



p. 8  
**ASPB Endorses  
Decadal Vision  
for Plant Science  
Research**



p. 9  
**Plant Biology 2013**  
Plant scientists meet  
for four days of plant  
science, career advice,  
and research techniques.



p. 17  
**Luminaries**  
Richard Vierstra,  
Professor, University of  
Wisconsin–Madison

# ASPB *News*



THE NEWSLETTER OF THE AMERICAN SOCIETY OF PLANT BIOLOGISTS

## President's Letter

### To Die For?

BY PEGGY G. LEMAUX  
ASPB President, University of California, Berkeley

In late July 2013, when I was contemplating the focus of my President's Symposium—at the gentle prodding of Program Committee chair Julia Bailey-Serres—I looked through the folder of ideas I had saved for future President's Letters. I found a figure I had kept from a July 2011 *National Geographic Magazine* article entitled "Food Ark" (<http://ngm.nationalgeographic.com/2011/07/food-ark/siebert-text>). The dramatic figure (<http://ngm.nationalgeographic.com/2011/07/food-ark/food-variety-graphic>) shows spikes ema-

nating from a central point, with the width of each spike indicating the size of the pool of varieties for 10 different crops. Each spike demonstrates the diversity in commercial seed houses of these 10 crops, comparing the number of varieties in 1903 to that available 80 years later. The differences in the widths of the spikes between the two years are striking! For example, in 1903, there were 497 varieties of lettuce, with that number shrinking to 36 varieties (7%) by 1983. There were 307 varieties of sweet corn that dwindled to 12

*continued on page 3*



© FAO/R. FAIDUTTI

### Alan M. Jones Assumes Presidency October 1



**A**lan Jones, University of North Carolina, is ASPB's new president. He succeeds Peggy G. Lemaux, University of California, Berkeley. The Society's new president-elect is Julian Schroeder, University of California, San Diego.

Alan Jones, known as "AJ" by many of his ASPB colleagues, received his

*continued on page 6*

# Contents

- 1 President's Letter
- 1 Alan Jones Assumes Presidency October 1
- 5 Julian Schroeder Elected to Lead ASPB in 2014–2015
- 7 Lisa Ainsworth Elected to Executive Committee
- 8 ASPB Endorses Decadal Vision for Plant Science Research

## Plant Biology 2013

- 9 Meeting Highlights

## Section News

- 13 Midwestern Section

## Minority Affairs

- 15 Putting Down Roots

## Luminaries

- 17 Richard Vierstra

## Membership Corner

- 19 Maria Julissa Ek-Ramos

## Science Policy

- 21 Policy Update
- 22 Steve Long Delivers Keynote Presentation at AAAS Charles Valentine Riley Memorial Lecture
- 23 Unleashing a Decade of Innovation in Plant Science

## Education Forum

- 25 PB2013 Education and Outreach Booth
- 28 PB2013 Education Workshop
- 29 PB2013 Education and Outreach Posters
- 30 PB2013 Meet the Future of Plant Science Research
- 31 PB2013 Education and Outreach Minisymposium
- 34 PB2013 Small Colleges/PUI Networking Event
- 35 Outstanding Outreach—2013 Education Foundation Grant Recipients

## New Staff

- 38 Tyrone Spady Joins ASPB as Legislative and Public Affairs Director
- 39 Susan Cato Joins ASPB as Director of Digital Marketing Strategy

ASPB staff are dedicated to serving our members. We welcome your questions and feedback.

For quick response, e-mail us at [info@aspb.org](mailto:info@aspb.org) or visit our FAQ at [www.aspb.org/faq](http://www.aspb.org/faq).

## ASPB Executive Committee

<b>President</b>	Peggy G. Lemaux
<b>Immediate past president</b>	Steven C. Huber
<b>President-elect</b>	Alan Jones
<b>Secretary</b>	Julia Bailey-Serres
<b>Treasurer</b>	Karen Koster
<b>Chair, Board of Trustees</b>	Richard Amasino
<b>Chair, Publications Committee</b>	Sally Mackenzie
<b>Chair, Women in Plant Biology Committee</b>	Kateri Duncan
<b>Chair, Minority Affairs Committee</b>	John Harada
<b>Chair, Education Committee</b>	Kathleen Archer
<b>Chair, International Committee</b>	Leon V. Kochian
<b>Chair, Membership Committee</b>	David Horvath
<b>Chair, Committee on Science Policy</b>	Patrick Schnable
<b>Elected members</b>	Gloria Muday Richard Vierstra MariaElena B. Zavala
<b>Sectional Representatives</b>	
<b>Midwestern</b>	Sarah E. Wyatt
<b>Northeastern</b>	Om Parkash Dhankher
<b>Southern</b>	Kent Chapman
<b>Mid-Atlantic</b>	Zhongchi Liu
<b>Western</b>	Camille Steber

## ASPB Staff

<b>Executive director</b>	Crispin Taylor, <a href="mailto:ctaylor@aspb.org">ctaylor@aspb.org</a>
<b>Executive and governance affairs administrator</b>	Sylvia Lee, <a href="mailto:slee@aspb.org">slee@aspb.org</a>
<b>Assoc. director of finance and administration</b>	Kim Kimmnach, <a href="mailto:kkimmnach@aspb.org">kkimmnach@aspb.org</a>
<b>Accounts receivable and payable specialist</b>	Stephanie Liu-Kuan, <a href="mailto:sliu@aspb.org">sliu@aspb.org</a>
<b>Senior staff accountant</b>	Jotee Pundu, <a href="mailto:jotee@aspb.org">jotee@aspb.org</a>
<b>Director of meetings, marketing, and membership</b>	Jean Rosenberg, <a href="mailto:jean@aspb.org">jean@aspb.org</a>
<b>Director of digital marketing strategy</b>	Susan Cato, <a href="mailto:scato@aspb.org">scato@aspb.org</a>
<b>Membership manager</b>	Shoshana Kronfeld, <a href="mailto:shoshana@aspb.org">shoshana@aspb.org</a>
<b>Subscriptions manager</b>	Suzanne Cholwek, <a href="mailto:suzanne@aspb.org">suzanne@aspb.org</a>
<b>Subscriptions assistant</b>	Linda Palmer, <a href="mailto:lpalmer@aspb.org">lpalmer@aspb.org</a>
<b>Legislative and public affairs director</b>	Tyrone Spady, <a href="mailto:tspady@aspb.org">tspady@aspb.org</a>
<b>Education coordinator</b>	Katie Engen, <a href="mailto:katie@aspb.org">katie@aspb.org</a>
<b>Director of publications</b>	Nancy A. Winchester, <a href="mailto:nancyw@aspb.org">nancyw@aspb.org</a>
<b>Publications assistant</b>	Diane McCauley, <a href="mailto:diane@aspb.org">diane@aspb.org</a>
<b>Managing editor</b>	Patti Lockhart, <a href="mailto:plockhart@aspb.org">plockhart@aspb.org</a>
<b>Science writer, <i>Plant Physiology</i></b>	Peter Minorsky, <a href="mailto:peminorsky@aspb.org">peminorsky@aspb.org</a>
<b>Production manager, <i>Plant Physiology</i></b>	Jon Munn, <a href="mailto:jmunn@aspb.org">jmunn@aspb.org</a>
<b>Manuscript manager, <i>Plant Physiology</i></b>	Ashton Wolf, <a href="mailto:awolf@aspb.org">awolf@aspb.org</a>
<b>Senior features editor, <i>The Plant Cell</i></b>	Nan Eckardt, <a href="mailto:neckardt@aspb.org">neckardt@aspb.org</a>
<b>Features editor, <i>The Plant Cell</i></b>	Mary Williams, <a href="mailto:mwilliams@aspb.org">mwilliams@aspb.org</a>
<b>Production manager, <i>The Plant Cell</i></b>	Susan Entwistle, <a href="mailto:susan@aspb.org">susan@aspb.org</a>
<b>Manuscript manager, <i>The Plant Cell</i></b>	Annette Kessler, <a href="mailto:akessler@aspb.org">akessler@aspb.org</a>

The *ASPB News* is distributed to all ASPB members and is also available online. It is published six times annually in odd-numbered months. Its purposes are to keep membership informed of ASPB activities and to reinforce the value of membership. The *ASPB News* is edited and produced by ASPB staff from material provided by members and other interested parties.

Copy deadline is the 5th day of the preceding even-numbered month (for example, December 5 for January/February publication).

Contact: Nancy A. Winchester, Editor, *ASPB News*, 15501 Monona Drive, Rockville, MD 20855-2768 USA; [nancyw@aspb.org](mailto:nancyw@aspb.org); 301-296-0904.

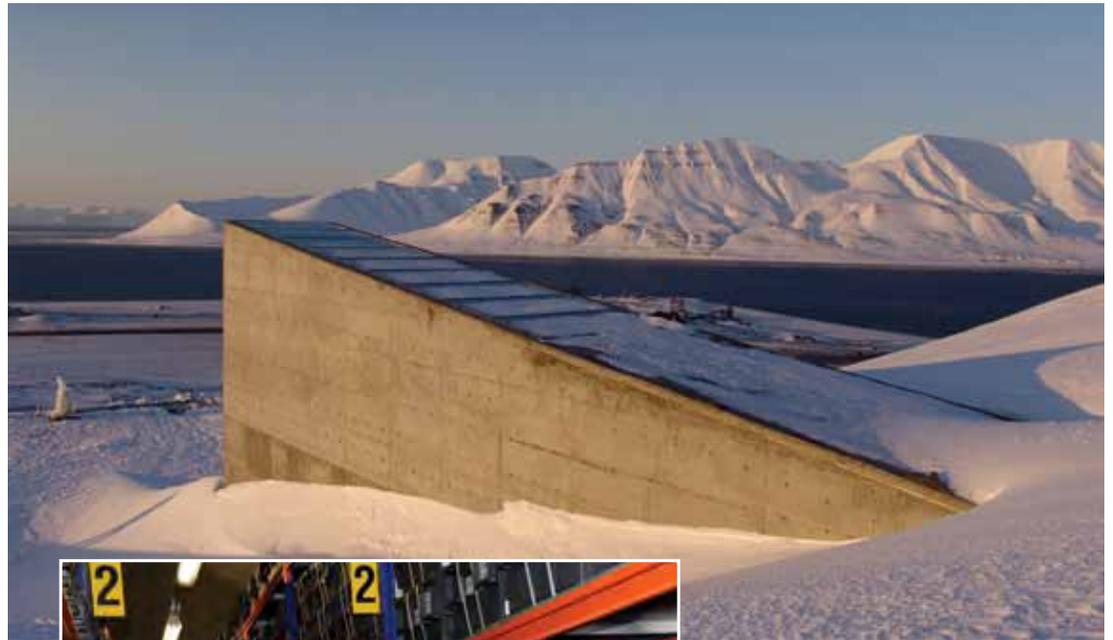
© 2013 American Society of Plant Biologists

**PRESIDENT'S LETTER**  
*continued from page 1*

varieties (4%) over the same time span. It made me stop and think about what had potentially been lost over those eight decades.

I could not get that figure out of my mind when I thought about what message I wanted to convey in my symposium. I thought about the idea of a symposium featuring the focus of my laboratory's research work: genetic engineering to improve crops for developed and developing countries. But then I thought about the bigger picture. If future researchers didn't have the broad palette of diversity, offered up by natural variation and occasional human intervention, on which to base future crop improvement—be it by breeding or engineering strategies—what would they do?

In considering this as a focus for my symposium, I remembered reading an interesting book on this topic a few years earlier titled *Unnatural Selection: Technology, Politics, and Plant Evolution*, by Cary Fowler. I thought maybe a search of Fowler's writings might help me find out about this idea. So my next step, like that of "any good researcher," was to enter the words "cary fowler plant diversity" into Google to see what I could find. From this search I learned of Fowler's efforts with the Global Crop Diversity Trust to set up the Global Seed Vault in Svalbard, Norway, an arctic location about 800 miles from the North Pole (<http://www.croptrust.org/content/svalbard-global-seed-vault>). The goal of this facility, which opened in February 2008, is to preserve a wide variety of plant seeds as a type of insurance policy against losses of the



*Cary Fowler, author of Unnatural Selection: Technology, Politics, and Plant Evolution, stands inside the Global Seed Vault.*

*(above) The Global Seed Vault in Svalbard, Norway, located approximately 800 miles from the North Pole. The goal of this facility is to preserve a wide variety of plant seeds as a type of insurance policy against losses of the seeds.*

PHOTOS ©MARI TEFRE/GLOBAL CROP DIVERSITY TRUST

seeds—even those being held in other seed banks.

A further web search uncovered a Ted Talk by Fowler, "One Seed at a Time, Protecting the Future of Food" ([http://www.ted.com/talks/cary\\_fowler\\_one\\_seed\\_at\\_a\\_time\\_protecting\\_the\\_future\\_of\\_food.html](http://www.ted.com/talks/cary_fowler_one_seed_at_a_time_protecting_the_future_of_food.html)). After listening to that talk, my mind was made up. The focus of my symposium in Providence was going to be the importance of global plant diversity for the future of our food supply and how we can use that diversity to

meet the challenges that loom ahead. For example, the varieties of wheat, corn, and rice we grow today may not thrive in a future threatened by climate change and novel biotic and abiotic stresses.

But my "research" didn't stop there. I wanted to know where the idea of establishing seed banks started. After all, when consumers stroll through the bounty presented in the fresh fruit and vegetable sections of supermarkets, it is probably not apparent why they should care about the few heirloom tomatoes they might see on

display. These fruits look strangely odd and are pretty expensive. Why should they matter? As plant biologists, we know that they represent the tip of the iceberg of the resources about which we should care deeply.

Most of us today have no real appreciation for the causes of and the human devastation that resulted from the Irish potato famine of the 1840s ([http://www.digitalhistory.uh.edu/history\\_online/irish\\_potato\\_famine.cfm](http://www.digitalhistory.uh.edu/history_online/irish_potato_famine.cfm)) or the scourge wrought by the

*continued on page 4*

## PRESIDENT'S LETTER

*continued from page 3*

southern corn leaf blight in the early 1970s (<http://www2.nau.edu/~bio372-c/class/sex/cornbl.htm>). And although a contemporary threat that could cause similar consequences looms, consumers today (and perhaps even most plant biologists) are unaware of the potential devastating effects that a new pathogen, Ug99, could have on global wheat supplies. Ug99 is a new strain of the fungus *Puccinia graminis*, which causes stem rust and which can devastate wheat yields when the grain shrivels (Singh et al., 2011). Roughly 90% of the world's wheat is susceptible to the pathogen.

All of these examples were or are exacerbated by the lack of diversity of our major crop species. Just as the image in the *National Geographic Magazine* showed, our domestic agriculture depends on a limited number of fruit, vegetable, or cereal varieties, with only an occasional heirloom variety even showing up in the marketplace. Thousands of those heirloom varieties have disappeared. In Fowler's Ted Talk, he indicated that in the early 1800s, there were about 7,100 varieties of apples with names in the United States, but today 6,800 of those varieties are extinct, never to reappear. In China, 90% of the wheat varieties cultivated just a century ago are now gone (<http://ngm.nationalgeographic.com/2011/07/>

[ark/siebert-text](http://www.ark-siebert-text.com)). The United Nations' Food and Agriculture Organization (FAO) estimates that since the beginning of the 20th century, about 75% of the genetic diversity of agricultural crops has been lost (<http://www.fao.org/docrep/004/v1430e/V1430E04.htm>). Although wheat is no exception in this regard, researchers were able to use the diversity in an ancient relative of modern wheat, einkorn wheat, to find the gene responsible for Ug99 resistance in this relative (Saintenac et al., 2013).

Although the average person might think occasionally about the losses of flora and fauna in the rainforests of South America as they are destroyed to make room for cattle ranching, oil drilling, and soybean production, they are not likely to lament the loss of crop diversity. Few even consider what it takes to get food to the market and onto their tables. But, as practicing plant biologists, we should care about the erosion in the genetic diversity of the plants that form the basis for our food supply!

Where did efforts to protect and preserve genetic diversity begin? The idea was first championed by Russian botanist Nikolay Vavilov. His childhood was spent in a rural village where famine was common because of crop failures. This led him to travel around the world in the 1920s and 1930s, gathering seeds from varieties that had resistance to biotic and abiotic stresses. Vavilov

also was made head of an institute in what is now St. Petersburg that became the first global seed bank, where he kept his precious seed collection.

