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ASPB News



THE NEWSLETTER OF THE AMERICAN SOCIETY OF PLANT BIOLOGISTS

President's Letter

Big Challenges Require Broad Thinking

BY ROB LAST
Michigan State University

This continues the experiment of publishing the President's Letter as part of a collection of essays and other resources related to the topic (<https://tinyurl.com/HumanNetworks>). Please also have a look at the previous collections on the future of not-for-profit science organizations (<http://bit.ly/futurenonprofitscience>), member security (<http://bit.ly/SecuringFuturePlantBiologists>), and future careers (<http://bit.ly/NextGenerationCareers>) and send your feedback about these topics and collections to roblast1@gmail.com or @Biokid001 on Twitter.

As a kid growing up in a suburb of New York City, neither biology in general nor plants specifically were a major fascination until 1976, when college at Ohio Wesleyan University brought me into contact with organismal biology. While pur-



suing a chemistry major, I minored in both botany and zoology. These departments were highly organismal in focus, and thus we studied animal behavior, ornithology, plant taxonomy, and mycology. In this molecular biology–emergent time, even the evolutionary biology curriculum had no nucleotides and few protein sequences. In

retrospect, it is apparent how lucky I was to be able to learn chemistry in one department and organismal biology in two others.

Graduate school at Carnegie Mellon and postdoc research at MIT opened my eyes to the predominance of molecular biology and model organism genetics in the biology of the 1980s. It made sense: you could do so much with *Escherichia coli*, baker's

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Judy Callis Assumes Presidency October 1

Judy Callis becomes ASPB president on October 1, 2019. She succeeds Rob Last, who becomes immediate past president.

Judy is a faculty member in the Department of Molecular and Cellular Biology and a member of the PhD graduate programs in plant biology, biochemistry and molecular biology, and genetics at the University of California, Davis. She was born in Ohio but grew up in St. Louis, Missouri, and received her AB degree from Washington University in St. Louis in 1977. She is grateful for excellent mentorship as a student and postdoc. As an undergraduate Judy had the privilege of working in the laboratory of Virginia Walbot, which started her long interest in plant biology research.

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What If Plant Scientists Were as Diverse as the Plants We Study?

BY JENNIFER NEMHAUSER, University of Washington
and ELIZABETH HASWELL, Washington University in St. Louis

This spring, in collaboration with Joanna Friesner, we launched DiversifyPlantSci (<https://tinyurl.com/DiversifyPlantSci>), an online directory of self-nominated plant scientists who share identity with groups that are currently minoritized in STEM fields. DiversifyPlantSci was inspired by many different groups hosting similar efforts, in particular DiversifyEEB (<https://diversifyeeb.com/>). DiversifyPlantSci membership now exceeds 250 people and includes scientists who identify as belonging to racial or ethnic groups other than White European or American, those who identify as women, those who have disabilities, and those who identify as members of the LGBTQ community. We aim for a scientific community in which every conference, every group of reviewers and editors, every special issue, every list of award nominees and recipients, every departmental seminar series, and every faculty recruitment effort reflects the true diversity of the global plant sciences community.

We write this piece as two plant biologists committed to increasing equity and inclusion in our institutions and organizations. Our efforts are informed by our roles within the science community: professors of biology at R1 institutions, editors of ASPB journals, elected members of the North American Arabidopsis Steering

Committee, and representatives at the recent Plant Summit (<http://bit.ly/NAASCPlantSummit>). One of us cohosts a podcast that tackles issues of scientific culture (<https://plantae.org/podcasts/the-taproot/>), and the other is chair of her department's Graduate Student and Postdoctoral Scientist Committee. All of that said, we do not consider ourselves experts. We see writing this article as an opportunity to reflect on what we have learned, share some hard-won insights, and (we hope) inspire the entire plant science community to enter into a deeply important conversation that results in action.

Like any other STEM discipline, the plant sciences have a number of deeply entrenched problems with systemic bias. Racism remains pervasive. Harassment on the basis of sex or gender expression happens at every career stage, in the laboratory, at meetings, and during fieldwork. A lack of exposure to the unwritten rules guiding academic interactions adds another barrier to success for first-generation scientists and those in training outside their home country. Perhaps it is no wonder that a substantial number of our trainees struggle with mental health issues, especially depression and anxiety.

