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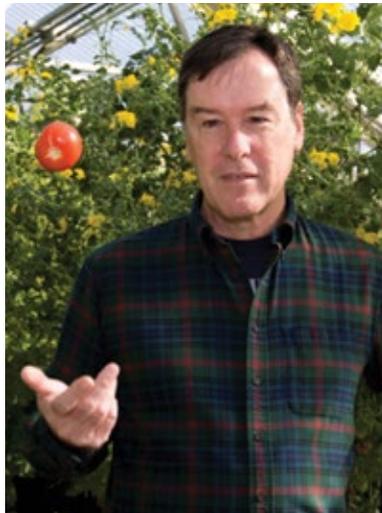
# ASPB News



THE NEWSLETTER OF THE AMERICAN SOCIETY OF PLANT BIOLOGISTS

## Harry Klee Assumes Presidency October 1

**H**arry Klee holds the Dickman Chair for Plant Improvement at the University of Florida (UF) in Gainesville. Harry earned a bachelor's degree in psychology and then a PhD in biochemistry from the University of Massachusetts, Amherst. He did postdoctoral research on *Agrobacterium tumefaciens* at the University of Washington with Eugene Nester, working on the mechanisms of crown gall tumor growth that led to characterization of the *Agrobacterium auxin* and cytokinin biosynthetic genes. Harry moved to Monsanto in 1984. There, he developed technologies for plant transformation and transgene expression and was part of the team that developed Roundup-resistant cotton, canola, and soybean. He continued work on the molecular biology of phytohormones, pioneering the use of transgenic plants to elaborate in vivo hormone function. In 1995, Harry moved to UF. There, he established a program to understand the biochemistry and genet-

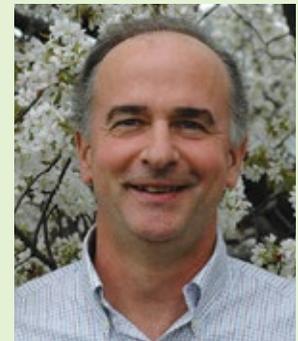


Harry Klee

ics underlying flavor in tomato and other fruit crops. Harry was elected a fellow of AAAS in 2009 and to the National Academy of Sciences in 2012. He has served on the editorial boards of *The Plant Journal*, *Plant Physiology*, *Molecular Breeding*, and *Critical Reviews in Plant Sciences*. He was editor-in-chief of *The Plant Journal* from 2002 to 2009. At UF, he served two-year terms as graduate coordinator and then director of the interdisciplinary Plant Molecular and Cellular Biology program. He has held visiting professorships at École Nationale Supérieure Agronomique de Toulouse (2001), Heilongjiang University (2012–2014), and Zhejiang University (2014 to present). He was an external reviewer of plant science research for the Swedish Research Council, the New Zealand Foundation for Research Science

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## Rob Last Elected to Lead ASPB in 2018–2019



Rob Last

**R**ob Last, Barnett Rosenberg Professor of Plant Biochemistry and Molecular Biology at Michigan State University, brings varied research, teaching, and administrative experiences in academia, industry, and government to ASPB leadership. Rob received his bachelor's degree in chemistry, with minors in botany/bacteriology and zoology, from Ohio Wesleyan University. He earned a PhD in biological sciences from Carnegie Mellon, working on yeast genes involved in pre-mRNA splicing. Rob then merged

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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.

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## President's Letter

# Where Do We Go from Here?

BY SALLY MACKENZIE  
Pennsylvania State University

A research community thrives best when it acts with a consensus voice and agrees to commonly held priorities. An effort to achieve such consensus within the plant science community was first launched with the 2013 publication of the document *Unleashing a Decade of Innovation in Plant Science: A Vision for 2015–2025* (<http://bit.ly/DecadalVision>). The Decadal Vision identified emerging societal challenges and opportunities in plant science over the next 10 years, as well as areas of common concern as research goes forward. Over the past two years, the broad objectives outlined in the Decadal Vision have advanced to identifying meaningful strategies that address the issues and priorities raised in that document.

This work has been carried out under the auspices of the Plant Science Research Network (PSRN), an NSF-funded Research Coordination Network that comprises 14 plant science societies, research institutes, and other organizations. Under the unflagging leadership of David Stern, president of the Boyce Thompson Institute, who is principal investigator of the grant, the PSRN team has convened a number of workshops to stimulate innovation



Sally Mackenzie

and integrate ideas from the broad swath of plant science represented by the PSRN to model the future of training in the plant sciences, the cyberinfrastructure that will be needed to grow capabilities in computation and big data, and the research areas likely to transform the plant science landscape over the next 20 years.

If you would like a taste of the work that underpins some of these discussions, I point you to the document *Imagining Science in 2035* (<http://bit.ly/ImaginingScience>), the outcome of a long-term visioning exercise carried out by the PSRN during a workshop held at the Howard Hughes Medical Institute. This workshop adopted a scenario planning approach that imagined possible future constructs for plant science research, and the *Imagining Science* document that emerged from this effort is intended to provide “a broad-based, plant science-oriented resource for planning research, education and training activities” (<https://tinyurl.com/yb4ll5xh>). Indeed, the PSRN has already used these future scenarios as



## Plant Science Research Network

starting points for subsequent workshops focused on plant science training and cyberinfrastructure needs over the coming two decades.

One profound outcome of the PSRN’s discussions to date is the growing recognition that future research, infrastructure, and training objectives must be highly integrative to be truly effective. This concept is a clear departure from the independent manner in which research initiatives and infrastructure and training efforts are implemented presently. As current demand for expertise in plant science broadens job opportunities far beyond the traditional realm of academic and industry research employment, and as we strive to expand diversity within the plant science research community, training models implemented into the future must be more versatile, accessible, and broad in experiential opportunities. High-end infrastructure necessary to accommodate research of the future will be centralized to better facilitate regional collaboration and intersector partnerships with less duplication.

The concepts developed through this deliberative process have been brought together in the National Plant Science Initiative (NPSI; <http://bit.ly/NPSI-Plantae>), an exciting and comprehensive plan to enhance future plant research in four primary directions: exploring and preserving biodiversity, exploring plant biochemical diversity, enabling deep phenomics, and discovering the plant microbiome. The proposed effort is seeking to increase investment in plant science research and training by a half-billion dollars, forging a compelling argument for the broad societal and research benefits deriving from the ability to treat nearly all plant species as models, making significant strides in synthetic biology and precision breeding, and harvesting the vast benefits of enhanced computation. The ideas presented are aimed at stimulating economic growth, enhancing public—private partnerships, and growing the U.S. agricultural economy.

Future plant science training will aim to enhance accessibility for a wider segment of

*continued on page 4*

# Christine Foyer Elected to ASPB Council

Christine Foyer is professor of plant sciences at the University of Leeds in the United Kingdom. Christine obtained her BSc at the University of Portsmouth and her PhD at Kings College, London. She joined the Photosynthesis Research Group at the University of Sheffield for her postdoctoral research. Christine was appointed as research director with her own group at the French National Institute for Agricultural Research in Versailles, France, in 1998. Christine then became head of department, first at the Institute of Grassland and Environmental Research in Wales and then at the Institute of Arable Crops Research (Rothamsted Research) in Harpenden, U.K. She joined Africa College at the University of Leeds in April 2009.



Christine Foyer

Christine has always been fascinated by plant metabolism, particularly reduction/oxidation (redox) biology and associated signaling. The goal of her research is to understand how primary processes (photosynthesis, respi-

ration) influence cellular redox processes and so signal changes in environmental factors to elicit appropriate responses underpinning acclimation and adaptation to fluctuating conditions. Christine considers the identification of climate-resilient species and nutrient-use-efficient cultivars key to the future of agriculture. She also recognizes the need to focus greater research attention on grain legumes to increase the contribution of pulses to global food production and sustainable agriculture and so eradicate hunger and malnutrition.

Christine is the general secretary of the Federation of European Societies of Plant Biologists and a member of the French Academy of Agriculture. She is an associate editor for *Plant, Cell and Environment*

and *Biochemical Journal*. She received the inaugural Founders Award from *Plant Physiology* in 2011. She has worked alongside colleagues from ASPB in the Global Plant Council and the Society for Experimental Biology.

Christine is enthusiastic about this opportunity to contribute to ASPB. She believes strongly that ASPB is a flagship organization that promotes excellence in all areas of plant science. This is particularly the case in the areas of policy and communication, in which ASPB provides timely information for policy and decision makers and also listens to and informs the public. Crucially, Christine sees ASPB as the go-to honest broker of information in the ongoing debate concerning the key role plant science research plays in global food and energy security. ■

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## PRESIDENT'S LETTER *continued from page 3*

STEM students who are likely to follow a much more diverse range of career-training pathways. Future training models must empower trainees, enable more

modular and customized experiences, allow a more diverse set of options for gaining necessary competencies, and permit individuals to enter, exit, and reenter their training path as needed over the course of a career. These are new concepts, denoting a signifi-

cant culture shift, and they will likely require pilot efforts by an initiating group of institutions to lead the way in refining their implementation.

I urge you to read the NPSI and accompanying documents and to share them with your

colleagues, students, and administrators. These are exciting times of change, and it will require the entire community speaking with one voice to make this plan a reality. ■

**HARRY KLEE**  
*continued from page 1*

& Technology, and New Zealand Crop & Food Research. He is a member of the science advisory boards for Mars Chocolate Plant Science Research and the Vineland Research and Innovation Centre.

The central theme of Harry's research has been phytohormones. Hormones are central to plant biology, cutting across physiology, biochemistry, and developmental biology; to understand hormone biology, one must reach out across disciplines. His time in industry had a profound impact on his career, demonstrating that one can do groundbreaking fundamental research that has real-world outcomes. That emphasis on translational research is illustrated by his current research focus based on ethylene and tomato fruit ripening. The emphasis of the lab is to elaborate the biochemical genetics of flavor, with the ultimate goal of restoring flavor to the commercial product. His laboratory identified many of the genes responsible for synthesizing important flavor

volatiles. That work has transitioned into large-scale genomics approaches for tomato flavor and fruit quality improvement. The program integrates biochemistry, genetics, and molecular breeding with human sensory and consumer science, together emphasizing the theme of interdisciplinary, collaborative research.