For this, one might expect that Vavilov was revered for his contributions, but sadly this was not the case. In 1943, he died of starvation in a prison camp, having been reviled by his government as being engaged in science of little importance. When Hitler set his sites on the city where the seed bank was, a group of scientists at the institute boxed up the seeds, moved them to the basement, and took shifts protecting them. The seed caretakers valued the seeds so highly for what they offered for the future of their country that many of them died of starvation instead of eating the seeds.

It is hard for me to fathom such devotion to plant diversity when I look around today and see what we are losing for reasons that are not nearly as dramatic as in Russia in the 1940s. I have to ask myself, would I be willing "to die for" the seed diversity that exists today? I should, when I consider that it took thousands of years for humans involved in domesticating plants to create the diversity that was inherent in our food supply just a few decades ago. Selective breeding by individuals was focused on very specific problems, like salty soils or specific pests, in their particular regions. And yet, we watch as these precious resources slip

away—just as with the 6,800 apple varieties that Fowler described.

The challenge for me, then, was to bring together a group of speakers in my symposium who could speak to this issue in a compelling way so that those who attended would feel the same devotion to protecting plant diversity that Cary Fowler—and now I—feel. If you missed the symposium and its outstanding speakers, please watch the video feed that is available online (<http://www.youtube.com/user/PlantBiologyTV>). And, I hope you will go a step further—invite friends, family, and other students to watch it. Perhaps then all of us will gain new respect for the importance of genetic diversity and fight to save it! ■

### Reference

- Saintenac, C., Zhang, W., Salcedo, A., Rouse, M. N., Trick, H. N., Akhunov, E., and Dubcovsky, J. (2013). Identification of wheat gene Sr35 that confers resistance to Ug99 stem rust race group. *Science* 341: 783–786.
- Singh, R. P., Hodson, D. P., Huerta-Espino, J., Jin, Y., Bhavani, S., Njau, P., Herrera-Foessel, S., Singh, P. K., Singh, S., and Govindan, V. (2011). The emergence of Ug99 races of the stem rust fungus is a threat to world wheat production. *Annual Review of Phytopathology* 49: 465–481.

# Julian Schroeder Elected to Lead ASPB in 2014–2015

Julian Schroeder became president-elect October 1 and is slated to become ASPB president next October for the 2014–2015 term.

Julian is professor and codirector of the Center for Food and Fuel for the 21st Century at the University of California, San Diego. He is also director of Plant Systems Biology Graduate Training in San Diego. He grew up in New Jersey, where he took frequent family weekend hikes in nature, and also in New York City. His family moved to Germany, where he pursued his undergraduate studies in physics at the University of Göttingen, including a year as an exchange student at the University of Grenoble in France. He completed his MS and PhD in biophysics and physics at the Max Planck Institute for Biophysical Chemistry in Göttingen as the first graduate student of Nobel laureate Erwin Neher, in conjunction with the University of Göttingen. He pursued a postdoctoral fellowship at the University of California, Los Angeles, with Susumu Hagiwara, who had codiscovered calcium channels in animal systems. In 1990, he joined the faculty at the University of California, San Diego, where he has been active since.

In his early research, Julian pioneered the characterization of ion channels in higher plants. He identified and characterized several of the major classes of higher plant ion channels and derived models for their functions in ion transport, osmoregulation, and signal transduction. He developed the model for how



*Julian Schroeder*

these different classes of ion channels with pumps function together in a network in guard cells for mediation of stomatal opening and stomatal closing during gas exchange regulation in plants. This understanding of plant ion channel functions is distinct from the “excitatory” paradigm of ion channel functions in excitable animal cells. At the same time, unique mechanisms by which plant anion and calcium-permeable channels can produce rapid signal transduction were defined. Julian and his coworkers developed and adapted interdisciplinary and systems biological approaches to guard cells, which control water loss and CO<sub>2</sub> intake in plants. He further adapted and developed reconstitution of plant ion channels and transporters in *Xenopus* oocytes, which allowed direct characterizations of dynamic transport properties and plant transporter gene functions.

Julian’s laboratory then pioneered the combined use of patch clamp analyses and *Arabidopsis* genetics. From the

above advances, his laboratory turned its research focus toward identifying the basic molecular mechanisms by which plants respond to and mount resistance to abiotic stresses. Several abiotic stress mechanisms that Julian and colleagues are characterizing are directly linked to water, including drought stress–induced signal transduction mechanisms, salinity resistance mechanisms, and how plants respond to the continuing rise in the atmospheric CO<sub>2</sub> concentration. Understanding the basic mechanisms of these abiotic stress responses is also relevant in reference to the availability of arable land to meet the food and energy needs of the growing human population.

Julian’s research has identified key early abscisic acid signal transduction genes and their underlying mechanisms. In this research Julian and colleagues obtained molecular genetic, genomic, biophysical, cell biological, and whole plant physiological evidence for new genes and mechanisms in guard cells that control water loss of plants in response to drought. In recent years Julian’s laboratory has identified CO<sub>2</sub> signal transduction mechanisms, including CO<sub>2</sub> binding proteins, intracellular signaling proteins, and channels in guard cells through which the continuing rise in atmospheric CO<sub>2</sub> level reduces stomatal pore apertures in plants.

A second effort in his lab focuses on identifying genes that mediate salt (sodium) stress resistance and heavy metal uptake

and detoxification in plants. His laboratory has co-identified major mechanisms through which plants detoxify and accumulate heavy metals and the metalloid arsenic. Julian’s lab also identified the plant HKT transporter family and showed its key role and the mechanism through which it mediates salinity resistance in *Arabidopsis*. Research on the staple crops rice and wheat in several laboratories is now showing that this same HKT transporter mechanism plays a major role in determining salinity resistance under saline stress. For example, HKT marker breeding efforts in wheat in Australia of Rana Munns, Matthew Gilliam, and colleagues are now showing major improvements in yield, illustrating how basic *Arabidopsis* research can feed into innovation in agriculture.

Julian is Novartis chair in plant sciences and distinguished professor in the Division of Biological Sciences at the University of California, San Diego. He has received awards for his research advances, including the Charles Albert Shull Award from ASPB, the Presidential Young Investigator Award from the National Science Foundation (NSF), the Deutsche Forschungsgemeinschaft (DFG) Heinz-Maier-Leibnitz Research Prize, and the Blasker Award in Environmental Science and Engineering. He received a Feodor-Lynen Alexander von Humboldt fellowship as a postdoc at UCLA. He was also an Alexander von Humboldt fellow

*continued on page 7*

**ALAN JONES**  
*continued from page 1*

BS magna cum laude from the University of Florida at Gainesville in 1978 and his PhD from the University of Illinois at Urbana–Champaign in 1983, where he was mentored by three ASPB members: past ASPP secretary Larry Vanderhoef, international member Fred Meins, and past president Tuan-hua David Ho. As a graduate student, AJ worked on auxin perception and developed the first photoaffinity tag for an auxin receptor. He did his postdoctoral research at the University of Wisconsin–Madison between 1983 and 1986 under mentor Peter Quail, with whom he worked on the structure of phytochrome A. This included determining the quaternary structure of phytochrome and a minimal primary structure for red/far-red photoreversibility. In 1986, Alan joined the Department of Biology at the University of North Carolina at Chapel Hill as an assistant professor. He was promoted to associate professor in 1992, to full professor in 1999, titled the George and Alice Welsh Distinguished Professor in 2005, and titled the Kenan Distinguished Professor in 2013. In 2004, he was made a courtesy appointment in the Department of Pharmacology in the School of Medicine at UNC Chapel Hill.

AJ's research has covered three main areas over the past three decades. He worked on Auxin Binding Protein 1 (ABP1), an essential auxin receptor of one particular class. His contributions were to show that ABP1 directly bound the hormone and that, as expected of a hormone receptor, auxin binding to ABP1 is the rate-limiting step for auxin-induced growth. Other contributions on this topic included phytochrome regulation of auxin transport and ABP1 action. In the 1990s, AJ and his student Andrew Groover became interested in programmed cell death (PCD) and noted that the first example of PCD in a eukaryotic cell was made by an ASPB member three-quarters of a century ago. Andrew brought the transdifferentiating cell culture known as the "zinnia system" to the Jones lab to study the process of controlled cell death during xylogenesis. AJ introduced the term "functional corpse" to the PCD field and the concept of "vacuolar PCD" to highlight the central role the vacuole plays in some plant PCD. His contributions from the past decade focus on cell signaling coupled by the heterotrimeric G protein complex (G signaling). AJ challenged the paradigm by showing that G signaling in plants has profoundly different properties from those we learned from textbooks. Working with ASPB member

Mike Sussman, Alan was one of the first to use T-DNA insertion mutagenesis of *Arabidopsis* where, with this reverse genetic approach, they showed that null alleles of the G protein confer several specific changes in hormone, light, and stress responsiveness. His interest in molecular structure and function began in Peter Quail's lab and extended to his own lab, in which he mapped protein–protein interfaces on phytochrome with his first student, Mike Edgerton, and then solved the crystal structure of the plant G protein alpha subunit last year. More recently, his lab has focused on unusual molecular mechanisms for G protein activation and the evolution of G signaling in Eukaryota.

AJ's public service includes participation as expert panelist in public forums on the safety and benefits of genetically modified crops and on radio shows about breakthroughs in plant sciences. He has also created teaching modules for K–12 teachers, including one that conveys the concept of differential gene expression to 9th- and 10th-grade biology students. This module incorporates *Arabidopsis* lines expressing  $\beta$ -glucuronidase from different gene promoters to illustrate tissue-specific expression. His latest education project, a collaboration with ASPB member Jane Ellis, is a coloring/activity book for pre-readers that teaches

the 12 Principles of Plant Biology distilled by ASPB's Education Foundation. The book, titled *My Life as a Plant*, was published by ASPB in 2012 and is being translated into numerous languages. AJ also served as grant panel manager twice for the USDA National Research Initiative (NRI) and Agriculture and Food Research Initiative programs and serves frequently as a regular panelist for the National Science Foundation, the NRI, the Department of Energy, and the National Institute of General Medical Science.

AJ has been an active ASPB member since 1978. From 1991 to 1998, he was monitoring editor and, from 2005 to 2012, associate editor of *Plant Physiology*. He was a member of the Constitution and Bylaws Committee from 1998 to 2001 and served on the Program Committee from 2001 to 2006. From 2007 to 2010, he served as an elected member of the ASPB Executive Committee. He became an ASPB fellow in 2009 for his dedicated service to the Society and the science of plant biology.

"My Society [ASPB] has been the most important element in my career progression, and I owe much," said Alan in a recent interview. "This is an exciting time to be part of ASPB governance. Our focus to provide even more value to all ASPB members fits my agenda perfectly, and I plan to do my best to reach that goal." ■

# Elizabeth (Lisa) Ainsworth Elected to Executive Committee

Lisa Ainsworth joins the ASPB Executive Committee as an elected member on October 1.

Lisa is a research scientist with the USDA–Agricultural Research Service (ARS) Global Change and Photosynthesis Research Unit in Urbana, Illinois, and an associate professor in the Department of Plant Biology at the University of Illinois at Urbana–Champaign. Lisa obtained her BS in biology from UCLA in 1997 and her PhD in crop sciences from the University of Illinois at Urbana–Champaign in 2003. Her thesis research with Steve Long investigated the effects of rising atmospheric carbon dioxide concentrations on photosynthesis and was supported by a DOE Graduate Research for the Environment Fellowship. Following her PhD, Lisa was an



Lisa Ainsworth

Alexander von Humboldt postdoctoral fellow at the Juelich Research Center with Ulrich Schurr and Achim Walter. There she investigated temporal and spatial variation in leaf growth in soybean.

Lisa's research focuses on understanding the molecular, biochemical, and physiologi-

cal responses of plants to global change, with an aim to identify targets for breeding and biotechnology that may be exploited to maximize crop yields and plant productivity in the coming decades. She is currently investigating ozone tolerance in a population of soybean recombinant inbred lines and variation in ozone tolerance in 200 inbred lines of maize in the field under open air conditions. Her research is funded by the USDA National Institute of Food and Agriculture and the NSF's Plant Genome Research Program.

Lisa has received recognition for her research accomplishments including the 2009 USDA–ARS Midwest Area Early Career Research Scientist Award, the 2011 President's Medal from the Society of Experimental Biology, and the 2012 Charles Albert Shull Award

from ASPB. At the University of Illinois, she was named a university scholar in 2012 in recognition of her research and teaching accomplishments. She has trained seven graduate students and three postdoctoral associates, hosted two international scientists, and mentored more than 25 undergraduate students since 2005.

Lisa has been a member of ASPB since 2002. She chaired a session on Global Climate Change at Plant Biology 2011 and served on the Bogorad Award Committee from 2006 to 2012 and the Shull Awards Committee in 2013. She is a monitoring editor for *Plant Physiology* and an associate editor for the *Journal of Experimental Botany*. Lisa also serves on the editorial advisory board of *New Phytologist*, *Global Change Biology*, and *Plant, Cell and Environment*. ■

## JULIAN SCHROEDER *continued from page 5*

at the Max Planck Institute for Biochemistry in Munich and visiting professor at the ETH Zurich, and was named Chinese Academy of Sciences International Professor (2009) and Churchill Overseas Fellow at Cambridge University (2012). He is a fellow of the American Association for the Advancement of Science.

Julian has been a member of ASPB since 1986 and has served the plant science community in diverse functions, including

present service on ASPB's Public Affairs Committee. He was a member of the North American Arabidopsis Steering Committee (NAASC) from 2006 to 2010 and was NAASC chair in 2009/2010. He has been active on the advisory board of the Arabidopsis Biological Resource Center (2007–2011) and The Arabidopsis Information Resource (TAIR). Prior to these activities, he was a member of the Department of Energy, Energy Biosciences Council. He has further served on many national and international grant panels, including for NSF

and NIH. Julian is committed to inspiring young students in the excitement of the plant sciences, is pursuing high school internship training in his laboratory for students from families with no prior four-year college degrees, and visits local schools for science presentations as a "Nifty 50" member of the annual San Diego Science Festival.

Julian favors opportunity, intellectual integrity, diversity, inspiring and creative research, ethics, and global cooperation. He also strongly supports recent efforts of global plant science societies and

the Global Plant Council to work together to advocate for plant research support and sees a need for training and providing opportunities to scientists from financially disadvantaged countries and regions of the world toward addressing and solving impending global challenges. He strongly supports efforts of members of ASPB to make their voices heard, and especially encourages young members to contact the ASPB president and leadership with ideas and criticisms toward enhancing ASPB's long-term impact. ■

# ASPB Endorses Decadal Vision for Plant Science Research

BY PEGGY G. LEMAUX

ASPB President, University of California, Berkeley

ASPB is very pleased to formally endorse the exciting and compelling consensus vision that is laid out in the recently published report *Unleashing a Decade of Innovation in Plant Science: A Vision for 2015–2025* (<http://tinyurl.com/mxrqevg>), as well as the goals and recommendations that the report articulates.

The overarching objective set out in the decadal vision report is

to markedly increase our ability to understand, predict, and alter how plants grow in constantly changing environments. These game-changing advances in plant science research are required to address the increasingly pressing challenge of meeting the demands for adequate food, feed, shelter, energy, and good health in the face of a burgeoning human population and climate change.

More specifically, the five major goals of the decadal vision are to (1) increase the ability to predict plant traits from plant genomes in diverse environments; (2) assemble plant traits in different ways to solve problems; (3) discover, catalog, and utilize plant-derived chemicals; (4) enhance the ability to find answers in a torrent of data; and (5) create novel approaches aimed at training future generations of plant scientists.

The decadal vision report is the culmination of two broad and inclusive plant science research summits (<http://plantsummit.wordpress.com/>) that were convened by ASPB and supported by the National Institute of Food and Agriculture, the National Science Foundation, the Department of Energy, and the Howard Hughes Medical Institute.

