

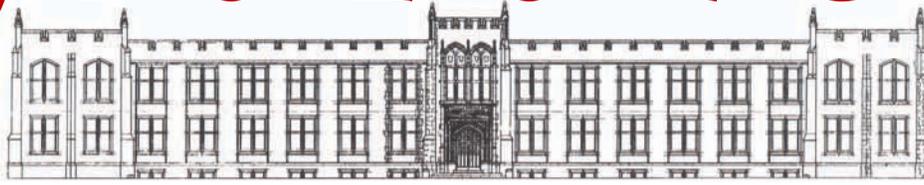


# BIOLOGUE



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Newsletter of the Biology Department, Washington University in St. Louis

## “It Grows on You”

Featured in this issue:

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## Science Outreach Celebrates 20 years and Becomes Part of New Washington University Institute for School Partnership



Photo by Joe Angeles/WUSTL

Science Outreach celebrates 20 years and becomes part of new Washington University Institute for School Partnership

Many in the Biology Department may have heard that something’s going on with those people in Science Outreach. We are definitely still here! But we are answering the phone a bit differently these days. Science Outreach has been rolled into a new initiative called the Institute for School Partnership. This is the University’s signature effort to improve teaching and learning within the K-12 education community. The Institute is interdisciplinary and committed to advancing K-12 activities across the University, with the overall goal of enhanced student success.

Many biofolks celebrated with us recently at a reception honoring 20 years of Science Outreach and the opening of the new Institute. Here are some of the highlights of the September 28 event.

Sally Elgin was recognized for her role as founder of Science Outreach and chair of the new Institute Faculty Fellows program. A tree will be planted in her honor on the grounds of Flynn Park Elementary School in University City.

Biology Professor Emeritus David Kirk was recognized for his generous support of Science Outreach and the new Institute. The Biology Department grounds will gain a new tree in honor of Dave and his late wife Marilyn.

—cont’d on page 4



*Erna Eisendrath*

## Native Landscaping in the Eisendrath Garden

Erna Eisendrath was a botanical historian working in the Olin library from 1968-1972. She was also a professor of botany at Washington University, 1961-1968. During her classes a number of plant species were discovered that had previously not been known. In response to these findings a group known as the Tyson Toilers was founded to discover and catalogue the new species. Eisendrath wrote: Missouri Wildflowers of the St. Louis Area, a treasured field guide still used in teaching the plants of MO today.

Fellow Wash U professors Barbara Pickard, Walter Lewis and Florence Moog got together to turn the outdoor area between Rebstock and Life Sciences into a garden in the late 1970's. They used extra plants from their own gardens and raised money to buy the rest. The garden was dedicated to Erna Eisendrath in 1981, a few years before her death in 1984. The Jeanette Goldfarb Plant Growth Facility is responsible for the maintenance of the Eisendrath Garden. The garden has gone through various improvements and renditions over the last three decades, the most recent of which is the addition of a Missouri native garden.



*The Eisendrath Garden sits between the Life Sciences building and Rebstock Hall. The new native garden space represents a Missouri prairie/glade ecosystem. The plants are low maintenance and will provide habitat for native insects when fully grown next season.*

Last summer, two ash trees and a redbud tree had to be removed from the garden, opening up a large sunny spot on the southeast side. With so many faculty members conducting research on native plants, for example MO primrose, false blue indigo, little bluestem, rockpinks, asters, and pale purple coneflowers to name a few, it made sense to create a native garden in the empty space. Part-time greenhouse employee Jeanne Cablish, who has her own landscaping design business *Native Landscaping by Jeanne*, specializes in the use of Missouri natives. She created the design and planted it in October. Greenhouse staff ordered MO limestone boulders to give the garden structure and a more natural appearance. They used leftover plants from experiments and purchased the remaining plants from *Grow Native!* (a MO Dept. of Conservation program) sources. Eventually, the garden will become an educational resource as well, once plants are established and labels are in place. It's a great way to show passersby some of the beautiful plants MO has to offer.



