



BIOLOGUE



NO. 76

FALL
2016



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

“It Grows on You”

Featured in this issue:

New Center for Engineering Mechano-Biology
Faculty Retirements: Ralph Quatrano and Ursula Goodenough

Faculty & Staff Honors & Awards
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Tech News with Frances Thuet



Washington University’s own Ram Dixit, Liz Haswell, and Lucia Strader from the Biology Department, along with Guy Genin, Marcus Foston and Barbara Pickard from the School of Engineering and Anders Carlsson from the Physics Department are working with PIs Yale E. Goldman, Vivek B. Shenoy and Rebecca G. Wells from the University of Pennsylvania to create a new Center for Engineering MechanoBiology (CEMB). This will be one of four NSF funded Science and Technology Centers this year, with each center awarded approximately \$24 Million over five years.

Mechanical stimuli are just as ubiquitous as chemical stimuli and greatly impact decisions that affect the health and survival of plant and animal cells. The CEMB will bring together leaders in the fields of plant biology, cell biology, biophysics, engineering, and physics to investigate how cells perceive mechanical information and generate mechanical outputs. By integrating diverse expertise and equipment into a single research program, the CEMB

will enable synergistic interactions needed to decipher the universal principles governing the mechanobiology of cells. The fundamental mechanisms uncovered by this work will provide new insights into processes underlying cell morphogenesis, intercellular communication in tissues and organs, regulation of gene expression and patterning of the extracellular matrix.

The engineering arm of CEMB will harness all of the information to develop new technologies and devices that can be used for agricultural and therapeutics applications. For example, the research could be applied to boost plant immune responses to protect against pests and pathogens. Similarly, mechanical interventions could be devised to specifically inhibit the growth and metastasis of tumor cells. The center will also fabricate “bionic” devices such as leaf-on-a-chip and heart-on-a-chip, which will enable rapid screening of new herbicides and drugs.

Outreach and education are also important to this —cont'd on p. 9

Ralph S. Quatrano to Retire in July 2016



Colleagues,

On July 1st of 2016, after exactly 18 years at Washington University (WUSTL), I will be on phased retirement with the title of Spencer T. Olin Professor Emeritus. My half time commitment will be as Special Assistant to the Provost for Corporate Engagement. As

part of WUSTL's commitment to build a very active and robust innovation/entrepreneurial hub (<http://cortexstl.com>), I will collaborate with others at Washington University to engage with companies to promote the St. Louis region and Washington University as a destination to establish a presence that will be mutually beneficial. I will contribute to the BIO course Joe Jez teaches in this area, and continue to be involved with a company I co-founded 12 years ago (*MOgene* www.mogene.com). The very active and growing entrepreneurial and venture capital culture here in St. Louis is exciting, and I look forward to being part of it providing consulting/advising services. My WUSTL office is Rebstock 314, so stop and see me!

Lee Anne is fully retired now, and is spending her time and efforts being the Trustee for our small town house association, volunteering to help maintain WUSTL's Elizabeth Danforth Butterfly Garden, and engaging in opportunities for the Spirit of St. Louis Women's Fund (<http://www.spiritstlwomensfund.org>) to contribute to supporting local non-profits.

We will definitely be spending more time traveling and hopefully visiting family and friends as we have done in 2015-16 while on sabbatical leave.

Warm regards to all,
Ralph

Ralph S. Quatrano, Ph.D.

Spencer T. Olin Professor Emeritus

Special Assistant to the Provost for Corporate Engagement

Ursula Goodenough to Retire in July 2017



Ursula Goodenough's Family in 2015, Martha's Vineyard.

I will be shifting to Professor Emerita status in July 2017. I came to the Biology Department in September 1978 from MA, and it's been a fantastic 39 years, but at age 74 it's time to return to my roots. I'm moving to my house in Chilmark MA, on Martha's Vineyard, which I built (well, the carpenters built!) in 1974 and where I've been spending my summers ever since. It's on an unpaved road in the woods and a 20-min walk to a private beach on the open ocean. Daughter Mathea and 3 granddaughters live on the Vineyard, daughter Jessica and 2 grandsons live on adjacent Nantucket, and many friends and family live in Boston and NYC.