Harry served as a member of the ASPB Early Career Award Committee (2006–2009) and the ASPB Science Policy Committee. He was part of a group that raised funds to endow the ASPB Innovation Prize for Agricultural Technology. His background is uniquely suited to ASPB's future. Central is his experience as editor-in-chief of *The Plant Journal*, published by the Society for Experimental Biology and Wiley. Following are some of Harry's thoughts as he prepares to serve the Society over the next few years:

*Journals are the major source of revenue for all of the good work that ASPB does. Without that revenue stream, we would not be able to have a presence on Capitol Hill.*

*We would not have scholarships for students, postdocs, and early career scientists to attend the annual meetings. The push to open access and competition from commercial publishers starting new journals is a major challenge to the Society that is only going to increase. Being an editor of a high-visibility journal also provides training in management and communications and a much broader understanding of issues across all of plant science.*

*Another issue that is vital to the future of ASPB is membership. The work to endow the Innovation Prize is an important step in acknowledging the contributions of our colleagues in the private sector and enlisting them in our cause. Broadening our membership base is a major point of emphasis.*

*Yet another critical priority for the Society must be education. We need to emphasize all aspects of science education. The GMO "debate" illustrates the challenges we face and the potential role of ASPB as an engine of change. This issue is only a symptom of society's failure to grasp*

*basic scientific principles. We need to be more proactive in addressing polarizing issues such as GMOs and climate change, both in formal education and by reaching out to our elected representatives. We need to be the trusted source of unbiased solid science on all things related to plants and agriculture. We need to do this in a way that is both forceful and fair. We can make a real difference in public policy.*

One of Harry's highest priorities is to increase and diversify the ASPB membership. The first step in this process is to understand what the Society can do to enhance the careers of plant biologists at all stages of their career, whether in academia, industry, or the public sector. We need to know what works and what's missing so that we can enhance the products we deliver. Another priority is to leverage ASPB resources to effectively advocate for science in a time of great uncertainty and public skepticism about the role of science in society. It should be a very fun year. ■

**ROB LAST**  
*continued from page 1*

his interests in plant biology, genetics, and biochemistry as an NSF postdoctoral fellow in Gerald Fink's group at the Whitehead Institute at the Massachusetts Institute of Technology. This work involved a molecular genetic dissection of the tryptophan biosynthetic pathway of *Arabidopsis*, including identification of a series of auxotrophic mutants. Rob moved to the Boyce Thompson Institute (BTI) at Cornell University in 1989, where he was an adjunct faculty member in the Cornell Section of Genetics

and Development and Plant Biology graduate program. At BTI he received the NSF Presidential Young Investigator Award and expanded his research interests to include studies of biochemical mechanisms of plant abiotic stress adaptation, primarily against UV-B and oxidative stress. This work led to insights on the role of specialized metabolites as UV protective agents, the function of Vitamin C in stress tolerance, and genetic dissection of ascorbate biosynthesis. Rob spent 1998–2002 as a founding science director at Cereon Genomics, a wholly owned

subsidiary of Monsanto. His group did early work on *Arabidopsis* phenomics and developed industrialized map-based cloning methods for commercial targets. Cereon also performed shotgun sequencing of the *Arabidopsis* Landsberg *erecta* genome and released tens of thousands of genetic markers to the public. Following 18 months as a program officer in the NSF Biology Directorate, Rob moved back to academic research as a professor in the Michigan State University (MSU) Department of Biochemistry and Molecular Biology and Department of Plant

Biology. In 2009 Rob was honored as a fellow of AAAS and fellow of ASPB. He received the MSU Distinguished Faculty Award in 2012. Rob has spent sabbaticals at the Max Planck Institute for Chemical Ecology in Jena, Germany, and as Erna and Jakob Michael Visiting Professor at the Weizmann Institute of Science, Rehovot, Israel.

Rob's overarching research interest is understanding how higher plants use metabolism to adapt to the environment and how primary consumers of plant

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**ROB LAST**  
*continued from page 5*

foods—including humans—benefit from these metabolic strategies. Until several years ago, his research exclusively used genetically tractable model organisms, but now it uses genomics technologies to study the full range of plant metabolic strategies that evolved over millions of years. Phylogeny-guided approaches are being used to understand how synthesis of glandular trichome insecticidal specialized metabolites evolved over hundreds of thousands to tens of millions of years. This work involves collaboration among exceptional trainees and peers who are experts in computational biology, analytical chemistry, biochemistry, and genomics.

Rob has served research and education in a variety of roles. He established a summer Research

Experiences for Undergraduates program, Plant Genomics at MSU, now in its 12th year, and the NIH-funded T32 Plant Biotechnology for Health and Sustainability Graduate Training Program, which is entering its fourth year. He served the three-week Cold Spring Harbor Plant Course in a variety of capacities, including six years as a full instructor. Rob is on the editorial boards of *Science Advances*, *Current Opinion in Plant Biology*, and *Frontiers in Plant Metabolism and Chemodiversity*, and he served as associate and monitoring editor for *Plant Physiology* and editor-in-chief for *The Arabidopsis Book*. He has served on a variety of advisory boards, including as founding chair of the board of directors of the iPlant Collaborative (now CyVerse) and chair of the Scientific Advisory Board for the Genome Canada-funded PhytoMetaSyn

synthetic biology project. Rob currently is on the advisory boards for the BioDiscovery Institute at the University of North Texas and the Missouri Transect: Climate, Plant and Community EPSCoR project.

This is a critically important time for all aspects of ASPB's activities, including training, publishing, and science advocacy. Rob has been affiliated with ASPB since 1989 and has experience with its operation and an abiding belief in its mission. In addition to 15 years of combined service on ASPB editorial boards, he currently is a member of the Program Committee, which organizes the annual meeting (2015–2019). Previously he has served on the Public Affairs (2006–2008), Publications (1997–1999), Web Redesign (2009–2010), and ad hoc Genomics Publication (1998–2000) Committees. During 2013

he participated in formulation of the Decadal Vision described in *Unleashing a Decade of Innovation in Plant Science* (<https://aspb.org/advocacy/decadal-vision/>). Rob's extensive experience in academia, industry, and government will provide perspectives on how to serve and expand the ASPB membership. Experience advising iPlant will help ASPB effectively develop the Plantae platform. Rob's commitment to education and embrace of diverse career experiences will allow him to help ASPB continue to strengthen its excellent education and outreach activities. Finally, years of work on the Publications Committee and editorial boards of ASPB publications have provided insight into how to leverage the publications assets of ASPB to advantage in creating a sustainable financial future. ■



**2017 Recognition Travel Award (RTA) winners with former RTA recipients, ASPB committee members and staff, and friends of the Minority Affairs Committee (MAC).**

Back row, from left: John Harada (friend of MAC; former member), MariaElena Zavala (friend of MAC; former member), John Tran (former RTA), John de la Parra, Rolston St. Hilaire (former RTA), Danielle Guzman, Hong Gu Kang (former RTA), Rika Judd, Jason Thomas, Miguel Vega-Sanchez (MAC), Reuben John, Michael Gonzales (MAC), Judith Owiti, Sylvia Braxton Lee (ASPB staff), Cadance Lowell. Front row, from left: Adán Colón-Carmona (MAC chair), Elizabeth Waters (former RTA), Daniela Parker (friend of MAC), Beverly Agtuca, Simon Zebelo, Marisa Otegui (friend of MAC; Women in Plant Biology Committee chair), and Dianne Laboy.

This article was first published August 25, 2017, in *The Plant Cell* (<http://www.plantcell.org/content/early/2017/08/25/tpc.17.00680>).

## Journal Impact: Brave New World

BY NANCY ECKARDT, Senior Features Editor, and  
SABEEHA MERCHANT, University of California, Los Angeles, and Editor-in-Chief, *The Plant Cell*

The InCites™ Journal Citation Reports® (JCR), a product of Clarivate Analytics, was released recently for the citation year 2016. We were pleased to see that *The Plant Cell* two-year and five-year Journal Impact Factors (JIFs) rose slightly compared with 2015, to values of nearly 8.7 and 10.0, respectively. *The Plant Cell* also scored highly in other metrics provided by the JCR, such as the cited half-life, immediacy index, and Eigenfactor and article influence scores.

These metrics reflect the long-standing high quality of the journal and its editorial board and the aim of the journal to publish not only the most cutting-edge research, but also full stories that are foundational and stand the test of time. However, *The Plant Cell* no longer stands alone at the top of the list of primary research journals in plant biology with respect to the most recognized output of the report, the two-year JIF. Given the widespread obsession with this number, we decided to offer our readers an analysis of the underlying data.

A journal's two-year JIF is calculated as the average number of citations in a single calendar year to articles published by that journal in the previous two years. Thus, the 2016 JIF for a journal is the average number of citations in 2016 to articles published in

that journal in 2014 and 2015. An interesting and not entirely logical aspect of the JIF calculation is that the numerator includes citations to all items published in the journal, whereas the denominator equals the number of so-called citable articles, mainly research articles and reviews. Thus, items categorized as editorial material are not counted in the denominator, but citations to editorial material are included in the numerator. The JCR database is not publicly available. However, Clarivate also publishes the Web of Science, a subscription-based scientific citation database that is widely available at many academic and research institution libraries, which can be mined to undertake journal- and article-specific analyses (described in Larivière et al., 2016).

Using this approach, we calculated mean citation frequencies corresponding to the JIF, as well as citation distributions, for eight highly regarded plant biology primary research journals. To approximate the JIF, data were retrieved from the Web of Science for each journal for citations in 2016 to all items published in 2014 and 2015, and this value was divided by the number of items retrieved in a search for “articles” plus “reviews” published in 2014 and 2015 in the same journal. We also computed the mean

and median citation frequencies specific to research articles and reviews, without including citations to other items in the numerator.

The data for these journals are presented in the table on page 8. The JCR JIF denominator value was precisely replicated for all journals in question by searching for “articles” plus “reviews” (with one minor exception; see table note). The Web of Science JIF numerator (total citations to all documents) was within three percentage points of the JCR JIF numerator for all journals, with two exceptions: citations to all documents in the Web of Science returned a numerator that was 10% lower than the JCR JIF numerator for *Plant Biotechnology Journal* (1,569 vs. 1,749) and 18% lower than the JCR JIF numerator for *Nature Plants* (678 vs. 824), yielding substantially lower Web of Science JIFs relative to the JCR JIFs for these two journals.

