



# BIOrhythms

Washington University Biology Department Newsletter

October 2009

*"Bittersweet October.  
The mellow, messy,  
leaf-kicking, perfect  
pause between the  
opposing miseries of  
summer and winter."*

—Carol Bishop Hipps

## Helpful Links

Biology Home Page  
Biology Course Listings  
Faculty Listings

*BIOrhythms is a publication of  
the Washington University  
Biology Department for  
Undergraduate Majors*

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## Featured in this issue:

Field Trip: [Tyson Research Center](#)

Faculty Spotlight: [Ellen Damschen, Ecology](#)

Course Spotlight: [BIO 4193: Experimental Ecology Lab](#)

Calendar: [Biology Events and links to event listings](#)



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**Tyson Research Center:** [Jon Chase, Director](#); [Kevin Smith, Associate Director](#)



The Tyson Research Center is a field station for Washington University in Eureka, MO that forms the basis of a dynamic environmental research and teaching program. Underutilized for its first 35 years, Director and Biology Professor Jon Chase along with his dynamic staff at Tyson, facilitate research and mentor opportunities for faculty, post-docs, grads, undergrads and even high school students.

## Undergraduate Opportunities

Tyson's summer research program for undergraduates is twelve weeks, May-August, is modeled after National Science Foundation Research Experience for Undergraduate sites around the country and includes a variety of activities:

- Participation in an active research project with a mentor, often leading to publications and/or honors theses
- Weekly natural history sessions: for example, a day on birds or insects
- Weekly seminar series: open to public; a professor from another institution gives a talk. The after-barbecue lets undergrads feel they're a part of the research community by mingling and socializing with professionals in the field
- High school internship program (in collaboration with Science Outreach and MO Botanical Gardens): gives undergrads a chance to play a role in mentoring high school students, typically from underserved areas; a great way to give back to the community and educate on ecology
- Volunteer opportunities: for example, working in the organic garden on site. Garden produce is used for staff and public events. Tyson tries to use all local foods when catering an event.



Funding from Wash U, Howard Hughes Medical Institute, the National Science Foundation and other grants provide fellowships and paid internships —*cont'd on page 3*

## The Ecology and Evolution Track

Regular Biology Core requirements plus an advanced lab requirement and 3 electives in Ecology or Evolution.

### Advanced Laboratory Requirement (one of following)

- Bio 4193 Experimental Ecology Laboratory
- Bio 437 Lab on DNA Manipulation
- Bio 4342 Research Explorations in Genomics

### Advanced Evolution and Ecology Electives

Students whose main interest is ecology should take at least two ecology electives and one evolution elective; students whose main interest is evolution should take at least two evolution electives and one ecology elective.

#### Ecology Electives

- Bio 372 Behavioral Ecology
- Bio 381 Intro to Ecology
- Bio 4170 Population Ecology
- Bio 419 Community Ecology

#### Evolution Electives

- Bio 3501 Evolution
- Bio 4181 Populat. Genetics
- Bio 3501 Evolution
- Bio 4182 Macroevolution
- Bio 4183 Molecul. Evolution
- Bio 4202 Evolutionary Genetics

## BIO 200/500 Independent Study/Research

**Purpose:** to provide opportunities for students to gain experience in using the scientific method to resolve problems of scientific importance.

**STUDENTS CAN NOW APPLY ONLINE!** Visit the website to learn more:  
<http://www.nslc.wustl.edu/courses/BIO500/bio500.html>

## Course Spotlight: BIO 4193 Experimental Ecology Lab



Offered every other Fall, this unique lab course allows students to work in the field to explore key ecology concepts: foraging, dispersal, and top-down bottom-up control. Students use the existing field sites at Tyson Research Center and the natural surroundings to design and interpret ecological experiments, gaining hands-on and writing experience. The Lab takes place 75% of the time on site. Class begins at Tyson's Living Learning Center with an overview of the day's activities, followed

by a trip out into the field for a statistical test, i. e. collecting data at a site for a specific system or subject. The data is then analyzed and reported on. Students describe the course as writing intensive, experimental, independent, increasingly complex and a great experience for learning how to do scientific research in a physical and realistic sense. The instructors, Jon Chase, Kevin Smith and Tim Dickson, along with T.A. Lauren Woods, act as mentors, providing guidance while at the same time leaving students in charge of designing and conducting experiments and writing about them, especially during the last 3rd of the semester. This is a great course for students interested in continued education and making a career out of science.

