Greetings from all corners of EEB. We have had another busy and exciting semester. After 11 years at the helm of EEB, Mark Bertness stepped down from the Chair position and stepped up to a long-deserved sabbatical in Sardinia. We congratulate Mark on his strong leadership and all the great things he has done for EEB over the years. I am delighted to be following in his footsteps and now finally appreciate all the hard work Mark has done to get us where we are today.

It has been a bumper semester by all counts. We welcomed 14 new graduate students – nine joined the PhD program, two arrived as transfers, and three are working on master’s degrees. We were treated to a string of polished Brown Bag seminars by many of these students describing their previous work and thesis plans. Two new faculty have joined our ranks – Jim Kellner, who uses remote sensing to study tropical forest dynamics, and Tim Whitfield, who studies plant diversity and is manager of the Brown Herbarium. Four newly-tenured faculty are taking on new roles on several fronts: Erika Edwards received an NSF CAREER award on the evolution of photosynthetic pathways and is planning new course material in support of that project; Stephen Porder enjoyed a productive sabbatical learning R and writing a well-received piece for the New York Times; Dov Sax has been appointed Director of the Center for Environmental Studies; and Dan Weinreich has stepped in as Co-Director of Graduate Studies in EEB.

Four EEB Faculty have moved their labs to BERT (Building for Environmental and Research and Teaching) – the newly renovated, former Psychology building across the street from Walter Hall. Shiny new labs and offices are crowned by a rooftop, state-of-the-art greenhouse with fancy new research and teaching space. It will unite a core of EEB faculty working on questions in conservation biology and environmental science.

EEB ended the year with a flurry of high profile stories on the Brown Web page highlighting new publications: Casey Dunn’s science paper, Sharon Swartz’s work on Bat flight visualized in the CAVE, and Jim Kellner’s studies of climate-driven northward movement of mangroves. As always, these great things have been celebrated every Friday in the nicely renovated Walter Hall Conference Room. Everyone seems to have high fitness, explosive speciation and low extinction rates. In Darwin Speramus!

### New to EEB in 2013

**Tiffany Amaral**  
Grants Coordinator  
Walter Hall

**Natividad Chen**  
Research Assistant  
Brainerd Lab

**Robert Lamb**  
Graduate Student, Universidad San Fran de Quito, Ecuador; Witman Lab

**Christopher Anderson**  
Postdoc: PhD, University of South Florida; Roberts Lab

**Juriaan de Vos**  
Postdoc: PhD, University of Zurich, Switzerland; Edwards Lab

**Rachel Menegaz**  
Postdoc: PhD, University of Missouri; Brainerd Lab

**Christopher Arellano**  
Postdoc: PhD, University of Colorado at Boulder; Roberts Lab

**Nuria Fernandez Gonzalez**  
Postdoc: PhD, Universidad de Autonoma Madrid, Spain; Rich Lab

**Abigail Moore**  
Postdoc: PhD, University of California at Berkeley; Edwards Lab

**David Boerma**  
Graduate Student from Clemson University; Swartz Lab

**James Kellner**  
Assistant Professor; ECI; PhD, University of Georgia

**Catriona Munro**  
Graduate Student from Southampton University, UK; Dunn Lab

**Sofia Castello y Tickell**  
Research Assistant  
Witman Lab

**Kealohanuiopuna Kinney**  
Graduate Student from University of Maryland; Kellner Lab

**Priyanka Nakka**  
Graduate Student from Wellesley College; Ramachandran Lab

**Huili Chen**  
Visiting Research Fellow  
Bertness Lab

**Phillip Lai**  
Fifth-Year Master’s Graduate Student  
Swartz Lab

(Continued on page 7)
Patterns of plant diversity and the ecological mechanisms that drive species co-existence have always been at the heart of my interest in field biology. Nowhere was this question more relevant than in the New Guinea lowland rainforest where I worked as a graduate student while at the University of Minnesota. These hyper-diverse forests contain more tree species in a few acres than could be found across the entire eastern part of North America. My research focused on understanding patterns in this diversity from a taxonomic, phylogenetic, and functional perspective. In other words, I wanted to know the number of species, the evolutionary relationships between these species, and also their life history strategies. Observing patterns in these different aspects of diversity can help inform hypotheses related to the mechanisms driving community assembly and the maintenance of species coexistence.