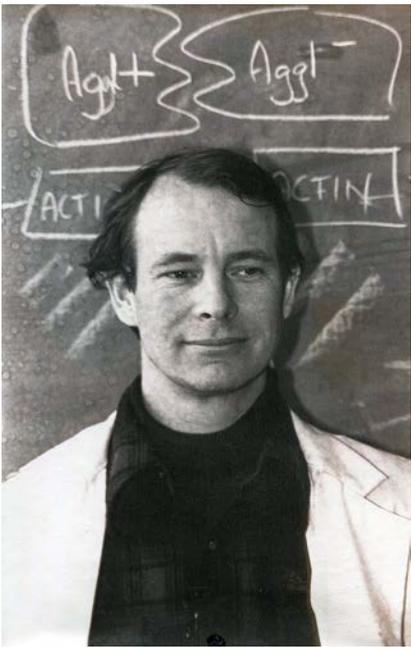
Much as I will miss you all and the ferment that is the bricks-and-mortar academic life, I intend to maintain a deep biology focus via collaborations. For the past few years, most of my work has entailed interfacing with other labs via quick-freeze EM imaging, utilizing the expertise of Robyn Roth at the Washington Center for Cellular Imaging at WUMS, and I hope this activity will continue going forward. My computer also contains thousands of unpublished images of numerous kinds of algae, and I plan to convert them into theme-based papers that the journal *Algal Research* is interesting in considering for publication. And I'll continue my long-standing projects to promote a religious naturalist orientation <http://religious-naturalist-association.org>. That said, there are also all those novels never read and movies never seen....

In 2008, carpenters built a second "guest house" on the Vineyard property, so I now have abundant space and numerous

—cont'd on p. 3

bedrooms. If any of you is in the region, notably Woods Hole which is a 45-min boat ride away, and want a day or so in paradise, PLEASE let me know and come visit. This goes for you all – faculty, postdocs, students, staff – and your families.

Meanwhile, my deepest thanks for all the stimulation, support, friendships, and good times that I've been blessed to have here. —*Ursula Goodenough*



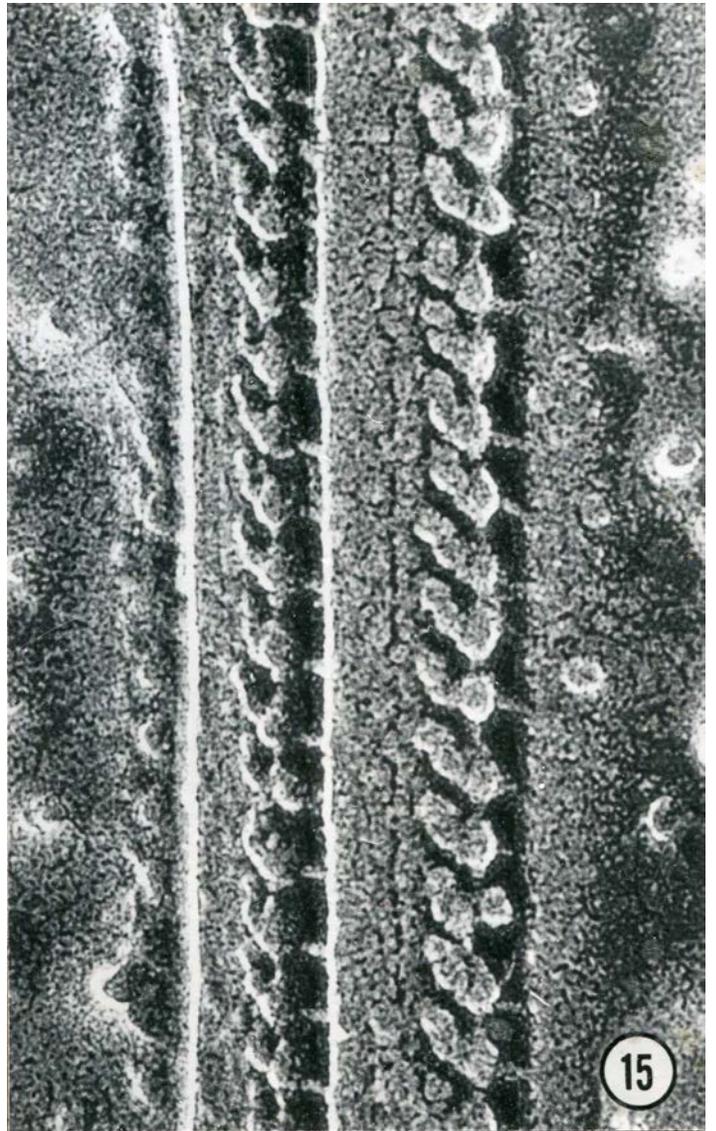
Steve Adair, long-term postdoc who started up the WU lab with me [Ursula] and made important discoveries about sexual adhesion in Chlamydomonas.