### Class Experience 9/11/09

Today's class met to hypothesize about the relationship between honeysuckle and buckbrush by collecting and analyzing data that examines the relationship between the abundance of the plants and distance from the road. All possible factors must be explored, all theories and alternative explanations discussed and then honed down through the process of elimination. Research questions: are honeysuckle and buckbrush competing? Is honeysuckle displacing buckbrush?



## Faculty Spotlight: Ellen Damschen, Assistant Professor



Biology Professor Ellen Damschen is originally from Hopkins, MN in the Twin Cities area. She graduated from Luther College in Decorah, Iowa with a BA in Music and Communications. While working for a few years after college, Ellen discovered a passion for ecology. She decided to pursue a career in ecology, starting at University of Minnesota to finish pre-requisites, eventually getting her PhD at North Carolina State University and doing a joint post-doc between University of California—

Santa Barbara and the National Center for Ecological Analysis and Synthesis (NCEAS) through an NSF Bioinformatics Post-doc Fellowship. Ellen came to the Washington University Biology Department in July 2007 for a position as an Assistant Professor.

Ellen teaches BIO/EnSt 381: Introduction to Ecology every spring semester. This course explores the science of ecology, including factors that control the distribution of species, population dynamics of organisms, structure and function of biological communities, ecosystem functioning, and environmental responses to human-induced change. Ellen enjoys teaching and working with students as well as —cont'd on page 4

*Tyson Research Center Cont'd*— for students to work in a variety of areas with different PI's (Principal Investigators). There is an information session each fall for paid fellowships in environmental biology the following summer at Tyson as well as other areas around the country. The Fall 2009 session will be sometime in November—look out for fliers advertising the event.

Undergrads sometimes take BIO 500 Independent Study before or after conducting research at Tyson. Some students continue their research for years after starting as undergrad interns, conduct honors theses, and many go on to graduate school (*See the sidebar for some examples of the types of research current undergraduate students are working on.*) Tyson also welcomes classes from other universities, such as a student group from UMSL (University of Missouri-St. Louis) led by Professor Robert Marquis, studying caterpillars. The idea of shared use and collaboration is very important to the mission of Tyson.

### The Living Learning Center

Tyson recently completed the construction of its state of the art Living Learning Center, used for offices, special events, classes such as BIO 4193 Experimental Ecology Lab and summer programs. The Center is trying to meet the Cascadia Region Green Building Council (CRGBC) “living building challenge” to become one of the greenest buildings in North America with zero net energy and zero wastewater. The building must be in operation for a full year before it can be certified. The building’s beautiful woodwork and inlay are made from different types of trees from the Tyson grounds. Check out the website or facebook page to read more about how it is working to meet the CRGBC’s 16 criteria.

### Field Sites for Research Projects



The Cave: used to study the distribution and number of slimy salamanders and cave salamanders



Twin ponds: used in an investigative lab, students study the ponds’ different ecosystems and hypothesize possible reasons for the differences



Pools: polyethylene pools mimic small ponds, different treatments are used for each one to study the biodiversity of small ecosystems

—cont'd on page 4

Undergraduate students talk briefly about their research at Tyson...

Joe Minaljevic studies how parasite diversity varies with spatial factors, productivity, and spatial heterogeneity. His field sites are ponds in the Southeast MO area. He collects and dissects juvenile frogs and counts the internal parasite diversity.

*Research question: What limits parasite diversity and how widespread is it?*

Anny Chung is an intern who helps with everyone’s projects. She’s currently on a project about plant pollinator interactions with basic plant species. She collects bees, flies, etc from the field site in Collinsville, IL and brings them back to Tyson for species identification.

*Research question: How have insect/plant interactions changed since data was last collected for the field site 100 years ago?*

Genevieve Pang studies disease ecology, specifically lyme disease by observing interactions between black-legged ticks and different species of hosts. She sets up host choice experiments in which ticks are given the option of using a mouse or lizard.

*Research question: Do the ticks show a host preference?*

To learn more about undergraduate research opportunities at Tyson, visit the website: <http://tyson.wustl.edu/opportunities.php>.

Student Affairs Office:  
Visit Plant Growth 105  
to...

- Declare a Biology major or minor and get a Biology Advisor
- Sign up for shadowing classes such as MedPrep, PEMRAP or CAREm
- Request HIPAA online training
- Sign up for the Neuroscience Track and/or BIO 404 waitlists
- Pick up general information and/or ask questions about Biology courses

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## Do You Have...