Clarivate Analytics reported that differences between the JCR and Web of Science databases can be due to the facts that (1) JCR citation aggregation is at the journal level and more inclusive than Web of Science cited-to-source linking (i.e., JCR includes citations that can't be linked to a specific citing article but are considered unequivocal for the cited journal; see also the descrip-

tion of “unmatched citations” by Larivière et al., 2016); (2) JCR citations were extracted in mid-March, but Web of Science coverage is continually expanding throughout the year (i.e., neither database is fully populated for 2016 citations until later in 2017; see table note); and (3) the Web of Science includes citations from the Book Citation Index, but JCR does not (T. Ciavarella, personal communication). The first observation is expected to yield a higher number of citations in the JCR relative to the Web of Science database, whereas the other two will yield lower JCR citations relative to the Web of Science. Thus, for example, *Nature Plants* saw a higher than average number of unmatched citations and relatively few book citations, whereas *The Plant Cell* was associated with a higher than average number of book citations that outweighed the inclusion of unmatched article-level citations (T. Ciavarella, personal communication). The high rate of book citations to recent articles might suggest that *The Plant Cell* continues to publish a large number of manuscripts that are foundational, provide substantial insight into biological processes, and are critical to moving the field forward.

It should be noted that the data for *Nature Plants* include

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## Citation Data for Eight Plant Science Journals from the Web of Science Database

	<i>Mol Plant</i>	<i>Nat Plants</i>	<i>New Phytol</i>	<i>Plant Biotechnol J</i>	<i>Plant Cell</i>	<i>Plant Cell Environ</i>	<i>Plant J</i>	<i>Plant Physiol</i>
<b>Number of articles</b>								
Citable items (JIF denominator)*	220	80	920	235	526	415	669	942
Articles	175	76	785	194	511	357	649	935
Reviews	45	4	135	41	15	58	20	7
<b>Editorial items</b>	134	113	121	13	100	32	22	37
Editorial material	40	59	105	11	86	30	4	22
Letters	87	3	1	0	0	0	0	0
News items	0	23	0	0	0	0	0	0
Biographical items	1	0	1	0	0	0	0	0
Corrections	6	28	14	2	14	2	18	15
<b>Total items</b>	354	193	1041	248	626	447	691	979
<b>Number of citations</b>								
Total citations in JCR (JCR JIF numerator)	1942	824	6751	1749	4570	2562	3948	6075
Total citations in WOS (WOS JIF numerator)	1911	678	6597	1569	4597	2484	3972	6048
WOS citations to citable items	1481	613	6425	1548	4553	2422	3959	6035
WOS citations to editorial items	430	61	172	21	44	62	13	13
% boost from editorial items	29	10	2.7	1.4	1.0	2.6	0.3	0.2
<b>Citation means</b>								
Mean citations/citable item	6.7	7.7	7.0	6.6	8.7	5.8	5.9	6.4
<b>Mean citations/article</b>	<b>5.7</b>	<b>7.6</b>	<b>6.0</b>	<b>6.9</b>	<b>8.3</b>	<b>5.4</b>	<b>5.7</b>	<b>6.4</b>
<b>Mean citations/review</b>	<b>10.8</b>	<b>10.3</b>	<b>12.8</b>	<b>5.3</b>	<b>20.5</b>	<b>8.7</b>	<b>11.8</b>	<b>13.9</b>
JCR JIF	8.827	10.300	7.330	7.443	8.688	6.173	5.901	6.456
<b>WOS JIF</b>	<b>8.686</b>	<b>8.475</b>	<b>7.171</b>	<b>6.677</b>	<b>8.740</b>	<b>5.986</b>	<b>5.937</b>	<b>6.420</b>

Note. JIF, Journal Impact Factor; JCR, Journal Citation Reports; WOS, Web of Science.

Data were downloaded from the WOS database on July 12, 2017. This database continues to add citations for an indeterminate time period; thus for direct comparisons, all data must be downloaded on the same date. For 2016 citations, we expected it to be nearly fully populated by July 2017. For example, for *The Plant Cell* and *Nature Plants*, searches run on August 17, 2017, returned total 2016 citations of 4598 and 681, respectively, compared with respective values of 4597 and 678 shown in the table, whereas a search run on February 24, 2017, returned total 2016 citations of only 4368 for *The Plant Cell*. Although this value is 95% of the value obtained in July, it would yield a JIF value of only 8.3 relative to the July value of 8.74.

\* Citable items in WOS correspond with the JCR JIF denominator in all cases, except that the JCR JIF denominator for *New Phytologist* was 921, whereas the WOS JIF is based on a denominator of 920 citable items returned in the WOS search. Items classified as "articles" in the Web of Science database may be used as a proxy for research articles, but, depending on the journal, they may include some review-type articles that are not primary research articles per se, but are labeled as "articles" rather than "reviews" in this database.

**JOURNAL IMPACT**  
*continued from page 7*

citations to articles published in only one year, 2015, as this journal had zero publications in 2014. Therefore, we might expect next

year's JIF for *Nature Plants* to be higher, as the 2015 publications are likely to accrue more citations in the second year after publication relative to the first year (and the JIF values for all other jour-

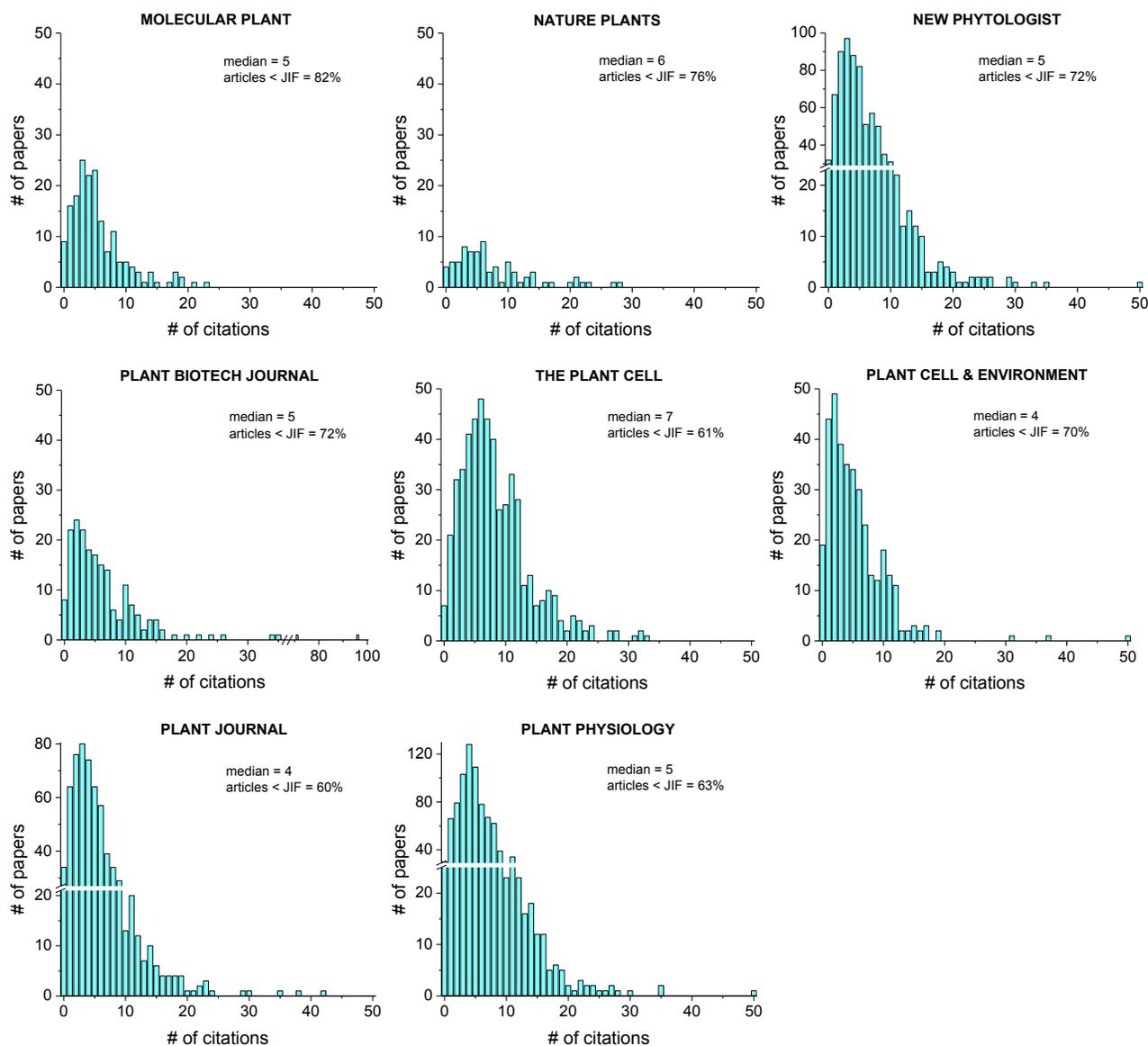
nals already include second-year citations).

Retrieving citations to individual article categories allowed us to calculate the mean citation frequencies specific to research

articles and reviews and to estimate the “boost” to the Web of Science JIF for each journal resulting from citations to editorial material. There is a notable

*continued on page 10*

**Citation Distributions of Eight Plant Science Journals**



Note. Note. JIF, Journal Impact Factor; JCR, Journal Citation Reports; WOS, Web of Science. Citations are to items categorized as “articles” in the Web of Science database, which are mainly primary research articles and equivalent to JCR “citable documents” minus those labeled as reviews. Citations are accumulated in 2016 to articles published in 2014–2015. Data were downloaded from the Web of Science on July 12, 2017. Articles < JCR JIF and articles < WOS JIF are the percentage of primary research papers (those categorized as “articles” in WOS) published in 2014 and 2015 having a total number of 2016 WOS citations below the value of the JCR JIF or WOS JIF, respectively. FIGURE COURTESY OF COLLEEN HUI.

## JOURNAL IMPACT continued from page 9

difference in the contribution to the JIF from citations to editorial material between these journals, with *Nature Plants* and *Molecular Plant*, in particular, receiving a 10% and nearly 30% boost, respectively, due to citations to editorial material. *The Plant Cell* received a 1% boost due to editorial material, and the boost for each of the other five journals was no more than 3% (*Plant Physiology* and *The Plant Journal* received essentially no boost).

The discrepancies in the data from the different databases and differences in the contribution from editorial material underscore the notion that the data do not support reporting, or placing any significance on, a JIF out to three decimal places. Indeed, based on these data, one is hard-pressed to justify a significant difference between JCR JIFs of 10.3 and 8.6. As far as individual authors are concerned, a better measure of journal impact may be obtained by comparing the mean, or better, median citation frequencies specific to research articles alone.