The question of what drives and maintains plant diversity is one aspect of my research but I’m also interested in how diversity influences other biological processes. My postdoctoral work focused on the relative role native plant diversity plays in resisting non-native invaders in the forests of central and southern Minnesota. Theory predicts that communities with high resident diversity tend to be more resistant to invasion but the role of diversity relative to other biotic and abiotic factors is poorly understood.

Whether working in tropical or temperate communities, I have always been interested in making plant collections to document my work. Herbarium specimens offer tremendous opportunities to address many questions beyond the original purpose of their collection. Within the mysterious cabinets of a herbarium lie vast arrays of specimens that contain morphological and anatomical details as well as definitive records of species distributions. Here at Brown, we have a historical collection that offers curious botanists the opportunity to investigate a record of diversity going back at least 150 years. As collections manager of the Brown University Herbarium, my role is to ensure the existing specimens are available to the widest possible audience.

A particularly exciting aspect of this responsibility is the current digitization project. With the help of Brown undergraduates, we will take a digital image of each specimen (around 100,000 images in total) and record where, when, and by whom each collection was made. When this project is complete, our collections will be available to anyone with an internet connection and be part of a larger dataset that includes herbaria from across northeastern North America. Considering how limited the access to Brown’s Herbarium was just a few years ago, the recent transformation is remarkable and being part of the change is extremely exciting.

In addition to being an important historical collection, Brown’s herbarium is also a working research facility relevant to faculty and students across campus. My goal is to facilitate growth in the collections through my own work and by collaborating with botanists and ecologists at Brown, regionally, and around the world. I plan to continue working in New Guinea where there is much to be discovered and many opportunities for addressing important ecological questions. Closer to home, I am also enthusiastic about compiling a complete collection of Rhode Island plants and hope to involve students in this effort.

Thanks to Stephen T. Olney, the herbarium’s 19th century benefactor, our collection includes a complete local flora circa 1850. How Rhode Island plant diversity has changed over the past century and a half is an interesting question that could involve a cadre of undergraduate botanists. With this in mind, I hope to develop a local flora class for students interested in investigating regional plant diversity.

It’s exciting to be part of such a varied and dynamic department. I’ve also enjoyed the vibrant atmosphere on campus and look forward to working with Brown’s students. The herbarium is also a great way to connect to a larger, off-campus, population of scientists and enthusiastic members of the public and my goal is to ensure our collection becomes an important regional resource to a wide and varied audience.
In case you missed the announcement in the last issue of the newsletter, **Erika Edwards**, **Stephen Porder**, **Dov Sax** and **Dan Weinreich** were promoted to Associate Professor with tenure. Continuing congratulations to all!

We have a new Dean of Medicine and Biological Sciences, Jack Elias from Yale. His research focuses on the molecular and cellular mechanisms of lung injury and repair. He gave an enthusiastic presentation of his work at the December faculty meeting and made a strong pitch for interaction among the different parts of Biomed.

**Mark Bertness** is on a senior Fulbright Fellowship at the University of Sassari, Sardinia, Italy, studying sand dune community organization.

**Casey Dunn** was a coauthor of a paper in Science (see Publications: Ryan et al.) that placed the comb jellies at the base of the animal family tree. This paper, which used entire genome sequencing, backs up conclusions of an earlier study in which Casey was lead author (Nature 452:745, 2008).

**Erika Edwards** is now an associate editor for Systematic Biology and the International Journal of Plant Sciences. She also gave a plenary lecture at the 16th International Photosynthesis Congress this summer.

**Adella Francis** has moved to the Graduate School as their financial guru. We miss you, Adella, but wish you the best of fortunes in your new position. Tiffany Bagby has taken Adella’s position.

Loh Down on Science picked up **Nick Gidmark**’s work on bite strength of carp, which he originally published in Biol Lett 9:20121181 (2013).

**Cally Harper**’s dissertation work on how bat tongues gather nectar from flowers, which appeared in PNAS (see Publications), appeared as a Research Highlight in Nature (497:291). Brown News and Events interviewed Cally about this research (6 May).

**Fred Jackson**, director of the Plant Environmental Center, has been busy this semester leading the move to transfer equipment and plants to the new, high-tech greenhouse perched atop newly renovated Hunter Laboratory, now the Building for Environmental Research and Teaching. Fred will have an enthusiastic report about this 21st-century operation in the Spring newsletter.