An announcement you'd like to make?

An interesting story or fun fact you'd like to share?

A professor or course you'd like to suggest for a spotlight?

We want your input!  
Send ideas and information to:

[gerrity@biology2.wustl.edu](mailto:gerrity@biology2.wustl.edu)



### *Tyson Research Center Cont'd—*

Prairie restoration: Biology Professor Tiffany Knight's project to study how nutrients and the timing of introduction of species to large plots influence the interactions between native and invasive plants provides many opportunities for undergrad and high school student research projects.

Tyson Research Center is not open to the public and is not a recreational area like its neighbor Castlewood State Park on the Meramec River. People who are not currently conducting research at Tyson but want to visit can attend monthly open houses for the Living Learning Center and Ecology Seminars during summer. See Tyson's website for more information: <http://www.tyson.wustl.edu/>.

*Ellen Damschen cont'd—*the time she spends with her co-workers out in the field doing research. The Damschen Research Lab studies how global change affects plant communities. Their research covers two major topics: climate change in the Klamath-Siskiyou Mountains of southwest Oregon; and habitat fragmentation in the longleaf pine ecosystem in the southeastern states of North Carolina, South Carolina, and Georgia.



### Oregon Klamath Region: Endemic Species and Climate Change

The California Floristic Province is a biodiversity hotspot that extends into southwest Oregon. The Damschen Lab examines whether or not endemic species in this area are at risk from climate change. In particular, they are asking if the floras associated with special soils (low Ca:Mg ratios, presence of heavy metals, low water availability)

may be more at risk than floras on "normal" soils. Plant species on widespread normal soils can often rely on their own movement to find more comfortable climates when conditions become unfavorable. However because special soils are naturally patchy, plants that are endemic to them may be especially vulnerable to climate change effects because they must move greater distances to find suitable habitat.

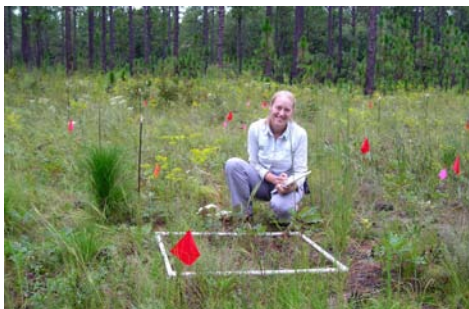
Mountainous areas that include multiple soil types are great for this type of study because there is a wide range of climatic diversity due to rapid elevational and topographic changes. This climatic diversity allows the Damschen Lab to see the same flora in a variety of climates and predict how plants might fare if the general climate were to shift in another direction. The lab compares current vegetation data to eminent ecologist Robert Whittaker's collection of data in 1949-51 to see if the amount of change over time differs among soil types and climates. They are finding evidence of climatic warming and drying. Northern slopes of mountains today look more like southern slopes from the 1950s. The lab also examines the effects of logging and fire suppression as other factors interacting with climate change to alter vegetation patterns. This information will help inform conservation efforts, including the practice of "managed relocation" where species are intentionally moved by conservation biologists to prevent future extinctions.

*—cont'd on page 5*

Ellen Damschen cont'd—

## Southeastern United States: Longleaf Pine Woodland Restoration and Corridors

Habitat destruction and fragmentation are the biggest endangerment factors for the longleaf pine ecosystem of the southeastern US. Only 3% of the original longleaf pine woodland was left by the 1980's. This ecosystem, thought to be 8000 years old, was historically maintained and managed by fire both naturally and intentionally by Native Americans. As the human population and industrialization increased, longleaf pine woodlands were depleted by the “naval stores industry” (lumber, turpentine, tar and more). While the habitat itself is not federally protected, some species within it are such as the Red-Cockaded Woodpecker and Gopher Tortoise. The Damschen Lab and Biology Professor John Orrock's lab are together studying which ecological processes are most effective for restoring longleaf pine understory communities.



In one project, the Damschen Lab uses one of the largest habitat fragmentation experiments in the world to test for the effects of “corridors” (natural habitat hallways that connect larger habitat areas allowing species to move between them) to see if they work. A broader well-known example of this effort is the Y2Y corridor (Yellowstone to Yukon), an international effort to connect habitats between Yellowstone National Park in Wyoming and the Yukon region of Canada. In the experimental landscapes, Ellen's research focuses on understanding how corridors affect the abundance and diversity of plants, while her co-researchers examine other factors such as birds, small mammals, insects, and disease. In new research, the Damschen Lab is exploring how corridors affect wind and how these changes, in turn, affect seed dispersal and fire dynamics.