Larivière et al. (2016) advocated publishing frequency distribution plots of the citations to provide a clearer view of the underlying data. We agree that showing the underlying frequency distribution of citations “echoes the reasonable requests that journal reviewers and editors make of authors to show their data in justifying the claims made in their papers” (Larivière et al., 2016). Distribution plots corresponding to the data on “articles” alone (i.e., not including editorial material or reviews) are shown in the figure on page 9 for the eight above-

mentioned plant science journals. As noted by Larivière et al., these distributions are skewed to the right, with the left-hand portion dominated by papers with lower citations. These authors report that “typically, 65–75% of the articles have fewer citations than indicated by the JIF” (Larivière et al., 2016). *The Plant Cell* scored well in this respect, with only 61% of research articles (as retrieved from the Web of Science) accumulating fewer citations than the JIF. By contrast, the value for *Molecular Plant* was 82%. The only other journals to achieve less than 65% in this respect were *The Plant Journal* and *Plant Physiology* at 60% and 63%, respectively. *The Plant Cell* also scored well for the number of research articles with zero citations in the Web of Science during this time period, at 1%; the other journals analyzed had 4% to 5% of articles showing zero citations, with the exception of *Plant Physiology* with 3% (see figure). These plots, together with the information in the table, suggest that both primary research papers and review articles in *The Plant Cell* accumulated, on average, higher citations than any other primary plant science journal for this time period.

Nevertheless, it is clear that *Nature Plants* and *Molecular Plant*, as well as all of the other high-profile plant science journals shown here, are increasing their output of high-impact plant science. The rise and success of new journals is to be applauded, as it signals the overall importance and impact of plant biology in the global life science community. The rise of online publishing and open access makes it likely that there will be an increas-

ingly larger number of essentially equivalent journals—in terms of citations—reporting the latest research in plant biology in the near future. Differences among these journals will therefore be measured in terms of the scope of the work published; the quality of their editorial boards; and their submission, reviewing, and publication processes and speeds.

We at *The Plant Cell* remain committed to providing fair and fast evaluation of your work by a world-class editorial board of your peers (<http://plantcelledboard.weebly.com/>) and to publishing the most exciting, cutting-edge research in plant genomics and developmental, cell, and molecular biology. All manuscripts are evaluated by a team of editors who are active researchers and who engage in pre- and post-review consultations to arrive at a thoughtful and thorough evaluation of your work in the shortest time possible. We aim to write decisions that are clear and provide sound reasoning for either declining or requesting revision of your work, to avoid multiple rounds of extensive revisions, and to help you publish your work as quickly as possible, whether in *The Plant Cell* or elsewhere. To increase the transparency of the review process, we now publish Peer Review Reports, with author approval, including decision letters, anonymous reviewer comments, and author responses for all versions of a manuscript, along with timelines showing the dates of each submission and decision.

As always, we help our authors disseminate their findings in an accessible manner to a wide audience, and we will continue to seek out new ways of doing so

in the rapidly changing communication space. For example, we provide post acceptance scientific editing by a team of professional science editors, who polish the writing and presentation and help us ensure that all manuscripts adhere to high standards of data reporting (transparency and availability) and data presentation (clarity and accessibility). We help authors learn about Altmetrics and how they can boost the visibility and impact of their work by issuing press releases and writing plain-language summaries (see “*The Plant Cell* in a Nutshell” at <https://plantae.org/research/the-plant-cell/#nutshell>). In addition, we have appointed a team of assistant editors who will join Mary Williams, Kevin Folta, and Nancy Eckardt to form a team of Feature Editors who will write articles, contribute blog posts, and create podcasts highlighting our authors and their work.

*The Plant Cell* (and our sister journal *Plant Physiology*) is published by the American Society of Plant Biologists, a nonprofit international scientific society devoted to the advancement of plant science and plant scientists. The Society supports travel awards for early-career scientists, undergraduate research fellowships, education and outreach programs, and important work on legislative and public affairs. Submit your best work to *The Plant Cell* and experience the difference! ■

## Reference

Larivière, V., et al. (2016). A simple proposal for the publication of journal citation distributions. bioRxiv 062109. <http://www.biorxiv.org/content/early/2016/07/05/062109.full.pdf+html>.



# ASPB/AAAS 2018 Mass Media Science & Engineering Fellows Program

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Earlier this year, Phenome 2017 brought together more than 200 key research drivers from academia, industry, and government. Phenome 2018 promises to build on this success, again attracting a multidisciplinary community and stimulating collaboration and innovation to tackle challenges such as food security in the face of a changing global climate. Along with providing a rich networking environment, Phenome 2018 will feature three general sessions on phenomics-enabled biology, systems and sensors, and data management and analysis.

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**November 17, 2017**  
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## Connecting Biology, Systems, and Tools

### General Sessions



#### **General Session I: Phenomics-Enabled Biology** Organized by meeting cochair Chris Topp (Danforth Plant Science Center)

This session will feature the many phenomics approaches used in plant biology, address the successes and limitations of those approaches, and consider how our technology-enhanced ability to quantify phenotypes is shaping our understanding of plant growth and plant-environment interactions at many scales.



#### **General Session II: Systems and Sensor Development to Advance Phenomics** Organized by Joshua Peschel (Iowa State)

This session will focus on sensors and systems, including the development of new sensor systems for phenotyping, the adaptation of existing sensors into phenotyping systems, and the development of protocols to collect reliable phenotypic data.



#### **General Session III: Data Crunching and New Analytics** Organized by Alina Zare (University of Florida)

This session will explore analytical methods for extracting, managing, and curating information from phenotypic data. Topics will include developing algorithms to process and interpret sensor data, jointly analyzing multiple types of data, and addressing open challenges.

## New to Phenomics?

Have you thought about how phenomics could fit into your research, or even wondered what phenomics is? Phenomics measures the phenotypes of organisms and examines the relationship of the phenome to genetic and environmental factors. Phenomics often uses high-throughput technologies to monitor the physical and biochemical parameters of phenotypes. Learn more about this emerging discipline and the approaches required to analyze and manage the massive amounts of resulting data at Phenome 2018. General Session I: Phenomics-Enabled Biology will provide a broad picture of the myriad approaches used in phenomics, and premeeting workshops will give phenomics novices an introduction to the field, along with hands-on experience.

Presenters for concurrent sessions will be selected based on submitted abstracts. Before the meeting, workshops organized by Malia Gehan (Danforth Plant Science Center) will provide short talks from different disciplines to help biologists learn the computational skills and concepts needed for phenomics analysis and give computer scientists and engineers the chance to learn about key biological concepts and jargon related to phenomics. For phenomics novices, the hands-on phenotyping workshop will provide the opportunity to work through real-world computational exercises. Those with more advanced skills are welcome to join a hackathon after the meeting, which will focus on solving a current phenomics challenge.

## For Updates

Join the Plant Phenomics network on [Plantae.org](http://Plantae.org)

Follow @PlantPhenomics and #phenome2018 on Twitter

Register at [phenome2018.org](http://phenome2018.org)

The annual Phenome conference series was established by the National Plant Science Council and the North American Plant Phenotyping Network and is powered by ASPB's Meeting & Event Solutions unit.



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## ASPB Members Elected to German National Academy of Sciences Leopoldina

Two members of the ASPB community, Katayoon “Katie” Dehesh and Julian Schroeder, have been recently elected to the German National Academy of Sciences Leopoldina. The Leopoldina is the oldest continuously existing academy in the world, tracing its founding back to 1652.

Katie is the director of the Institute for Integrative Genome Biology and the Ernst and Helen Leibacher Endowed Chair in Botany and Plant Sciences at the University of California, Riverside. She is also a member of the ASPB Publications Committee, which supervises and reports to the Society’s board of directors on all noneditorial aspects of the Society’s journals and other publications.

Katie’s research focuses on biofuels and plant defense responses. With regard to biofuels, the work of Katie’s team includes the modification of the conversion of starch to oil and the optimization of fatty acid profiles in



*Katayoon (Katie) Dehesh*

PHOTO BY UC RIVERSIDE

bioenergy crops. Her team’s plant defense work looks at early stress detection and hydroperoxide lyase-mediated signaling.

This year’s other new electee, Julian, is the codirector of the University of California, San Diego, Food and Fuel for the 21st Century research program and a distinguished profes-



*Julian Schroeder*

PHOTO BY UC SAN DIEGO

sor of biology in the Division of Biological Sciences, and he holds the Novartis Chair in Plant Sciences. In addition to being a former ASPB president, he has served the Society on several committees including the Science Policy Committee (formerly the Public Affairs Committee) and the Adolph E. Gude Award

Committee. He is a recipient of the Charles Albert Shull Award, which is a monetary award made annually for outstanding investigations in the field of plant biology by a member who is generally under 45 years of age.

The work of Julian’s laboratory seeks to characterize the pathways and mechanisms that mediate abiotic stress resistance in plants. Among the stresses being investigated by Julian’s team are elevated CO<sub>2</sub>, drought, and salinity. In particular, the lab’s work employs interdisciplinary and systems approaches to stomata, which are critical players in many types of plant abiotic stress response.

Dedicated to both the advancement of science and the creation of a better future, the Leopoldina has 1,500 members from Germany and dozens of other countries. Katie and Julian join the ranks of such eminent scholars as Marie Curie, Charles Darwin, Albert Einstein, and Max Planck. ■

# ASPB/AAAS Mass Media Fellow Reports In

BY JENNA GALLEGOS

Having completed my tenure as a AAAS Mass Media Fellow, I want to sincerely thank the members and representatives of The American Society of Plant Biologists for sponsoring me and share a bit about my experience as a fellow.

My first day on the job, another writer at *The Washington Post* forwarded me an email from a scientist. She had asked him to explain the latest findings on a new antibiotic in plain language, and his response was anything but plain. She hoped I might be able to sift through the jargon and decide if the study was important. At that moment, I realized how valuable it is to have scientists in the newsroom.

I'm a molecular plant biologist, so my background did not always apply to the study I was writing about. In my 10 weeks at *The Washington Post*, I wrote about antibiotics, cross talk between the gut and the brain, the effect of climate change on air travel, traumatic brain injuries, nutrition, whisky, genetically modified salmon, and brain-training games. These fields are unfamiliar, but my training as a scientist helped me identify potential caveats, important additional studies, and whom to interview about the scientific consensus on each issue.



Jenna Gallegos

My scientific background really came in handy when writing an in-depth analysis on two studies examining the effect of neonicotinoid pesticides on bees. Both concluded that neonicotinoids threaten bees. In one, many of the results were not statistically significant. Because I knew the issue was controversial, I contacted not only the authors of the two new studies, but also other scientists who had conducted similar studies, as well as a farmer and a beekeeper. Following the initial wave of coverage, a Slate article and a popular science blog singled out and commended my piece for its “admirable nuance.”

As a plant scientist, I have also leveraged my own experience to write about topics *The Washington Post* would not typically cover. I attended the first meeting of the National Academy of Sciences Science Breakthroughs 2030 committee and wrote a story about their plans to identify the biggest challenges and opportunities in food and agriculture for the next decade. I also published a list of the 10 biggest myths in agriculture, including topics like precision agriculture, pesticides, and genetic engineering.

