

# BIOrhythms

Washington University Biology Department Newsletter

April 2016

*“Keep away from people who try to belittle your ambitions. Small people always do that, but the really great make you feel that you, too, can become great.”*

—Mark Twain

## Helpful Links

[Biology Home Page](#)  
[Biology Course Listings](#)  
[Faculty Listings](#)

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

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

## Featured in this issue:

**Faculty Spotlight:** Richard Vierstra

**Biology Student Awards and Prizes:** 2016 Winners

**Student Group:** JCUBES

**Summer Jobs:** Career Center

**Calendar:** Biology Events and links to event listings



## Faculty Spotlight: Richard Vierstra, George & Charmaine Mallinckrodt Professor of Biology



*Installation ceremony for Dr. Vierstra, March 2016, photo credit: The Record*

Dr. Richard (Rick) Vierstra grew up in Rhode Island where his early interest in biology and chemistry was fueled by his father's gift of a chemistry book designed for children with Do It Yourself experiments. This book, now banned from most libraries for being too dangerous, contained instructions on how to make explosives and poisonous gases! Despite the danger, these experiments cultivated his fascination with biochemistry. He studied Biology and Chemistry as an undergrad at the University of Connecticut, where his first instructors sparked an interest in botany, eventually leading to studies in plant biochemistry. Dr. Vierstra earned his Ph.D in the Department of Energy Plant Research Lab at Michigan State University. His postdoc work was completed in the lab of Dr. Peter Quail at the University of Wisconsin in Madison, where he stayed on for his first appointment in the Horticulture Department, eventually moving into Genetics.

After many years at UW-Madison, Dr. Vierstra decided it was time for a change. He came to Wash U in fall 2015 because of the university's reputation for having a strong biology department, especially in plant science. In addition, Wash U's partner institutes, the Donald Danforth Plant Science Center and Monsanto Corporation, have a lot to offer in the field of agricultural research. He was officially installed as the George & Charmaine Mallinckrodt Professor of Biology, an endowed professorship, in March 2016.

—Cont'd on page 2

## WU CAREER CENTER SUMMER OPPORTUNITIES

### Locations:

Danforth University Center,  
Suite 110 with satellite offices  
in Lopata Hall, Brauer Hall  
and Steinberg Hall

Main Office Hours in the  
Danforth University Center:  
Mon-Fri: 8:30-5:00

### Contact Us:

Phone: 314.935.5930

Fax: 314.935.5905

Email: [careers@wustl.edu](mailto:careers@wustl.edu)

Web: [careercenter.wustl.edu](http://careercenter.wustl.edu)

### Have a Quick Question?

You can always stop by the  
Career Center's Quick Ques-  
tion hours in the main office  
Monday-Friday, 11am-5pm for  
assistance with CAREERlink,  
writing your resume and cover  
letters, or for quick guidance.

### Report Your Plans – Win \$100

Report your summer or post-  
graduate plans by June 1 for a  
chance to win \$100!

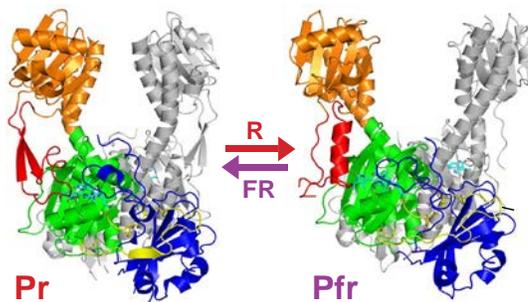
Whether you're traveling,  
taking classes, starting an  
internship or full-time job, or  
planning on attending gradu-  
ate school, we want to know!  
Please take 30 seconds to  
**report your plans** for summer  
2016 before the contest ends  
June 1.

**\*\*\*SEE NEXT PAGE FOR  
UPCOMING SUMMER & POST-  
GRADUATE OPPORTUNITIES**

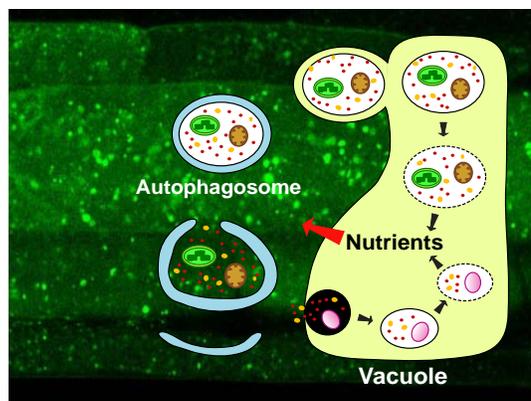
*Faculty Spotlight cont'd*—The Vierstra Lab's research is focused on understanding how plants detect and respond to light through the phytochrome family of photoreceptors and then using this body of knowledge toward more efficient agricultural growth. The lab also studies how cells break down proteins through the ubiquitin/26S proteasome and autophagy systems, and how they work together to promote growth and development and maintain cell health, as well as how a relative of ubiquitin called SUMO helps plants survive stress. This research has larger implications in understanding and treating neurological disorders and diseases such as Parkinson's, ALS and MS as well as certain cancers in addition to improving plant nutrition and stress tolerance (see lab description below). The Vierstra Lab has a variety of job opportunities for undergraduates, starting this summer. Interested students should email Dr. Vierstra at [rdvierstra@wustl.edu](mailto:rdvierstra@wustl.edu) for more information!

