BioNews Spring 2013 Issue 14

BioNews is published two times a year and features the People and Programs of SF State's Department of Biology.

Bate's Paradise Flycatcher
Photo by Dr. Ravinder Sehgal

Inside this Issue

DEPARTMENT OF BIOLOGY

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To Alumni and Friends of Biology

from Dr. Michael Goldman, Department Chair

The buzz is already in the air for spring's main event, our 7th annual Baccalaureate and Masters Recognition Ceremony. Long-time Administrative Office Coordinator **Kathleen Baker** has retired from the University, but kindly continues to lead us in organizing this event. We'll proudly honor nearly 300 outstanding graduates this year, each with a unique and exciting story of success, and each with his or her own special contribution to protecting the biosphere and enhancing global health. Ten of our students were elected to Phi Beta Kappa, and nearly thirty graduating magna or summa cum laude.

Our first "Friends of Biology Open House" was held on 11 April with nearly 100 people in attendance. It was a splendid event, hosted by Professor **Ravinder Sehgal**, who chairs our Development & Advancement Committee. Brief presentations by Professors **Diana Chu** and **Vance Vredenburg** nearly brought the house down. Vance and Diana showed exactly why, even in times of great economic woes worldwide, our faculty remain highly competitive for federal funding with nearly $22 million in grants. We hope it will be part of a tradition lasting far into the future, and that you will be able to join us next time.

We were saddened at the loss of our beloved Professor Emerita **Ruth G. Doell** early this semester. We invite colleagues and students to send in memories *(email to silver@sfsu.edu)* as we prepare a memorial article for next semester's issue of *BioNews*. Gifts in memory of Dr. Doell may be sent to the Department of Biology. *(Donate online at http://biology.sfsu.edu, click on the "Make a Difference" link or use the enclosed envelope.)*

Dr. Andrea Swei joined our faculty in December, and you can read about her exciting work on page 4. We are currently recruiting two potential new faculty members, including one in the key area of plant physiology.

Biology alumni **Dan Maher, Ken Hitchner** and **John Wulf** are again organizing their annual meeting, Personalized Medicine 6.0: Next Generation Sequencing for Targeted Therapeutics, on May 30 in South San Francisco. It's our most exciting program yet, with featured speakers including Kimberly J. Popovits, Chairman of the Board, Chief Executive Officer & President of Genomic Health, Dr. Mark Sliwkowski, Distinguished Staff Scientist at Genentech, Professor Atul Butte of Stanford University, Dr. Carl Borrebaeck, Professor & Chair of Immunotechnology and Director of CREATE Health at Lund University in Sweden, and California State Assembly member Kevin Mullin, Chair of the Assembly's Select Committee on Biotechnology. *(For more information, visit: http://personalizedmedicine.sfsu.edu)*

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We are pleased to present this list of generous donors who made gifts to the Department of Biology in 2012.
Your gift helped us bridge the gap in decreased state support.

More than ever, SF State counts on private support to help ensure excellence and affordability in public higher education.

Please make a gift to the Department of Biology today.
Use the enclosed envelope or visit:
http://biology.sfsu.edu
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A Notable Alumna

Tatiane Russo-Tait *(MS Cell and Molecular Biology 2011)* is the Northern California Ocean Sciences Bowl (aka Sea Lion Bowl) Regional Coordinator. Each year, the Sea Lion Bowl brings together talented high school students from 16 schools across northern California. This year that number was increased when eight additional junior-varsity teams were added to accommodate the increasing interest by schools.

The one-day event test students' knowledge of marine sciences through timed competitions with multiple choice or short-answer questions from the fields of Biology, Environmental Science, Geology, Geography, Chemical and Physical Oceanography and from topics on the contributions of the ocean including national and international economics, history, policy and culture. Winning teams from 25 regional competitions compete in the National Ocean Sciences Bowl.

Tati's favorite part of the event is working with students and the over 100 volunteers who come from SF State's Romberg Tiburon Center and College of Science & Engineering, UC Berkeley, UC Davis, Monterey Bay Aquarium and other marine science institutions during the months leading up to the competition. "The student scrimmages and volunteer trainings provide an opportunity for interaction, and is a great way to inspire, support and nurture the next generation of ocean science students and researchers."

Tati is also the Program Director of the Science Supplemental Instruction (SI) Program at the Center for Science and Mathematics Education (CSME). The SI Program offers companion workshops to introductory level science courses. In these courses, instructors create a collaborative learning community focused on group discussion and problem solving with the goal of supporting student learning and enhancing student success in the main lecture courses.