What to do? As a starting point, as plant scientists we must

all examine the rationales we give for our efforts at improving diversity and inclusion. One commonly heard justification is that diverse teams are more effective and innovative (and this is strongly supported by data). Yet, do we really want to convey to our trainees that their productivity and efficiency are the ultimate measure of their worth? Instead, we should improve diversity and inclusion in plant science simply because it is the right thing to do. Everyone deserves to have equal access to the privilege and joy of doing plant science and to be a respected and valued member of our community.

Next, we must recognize that effective solutions to diversity, inclusion, and equity problems demand change from powerful individuals and institutions—not from the vulnerable people they are meant to serve. Ceding power is difficult, but institutions must intentionally promote the good of the community over the propagation of existing structures. At least in name, recruitment and retention of a diverse workforce are embraced by most institutions where plant science is done, and a solid foundation of evidence-based practices can guide us in actualizing these goals. Some institutional and process solutions will have wide-ranging benefits across minoritized groups. For example, there are excellent resources

on how we should restructure our educational programs (see Resources sidebar on page 8). At the professional society level, plant biologists must do better at establishing community norms and expectations that include all facets of professional life (for a great example, see <https://paleosoc.org/ethics-and-inclusion/>).

Another necessary shift is to properly value the contributions of our colleagues. Beronda Montgomery (see Beronda's contribution to the *Plantae* collection at <https://tinyurl.com/HumanNetworks>), Gina Baucom, and others doing similar work in this space (see Resources sidebar) should be compensated for their work. This compensation could take the form of formal titles that recognize their contributions to societies and organizations in a way that may influence promotion or funding decisions, monetary compensation for their advocacy work whenever possible, and funding awards to support their science in recognition of the opportunity cost accrued when doing community service and advocacy. The artificial separation between doing research and improving the environment in which research is done should be eliminated. We envision a future in which talks by our colleagues are used to share new scientific discoveries

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Maureen C. McCann Elected to Lead ASPB in 2020–2021

Maureen C. McCann becomes ASPB president-elect on October 1, 2019, and will assume the office of president in October 2020, succeeding Judy Callis.

Maureen is a professor of biological sciences at Purdue University, a member of Purdue's Center for Plant Biology, and director of the NEPTUNE Center for Power and Energy, funded by the Office of Naval Research.

At the national level, she was recently appointed to DOE's Biological and Environmental Remediation Advisory Committee and the National Academies' Committee on Safeguarding the Bioeconomy. She previously served on the USDA–DOE Biomass Research and Development Technical Advisory Committee and the DOE Office of Science, Council for Chemical and Biochemical Sciences. Last year, Maureen participated, as one of 14 nominated individuals, in DOE's Oppenheimer Science and Energy Leadership Program to provide potential future leaders with an overview of DOE and the National Laboratories system.

Maureen was born in Edinburgh, Scotland, and was a first-generation college attendee. She obtained her undergraduate degree in 1987 in natural sciences from the University of Cambridge and a PhD in 1990 in botany from the University of East Anglia, United Kingdom. She was a postdoctoral researcher at the John Innes Centre, a govern-



Maureen McCann

ment-funded research institute for plant and microbial sciences, and remained there as a project leader from 1995, funded by The Royal Society with a University Research Fellowship. This 10-year fellowship allowed her to develop her research interests in how the molecular architecture of the plant cell wall contributes to cell growth and differentiation and thus to the final stature and form of plants.

Maureen moved to Purdue in 2003. As an instructor, she teaches eukaryotic genetics to juniors and seniors. As a plant biologist with a passion for sustainable production of food, feed, fuel, chemicals, and materials from lignocellulosic biomass, she has 104 peer-reviewed publications, 24 of which were published in *The Plant Cell* and *Plant Physiology*, and an h-index of 59, with more than 14,600 citations.

Maureen first joined ASPB in 2002. She was a monitoring editor for *Plant Physiology* from 2008 to 2013 and a member of the ASPB Science Policy Committee

(formerly Public Affairs) from 2010 to 2014. In 2015, she became an elected member of the Board of Directors, and last year she was elected a fellow of ASPB.

From 2009 to 2018, Maureen was director of the Center for Direct Catalytic Conversion of Biomass to Biofuels (C3Bio), an Energy Frontier Research Center funded by DOE's Office of Science. C3Bio was a team of chemical engineers, chemists, and plant biologists focused on building the scientific knowledge base to convert plant materials (fast-growing trees, crop residues, dedicated bioenergy crops) into liquid hydrocarbon fuels and high-value chemicals. Within C3Bio, Maureen's lab explored synthetic biology and genetic engineering approaches to optimize cell wall architecture and biomass structure for novel chemical conversion processes. Although C3Bio was funded to conduct grand challenge science at the atomic and molecular scale, the center also produced 11 patent applications, supported the start-up company Spero Energy, and engaged more than 100 early career scientists in interdisciplinary research.