**Heinke Jäger** moved on from a post-doc with Stephen Porder and Dov Sax to a position as a restoration ecologist at the Charles Darwin Research Station in Galapagos, Ecuador, where she will hunt invasive African land snails, combat invasive blackberry and continue working on the invasive quinine tree.

Brown News and Events (15 July) interviewed **Heather Leslie** about the group’s paper (Reddy et al. - see Publications) on market forces and sustainability in a Mexican fishery.


**David Rand** received the Dean’s Award for Excellence in Teaching, Advising and Mentoring in the Biological Sciences.

**Dov Sax** is now Director of the Center for Environmental Studies. Brown New and Events (31 May) interviewed Dov at length about the new curriculum in environmental studies.

**Victor Schmidt** was awarded an NSF EPSCoR -RI fellowship to study the influence of antibiotics on fish microbiomes.

Former Bertness grad student **Brian Silliman** was named Associate Professor and the Rachel Carson Chair in Conservation Biology at Duke University.

**Kate Smith** and **Sohini Ramachandran** received an ECI research grant to work with faculty in Geology and Biostatistics on the environmental drivers of global disease outbreaks.

**Sharon Swartz** was one of the instructors in a co-listed Brown/RISD course, “Virtual Reality Design for Science”, which utilizes Brown’s “Cave” (virtual reality environment). These students developed interactive 3-D visualizations of bats in flight.

Casey Dunn’s CreatureCast, which we’ve featured in previous newsletters, now appears periodically in the New York Times at creaturecast.org. In an interview appearing in the Times on September 16, Casey also talks about how he became engaged in CreatureCast and about the role he feels CreatureCast plays in both enhancing public understanding and in helping to maintain the fascination and enthusiasm of students who are learning about science. Here are some episodes that have appeared in the Times during the past autumn.


ADDENDUM: An undergraduate thesis talk was inadvertently omitted from the May 2013 issue of the newsletter.

**Harriet Booth** (Deegan) Does Chronic Nutrient Enrichment Result in a Trophic Bottleneck in a Salt Marsh?
Remote Sensing of Ecosystems
By Jim Kellner, Assistant Professor

I am interested in the structure and dynamics of forests over large geographic areas, especially in tropical systems. Most of my research today is focused on tropical rain forests in the Central American republics of Costa Rica and Panama, in addition to systems in the Hawaiian Islands. Some of the questions that my students and I are working on include understanding the role of natural and anthropogenic disturbances in mediating interactions between tropical forests and the atmosphere, and whether tropical forests are a net source or sink of carbon (C). In the Hawaiian Islands we are working with collaborators to understand how pathways of primary succession after volcanic origination of substrates may depend on the frequency of fire, and how this information can be used to inform conservation and management of landscapes with numerous threatened and endangered species. What integrates these questions is that they deal with processes that are playing out on large landscapes, and they are therefore difficult or impossible to answer using traditional field studies alone.

To overcome this limitation, I use environmental remote sensing as a framework to address questions in basic and applied science from both ecological and evolutionary perspectives. Much of my work has been facilitated by recent developments that allow us to quantify the structure, chemical and physiological condition of plants at very high resolution and throughout large areas using airborne or satellite data. These technologies enable researchers to ask entirely new questions, or to interrogate old questions from new perspectives. One example is the problem of introduced species in the Hawaiian archipelago. The Hawaiian Islands are the most remote archipelago on Earth, and contain no native, ground-dwelling, terrestrial mammals. Introductions of ungulate herbivores, such as goats and sheep, contributed directly to the impoverishment of Hawaiian biota. Contemporary management emphasizes removal and exclusion of herbivores through large-scale fencing and hunting operations, but we do not know whether these actions lead to recovery of targeted populations of native plants. My collaborators and I have worked to determine whether removal and exclusion of goats facilitated recovery of native populations using a large-scale experiment integrated with field studies and airborne and satellite remote sensing. I compared a 4.28 km² treatment area that was fenced in 2001, followed by removal of ungulates in 2003, to an unmanaged control site of 3.0 km² where ungulate numbers were not manipulated. Assessment of impacted and control sites before and after ungulate exclusion using airborne and satellite remote sensing combined with ground-based field studies showed that removal of ungulates facilitated increases in exotic species, but the abundance of native species was unchanged. Time series of the enhanced vegetation index (EVI) from NASA’s MODIS sensor were indistinguishable between the treatment and control sites for four years prior to ungulate removal, but diverged immediately following exclusion of ungulates. The increase in EVI, which I corroborated in the field, coincided with the timing of ungulate removal, a crucial finding that was only possible through the integration of satellite observations and field studies.