There are many benefits to native gardening, including lower maintenance and attraction of native species. Native landscapes generally require less water and fertilizer to be successful. This particular garden represents a MO prairie/glade. Prairie grasses give the space structure design-wise, and in a literal sense by helping prevent erosion with interlocking root systems. Plants such as Butterfly Milkweed and Purple Prairie Clover serve as hosts to the native Monarch and Dogface butterflies. Many other flowering plants will attract native bees vital to our ecosystem. Native landscape promoters encourage people to create pockets of habitat in their own gardens throughout urban areas, to provide habitat filling stations so to speak for native species to get the sustenance they need and appropriate environment to reproduce, fostering their survival.

Though it doesn't look like much now, keep an eye out next spring. The new garden should fill in and flourish in the summer. To find out more about native landscaping check out these websites:

## For Businesses

*Grow Native!* A program of the Missouri Department of Conservation, the *Grow Native!* program helps protect and restore our state's biodiversity by increasing conservation awareness of native plants and their effective use. By building partnerships among private industry, non-profit organizations, government agencies and landowners,

*Grow Native!* aims to significantly increase the demand for and use of native

plants on all landscapes. *Grow Native!* provides individuals, organizations, schools and government agencies with information, education and training materials that help them discover and use native plants. *Grow Native!* also offers businesses marketing materials that help "grow" sales. [www.grownative.org/](http://www.grownative.org/)

## For Individuals:

*Wild Ones: Native Plants, Natural Landscapes* promotes environmentally sound landscaping practices to preserve biodiversity through the preservation, restoration and establishment of native plant communities. *Wild Ones* is a not-for-profit environmental education and advocacy organization.

*Wild Ones® Natural Landscapers, Ltd.* has established a web site with two primary goals:

Provide information about the *Wild Ones* organization and native plant landscaping to members, potential members and other interested people.

Strengthen local chapters by helping them communicate with their members, and by encouraging the exchange of good ideas among chapters.

National Organization: [www.for-wild.org/](http://www.for-wild.org/)

St. Louis Wild Ones: [www.stlwildones.org/Home.html](http://www.stlwildones.org/Home.html)

—Erin Gerrity



*The Institute for School Partnership is Washington University's signature effort to strategically improve teaching and learning within the K-12 education community. The Institute is interdisciplinary and committed to advancing all K-12 activities across the University, with the overall goal of enhanced student development and success.*

The Institute for School Partnership consists of the following four focus areas:

### 1. Campus wide coordination of K-12 public school efforts

- K-12 Connections places WU students, staff, and faculty on-call with volunteer opportunities in high-needs urban school districts
- Faculty Fellows program provides support for WU faculty to design, implement, and evaluate inquiry-based instructional materials that put current content into K-12 classrooms

### 2. STEM education (Science, Technology, Engineering, Mathematics)

- Continuation of the traditional WU Science Outreach efforts
- MySci gives early elementary students and teachers access to innovative explorations of plants, animals, and the earth

- Hot Topics Workshops offer local science teachers professional development in emerging areas of research and materials to carry out engaging investigations
- Pre-college student enrichment experiences provide immersion in authentic science research and engineering challenges, and inspiration for pursuit of higher education

### 3. School Leadership

- Principals Academy offers local school administrators understanding of best practices and strategies for encouraging excellence in school districts
- Graduate credit courses are designed to improve teacher quality in both content knowledge and pedagogical practice
- Evidence-based educational practice and professional learning communities are encouraged within networks of K-12 teachers, administrators, and policymakers

### 4. School Partnerships using community school reform model

- Deep, long-term, results-oriented partnerships with specific local schools to bring about measurable increases in student achievement
- Collaborative efforts with Arts & Sciences, Brown School of Social Work, and Olin Business School to create models of school excellence in the St. Louis region

*Science Outreach Cont'd*—The group of 20 inaugural Faculty Fellows was recognized for their dedication to embedding K-12 outreach efforts in their work. The faculty fellows program will provide a forum for sharing efforts to connect with schools in the community and contribute to urban education. (Note the heavy presence of biofolks in the list of fellows below!)