Tati discovered she enjoyed teaching while a graduate student in SF State's "CIRM Bridges to Stem Cell Research" program. After participating in a "Stem Cell Awareness Day" event where she spoke to high school students, she enrolled in Dr. Kimberly Tanner's "Science Teaching for Scientists" course, and later was selected to participate in the Science Education Partnership & Assessment Laboratory (SEPAL)'s "Community College Biology Faculty Enhancement through Scientific Teaching" (CCB FEST) program where she received additional pedagogical training, curriculum building practice and teaching experience. This Spring Tati taught "The Science and Politics of Stem Cell Biology"-- the first stem cell biology course for non-majors offered by SFSU.

"The education and training I received at SF State are invaluable to me," said Tati. "The science education training from SEPAL provided me with a great skill set and many tools that I use every day to teach science courses, mentor undergraduate science students, train and support science instructors and run programs at the CSME."

Editor's note: To learn more about volunteering for the 2014 Sea Lion Bowl, visit: www.sealionbowl.org or email Tati at tati@sfsu.edu. Learn more about SEPAL's CCB FEST program by visiting: http://sfsusepal.org/programs/ccb-fest/ To learn more about the CSME, visit: www.csmesf.org

Your Gifts: A Snapshot of 2012

19 2012 donors graduated from the following 19 Classes of 1941, 1954, 1957-1959, 1962, 1964-1966, 1969, 1970-1971, 1974-1979, 1980-1982, 1984, 1986-1989, 1991, 1993-1994, 1996, 1998-1999, 2001, 2003, 2005, 2008-2012

123 Donors provided vital support in 2012. Gifts were sent in from Austria, California, Florida, Hawaii, Maryland, Minnesota, North Carolina, New Jersey, New Mexico, Nevada, New York, Ohio, Oregon, Pennsylvania, the United Kingdom, Virginia, and Washington.

$1,675,079

In 2012, the Department of Biology received well over one and a half million dollars in support from alumni, friends, companies and foundations.

"We need to ensure that our students —our emerging experts— possess the skills necessary to effectively educate and communicate with different audiences."

What do Science Students Really Understand about Climate Change?

Kathryn Danielson wants to know what undergraduate science students understand about climate change and, in particular, its impact on the oceans. According to Kathryn, "There is a tacit assumption that undergraduate science students understand climate change, but there is little scientific evidence to support this assumption."

Kathryn earned an undergraduate degree in Integrative Biology and Environmental Studies from the University of Illinois, Urbana-Champaign in 2009, then moved to San Francisco, and began working as a teacher and naturalist at the Aquarium of the Bay on Pier 39 and the Marine Science Institute in Redwood City. "After speaking with students and the public about the challenges facing our oceans," said Kathryn, "I realized that I wanted to know more about what people thought about climate change, and how they use science to understand the environmental issues."

Kathryn studied with Dr. Kimberly Tanner who directs the Science Education Partnership & Assessment Lab (SEPAL) which Kathryn describes as a "pioneering force in the field of discipline-based science education research."

When asked to describe her research, she explained, "along with climate changes' impacts of global warming, sea level rise, and melting ice, our worlds' oceans are experiencing a drop in pH due to the absorption of anthropogenic (man-made) carbon dioxide from fossil fuel combustion. This process is known as ocean acidification, and it is expected to have profound biological and economic impacts. I want to know what conceptions and misconceptions of climate change and ocean acidification do undergraduate science students possess? How can these conceptions and misconceptions inform how we teach the science of climate change? With these findings, I hope to improve climate change education efforts, so our science students are better equipped to use the science they know to understand these processes." Her poster "Investigating Advanced Undergraduate Science Students' Conceptions & Misconceptions of Ocean Acidification" won first prize at the High CO_2 meeting in Monterey earlier this year.

Kathryn will graduate in May with a M.S. in Marine Biology with a concentration in Science Education. She plans to pursue a Ph.D.

Introducing… Dr. Andrea Swei

Andrea Swei joined the Department of Biology as an Assistant Professor in the field of global health ecology in January.

Before coming to SF State, she earned her Ph.D. in Ecology from UC Berkeley in 2009, and was a Ruth L. Kirschstein National Research Service Postdoctoral Fellow at UCSF's Department of Laboratory Medicine where she investigated the pathogenicity of tick-borne pathogens. "I have been working in Lyme disease ecology for nearly 14 years, and am fascinated by the way that animal ecology, land use change and vector biology are connected."

Dr. Swei describes the Department of Biology faculty as "dynamic" and "collaborative" with 'tons of great talent" and is looking forward to working with her new colleagues in the coming years. She will also be encouraging biology majors to develop an interest in disease ecology. "We need more trained students to deal with changing environmental conditions, and what it means for wildlife and human diseases."

