

Dear EEBer,

This is our fourth annual newsletter to EEB alums and current students. Our goal is to keep everyone informed of what is happening in Tulane's Department of Ecology and Evolutionary Biology (EEB).

We continue to build strength in the sub-disciplinary areas in which we have focused our research and teaching efforts. During the past academic year we successfully hired a new plant ecologist, Taylor Feild, who becomes a member of the EEB faculty this fall semester. We are very pleased to have Taylor join us as an advanced assistant professor from the University of Toronto. This coming academic year we expect to fill another new faculty position in phylogenetic systematics. So this is indeed an exciting time in the EEB Department.

We congratulate all the award winners from this past year. If you have information you would like to share with others you know, please inform us about it so that we can include it in next year's newsletter. Information on where to write is given below.

David C. Heins, Professor & Chair



The EEB office is located in Dinwiddie Hall, Room 310. In 1923, Moise Goldstein & Associates designed the Science Building in an Elizabethan style with Alabama limestone, concrete and brick. The building was renamed in 1936 for Dr. Albert Bledsoe Dinwiddie, Professor of Mathematics and President of Tulane University from 1918 to 1935.

### EEB STUDENT HONORS & AWARDS 2004-2005

#### Undergraduate Students

The Fred R. Cagle Memorial Prize

**Jennifer Weaver (NC)**  
**Aaron Fox (TU)**

The Senior Scholar Award

**Jennifer Weaver (NC)**

The Zoology Prize

**Pamela Thompson (NC)**  
**Johanna Ecke (NC)**

The Gerald E. Gunning Memorial Award

**Meghan Greeley (NC)**  
**Ashley Olson (NC)**

#### Graduate Students

George Henry Penn Award

**Donata Henry**

Teaching Assistant Award

**Tara Massad (Diversity of Life)**  
**Samantha Gerlach (Upper-level Courses)**

Theodore Roosevelt Memorial Fund

**Mollie Cashner**

Who's Who in American University Students

**Malia Fincher**

University of Sydney Research Fellow

**Shawn Vincent**



#### Completed Dissertations

The following Ph.D. candidates have successfully defended their dissertations:

**Gantt C. Boswell**—"Nitrogen economy of the purple pitcher plant, *Sarracenia purpurea* L., in the Gulf of Mexico Coastal Plain"

**Donata R. Henry**—"Reproductive success and habitat selection of Swainson's Warbler in managed pine versus bottomland hardwood forests"

**Carlos Valderamma**—"Effect of bottomland hardwood forest fragmentation on spider communities in southeastern Louisiana"

#### Updates from EEB Alumni

EEB Undergraduates Admitted to Graduate School:

**Joanie Kenney (NC '01)**—Experimental Pathology / Microbiology at the University of Texas Medical Branch, Galveston, Texas

**Melissa Touns (NC '04)**—Zoology at the University of Florida

If you are an EEB alum, we would love to hear from you! Please send your career news to [eebalums@tulane.edu](mailto:eebalums@tulane.edu).

We welcome pictures and brief descriptions of what you're up to lately!

**Hank Bart**, his students and associates are continuing their work on several studies of systematics and evolutionary ecology of fishes. Hank's NSF-funded systematic revision of ictiobine fishes (carpsuckers and buffalofishes) is in its third and final year. **Hank, Mark Clements, Mike Doosey** and **Nelson Rios** are part of a new international collaboration to produce a tree of life for cypriniform fishes (minnows and carps; <http://bio.slu.edu/mayden/cypriniformes/core.html>), funded by the prestigious Assembling the Tree of Life program at NSF. The four of them traveled to Tallinn, Estonia in Fall 2004 to present two invited papers in a symposium on cypriniform fishes at the European Congress of Ichthyology. Another symposium on cypriniforms is being planned for the Japanese Ichthyological Society meetings in Fall 2005. **Mike Doosey** was accepted into the East Asian and Pacific Summer Institute jointly funded by NSF and science funding agencies in Australia, China, Japan, Korea, and Taiwan. Mike will spend two months in Japan in Summer 2005 doing mitogenomic sequencing at the Tohoku National Fisheries Research Institute. **Mark Clements** and **Rebecca Blanton** are nearing completion of their respective phylogeographic studies of western "jumprock" suckers and the fantail darter species complex. Rebecca was accepted into the Applied Phylogenetics Workshop at Bodega Bay this spring. **Mollie Cashner** will be conducting field experiments with nest associating minnows at the Highlands Biological Station and near-by streams in North Carolina this spring and early summer. **Andy Abernathy** is just starting a project examining the effects of taxonomic name changes in museum databases on niche-modeling this spring and early summer.



