BioNews

BIONEWS IS PUBLISHED TWICE A YEAR AND FEATURES THE PEOPLE AND PROGRAMS OF SF STATE'S DEPARTMENT OF BIOLOGY



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Advancing Global Health and the Biosphere Educating Generations of Scientists, Health Professionals, Teachers and Citizens



Congratulations 2014 Graduates!

Fouquieria speindens Photo by **Sheryl Creer**

Dr. Michael Goldman

Department Chair

Spring 2014

Issue 16

We're excited about our upcoming graduation celebration, where we'll hear from incredible students like **Elvin Lauron**, receiving an M.S. in Cell and Molecular Biology, and **Laurence Henson**, B.S. in Physiology, and recognize dozens of others for their achievements. We've also just finished a very successful combined Earth Day Celebration and Biology Alumni event, featuring a film and panel discussion on the science of our changing environment.

May 22 brings our seventh annual Personalized Medicine Conference. This year's event focuses on the microbiome with speakers from San Diego State University, and companies including Second Genome and Illumina. Our alumni organizing committee has expanded to five highly-successful graduates— **Dan Maher, Ken Hitchner, John Wulf, Amy Waterhouse** and **Helen Jenkins**. We continue a very productive partnership with the City of South San Francisco, the birthplace of the biotechnology industry. For more information about the conference and to register, visit: http://personalizedmedicine.sfsu.edu

We are saddened to have lost **Professor Emeritus William Bigler**, who passed away on February 23. Bill headed our Center for Biomedical Laboratory Science (formerly the Center for Advanced Medical Technology), which merged with Biology over ten years ago. We also lost **Professor Emeritus Remo Morelli** who passed away on April 22. Remo was a much-loved Professor of Microbiology whose joy of science touched both students and colleagues. Lastly, our long-time hematology lecturer **Dr. Leslie Tobler** also passed away in April. We'll look back on their academic and professional careers in the Fall issue of *BioNews*.

We're privileged to hear from many of you about how much you appreciated the work of a particular faculty or staff member over the years. I thought I might challenge our alumni to put that appreciation to good use in the form of a contest. Make a donation to the Department of Biology for use where the need is greatest, online or using the enclosed envelope, and include the name of a faculty or staff member (in honor of or in memory of). We'll keep score and announce the winners in the Spring 2015 issue of *BioNews*. Can't make up your mind? List them all. As you know, it is a continuing struggle to obtain the resources to support our educational program. Your support goes a long way towards needed equipment, supplies and student stipends. These generous donations will honor our past, and support the next generation of scientists, teachers, health professionals and informed citizens.

Tracking Avian Parasites



Graduate Ecology, Evolution and Conservation Biology major Allison Nelson is an awardwinning researcher. She is the

recipient of a Western Bird Banding Association Grant, a Sigma Xi Grant, and five scholarships: an Association of Environmental Professionals, San Francisco Chapter Scholarship, Arthur A. Nelson Scholarship (offered through SF State's Department of Biology), SF State Alumni Association Graduate Scholarship, and for two years in a row — SF State's Bruce A Rosenblatt Community Service Scholarship.

Allison has partnered with two local nonprofit avian science and conservation organizations — the San Francisco Bay Bird Observatory and Point Blue Conservation Science — to study the migratory geography of the Hermit Thrush (*Catharus guttatus*) and the blood parasites they carry.

"We have been attaching geolocators to Hermit Thrushes (photo below) in the Bay Area. These tiny devices, worn like a backpack, will help us learn where these birds breed, and what migration routes they follow," explained Allison. "DNA analysis of blood samples collected from these birds and Catharus thrushes sampled at other western U.S. sites will help us estimate locations of parasite transmission, and understand the role that bird movements play in the spread of these pathogens. Given the appeal of Catharus thrushes, a group of birds revered for their exquisite songs, this study will offer broad opportunities to inform the public and policy makers about the conservation requirements of temperate and Neotropical-Nearctic migrant passerines."

For more information about Allison's research, email her at nelson.allison@gmail.com



Graduate Students Assist Bay Area Life Science Industry Startups

Professional Science Master's (PSM) students **Helen Lam, Peter Manzo** and **Joseph Oloo** were Project Managers in a new team-based advisory program that connects qualified life science startups with experienced professionals who hold a diverse range of technical and business expertise.