Gene Duplication Leads to Novelty and Diversity

Karen Crow's research on the American paddlefish *(see photo bottom right)* has found that the species duplicated its entire genome about 42 million years ago putting a twist on the evolution of novelty and diversity in vertebrates. The American paddlefish is often used as a proxy for the common ancestor of the bony fishes, which includes humans and tunas, because of its position on the evolutionary tree. According to Dr. Crow, "we are all modified fish."

Before joining the Biology faculty as an Assistant Professor in Fall 2007, SF State alumna Dr. Crow earned a MS in Marine Science with an emphasis in Ichthyology from the Moss Landing Marine Laboratories, and a Ph.D. in Ecology and Evolutionary Biology from UC Santa Cruz.

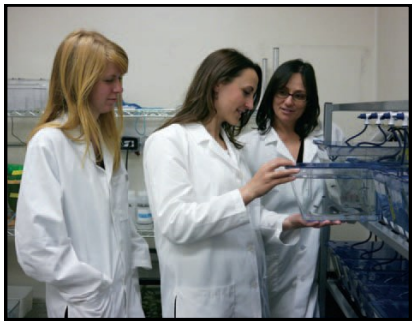
Dr. Crow teaches "Biology of Fishes," "Evolutionary Developmental Biology" and graduate seminars related to her areas of expertise. She also heads a marine biology/evolutionary genetics lab. Her research uses molecular approaches to understand the evolutionary forces that generate biological diversity and novelty in fishes, and has received funding from the National Geographic Society and National Science Foundation.

Dr. Crow and colleagues sequenced chromosomal regions in the paddlefish genome containing 19 Hox genes. (Hox genes determine body shape and limb development and have become prime candidates for detecting whole genome duplications.) The results indicated that a whole genome duplication occurred in the paddlefish, and that some Hox gene copies may have been instrumental in the evolution and development of the extremely elongated rostrum (snout) in this species.

Whole genome duplications are considered by some researchers as 'game-changing' events in evolutionary history that contribute to the evolution of novel functions and even the evolution of new species. When gene duplications happen, one copy is either lost or is free to "explore evolutionary space" which may result in new functions or morphologies while the other copy maintains the ancestral function. "When we investigated duplicate Hox genes in the American paddlefish, we found several that were expressed in the rostrum, an area that has not previously been described to show Hox expression, but also some pairs in which one copy—but not the other— is expressed in the rostrum indicating functional divergence. This means that duplicate genes are divergent enough to have unique expression patterns. This extra genetic material adds complexity to comparative studies."

"Our findings on the paddlefish suggest that genome duplication may have played a more important role in the evolution of animal diversity than previously thought," said Dr. Crow who would like to know how often variation occurs in Hox genes, how fast it occurs, and what factors are associated with it. "We are only beginning to understand the genetic basis of the evolution of novelty and diversity."

"The underlying theme to my research is to understand the evolutionary processes that contribute to the evolution of novelty and diversity."

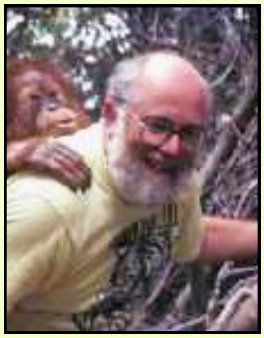


L-R: Graduate students Julia Taylor, Sophia Archambeault and Dr. Karen Crow

FishLab students sampling local fishes

American Paddlefish

IN MEMORY



Professor Emeritus **Hal Markowitz** passed away on September 13, 2012 at the age of 79.

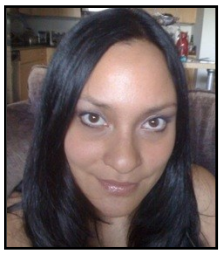
Dr. Markowitz was key to the Biology Department's efforts in animal behavior. His field research projects focused primarily on marine mammals and primates.

He was also a Faculty Specialist in Environmental Enrichment and Animal Well Being at UCSF, Professor and Director of Distance Education at the University of Papua New Guinea, an international leader, popular lecturer and consultant on environmental enrichment efforts for zoo animals.

Dr. Markowitz authored and co-authored more than 300 works spanning areas from relationships between brain chemistry and anatomy to behavior, animal husbandry procedures and biomedical research outcomes to genetics and behavioral ecology. His 1982 book *Behavioral Enrichment in the Zoo* was seen by many as instrumental in spurring the modern movement in environmental enrichment for captive animals. His book *Enriching Animal Lives* (2011) focused on ways to improve the lives of a wide range of animals, and made a plea for the need to empower animals.

Retiring Office Manager, Kathleen Baker worked with Dr. Markowitz for many years. "What I remember the most about him aside from his excellence in teaching was that he was a very kind person and devoted to his students."