Between 2010 and 2018, Maureen also served as director of Purdue's Energy Center, representing more than 200 affiliated faculty with energy-related research interests. During her tenure, the Energy Center received direct proposal credit from its affiliated faculty for over \$500 million of proposals and \$100 million in funded awards.

Maureen expressed the following about her upcoming presidency:

A career in academic research is, in equal measures, hard work and great fun. But I believe deeply that academic life is a privilege and that we have a collective responsibility to entrain science for the public interest. As president, I would like to amplify the voices of our early career scientists throughout ASPB, on Capitol Hill, and beyond. Global trends of increasing population, increasing urbanization, and climate change will impact the global economy and agricultural system to an unprecedented extent over the next few decades. The remarkable metabolic diversity and plasticity of plants will be critical to mitigate and meet these challenges in the production of food, feed, chemicals, pharmaceuticals, fuels, and materials for a robust and sustainable bio-based economy.

To paraphrase Matt Damon's character from the movie The Martian as he contemplates surviving on Mars until and if he is rescued, we're going to have to "science the hell" out of this. One of our key assets is our Society. Free exchange of knowledge at the forefront of scientific disciplines, the development of interdisciplinary collaborations across the research community, and, most critically, the next generation of the best and brightest minds rooting their careers in the plant sciences are prerequisites that ASPB facilitates. ASPB is their voice for the importance of plant biology, the value of the research enterprise, and the impact of our science in the world. ■

Clint Chapple Elected to Board of Directors

Clint Chapple is a distinguished professor in the Department of Biochemistry at Purdue University, where he was department head from 2008 to 2015. He is currently director of the Purdue Center for Plant Biology. He received his BSc and MSc in botany and his PhD in chemistry from the University of Guelph in Guelph, Ontario, Canada, and did his postdoctoral research at Michigan State University in the DOE Plant Research Lab.

Clint has had a long-standing interest in plant secondary metabolism, particularly glucosinolates and phenylpropanoids. His independent work has capitalized on biochemical genetic approaches to explore the phenylpropanoid



Clint Chapple

pathway in Arabidopsis. His lab has also pursued questions on the evolution of lignin synthesis in Selaginella and the evolution of secondary metabolic pathways through enzyme neofunctionalization. His lab is probably best

known for its work on modifying lignin monomer composition to improve the potential utility of biomass for the production of biofuel. Its work is now moving into the exploration of the role that the Mediator complex plays in the regulation of phenylpropanoid metabolism.

Clint has been acknowledged with a number of awards from Purdue University, including the Herbert Newby McCoy Award and University Faculty Scholar, and he was recently inducted into Purdue University's Book of Great Teachers. In 2002, he was named a fellow of AAAS. He has served on the editorial boards of *The Plant Journal* and *Plant Physiology* and currently serves as a reviewing editor for *The Plant Cell*.

Clint has been a member of ASPB since he was a graduate student and looks forward to the opportunity to continue to give back to the Society. He appreciates the educational opportunities the annual Plant Biology meeting has provided to his students and wants to see a continued commitment of the Society to graduate and undergraduate mentoring and career development. He also sees the publication of the Society's journals as a major way in which all plant science community members can contribute to the field, and he is enthusiastic about the opportunity he has had to serve ASPB through editorial service for those journals. ■

The Plant Cell Is 30!

Place your order for the Plant Biology 2019 meeting T-shirt (<https://my.aspb.org/store>). This year the meeting celebrates 30 years of *The Plant Cell*, which blossomed in January 1989. The design was created by Nan Eckardt, senior features editor of *The Plant Cell*. It features nine outstanding images from the thousands of beautiful photos published in the journal over the years. The T-shirt also commemorates Plant Biology 2019 with the meeting logo featured on the sleeve. Men's and women's styles are available.

#ThePlantCellebration30



PRESIDENT'S LETTER *continued from page 1*

yeast, *Drosophila*, mouse, and *Arabidopsis thaliana*.