Marriage to John Heuser, another key collaborator.



Lab group circa 1994, with key collaborators Ginger Armbrust, Patrick Ferris, Carol Huang, Linda Small (now in Ken Olsen's lab), and Jeff Woessner, and wonderful undergrads.



Rows of dynein motors in a flagellum of Chlamydomonas visualized by techniques developed by John Heuser.

FACULTY AND STAFF HONORS AND AWARDS

Barbara Kunkel wins Hadas Award



Barbara Kunkel, professor of biology and recipient of the 2016 David Hadas Teaching Award, shares lessons from the classroom

In a letter nominating biology professor Barbara Kunkel for the 2016 David Hadas Teaching Award, a distinction that recognizes excellence and commitment in teaching first-year undergraduate students, the nominator details Kunkel's

energetic and successful efforts to lead and improve Biology 2960. As course master for this large introductory course, Kunkel revised the curriculum, improved the implementation of 'clickers,' introduced peer-led discussion groups called "Biology Learning Teams," and more, the letter says.

Kunkel credits some of her teaching strategies to the NAS-HHMI Summer Institute for Biology Teaching, which she and two colleagues attended in 2013. "I learned just so many fundamental things about teaching that I didn't know. Looking back, they make perfect sense. But I just had not been aware of them," she recalls. "I wasn't brought up in the culture of grooming myself to be a teacher. I was groomed to be a professor and to do research and run a research group."

It takes more than just being enthusiastic about a topic to be a good teacher."

From years of experience, as well as professional development opportunities like the Summer Institute, Kunkel says that one lesson stands out: "I guess what I learned, and it actually took me a while to learn this, is that it takes more than just being enthusiastic about a topic to be a good teacher," she says. This may be especially true for teaching first-year students in an introductory course like Biology 2960. "There's a very diverse group of students based on preparedness levels, based on interest, based on understanding what it takes to be a good student. They need a lot more. The course has to be put together differently, and the lecture has to be put together differently. Enthusiasm isn't enough."

One of the fundamental teaching principles that Kunkel has

embraced and is trying to incorporate into her courses is "backward design." With a limited amount of time to teach students important concepts, it's helpful to identify up-front what students should learn and the skills they need to master. From there, teachers can work backward to design lectures and teaching materials based on those goals. Kunkel also implements active learning – for example, she encourages students to draw diagrams to help them clarify biological processes and concepts, rather than simply read their lecture notes over and over.

Kunkel appreciates seeing first-year students get excited about topics they have never been exposed to before. "To see the diversity of students and what their motivations are for taking this class, and what do they think they want to do when they graduate," she adds. "That's always really fun. And also helping a student understand something when they were confused, perhaps by explaining it to them a different way or getting some one-on-one time with them. That's really rewarding," she says. Yet even after receiving the David Hadas Award for excellence in teaching first-years, she still sees challenges for helping new students succeed.