Results so far indicate that corridors increase the number of native plant species over time, while they don't seem to affect exotic species in any beneficial way, which is good news for preserving the native habitat.

To learn more about the Damschen Lab's research visit the website: <http://biology4.wustl.edu/faculty/damschen/Index.htm>.

## Biology Club Event

Dawn Meehan, Director of Admissions at Cold Spring Harbor, and grad student Colin Malone (Wash U alum) are coming to speak to the Biology Club on Monday, October 5th, 6-7 PM. Cold Spring Harbor Laboratory is recruiting for their undergraduate summer research program (an excellent opportunity to conduct mentored research in cancer, neuroscience, plant biology, genomics, or bioinformatics) as well as graduate school students to attend their school. Summer interns live near the beautiful scenery of the Laboratory's own private campus in Long Island, New York, work with committed, experienced faculty in cutting-edge fields of basic science research, and receive a stipend to cover their costs for the summer. You can find more information at [www.cshl.edu](http://www.cshl.edu), or by stopping by this annual presentation.

If you would like to attend (no commitment, just as a 'possibility'), please RSVP so that we can know how many people to expect. Pizza and drinks will be provided at the meeting. Email [wubioclub@gmail.com](mailto:wubioclub@gmail.com) for RSVP, questions or information.

## Wind Study Results



Corridors increase the number of wind-dispersed species by both the connection they provide and the change in patch shape (i.e., corridors increase the amount of habitat edge). The Damschen Lab investigates why. The team puts up towers with fake fluorescent seeds that mimic native species in size, weight, etc. They release the seeds under variable wind conditions and come back at night to find them using lights.



*This project is a collaboration with CO-PI Jay Turner from Department of Energy, Environmental and Chemical Engineering, CO-PI Dirk Baker (postdoc in the Damschen Lab), and CO-PI Gil Bohrer of The Ohio State University.*

# Biology Department Calendar



## Links to General Calendars and Regular Events:

Washington University Record Calendar: <http://record.wustl.edu/calendar>

Biology Department Seminars, Mondays, 4:00pm, Rebstock 322, check the website for topics/schedule: <http://www.biology.wustl.edu/seminars/nextsemester.html>

Evolution, Ecology, & Population Biology Seminars, Thursdays, 4:00pm, Rebstock 322, check the website for topics/schedule: <http://www.biology.wustl.edu/seminars/evpop.html>

Bioforum, alternating Fridays, 4:00pm, McDonnell 361, check the website for topics/schedule: <http://www.biology.wustl.edu/seminars/biologyforum.html>

Plant Lunches: most Tuesdays at noon (1st Tuesday of month @ DDSPC, others @ McDonnell 212)  
Contact Professors Tuan-hua David Ho or Mark Running for topics/schedule.

Donald Danforth Plant Science Center (DDSPC), Weekly Seminar Series—Wednesdays, 4:00pm, AT&T Auditorium, check the website for topics: <http://www.danforthcenter.org/opportunities/seminars.asp>

Division of Biology and Biomedical Sciences (DBBS), all lectures and seminars: <http://dbbs.wustl.edu/dbbs/website.nsf/SDN>

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## October 2008

2nd Fall 2009 Internship & Job Career Fair, Friday, October 2nd, 10:00am-2:00pm, Athletic Complex

5th Bio Club Event: Cold Spring Harbor Lab Recruiting event, Monday, October 5th, 6:00-7:00pm

16th Fall Break, Friday, October 16th—NO CLASSES

22nd Albert Einstein University: PhD, MSTP, and Summer Research Programs, Thursday, October 22nd, 5:00-6:00pm, DUC, Room 248

23rd Parent and Family Weekend, Friday, October 23rd-25th

## November 2008

4th “The Making of the Fittest: Natural Selection and the DNA Record of Evolution”, Lecture 3 in 150th anniversary “On the Origin of Species” lecture series, University of Wisconsin, Speaker: Dr. Sean Carroll, Professor, Molecular Biology and Genetics, University of Wisconsin, Wednesday, November 4th, 7:00pm, Rebstock 322

24th “Frontiers of Evolution” - Lecture 4 in the 150th anniversary “Origin of Species” lecture series, panel discussion, Tuesday, November 24th, Rebstock 322, 12:00 noon

25th Thanksgiving Break, Wednesday, November 25th-27th—NO CLASSES

