rebecca Clouse (MS 2014) and Mikyung Kim (current graduate student) presented a research poster at the International Society for Neuroscience meeting in San Diego, California. The research was done with faculty member Pamela Coburn-Litvak, in collaboration with Brenda Anderson in the Biopsychology department of the State University of New York in Stony Brook, New York. Rebecca and Mikyung worked with Dr. Anderson's graduate students to conduct the research, which assessed the effects of unpredictable but controllable stress on memory function.



Dr. Benjamin Navia and Dr. Jack Stout attended the 11th International Congress of Neuroethology in Sapporo, Japan from July 27th to August 1, 2014. At this congress, co-organized by the International Society for Neuroethology (ISN), the

Japanese Association of Neuroethologists (JAN) and the Science Council of Japan (SCJ), Dr. Navia presented a poster entitled *The Effects of Juvenile Hormone III and Chelerythrine Chloride in the Selectivity of Phonotaxis and its Neuronal Correlates in Female Cricket Acheta domestica*. Dr. Navia recently submitted a manuscript for publication to the journal *Physiological Entomology* and continues to do research this Fall with undergraduate students Delia Frey, Re'Jeanne Greene, Karis Kang and Jeong Bin Lee.

Dr. Peter Lyons attended the Gordon Conference on Protein Processing, Trafficking, and Secretion in New London, NH in July of 2014. He presented ongoing research done together with students Hazel Ezeribe, Donnel Dockery, Gifty Barfi, and Anna Kwon on the characterization of a proteolytic enzyme. While at this meeting, Dr. Lyons also participated in a career panel discussion for graduate students and postdocs.

Dr. Kanya Long attended the Advanced Course in Immunology, held in Boston, Massachusetts, in August. This course, administered by the American Association of Immunologists (AAI), is considered the premier short course in immunology and is intended to help faculty at primarily undergraduate institutions develop immunology curricula and form research collaborations in the field. Dr. Long also attended the Annual Meeting of the American Society for Tropical Medicine and Hygiene in New Orleans, LA in November. In addition to the many sessions on mosquito-borne viruses, of particular interest to Long, this meeting held special sessions on the Ebola outbreak in West Africa and on the ongoing chikungunya epidemic in the Caribbean.

Publications

Dr. Tom Goodwin, Professor and Chair of Biology, served as editor for a recently-published book entitled *Biology: A Seventh-day Adventist Approach for Students and Teachers*. This is the fourth volume of the Faith and Learning series, co-sponsored by the Center for College Faith at Andrews University and the Department of Education of the General Conference of Seventh-day Adventists. Contributing authors examine a variety of



evidences addressing issues of biology in light of a biblical worldview. This book invites readers to explore the connections between scientific investigation and the beliefs of the Seventh-day Adventist Church. Authors go beyond the creation-evolution debate to interact with such subjects as the fossil record, ecology and stewardship, the biology of human nature, and the human genome.

Kanya Long, Assistant Professor of Biology, co-authored two articles on dengue transmission in Peru. The first article, first-authored by Dr. Robert Reiner, now

at the Indiana University School of Public Health, and published in *Proceedings of the National Academy of Sciences*, explored dengue transmission dynamics in Iquitos, Peru over a 12-year period. This study was unique in its use of an extensive, longitudinal data set that captured not only active dengue infections, but also infections that occurred between study visits, allowing an estimate of how force of infection varies through time. While a high degree of variation was found, there was also evidence of synchrony of force of infection across four virus serotypes, indicating shared drivers of virus trans-

mission. An exploration of human and mosquito host dynamics that impact virus transmission continues. The second article, first-authored by Maya Williams, the Head of the Viral and Rickettsial Diseases Department at the Naval Medical Research Center, and published in the *American Journal of Tropical Medicine and Hygiene*, examined the 2010-2011 dengue outbreak in northern Peru, the largest in the region's history. Whole-genome sequencing and phylogenetic analysis confirmed that this outbreak was associated with lineage II of the south-east Asian/American genotype, a lineage distinct from what had been seen in the region previously. Further studies in cell culture and in mosquitoes indicated that viruses from this outbreak were not associated with higher replication potential in either human or mosquito hosts. These studies follow Long's post-doctoral work in Iquitos, Peru, and represent an ongoing collaboration with the University of California, Davis, based in Iquitos.

Libby Megna's (MS 2012) master's research was recently featured in the *Journal of Avian Biology* (volume 45, pages 410-416). Her paper titled "Equal reproductive success of phenotypes in the *Larus glaucescens-occidentalis* complex", coauthored with Andre Moncrieff, James Hayward, and Shandelle Henson, detailed research on hybridization between Glaucous-winged Gulls and Western Gulls at Protection Island National

Wildlife Refuge, Washington. Contrary to the most accepted explanation for the persistence of hybrids in this region, Megna and her colleagues demonstrated that hybrids experience no advantage over "pure" parental types in terms of reproductive success. This finding poses intriguing questions: Why are most of the gulls that nest in this and nearby colonies hybrids? Why don't gulls always mate with members of their own species? It will take much more research to answer these questions. Meanwhile, Megna is pursuing the problem of hybridization with songbirds for her PhD dissertation at the University of Wyoming.