Alongside teaching and lab research, Dr. Vierstra serves on several international committees including the Board of Trustees of the American Society of Plant Biologists, International Society of Plant Molecular Biology, and the North American Steering Committee on Arabidopsis Research. In his free time, he enjoys carpentry projects, watching and playing sports.

## Vierstra Lab Research Description



*3-D structure of the photosensing module of a bacterial phytochrome showing the nanometer-scale conformational changes that occur during photoconversion between the inactive Pr and the active Pfr states.*



*Diagram showing how autophagy captures cytoplasmic material and transport it to the vacuole for degradation. The background shows Arabidopsis root cells containing GFP-labeled autophagic vesicles inside the vacuole.*

Light is essential to plants, providing both the necessary energy for growth and signals to entrain their life cycle to the daily and seasonal rhythms. To perceive this signal, plants employ a family of red/far-red light-absorbing photoreceptors called phytochromes. The Vierstra lab is attempting to understand how phytochromes work at the atomic level, using a variety of structure-based approaches such as X-ray crystallography and single particle electron microscopy with both plant and microbial versions. An emerging model is that light excitation triggers an isomerization of the bilin chromophore, which induce dramatic changes within the protein that alter signaling. Based on this model, the lab is now trying to reengineer phytochromes as a novel strategy to improve agricultural yield and sustainability.

All cells have catabolic mechanisms designed to maintain proper homeostasis and influence the levels of key regulators that control growth and development. The Vierstra lab is studying two key degradative routes in plants, the

—Cont'd on page 4

## Annual Biology Awards and Prizes and New Dean Quatrano Prize

**Stalker Award Winner 2016:** Jenny Liu. The Harrison D. Stalker Award honors a graduating Biology major who, in addition to doing excellent work in science, has taken advantage of Washington University's broad opportunities in the liberal arts.

**Spector Prize Winner 2016:** Vita Jaspan. This prize is awarded to the honors thesis chosen for the design of the experiments, the technical excellence with which they were carried out, and the incisiveness of interpretation of the results.

**The Dean Quatrano Prize 2016 Winner:** Shyam Akula. This new prize is to be awarded for the first time this year to the thesis showing greatest evidence of creativity in design, research methodology, and/or broader scientific implications.

---

## Ralph Bunche Scholars 2016: Jasmine Brown and Sakirat Akadri

Biology and Biochemistry track majors Jasmine Brown and Sakirat Akadri will be recognized at the annual James E. McLeod Honors and Awards Ceremony as 2016 Ralph Bunche Scholars. The Award is named in honor of Ralph Bunche who was a United Nations mediator and 1950 Nobel Peace Prize recipient.

Recognition is given for outstanding academic achievement to undergraduate students of Black/African American descent. This Award recognizes the academic achievement of freshmen who have completed at least 14 graded units in the semester and have a cumulative GPA of 3.5 or higher. It also recognizes undergraduates who have completed at least 14 graded units in the semester and have a semester GPA of 3.5 or higher for at least 3 consecutive semesters.

This year's Awards Ceremony will be held on Monday, May 2, 2016 from 3-5pm in Whitaker Hall Auditorium and Atrium. The Ceremony is a highlight of the spring semester. —Cheryl Holland and Donna Williams, Co-Chairs, McLeod Honors and Awards Program

---

## Goldwater Scholarship Winners 2016: Trevor Krolak and Krishna Paranandi

Two juniors at Washington University in St. Louis have been awarded the Barry M. Goldwater Scholarship for the 2016-17 academic year.

The winners are Trevor J. Krolak, a biology and neuroscience major, and Krishna S. Paranandi, who is majoring in molecular biology and biochemistry. John Webb, a biology major, received an honorable mention in the competition. —*Cont'd on page 4*

Classes of 2017, 2018, & 2019: Sign up for Career Camp!

Career Camp is Thursday, August 25: 9:00 a.m. to 4:00 p.m. This event provides an opportunity to reflect on your summer and college experience and then create an action plan for the following year. You'll choose the sessions right for you throughout the day. You may choose to:

- Reflect on your previous summer and college experience for future decision making
  - Identify your interests and explore options within those areas
  - Understand how to select and apply to the right graduate, medical or law school
  - Explore career paths and network with industry professionals
  - Build professional skills, such as resume and cover-letter writing, interviewing and networking
  - Connect with an advisor to support you throughout the year
  - Create an individualized action plan for the year ahead
- Take advantage of this unique program to clarify your plans and use the year ahead to set your next summer goals. If you will be living in Residential Life housing, you will be allowed to move in by Wednesday, August 24.