Arriving at Boyce Thompson Institute at Cornell University in 1989 as one of the first “*Arabidopsis* people” in Ithaca, I encountered colleagues openly skeptical of the focus on one species. What about the hundreds of millions of years of evolutionary innovations that you couldn’t study in only one species or genus? Many in my cohort and future generations, however, resisted the siren call of biological diversity in favor of the amazing things that you could do with model or reference species, thanks to genetic resources, a large community of like-minded and generous colleagues, and annual meetings. This devotion to model organisms propelled science, bringing us to where we are now, with thousands of sequenced genomes and transcriptomes, along with deep insights into plant development, signaling, and metabolism. It also benefits researchers working in agriculture, ecology, and evolutionary biology.

But trying to understand the complexity and commercial potential of all plants by studying a single species is like setting out to understand the rules of human relations by observing your family, or drawing conclusions about the world’s cultures while living in one small town. These are fine—and perhaps even necessary—ways to start, but there is so much more that can be done and learned by expanding your study systems.

Despite remarkable conceptual and technical advances of the past 30 years, the plant biology community that many ASPB members align with does not take advantage of opportunities to understand the

full range of biological complexity and to apply this knowledge to hard questions. Sometimes the road to breadth starts with simple behavioral changes. My home institution of 15 years—Michigan State University (MSU)—has a world-renowned community of highly collaborative plant biologists and plant scientists. However, we are missing opportunities to learn from each other because not many of the molecular and cellular biology practitioners and eco-evo scientists regularly attend each other’s seminar series. This is a shame, given the rich opportunities for finding new phenotypes and interactions for “us” to probe molecularly, and the emerging information on molecular networks for “them” to study using their lens of adaptation and evolution. Together we are a much stronger scientific community, and to achieve that strength we have to learn about—and appreciate—each other’s science. Avoiding learning about the big questions and approaches of other disciplines also gives our students and postdocs the idea that avoiding breadth is good training practice, and it most assuredly is not.

This need for more diverse training is a broad phenomenon, and certainly not confined to the MSU campus. As a participant in the ASPB-affiliated Plant Sciences Research Network 2019 Plant Summit this winter, I had the pleasure of interacting with a wide range of scientists, educators, and policy makers representing agriculture, plant ecology, and evolutionary and molecular biology. Our goal was to develop a vision for the next decade of Plant Sciences writ broadly, with an emphasis on big and cross-cutting questions and approaches to benefit society. We made good progress, but this

broadly knowledgeable group of people could have spent its discussion time more effectively. Intervals that should have been spent developing a broad and deep consensus vision for research, career development, and funding advocacy were devoted to defending turf and justifying specific worldviews. Although the “forming, storming, and norming” process that this group went through is perfectly normal (as described by Bruce Tuckman in 1965), such communities best use their time on Tuckman’s fourth step: “performing.”

Broadly trained scientists who are accustomed to working with people from diverse groups will naturally push our community toward cross-cutting science that solves problems. They are less likely to view disciplines as boundaries, moving away from storming and norming into performing when placed into a new group of problem solvers. Broadly trained people are faster at seeing patterns in data and developing multidisciplinary approaches to hard problems: perhaps this is because more of the collaborative concept space is located in their own brains. Groups of people who have experienced diverse cultures more effectively communicate with those from other disciplines because they have spent their professional and personal lives developing strategies for understanding, and being understood by, others.

As educators and learners, we have the opportunity to help other scientists achieve broad training across the boundaries of disciplinary culture. We can nurture collaboration and mentor students and colleagues by learning what motivates them and meeting them where they are, rather than where our training took us. At the same

time, we must teach each other how to evaluate our audience’s needs and communicate our science to those not familiar with the intricate details of our favorite developmental cascade, signal transduction pathway, or metabolic network. We can create institutional structures that are interdisciplinary and next-gen training oriented and help our universities, colleges, institutes, and companies move away from disciplinary silos and toward organizations configured for solving the problems of the future.