"There are some fundamental issues that I think we need to help our freshmen with," she explains. "For example, helping them understand what responsibilities they have for their own learning. If something is not clear to them, they should seek out help." She acknowledges that there are a variety of reasons students don't seek assistance or input. "Some of them were straight-A students in high school, and they think they've got it figured out," she says. "So it would be really worth the faculty trying to figure out what's at the bottom of that, so that maybe we can actually come up with different ways to help the students make those connections."

One of my fantasies would be to have some freshmen get involved in research earlier"

Going forward, she also hopes to give more undergraduates opportunities to work in a laboratory. "One of my fantasies would be to have some freshmen get involved in research earlier, especially those students who may not see themselves as biologists or see themselves as scientists," she says. "If there was a way to get them involved in research – in my lab or somebody else's lab - earlier on, so that they could actually say 'I can be a scientist, or I can be a biologist,' they might engage and feel more confident in the material." —*The Ampersand*

FACULTY AND STAFF HONORS AND AWARDS

Elizabeth Haswell wins Faculty Scholar Award



Photo Credit: The Source

Elizabeth Haswell, associate professor of biology in Arts & Sciences at Washington University in St. Louis, was named a Faculty Scholar by a trio of major philanthropies Sept. 22. In all, just 84 out of more than 1,400 applicants were successful.

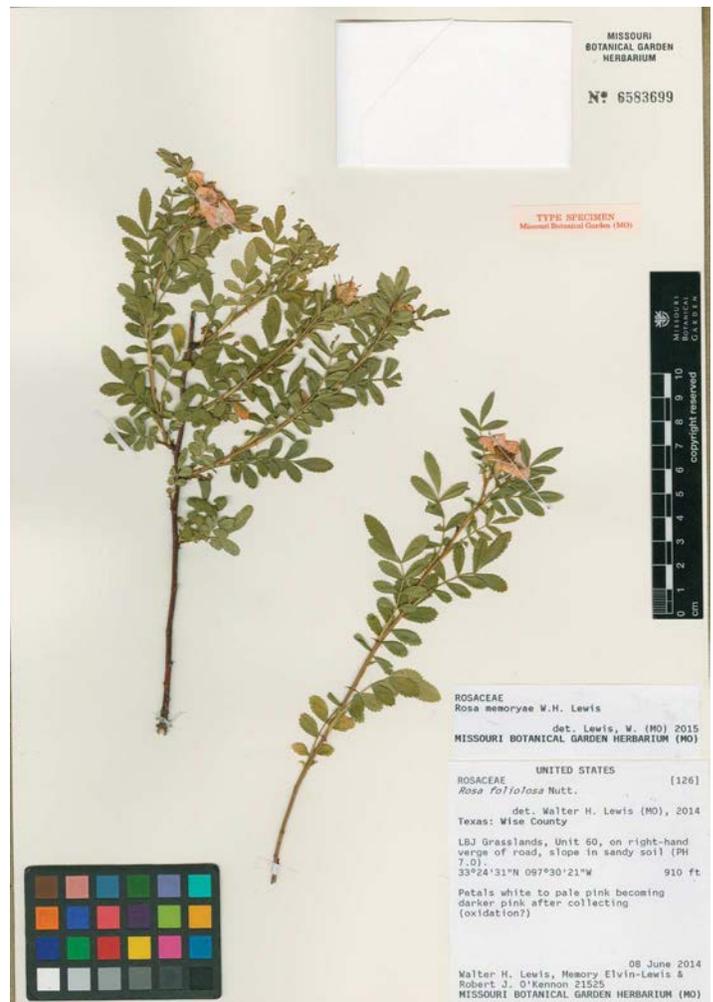
In 2015, the Howard Hughes Medical Institute (HHMI), in partnership with the Simons Foundation and the Bill & Melinda Gates Foundation, initiated the Faculty Scholars Program to select outstanding early-career scientists in basic biological and biomedical research, as well as in chemistry, physics, computer science and engineering that are related to biology or medicine. Haswell's award provides \$900,000 in support over a five-year period.

Haswell studies how plants use mechanosensitive ion channels to sense and respond to mechanical forces such as tension, touch or vibration. She is also developing research tools that will enable her to measure membrane tension in live cells and to explore electrical signaling during trap closure in a carnivorous aquatic plant. "I work at the intersection of mechanobiology and plant biology," Haswell said.