The BayBio Fellows All-Star Team (FAST) Advisory Program was launched in Fall 2013 with generous support from Abbott Diabetes, Bayer Healthcare and Pfizer, and worked with the first cohort of selected Bay Area life science companies: Glialogix, Inc., Omniox, Inc., Sandstone Diagnostics and Xcell Biosciences, Inc. The goal of the program is to help promising Bay Area life science startups fast-track their path to funding and success. During the 8-week program, startups are coached in perfecting their business model and product development plans and in designing a compelling commercialization strategy to increase the probability and speed of securing funding from investors.

"BayBio's Executive Director Lori Lindburg and FAST Project Manager Steve Karp approached me about involving PSM students in the program last September," said PSM Program Director Dr. Lily Chen. "I saw this as a great opportunity for the students to gain an understanding of some of the issues involved in early stage research and development and to meet high-level entrepreneurs, researchers, investors and business advisors with expertise in clinical development, regulatory affairs, relevant technical R&D, financing and business development. As project managers, students chaired weekly meetings and provided notes and minutes to their team members."

Helen Lam who worked with the team advising Greg Sommer from Sandstone Diagnostics learned "a lot about how much funding it takes to get products through clinical trials and the pros and cons of different fundraising methods."

Joseph Oloo who worked with the team advising Dr. Thadd Reeder from Glialogix, Inc. learned "that it is not only about good science or good ideas that can save lives, but also about who you can convince to invest, hearing key opinion leaders say good things about your ideas and having good sales skills."



L-R: Helen Lam, Dr. Lily Chen, Peter Manzo and Joseph Oloo

Two Urban Ecologists



"Urban ecology is a new frontier with significant implications as more of the global population moves toward urban areas and are subsequently disconnected with the natural world...not to mention the beneficial 'services' that functional healthy ecosystems provide." - Jonathan Young

Graduate Ecology & Conservation Biology major Jonathan Young wants to restore a healthy ecology in and around Mountain Lake—one of San Francisco's few remaining natural lakes located on the southern border of the Presidio. Before leaded exhaust from millions of passing cars and artificial fill

degraded the lake's environment, turtles, frogs, newts, three-spine sticklebacks, freshwater mussels, and a large diversity of dragonflies and damselflies once flourished there. Now, decades' worth of toxic sludge have been dredged out, and aquatic plants are waiting in a transplant nursery ready to repopulate the lake.

Jonathan is leading a team of scientists with expertise on the original plants and animals. Their plan is to introduce one organism at a time beginning with infant water plants such as the sago pondweed (*Stuckenia pectinata*), coontails (*Ceratophyllum demersum*) and water nymphs (*Najas guadalupensis*) collected from the wetlands of Muir Beach and Abbotts Lagoon at Point Reyes National Seashore. These plants will form a leafy canopy that will provide habitat for invertebrates, reestablish critical nutrient cycling processes and provide a source of food for the lake's ducks and turtles.

When asked why he wanted to restore Mountain Lake's ecology, Jonathan replied, "There are two things I love most of all—natural history and San Francisco, and restoring and managing native habitat will give thousands of urban folks a glimpse of what once covered the City. The Mountain Lake project is very long term. It's too exciting and all the really juicy stuff is just beginning to unfold (i.e., flora/fauna reintroductions). There are endless opportunities for research there." To learn more about Jonathan's project, email him at: jyoung@presidiotrust.gov



"Over 80% of San Francisco Bay's marshes have been lost, but we are in the midst of restoring thousands of acres of wetlands —this is second only to the Everglades in restoration efforts." - Whitney Thornton

Ecology, Evolution & Conservation Biology major Whitney Thornton is a self-described "plant nerd" and her research is focused on restoring San Francisco Bay's wetlands which are threatened by an invasive cordgrass (*Spartina alterniflora*) that is native to the East Coast. In the 1970s the U.S. Army Corps of Engineers planted it in the Alameda

Creek Flood Control Channel (*photo left*) in Hayward as part of an experimental bank restoration project. By the early 2000s the plant had spread into all of the Bay's wetland elevations and was overwhelming native plants resulting in a loss of foraging and nesting habitats for native and migratory birds and the endangered California Clapper Rail and salt marsh harvest mouse. *Spartina* produces about 20 times as much pollen as the native Pacific cordgrass (*Spartina foliosa*) and many biologists believed that the bay's 19,000 acres of tidal flats could be infested by end of this year.

Whitney hopes to change that. She is a senior staff biologist with the State Coastal Conservancy's Invasive Spartina Project which oversees and coordinates the efforts of multiple regional organizations and agencies. Currently, herbicide is being applied to the cordgrass at low tide between June and October, but eventually restoring the wetlands will be needed, and this is where Whitney's research comes in. For the last three years she has been installing small plastic cages over young native wetland plants growing in five different marshes throughout the Bay to protect them from the elements. "Only a few plants can survive in an area where the land is intermittently covered with shallow saltwater, but these plants provide the backbone of a highly productive ecosystem," said Whitney. "An intact coastal wetland cycles nutrients, stabilizes shorelines, offers flood protection and acts as a nursery for marine life."