ASPB certainly intends to use the decadal vision to inform and guide its legislative affairs and advocacy efforts; however, achieving the goals of the decadal vision will require cooperation among many stakeholders. ASPB therefore also welcomes the formation of an inclusive National Plant Science Council that will serve as a forum for updating, communicating, and monitoring the impact of the decadal vision on an ongoing basis. ■



## Sunny and Cold

That's the forecast if you use **Model TSC33SD** for your vernalization studies. At a setting of 6.5° C, it provides 250 micromoles of digitally controlled light intensity. And our unique air delivery system provides excellent control of air temperature on each shelf because it can be adjusted to correct for air density as the temperature setpoint is changed. No other manufacturer offers that!

Lighting detail



- 5–50° C temperature range
- Black light and HO light capabilities
- Shelf to shelf temperature uniformity
- 33" W x 29" H footprint
- Quiet bottom-mounted compressor
- 16.7 ft<sup>2</sup> of shelf space under the lights
- 8" between shelf and lights
- Shelves/lights unplug and slide out for removal
- Optional humidity control

*Powers Scientific, Inc.*

Please contact us at **800-998-0500** or [www.powersscientific.com](http://www.powersscientific.com) for more information and pricing.

## Highlights from Plant Biology 2013

BY LEEANN THORNTON

ASPB Membership Committee, The College of New Jersey

Plant biologists are so nice! That was my theme for the Plant Biology 2013 meeting in Providence, Rhode Island. The important people never acted too important to have meaningful conversations with timid or eager young scientists. I had two undergraduates with me at the conference this year, so I was able to see ASPB through their eyes. They chatted with ASPB President Peggy Lemaux and absorbed great research ideas from senior scientists visiting their poster. They experienced the payoff of courageously approaching a scientist whose work they admired.

I also followed the Twitter feed to get a broader perspective; there were about 400 tweets about the meeting. The Twitter samples highlighted networking, gave support for presentations, and celebrated the “wow factor” of the science.

Attending an ASPB meeting makes me so proud to be a plant biologist. There was a great deal of science this year about plants interacting with their environment. There was some sophisticated research helping us better understand and predict how plants will handle the increasing carbon dioxide, ozone, and drought stresses of the very near future. There was beautiful root architecture analysis to aid in selecting maize plants with the deepest and cheapest roots for nitrogen and water acquisition. There was molecular analysis of osmotic safety valves that illustrate the beautiful complexity of plants incorporat-

ing mechanical sensing into their array of stimuli. And then there were stories about plants interacting with other organisms and how they must delicately balance energy spent on defense with energy spent on growth and reproduction.

One of my lasting impressions of Plant Biology 2013 was the broad and forward thinking of the Plant Science Research Summit report. It is timely to portray plant science as a unified force working to solve the most critical research problems. This meeting left me with the overwhelming impression that there is so much we do not know about plants. The handful of species that provide the majority of human nutrition will not sustain us. We need to know more about the natural variation in how plants respond to specific environments, and we need to do more to protect the diversity that keeps both humans and the entire planet healthy. The President’s Symposium on the last day included excellent examples of broad and forward-thinking research.

Attending an ASPB conference brings great thinkers together to fuel curiosity and innovation. More than four days of being saturated in plant science, career advice, research techniques, and enthusiastic support for one’s work is an awesome reminder of what is possible in this field of work. Even though we have opportunities to connect with and support each other throughout the year, removing all the distractions of daily life to embrace the intensity of the conference is an irreplaceable opportunity.



## tweets from Plant Biology 2013

“ @KeikoUTorii: #PlantBiology2013 Simon Chan memorial symposium starts with Dorothy Shippen, describing about telomeres & telomerase. <http://www.hhmi.org/scientists/simon-w-l-chan>

@mattVDiLeo: Engineering crops for a higher CO2 climate might include reducing rubisco levels... #PlantBiology2013

@iPlantCollab: “If you can’t do bioinformatics, you can’t do biology”—Lincoln Stein. genomics tools minisymposium 10 (552 A/B) at 3:45 #PlantBiology2013

@weedinggems: Zeigler: You can do what people say cannot be done! The Green Revolution prevented the predictions of starvation in Asia. #PlantBiology2013

@PlantTeaching: #PlantBiology2013 I’m rather excited to be at a major symposium in which the first 3 of 4 speakers are women—next up, Jane Parker

@IHStreet: Sen S; know plants, know life, no plants, no life. <http://Knowplants.org> (words on his final slide). #PlantBiology2013

@mattVDiLeo: Parady: Slowing gains don’t indicate slowing #innovation. High tech requires more research to maintain in changing env. #PlantBiology2013

@RosGleadow: bananas v imp staple in Africa but sterile and not bred makes GM best option for fortifying with vit A #PlantBiology2013

**Want to see what else your colleagues said about PB2013? Visit #PlantBiology2013 on Twitter.**



Great App!



Seeing old friends!



So many plant biologists.  
So little time.



Jaswinder Singh, McGill University, and ASPB President Peggy Lemaux, UC Berkeley.



2013 award winners (back row, from left): John Cushman, Brian Larkins, Robert Zeigler, Sally Mackenzie, Robert Turgeon, Jeffrey Harper, Michael Gore, and Daisuke Urano. (front row, from left): Youngsook Lee, Luis Herrera-Estrella, Erin Dolan, 2012 award winner Agepati Raghavendra, ASPB President Peggy G. Lemaux, Jen Sheen, Rachel Egger, and John Harada.



*What a great session!*



*Robert Zeigler, IRRRI*



*Leon Kochian, USDA-ARS  
Cornell University*



*Sharlene Weatherwax, DOE*



*Bill Lucas, UC Davis, and Dorothy  
Shippen, Texas A&M University,  
at the Simon Chan Reception.*



*Cathie Martin, John Innes  
Centre and Editor-in-Chief of  
The Plant Cell*



*Cary Fowler, author of Unnatural  
Selection: Technology, Politics, and  
Plant Evolution.*



*Sally Mackenzie, University  
of Nebraska*

# Providence, Rhode Island

# Plant Biology 2014

JULY 12–16 PORTLAND, OREGON  
OREGON2014.ASPB.ORG



American Society  
of Plant Biologists

FEATURING

*Plant Physiology*<sup>®</sup>

THE  
**PLANT**  
CELL



THE CANADIAN SOCIETY  
OF PLANT PHYSIOLOGISTS  
LA SOCIÉTÉ CANADIENNE  
DE PHYSIOLOGIE VÉGÉTALE

## Midwestern Section

# Highlights from the 2013 Annual Meeting at Chicago State University

BY JANE GEISLER-LEE  
Chair of ASPB Midwestern Section

The annual MWASPB meeting went smoothly and successfully at Chicago State University in Chicago, Illinois, March 23–24. More than 120 people—undergraduate, graduate, technicians, postdocs, and faculty—attended and enjoyed this event. Attendees came from North and South Dakota, Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Nebraska, Ohio, and Wisconsin. Three graduate students—Justin Burum, Jennifer Neva, and Garrett Welle—drove 12 hours from Grand Forks, North Dakota, to attend the meeting. MWASPB has built an excellent tradition as a big, friendly family in nurturing undergraduate and graduate students to mature into scientists. The annual MWASPB meeting also has been a great opportunity for postdocs and faculty to seek professional support and regional collaborators. The 2013 meeting fulfilled these two main purposes, and here are some comments from the attendees:

*“I just want to say thank you for all the things you and the ASPB officers have done. The conference was so great, and I am sure everyone who came enjoyed it a lot.”*

*“Thanks again for a great conference.”*

*“We made it home safe and sound. Thank you very much for your concern and also for putting on a wonderful conference. It was a great opportunity for...us to present our research.”*

The fourth floor of the newly built library at the Chicago State University was an excellent venue for the scientific knowledge exchange and professional interaction. The meeting logistics by organizer Devi Potluri and his institution were fantastic. The main auditorium was carefully arranged with visual and audio support, and the Sun Room was a great location for the break sessions, with the warm sun shining in the early Chicago spring.

The program, with attendees’ presentations and invited speakers’ speeches, was carefully arranged by the organizer, Ter-Yun Timothy Lin, and Jane Geisler-Lee, chair of MWASPB, into six sessions: reproductive biology, plant growth and development, photosynthesis, gene regulation, plant–microbe interaction, and postdoc presentations. The photosynthesis and plant–microbe interaction sessions were led by two featured speakers, Don Ort and Jean Greenberg. In the poster viewing, there were more than 80 posters for one-on-one discussions. The highlight of the meeting was the keynote



Lunch break in the cafeteria area on the 4th floor of the Chicago State University Library.

speaker, Toni Kutchan, on A Transcriptomic/Metabolomic Approach to Biochemical Pathways in Non-Model Systems. Toni’s research on drug discovery prompted Devi to claim that “future medicine depends on and starts from plant biology!”

Before the Chicago meeting, Edgar Cahoon, vice chair of MWASPB, processed travel award applications and provided the awards to six students: Allison Barbaglia, Ian Beddows, Linh Bui, Sterling Field, Lingxiao Ge, and Hae Jin Kim. As tradition, MWASPB awarded best oral and poster students’ presentations despite the stiff competition. The 2013 winners are

*Best undergraduate oral presentations:* Mary Ellis, Sterling Fields

*Best graduate oral presentations:* Justin Burum, Kelsey Kropp, Norman Best

*Best undergraduate poster presentations:* Trevor Nolan, Jonathan Hermann, Julia Miller

*Best graduate poster presentations:* Jie Li, Austin Meier, Yuji Yamazachi

In the 2013 business meeting, Sarah Wyatt, ASPB Executive Committee representative, called votes for constitution changes in membership fee increase (Article III), officers and duties (Article V), and timing of proposed amendments to the constitution (Article VI). In the meeting, all the attendees participated in the agenda: registration fee increase, future meeting planning (for the years 2014 and 2015), publication manager to be appointed, and nomination for the incoming secretary/treasurer election.

The only drawback of this 2013 meeting was that it ended with a snowstorm on the afternoon of March 24. Several contingents westbound (from Chicago) were stranded in the interstate traffic by treacherous weather, but all reported that they returned home safely! ■

# CALL FOR APPLICATIONS

## American Philosophical Society, Research Programs

Information and application instructions for all of the Society's programs can be accessed at our website, <http://www.amphilsoc.org>. Click on the "Grants" tab at the top of the homepage.

### Information About All Programs

#### Purpose, Scope

Awards are made for noncommercial research only. The Society makes no grants for academic study or classroom presentation, for travel to conferences, for non-scholarly projects, for assistance with translation, or for the preparation of materials for use by students. The Society does not pay overhead or indirect costs to any institution or costs of publication.

#### Eligibility

Applicants may be citizens or residents of the United States or American citizens resident abroad. Foreign nationals whose research can only be carried out in the United States are eligible. Grants are made to individuals; institutions are not eligible to apply. Requirements for each program vary.

#### Tax information

Grants and fellowships are taxable income, but the Society is not required to report payments. It is recommended that grant and fellowship recipients discuss their reporting obligations with their tax advisors.

#### Contact information

Questions concerning the FRANKLIN and LEWIS AND CLARK programs should be directed to Linda Musumeci, Director of Grants and Fellowships, at [LMusumeci@amphilsoc.org](mailto:LMusumeci@amphilsoc.org) or 215-440-3429

Questions concerning the LIBRARY RESIDENT Research Fellowships should be directed to Earle Spamer, Library Programs Coordinator, at [libfellows@amphilsoc.org](mailto:libfellows@amphilsoc.org) or 215-440-3443.

### Brief Information About Individual Programs

#### Franklin Research Grants

**Scope** This program of small grants to scholars is intended to support the cost of research leading to publication in all areas of knowledge. The Franklin program is particularly designed to help meet the cost of travel to libraries and archives for research purposes; the purchase of microfilm, photocopies or equivalent research materials; the costs associated with fieldwork; or laboratory research expenses.

**Eligibility** Applicants are expected to have a doctorate or to have published work of doctoral character and quality. Ph.D. candidates are not eligible to apply, but the Society is especially interested in supporting the work of young scholars who have recently received the doctorate.

**Award** From \$1,000 to \$6,000

**Deadlines** October 1, December 1 (December 2 in 2013); notification in January and March.

#### Lewis and Clark Fund for Exploration and Field Research

**Scope** The Lewis and Clark Fund encourages exploratory field studies for the collection of specimens and data and to provide the imaginative stimulus that accompanies direct observation. Applications are invited from disciplines with a large dependence on field studies, such as archeology, anthropology, biology, ecology, geography, geology, linguistics, and paleontology, but grants will not be restricted to these fields.

**Eligibility** Grants will be available to doctoral students who wish to participate in field studies for their dissertations or for other purposes. Master's candidates, undergraduates, and postdoctoral fellows are not eligible.

**Award** Grants will depend on travel costs but will ordinarily be in the range of several hundred dollars to about \$5,000.

**Deadline** February 1 (February 3 in 2014); notification in May.

#### Library Resident Research Fellowships

**Scope** The Library Resident Research fellowships support research in the Society's collections.

**Eligibility** Applicants must demonstrate a need to work in the Society's collections for a minimum of one month and a maximum of three months. Applicants in any relevant field of scholarship may apply. Candidates whose normal place of residence is farther away than a 75-mile radius of Philadelphia will be given some preference. Applicants do not need to hold the doctorate, although Ph.D. candidates must have passed their preliminary examinations.

**Stipend** Stipend \$2,500 per month.

**Deadline** March 1 (March 3 in 2014), notification in May.

## Putting Down Roots

### Building Foundations and Connections at the Annual Meeting

BY BERONDA L. MONTGOMERY

ASPB Minority Affairs Committee Member, Michigan State University

In 2005, the ASPB Minority Affairs Committee (MAC) began the Recognition Travel Awards (RTA) program (<http://rta.aspb.org/>). With financial support from the Society, this program provides travel fellowships for students, postdocs, and faculty who are members of groups underrepresented in the U.S. scientific workforce and/or faculty members who train underrepresented students to attend the annual meeting. The goals of the program are to increase diversity among meeting attendees and to provide access to the meeting's scientific content, professional development sessions, and networking opportunities to those who might not otherwise have been able to attend. In recent years, the program also received additional support from an NSF grant. The program has supported the attendance of 91 individuals since its inception.

RTA awardees participate in a premeeting orientation during which they are able to meet each other and establish initial connections, be introduced to the MAC members and programs, and obtain an overview of conference activities. RTA participants engage in formal conference activities, which include attending the MAC symposium and MAC-sponsored dinner and keynote address. RTA participants have favorably evaluated the program over the years, and many



2013 RTA winners with MAC members (left to right): Beronda Montgomery (MAC), Adan Colon-Carmona (MAC), Jessica Diaz, Elena Cravens, Lynnicia Massenburg, Brittany Pena, Derek Isaiah Sloss, Kira Glover-Cutter, Abreeotta J. Williams, Rolston St. Hilaire, Michael Gonzales (MAC), Gustavo Macintosh (MAC), Amybeth Cohen, Jackie Chaparro (MAC minisymposium speaker), John Harada (MAC), and John Tran.

have continued to engage with ASPB.

Alumna Jessica Diaz has received the award twice, first in 2009, when she was an undergraduate student, and again in 2013 after her successful transition to doctoral studies at the University of California, Riverside. Jessica's story is only one of many encouraging narratives to emerge from the RTA program. In describing her most recent experience, Jessica stated that the "extra attention from this award program allowed me to feel comfortable at this national meeting. This program offers a great

opportunity to have underrepresented minorities from different backgrounds and points in their career come together.... I would not have had that experience if I came to this conference on my own." Jessica continued, "I also received a wealth of advice and motivation from the committee that will be greatly used while I am preparing for the next phase of my career."

Many scientists have sustained relationships with professional societies that outlast their association with any single institution. Such sustained associations provide opportunities

for societies to have significant roles in providing long-term mentoring and engagement for members, including much-needed support for individuals from groups underrepresented in the sciences. The RTA program is one effort supported by MAC to encourage engagement and integration of a diverse base of individuals in the ASPB community. Members interested in the RTA program or other MAC outreach activities should contact John Harada, MAC chair, at [jjharada@ucdavis.edu](mailto:jjharada@ucdavis.edu). ■

# ASPB/AAAS 2014 Mass Media Science & Engineering Fellows Program

Are you interested in science writing?

Do you want to help people understand  
complex scientific issues?