**Taylor Feild's** work is focused, but not exclusively, on tropical plant ecophysiology and evolutionary biology. He explores the interacting roles of whole organism form/function in shaping the evolutionary trajectories of particular lineages. All of the projects in his lab weave together ecophysiological data, with phylogenetic patterns, to mechanistically inform the tempo of ecological evolution. In particular, he is interested in how new plant functional traits originate and how functional/ecological characters of the plant vegetative system (i.e., wood and leaf form) connect to understanding diversification and extinction. During the past six years, he has focused his approach on two enduring puzzles of evolutionary botany: the origin of vessel-less wood in the tropical cloud forest angiosperms Winteraceae and the early ecological evolution of angiosperms. Dr. Feild is keenly interested in sharing his interests and enthusiasm for plants as organisms with graduate and undergraduate students through field- and laboratory-based teaching.

First and foremost in news from **Dr. Sherry's** lab is the recent defence of dissertations by **Donata Roome** ("Reproductive success and habitat selection of Swainson's warbler [pictured right] in managed pine versus bottomland hardwood forests") and **Carlos Valderrama** ("Effect of bottomland hardwood forest fragmentation on spider communities in southeastern Louisiana"), both in December of 2004. Hot on their heels are **David Brown** (ecology of ovenbirds wintering in Jamaica) and **Jennifer Coulson** (demography and nesting ecology of Swallow-tailed Kite), both planning to defend in September of 2005. Both have written several chapters of their dissertation and submitted them for publication.



The tropical students, meanwhile, have not been idle. **Bryan Sigel** has a paper from his dissertation *in press* in Conservation Biology ("Avian community response to lowland tropical rainforest isolation: 40 years of change at La Selva Biological Station"), another chapter is nearly completed, and he plans to complete the dissertation within a year. **Stefan Woltmann** should defend his prospectus in Fall 2005, and he already has done several trips to Costa Rica and Nicaragua, where he plans to assess dispersal and survival of the Chestnut-backed Antbird in response to human landscape alterations in tropical rainforests where this species resides.

Sherry enjoyed the pleasure of bird-watching in December with former student in the lab, **Shannon Tanner** (NC, '03), who did a senior honors thesis on bird communities in commercial pine communities in Louisiana. The list of birds for the day was about 30, which is not bad considering the strength of the Mistral winds buffeting the Camargue wetlands of the Mediterranean coast of southern France, where the two attempted to increase their European bird lists. Sherry is spending the last 6 months of his sabbatical leave nearby in Montpellier, France, studying the methods of capture-recapture-dispersal, including many new modelling and statistical procedures. These methods will be broadly applicable to the kinds of demographic (population) and conservation research he envisions for the lab for the next few years. He tries to learn what he can about French wine and cheese, and other aspects of the culture with his family until June of 2005.

Researchers in the **Irschick** lab have been extremely busy. **Christine Buckley** has had several papers accepted (one in Functional Ecology, the other in Animal Behaviour), and has begun her research on plasticity and life history in *Sceloporus* lizards. She was also awarded a prestigious explorers grant for \$1200 to fund her summer research. **David McMillan** has also had considerable success examining heat-shock proteins in lizards in a productive collaboration with Dr. Barney Rees from the University of New Orleans. David is interested in how heat-shock expression is related to various aspects of locomotor performance in lizards. **Shawn Vincent** has been hard at work publishing the final portions of his thesis, including papers in the Journal of Zoology London, and Oecologia. Both papers examine feeding in a fascinating group of water snakes. **Simon Lailvaux** has also been busy submitting grants and writing; recently he and Duncan Irschick have been working on a review for the journal Animal Behaviour that synthesizes prior studies on sexual selection, physiology, and performance. Finally, **Phillip Bergmann** has been traveling all over the country gathering digital x-rays for his work examining the evolutionary bases of variation in vertebral number and limb dimensions. Phillip has been working closely with several undergraduates (**Jacqueline Fountain** (NC '05) and **Wan-Ching Wu** (NC '08) ) on both this topic and also the basis of temperature dependence of several kinds of performance (clinging and sprinting), for which several papers are in review. Currently, the PI (Duncan Irschick) has been hard at work on his sabbatical in Arizona and is enjoying the bracing weather in Flagstaff and the abundance of lizards.