Not only has being a scientist influenced my work as a science writer, but spending the summer

as a science writer has improved my ability to think scientifically. I read as many scientific publications as a reporter as I did in graduate school. Because many of these articles are in fields distally related to my own, I had to read them very carefully and think critically. When I was not reading papers, I was interviewing the authors of those papers or other scientists who scrutinized the methods and conclusions.

My career projection will forever be changed by the ASPB/AAAS Mass Media Fellowship. I have embarked on an interdisciplinary scientific career as a postdoctoral researcher at Colorado State University with a dual focus on research and science writing. I also plan to continue contributing to *The Washington Post* as a freelance writer and will be serving as an assistant features editor writing plain-language summaries for *The Plant Cell*.

I am forever grateful to ASPB for investing in my experience and supporting the larger goal of the ASPB/AAAS Mass Media Fellowship program: “to enhance coverage of science-related issues in the media in order to improve public understanding and appreciation of science and technology.” ■

As the years churn on, many esteemed members of ASPB have passed the torch to their younger colleagues and stepped out of the limelight to allow others to bask in its glory. Yet, many continue their good works to the benefit of plant biology and the world. Edited by Rebecca Dickstein, University of North Texas, "Where Are They Now?" is part of the *ASPB News* suite of columns focused on the personal and scientific life and insights of ASPB members at all stages of their career. This column offers a look into the current activities of influential members of ASPB who continue to make a positive mark on our Society. We hope you all enjoy this addition to your newsletter.

Please feel free to submit your own article to "Luminaries," "Membership Corner," or "Where Are They Now?" For details, please contact Jill Deikman, Membership Committee chair, at [jill.deikman@monsanto.com](mailto:jill.deikman@monsanto.com). As always, we are open to suggestions for articles or features of interest to readers of the *ASPB News*.

## Elisabeth Gantt

Distinguished University Professor Emerita, University of Maryland, College Park

Like many biology students, I did not set out to become a plant biologist; in fact, I sort of fell into it backwards. Aspiring women scientists in my youth generally went into teaching or were married to a scientist who led the research team. Teaching high school was an appropriate goal, but realizing that my knowledge of plant biology was limited, I enrolled in a plant morphology class with Howard Arnott, a newly minted University of California, Berkeley, PhD with an enriched plant background. My interest in plant biology never waned after that time. It was perhaps an accident of history: the USSR sent up Sputnik 1 in 1957, which subsequently launched the development of U.S. science as never before and benefited many of us in the process. I would like to recall some factors about a 50-year journey in plant biology I was fortunate to observe, and I want to raise an issue facing some "retired-research-active" plant biologists.

In 2013 I had the opportunity to cover some personal and scientific recollections (Gantt, 2013), and but for a few important omissions, there is no reason to repeat



Left to right: Len Pysh (department chair, Roanoke College, Department of Biology), Marilee Ramesh, Beth Gantt, and DorothyBelle Poli.

them. Here I want to recollect the privilege of having experienced much of the development of the American Society of Plant Physiologists (ASPP), which in 2001 became ASPB.

In 1966 I joined the Radiation Biology Laboratory of the Smithsonian, where the director, William H. Klein, and Winifred Klein attended to such essential ASPP business as membership matters in their home basement, while Martin Gibbs in Boston guided ASPP's journal *Plant Physiology*. The Society began

to prosper in the years following, greatly aided by acquiring the headquarters in Rockville, Maryland, through the generosity of the Gude family.

In 1989 Jack Hanson wrote an excellent history of ASPP up to that time. I fondly remember his involvement, talent, and dedication. Being only a few miles from the Rockville ASPP headquarters, I had become active in various capacities in ASPP for some years prior. The close proximity also allowed interactions with many of the Society's dedicated officers,

volunteers, and executive directors (Bob Chasson, Mel Josephs, Crispin Taylor) and many of the support staff.

Establishing a second journal, *The Plant Cell*, certainly ranks as one highlight of that time, and was made possible partly by some wise planning and management of funds that the Society had practiced. There were many other highlights. The Society had only men as elected officers until 1973, when Mary Stiller of Purdue University became ASPP's secretary. It took another decade, until 1984–85, before I became the second elected woman, again as secretary.

In Jack Hanson's history, he noted, "There could, however, be a significant change in gender. For the first time, at the 1984 Davis meeting, there was a meeting scheduled specifically for women in plant physiology." It was attended not only by women, but also by a significant number of men. This was the start of including women as equals in all aspects of running the Society. It clearly is also one of the Society's significant accomplishments, and is an example of how changes are initiated first by a few and then supported by many.

Another major ASPP accomplishment was increased support for young plant biologists.

“Where Are They Now?” was designed to recognize the past and present activities of retired plant biologists. The term *retired* implies various things—clearly, it means that they are no longer salaried, but are they no longer contributing? Three of my cohorts elected to the National Academy of Sciences in 1996, Brian Larkins, Chris Somerville, and Maarten Chrispeels (2016), have plates full of commitments in serving plant biology. My own path has been somewhat different. I am happy to tell you that I am a visitor scientist at Roanoke College in Salem, Virginia. The Department of Biology has kindly made some research space available. I am especially grateful for being able to be engaged in a small research project by myself, and I am lucky to be associated with several scientists, three shown in the picture, who are trained plant biologists.

I retired at the age of 72, not because I was tired of research and teaching, but because I thought it was time to release a position for younger people. Furthermore, I was fortunate to be able to keep my laboratory longer than anticipated, largely because of the temporary hiring freeze after the 2008 severe financial crisis. However, I was also in a favorable position by having padded my research budget with thousands of dollars from my personal contributions, and some from contributions over decades of honoraria and other funds that I never took personally. There is no doubt that many other plant biologists have contributed personal and grant funds to their research budgets.

For some years, I was able to use some of these funds for my research, until the chair of the department froze all my funds for over one year, with the justification that they were now “state funds.” After various appeals, the university granted me the use of one-third of the research budget. Actions of sequestering the research funds of retired-research-active faculty are not unusual, as I have learned from other plant scientists in public state universities. A valued retired-research-active neighbor, John Boyer (2016), continues research through the generosity of a former postdoc at the University of Missouri. I have also been appraised that some Canadian universities make office and laboratory space available to retired-research-active scientists, and even have initiated funds for which such retired faculty can compete.

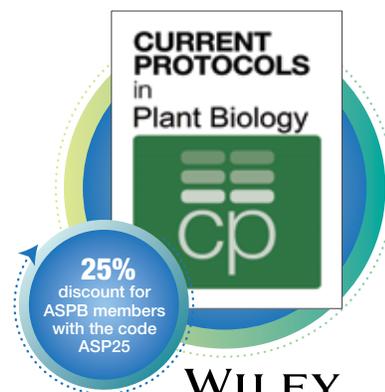
I hope that ASPB can begin a discussion by retired-research-active plant biologists that to me seems overdue. I am not able to attend the annual meetings any more due to family constraints. However, I would welcome your thoughts and ideas to get a sense of how much interest there may be in this topic (email me at [bg80plus@gmail.com](mailto:bg80plus@gmail.com)). ■

### References

- Boyer, J. S.** (2016). Where are they now? *ASPB News* **43**(3): 17–18.
- Chrispeels, M. J.** (2016). Where are they now? *ASPB News* **43**(6): 17–18.
- Gantt, E.** (2013). Benefits of an inclusive US education system. *Annual Review of Plant Biology* **64**: 1–17.
- Hanson, J. B.** (1989). *History of the American Society of Plant Physiologists*. Rockville, MD: American Society of Plant Physiologists. <https://aspb.org/about/history/>

The *ASPB News* wishes to thank Beth Gantt for launching “Where Are They Now?”. Her first column as editor appeared in the September/October 2012 issue of the newsletter and featured Larry Vanderhoef, and she delivered two to three insightful articles every year since then. It is fitting that Beth herself is the featured scientist five years later, and we thank her for her service as she now prepares to hand over the reins to Rebecca Dickstein, Professor of Biology at the University of North Texas. We welcome Becca, and we extend our heartfelt gratitude to Beth.

**Jill Deikman**, *Membership Committee chair*  
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## Policy Update

BY LAUREN BROCCOLI  
Lewis-Burke Associates, LLC

### House Agriculture Committee Holds Hearing on University Research

On June 22, the House Committee on Agriculture held a hearing on university research. Whereas the Senate Agriculture Committee hearing on June 15 (detailed below) featured a panel of USDA federal officials, the House hearing focused exclusively on university leaders and the challenges and opportunities of agricultural academic research.

Witnesses included Robert Duncan, Texas Tech University System chancellor; Jacqueline Burns, dean for research, University of Florida Institute of Food and Agricultural Sciences; Glenda Humiston, vice president, Agriculture and Natural Resources, University of California, Oakland; Walter Hill, vice provost for land grant affairs at Tuskegee University; Steven Tallant, president, Texas A&M University-Kingsville; and Carrie Billy, president and CEO, American Indian Higher Education Consortium.

In his opening remarks, Chairman Michael Conaway (R-TX) emphasized the role that universities play as drivers of innovation and efficiency. Unlike the bipartisan discourse in the Senate hearing regarding maintaining funding for USDA research programs despite the president's fiscal year (FY) 2018 budget request, committee leadership did not posture

on the budget. Chairman Conaway mentioned the \$104 billion savings achieved by the 2014 Farm Bill and alluded to the agriculture community having already achieved austerity measures for many programs. Ranking member Colin Peterson (D-MN) emphasized that agricultural research at universities is the foundation of agricultural innovation for the country.

Rep. Jim McGovern (D-MA) was the exception, offering a scathing statement on the proposed cuts to USDA research, specifically the 17 ARS facilities that were proposed for termination. He questioned the panel on the importance of these collaborations and cited the Senate hearing testimony from ARS administrator Chavonda Jacobs-Young about the necessity of these collaborations to meet the USDA mission.

Rep. Rodney Davis (R-IL), chair of the Research Subcommittee, questioned Burns on both the safety and promise of biotechnologies, an exchange that highlighted gene editing and CRISPR as safe technologies that are being used to address citrus diseases and would be key to producing more nutritious foods. Chairman Davis most recently announced a new bipartisan Agriculture Research Caucus cochaired by another member of the committee, Rep. Jimmy Panetta (D-CA).