Apply for the ASPB/AAAS Mass Media Science & Engineering Fellows Program and learn how to increase public understanding of science and technology. Fellows in the 10-week 2014 summer program will work as reporters, researchers, and production assistants in mass media organizations nationwide. Deadline: January 15, 2014.

## Former host sites include:

- *Chicago Tribune*
- *Los Angeles Times*
- National Public Radio
- *Sacramento Bee*
- *Scientific American*

Visit <http://www.aaas.org/programs/education/MassMedia/>  
for more details and to download an application brochure,  
or call 202-326-6441 for more information.



ADVANCING SCIENCE, SERVING SOCIETY

Welcome to the *ASPB News* “Luminaries” column. Student and postdoc members are invited to submit their ideas for a 500- to 750-word interview they might like to conduct with a prominent scientist. Contact Membership Committee Chair David Horvath at david.horvath@ars.usda.gov, who will help you develop some questions to frame your story. If we publish your interview, you will receive a \$50 Amazon gift card.

## Richard Vierstra

Professor, University of Wisconsin–Madison

BY KRANTHI K. MANDADI

ASPB Postdoc Ambassador, Texas A&M University

**Most of us have an important person in our life who inspired us to get to where we are. Who was your role model or the “modifier” that targeted you onto your career path?**

I have been fortunate to have worked with a number of excellent scientists early in my career. As a teenager living near the ocean (Rhode Island), I wanted to be a marine biologist, but my propensity for seasickness forced me into something more “terra firma.” Terry Webster, a plant morphologist at the University of Connecticut who taught my first undergraduate biology class and opened my eyes to just how complex and fascinating plants really are, led me to the study of plants. I then obtained a PhD at the DOE–Plant Research Lab (PRL) at Michigan State University with Kenneth Poff, who introduced me to blue light photobiology. For students and postdocs at the PRL in the late 1970s, these were exciting times as modern biology experimentation was unfolding and just being applied to plants. I always liked photobiology, given the precise way that the stimulus (i.e., light)

could be applied, so I continued as a postdoc with Peter Quail at Wisconsin working with phytochromes at the other end of the light spectrum. Working with Peter was a great experience that taught me how to be more analytical and focused. I have had the great pleasure of running my own lab at Wisconsin ever since.

**Reflecting back on your past, what interested you most when choosing a career in plant biology, and what influenced you to venture into the “expanding universe” of protein ubiquitylation?**

How I got into ubiquitin as a beginning professor was largely serendipity and great advice by another plant luminary, Joe Varner at Washington University in St. Louis. I was interviewing for a job at Wash-U and was giving a seminar on what my future research directions might be. I knew I had to move away from phytochrome signaling to create my own niche and thought that protein turnover was an interesting but as yet unexplored field. Phytochrome (Phy) A provided a great model to study such degradation given that the



Rick Vierstra

Pr form was known to be highly stable, while the photoactivated Pfr form was rapidly degraded. Upon proposing based on the literature that light somehow “tagged” PhyA before its turnover, Joe had the remarkable insight that the newly discovered ubiquitin system might be involved. After reading the first review on the topic by the Nobel laureates Hershko and Ciechanover, I realized that this molecule was a great place to start my lab at Wisconsin, and within two years we were able to make the connection between ubiquitylation and PhyA turnover.

**You had a long and successful career in research and publishing. What scientific discoveries over the past few years have radically influenced plant biology research?**

This is a great question. Within so many topics my lab has worked on that involved so many talented scientists, it is hard to narrow it down to just a few, but several do stand out. Clearly connecting PhyA degradation to ubiquitin was a landmark for me as it represented the first natural target identified in any eukaryote and offered a unique entrée into the system. Another was the first 3-D structure of a phytochrome photosensory domain. After years of postulating how phytochromes perceive light, we could now look down into the electron density for the chromophore pocket and actually see the bilin, which revealed its conformation and how it might change upon light absorption. Definitely a religious moment! A third was our appreciation for just how intricate and far reaching the ubiquitin system is. First indications from yeast suggested that just a couple of ligases (E3s) were responsible for attaching

*continued on page 18*

## LUMINARIES

*continued from page 17*

ubiquitin to targets. However, once its genome sequence became available, we were startled to find almost 700 Arabidopsis genes encoding just one E3 type (F-Box proteins), making it way more complicated than we ever imagined. A fourth was the realization that ubiquitin was just the tip of the iceberg in terms of proteinaceous post-translational modifiers. My lab now works on several others, including SUMO and two modifiers involved in autophagy.

**Arabidopsis has been the primary workhorse for plant biology research for the past decade or two and has contributed immensely to our current knowledge of how plants function and interact with their environment. There is now a trend to move away from Arabidopsis and similar model plants into crops for research. Is this wise?**

I think plant scientists mutually agree that our ultimate goal is to develop ways to change crops to improve their yield and nutrition in a sustainable way. So an understanding of crops species is clearly needed. But I think that moving away from such a simple and tractable model as Arabidopsis or other plant models is premature. There is still way too much we do not understand about the basic physiological and developmental processes in plants to completely abandon Arabidopsis and shift to crops that are more challenging to work with and offer less foundational knowledge.

**Today more than ever, there is an augmented necessity for**

**improving crop plants, both sustainably and rapidly, to meet the rising food, fiber, and fuel demands of the exponentially growing world population. What is your take on using genetically modified (GM) crops that have the potential to fulfill our demands?**

With our ever-increasing population and more emphasis on using plants as fuel, it is clear that a wide range of approaches will be needed to keep us all sufficiently fed, including controls on population growth and new ways to sustainably increase food and fiber production. No doubt, GM crops have to be in this equation. But scientists have to keep people informed about the benefits and risks. When you think about food safety, whether a crop is sensitive or resistant to an herbicide or an insect might involve substituting one amino acid for another in a 500-amino-acid protein, or introducing another relatively benign protein among the 20,000 other proteins in the plant. The greater risk is who controls our food supply, the ecology of farmlands, and in some cases the pesticides used—not the GM food we actually consume.

**Many say we are in the golden age of scientific research, mainly due to the technological advancements that changed the way we experiment. However, when it comes to public research funding and the job market, it appears that this age might be over for newly minted PhDs. What advice would you give to young scientists interested in entering the field?**

First let me say that the notion of a PhD glut in plant biology is based on the perspective that

the only “good” jobs are the ones allowing you to run research labs at top-flight universities. And you are right that there were, are, and always will be only a few of these coveted positions opening each year. But there are many other ways to be engaged in science, including the all-important tasks of training the next generation of scientists, which often occurs at primarily undergraduate colleges and universities; working in biotech companies that actually bring new technologies into practice; and working on scientific policy boards that help encourage science while simultaneously protecting citizen interests. The famous luminary Anton Lang, who was the first director of the DOE–PRL, advised me as a graduate student that “there is always room for good scientists,” regardless of the ups and downs of the economy. Your job, he said, is “to learn how to be one of those scientists.”

**As an employer yourself, what are the key qualities you look for in a potential candidate for a faculty or postdoc position?**

As for candidates for jobs in my lab, I am looking for those who are excited about science, read the literature, can identify emerging trends, and are technically gifted. Learning how to organize a proper experiment with all the necessary controls that will eventually lead to an answer (either good or bad) is a true gift that sometimes takes years to learn. As a beginning faculty member, focus your lab around a good question that excites you and not around a good technique, and don’t be afraid to switch fields or techniques. Once you have that

fascinating question, try to find the best techniques to answer it regardless of whether they are familiar to you or not. Don’t be afraid—anybody with a reasonable amount of talent can become proficient in most experimental approaches, from genetics and biochemistry to proteomics and structural biology. This strategy has kept me engaged for some 30 years as a research professor, with many interesting questions remaining.

**ASPB and its science policy committee is instrumental in advocating for plant biology research on Capitol Hill. As an elected member of ASPB yourself, what advice would you give to educators and scientists across the nation to promote public interest and investment in plant sciences?**

I think that we as plant scientists need to stay engaged in the public discourse about how important basic research is to our national economy and to global health. One of the main ways we are going to keep pace feeding the 9 billion people expected by 2050 is with technology developed in our research labs. Given what is now possible with respect to increasing yield and improving resistance to biotic and abiotic stress, diverting just a small fraction of what the United States spends on military defense toward agricultural research could have a profound impact. ■

ASPB members share a common goal of promoting the growth, development, and outreach of plant biology as a pure and applied science. This column features some of the dedicated and innovative members of ASPB who believe that membership in our Society is crucial to the future of plant biology. If you are interested in contributing to this feature, please contact ASPB Membership at [info@aspb.org](mailto:info@aspb.org).

## Maria Julissa Ek-Ramos

**Professional Title:** Professor/Postdoctoral Research Associate

**Place of Work or School:** Universidad Autónoma de Nuevo León / Texas A&M University Department of Entomology

**Research Area:** Multitrophic interactions (Plants–fungi–insects)

**Member Since:** 2004



Maria Julissa Ek-Ramos

### What would you tell colleagues to encourage them to join ASPB?

I would tell them that the Society is friendly, broad, and always willing to embrace technology and new ideas to help its members advance their careers.

### What do you think is the next “big thing” in plant biology?

I think that it will be the creation of plants “by design” using synthetic

biology. In general, using synthetic biology to recreate ecological settings and interactions.

### What advice would you give to a plant scientist just starting out?

Keep your knowledge updated (it changes fast), have an open mind, and be sure to start your network of potential collaborators in and out of your field.

### Why has being a member of ASPB been important?

Being an ASPB member has been important because I have been successful in getting great jobs announced in the Job Bank and meeting awesome collaborators. Also, I have obtained resources to assist with attending several ASPB meetings, where I met very important people in my life and career.

### Was someone instrumental in getting you to join ASPB?

Yes, I was encouraged to join ASPB by Steve van Nocker.

### What person, living or deceased, do you most admire? Why?

Norman Borlaug. He was a great combination of a plant biologist and a humanitarian of iron will who made a big difference when it mattered the most. I am from Mexico, and I proudly say I am here because of the success of his research and humanitarian efforts.

### What are you reading these days?

*Blink* by Malcolm Gladwell.

### What are your hobbies?

Playing guitar, knitting, and photography.

### What is your most treasured possession? Why?

My Mac. It is my window to other places, ideas, people, resources, and so on.

### What do you still have to learn?

A lot—we never stop learning.

### Has there been an issue in plant biology where you thought ASPB should be involved or that led you to consider being active in the governance of ASPB, and what was it?

Yes, it was the increasing problem regarding funding. I think ASPB should promote ideas to the government for the support and creation of more foundations like the Bill & Melinda Gates Foundation, where private money can be available to plant scientists.

### What do you see as the most important role for scientific societies such as ASPB?

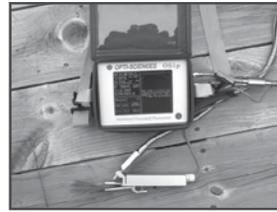
I think the most important role is to bring science to the public, and I think it can be assessed through the success of its members. ■

# When the problem is *plant stress measurement*, *Opti-Sciences is the answer.*

www.optisci.com 603-883-4400

## C<sub>4</sub> plant drought stress

answer - PAR clip with OS1p or OS5p



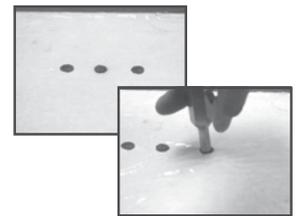
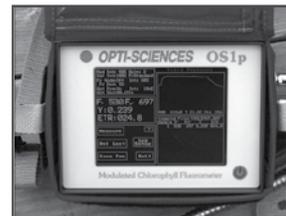
OS1p & PAR clip



OS5p & PAR clip

## C<sub>3</sub> plant drought stress

answer - OS1p or OS5p with the Burke Assay, LCI-SD, LCpro-SD, iFL/LCpro-SD



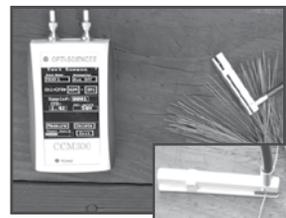
Burke Assay for C<sub>3</sub> plant drought stress

**Nitrogen stress for:** Rice, wheat, corn, sugar cane, soybean, hay, potatoes, barley, mustard, peas, cassava, and other food crops. *It is possible to measure plants from germination through harvest.*

answer - CCM-200plus, CCM-300

**Nitrogen stress for very small and difficult to measure plants:** Conifers, Turf grasses, Arabidopsis, germinating plants, CAM plants including cactus.

answer - CCM-300 - Chlorophyll content



CCM-300 direct readout in chlorophyll content



CCM-200plus CCI for chlorophyll content

## Other nutrient plant stress:

Calcium, manganese & phosphorus - All fluorometers

Boron, chlorine, cobalt, copper, nickel, potassium, zinc -

OS1p or OS5p

Sulfur, iron, molybdenum, -

CCM-200plus, Lci-SD, LCpro-SD, iFL/LCpro-SD

## Heat stress in C<sub>3</sub> & C<sub>4</sub> plants

PAR clip with OS1p or OS5p, Lci-SD, LCpro-SD, iFL/LCpro-SD



Os30p+ for F<sub>v</sub>/F<sub>m</sub>, F<sub>v</sub>/F<sub>o</sub>, Advanced OJIP, & PI<sub>ABS</sub>



iFL / LCpro-SD - Integrated Fluorometer & Gas Exchange With all fluorescence and IRGA parameters

## Cold stress in C<sub>3</sub> & C<sub>4</sub> plants

All fluorometers and gas exchange systems Best- Y(II) from the OS1p & OS5p along with J/A from iFL/LCpro-SD

## Pesticide, herbicide &

**chemical stress:** Various instruments are used depending on chemical type. Go to [www.optisci.com](http://www.optisci.com) for the Desk Top Plant Stress Guide v.2.3 for details.



LCi-SD- ambient IRGA system



Light stress - OS5p with PAR Clip - q<sub>E</sub>, q<sub>T</sub>, q<sub>I</sub> iFL/LCpro-SD

# Policy Update

BY KAITLIN CHELL

Lewis-Burke Associates, LLC

As Congress went into August recess, it had not finished major agricultural legislation. Congressional action will be needed to extend current law in the limited time remaining before the beginning of fiscal year (FY) 2014 on October 1. However, in a show of bipartisanship, members in the House and Senate have joined in introducing legislation to promote agricultural research by creating a new charitable, tax-exempt status for agricultural research organizations that can help leverage private funding for research in partnership with universities.

## Farm Bill

Both the Senate and House of Representatives have passed their respective versions of the 2013 Farm Bill, and now there is pressure to convene a conference committee to negotiate a final bill. However, the House Republican leadership is holding up the process as it tries to determine how to move a separate nutrition bill, as the nutrition component was stripped from the House's version of the Federal Agriculture Reform and Risk Management Act of 2013 (H.R. 2642) before narrowly passing the House floor on a 216 to 208 vote. This has delayed any move toward convening a conference committee. The original House Farm Bill proposed reducing the Supplemental Nutrition Assistance Program (SNAP; "food stamps") by \$20.5 billion over 10 years. However, by striking

the nutrition section, the House has deleted those proposed "savings." The companion Senate bill, the Agriculture Reform and Risk Management Act of 2013 (S. 954), includes the nutrition piece and would save \$4 billion out of the SNAP program if enacted. Both House and Senate Agriculture Committees will have to entertain another extension of existing authorities beyond September 30 while they continue to try to bridge their differences and convene a conference.

## Agriculture Appropriations Bill

The hope of moving the FY2014 Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations bill was derailed by the initial failure of the House to pass a comprehensive Farm Bill. In the absence of a Farm Bill, calling up the Agriculture Appropriations Bill (H.R. 2410) for debate on the House floor would have invited amendments more suited to the Farm Bill. As such, House Republican leadership delayed action on the appropriations bill. The Senate Appropriations Committee has also reported its version of the bill (S. 1244), but the Senate is just now considering its first appropriations bill on the Senate floor. With very few legislative days in September, Congress will have to turn to a Continuing Resolution (CR) to fund the entire federal government for some period of time beginning October 1. The

discussions surrounding the CR also are expected to begin conversations with the White House on (1) the need to again increase the debt limit, (2) the prospect of another round of across-the-board cuts through sequestration in January pursuant to the Budget Control Act of 2011, and (3) further deficit reduction talks with the president.