In Panama, my colleagues and I are combining measurements of foliar chemistry made throughout a large landscape managed by the Smithsonian Tropical Research Institute with functional genomics. I want to understand sources of variation in chemical phenotypes of canopy trees, and whether these have a primarily genetic or environmental basis. This project builds on an approach that I developed during my dissertation using high-spatial-resolution satellite observations from commercial sensors to map canopy trees remotely and quantify population dynamics.

Before coming to Brown I was an Assistant Professor at the University of Maryland, College Park, and a postdoctoral research scientist at the Carnegie Institution for Science in Palo Alto, California. I am excited by opportunities to teach and mentor Brown undergraduates and graduate students. Over the next few years, I will be working to implement a remote sensing platform onboard a medium-sized autonomous aircraft. This is sure to generate lots of opportunities for undergraduates and graduates to bring remote observations to bear on ecological and evolutionary problems.
2013 Fall Seminars

Tuesday Colloquia
A formal colloquium that features guest speakers from outside Brown University

9/17 Rick Prum, Yale University.
The evolution of beauty.

9/24 Hopi Hoekstra, Harvard University.
From mice to molecules to mutations.

10/1 Kurt Schwenk, University of Connecticut.
How snakes smell with their tongues.

10/8 Holly Dunsworth, University of Rhode Island.
How hip is human life history?

10/15 Colleen Farmer, University of Utah.
Loopy lungs: The role aerodynamic valves and unidirectional airflow in the evolution of Permian and Triassic tetrapods.

10/22 Christopher Dick, University of Michigan
Biogeographic and community assembly of tree diversity in species rich tropical forests.

10/29 Alison Sweeney, University of Pennsylvania.
Biophotonics of the Tridacnid giant clam photosymbiosis.

11/5 Robert Shadwick, University of British Columbia.
Biomechanics of large baleen whales.

11/12 Casey Dunn, Brown University.
The evolution of complexity in animals.

11/19 Matthew Bonds, Harvard University.
Ecology of poverty and disease.

12/3 Melina Hale, University of Chicago.
Development of fin morphology and movement in the context of changing functional demands.

Brown Bag Seminars
Talks that cover research and work within the EEB department

9/13 Kealoha Kinney, Graduate Student.
Decoding long term ecosystem development in tropical drylands.

9/20 Apollonya Porcelli, Graduate Student, Sociology (EEB Open Master’s Program).
Ecological knowledge, fishing livelihoods, and species composition of the Xingu River in Brazil.

9/27 Jurriaan de Vos, Postdoctoral Research Fellow.
Heterostyly and whole-plant aspects of sexual diversity.

10/4 Brooke Osborne, Graduate Student.
Moisture and temperature controls on nitrification differ among nitrifier communities from three alpine soil habitats.

10/11 Adam Spierer, Graduate Student.
Relationship of cross-linking potential to mechanism of cell death.

10/18 David Boerma, Graduate Student.
From turtle ecomorphology to bat flight.

10/25 David Sleboda, Graduate Student.
Force enhancement in bullfrog skeletal muscle.

11/1 Robert Lamb, Graduate Student.
Drivers of marine community structure in a dynamic oceanographic system.

11/8 Kim Cohen, Graduate Student.
From bats to bunnies.

11/15 Cat Munro, Graduate Student.
Under pressure: What barophysiology can tell us about bathymetric distribution patterns.

11/22 Carlos Silva, Graduate Student.
Tropical forest response to climate and atmospheric change.

12/7 Chris Graves, Victor Schmidt & Elizabeth Makrides, IGERT Graduate Students.
From knee deep in s**t to neck deep in data: The journey of Team Powersoil.
New Publications

PUBLICATIONS


**Smith KF, V Schmidt, GE Rosen** et al. 2013. Microbial diversity and potential pathogens in ornamental fish aquarium water. PLoS ONE 7(9):e39971.


Feedback to the EEB Newsletter:
We would like to hear from you!
Comments and information are welcome to:

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