Walter and Memory Lewis to be featured in exhibit

Walter Lewis, Professor Emeritus of Biology has been studying North American roses for over 60 years. His 2 recent taxonomic publications present an assortment of new taxa and 13 nothotaxa (hybrids) 2 nothosubspecies and discussions on ongoing introgressions. Also included is a new endemic section centered on the Ozark Plateau, one subspecies and one species named *Rosa memoryae* named for his wife, Memory Elvin-Lewis who has collaborated with him on numerous field trips of *Rosa* and other taxa primarily in North and South America.

Also the Ontario Science Centre is developing a digital exhibit for the Science Centre showcasing Canadian scientists and innovators, in which both Memory Elvin-Lewis and Walter Lewis are to be featured. A similar display is being developed at the Natural History Museum at U.B.C. where Walter obtained his B.A and M.A degree in Botany and Memory her B.A. in Bacteriology and Genetics. The University has also honored them with honorary D.Sc.'s and Memory with a Distinguished Alumni Award. Also the Botany Department at UBC is a recipient of a Walter Lewis, Botany Research Award sponsored by him to encourage the collection and study of regional plants by young investigators. —submitted by Memory Lewis



Rosa memoryae W. H. Lewis. Holotype, W. H. Lewis, R. J. O'Kennon & M. Elvin-Lewis 21525 (MO).

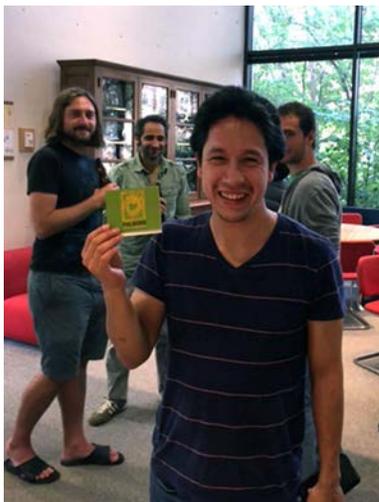
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BIOLOGY COMMUNITY

ANNUAL SALSA CONTEST: To the Victor go the spoils



The Biology Department revived a long standing tradition of the annual salsa party and contest as part of a Friday Gathering in October, a new department initiative in which labs volunteer to host department-wide parties. This particular event was hosted by Biology Administrative staff members Mike Dyer, Judy Musick and Frances Thuet. The new Friday Gatherings have been well-attended, a great way for research and administrative staff to come together and get to know each other. Victor Manuel Aguilar Hernandez, of Richard Vierstra's Lab, won the salsa contest this year. "*The salsa verde (green sauce) was made with roasted tomatillo and jalapeño pepper. The roasting gives it a smoky flavor, complemented by onion, chopped cilantro, salt and few drops of fresh squeezed lemon juice. Recommended for asada steak and chorizo.*"—*Victor Aguilar*



ANNUAL COOKIE CONTEST: Some might say these cookies were Purrfect



The December Biology Department Friday Gathering, hosted by the Strader Lab, featured an annual cookie exchange and contest. Sam Powers and Cynthia Holland won the "Most Attractive Cookie" prize. Apparently, they spent 7 hours decorating these adorable Pusheen cat cookies! They are both 3rd year graduate students in the PMB program from the Strader Lab and the Jez Lab.

The "Tastiest Cookie" prize for Saltine Toffees went to Cas-sandra Vernier of the Ben-Shahar Lab (see recipe, next page), while Fred Ingliss of the Strassmann-Queller lab took "Ugliest Sweater" prize for a St. Louis Rams Christmas sweater.



Some of the cookies featured in this year's contest. (Winning cookies not pictured, they got eaten too fast!)

STAFF SPOTLIGHT: RUTH LEWIS



Ruth Lewis has been the biology subject librarian since 1985. She moved to Olin Library with the collection when the Biology Library was closed in 2009.