The major areas of research in **Lee Dyer's** laboratory include: chemical ecology, diversity of tropical plants and insects, effects of climate change on insects, biological control of pest herbivores, and natural history of moths and butterflies. We investigate how plant chemistry and parasites affect insect herbivores in banana plantations, tropical rain forests, alfalfa fields, temperate grasslands, and laboratory mesocosms.

Our exhaustive collecting and rearing programs in Costa Rica, Ecuador, Arizona, and Louisiana are uncovering patterns that help us answer questions such as how will global warming affect outbreaks of insects in forests and agricultural fields? In addition, our experimental approach combined with analyses of plant chemistry address questions on causes and consequences of high levels of biodiversity. Basic natural history data and keys to immatures are continually entered into an online database:

<http://www.caterpillars.org>

Information on researchers in the laboratory can be found at the following URL: <http://www.tulane.edu/~piper/person.htm>.

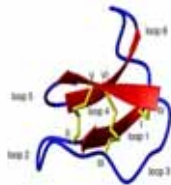
Summaries of our major research projects are posted on this web address: <http://www.tulane.edu/~piper/res.htm>.



**Hank Bart** and **Nelson Rios** are continuing their work on several biodiversity informatics initiatives. The tool they developed for automated georeferencing of natural history collection data (GEOLocate; <http://www.museum.tulane.edu/geolocate/>) is gaining wide acceptance in the natural history collection community. A proposal to develop a world version of GEOLocate is pending at NSF. Hank and Nelson are collaborating with scientists at the University of Kansas Natural History Museum and Biodiversity Center on a new, NSF-funded project to create a new distributed network of fish collection databases called Fishnet II. TUMNH's role in the project is to develop a collaborative georeferencing framework to optimize record verification across the network. Hank and Nelson are also collaborating with investigators across the country to develop an Internet-based georeferencing toolkit called Biogeomancer, with funding from the Moore Foundation. The project is enabling them to offer many of GEOLocate's georeferencing capabilities as web services. Nelson is the architect of the unique cyberinfrastructure currently under development for the Cypriniformes Tree of Life project. The virtual portal he is developing may serve as a model for other NSF Tree of Life projects. Hank was recently elected to the steering committee for the Legacy Infrastructure Network for Natural Environments project (LINNE; <http://www.flmnh.ufl.edu/linne/>), a major new funding program currently being proposed for development at NSF. The aim of the project is to build a network of cyber laboratories at natural history museums for enhancing taxonomic research.



**Steven Darwin's** graduate student **Samantha Gerlach** has found new, potentially therapeutic compounds, in South Pacific plants. Samantha traveled to Sweden for one month this spring to study plant cyclotides at the Medicinal Chemistry Department, Division of Pharmacognosy, Uppsala University. Cyclotides, a recently recognized family of complex proteins, are composed of approximately 30 amino acids and characterized by a cystine knot containing three conserved disulfide bridges embedded in a circular peptide backbone. In the 1960s, physicians noted that a decoction of the plant *Oldenlandia affinis* (Rubiaceae) was used in traditional medicine by women of northern Congo. The first known cyclotide, Kalata B1 (pictured right), was later isolated and sequenced from an extract



of the plant. To date, roughly 50 cyclotides have been sequenced from three plant families: Violaceae, Rubiaceae, and Cucurbitaceae. They display powerful therapeutic properties including anti-HIV, uterotonic, hemolytic, and cytotoxic activity. Their speculated natural function is plant defense, supported by their antibacterial, antifungal, and insecticidal attributes. While at Uppsala, Samantha analyzed two woody plants native to Samoan and Palaun rain forests: *Psychotria leptothyrsa* (left) and *P. insularum* (bottom right), both of Family Rubiaceae.