## NSF and USDA Nominations

On August 1, the Senate approved the president's nominations of Krysta Harden and Robert Bonnie to be the Deputy Secretary of Agriculture and the Under Secretary for Natural Resources and Environment, respectively.

Krysta Harden has been the chief of staff to Secretary of Agriculture Tom Vilsack since 2011. She also served as the assistant secretary for congressional relations at USDA from 2009 to 2011. She served as CEO of the National Association of Conservation Districts; was a senior vice president of Gordley Associates, a government relations corporation focused on agriculture, from 1993 to 2004; and has experience as staff in the House of Representatives. She is a native of Georgia and comes from a family of farmers. She will replace Kathleen Merrigan, who left USDA earlier this year.

Robert Bonnie has been nominated as Under Secretary for Natural Resources and the

Environment. He has served as a senior policy adviser for environment and climate to Secretary Vilsack since 2009. Prior to coming to USDA, he held a number of positions with the Environmental Defense Fund from 1995 to 2008. A Kentucky native with degrees in resource economics and forestry, he is an expert on the use of markets to promote stewardship on farms, ranches, and forest lands.

Additionally, on July 31, President Obama announced the nomination of France A. Córdoba as his selection for the next director of NSF. Córdoba is president emeritus of Purdue University and is currently the chair of the Board of Regents of the Smithsonian Institution, as well as a member of the National Science Board (NSB). She served as president of Purdue University from 2007 to 2012. Before joining Purdue University, she was chancellor of the University of California, Riverside, from 2002 to 2007 and vice chancellor for research and professor of physics at the University of California, Santa Barbara, from 1996 to 2002. Córdoba is an astrophysicist with a BA in English from Stanford University and a PhD in physics from the California Institute of Technology. Following her PhD, she spent 10 years working in the Space Astronomy and Astrophysics Group at the Los Alamos National Laboratory. From 1993 to 1996, she was the

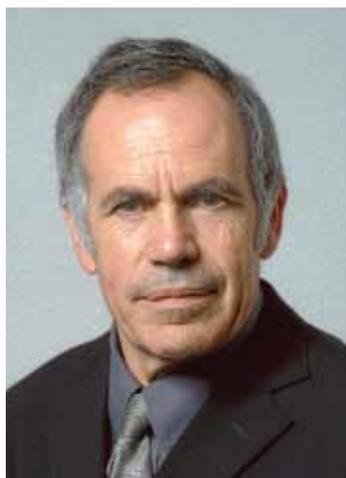
*continued on page 22*

# Steve Long Delivers Keynote Presentation at AAAS Charles Valentine Riley Memorial Lecture

BY KAREN MOWRER

Lewis-Burke Associates, LLC

On June 25, Steve Long, ASPB member and Gutgesell Endowed University Professor of Plant Biology and Crop Sciences at the University of Illinois, delivered the keynote presentation at the 2013 AAAS Charles Valentine Riley Memorial Lecture. In his lecture, titled “Food, Feed, and Fuel from Crops Under Global Atmospheric Change: Could We Have it All in 2030?”, Steve highlighted three main topics: the ability to address food security while considering global change, the development of bioenergy resources that do not conflict with food production, and the barriers to progress that exist beyond the scientific and technological challenges. He concluded by answering the question posed



Steve Long

in his lecture’s title, stating his belief that the challenges of the future can be met from a scientific perspective as long as government

policies do not hinder scientific discovery and application.

Following his keynote address, Steve participated in a panel discussion moderated by Per Pinstруп-Andersen of Cornell University, which included Massachusetts Farm Bureau Federation president Richard Bonanno, National Corn Growers Association president Pam Johnson, and National Institute of Food and Agriculture (NIFA) director Sonny Ramaswamy. The panelists discussed the pressing societal problems that must be addressed by agricultural research and emphasized the key role of science and technology in enhancing farmers’ capabilities, the need to educate and train agricultural scientists to ensure a robust work-

force, and the importance of advocating in support of the agricultural research enterprise.

Launched in 2010 and presented in collaboration with AAAS, the Charles Valentine Riley Memorial Foundation (RMF), and the World Food Prize Foundation, the annual lecture advances RMF’s efforts “to promote a broader and more complete understanding of agriculture as the most basic human endeavor and to enhance agriculture through increased scientific knowledge.” Among those honored as lecturers in previous years are Robert Horsch of the Bill & Melinda Gates Foundation, Pamela Ronald of UC Davis, and former NIFA director Roger Beachy. ■

## POLICY UPDATE *continued from page 21*

National Aeronautics and Space Administration (NASA) chief scientist.

Before becoming NSF director, Córdova must be confirmed by the Senate. This is a straightforward process, but could take a number of months. Until this happens, NSF will continue to be run by Cora Marrett, who has

been acting director since Subra Suresh stepped down at the end of March 2013 to become president of Carnegie Mellon University.

## Bipartisan Agriculture Research Bill

In spite of partisan differences on the Farm Bill and on overall funding levels for the annual appropriations bills, a bipartisan group has introduced legislation designed to spur innovation and strengthen

the agricultural enterprise through research partnerships. Senate Agriculture chairwoman Debbie Stabenow (D-MI) and Senator John Thune (R-SD) have introduced legislation in the Senate to amend the U.S. Tax Code to create a charitable, tax-exempt mechanism to support agricultural research. The bill, S. 1280, the Charitable Research Act of 2013, is cosponsored by Senators Roy Blunt (R-MO), Thad Cochran (R-

MS), Chris Coons (D-DE), James Inhofe (R-OK), Amy Klobuchar (D-MN), and Ron Wyden (D-OR). The bill has been referred to the Senate Finance Committee, which plans to consider a tax reform bill this fall.

A companion bill, H.R. 2671, has been introduced in the House by Rep. Devin Nunes (R-CA) and Rep. Ron Kind (D-WI). The bill has 15 cosponsors, includ-

*continued on page 23*

# Unleashing a Decade of Innovation in Plant Science

## ASPB Annual Meeting Features Workshop on Plant Science Decadal Vision

BY BRIDGET KRIEGER

Lewis-Burke Associates, LLC

After two years of bringing stakeholders together and gathering community feedback, the Plant Science Decadal Vision was officially released at the ASPB Annual Meeting during a workshop on July 22. The workshop not only launched the report, but also served as a “call to action” for the plant science community to galvanize around the report’s recommendations.

The impetus for the report came from a growing recognition by leaders in the plant science community that, in a constrained funding environment coupled with a changing climate, plant scientists need to better coordinate research efforts to address global grand challenges related to food, energy, shelter, and health. ASPB led this community effort and sought and received funding support from

NSF, DOE, and USDA.

The goals of the vision are to

1. increase the ability to predict plant traits from plant genomes in diverse environments;
2. assemble plant traits in different ways to solve problems;
3. discover, catalog, and utilize plant-derived chemicals;
4. enhance the ability to find answers in a torrent of data; and
5. reimagine graduate training: create a T-training environment for plant science doctoral students.

During the workshop, members of the ASPB community heard from Peggy Lemaux (ASPB president), David Stern and Sally Mackenzie (lead authors of the Decadal Vision report), Sharlene Weatherwax (DOE, Office of Science), and April

Burke (ASPB’s legislative affairs consultant) to learn more about the vision, its impacts on plant science research, and how the plant science community can work toward implementing it. Workshop participants asked questions that ranged from policy to more scientific concerns, but the overall reaction to the report and its goals was positive.

The vision was also the cornerstone for discussion on the following morning at ASPB’s Science Policy Committee (formerly the Public Affairs Committee) meeting. During the meeting, committee members discussed the establishment of the National Plant Science Council, which will have representation from throughout the plant science community and will oversee the progress of the vision’s goals. The committee also discussed the

strategy for rolling out the report to other community, philanthropic, industry, federal, and congressional stakeholders over the next several months.

The launch of the report is just the beginning of what ASPB hopes will be a lasting endeavor to promote a national dialogue on the importance of plant science and, most importantly, steer funding toward plant science research.

**How will you support this call to action?** If you were unable to attend the workshop but are interested in learning about the report, please contact Tyrone Spady at [tspady@aspb.org](mailto:tspady@aspb.org).

To read the Plant Science Decadal Vision, please visit <http://my.aspb.org/news/134815/Unleashing-a-Decade-of-Innovation-in-Plant-Science---A-Vision-for-2015-2025.htm>. ■

### POLICY UPDATE *continued from page 22*

ing the chairman and ranking member of the House Agriculture Committee, Rep. Frank Lucas (R-OK) and Rep. Collin Peterson (D-MN). The bill has been referred to the House Ways and Means Committee, which also

intends to consider tax reform legislation this fall.

The legislation would amend the Internal Revenue Code to allow an agricultural research organization that directly engages in research in partnership with a land-grant college or university or a non-land-grant college of agriculture to receive a chari-

table tax deduction for research expenditures. The legislation is designed to generate new funding for agriculture research to help strengthen American agriculture and spur innovation in the agricultural sector of the U.S. economy. In introducing the legislation, the sponsors highlighted the need for innovative approaches to

increase research funding during a constrained budget environment and to leverage private-sector funding to support the research necessary to increase food production through new methods and technologies. ■



**New  
Articles!**

The American Society of Plant Biologists has published *The Arabidopsis Book* (TAB) as a free online compendium since 2002. ASPB is providing funds for the production of TAB as a public service.

Founded by Chris Somerville and Elliot Meyerowitz, TAB now has more than 100 articles online.

The current editorial board is working hard to continue TAB's ongoing expansion:

**Keiko Torii** (*editor-in-chief*)

University of Washington

**Caren Chang**

University of Maryland

**Luca Comai**

University of California, Davis

**Georg Jander**

Boyce Thompson Institute

**Dan Kliebenstein**

University of California, Davis

**Rob Last**

Michigan State University

**Ryan Lister**

University of Western Australia

**Rob McClung**

Dartmouth College

**Harvey Millar**

University of Western Australia

**Doris Wagner**

University of Pennsylvania

The board is overseeing all new content development as well as updates to existing articles to keep TAB the most comprehensive and current work on Arabidopsis.

## *The Arabidopsis Book* Posts New Content!

### **Translational Regulation of Cytoplasmic mRNAs**

Bijoyita Roy and Albrecht G. von Arnim  
July 18, 2013. Edited by Caren Chang.

### **The UVR8 UV-B Photoreceptor: Perception, Signaling, and Response**

Kimberley Tilbrook, Adriana B. Arongaus, Melanie Binkert, Marc Heijde, Ruohe Yin, and Roman Ulm  
June 11, 2013. Edited by Rob McClung.

### **Leaf Development** (update)

Hirokazu Tsukaya  
June 7, 2013. Edited by Keiko Torii.

### **Stomatal Development in Arabidopsis** (update)

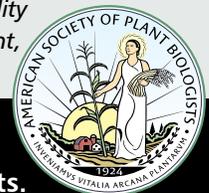
Lynn Jo Pillitteri and Juan Dong  
June 6, 2013. Edited by Keiko Torii.

### **Acyl-Lipid Metabolism** (update)

Yonghua Li-Beisson, Basil Shorrosh, Fred Beisson, Mats X. Andersson, Vincent Arondel, Philip D. Bates, Sébastien Baud, David Bird, Allan DeBono, Timothy P. Durrett, Rochus B. Franke, Ian A. Graham, Kenta Katayama, Amélie A. Kelly, Tony Larson, Jonathan E. Markham, Martine Miquel, Isabel Molina, Ikuo Nishida, Owen Rowland, Lacey Samuels, Katherine M. Schmid, Hajime Wada, Ruth Welti, Changcheng Xu, Rémi Zallot, and John Ohlrogge  
January 28, 2013. Edited by Rob Last.

*As part of continuing initiatives to improve the quality and visibility of The Arabidopsis Book and its content, PubMed is now indexing past and future articles.*

TAB is hosted in partnership with BioOne  
([www.bioone.org](http://www.bioone.org)) in HTML and PDF formats.



## Plant Biology 2013

## Education and Outreach Booth

## Waves of Innovative Resources Shared in Ocean State

BY SCOTT WOODY, University of Wisconsin–Madison  
KATIE ENGEN, ASPB Education Coordinator

The Education Committee booth presentation at Plant Biology 2013 in Providence continued its tradition of introducing or updating visitors to the many activities of ASPB aimed at improving K–16 science education in general and plant biology educational approaches in particular. The booth featured presentations by the two winning entries in the annual Education Booth Contest for Innovative Approaches to Plant Biology Education (EBC for short), a station featuring new plant and molecular resources for hands-on approaches to genetics and modern genomics education, and presentations by volunteers from the PlantingScience program (<http://www.plantingscience.org>), as well as representatives from the Partnership for Undergraduate Life Sciences Education initiative that fosters implementation of the Vision and Change model for undergraduate science education reform. The education booth was staffed throughout the conference by participants in each of these endeavors, as well as by members of the ASPB Education Committee, who were on hand to answer questions about our mission and activities and to direct visitors to the many plant-based educational resources that ASPB and its members have produced in hopes of making plants a staple used in classrooms and laboratories around the world.

### Winning Presentations in the Education Booth

The ASPB Education Committee has offered an annual call for proposals to our membership seeking new and innovative approaches to science education modules that focus on plants as model systems ideally suited for use in classrooms and laboratories at all levels of the K–16 curriculum (<http://ebc.aspb.org>). Winning entries in the 2013 contest were awarded \$500 cash prizes and waived conference registration fees for up to three presenters. More importantly, those presenting at Plant Biology 2013 were afforded a platform in the education booth from which they were able to share a vision of new pedagogical approaches to plant biology education and research.

Brent Buckner (professor of biology, Truman State University) and Jason Williams (iPlant coordinator, DNA Learning Center, Cold Spring Harbor Laboratory) presented their approach to plant biology education at the undergraduate level, “Integrating a Semester-Long Plant Genomics Investigative Research Experience into Introductory and Advanced Courses.” Brent described to visitors how, for well over a decade, he has involved introductory and advanced genetics classes in semester-long, plant-based investigative research experiences.



*Brent Buckner described to visitors how, for well over a decade, he has involved introductory and advanced genetics classes in semester-long, plant-based investigative research experiences.*

He shared his views and experiences regarding undergraduate classroom laboratory experiences by involving students in his ongoing personal research projects. Not only does this allow students to experience hands-on active involvement in the scientific process, but it also provides the educational opportunities to challenge the students to think critically about relevant “Big Idea” concepts, such as the definitions of a gene and a genome. Additionally, the next generation of plant scientists must be able to work with large data sets and utilize bioinformatics tools to visualize these data.

Incorporating this important technology into the undergraduate curriculum remains a challenge. At the forefront of meeting

this educational challenge is the iPlant DNA Subway educational platform (<http://dnasubway.iplantcollaborative.org/>). Jason joined Brent as a copresenter of this educational booth, and they described how to utilize the iPlant DNA Subway to allow undergraduate students to investigate both gene and genome structure by utilizing standard bioinformatics tools combined in this user-friendly and intuitive environment. They provided “mini” hands-on introductions to the iPlant DNA Subway platform and demonstrated how students can translate the skills learned on tools such as the Broad Institute’s Integrative Genomics Viewer (<http://www.broadinstitute.org/igv/>).

*continued on page 26*

**EDUCATION AND OUTREACH BOOTH**  
*continued from page 25*

The second winner of the EBC in 2013 was a proposal put forth by lead author Harriet Truscott, (communications officer) and presented jointly in Providence by Ginny Page (director) and Dan Jenkins (project manager), all of the Science and Public Schools (SAPS) program based at the Cambridge University Botanic Garden in the United Kingdom. Offering booth visitors the chance to “clone a cauliflower,” the SAPS team introduced some of the wide range of teaching ideas freely available from their website, <http://www.saps.org.uk>. ASPB member Alison Long of nearby Brown University helpfully prepared cauliflower samples so the group did not have to fly them in from the UK.

Conference attendees were lining up throughout the event to try their hand at simple micro-propagation, using a reliable technique developed by conservation scientists from the Royal Botanic Gardens, Kew. This protocol can be used to introduce plant physiology courses at the undergraduate level, but is robust enough to be used with high school students and for outreach events. (Download the full protocol from <http://www.saps.org.uk/secondary/teaching-resources/706>.)