Whitney enrolled in SF State's graduate Biology program partially because her research advisor, Dr. Kathy Boyer, has a "strong record in publishing research that has practical implications — the science that comes out of her lab has direct implications for local restoration efforts — and SF State has a long track record of being the local university for salt marsh related research." To learn more about Whitney's research, email her at: whitneythornton@gmail.com



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Your generosity supported the Biology Department & Scholarship Funds, Great Sunflower Project, Personalized Medicine Conference, Professional Science Master's Program, and the Sierra Nevada Field Campus Greening Initiative. These and other cutting-edge programs — along with strong academic traditions ensure our students a promising future.

Biology Researchers Travel to Antarctica

Assistant Professor Anne Todgham led a team of Biology researchers to Antarctica last fall. Their goal? To understand how the future ocean may affect the development of life at its earliest stages. Their research, funded by the National Science Foundation's Office of Polar Programs, was focused on learning how vulnerable or stress tolerant embryonic and juvenile Antarctic fishes are to changes in temperature and CO2 levels. Antarctic fishes are considered especially vulnerable to changes in environmental conditions because they evolved in a very stable habitat over millions of years. Much of their research took place in the Crary Aquarium at McMurdo Station where dozens of containers filled with water are kept at different temperatures and with varying amounts of carbon dioxide to simulate future best- and worst-case scenarios of ocean warming and acidification.

Evolution and Conservation Biology graduate major Erin Flynn was awarded a 2013-2014 COAST Graduate Student Research Award to fund her study on the effects of elevated temperature and ocean acidification on the early development of the Antarctic dragon fish. When asked why she joined the team, she replied, "I want to understand how individuals cope with changing environmental conditions in order predict their ability to respond to future changes. The fish that live in Antarctica's ocean are really good at coping with living at below-freezing temperatures, but generally have a limited ability to handle warmer temperatures. Also, the cold Antarctic water absorbs more CO2 than warmer oceans, so animals that live in these waters are already experiencing changing seawater chemistry. This research is providing an opportunity to see how animals on the 'frontlines' are coping."

Alumna **Brittany Bjelde** (*MS Marine* Biology 2013) joined the team because

she wanted to understand the biochemical and physiological mechanisms animals use to tolerate climate change stressors. Her research focuses on the effects



of ocean acidification on juvenile Emerald Rockcod (Trematomus bernacchii) (photo left). In her lab at

photo by Dr. Anne Todgham

UC Davis where she is a Ph.D. student in the Animal Biology program, Brittany is analyzing samples from McMurdo looking for indicators of energy status, damage due to oxidative stress and changes in growth patterns. (To see Brittany's photos of Antarctic, visit: http:// fanguelab.ucdavis.edu/links-cool-stuff/)

Postdoc and Environmental Physiologist Nathan Miller was instrumental in the design and set up of the ocean acidification and warming experiments. Nate also wanted to learn more about the environmental tolerances of Antarctic amphipods. He exposed groups of them to four different salinities: 15, 25, 35 and 40 parts per thousand (ppt) (natural seawater is ~32-35 ppt) at a constant temperature of –1C for four days. Afterwards, he placed a subset of them in a temperature controlled water bath to learn at what temperature they would stop swimming. "I found that amphipods have high thermal tolerance limits in 25 -40 ppt salinity, but low salinity levels - which result from sea ice meltshad the potential to influence their response to thermal stress." At the Romberg Tiburon Center, he is developing methods to measure enzyme activities and the concentration of ions in the tissues of samples from McMurdo in order to explain these patterns of tolerance.

Please support Biology research. Donate online at http://biology.sfsu.edu Thank you!

Dr. Anne Todgham photo by Diane Fenster





Nathan Miller measuring oxygen consumption on juvenile fish.



Brittany Bjelde analyzing video recordings for heart rate and ventilation frequency.



Erin Flynn Photo by Jynne Diling Martin

"The moment you land on the ice is incredible, and the first breath you take is like you've landed on a foreign planet, the air is so dry and yet cold and crisp. One day our team headed out on the ice in our vehicle, a PistenBully, to collect fish and water samples from our field site at the Cape Evans Ice Wall. Along the way we discovered a large iceberg with an ice-cave. After climbing in everyone was speechless, the beauty of the ice formations, the old blue ice glowing and little ice-flakes crystalizing in a way I had never seen before — truly spectacular."