Reps. Ted Yoho (R-FL) and Tim Walz (D-MN) made statements regarding public percep-

tion of GMOs and inquired whether academic researchers were addressing the disconnect with the general public. Rep. Rick Crawford's (R-AR) exchange with Chancellor Duncan emphasized the need to increase funding for the capacity-building grants for the Non-Land Grant Colleges of Agriculture (NLGCA) program. Rep. Jim Costa (D-CA) stated his intent to increase the NLGCA authorization and to modify the multistate requirement for the Specialty Crop Research Initiative. Finally, Rep. Neal Dunn (R-FL) inquired about the impact on academic research if a proposed 10% cap was instituted on the indirect costs of USDA research grants.

Witnesses' testimony touched on a wide range of topics but emphasized deferred maintenance costs and recommended that the next Farm Bill authorize a dedicated infrastructure funding stream that would require matching funds. Many of the witnesses discussed the need for additional programs that support diversity in agricultural sciences and workforce development for Hispanic-serving institutions. With respect to the Agriculture and Food Research Initiative, many commented on the need to work with appropriators to achieve funding at the authorized level.

#### Source and Additional Information

- The full webcast and witness testimonies are available at <http://bit.ly/2sUYBki>.

### Senate Agriculture Committee Holds Hearing on Agriculture Research

On June 15, the Senate Committee on Agriculture, Nutrition, and Forestry held a hearing on federally funded agricultural research at USDA, the fourth in a series of Farm Bill-related hearings this past year. The hearing consisted of two panels. The first comprised USDA officials and academic researchers, including Ann Bartuska, acting deputy undersecretary for Research, Education, and Economics (REE), USDA; Sonny Ramaswamy, director, National Institute of Food and Agriculture (NIFA), USDA; Chavonda Jacobs-Young, administrator, ARS, USDA; and Sally Rockey, executive director, Foundation for Food and Agriculture Research (FFAR).

In his opening remarks, Chairman Pat Roberts (R-KS) praised agricultural research as the backbone of agricultural productivity and a necessity in preparing for the demands of a growing global population, and he acknowledged the importance of strong public-private partnerships in the strained federal funding environment. Both Chairman Roberts and Senate Agriculture Appropriations Chairman John Hoeven (R-ND) were critical of the president's FY2018 budget request, which proposed drastic cuts to the REE mission area, including a 22% cut to ARS, the proposed closure of ARS facili-

ties, and the elimination of several NIFA programs. Senator Hoeven offered blunt remarks stating the importance of agricultural research and his intent to continue support for these research programs. Nearly all members of the committee were in attendance and expressed universal support for federal investments in agriculture research, pressing witnesses to explain proposed cuts that would have significant impacts on their constituents.

Sen. Michael Bennet (D-CO) expressed outrage at the proposed cuts to ARS as an “insult” and a “war on agriculture.” He pressed Jacobs-Young to explain the proposed closure of the ARS facility in Colorado, one of 17 included in the budget request. Jacobs-Young noted that the decision to cut or eliminate ARS facilities was “data driven” based on the following criteria: minimizing the impact on ARS employees, preserving ARS infrastructure, and maintaining a balanced portfolio. Sen. Bennet emphasized that the proposal, regardless of being data driven, would not be supported by him or other committee members. Chairman Roberts voiced his support for the exchange, stating that “the president proposes, and Congress disposes.”

Similarly, Sen. Amy Klobuchar (D-MN) inquired about the proposed cut for the National Animal Health Laboratory Network, a NIFA program that supports research on emerging animal diseases. Ramaswamy responded that the federal government dedicates \$75 billion to cybersecurity efforts, but USDA programs that support the security of the food supply amount to only \$38 million, which would be

largely insufficient in the event of an attack or pathogen outbreak. Sen. Klobuchar also questioned Jacobs-Young about emerging plant science techniques, such as the phenomics research being conducted at the University of Minnesota. Jacobs-Young spoke about agriculture being a high-tech industry, the importance of developing data that can “speed up the process,” and the reasons all the *-omics* are important to agricultural innovation.

Notably, during Rockey’s oral testimony, she indicated that by the end of the year, FFAR will have awarded a total of \$100 million, half of the \$200 million in mandatory funding that created FFAR in the 2014 Farm Bill. Chairman Roberts questioned Rockey about plans to generate new money to be sustainable, to which Rockey responded that FFAR is working on this but that the model developed in the last Farm Bill works best with additional federal investment.

The second panel of academics and industry representatives included John Floros, dean and director, College of Agriculture and K-State Research and Extension, Kansas State University; Gary McMurray, division chief, Food Processing Technology Division, Georgia Tech Research Institute; Kerry Hartman, academic dean and sciences chair, Environmental Sciences, Nueta Hidatsa Sahnish College; and Steve Wellman, farmer, Wellman Farms. Testimony illustrated the importance of USDA’s relationship with land grant institutions through formula funding, as well as opportunities through the Agriculture and Food Research Initiative (AFRI) for non-land

grant institutions to be competitive. Most notably, McMurray’s testimony emphasized the need for an Advanced Research Projects Agency–Agriculture to support large, multidisciplinary projects.

The hearing captured the continued growing bipartisan support for USDA agricultural research, evident in the \$25 million increase for the AFRI program for FY2017 and the recent establishment of a new, bipartisan Agriculture Research Caucus in the House. The Trump administration had not yet announced nominees for either undersecretary of REE or USDA chief scientist, and Agriculture Secretary Sonny Perdue had not made specific comments on agricultural research to date.

#### *Source and Additional Information*

- The full webcast and witness testimonies are available at <http://bit.ly/2sbOcRL>.

### Trump Announces Sam Clovis as USDA REE Undersecretary Nominee

The Trump administration announced Sam Clovis as the nominee for USDA undersecretary of Research, Education, and Economics (REE). The undersecretary of REE oversees the National Institute of Food and Agriculture and is technically the USDA chief scientist, a position that requires Senate confirmation.

The 2008 Farm Bill mandates the qualifications of chief scientist as a “[leader] among distinguished scientists with specialized or significant experience in agricultural research, education and economics.” Clovis holds a PhD in public administration from the University of Alabama and was

a conservative radio host before joining the Trump campaign and serving as USDA adviser during the transition. On July 24, a coalition of 22 commodity groups including the American Farm Bureau Federation, the American Soybean Association, and the National Corn Growers Association sent a letter to the Senate Agriculture Committee formally endorsing Clovis’s nomination and urging the committee to confirm him.

Senate Agriculture Committee ranking member Debbie Stabenow (D-MI) released a statement citing “concerns” with Clovis’s qualifications and noted a “troubling view on climate change.” Additionally, Chairman Pat Roberts (R-KS) alluded to Clovis’s past statements that crop insurance was unconstitutional and stated that any nominee with those views “might as well not show up” before the committee. USDA secretary Sonny Perdue has formally endorsed Clovis’s nomination.

#### *Source and Additional Information*

- Senator Stabenow’s statement is available at <http://bit.ly/2vqHnwl>.

### FY2018 Appropriations Update

Entering August, the House of Representatives passed four of the 12 FY2018 spending bills in a minibus package that included the FY2018 Energy and Water Development appropriations bill (detailed below). The remaining eight appropriations bills had been approved in committee. Meanwhile, the Senate Appropriations Committee approved six of its FY2018 spending

*continued on page 20*

**POLICY UPDATE***continued from page 19*

bills. Congress was to remain in recess until after Labor Day, returning to Washington with only 12 legislative days before the new fiscal year begins October 1. Congress was expected to pass a short-term continuing resolution to avoid a government shutdown and attempt to negotiate a bipartisan budget agreement that would allow FY2018 bills to progress.

Provided below are topline funding levels for both the House and Senate FY2018 appropriations bills that fund federal agencies of interest to ASPB.

**House FY2018  
Appropriations Bills**

- **Agriculture:** The National Institute of Food and Agriculture (NIFA) would receive \$1.34 billion, a 1.6% decrease compared with the FY2017 enacted level of \$1.36 billion. The House bill would reject the president's proposed closure of 17 ARS facilities and laboratories and would provide \$1.192 billion to ARS overall, a 6.1% cut compared with the FY2017 enacted level. The Agriculture and Food Research Initiative (AFRI) would receive flat funding of \$375 million, a \$25 million increase compared with the FY2016 level and the president's proposed FY2018 level.
- **Energy and Water:** Basic Energy Sciences (BES) would receive flat funding compared with FY2017. Climate and earth sciences were not targeted for cuts; although the bill proposes a \$30 million reduction compared with the FY2017 enacted level for the

Biological and Environmental Research (BER) program, it does not specify how the cuts would be applied. The Advanced Research Projects Agency–Energy (ARPA-E) would be terminated.

- **Commerce, Justice, Science:** NSF would receive \$7.34 billion, 1.8% below the FY2017 level but \$686.6 million above the president's FY2018 budget request. Research and Related Activities would be flat, whereas Major Research Equipment and Facilities Construction would be reduced by 63%.

**Senate FY2018  
Appropriations Bills**

- **Agriculture:** NIFA would be funded at a level of \$1.37 billion, a \$10.3 million or 0.8% increase compared with FY2017. It is also 2.4% higher than the House mark. AFRI would receive flat funding of \$375 million, consistent with the House bill. ARS would receive \$1.18 billion for salary and expenses, a decrease from the FY2017 enacted level of \$1.27 billion and slightly lower than the House mark of \$1.19 billion. It would also reject the proposed closure of 17 labs and facilities.
- **Energy and Water:** BER would receive \$633 million, or 3.4% above FY2017 and \$51 million above the House bill. The Earth and Environmental Systems Sciences subprogram would also be funded at \$188 million above the request. ARPA-E would receive \$330 million, an increase of \$24 million compared with the FY2017 enacted level, and in

sharp contrast to the House bill that proposes eliminating the agency. BES would receive \$1.98 billion, \$108.8 million or 5.8% above the FY2017 enacted level and the House bill.

- **Commerce, Justice, Science:** NSF would receive \$7.31 billion, 2.2% below the FY2017 level but \$658 million above the president's FY2018 budget request. Research and Related Activities and Education and Human Resources would both be reduced by 2% compared with the House and FY2017 levels, and the Senate would fully fund construction projects under the Major Research Equipment and Facilities Construction account.

*Sources and Additional Information*

- To see bill text and report language, visit the House Appropriations Committee at <http://bit.ly/2stNSy2>.
- To see bill text and report language, visit the Senate Appropriations Committee at <http://bit.ly/2gQ9rUw>.

**Securing Our Agriculture  
and Food Act Signed into  
Law**

On June 30, President Trump signed the Securing Our Agriculture and Food Act into law, which directs the Department of Homeland Security (DHS) to coordinate agroterrorism efforts. The bill was introduced by Rep. David Young (R-IA) in February and cosponsored by Sen. Pat Roberts (R-KS) in response to the 2015 avian influenza outbreak.