James Hayward, Professor of Biology, authored two articles on the behavior of Flightless Cormorants, unusual birds restricted to the Galapagos Islands. The first article, published in *The Wilson Journal of Ornithology* (volume 125, pages 790-799) and coauthored with Libby Megna, Brianna Payne, Susana Velasquez Chávez, and Shandelle Henson, examined temporal and environmental factors on the behavior of these birds. Using mathematical modeling, the authors showed that the behavior of these birds is shaped primarily by time of day, wind speed, and solar flux. Unlike many marine birds, Flightless Cormorants respond little to changes in tide height. In a second article published in *Marine Ornithology* (volume 42, pages 9-10), Hayward, Megna, and Payne corrected a mistaken

but previously published conclusion that adults feed young Flightless Cormorants by stuffing food down their throats. Using careful observations and digital photography, Hayward *et al.* found instead that young Flightless Cormorants stuff their heads and necks down the throats of their parents to obtain food. They note that the earlier "mistaken interpretation is not surprising, given that much splashing accompanies their frenzied feedings."

Egg cannibalism in Glaucous-winged Gulls increases with sea surface temperature. This is the primary finding in a paper published in *The Condor: Ornithological Applications* (volume 116, pages 62-73) by James Hayward, Lynelle Welton, Shandelle Henson, Libby Megna, Brianna Payne, and Andre Moncrieff. Although egg cannibalism is a well-known phenomenon in gull colonies, never before has the intensity of this form of predation been linked to rises in sea surface temperature. The authors suggest that heightened sea surface temperatures associated with both El Niño events and climate change lead to decreased marine productivity. Decreased marine productivity, in turn, stresses seabirds such as gulls, diminishing their energy intake and lengthening their foraging bouts. Under these conditions cannibalism becomes an effective means of gaining calories, despite the risk of attack by parents robbed of their hard-earned productive output.

Alumni Calling Songs

Tammy Trott (BS 1991) was recently appointed as one of five commissioners of the Sargasso Sea Commission, which will "exercise a stewardship role for the Sargasso Sea and keep its health, productivity and resilience under continual review." Nominees for the role were required to be "distinguished scientists and other persons of international reputation committed to the conservation of high seas ecosystems." See <http://www.sargassoalliance.org> for more information.



John Francis (BS 1991) is currently Assistant Professor at Yale School of Medicine, where he specializes in infectious disease. He visited us



this past year and spoke to our biology students during departmental assembly about his work in the HIV/AIDS field.

Tori Steely (BS 2008, MS 2013) currently biology teacher at Battle Creek Academy, was awarded a \$2000 Hanes Trust Grant for a project entitled *A Tall Grass Prairie Reconstruction for K-12 and Public Use, Battle Creek, MI*. The award was presented by Dr. Dennis Woodland.



Jason Jeffrey (BS 1999, MS 2002) recently joined the hospital physician team at Sonora Regional Medical Center,

Sonora, CA. Jason completed his MD at Loma Linda University, a residency at Santa Clara Valley Medical Center, and currently practices family medicine.



Beverly Sturges (BS 1979) is a Professor of Clinical Neurology and Neurosurgery at UC Davis. She recently received the 2014 School of Veterinary Medicine (SVM) Faculty Clinical Excellence Award in recognition of her exceptional commitment to patient care, outstanding clinical instruction for the Department of Veterinary Medicine and residency training, and her expertise and achievement in research to advance the discipline of clinical neurology and neurosurgery.



Future Plans!

Our recent departmental changes, funded by the University with crucial support from departmental alumni, have made a huge improvement. Students are using every study area that was created and reviews are very good! However, we don't want things to stop there. There are other areas where improvements and additions would greatly facilitate teaching and research. In the coming year we hope to acquire two items of equipment, if funding allows, that will strengthen teaching and research. Each of these items will also support the new Biotechnology program that will be launched in the upcoming 2015-16 year, enabling us to perform cutting edge research and to incorporate these techniques into our classes.

1) Research-grade autoclave (\$40,000). Five of our eleven Biology faculty have research programs that are cell and molecular in nature. Each of these programs, as well as many of our core biology courses, require the reliable sterilization

of equipment and media. In particular, Dr. Kanya Long's virology research (see publications on pages 6-7) requires effective sterilization. Our current autoclaves are designed primarily for the food service industry and have had some mechanical issues in recent years. We are in need of a research-grade autoclave to meet our increasing sterilization needs.

2) Real-time PCR (\$24,000). The new Biotechnology program includes a strong component in genetics and genomics. Key to the fields of genetics and genomics is the ability to analyze gene expression in a quantitative manner. We are investigating the purchase of a real-time PCR instrument to improve our ability to teach and investigate biological questions at the cutting edge of genetics, genomics, and gene expression.

In addition to the above instrumentation needs, we plan to continue strategic upgrades of teaching spaces as university

funds allow. This will include an overhaul of the microbiology lab on the third floor (the prep room in particular is in need of renovation) and continued improvements in lab space for introductory biology courses.

If you would like to help support a specific need noted above, you can indicate such with your donation (e.g., autoclave or PCR). We are grateful for generous alumni support over the years!



We'd love to hear from you! And we'd love to share important events in your lives with other alumni via this newsletter. Send us an email or letter to let us know what is new in your life. Below are some suggestions if you don't know what to say! Photographs are great too.

Name: _____

Address: _____

Year you graduated from AU _____ AU degree _____

Other degrees since graduating from AU _____

Your current employment _____

Your current interests and activities _____



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