Robert E. Blankenship, Biology

Heather Corcoran, Art

Joseph P. Culver, Radiology

Sarah C.R. Elgin, Biology

Patrick C. Gibbons, Physics

Sophia E. Hayes, Chemistry

Erik Herzog, Biology

Young-Shin Jun, Engineering

David Kirk, Biology Emeritus

Andrew Knight, Business

Tiffany Knight, Biology

Cynthia Lo, Engineering

Kathryn G. Miller, Biology

Amanda Moore McBride, Social Work

Kenneth M. Olsen, Biology

Barbara Schaal, Biology

Jennifer R. Smith, Earth and Planetary Sciences

Blake Thornton, Mathematics

Julia A. Walker, English

Jason C. Woods, Radiology

The event wrapped up with a video presentation explaining the focus areas of the new Institute for School Partnership (ISP) and showcasing some current partnerships with specific local schools. The video is available for viewing on our new website, [schoolpartnership.wustl.edu](http://schoolpartnership.wustl.edu), along with more detailed information about our plans. If you happen to have 3D glasses on hand, you might also want to visit [isp3d.com](http://isp3d.com) for a cool and quick introduction to the ISP! Thank you to everyone in the Biology Department for your support and dedication to our work over the years. The many different ways that we have worked together has helped us grow our organization and expand our impacts in the K-12 community. We look forward to continuing our strong ties to Biology as the Institute for School Partnership! —*Susan Flowers*

# FACULTY AND STAFF HONORS AND AWARDS

## Barbara Schaal Named New Director of Tyson Research Center



Barbara A. Schaal, the Mary Dell Chilton Distinguished Professor and Professor in Biology, will serve as Director of the Tyson Research Center. As Director, Dr. Schaal assumes leadership of the approximately 2,000 acre property which serves as research site to a number of faculty, students, and staff at Washington University. Tyson recently garnered significant acclaim for its new Living Learning Center. This building is one of two projects to earn the first

Living Building designation, the strictest green building rating in the world. Ed Macias, Provost, states that Wash U is truly fortunate to have Dr. Schaal among its senior administrators. She currently serves as Vice President of the National Academy of Science and was appointed by President Obama to PCAST, the President's Council of Advisors on Science and Technology. He is confident her leadership at Tyson will continue the development of Tyson as a resource for scholarship and teaching across the university and result in new opportunities for collaborations.

## Stan Braude Receives Distinguished Teaching Award from ABS

At the annual Animal Behavior Society conference in July, Stan Braude was presented with the 2011 ABS Distinguished Teaching Award "for sustained excellence in teaching". The award cited his creativity and innovation in the classroom, commitment to science outreach, caring support of students, and the impact on the field through publication of numerous articles and textbooks. Previous recipients of this prestigious award include R. Matthews, K. Wynne-Edwards, G.R. Michener, D.K. Candland, J.L. Gould, R. Jander, H.J. Brockmann, and W. Eberhard.

**JEANNE CABLISH** (right) of the Jeanette Goldfarb Plant Growth Facility, working on the Rose family garden, winners of the *Grow Native!* Landcape Challenge. The Rose family received the design services of Jeanne Cablish with *Native Landscaping by Jeanne*, the labor, and more than \$1,500 for dozens of different plants planted at the house. The contest, which promotes the use of native plants in home landscaping, was sponsored by *Grow Native!*, *Shaw Nature Reserve* and the *Wild Ones St. Louis Chapter Natural Landscapers*.