The legislation amends the Homeland Security Act of 2002, directing DHS to coordinate

programs to prepare and secure the country's food, agricultural, and veterinary systems against terrorist attacks. The DHS assistant secretary for health affairs is directed to create a program that will integrate and provide oversight of domestic preparedness for food and agricultural systems. This effort includes coordinating screening procedures and leading policy objectives to increase DHS's ability to respond to stakeholders and to agroterrorism.

*Source and Additional Information*

- The text for the Securing Our Agriculture and Food Act can be found at <http://bit.ly/2uy4RMR>. ■

# ASPB Education Committee Outreach at Arabidopsis Meeting in St. Louis

BY SCOTT WOODY, University of Wisconsin–Madison, and  
COURTNEY PRICE, Ohio State University

The ASPB Education Committee hosted an outreach booth at the International Conference on Arabidopsis Research (ICAR), held June 19–22 in St. Louis, Missouri. ASPB members might recall that ICAR has, since the 2011 event in Madison, Wisconsin, “gone global,” and the 2017 event marked the first time ICAR returned to the United States; the next such event is not scheduled until 2020. The Education Committee therefore felt it was important to support the 2017 event in service to the Arabidopsis research community, which remains a core constituency among ASPB membership.

The ASPB booth featured multiple stations that described the various programs and resources available through ASPB and affiliated groups, including the Summer Undergraduate Research Fellowship (SURF; <http://surf.aspb.org/>) funding opportunity, the ASPB Master Educator Program (<https://aspb-mep.secure-platform.com/a>), and, notably, the Plant Biology Learning Objectives, Outreach Materials, & Education (<http://bloome.aspb.org/>) grant program. We were pleased to allot a booth station to feature the work of 2016 BLOOME grant recipients Erich Grotewold and Courtney Price of the Center for Applied Plant Sciences and the Arabidopsis Biological Resource Center, Ohio State University (see inset).

The ASPB booth also featured new resources from the Genetic Resource Development Program (Scott Woody and Rick Amasino, University of Wisconsin–Madison), including living and lighted plant populations and GameteMaker, a genetic mapping simulation app. This app enables students to propagate simulated F2 populations in which mutant

alleles of various sorts are segregating and then to apply PCR-based molecular marker assays to virtually map causative mutant loci (<http://sim.fpscgenetics.org>).

Special thanks for making the ICAR outreach event a success are owed to new Education Committee coordinator Winnie Nham, who, faced with two almost overlapping outreach

events (ICAR and Plant Biology 2017), experienced an early trial by fire and provided outstanding support for both. Special thanks, as well, to former Education Committee chair Mary Williams, who, as her already busy schedule allowed, helped host the ASPB booth. ■

## 2016 Plant BLOOME Grant Project

### “Plant Solutions for Global Problems: Bringing Plant Science to Life Through Interactive Videoconferencing”

In 2016 Erich Grotewold was awarded a Plant BLOOME grant from ASPB for the project titled “Plant Solutions for Global Problems: Bringing Plant Science to Life Through Interactive Videoconferencing.” The project brought together faculty and staff from the Center for Applied Plant Sciences, PhD fellows from the Translational Plant Sciences Graduate Program, and educators from the Center of Science and Industry (COSI) in the development of resources designed to engage students and the general public in learning about how plants impact our lives.

First, the project team developed a new interactive videoconference program for middle and high school students that introduces students to various plant science concepts. This program uses online software to virtually connect students across the United States to a PhD fellow and COSI educator for a one-hour hands-on program that is aligned with the Next Generation Science Standards. In advance of the program, teachers receive a kit of materials that includes detailed lesson plans and supplies for all activities.

The second set of materials developed through this project includes four short educational videos that reinforce important concepts in plant science for a general audience. The foci of these videos are (1) careers in plant sciences, (2) plants as the foundation of our food system, (3) plants as a resource for biofuels and bioproducts, and (4) plants as solutions to global challenges.

The project team was pleased to be invited to highlight these new resources as a part of the ASPB Education Committee booth at ICAR this summer.

# At the ASPB Education Booth, a BLOOMEing Good Time

BY SARAH WYATT  
Ohio University

At Plant Biology 2017, Plant Biology Learning Objectives, Outreach Materials, & Education (Plant BLOOME, <http://BLOOME.aspb.org>) projects were a focus of the Education Booth. Plant BLOOME grants are awarded on a competitive basis to fund innovative ideas to increase education and outreach projects focusing on plant science literacy. Four previous award winners came to Hawaii to share the products of their labors.

Molly Edwards, a graduate student at Harvard with Elena Kramer, presented Science IRL, a video series available on YouTube (<https://www.youtube.com/scienceIRL>) designed to show how textbook science concepts come to life in the lab. Since each episode revolves around an experiment that a scientist does every day in the lab or field, viewers get to see what being a scientist is like in real life. With 1,300+ subscribers on YouTube, Science IRL has produced over a dozen episodes that highlight a wide array of science concepts. From GMOs to plant evolution to PCR and DNA, this series is great for increasing interest in plant science among high school and undergraduate students—and graduate students and faculty, for that matter.

Another graduate student, Katie D'Amico from Ohio State University, presented results of the project “Plant Solutions for Global Problems: Bringing Plant Science to Life Through Interactive Videoconferencing.”



*The ASPB Education Booth, a BLOOMEing Good Time. Molly Edwards (left), creator of Science IRL; Anna Backhaus and Isotta Reichenbach, creators of BioToons.*



*BioToons is a series of comics showcasing fascinating facts about the secret life of plants.*

The project is a collaboration between Erich Grotewold (Ohio State University) and the Center of Science and Industry (COSI) in Columbus, Ohio, to develop short educational videos and an interactive videoconferencing program to enhance plant science education for middle and high school students. The educational videos describe careers in plant sciences, plants as the foundation of our food system, plants as a resource for biofuels and bioproducts,



*BioToons presents their science comics at the Education booth.*

and plants as solutions to global challenges. The project showcased these videos at the ASPB Education Booth.

Also at Plant Biology 2017 were two recent undergraduates from the University of East Anglia, Anna Backhaus (Biology Sciences) and Isotta Reichenbach (Literature, Drama, and Creative

Writing), who joined forces to create BioToons, a comic book series about plant biology for 9- to 12-year-olds. Their comic books explain cutting-edge research projects to communicate the beauty, complexity, and fascination of plant biology to children. The pair work with scientists to bring their research projects to the page in beautifully illustrated story lines. Complete with costumes, the pair told us stories of migrating tomatoes and heroic Arabidopsis plants, just some of the main characters featured in their comics. Copies of their comics were available for conference attendees to peruse.

Last but not least, Alan Berkowitz (Cary Institute of Ecosystem Studies) presented his “School Woodland Ecosystem Study Project.” The project focuses on taking high school students to the woodlands in their own schoolyard to explore the tree species. The group works with teachers to develop inquiry-based, exploratory lesson plans that increase student understanding of fundamental concepts like biodiversity. The project resulted in a curriculum guide that outlines the lessons taught to the high school students and information about how to implement this program in other schools.

And, of course, there were T-shirts for sale, coloring books, and 12 Principles of Plant Biology bookmarks. ■

# Plant Biology 2017: Education Workshop Does Big Data

BY SARAH WYATT  
Ohio University

**B**ig data, computation, and bioinformatics have flooded the research community. At Plant Biology 2017, they flooded the classroom as well. The education workshop “ABCs (Analysis, Bioinformatics, and Computation) in the Classroom” featured ways to integrate computation and analysis of biological data into the classroom. Katerina Thompson (University of Maryland) and Judy Brusslan (California State University, Long Beach) joined us to share tried and tested techniques and projects they have developed and used successfully in the classroom.

Katerina introduced Math Bench (<http://mathbench.umd.edu>), an integrated suite of 40+ interactive online modules for use in fundamental college-level biol-

ogy courses. The project, funded in part by NSF and the Howard Hughes Medical Institute, introduces and reinforces basic manipulation and graphing of data and understanding of mathematical

models and their use in biological systems.

Judy shared her strategies for incorporating bioinformatics analysis of RNA-seq data in her upper-division undergraduate

biology course. Judy combines analysis of available RNA-seq data using CyVerse pipelines ([www.cyverse.org](http://www.cyverse.org)) and wet lab confirmation of genes identified to get students excited about big data analysis and give them an introduction to tools they will need for a career in biology. She provided workshop attendees with access to data, and everyone got a chance to experience the pipeline from a student’s perspective.

Katerina and Judy shared student feedback and assessment indicating the success of their approaches. Computation is becoming not only the standard for research but also a necessary component of biology education, and Katerina and Judy provided excellent resources and a model for integration of computation into the classroom. ■



*Katerina Thompson, University of Maryland (left), and Judy Brusslan, California State University, Long Beach, sharing tried and tested techniques and projects they have developed and used successfully in the classroom.*



*Katerina Thompson introducing workshop participants to MathBench.*

# Education and Outreach at Plant Biology 2017

BY ERIN FRIEDMAN  
Lynchburg College

Can art be used to teach elementary students that plants respond to environmental cues? How can museums make learning about plant evolution more fun? Do writing and editing Wikipedia articles increase student engagement in science writing? How can teachers use schoolyard woodlands to teach students about diversity? Can citizen science be used to demonstrate that wild animals do not have a preference against GMOs? These questions and more were addressed at the education and outreach concurrent symposium at Plant Biology 2017. An engaged group of plant scientists tore themselves away from the beautiful Hawaiian afternoon to discuss these and other important topics.

## Veg-a-Sketch: Teaching Plant Development

The symposium began with two presentations about educational tools targeted to K–12 students. Kevin Folta (University of Florida), winner of the 2017 ASPB Leadership in Science Public Service Award, shared Veg-a-Sketch, a tool used to teach children about photomorphogenic development. This elegant system allows students and teachers to grow purple-pigmented lettuce under normal classroom conditions. They then construct a simple light box that exposes the plants only to green light, depigmenting the leaves. The



Kevin Folta presenting Veg-a-Sketch.

students apply stencils and return the plants to white light to restore the accumulation of purple anthocyanin pigments in the leaves. The regions of leaf blocked by the stencils remain green, allowing the students to create artistic designs while learning about cryptochrome responses and plants' developmental responses to abiotic stimuli.

In addition to the obvious use of this tool to allow students to explore biological responses, Kevin also discussed his hope that students would become more interested in and thus eat more foods containing healthy pigments. Although Kevin

discussed use of Veg-a-Sketch in elementary classrooms, attendees shared ideas about inquiry-based activities that could be used to challenge undergraduate students as well. These kits will be available to schools, and information can be found at [www.veg-a-sketch.com](http://www.veg-a-sketch.com).

