“Nothing in biology makes sense except in the light of evolution.”
—Theodosius Dobzhansky

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Contact Erin Gerrity to submit articles/info:

Erin Gerrity
Editor-BIOrhythms
Biology Department
Washington University
Plant Growth 105
Campus Box 1137
St. Louis, MO 63130-4899
314 935-5064
gerrity@biology2.wustl.edu

Never having visited the Danforth Plant Science Center, I had no idea what to expect. I did not anticipate the beautiful construction and grand openness of the building. Structurally, the Center is built to feel like a steamship with a large open area in the center surrounded by hallways/offices on the sides. Warm wooden tones mixed with modern materials, furnishings and fixtures give the space a sense of the traditional and a sleek contemporary feel at the same time. In addition to its aesthetic qualities, it is eco-friendly; for example it’s flooded with natural light and fountains provide humidity. In addition to the main building, there are several greenhouses for multiple plant experiments conducted at the center’s many labs. The overall atmosphere holds an air of excitement with lots of different people coming and going.
DDPSC Cont’d—DDPSC is a non-profit business with a model that falls somewhere between corporation and educational institution. It contains 19 individual science labs that work together as a plant science collaborative. Before the building was completed in 2001, DDPSC members were spread out across St. Louis. Having a centralized location allows the group to function more easily as a collaborative and this environment gives grad and undergrad students a broader exposure to different facets of plant research. The Center has a board of trustees and a scientific advisory board which oversee the activities of the center. Each of the individual science labs is headed by a Principal Investigator (PI). These PIs have different levels of membership similar to associate, assistant and full professorships. Many members are adjunct faculty for Wash U. One of the Center’s newest additions is President Jim Carrington. Former director and professor of biology Roger Beachy now keeps an office on the Danforth campus.

Undergrad Opportunities

The summer internship program at DDPSC is funded mainly by a National Science Foundation Research Experiences for Undergraduates (NSF REU) grant along with a few other sources. (Students may contact individual PIs to see if anything is available job or internship wise, but there is no structured undergrad program during spring or fall semesters.) The deadline to apply for the summer internships is February 10th. Weekly meetings, professional speakers, career path choice advice and field trips to places such as Missouri Botanical Gardens, Monsanto, Division of Biology and Biomedical Sciences, St. Louis Zoo and even local wineries expose them to different career opportunities. Field trip education ranges from researching caffeine levels in plants at the zoo after using coffee grounds as pesticides to studying the effects of powdery mildew on grapevines at a winery. The field trips provide opportunities for real-world applications to concepts studied in classes and research labs.

The growing internship program started with three corporate sponsors. The first NSF REU grant for DDPSC’s internship program has evolved into a model that NSF uses as a guideline for other institutions’ applications. It functions well as an official program with more structure and group activities because of the multiple PIs collaborating at the Center. State of the art core facilities provide a way to have on-site workshops on proteomic analysis, tissue culture analysis, mass spectrometer, and microscopy. The Committee for Scientific Training and Mentoring (CSTM), a voluntary internal group within the Danforth Center, participates in career panels with the interns, helping to connect them with the Center’s scientists. The intensive learning environment is complemented by social group activities such as float trips, field trips to see St. Louis cultural...
Dr. Ken Olsen is originally from St. Louis, where trips to Missouri Botanical Garden sparked his interest in plant science. Throughout childhood he was equally interested in plants and reptiles, but decided on a definite direction toward plant science in his high school years. He received his B.A. in Biology from Wash U, his M.A. in Botany from The University of Texas-Austin, returned to Wash U to complete his PhD in the Population and Evolutional Biology Program, and completed his post-doctoral research in the Department of Genetics at North Carolina State University. Olsen, now Associate Professor of Biology, has been with Wash U as a professor since 2005. His specific interests lie in plant evolution, including the question of the genetic basis of adaptation, which is one of the most important questions in evolutionary biology. This question was very difficult to address until the genomic era of the last decade, but now scientists are increasingly able to draw a connection between variation at the DNA sequence level and traits that are favored by natural selection in natural populations. One way Olsen looks at this phenomenon is by using crop domestication as a genetic model for rapid evolutionary change. Currently his lab group is studying the evolutionary genomics of weedy rice (red rice), which is a major pest in US rice fields. He also studies the evolutionary genetics of wild plant species. Topics of interest include the genetic basis of adaptive variation, the forces affecting genome-wide patterns of linkage disequilibrium, and phylogeography. A current research focus is on the molecular evolution of adaptive polymorphisms for cyanogenesis (cyanide release with tissue damage) in clover.