ALUMNI



NICOLE ABREU (MS Cell and Molecular Biology 2010) is a Ph.D. candidate in the Department of Plant and Microbial Biology at UC Berkeley, and co-author of "Sinus Microbiome Diversity Depletion and *Corynebacterium tuberculostearicum* Enrichment" published in *Science Translational Medicine*.

KRITI BEHL (BS Physiology 2013) is a Peer Health Exchange Coordinator at SF State where she partners with San Francisco public high schools to teach a comprehensive health curriculum that includes sexual and mental health, substance abuse and nutrition.

ALBA GUTIERREZ

(MS Cell and Molecular Biology 2010) co-authored "Quantification and Analysis of Ecdysis in the Hornworm, *Manduca sexta*, using Machine Vision-Based Tracking" published in *Invert Neurosci*.

RICHARD HATFIELD (MA Conservation Biology 2003) is an Endangered Species Conservation Biologist for the Xerces Society for Invertebrate Conservation and co-author of *Conserving Bumble Bees—Guidelines for Creating and Managing Habitat for America's Declining Pollinators.*

BRITTANY HUNTINGTON (MS Marine Biology 2006) earned a Ph.D. in Marine Biology and Fisheries (2011) from the University of Miami's Rosenstiel School of Marine & Atmospheric Science, received a National Research Council Post-doctoral Fellowship (2012) at NOAA's Southeast Fishery Science Center and is an Oregon Department of Fish and Wildlife Marine Reserves Research Project Leader.

CHRISTIAN IBARRA

(MS Cell and Molecular Biology 2002) earned a Ph.D. in Plant and Microbial Biology from UC Berkeley and is a Howard Hughes Medical Institute Postdoctoral Associate in the UC Davis Department of Plant Sciences.

NEWS

SAMANTHA KUBECK (Professional Science Master—Biotechnology 2012) is a Quality Assurance Specialist at Nodality Inc.— a personalized medicine company.

BRIANA MCCARTHY (MS Ecology and Systematic Biology 2008) received the 19th Assembly District's Environmental Leadership Award. She is a Teacher Educator at the California Academy of Science Teacher Institute on Science and Sustainability and works with 3rd and 5th grade teachers to enhance their science and sustainability instruction.

MINA MOSTAFAVI (MS Microbiology 2011) is a Scientific Associate at Novartis Institutes for Biomedical Research.

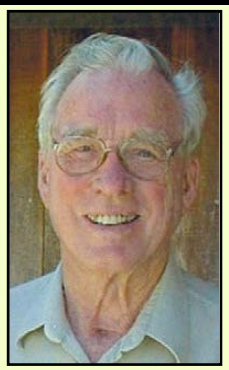
KATIE SANDERS (BS Cell and Molecular Biology 2005) is a Ph.D. candidate in Cell and Molecular Biology at UC Irvine and studies the interactions of microRNA and telomerase in cancer.

MARILYN THOMAS (B.S. Microbiology 2010) was named the 2012 Trustee Emeritus Ali C. Razi Scholar — an honor given to the top-scoring recipient of the William Randolph Hearst/CSU Trustees' Award for Outstanding Achievement.

BAOUYEN TRAN (BS Cell and Molecular Biology 2010) is a Ph.D. candidate at Baylor University and a recipient of an Epilepsy Foundation Fellowship.

An Alumnus remembers

Claude Alexander



Dear BioNews Editor:

I was saddened to learn of Alex's death. His physiology lab course (which I took in 1961)...got me enthusiastic about experimental biology. Alex (along with Dr. Sarane Bowen) mentored my fledgling interest, and gave me the confidence to pursue a Ph.D. and career in neuroscience and diabetes research.

Over the years, my research program has focused on the neuroendocrinology of diabetes and obesity. Our work has made seminal discoveries on CNS mechanisms that regulate food intake and body weight.

DENIS BASKIN, Ph.D.
(B.A. Biology 1962)
Senior Research Scientist
Seattle VA Medical Center
Research Professor
Department of Medicine
University of Washington

Department of Biology
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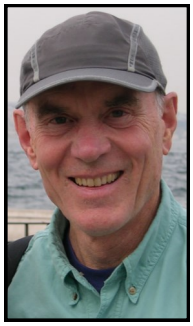
News Briefs



Dr. Wim Kimmerer received the Delta Science Program's 2012 Brown-Nichols Science Award in recognition of his outstanding contributions to science in the San Francisco Estuary and watershed.

Dr. Gretchen LeBuhn's paper "Avian Body Size Changes and Climate Change: Warming or Increasing Variability" was in the top 25 most downloaded *Global Change Biology* articles in 2012.

Dr. Vance Vredenburg was named a California Academy of Sciences Fellow in recognition of his research on the impact of an emerging infectious amphibian disease *chytridiomycosis*.