Early Registration, 5/31: \$30  
Regular Registration, 6/1-6/30: \$40  
Final Registration, 7/1-8/5: \$50

[Click here to register for Career Camp!](#)

## Upcoming Internship and Full-time Job Opportunities

Research Associate, Post Graduation, Full-Time Internship  
Endurix National Staffing - Saint Louis, Missouri  
Deadline May 6

Urban Lakes & Ponds Restoration Opportunities Intern, Full-Time Internship  
NYC Parks Department - New York, New York  
Deadline May 8

Clinical Monitoring Associate I, Post Graduation  
PAREXEL - Billerica, Massachusetts  
Deadline May 20

UC Berkeley Summer Business Program, Full-Time Internship  
UC Berkeley, Haas School of Business Undergraduate Program - Berkeley, California

Bioclinician, Post Graduation  
Medical Center Navicent Health - Macon, Georgia  
Deadline June 30

For more details on these or other opportunities, visit [CAREER-link](#).

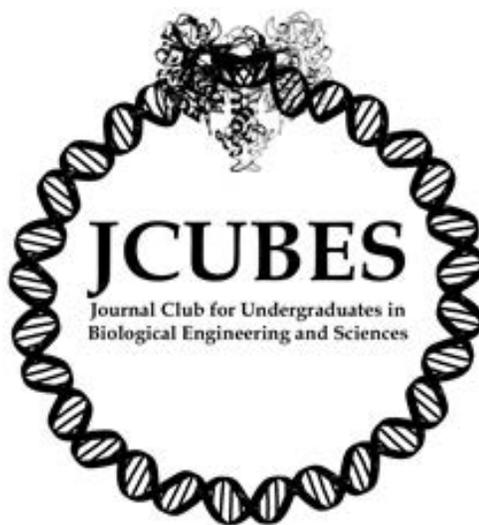


*Goldwater Scholarship cont'd*—“I believe the success of our students in winning these extremely competitive national awards is really grounded in the excellent faculty mentoring each of these students has received from very early on in their undergraduate careers,” said Grizelda D. McClelland, assistant dean in the College of Arts & Sciences, who works with students interested in the fellowship programs.

The Barry M. Goldwater Scholarship is considered one of the most prestigious awards for undergraduates planning careers in the sciences, engineering or math. Congress established it in 1986 to honor the longtime senator.

---

## JCUBES: The Journal Club for Undergraduates in Biological Engineering and Sciences



We are Wash U's undergraduate journal club! We hold regular meetings to discuss cutting-edge life sciences research. We have one final presentation this semester taking place on Thursday April 28th at 6:00 PM in Life Sciences 310. Be sure to swing by! Free pizza and refreshments are provided generously by the Departments of Biology and Biomedical Engineering. Make sure to check out our blog [www.wustljcubes.wordpress.com](http://www.wustljcubes.wordpress.com) or email us at [wustljcubes@gmail.com](mailto:wustljcubes@gmail.com) to get updates about our upcoming summer programming! If you are going to be in St. Louis this summer, we would love to hear from you!

---

## *Vierstra Lab Research Description cont'd*—

ubiquitin/proteasome system (UPS) and autophagy, with the goals of understanding how they work, how they select targets, and how they function synergistically. The UPS involves tagging of unwanted proteins with the highly conserved protein ubiquitin. Once modified, these targets are individually recognized and broken down by the 26S proteasome, a self-compartmentalized proteolytic machine. Over 6% of the Arabidopsis genome encodes UPS components, with over a 1000 factors participating in target selection alone. Autophagy ('self eating') involves encapsulating unwanted cytosolic constituents in vesicles called autophagosomes, which are delivered to the vacuole for degradation. In contrast to the UPS, autophagy is designed to handle large protein complexes, protein aggregates and even entire organelles. The Vierstra lab is also studying a relative of ubiquitin called SUMO that becomes post-translationally attached to a plethora of nuclear proteins when cells are exposed to various environmental insults, presumably to provide stress protection. For all this research, the Vierstra lab combines data on the proteome, transcriptome and interactome using a variety of cell biological, biochemical, genetic and mass spectrometric techniques.

# 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>

Evolution, Ecology, & Population Biology Seminars, Thursdays, 4:00pm, Rebstock 322, check the website for topics/schedule: [http://wubio.wustl.edu/events?field\\_event\\_tags\\_tid=18](http://wubio.wustl.edu/events?field_event_tags_tid=18)

History & Philosophy of Science Seminar Series: <http://pages.wustl.edu/hpbm/events>

PMB Super Group: most Wednesdays 12:00-1:00 in McDonnell 412: <http://wubio.wustl.edu/events/pmb-supergroup-seminar-series>

Donald Danforth Plant Science Center (DDPSC), Weekly Seminar Series—check the website for event details and topics: <http://www.danforthcenter.org/events/scientific-seminars>

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

---

## May 2016

2nd

Spector Prize Ceremony

18th

Honors Reception for Students, Mentors and Families

19th

Arts & Sciences Recognition Ceremony  
Biology Major Graduates Celebration

20th

COMMENCEMENT

23rd

Summer Session I begins

30th

Memorial Holiday-NO CLASSES