The educational component of Dr. Olsen’s clover project is funded by his National Science Foundation CAREER grant and coordinated through Washington University’s Science Outreach program. High school classes across the country collect samples of their local clover populations and analyze them for cyanogenesis variation. The research seeks to validate predictions about the frequency of cyanogenesis in a given environment, and to study the genetic basis of the production of cyanide or lack thereof. Typically, the warmer a climate is, the higher the percentage of plants with cyanogenesis in the clover population; for example, about 90% of the plants produce cyanide in Louisiana vs. only about 10% in Wisconsin.

Ken Olsen teaches the undergraduate course Bio 3501: Evolution (see next page for course spotlight) in fall and often teaches the graduate course Bio 580: Seminar in Population Biology in spring. He is also in charge of the Bio 200 and Bio 500: Independent Study programs. For more information about the Olsen Lab, visit: http://biology4.wustl.edu/olsen/.
DDPSC Cont’d—attractions and dinners. The program ends with a one day symposium where the students present their summer projects.

Applicants come from all over the United States. Numbers are reaching up to 130 per year, giving students a 1 in 10 chance of receiving the internship. Students must be permanent US residents (this is dictated by NSF). Typically, about half of the internships go to students that need housing provided by the program. The selection committee also tries to choose students who come from institutions with fewer resources or opportunities for undergrads.

What do the interns like best? Though they often work independently in a lab, they also get the social aspect of a shared experience because of the workshops and field trips as well as the purely social events. Students also receive a lot of guidance from the Center’s Post docs, who are well trained mentors providing direct resources for career paths the students may be interested in following. For more information on how to apply for a DDPSC internship, visit the website: www.danforthcenter.org/the_center/education_and_outreach/internships/. —Erin Gerrity

Course Spotlight: Bio 3501: Evolution

Bio 3501 is a general survey of organic evolution covering both micro and macroevolution. This medium-sized class is worth 4 credit units and is taught by Professor Ken Olsen. As a student, Evolution was Professor Olsen’s favorite course because it provided the context that tied together many different aspects of introductory biology, from molecular biology and genetics up to ecology. Evolution connects genomes and genetic variation to phenotypes and the interactions of organisms with their environment. Evolution is a fundamentally important concept for anyone going into the study of medicine. Among other things, it provides a crucial foundation for tackling problems such as pathogen evolution, for example with the H5N1 influenza virus and antibiotic resistant bacteria. Understanding the importance of genetic variation in human populations is also very important for recognizing how different patients might respond to drug treatments. Topics covered in Bio 3501 include natural selection, adaptation, evolution of pathogens, formation of species, and phylogenetics.

Synapse Announcements

Synapse is WashU’s premier neuroscience student group on campus. Our mission is to foster neuroscience exploration by providing students opportunities to get involved with neuroscience-related activities. We host events, organize shadowing opportunities, and volunteer around the St. Louis community.

This spring semester Synapse brings to you:
- Events including Neuroscience Researcher’s Panel, brain dissections at the med school, lumbar puncture workshops and more
- Shadowing with neurologists and neurosurgeons, including a new program with neurosurgery residents
- Volunteering opportunities involving fun neuroscience demonstrations and classes at St. Louis Public Schools, as well as dance therapy with Parkinson's patients

There are so many ways to get involved! For more information:
- Come to the General Body Meeting: Monday, 1/30 at 7pm in DUC 234!
- Visit us at the Activities Fair on 1/25—we’ll be the table with a human brain on display!
- Check out synapse.wustl.edu or
- Email the Exec Team at synapse@su.wustl.edu!
Biology Department Calendar

Links to General Calendars and Regular Events:

Washington University Record Calendar:  http://news.wustl.edu/Pages/Calendar.aspx

Biology Department Seminars, Mondays, 4:00pm, Rebstock 322, check the website for topics/schedule:  http://wubio.wustl.edu/events?tid=8

Evolution, Ecology, & Population Biology Seminars, Thursdays, 4:00pm, Rebstock 322, check the website for topics/schedule:  http://wubio.wustl.edu/events?tid=3

History & Philosophy of Science Seminar Series:  http://wubio.wustl.edu/events?tid=12

Plant Lunches: most Tuesdays at noon (1st Tuesday of month @ DDSPC, others @ McDonnell 212):  http://wubio.wustl.edu/events?tid=10

Donald Danforth Plant Science Center (DDPSC), Weekly Seminar Series—Wednesdays, 3:45pm, AT&T Auditorium, check the website for topics:  http://www.danforthcenter.org/the_center/events/seminars_symposia/

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

February 2012

1st  Internship & Job Career Fair, 3:00-7:00pm, DUC

10th  Deadline to apply for Summer Internships at DDPSC:  http://www.danforthcenter.org/the_center/education_and_outreach/internships/

March 2012

11th  Spring Break begins—NO CLASSES

28th  Summer Registration begins

April 2012

17th  Fall Registration begins, April 17th—20th

27th  Last Day of Classes