As Scholarly Communications Coordinator in the libraries, Ruth has a special interest in open access, public access, copyright, ORCID,

changing models for peer review, assessment and other aspects of publishing. She also serves as subject librarian for mathematics and history of science, technology and medicine.

Ruth is eager to work with biology groups and classes and assist with any questions or concerns regarding library resources and services. Suggestions for books, journals, databases or services are welcome. Contact Ruth at rlewis@wustl.edu; more info at <http://libguides.wustl.edu/ruth>.

Winning Cookie Saltine Toffees Recipe

- 4 oz. Saltine Crackers
- 1 cup Butter
- 1 cup Brown Sugar
- 2 cups Semisweet Chocolate Chips
- 3/4 cup Chopped Pecans (or other nut)

Preheat Oven to 400; Spray cookie sheet with pam, line cookie sheet with saltines.

In a sauce pan combine sugar and butter. Bring to a boil. Boil for 3 minutes. Immediately pour over saltines and spread to cover completely.

Bake for 5-6 minutes or until the saltines are dancing :) Remove from oven and sprinkle chocolate chips over top of crackers. Let sit for 3-5 minutes then spread chocolate to cover all. Top with nuts. Cool completely and then break into pieces.

FACULTY AND STAFF HONORS AND AWARDS *cont'd*

GRANT AWARDS

Sarah Elgin, Viktor Hamburger Professor of Arts & Sciences and Howard Hughes Medical Institute Professor in biology, was awarded a four-year, \$1.2 million grant from the National Institutes of Health (NIH) for research on "Repeat-Induced Heterochromatin Formation in *Drosophila*."

Erik Herzog, professor of biology in Arts & Sciences, received a \$824,000 grant from the National Institutes of Health (NIH) as co-principal investigator of a four-year research project titled "Multiscale Modeling of the Mammalian Clock: The Role of GABA Signaling."

Richard D. Vierstra, George and Charmaine Mallinckrodt Professor in biology in Arts & Sciences, was awarded a three-year, \$949,000 grant from the National Science Foundation to undertake a project titled "Defining the Sumoylation System in Maize and its Roles in Stress Protection."

Hani Zaher was awarded \$400,000 from the Siteman Cancer Center to undertake a project entitled "RNA as a target if Alkylation Chemotherapy in Cancer."

The Gordon and Betty Moore Foundation has awarded a two-year, \$1 million grant to **Himadri B. Pakrasi**, the Myron and Sonya Glassberg/Albert and Blanche Greensfelder Distinguished University Professor and director of the International Center for Advanced Renewable Energy and Sustainability (I-CARES), to collaborate with Jonathan Zehr, Distinguished Professor of Ocean Sciences at the University of California, Santa Cruz. The Pakrasi and Zehr labs will develop methods to study uncultivated microorganisms and the symbiotic relationship between oceanic cyanobacteria and microalgae, as part of the Moore Foundation's Marine Microbiology Initiative.

"The well-being of oceanic life is fundamentally important for the sustainability of the planet," said Pakrasi. "The information garnered from this study has the potential to influence an array of fields of science."

"This research is significant because it will lead to the development of methods for studying important and unique microorganisms in the ocean," said Zehr. "We hope to provide the Pakrasi laboratory with the samples that enable them to determine basic cellular and physiological —*cont'd on p. 8*

SAFETY SPOTLIGHT— by

Gerry Rohde



Welcome to “Safety Spotlight”.

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

This coming spring, beginning in March, regular research laboratory safety and compliance audits will resume in Biology with Emily Audrain, our new Environmental Health & Safety contact and inspector who has been assigned on the Danforth Campus exclusively to Biology.



In the past year, Emily already made occasional appearances in some parts of the department, while also attending job training courses, getting married, having a child, and fulfilling residual Illinois Air National Guard duties, where she was and still is a Bio Environmental Engineer.

Her education includes a B.S. in Chemistry from the University of Illinois at Urbana-

Champaign and an M.Eng. in Environmental, Energy, & Chemical Engineering from Washington University.