Cablish said both woodland plants, which grow well in the shade, and prairie plants, that thrive in direct sun, were used, and there was a mix of grasses and flowering plants. Woodland plants included wild hydrangea, ferns and columbine, while some of the prairie plants were aromatic aster, black-eyed Susan, Missouri primrose and purple coneflower. "Once established, the plants won't need fertilizing or much watering, and they'll provide habitat for insects like butterflies and for birds," Cablish said. "Too many non-native plants don't provide that habitat and often require a lot of maintenance." Read more at: [http://www.stltoday.com/suburban-journals/metro/news/article\\_08745e7b-ec9c-543d-a852-dee3f9939e2a.html?mode=story](http://www.stltoday.com/suburban-journals/metro/news/article_08745e7b-ec9c-543d-a852-dee3f9939e2a.html?mode=story) (Photo by Andrew Jansen, Suburban Journal).



## GRANT AWARDS

Waselkov, Katherine: “An Investigation Of The Phylogeographic Origin And Conservation Status Of Endemic *Amaranthus* Species,” 4/1/11-3/31/13, National Geographic Society—\$8,780

Goodenough, Ursula: “Systems Biology Of Lipid Body Formation In The Green Alga *Chlamydomonas Reinhardtii*,” 8/1/11-7/31/14, Department of Energy—\$1,160,865

“We just received a generous second grant from the DOE for our algal-biodiesel research, so we’re in business for a while. This allowed Jannette Rusch, most recently in Genetics at WUMS, to join us as Senior Scientist, where she’s focusing on the role of autophagy in stress-induced TAG synthesis. Thanks largely to our exceptionally skilled support staff — Carrie Goodson, Robyn Roth, and, more recently, Tuya Wulan — we’ve made lots of cool discoveries about the system, including a way to induce *Chlamydomonas* to become truly bloated with TAG (we call the cells obese). A paper describing this is at <http://ec.asm.org/content/early/2011/10/25/EC.05242-11.full.pdf+html>, and Carrie and I even went through the hoops of filing a provisional patent application on it, a first-ever from my lab. So — you never can tell what’ll happen when you switch research projects at the age of 65!” —*Ursula Goodenough*

## STRADER LAB



Lucia Strader grew up on a cattle ranch in a small town in Louisiana. As a child, she was always interested in the way things grow and develop, but didn’t fully understand the job of a scientist until she attended 4H camp in 7th grade at Louisiana State University

in Baton Rouge. She was captivated by the presentation of a soybean breeder who talked about developing diesel for vehicles out of soy. At that point, she decided to pursue a career in agronomy. Dr. Strader completed her undergraduate degree in agronomy at Louisiana State University. Her undergrad experience was an important turning point in life, shaping her interest in plant genetics and end-use goals in a more detailed way. She worked in a lab researching the effects of smoke on seed germination. She completed graduate work at Washington State University in Pullman, WA and her postdoc at Rice University in Houston, TX. Her first appointment as Assistant Professor at Wash U began in July 2011. She’s enjoying getting to know fellow Biology faculty members and exploring St. Louis with her family.

The Strader Lab studies how plants grow, more specifically how that growth is controlled by the hormone auxin. The lab uses *Arabidopsis* as the primary model to look at how auxin levels are controlled and how the plant responds to auxin to facilitate its growth. Dr. Strader explains that plants, unlike us, are stuck in their environments and therefore have to make adjustments to control growth in the most efficient and beneficial ways. Auxin is the major hormone that controls that growth, for example directing root growth downward and facilitating branch growth toward the light. However, altering plant auxin response also alters plant responses to other hormones involved in stress response and fruit ripening. Part of the focus in the Strader lab is to disentangle these responses. These basic mechanisms of hormone interaction, when understood, can potentially be used to adapt crops to less desirable conditions, increasing our ability to —*cont’d on page 7*

SAVE THE DATES  
Don't miss the annual  
Thomas S. Hall Lecture—  
Tuesday, March 6th 2012 @ 4pm,  
Susan Lindee, University of PA  
&  
Viktor Hamburger Lecture—  
Monday April 9th, 2012 @ 4pm,  
Ben Barres, Stanford University  
Dept. of Neurobiology

grow a wider variety of plants in different environments. The Strader lab's findings form the basis for more targeted agricultural research.