The SAPS team believes that it is vital that young people in the UK and elsewhere recognize the importance of plants and plant science to modern life and have a good understanding of how plants work. Their work includes producing relevant, thought-provoking teaching resources, with a focus on high-quality practical work. In

addition, the SAPS program works closely with educational organizations to ensure that the science curriculum and approaches to assessment support learning and enjoyment of plant science. The SAPS team was delighted by the energy and enthusiasm of the plant scientists they encountered at the ASPB annual meeting and look forward to taking their stories and ideas back to share with students and educators in the UK.

**Additional Booth Attractions**

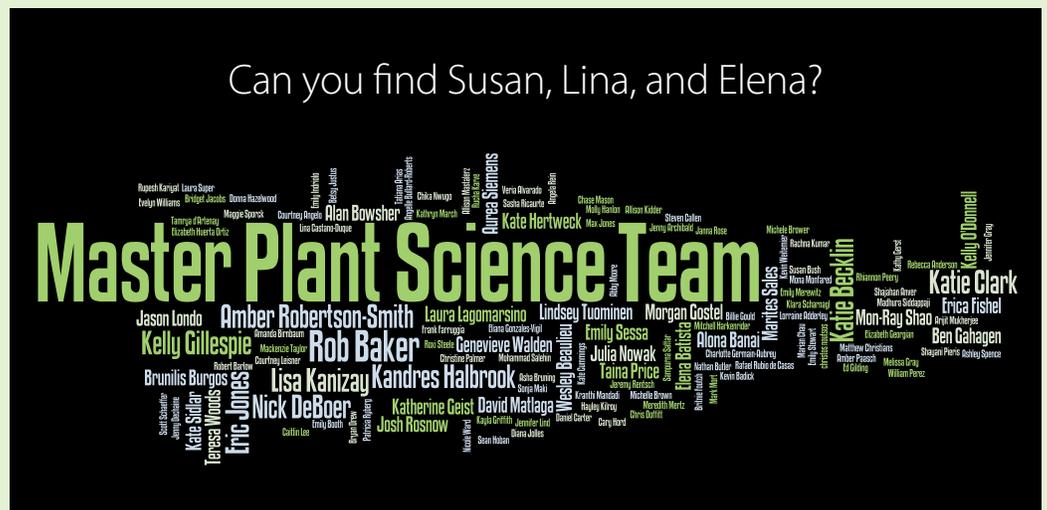
Scott Woody (scientist, Biochemistry Department, UW–Madison, and ASPB Education Committee

member) presented the latest offerings from the FPsc Genetic Resource Development Program that he and Rick Amasino have developed to enhance K–12 and undergraduate education in fundamental Mendelian genetics and modern genomics sciences. FPsc (Fast Plants, self-compatible) is a self-compatible and highly inbred analog of the familiar Wisconsin Fast Plants variety of rapid-cycling *Brassica rapa*. The FPsc development team has produced a collection of FPsc mutant derivatives whose phenotypes are unambiguously distinct from the inbred wild type and a complementary collection of molecular

resources that enable teachers and students to transition almost seamlessly from traditional Mendelian genetic analysis to mapping experiments that make use of polymorphic marker loci in the *B. rapa* genome to enable students to “get to the genes” responsible for the several provocative mutant phenotypes that the FPsc team has on offer (for more information, visit <http://www.FPsc.wisc.edu>). Using custom-built light boxes to display plant populations in which mutant alleles were segregating (ably propagated by members of Rob McClung’s group at Dartmouth College in advance of the meeting), the FPsc

**What’s the Wordle on MPST?**

Since 2008, ASPB has supported volunteers who work via the robust online platform PlantingScience (<http://www.PlantingScience.org>) to mentor middle and high school students as they conduct plant science research in their classrooms. A subset of volunteers comprises graduate students and postdocs who apply to become part of what is called the Masters of Plant Science Team (MPST). ASPB funds 12 MPST members each academic year; as the host of the PlantingScience program, the Botanical Society of America (BSA) also sponsors many MPST members. Information on the most recent class of ASPB MPST members is at <http://newsletter.aspb.org/2012/novdec12.pdf#page=25>.



©2013 PLANTINGSCIENCE CC BY-NC-SA 3.0



Booth organizer Scott Woody answers questions about the FPsc Genetic Resource Development Program.

station provided an oasis of living plants in the exhibition hall and exciting visions of student learning outcomes made possible by use of this powerful new generation of plant-based genetic resources.

PlantingScience is a robust program that creates virtual connections between faculty mentors and middle and high school students conducting plant science research. Booth visitors interested in PlantingScience (<http://www.plantingscience.org>) were able to learn how to get involved by chatting with any of three current mentors: Susan Bush, PhD (UC Davis); Lina Castano-Duque (Penn State University); and Elena Batista (Louisiana State University). These three busy advocates for inquiry-based teaching explained to booth visitors the details and delights of working with PlantingScience program participants as well as joining other outreach initiatives supported by ASPB. (See the box on page 26: What's the Wordle on MPST?)

Partnership for Undergraduate Life Science Education (PULSE)

fellows Nitya Jacobs (University of Georgia) and Tom Jacks (Dartmouth College) spent time with booth visitors to elaborate on and invite participation in the PULSE initiatives. More details on PULSE priorities and the new evaluation rubric for life science departments adopting Vision and Change principles can be found at <http://www.pulsecommunity.org>. See also page 31 in *Plant Biology 2013: Education and Outreach Minisymposium: More Changes to Enact the Vision*.

Education Committee chair Kathleen Archer (Trinity College, Connecticut) worked with committee members Burkhard Schulz (Purdue University), George Ude (Bowie State University), Scott Woody (University of Wisconsin–Madison), Sarah Wyatt (Ohio University), and ad hoc member Erin Dolan (University of Georgia) to share with booth visitors a wide variety of resources for education and outreach. They dispensed resources such as those found at <http://tinyurl.com/nrcqk84> and <http://tinyurl.com/8qcme3x>. Anyone interested

in publishing scholarly plant science education research was invited to respond to the *CBE Life Sciences Education* (<http://www.lifescied.org/>) call for papers (deadline December 1, 2013); this journal will publish a special issue devoted to Plant Sciences Education in 2014.

Booth visitors were challenged to make outreach or education-with-a-message a consistent part of the coming year (see The 1% Challenge below). Many posted a gold star marker in the appropriate pledge category on the large challenge bulletin board display. Another popular element of the booth was the call for help to rename the ASPB education and outreach grant. This grant funds developing programs or resources created by ASPB members to support education and outreach activities that advance knowledge and appreciation of plant biology. More information about the grant can be found at <http://efg.aspb.org>, and the 2013 winners are featured on page 35 of this issue. Booth visitors played with magnetic letters and Scrabble® tiles to create new names—with mean-

ingful acronyms—for this grant program. Contenders included

- Ed-GROW: Ed—Growing Resources & Outreach Worldwide
- GROWE: Germinating Resources & Outreach for Worldwide Education
- Plant BLOOM: Plant Biology Learning Outcomes & Outreach Materials
- PI/GI: Planting Ideas/Growing Ideas
- Plant BIO: Plant Better Instruction & Outreach
- GRM Grant: Getting to the Roots of the Matter
- POWER: Plant Outreach with Education Resources
- POWER: Plant Outreach with Education Research
- POWER: Plant Outreach with Educational Rigor
- Plant POWER: Producing Outreach & Worldwide Educational Resources

The new name will be announced with the 2014 grant RFP later this fall.

Dozens of booth visitors signed up for more information on how to nominate the high school teachers and public librarians with whom they collaborate to receive free access to *The Plant Cell* and *Plant Physiology*. Accompanying materials to support high school students' successful use of these primary resources were also supplied. These materials and the easy online nomination form (to involve educators in your network) are available at <http://journalaccess.aspb.org>. ■

## The 1% Challenge

**commit 1% of your time to education & outreach**

School children, funders, politicians, and voters all need to hear useful messages about the roles of plants and plant science in their lives.

**YOU are an expert messenger!**

1% of your time is...	
5 minutes each day.	
2 hours each month.	
2 days each year.	

Add 1 marker per goal on the 1% Challenge chart to the right.

Ex. 1—Two hours per month = 1 marker      
Ex. 2—Six days per year = 3 markers.

## Plant Biology 2013

## Education Workshop

## A Snapshot of Teaching with Backward Design

BY KATHLEEN ARCHER

Trinity College, Hartford, Connecticut

Read the paragraph below and see if you can answer the questions that follow.

It is very important that you learn about traxoline. Traxoline is a new form of zionter. It is monotilled in Ceristanna. The Ceristannians gristerlate large amounts of fevon and then bracter it to quasel traxoline. Traxoline may well be one of our most lukized snezlaus in the future because of our zionter lesceledge.

- What is traxoline?
- Where is traxoline monotilled?
- How is traxoline quaselled?
- Why is it important to know about traxoline?\*

Of course, you found it easy to answer each question, and yet what do you actually *understand* about traxoline? Nothing! In the Education Workshop for Plant Biology 2013, Erin Dolan, associate professor of biochemistry at the University of Georgia and editor-in-chief of the journal *CBE Life Sciences Education*, showed how to construct questions that actually require comprehension as part of her workshop titled “Applying Vision and Change Principles to Teaching: Course Development Using Backward Design.”

“Backward design” refers to a method of course development that starts by identifying broad goals for a course and from those generating specific learning objec-

tives. Next, instructors determine how they will know when students have achieved the desired learning outcomes—by writing exam questions, designing assignments, or creating other assessments that reveal what students understand. Lastly, instructors then plan the classroom activities that promote learning and successful achievement of the objectives.

To illustrate how this is done, Erin modeled the steps by first showing her learning objectives for the workshop. Next, she addressed effective assessments by having participants compare several typical exam questions, discussing in small groups which ones required simple recall and which ones could be answered only when conceptual understanding has been attained. The discussions gave participants practice with different question types and were themselves excellent examples of active learning. The small groups reported back to the group at large, modeling formative assessment, the informal process of monitoring student learning so that an instructor can gauge how well students are progressing. The workshop itself became a learning activity, completing the sequence of backward design.

Erin stressed that the teaching methods she described are evidence based: they have been demonstrated to be effective by



Erin Dolan (standing) directs a highly interactive session.

objective measures, meeting the kind of standard we are accustomed to in our own scientific benchwork. Using such proven techniques, which are called for in the Vision and Change

report, is the way to promote true conceptual understanding with our students and avoid the trap of “traxoline.” ■

\* Attributed to Judith Lanier.

### For more information on teaching strategies presented in the workshop, see the following:

Handelsman, J., Ebert-May, D., Beichner, R., Bruns, P., Chang, A., DeHaan, R., Gentile, J., Lauffer, S., Stewart, J., Tilghman, S. M., and Wood, W. B. (2004). Scientific teaching. *Science* 304 (5670):521–522.

Wiggins, G., and McTighe, J. (2005). *Understanding by Design*, expanded 2nd edition. Alexandria, VA: ASCD.

For a workshop that provides training in the teaching strategies presented in Providence, see The National Academies Summer Institutes on Undergraduate Education at <http://www.academiessummerinstitute.org/>.

To view the Vision and Change report, go to <http://visionandchange.org/finalreport/>.

For insight into ASPB’s involvement with the Vision and Change initiatives, go to:

- <http://newsletter.aspb.org/2011/julaug11.pdf#page=26>
- <http://tinyurl.com/ASPBandVisionChange>
- <http://www.aspb.org/PlantBioCoreConcepts>

## Plant Biology 2013

# Education and Outreach Posters

BY SARAH E. WYATT  
Ohio University

The Plant Biology 2013 poster session included 19 posters highlighting a range of education and outreach projects. Many of the featured posters fit into three broad categories: (1) examples of research projects used as a foundation for classroom activities, (2) tools for learning through research and inquiry-based activities, and (3) examples of undergraduate research or internship projects focusing on the educational benefits of practical research experiences.

One of the research projects or topics used to enhance inquiry-based learning was by Terzaghi et al. (#12022, <http://precis.preciscentral.com/utills/ip/SearchResults.asp?EventId=996a7fa0>), which used climate change to capture the imagination. Students in two undergraduate courses (molecular biology and plant physiology) and a summer camp for seventh-grade girls developed and tested hypotheses on genes potentially affected by climate change through qPCR and the effects of climate change on growth and flowering time. Other posters highlighted the use of bar coding of medicinal plants in the Wabanaki Garden (Roe et al; <http://tinyurl.com/kybvcgt>) and using Taro

Bacilliform Virus (TaBV) infection of Taro to teach molecular techniques (Neupane et al; #12023, <http://precis.preciscentral.com/utills/ip/SearchResults.asp?EventId=996a7fa0>). All of these projects demonstrate not only the variety of approaches that can be used to incorporate research into teaching plant physiology, molecular biology, and diversity, but also the creativity of plant biologists to bring research and teaching to life for students.

Among the tools presented to enhance plant science education were DNA subway, an iPlant component for education and research (#12013, <http://precis.preciscentral.com/utills/ip/SearchResults.asp?EventId=996a7fa0>; see also p. 25), MathBench Biology Modules (#12009, <http://precis.preciscentral.com/utills/ip/SearchResults.asp?EventId=996a7fa0>), and an

example of using a Google free application platform to teach Introduction to Plant Science in the University of Hawaii system (#12016, <http://precis.preciscentral.com/utills/ip/SearchResults.asp?EventId=996a7fa0>).

Several posters focused on the benefits of undergraduate research and internships in education. These posters reinforced our appreciation for how immersion in a research laboratory or internship gives students not only practical experience, but also brings their education “to life.” Students repeatedly report that these experiences increase their appreciation for and help them to see the relevance of their coursework. One glowing example of the benefit of research experience is a poster by Nikhil Gopal, a student from Montgomery Middle School in New Jersey (see the related article in this issue

titled “Meet the Future of Plant Science Research: The “A-ha!” Moment Is Unforgettable”).

In addition to these, two posters highlighted unique outreach and education activities. Muday et al. presented evidence that learning by teaching not only enhanced learning for both undergraduates and the middle and high school students they taught, but also increased interest in teaching biology as a profession (#12011, <http://precis.preciscentral.com/utills/ip/SearchResults.asp?EventId=996a7fa0>). Muday et al. developed a curriculum in which more than 200 non-majors at Wake Forest University in North Carolina led 2,500 seventh-grade and high school students through problem-based learning exercises in plant genetics. Meanwhile, Clore et al. presented an educational program for middle school students that included learning through gardening and campus tours (#12015, <http://precis.preciscentral.com/utills/ip/SearchResults.asp?EventId=996a7fa0>). The projects also involved local gardeners, which enhances ties between the community and educational activities at New College of Florida. ■

**Interested in scholarly plant science education research publication?**

*CBE Life Sciences Education*  
(<http://www.lifescied.org/>) will publish  
a special issue devoted to  
Plant Sciences Education in 2014.

## Plant Biology 2013

## Meet the Future of Plant Science Research

## The “A-ha!” Moment Is Unforgettable

BY KATIE ENGEN

ASPB Education Coordinator

Like many poster presenters, Nikhil Gopal dressed sharply and fielded dozens of questions during the Plant Biology 2013 poster session on July 20 in Providence, Rhode Island. Unlike any other presenter, Nikhil is in middle school. His father, Srihari Gopal, drove Nikhil from New Jersey so he could spend his Saturday immersed in what he likes best—science.

Nikhil's poster, “The Effect of Roadside Mowing and Fertilizer Use on Common Milkweed (*Asclepias syriaca*) Populations in Central New Jersey” (#21007; <http://precis.preciscentral.com/utills/ip/SearchResults.asp?EventId=996a7fa0>) represents the collaborative work he did with his teacher, Jamie Witsen. It is clear that Jamie has been an effective mentor. As Nikhil noted, “The greatest motivation for this project was my science teacher, Mrs. Jamie Witsen. She inspired me to think like a scientist and to never stop asking questions. I obviously have never presented before at a scientific conference, and I learned about what to expect from Mrs. Witsen.” Nikhil explained that Jamie could not present with him since she was in Peru working on a research project in the rainforest.

But it's not like Nikhil couldn't handle himself independently. As ASPB member Julia Frugoli discovered, “When I asked him

how he came to present at ASPB, he said a scientist read his blog and suggested it, so he submitted his abstract and paid the fee.” After spending time talking with Nikhil, Julia further noted, “His poster was excellent. He was incredibly intelligent and articulate. His presentation skills were as good as many graduate students.”