## Games for Museum Visitors

Mario De Tullio (University of Bari) then discussed his creation and use of three interactive games to teach museum visitors about plant evolution. The games are presented to visitors following their exploration of more traditional museum exhibits. The animations



are professional and engaging and feature a simple drag-and-drop design with content repetition to reinforce concepts.

Mario reported that students enjoyed playing the games and were able to navigate topics ranging from evolution and biodiversity to gene expression using the ABC model of flower development. Although these resources are currently available only in Italian, Mario discussed his desire to develop similar games in English, and attendees spent most of the Q&A portion of the presentation discussing possible modes of implementation and suggesting additional content.

## Teacher Training to Use Schoolyard Woodlands

Alan Berkowitz (Cary Institute of Ecosystem Studies) shifted the discussion to teacher education, presenting the results of a project funded by a 2014 Plant BLOOME grant. To increase science literacy in schools and decrease plant



Anne Sternberger (left) presenting “Wikipedia in the Classroom.” Karl Haro von Mogel (right) showing the list of participants in his citizen science project to test whether squirrels prefer non-GMO corn.

blindness, this project features teacher training and corresponding classroom curriculum.

The teaching modules use schoolyard woodlands to demonstrate themes including dispersal, growth strategies, herbivory, and decomposition. By using a top-down approach in which teaching fellows train additional teachers, who then teach their students, the program has reached a large number of students. To date, five teaching fellows and 19 field test teachers have participated, and students have demonstrated improved recognition of diversity and the influence of species on the environment as a result of this program.

### Research and Outreach Using GMO Corn

Squirrels won't eat it, so why should we? This unsubstantiated claim is one of many used to validate anti-GMO sentiments. Karl Haro von Mogel (Biology Fortified) tested this claim using the power of citizen

science. The crowdfunded project investigated whether wild animals prefer non-GMO corn (spoiler: they don't, but they do love corn!). The experiment was massively successful on many fronts: the project was fully funded (and then some), supplies were secured and provided to participants, controls were included, and 442 experiments were completed. Experimenters included interested individuals and those who hoped to demonstrate (or disprove) a relationship between GM corn and animal preference.

Although the results of this project were unsurprising to most attendees, the impact has been wide-ranging. One take-home from this presentation was that research can also serve as outreach; these types of studies can generate publishable data, teaching resources, and citizen scientists who become scientific advocates as a result of being involved in the scientific process.

### Editing and Writing Wikipedia Content

In the past few Plant Biology meetings, scientific writing in the classroom has been a hot topic of discussion. Anne Sternberger and Sarah Wyatt (Ohio University) discussed the use of editing and writing Wikipedia content to engage student writers. The idea is quite simple: providing students with an actual audience (e.g., Wikipedia users) and purpose increases engagement, ownership, and perceived importance of a task. Although implementing these types of assignments can seem daunting, Sternberger discussed her experiences as a student and then a teaching assistant in Wyatt's courses that used this writing model.

Wikipedia writing can range from evaluating to editing to creating, and robust tools are available from Wiki Education ([www.wikiedu.org](http://www.wikiedu.org)) to support these tasks. In an introductory-level undergraduate course, the task could simply be to critique and

evaluate content and supporting documents for an existing article. Advanced students can identify gaps in Wikipedia content and create new content or even new articles. Training modules help students and instructors learn how to use the tools and what requirements must be met when citing sources. The impact of these edits is easy to track, which further reinforces student engagement. Sternberger reported that for approximately 180 student writers, there had been 1.1 million article views to date.

### Other Educational Projects

Some speakers also presented posters to increase opportunities for discussion of their work. In addition, a dozen or so other posters were presented in the Education section. Major themes this year included the following:

- Use of gaming to teach genetics and molecular mechanisms (Ludmila Tyler et al., University of Massachusetts)
- Integration of authentic research activities into undergraduate coursework (Stan Roux, University of Texas; Ken Helm, Siena College; Sabrina Robertson, North Carolina State University; M. Herman, St. John Fisher College) and problem solving (Miranda Meents, University of British Columbia)
- Outreach and education projects to help scientists connect to the general community ([marketsci.org](http://marketsci.org) and the Plant Breeding Coordinating Committee)
- Ways for authors to make their data more discoverable and reusable (Arabidopsis Information Resource and Phoenix Bioinformatics). ■

# SURFing at the Undergraduate Poster Session in Honolulu

BY MICHAEL CAMPBELL  
Pennsylvania State University

Plant Biology 2017 welcomed students in Honolulu with an exclusive undergraduate poster session. I had the pleasure of meeting many talented young researchers at the poster session and was able to chat in depth with 14 of the ASPB Summer Undergraduate Research Fellow (SURF) awardees at both the undergraduate poster session and a SURF networking dinner that followed. What was exciting about this year's group was the ethnic and gender diversity as well as the diversity of institutions represented. It is critical that ASPB develop research opportunities in plant sciences at multiple levels, and the SURF program and undergraduate poster session once again demonstrated the Society's commitment to that endeavor.

To see scientists at the very beginning of their career is rewarding and hopeful, and the level of enthusiasm from the undergraduates regarding their work was fantastic. The young researchers certainly demonstrated their expertise and interest in science and gave me confidence that they have the mettle to provide ASPB and society with

the next generation of plant scientists. Although many expressed career interests in plant biology, some mentioned other avenues that they will pursue. In particular was a student who expressed a desire to pursue a career in science policy. This demonstrates the value of the SURF program in providing an excellent avenue to undergraduates to hone their skills for a career in scientific research but also to have a significant impact on plant science funding and policy.

It does appear that the SURF program has increased in ethnic and gender diversity, and certainly more can and should be done to continue in that direction. It is imperative that plant biology reach out to a more diverse pool of individuals, and the SURF program is an indication of that goal of increased inclusion.

Another unique component of the undergraduate poster event was the diversity of institutions represented. Students presenting at the undergraduate poster session came from both large and small programs. Although the bulk of highly significant publications in plant biology come from large land grant institu-



*Cairo Archer (Cornell University) discussing her research at the Plant Biology 2017 undergraduate poster session.*

tions and private colleges with significant resources, future scientists are also being trained at colleges and universities that do not make the top tier. The SURF program enables students at these smaller institutions to participate in research and brings plant science to these institutions at an increased level scientifically. This creates a pipeline of individuals who move on to graduate programs at larger institutions, but more significantly, it brings plant science to smaller institutions, thus reaching a wider audi-

ence in a society that currently questions public funding for plant science programs.

If you have never attended the undergraduate poster session at the annual Plant Biology meeting, I suggest you pay a visit in 2018. To discuss science with undergraduates at the beginning of their scientific career is uplifting. They have an enthusiasm, and a level of energy and excitement, that is needed to keep plant science research relevant and vibrant. ■

# PlantingScience Professional Development Workshop Strengthens Classroom and Early Career Scientist Connections

BY SUSAN BUSH  
Trinity College

In July 2017, PlantingScience hosted a professional development workshop at the Biological Sciences Curriculum Study (BSCS) in Colorado Springs, Colorado, as part of the PlantingScience: Digging Deeper Together grant funded by NSF and led by efforts from BSCS, the Botanical Society of America (BSA), and ASPB. The workshop included 24 high school teachers from around the country with 12 plant scientists at early stages of their career; the latter were graduate students, postdoctoral scholars, and professors from Doctoral Program—Highest Research Activity (R1) and Primarily Undergraduate Institution (PUI) schools. The goal of this workshop was to bring together teachers and scientist mentors participating in the online PlantingScience platform. As an early career scientist at a PUI, I attended this workshop to learn more about the PlantingScience program.

The PlantingScience online platform is a free resource for student-centered plant investigations that integrates scientific practices and big ideas in biology that meet the guidelines in the Next Generation Science Standards. PlantingScience is a learning community, initiated in 2005, in which volunteer scientists provide online mentorship to high school and middle school student teams

as they design and think through their own plant science inquiry projects.

In addition to PlantingScience, the Digging Deeper grant is designed to develop, implement, and evaluate a collaborative professional development (PD) model for high school science teachers and scientists participating in the PlantingScience program. At the same time, the Digging Deeper grant includes research on the effect of the PD model on science teaching and student outcomes focused on photosynthesis. The summer workshops at BSCS facilitate the PlantingScience PD model, allowing science teachers and career scientists to work closely over extended periods to develop a shared expertise that catalyzes the ultimate goal: engaged students who can proficiently integrate science content with practices of science.

At the workshop, plant scientists and teachers worked together on a number of projects ultimately designed to achieve learning outcomes in high school science classrooms, but the meeting was much more than that. The teachers honed their experimental skills



*Participants at the PlantingScience Professional Development Workshop.*

with help from the scientists. The scientists learned about teaching resources and pedagogical approaches; these resources were designed for classroom teachers, but many scientists were excited to report that the teaching tools will be translated into their own labs and classrooms. One graduate student said she had picked up some teaching skills “through osmosis” during her PhD training, but the PD workshop opened her eyes to diverse teaching publications and pedagogical resources that she can use as a teaching assistant, in the lab, and during lectures.

Across the board, scientists from ASPB and BSA at the workshop deeply appreciated the opportunity to communicate with teachers. Online mentoring of high school students depends on open communication between the scientist mentors and the classroom teachers. The scientists moreover were impressed with the teachers’ knowledge and scientific prowess. For the teachers, increasing their own education and boosting student comprehension of difficult concepts like photosynthesis and cellular respiration proved to be an outstanding opportunity. The teachers viewed the chance for high school students to interact with real-life scientists outside of their classrooms and increase scientific literacy as a huge benefit of participating in PlantingScience.

All told, the community-building aspect of this workshop was truly influential for both scientists and teachers. Open communication and the experience of different perspectives have built new collaborations and connections between scientists and teachers, something the PlantingScience administrators hope will persist both online and off. ■

## WILEY



**Editor-in-Chief:** Dr. Ivan Baxter  
USDA-ARS Plant Genetics Research Unit  
Donald Danforth Plant Science Center

## Plant Direct

Open Access

### New open access journal from ASPB and SEB

*Plant Direct* is a new open access, sound science journal for the plant sciences that gives prompt and equal consideration to papers reporting work dealing with a variety of subjects. Topics include but are not limited to genetics, biochemistry, development, cell biology, biotic stress, abiotic stress, genomics, phenomics, bioinformatics, physiology, molecular biology, and evolution. A collaborative journal launched by ASPB, SEB, and Wiley, *Plant Direct* publishes papers submitted directly to the journal as well as those referred from a select group of the societies' journals.

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