#### Strader Lab Description from Biology Website:

Animals require cell movement to determine the final form of organs. Because there is no morphogenic cell movement in plants, and because the cell wall is usually formed immediately after cell division, plant morphogenesis depends upon careful control of both cell division and cell expansion. The auxin indole-3-acetic acid (IAA) is a critical plant hormone, controlling both cell division and cell expansion and thereby orchestrating many developmental events and environmental responses. Normal plant morphogenesis and environmental responses require modulation of auxin levels and responsiveness by interaction with other hormones, controlling biosynthesis, regulating transport, and managing storage forms. One auxin storage form of interest to the Strader lab is the side chain-lengthened compound indole-3-butyric acid (IBA), which is shortened into IAA by peroxisomal  $\beta$ -oxidation.

Current research in the Strader lab focuses on several projects using the model plant *Arabidopsis thaliana*:

- The role of the MAP kinase phosphatase IBRS on mediating responses to the plant hormones auxin, abscisic acid, and ethylene
- The role of IBA-derived auxin in plant development
- The role of IBA transport in plant development



The Strader lab currently has 3 undergrads, Ericka Robert (sophomore), Sulaman Durrani (sophomore), and Emily Leff (freshman). Each student is screening for novel IBA response mutants and using recombination mapping to identify the causative genes in these mutants. Their work will contribute to

our understanding of how IBA-to-IAA conversion occurs and how this process contributes to auxin in plant development.

Lab Technician Lauren Gunther is researching the roles of two genes, ECH2 and IBR10, previously identified in *Arabidopsis* as necessary for conversion of the auxin precursor IBA to the active hormone, in activating IBA in the moss *Physcomitrella patens*. She has already discovered that IBA acts as a more effective auxin precursor in the moss than it does in the plant *Arabidopsis*. Her follow-up experiments will help determine the conservation of components necessary for this response.

Tara Enders, a 1st year grad rotation student in the Plant Biology Program (also see article on the Dixit Lab), is working on a MAP kinase in *Arabidopsis* that may be involved in auxin response. Her rotation project includes analysis of reporters and epistasis studies to determine how this MAP kinase is contributing to the auxin response.

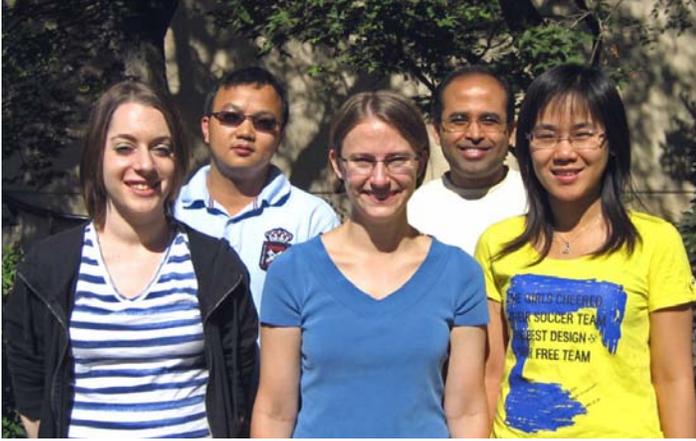


Postdoc Julie Thole is working on a separate MAP kinase that may be working with the IBRS phosphatase involved in auxin response. She is currently trying to understand the roles of these two proteins in phytohormone response.

—Lucia Strader/Erin Gerrity



## DIXIT LAB



It has been a great three years for my lab. Our research is going strong and we have new people who are spearheading exciting new directions in the lab. This year, we published a research article in *Molecular Plant* and a review article in *Protoplasma*. Two other papers have been provisionally accepted in *Biophysical Journal* and *Cytoskeleton*.