When asked why he does research, Nikhil answered, “Doing scientific research makes me feel like I'm making a great contribution to the world. When I think of new research ideas, I feel like I'm on the edge of finding out how something works. The thrill of figuring out if my hypothesis was correct or having an ‘a-ha!’ moment is unforgettable. Simply put, this is what research means to me.”

Nikhil summarized his Plant Biology 2013 experience: “I admit that I was a bit nervous when I walked into the exhibition hall at Plant Biology 2013. I had never talked to so many scientists before, and I was wondering whether people would like my research. To my surprise, many visitors at the poster session were friendly people who shared the same joy of science that I do.”

Nikhil has an abiding interest in communicating about science, too. He posts articles on topics that interest him on his blog, Eyes4Science (<http://www.eyes4science.blogspot.com>). All of the



Middle school student and poster presenter Nikhil Gopal.

money he raises through readership is donated to Earthworks, an environmental charity.

On a related note, Nikhil already has been encouraged

to consider the ASPB Summer Undergraduate Research Fellowship (<http://surf.aspb.org>). When the time comes, he should be up for the challenge. ■

## Plant Biology 2013

# Education and Outreach Minisymposium

## More Changes to Enact the Vision

BY BURKHARD SCHULZ  
Purdue University

**V**ision and change were the magic words at the Education and Outreach Minisymposium at Plant Biology 2013. In a number of talks covering a broad range of topics, speakers clearly saw the Vision and Change document (“Vision and Change in Undergraduate Life Science Education: A Call to Action,” <http://visionandchange.org/>) as their guiding light as they related aspects of the presented projects and initiatives to this report. All of the presentations discussed highly collaborative projects involving large groups of people representing a balance of skills and experience.

### Partnership for Undergraduate Life Sciences Education (PULSE)

Thomas Jack (Dartmouth College) and Nitya Jacob (Oxford College/Emory University) presented information on the Partnership for Undergraduate Life Sciences Education (PULSE), a joint effort by NSF, the Howard Hughes Medical Institute (HHMI), and NIH to support a network of 40 Leadership Fellows as they prototype change in undergraduate life science education. The 40 fellows come from all walks of academic life, from two-year colleges to research universities. The PULSE fellows released a timely—just hours before the start of this minisym-

posium—milestone in the form of the “PULSE Vision and Change Rubrics v1.0” document. These rubrics are intended to serve as a roadmap for implementation of the principles of Vision and Change in life science university departments.



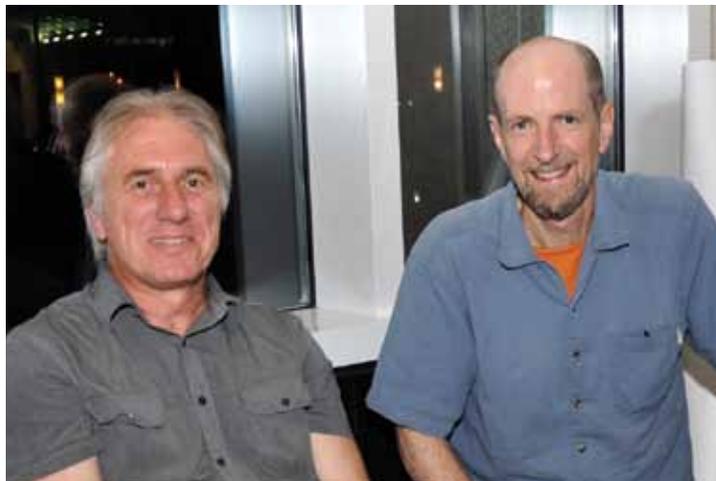
Nitya Jacob

Department heads should have every reason to get excited about a 13-page document that covers everything from “core concepts” and “course level assessments” to “infrastructure and departmental support.” Styled after the standards scaffold of the Leadership in Energy & Environmental Design (LEED) certification for sustainable architecture, much of the groundwork is completed for these rubrics. However, the PULSE fellows ask for responses to the initial draft of the document so it can be tweaked into a polished form.

To view the rubrics directly go to <http://tinyurl.com/PULSEVisionChangeRubrics1-0>.

To join a discussion on the utility of the rubrics, visit <http://>

*continued on page 32*



Burkhard Schulz (left) and Thomas Jack

The PULSE community is now almost 1,000 members strong and growing. To sign up for membership, visit the PULSE website (<http://www.pulsecommunity.org>). The PULSE network includes specific working groups:

**Raising the PULSE** raises awareness of Vision and Change, celebrates the good work already under way around the country, and inspires university science departments to embrace the challenge.

**Taking the PULSE** helps departments/institutions to use existing assessment evidence and is designing new tools to evaluate progress in efforts to implement Vision and Change principles.

**Faculty Networks** builds regional and national faculty networks and disseminates a blend of new and existing resources for faculty development based on Vision and Change.

**Vision and Change Ambassadors** recruits and trains PULSE members to work as departmental Vision and Change facilitators through departmental consulting visits.

Check PULSE Points (<http://my.aspb.org/news/108419/Check-this-weeks-PULSE-Points-.htm>) on ASPB's main page for ways to get involved with any or all PULSE groups.

**MINISYMPOSIUM***continued from page 31*

[www.pulsecommunity.org/group/taking-the-pulse-public/forum/topic/show?id=6519195%3ATopic%3A18396&xx\\_source=msg](http://www.pulsecommunity.org/group/taking-the-pulse-public/forum/topic/show?id=6519195%3ATopic%3A18396&xx_source=msg).

The recognition and certification process linked to the PULSE rubrics should serve as an incentive for departments to undergo the process of adopting Vision and Change principles. In this vein, Nitya and Tom also introduced the new PULSE Ambassadors program designed to enhance interdepartmental competitive spirit and commitment to change. At the moment, the ambassadors program is in the recruitment and training phase; it will start in earnest in 2014 with a number of pilot departmental visits to catalyze and assist departmental transitions. Another supporting idea is the establishment of regional PULSE networks, which will make it easier for faculty and departments to organize and attend conferences to discuss and work on the implementation of Vision and Change.

**GARNet: the Arabidopsis Research Network**

Charis Cook (University of Warwick) introduced the Genomic Arabidopsis Resource Network (GARNet, <http://gar-netcommunity.org.uk/>). GARNet started out as a network supported by the Biotechnology and Biological Research Council to provide access to genomic tools and resources for the Arabidopsis research community in the United Kingdom. The goal was to facilitate the massive adoption of reverse genetics in Arabidopsis research. Later, GARNet became a driving force to support plant

*Charis Cook*

systems biology, and it is now exploring the development of plant synthetic biology. GARNet represents a strong unifying force whose main goal is to reach out to the plant science research community and facilitate novel developments and strategic planning in this field. The annual GARNet meetings developed into a European version of the Arabidopsis meeting, and its workshops provide technical updates and novel research tools for the plant science community. Its reach goes beyond the beloved “little mouse-eared cress.” The small grain cereal and grass network “Monogram,” as well as the Brassica research community, were supported with infrastructure and consulting work from GARNet. The UK Plant Science Federation (UKPSF; <http://www.plantsci.org.uk/>) is a special interest group of the Society of Experimental Biology (SEB) and was founded with support from GARNet. Now financially supported by SEB and the Gatsby Charitable Foundation, the UKPSF acts as an umbrella organization for all of plant science in the UK. It considers itself to

be a central resource for plant scientists to create communities, identify funding sources, inform about events, and showcase outstanding plant science in the UK.

**MathBench Biology Modules as a Tool for Plant Science Classes**

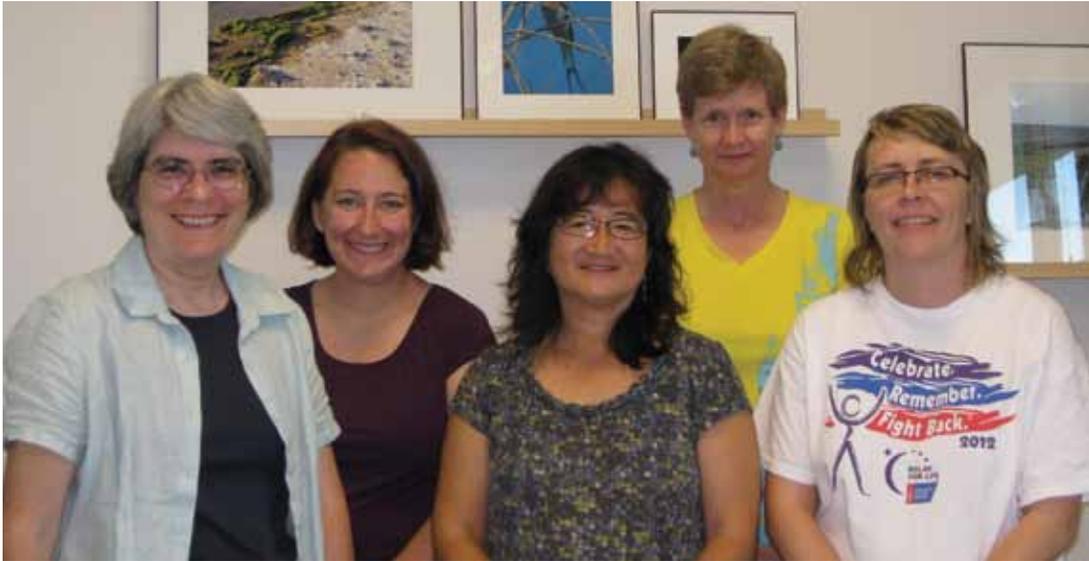
The presentation by Christine M. Fleet (Emory and Henry College, Emory, Virginia) of the MathBench program addresses a sore point for many instructors in plant science undergraduate courses: a “mysterious disconnect” of many students to mathematics and quantitative description of biological processes, which are often essential to fully understanding how plant biology works at the detailed level. Sponsored by HHMI, NSF, University of Maryland, and Montgomery College, the MathBench initiative aims to integrate mathematics and quantitative approaches in plant biology learning. The goals are to increase mathematics literacy, reinforce biological concepts on a quantitative foundation, and prepare students for even more complicated mathematical approaches in upper-level courses. The MathBench website (<http://mathbench.umd.edu/>) provides a treasure trove of interactive web-based learning modules that introduce students to mathematical concepts relevant to plant biology. Modules on sampling, graphing, visualization, probability and statistics, statistical tests, population dynamics, environmental science, cellular processes, and climate change can be found there. The clear design of the website modules, straightforward language used in the descriptions, and down-to-earth examples spiced up with a little bit of humor make it easy to work through these

*Christine Fleet*

modules. Christine presented results from two years of instructions using MathBench in genetics courses and student research projects using Arabidopsis. Pre- and post-test scores, as well as student comments, were gathered during this time to evaluate the efficacy of MathBench on the student's quantitative skills. In all cases—beginner level as well as higher-level courses—and irrespective of the previous background level in math expertise (algebra, precalculus, postcalculus), the quantitative skills improved significantly. Post-course surveys show that a great majority (greater than 83%) of the students commented favorably on the MathBench modules.

**What Undergraduates in Biology Don't Know About Plant Structure and Growth**

Maryann Herman (St. John Fisher College, Rochester, New York) and her co-PIs asked, “What do undergraduates in biology NOT know about plant structure and growth?” The answer to this question seems to trigger eye-rolling and chuckles from instructors and professors working on the



Project team members: (from left) Kathleen Archer, Maryann Herman, Grace Miller, Laura Olsen, and Jodie Ramsay

improvement of the “plant science literacy” of undergraduate students across the nation. Maryann reported on the interesting approach of a consortium of plant science undergraduate instructors from a wide variety of educational institutions to quantify and analyze the knowledge gaps and misconceptions of biology undergraduate students concerning plant structure and growth. More than 60 in-depth, oral interviews with 15 questions were conducted with undergraduate students from institutions ranging from small liberal arts colleges to large land-grant research universities. The overall goal was to assemble a concept inventory to assess student misconceptions. The interviews were coded into three categories: (1) correct, (2) misconception, and (3) do not know. The student demographics covered three different groups: (A) students who attended a course in introductory biology, (B) students with an additional introductory botany course, and (C) students who attended at least one upper-

division botany course. Analysis of the interview data showed that students gave the most correct answers to simple concept questions. Misconceptions about gas exchange and cell support ran as high as 64%. Developmental questions, such as how lateral roots, bark, or leaves are formed, could not be answered by up to 68% of all students. Attending additional botany courses helped ease the knowledge gaps, but (interestingly) sometimes increased misconceptions about cell support and fertilization.

### Plants iView: Bringing Research to the Middle School Classroom

Funded by the ASPB Education Foundation and a University of Illinois Public Engagement Grant, Plants iView was born as a science education and outreach program in the Department of Plant Biology at the University of Illinois, Urbana–Champaign (UIUC). Presenter Miranda Haus of UIUC explained that the initiative was developed by members



Miranda Haus

of the Plant Biology Association of Graduate Students who saw the need to put their plant biology knowledge and enthusiasm to better use in middle school classrooms in their local community. A key goal undergirding this program is to increase public awareness of the importance of plants in our everyday life. By doing this with and for middle school students, the program addresses a target group that is in a critical age to develop and solidify

interest in science and specifically in plant science throughout their high school years and until they attend college. Plants iView creates interactive learning modules in plant science, and then realizes them in classrooms and in after-school programs at schools in the Urbana, Illinois, area. An accompanying website for Plants iView (<http://www.igb.illinois.edu/plantsiview/>) supplies PowerPoint presentations and handout materials for teachers, a teacher discussion forum, and a calendar and sign-up form for graduate student volunteers who participate in the program. Plants iView designs the lesson plans, prepares supplies for the school visits, and mentors the activities. Its further goals are to disseminate the material nationwide (12 lessons are already developed and ready to download from the Plants iView website) and to assess the effect of the program on middle school students, as well as on graduate students, with the help of faculty from the College of Education at UIUC. Data from three sessions of Plants iView classes have already been analyzed. The Plants iView program is an example of a student initiative that broadens the educational experience for graduate students in terms of outreach and informal education. It provides decisive experiences for middle school students to open their minds up to considering the importance that plants and plant science play in their lives. The support from ASPB and the Department of Plant Biology at UIUC ensures a necessary continuity, even with a relatively transient group of graduate students. ■

## Plant Biology 2013

## Small Colleges/PUI Networking Event

BY LEEANN THORNTON

ASPB Membership Committee, The College of New Jersey

Each year, this workshop-style event is targeted toward scientists working at or interested in small colleges or primarily undergraduate institutions (PUIs) who want to network, discuss issues of common interest, find out about PUI-related opportunities, and provide feedback on ASPB programs for PUIs.

At Plant Biology 2013 in Providence, the mid-morning gathering of about 80 participants focused on three specific questions for small-group discussion; see figure 1. Results of these interactions were reported to the wider group. The group had announcements from ASPB representatives for the Summer Undergraduate Research Fellowship (SURF), Membership Committee, the Master Educator Program, and the Education Foundation grants. They also learned about funding opportunities from NSF, research tools from iPlant, and research support from the Council of Undergraduate Education.

Words of wisdom from the small group discussions:

“Take advantage of the Research Opportunity Awards if you have collaborators with NSF funding; these could help provide opportunities for you or your students.”

“Reduce your teaching load by finding ways for your undergraduate research mentoring to count toward teaching, or have your research students register for independent study with you.”

“Learn how to be a good mentor to your students, and develop a supportive mentoring relationship with senior faculty whose research program you respect.”

“Beware of spreading yourself too thin; too many undergraduate researchers divides your time so much that very little gets done in your research lab.”



*Small group discussion questions promoted conversation about research best practices among PUI professors and aspiring professors.*

**Small College / Primarily Undergraduate Networking Event**

*Small group discussion: Becoming and staying a successful PUI scientist*

*After introducing yourselves, share opinions and wisdom on the following:*

1. What makes doing research at a PUI appealing?
2. What challenges must be overcome to maintain a research program at a PUI? How are they surmounted?
3. What are the most important ways to prepare for a job at a PUI? How can you maintain career balance once there?



*Figure 1: Small group discussion questions to promote conversation about research best practices among PUI professors and aspiring professors.*

In order to build on this event's successful history and plan for the Plant Biology 2014 iteration in Portland, Oregon, ASPB is seeking input from its members. The goal is to catalyze discussions that help participants learn more about best practices in performing research at undergraduate institutions. Your input is welcome!