The latter species has a long history of medicinal use in Samoa. Preliminary results suggest that *P. leptothyrsa* and possibly also *P. insularum* contain cyclotides. Future research goals include isolating and sequencing these cyclotides and seeing if cyclotides are present in other Pacific Island *Psychotria* species. Samantha's research is being directed by Steven Darwin (EEB, Tulane) and Paul Cox (Institute for Ethnomedicine, Provo, Utah). Her travel to Sweden was partially supported by the Institute for Ethnomedicine.



**Jeff Chambers'** research focuses on the ecology of forest trees, respiration and photosynthesis. Studies he has led have helped elucidate the role of tropical forests in the global carbon cycle and forest interactions with the atmosphere, including the discovery of thousand year old trees in the Central Amazon. Most of his research is being carried out in the Amazon basin with a currently funded project from NASA (The Large Scale Biosphere-Atmosphere Experiment in Amazonia). Plans to expand this work to other Neotropical sites (Ecuador, Peru, French Guyana, and Bolivia) are underway in collaboration with an integrated network of permanent forest sample plots called RAINFOR. This regional work includes relating field data on canopy chemistry and species composition to high-spectral resolution satellite remote sensing data, toward better understanding ecological processes occurring across the entire Amazon basin. A project in Brazil's Atlantic Rainforest, listed as among the top five biodiversity hotspots by Conservation International, is continuing. Here, reforestation efforts on degraded landscapes are being linked to sequestration of atmospheric CO<sub>2</sub> under a carbon trading framework that links ecology and economics. In addition, reforestation experiments using different species compositions and planting densities as treatments have been established. Activities are also underway locally at the Pearl River Basin in bottomland hardwood and flooded swamp forests using similar field and remote sensing methods being applied in South America.



The laboratory of **David Heins** published two long-term studies this year. Former Newcomb College students **Britt Ulinski** (NC '01) and **Jill Johnson** (NC '99) co-authored with David a paper on the effects of the cestode macroparasite *Schistocephalus* on reproductive success in ninespine stickleback of Alaska. The research showed that *Schistocephalus* is a parasitic castrator which takes host fitness to zero by inhibiting reproduction. Infected female stickleback, however, showed significantly better body condition than uninfected, reproducing females. The symptoms of infection observed in the study may represent adaptive parasite manipulations resulting in an extended parasite transmission period by allowing hosts to live longer than they would had they been reproducing.

**David** co-authored a paper with colleagues at other institutions that addressed life history differentiation in benthic (bottom feeding) and limnetic (plankton feeding) threespine stickleback from Alaska. The two ecotypes exist at three levels of variation: species differences, ecotypic variation among populations, and polytypic variation within populations. This was the first paper addressing life history differences in these two forms of stickleback which have received a great deal of attention in terms of morphological variation and speciation. In the polytypic population studied, benthic females produced fewer, larger eggs than their limnetic counterparts. The research provided the first evidence of reproductive life history differences between morphotypes of stickleback within a population. The association between morphology and egg size may reflect disruptive selection on fry size imposed by differences in water temperature between habitats (shallow versus deep water; stratification, thermoclines and all that jazz) in which the morphotypes breed.



**Jennifer Weaver** (NC '05) completed an honors thesis involving a long-term study addressing the possible effects of a major forest fire (Millers Reach Fire) on the reproductive biology of threespine stickleback in one lake of the Matanuska-Susitna Valley, Alaska. Nutrient enrichment of lakes during (ash fall) and after (runoff) the fire appears to have resulted in increased lake productivity and hence changes in the reproductive allocation of the fish involving clutch size, egg size and clutch mass. Further research is planned to determine if changes occurred among stickleback in other lakes in the burn area as compared with lakes outside the fire zone.

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## New Faculty Search:

### Phylogenetic Systematics

The EEB Department seeks a scientist whose research objectives address the way in which life has diversified and changed over time and the creative mechanisms that underpin our understanding of biological diversity.

visit us online: [www.tulane.edu/~ebio](http://www.tulane.edu/~ebio)



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