Distinguished Invertebrate Zoologist and Museum Innovator

by Dr. Terry Gosliner with contributions from Christina Piotrowski and Dr. Sarah Cohen



"A Shipboard Lab in the South China Sea" Photo by Gary Williams

Alumnus **Dr. Robert Van Syoc** (B.A. Marine Biology 1978; M.A. Marine Biology 1983) recently completed more than 32 years of service at the California Academy of Sciences as Senior Collection Manager in the Department of Invertebrate Zoology and Geology. He began working as a Curatorial Assistant in 1980, and was promoted to Collection Manager in 1982. Bob was one of the early adopters of computerization of museum collection records that now serve as the norm throughout the field.

During his tenure as Collections Manager, Bob took a leave of absence to pursue his Ph.D. degree at Scripps Institution of Oceanography, where he developed his passion for the study of barnacles. He became one of the world's experts on barnacle systematics, and was one of the first crustacean systematists to use molecular techniques to study complex questions about barnacle evolution. Bob has done a remarkable job of building the Cal Academy barnacle collections - now one of the best in the world. His study of commensal barnacles that live in association with sponges, black corals and gorgonians has led to the discovery of previously unknown levels of diversity and host specificity that had not been documented in barnacles.

Bob continues to work as a Cal Academy Senior Research Fellow to complete aspects of his research on barnacle systematics and evolution. He also provides stewardship on local environmental education and citizen science along the Sonoma County coast, and is active in the effort to extend the northern boundary of the Gulf of the Farallones National Marine Sanctuary. As a Research Professor in SF State's Biology Department, he generously contributes his expertise to the Invertebrate Zoology courses.

Notable Alumni





CHRISTINA BUCK (*MS Marine Biology 2012*) is a Field Biologist at Stillwater Sciences. She authored "The Influence of Coastal Nutrients on Phytoplankton Productivity in a Shallow Low Inflow Estuary, Drakes Estero, California" published in *Estuaries and Coasts*.

BRIAN CLARK (BS Marine Biology 2013) is a graduate student at CSU Northridge researching the reproductive behavior of the Giant Sea Bass, a critically endangered fish found off the California coast. To learn more about his research, visit: https://experiment.com/savethegiants



TARA CORNELISSE (MS Conservation Biology 2008) is a Postdoc at the American Museum of Natural History (New York, NY) working with the Network of Conservation Educators and Practitioners to create conservation modules for post-secondary education.



RACHEL DINER (MS Marine Biology 2013) co-authored "Emiliania huxleyi Increases Calcification but Not Expression of Calcification-Related Genes in Long-Term Exposure to Elevated Temperature and pCO2" published in Philosophical Transactions of the Royal Society.







TRICIA GOULDING (MS Marine Biology 2011) is in the Ph.D. in Biology program at Penn State University. She is the leadauthor of "Phylogeography of a Marine Acanthocephalan: Lack of Cryptic Diversity in a Cosmopolitan Parasite of Mole Crabs" published in the Journal of Biogeography.



ADAM HARVEY (MS Professional Science Master 2012) co-authored "Proteomic Analysis of the Extracellular Matrix Produced by Mesenchymal Stromal Cells: Implications for Cell Therapy Mechanisms" published in PLOS ONE. STEFAN JENKINS (MS Cell & Molecular Biology 2010) is a scientist at the Lawrence Berkeley National Lab. He authored "Global LC/MS Metabolomics Profiling of Calcium Stressed and Immunosuppressant Drug Treated Saccharomyces cerevisiae" published in Metabolites Journal.

JENNIFER KRAUEL (MS Ecology & Systematic Biology 2009) is in the Ph.D. in Ecology & Evolutionary Biology program at the University of Tennessee researching bat conservation biology. For more information, visit: www.krauel.com





RICHARD KRIEBEL (MA Ecology & Systematic Biology 2008) is a Postdoctoral Fellow in the University of Wisconsin's Department of Botany.

OMID (SAYED) MIRY (BS Physiology 2010) is a Ph.D. candidate at New York Medical College and co-authored "Treatment with Thryoxine Restores Myelination and Clinical Recovery after Intraventricular Hemorrhage" published in the Journal of Neuroscience.



CORRIE MOREAU (BS Zoology 2000; MA Ecology & Systematic Biology 2003) earned a Ph.D. from Harvard University, and is an Assistant Curator (Insects) at Chicago's Field Museum of Natural History.



JUNIPER SCRIBNER (MS Physiology & Behavioral Biology 2005) is an Associate Scientist researching cancer and autoimmune diseases at MacroGenics.