Please provide feedback to [info@aspb.org](mailto:info@aspb.org) on these questions:

1. What topics of conversation related to research would you like to explore at the Plant Biology 2014 PUI Networking Event in Portland, Oregon?
2. What particular challenges do you face in doing research at a PUI that you would like to discuss further with the networking group?

Please also consider joining the ASPB PUI Interest Group at <http://my.aspb.org/members/group.aspx?id=67868>. ■

# Outstanding Outreach

## 2013 Education Foundation Grant Recipients

BY KATIE ENGEN

ASPB Education Coordinator

**A**SPB supports innovative outreach resources developed by Society members with support from an education and outreach grant program (<http://efg.aspb.org>) established in 2004 to advance knowledge of and appreciation for plant biology. Successful projects are designed to enrich public understanding of the

- Importance of plants for the sustainable production of medicine, food, fibers, and fuels;
- Critical role plants play in sustaining functional ecosystems in changing environments;
- Latest developments in plant biotechnologies, including genetic modifications of crops;
- Contributions and discoveries from plants that improve

human health and well-being; and/or

- Range of careers related to plant biology or available to plant biologists.

Congratulations to the 2013 ASPB Education Foundation Grant recipients!

### PI: Marian Quain, PhD, CSIR–Crops Research Institute

**Project Title:** Introducing Basic Biotechnology Teaching Techniques in High Schools in Sub-Saharan Africa—Ghana

#### Coinvestigators:

**Marceline Egnin**, PhD, Tuskegee University, College of Agriculture, Environment, and Nutrition Sciences

**James Y. Asibuo**, PhD, CSIR–Crops Research Institute, Ghana

**Eric Warren Acquah**, International Community School, Oboasi, Ghana, and University of Cambridge International Examinations IGCSE O & A Level Biology

**Project Description:** With the advent of modern biotechnology, institutions such as ASPB have embarked on education outreach to expose underserved communities to cutting-edge science. In developing countries such as Ghana, biotechnology is lacking, and this greatly affects the understanding and relevance of molecular science. Considering the current curricula for high school, which pipelines students into higher education, there is an obvious gap between the emerging state-of-the-art science, its understanding and application, and the awareness that students and teachers in sub-Saharan Africa have of modern biotechnology. Currently fermentation is the only mention of biotechnology in biology and related high school science textbooks in Ghana. This project seeks to introduce modern biotechnology in an applicable way to educate teachers (tutors) and students. It will also set a platform to integrate tutors and students into existing biotechnology awareness creation initiatives in Ghana. Specific gaps in the teaching of biotechnology

and genomics in Ghanaian high schools will be identified, and a teaching model for high school teachers to implement modern agricultural biotechnology will be communicated through hands-on workshops to train high school teachers in basic concepts of biotechnology and genomics. This project exposes 20 biology, agriculture, and related sciences teachers from junior to senior high school classrooms to several five-day, intensive, hands-on training periods utilizing paper models and dry labs to enhance their understanding and delivery of plant biology with emphasis on biotechnology. This will be followed by monthly visits to schools of participating teachers to monitor adoption and curriculum implementation of modules. A website will be established to link PIs with teachers, and findings and outcomes will be widely communicated to facilitate sustainability and continued distribution of this innovative initiative.

### PI: Roger Hangarter, PhD, Indiana University

**Project Title:** The Living Canvas: Painting with Chloroplasts

**Coinvestigator:** Margaret Dolinsky, Indiana University School of Fine Arts

**Project Description:** The objective of this proposal is to

*continued on page 36*



*Marceline Egnin and Marian Quain*

## OUTSTANDING OUTREACH *continued from page 35*



Roger Hangarter

develop an interactive science/art/educational exhibit in which aesthetic experience is the vehicle to examine photosynthesis in the context of its central role in life on Earth. This project will develop a series of visually compelling, exhibition-quality images created by light-dependent positioning of chloroplasts in leaf cells alongside an experiential touch-screen interactive table (4 × 7 feet). This presentation will give visitors the opportunity to examine the results of how leaf cells act as a living canvas as chloroplasts move in response to light and how the process was used to create the art on living canvases. The exhibition will incorporate a number of assets, including high-definition imagery and time-lapse movies, that will reveal the process of chloroplast movements as they occur from the level of a single cell up to how those subcellular changes affect the optical properties of whole leaves to maximize photosynthesis. The experience will be designed to stimulate a sense of intrigue and awe in ways that are intended to

enhance the visitors' awareness of plant life and their relationship to plants in their environment. The work is set to premier at the Indiana University Grunwald Gallery of Art from August 30 to October 11, 2013. The exhibit will be assessed for its ability to engage and inform visitors by a team from the Indiana University Center for Innovative Teaching and Learning. The exhibit will be appropriate for installations in a variety of venues, including botanic gardens, art spaces, and museums. A companion website will also be developed. This grant's budget will cover the development and construction of the exhibit and will also serve as seed funding to pursue additional grants for the development of a larger, more comprehensive exhibition. Roger's previous success with museum-quality installations is detailed at <http://newsletter.aspb.org/2013/mayjun13.pdf#page=32>.

### PI: Shannon Galbraith-Kent, Thomas More College

**Project Title:** Planting Seeds: Teacher Development for Engaging 21st-Century Learning and Inspiring

#### Coinvestigators:

##### Boone County Schools:

**Anna Marie Tracy**, EdD, supervisor, NCLB

##### Thomas More College (TMC):

**Chris Lorentz**, PhD, professor, biology; director, TMC Field Station (aquatic biology)

**Kimberly Haverkos**, PhD, assistant professor, education (secondary science education)

**Zachary Taylor**, PhD, assistant professor, biology (molecular genetics)

**William Wetzel**, PhD, associate professor, chemistry (analytical chemistry)

**Project Description:** This project aims to help high school science teachers go beyond information dissemination in plant biology and create learning environments. To help teachers successfully implement new standards (Next Generation Science Standards [NGSS]), we propose a professional development program in plant biology based on some of NGSS's practices. The overall objective of our "Planting Seeds" program (a partnership between Boone County Schools and the TMC faculty, both in Northern Kentucky) is to engage 20 high school teachers in professional learning and development to ultimately impact thousands of students. Our program will consist of four Saturday workshops (which leverage the expertise of an interdisciplinary TMC faculty); creation of a Professional Learning Community (PLC), including the use of online forums; the development, demonstration, and dissemination of plant biology lessons by high school teachers, in which they engage their students in interpre-

tation of plant data from various sources (e.g., online, greenhouse); and guest speaker appearances in classrooms, which link plant biology to diverse careers and global sustainability. Several outcomes anticipated include a strong partnership for future plant biology projects between TMC and the Boone County Schools; a sustainable peer-built support system for science teachers through an easily accessed PLC; an increased awareness and confidence in the area of plant biology for the teachers and discussions with students about careers utilizing plant biology; and a final product, "Plant Biology: 21st-Century Literacies and Practices for Instructional Excellence," available on the TMC website to share teacher-designed lesson plans. Teacher and student surveys will be used to help evaluate the program (by an objective professional evaluator), including overall effectiveness, lesson improvement, alignment with NGSS and plant biology principles, and increases in student interest and knowledge. The project results will be shared with any interested parties (e.g., teachers and boards of education).



Shannon Galbraith-Kent and Anna Marie Tracy

**PI: Linda Young, PhD,  
Ohio Northern University**

**Project Title:** Planting Seeds of Science: Roots, Leaves, and STEM in After School and Summer Enrichment Programs

**Coinvestigators:**

**Vicki Motz**, PhD, Ohio Northern University and Union County Master Gardeners

**Zach Balch**, MA, program coordinator of the Bunsold After School Enrichment Program (BASE)

**Project Description:** A partnership between Ohio Northern University, the Union County

Master Gardeners, and the Marysville Exempted School District will be formed to improve the delivery of botany education to seventh- and eighth-grade students participating in the BASE and summer K–8 School-Age Child Care Enrichment program (SACC) student populations. The goals of this project are threefold, with the overarching goal of fostering inquiry-based exploration of botany at all levels from K–8 and to sponsor and inspire the next generation of STEM educators to address sustainable horticulture.

First, the BASE three-month pilot  
**continued on page 39**



(from left) Vicki Motz (ONU Biology faculty), Zach Balch (Bunsold After School Coordinator), Linda Young (ONU Biology faculty).

## My Life as a Plant Now Available in German!

*My Life as a Plant* is now available in German thanks to the volunteer efforts of a team from the University of North Carolina: Susanne Wolfenstetter, PhD, Lisa Wünsch-El Kasmi, MSciEd, and Farid El Kasmi, PhD.

All three of us were very excited when we were asked to translate *My Life as a Plant*! This great book is a fun way—not only for kids—to gain more knowledge on a very important aspect of life—plant biology! Using a very versatile and “hands on” approach, the book teaches children not only how important plants are for our daily lives, but also how plants live and how they are organized! Translating this book was a lot of fun—thanks for giving us the chance to be part of this wonderful project!

Karl-Josef Dietz (University of Bielefeld) also is working to make this translation available through the outreach initiatives of the German Botanical Society (<http://www.deutsche-botanische-gesellschaft.de/html/00DBGenglish.html>).

**Amazon:** <https://www.createspace.com/4378467>

**Free PDF:** [http://my.aspb.org/?page=My\\_Life\\_As\\_A\\_Plant](http://my.aspb.org/?page=My_Life_As_A_Plant)



(from left) Susanne Wolfenstetter, Lisa Wünsch-El Kasmi, and Farid El Kasmi



## ASPB Welcomes Tyrone Spady as Our New Legislative and Public Affairs Director

**W**e are delighted to announce that Tyrone Spady joined ASPB's staff on August 26, 2013, as our new legislative and public affairs director. In that capacity, Tyrone will be directing the legislative affairs work of the Society and our consultants, Lewis-Burke Associates, as well as working closely with other staff, committees, and members on our burgeoning public outreach and education programs. He will play a key role in promulgating and building on the Plant Science Research Summit report, *Unleashing a Decade of Innovation in Plant Science: A Vision for 2015–2025* (<http://plantsummit.wordpress.com/summit-report/>).

Tyrone comes to ASPB from the Federation of American

Societies for Experimental Biology (FASEB), where he served as a legislative affairs officer with particular responsibility for engaging NSF, DOE, and USDA, as well as the congressional committees that oversee those agencies and their budgets. Tyrone is an active and respected member of a number of the coalitions to which ASPB already belongs; for example, he helped to organize the Coalition for National Science Funding poster session and reception in April 2013 at which ASPB member Zhongchi Liu presented her work to members of Congress and their staffs (<http://newsletter.aspb.org/2013/julaug13.pdf#page=21>).

Before moving to his legislative affairs position at FASEB, Tyrone worked in that organi-

zation's science policy office, developing press releases, policy statements, and public outreach materials—all experience and activities that he will bring to bear in his leadership role at ASPB.

Tyrone has a PhD in zoology from the University of New Hampshire, and he carried out postdoctoral research in genetics at NIH before moving to FASEB. He succeeds Kathy Munkvold, who left ASPB in late June to



Tyrone Spady

return to the bench (<http://newsletter.aspb.org/2013/julaug13.pdf#page=4>).

Welcome, Tyrone!

Anyone who is interested in back issues of Annual Reviews of Plant Physiology, vol. 25 (1975) to vol. 53 (2002), should contact Delmar Vander Zee at [Delmar@dordt.edu](mailto:Delmar@dordt.edu) to arrange shipping. No charge for the issues; recipient pays shipping costs.



### Grow with Caron!

Plant growth chambers precisely optimized for:

- General Plant Growth
- Arabidopsis/Algae
- Plant Tissue Culture
- Seed Germination



Caron's Plant Growth Chamber product line goes beyond all conventional competitive offerings. Our chambers give your plants the environment they need to become healthy and vibrant! Our large capacity units incorporate earth-friendly technologies, user convenient features and tight parameters to ensure successful research. With 30 years of experience in environmental control, we guarantee you can trust us for your research needs. Call us today to learn how you can Grow with Caron!

[www.caronproducts.com/plantgrowth](http://www.caronproducts.com/plantgrowth)

**CARON**  
Opening Doors for Scientists

PO Box 715 • Marietta, OH 45750  
Phone: 800-648-3042 • 740-373-6809  
Fax: 740-374-3760  
[www.caronproducts.com](http://www.caronproducts.com)  
[sales@caronproducts.com](mailto:sales@caronproducts.com)

## Susan Cato Joins ASPB as Director of Digital Marketing Strategy

Taking a significant step along our path toward becoming an ever more digitally innovative organization that focuses strongly on meeting the needs of its members, ASPB is delighted to announce that Susan Cato has joined the Society's staff as our first director of digital marketing strategy.

As her title suggests, Susan's overarching role is to provide ASPB with strategic thought leadership in the development and marketing of novel products and services that provide superb user experiences—and a great deal of practical utility—for ASPB members and the global plant biology community as a whole. More specifically, Susan will create strategic plans for new products and for member and



Susan Cato

market development—including expanded outreach to plant scientists in industry, government, and academic research; she will lead the evolution and transformational change of the Society's

digital product portfolio; and she will design and help optimize the Society's digital operation, so that we might more readily integrate, share, and make use of data and information from a variety of sources.

Susan has extensive experience in both for-profit and not-for-profit settings, and she has led digital strategy and tactical deployment at each of her employers since the mid-1990s, when she developed the Optical Society of America's first website. Susan is passionate about the digital world and has demonstrated the ability to create a world-class online presence, combining strategic and critical thinking to develop a vision with hands-on expertise to make sure it comes to

life. We are thrilled that she will be leading this process at ASPB.

Susan has studied chemistry and mass media communications and, through the guidance and input of her mother, who was an electron microscopist at the Boyce Thompson Institute, has a strong affinity for plants. Throughout her career, Susan has remained an active participant in the digital product development and marketing communities, and she regularly presents her work and ideas at professional meetings. In between work and conferences, she blogs at <http://susancato.com/>.

Welcome, Susan!

### OUTSTANDING OUTREACH *continued from page 37*

program (conducted in 2012) will be developed into a sustainable yearlong program with sufficient durable equipment and a botanist/master gardener/middle school educator vetting working curriculum, which could then be implemented by any adult working with the group. Second, outreach will

be expanded to and adapted for summer K–8 students. And third, college STEM education students will be involved in developing the curricular material, implementing it, assessing it, and revising it. College students will benefit from developing exercises and receiving immediate feedback from student participants and experienced educators. Middle school students will spend their after-school hours

being turned on to botany via hands-on exercises and becoming aware of the need for sustainable agricultural practices. Exercises will be adapted for the enrichment program, implemented, assessed formatively and summatively at all levels, and revised into a final document, “BASEic Botany,” a manual of stand-alone lab exercises developed by STEM education students under the direction of ONU fac-

ulty in close alignment with the ASPB Principles of Plant Biology. ONU STEM education students would present their findings at an undergraduate forum, a manuscript would be prepared for publication in the *American Biology Journal*, and the BASEic Botany manual would be made available for dissemination through the ASPB website. ■

## *Plant Physiology*<sup>®</sup> 2012 Update Collection Now Available

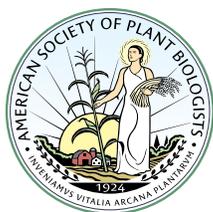
The 2012 edition of the Annual Update Collection compiles all the front-section Updates published in *Plant Physiology* in 2012, along with the prologue editorials written by the guest editors of that year's Focus Issues.

Updates review recent progress in the thematic areas covered by the Focus Issues (and more) and are written to be accessible and interesting for people reading them as an introduction to a particular topic, preparing for a lecture, or making classroom assignments.

### The 2012 Collection covers

- Nuclear Architecture and Dynamics
- Ubiquitin in Plant Biology
- Climate Change
- Seven other updates

The Annual Update Collection 2012 is available in a convenient printed format for only \$35 (shipping included). To order, visit <https://aspb.site-ym.com/store/default.asp>



ASPB staff are dedicated to serving our members.  
We welcome your questions and feedback.

**For quick response, e-mail us at [info@aspb.org](mailto:info@aspb.org) or visit our FAQ at [www.aspb.org/faq](http://www.aspb.org/faq).**