In light of Emily’s approaching visits, please consult the links below for *updated* versions of these applicable files:

LAB INSPECTION CHECKLIST

http://ehs.wustl.edu/resources/EHS%20Documents/Lab_Inspection_Checklist.pdf

LAB INSPECTION CHECKLIST COMMENTS

http://ehs.wustl.edu/resources/EHS%20Documents/Laboratory_Comment_Sheet.pdf

LAB INSPECTION CHECKLIST AUTOMATIC FAILURE CATEGORIES

http://ehs.wustl.edu/resources/EHS%20Documents/Critical_Safety_and_Compliance_Factors.pdf

Continue to be safe – and remember:

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

Grant Awards cont’d—features of one particular symbiosis, which is uncultivated and yet it is one of the most important nitrogen-fixing microorganisms that fertilizes the open ocean with nitrogen.”

Certain cyanobacteria can convert nitrogen from the atmosphere and turn it into a form that other organisms use for growth (a process called nitrogen-fixation). This is important because nitrogen is an essential building block for all life forms. In contrast, microalgae are incapable of nitrogen-fixation. However, Zehr and his research team identified cyanobacteria in the ocean that are incapable of growing on its own and connect themselves to the algae to survive.

“This collaboration brings in new and unique instrumentation funded by the Moore Foundation that is necessary for studying the physiology of cyanobacteria and algae, which are very difficult to capture and isolate,” said Pakrasi. “By teaming up with Dr. Zehr and his group, we are able to bring in the tools of genomics, synthetic biology and biochemistry to understand how these organisms are dependent on one another.”

The Pakrasi and Zehr labs will convene with Moore Foundation officials for the first time in San Francisco, CA for a kick-off meeting in mid-February.—*The Record*

The Gordon and Betty Moore Foundation fosters path-breaking scientific discovery, environmental conservation, patient care improvements and preservation of the special character of the Bay Area. Visit moore.org and follow @MooreFound.

TECH NEWS— by Frances Thuet

Want to keep your WUSTL key password for 1 year?!

Two Step Authentication is now required for off campus access to the Washington University Human Resource Management System (HRMS).

Using two-step authentication services provided by Duo, WashU 2FA enables identity verification through the use of a second device to protect your WUSTL Key ID. Once enrolled in the Duo authentication service, you'll log in to HRMS as usual with your WUSTL Key ID and password. This is the first step of authentication. Next, you'll verify your identity using the device you've enrolled with Duo (a mobile phone, tablet or home phone). This is the second step of authentication. Enrollment in WashU 2FA eliminates the birth year authentication requirement in HRMS and increases the password expiration period to one year.

You can find information for downloading and installing the DUO app to your smart phone or tablet here:

<https://informationsecurity.wustl.edu/resources/information-security-solutions/washu-2fa-two-step-authentication/>

If you have any questions or need some assistance with the setup please contact Frances Thuet (thuet@wustl.edu).

The Biology Department has a new HP Designjet Z6800 poster printer that can print on 24, 36, 42 and 60 inch wide paper rolls as well as 36 and 42 inch wide fabric rolls. Most users print Powerpoint and PDF format files though it is capable of printing other file types.

Costs depend on the poster media type and dimensions. For paper posters costs will range from about \$24 (for 24" wide rolls) up to about \$33 (for a 60 inch rolls). For fabric rolls costs will be higher - from roughly \$31 (for 36 inch wide rolls) to \$35 (for 42 inch wide rolls). By "width" we mean the width of the spool the roll of paper comes on; 24, 36 and 42 inches. That will be the smallest dimension of your poster.

Exact costs will vary depending on your poster's exact size and media type.

Poster printing requires an appointment with Mike Malolepszy (5-4262 or klaus@wustl.edu) with priority given to Biology Department faculty, students and staff.

CEMB cont'd—

initiative, with goals to increase representation of under-represented minorities and training the next generation of scientists to think in new ways through this multi-disciplinary approach to research. The center will develop new courses, workshops and other educational opportunities for undergrads, graduate students and postdocs focusing on the multi-disciplinary approach.

For additional information, please visit: <https://cemb.wustl.edu/>



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

gerrity@biology2.wustl.edu

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