We want to hear from alumni! Let us know about your latest academic and/or professional news. Email: silver@sfsu.edu

Alumni and Students Share their Knowledge of Botany



Alumna **Sheryl Creer** (B.S. Botany 2010; MS Ecology, Evolution and Conservation Biology 2013) and graduate students **Rebecca Crowe, Scott Simono, Haley M.S. Smith** and **Jane Van Susteren** host collaborative plant identification workshops between the Department of Biology and the Yerba Buena Chapter of

the California Native Plant Society (CNPS). According to Yerba Buena Chapter Programs Co-Chair Mila Stroganoff, "CNPS is a statewide organization that holds symposia and workshops, publishes a journal, deals with plant conservation, vegetation mapping and rare plants, and funds student research. The Yerba Buena Chapter covers San Francisco and northern San Mateo County, and publishes a quarterly newsletter, hosts lectures and field trips, and organizes an annual native plant garden tour and native plant sale."

Jane and Rebecca currently run the workshops which are held once a month on Thursdays, 6:00-8:00 p.m., in Hensill Hall room 440 and are open to the public. (For more information on the workshop dates, email: milastroganoff@sbcglobal.net) To date, the workshops have been mostly attended by members from the Yerba Buena CNPS chapter and students from Dr. Bob Patterson's Taxonomy class and the Geography Department. "We set up dissecting scopes for attendees and provide plant material that is freshly collected, in pots from SF State's greenhouse or dried specimens from the H.D. Thiers Herbarium," explained Sheryl (photo above). "Sessions consists of guided keying and keying in small groups. We also offer focused workshops where we work with a specific group such as oaks, conifers, and ferns."

"Any time I have the opportunity to teach Botany —especially where our native plants are concerned— I take it! Having the opportunity to work with a group of people with varying skill levels and experience has been a welcome challenge. Articulating botanical concepts, themes and terminology has strengthened my understanding of the material." - Sheryl Creer

Sheryl will be co-teaching a 3-day workshop "Introduction to California Plant Families" with another Biology alumna and UC Berkeley Ph.D. candidate **Genevieve K. Walden** (MS Ecology & Systematic Botany 2010) at the Jepson Herbarium. (For information on this workshop, visit: http://ucjeps.berkeley.edu/workshops/2014/ index.html#Mar21)



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The Department of Biology proudly presents **"Personalized Medicine 7.0: The Microbiome in Health & Disease"** May 22, 2014. For more information, email: dnamed@sfsu.edu or visit http://personalizedmedicine.sfsu.edu



Dr. Annette Chan photo by Charles Lee

Below are two photos taken with Nikon C1 Confocal Laser:



Xenopus laevis embryo



Chicken embryo photo by Tiffany Barnes

FROM SCIENCE FICTION AND BEYOND....

Cell and Molecular Imaging Center (CMIC) Director **Dr. Annette Chan** has been a Trekkie for as long as she can remember. "When I was very young, I believed that Starfleet Academy actually existed, and if I worked very hard, someday I might be a scientist on the Enterprise."

Dr. Chan attended UC Berkeley (UCB) where she majored in zoology, and discovered that she had an interest in microscopy. After graduating, she worked at UCB's Biological Imaging Facility, and entered UCB's graduate program in plant biology. She also continued her life-long hobby of composing stories. "I wrote up one of my stories in script format for *Star Trek*, and I sent it to Paramount Studios. A few months later, I got a call asking if I would like to do a writing internship with *Star Trek*. I accepted the offer, and headed for Hollywood in 1994, where I worked with the writers of *Star Trek: the Next Generation* and *Star Trek: Deep Space Nine.* While walking on the incredibly realistic *Star Trek* sets, I realized that my childhood dream had come true — I had actually become a scientist working on the Enterprise."

She enjoyed her time in Hollywood, but she missed doing science, so she returned to UCB, and completed her doctorate in plant biology with a specialty in cell biology in 1997. Afterwards, she managed microscopes at UCB's Howard Hughes Medical Institute for eight years. When the facility manager position for SF State's CMIC opened up in 2005, she applied for it. "I wanted to take on a new challenge, and the position allowed me to teach which I enjoy."

"A Biology degree from SF State can open up new opportunities. Our students have the chance to do great things, make new discoveries, and turn the imagination of science fiction writers into reality."

The CMIC is a core research facility that provides state-of-the-art equipment and training for contemporary imaging techniques such as confocal microscopy, deconvolution microscopy, and flow cytometry. Shared equipment in the imaging core includes two point-scanning confocal microscopes, a spinning disk confocal microscope and a dual-laser flow cytometer.

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