We also received funding from I-CARES and NSF this year. The I-CARES project seeks to develop an *in vitro* system to build microtubule organization from scratch using purified components. The NSF project focuses on understanding how a plant kinesin controls cell wall organization. We are grateful to both agencies for supporting our research.

Dr. Quan Zhang joined my lab as a Research Scientist in August 2011 and he is working hard to develop a microfluidics system to automate and better control our *in vitro* microtubule organization assays. Tara Enders, a new graduate student in the Plant Biology program, did a rotation project in the summer and made great headway in analyzing the biochemical activity and subcellular location of the microtubule severing protein katanin. Erica Fishel and Chuanmei Zhu, both fourth year graduate students in the lab, have received much recognition in the past two years. Erica was awarded a travel grant to attend the SIVB annual meeting in April 2010 and the ASPB annual meeting in March 2011. Erica's work was also selected for a minisymposium talk at the ASPB meeting. Erica also secured funding from Sigma Xi earlier this year to do mass spectrometry. Chuanmei has been awarded the MAC travel award to attend the upcoming ASCB annual meeting. Chuanmei was an Imaging Sciences Pathway fellow in 2010 and was recently selected to be a scholar in the McDonnell Academy.

We have several ongoing collaborations on and off campus that have yielded exciting results. Our computer simulation work with Dr. Gautam's lab at Texas A&M was published in *Molecular Biology of the Cell* and was featured on the cover of the August 2010 issue. This work seeks to understand the self-organizing properties of plant cortical microtubules. Our collaboration with Dr. Cavalli's lab at the medical school uses single molecule imaging to dissect how the Syd protein modulates kinesin motility in neurons. Part of this work was published in the July 2011 issue of the *EMBO Journal*.

I have also enjoyed teaching new classes since last year. I taught BIO 334 (Cell Biology) last Spring and thoroughly enjoyed it! Thank you Ursula for giving me the opportunity to become the course master for this class! This semester, besides giving guest lectures in Biology courses, I am involved in teaching an architecture class with Dr. Sung Ho Kim. The course is called Mapping Soft Bodies/Constructing Complex Objects and it challenges undergraduate students to incorporate principles underlying cellular architecture in constructing man-made objects.

We are looking forward to a fun holiday season and a productive 2012. —*Ram Dixit*



*New Dixit Lab Members: Tara Enders (left) and Quan Zhang (right)*



## SAFETY SPOTLIGHT—*Gerry Rohde*



*Gerry Rohde*

Welcome to “safety spotlight”.

Thankfully, we have no recent chemical spills or laboratory fires to write about.

While the lack of such reports are indicative of a fundamental and collective safety awareness across the department, continual risk assessment of laboratory work remains a key component of successfully protecting the health of our lab members.

It is within this context that the University’s Environmental, Health, & Safety department (E.H. & S.) has asked that lab personnel and students please discontinue the use of containers constructed from expanded polystyrene beads, or “Styrofoam”, for the transportation of liquid nitrogen.

These containers are designed for dry ice and, thus, may not necessarily withstand the circa almost four times colder temperature of liquid nitrogen. In addition to potentially failing structurally, Styrofoam boxes are also purposefully permeable to facilitate the relatively unrestricted escape of CO<sub>2</sub> gas that occurs as a result of solid carbon dioxide sublimation.

Thus, if a Styrofoam container were not to break outright in the first place when filled with liquid nitrogen, the permeability of its walls and bottom could allow the liquid, rather than just the nitrogen gas, to leak, and, consequently, pose a severe freezer burn hazard.

E.H. & S. recommends, therefore, and even requests, that dewar flasks instead be used for liquid nitrogen transfers and handling. If your lab doesn’t have or doesn’t want to buy a liquid nitrogen dewar, please be aware that such a vessel is available in the stockroom for the occasional user.



Continue to be safe – and remember:

“Falling objects can be brutal if you don’t protect your noodle”. —*Gerry Rohde*



Do you have any exciting news to share? Please submit announcements, lab notes and photos to Erin Gerrity:

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