The Plant Biology 2019 (<https://plantbiology.aspb.org/>) and Plant Synthetic Biology 2019 (<https://plantsyntheticbiology.org/>) meetings in San Jose, California, in August will provide varied opportunities to experience cross-disciplinary research and think about how to effect organizational and cultural change. The major symposia exemplify this spirit. For example, the President’s Symposium features topics related to developing the workforce through mentoring and early research experiences and dissecting complex physiology through transdisciplinary research. The Future of Food and Agriculture symposium will cover artificial meat and development of sustainable breeding and food production. Drop by the ASPB Pavilion for conversation circles on topics including putting together a training program, developing strategies to effect change, getting involved in science policy, and commercializing your ideas and results. *A suggestion: attend a conversation circle or workshop that is outside your current interests.* Last, but not least, register and attend Plant SynBio 2019, which starts with the final major symposium of Plant Biology 2019 and continues through Friday, August 9. See you in SJ! ■

JUDY CALLIS
continued from page 1

After several years as a research technician at the University of Wisconsin–Madison, she received an MS in botany in 1981 from the University of Illinois, where she worked with Tuan-hua David Ho on α -amylase isozymes. From there, Judy moved to Stanford University, where she received a PhD in biology in 1987. During that time, she became interested in posttranscription regulation of gene expression. Following that theme she worked on aspects of ubiquitin-mediated proteolysis with Rick Vierstra at UW–Madison from 1987 to 1989. At the end of 1989 (on Halloween, to be precise), she joined the faculty at UC Davis, initially in the Department of Biochemistry and Biophysics. Judy is now a full professor and serves as vice chair for academic personnel in the Department of Molecular and Cellular Biology.

Judy's main research interests are in the area of regulated proteolysis, with a focus on the ubiquitin pathway. Combining genetics, biochemistry, and molecular biology, her laboratory is working to understand the specificity of modification of proteins by ubiquitin and the physiological consequences of this change. In addition, her labo-

ratory has studied the cis-acting signals on the Aux/IAA proteins, short-lived repressors of auxin signaling, and defined the residues required for their rapid and auxin-regulated degradation. She has studied various components of the ubiquitin system, such as E3 ligases and the ubiquitin-like protein RUB. More recently she has expanded her interests into the study of the fructokinase family in plants.

Judy has taught metabolism to more than 200 students a year for over 15 years and has cotaught a course in plant biochemistry (that is not quite as big a class). She also enjoys leading a discussion of research literature for undergraduates and supervising both graduate and undergraduate students in research. Earlier this year, she was awarded the UC Davis Prize for Undergraduate Teaching and Scholarly Achievement.

Judy has been an ASPB member since 1979 and has served as a member of the Publications Committee (1994–1999; chair, 1998), as a member of the ad hoc Web Site Committee (1996–1997), as monitoring editor for *Plant Physiology* (2000–2006), as a member of the review panel for the Summer Undergraduate Research Fellowship awards in 2001 and 2003, as a member of

the Corresponding Membership Award Committee (2003–2007), as a member of the Program Committee (2006–2010), as a member of *The Plant Cell* editorial board (2009–2015; continuing as guest editor), and currently as a member of the Science Policy Committee (2016–2020). Other professional activities include service on grant review panels for NIH, NSF, USDA, and DOE; as an ad hoc reviewer for several journals; and as one of the reviewing editors for the *Journal of Biological Chemistry*. Judy was elected a fellow of AAAS in 2002 and an ASPB fellow in 2012. For 2005–2010, she served as the Ruth R. and Paul K. Stumpf Endowed Chair in Plant Biochemistry.

Judy shared the following:

What I have heard to date is that ASPB members value the community organized around ASPB-sponsored activities, whether these activities be meetings, webinars, educational materials, publications, or the newsletter. All these support our core missions of career training, educating, and communicating our science, and sound science in general, both within our community and to wider communities and policy makers. I look forward to hearing more about your needs and concerns so that we may strengthen

our community. I would like to continue previous presidents' initiatives to identify services to broaden our membership base and to reach and support plant biologists in diverse career paths. Identifying activities and services will require your input and action; let us know what we can do for you! In turn, participation in ASPB activities will enrich both you and the Society. We have excellent professionals at our headquarters who also bring ideas to the table and assist with member-derived initiatives.

In the coming year, with an effort led by Phil Taylor, we hope to coordinate and strengthen our current mentoring and training activities such that we reach as many members (of all ages!) as possible and provide the most effective career-building skills for use at the laboratory bench and, significantly, off the bench as well. ASPB is your community, and let us make it the best it can be with effective and relevant activities. Let us all sustain and promote ASPB by our participation and contributions, especially to welcome and mentor future generations of scientists. ■

WHAT IF PLANT SCIENTISTS *continued from page 3*

and new diversity, inclusion, and equity practices.

A few thoughts on best practices you can start implementing today:

1. If you have any power or privilege within your organization or institution, find ways to use it to champion, promote, and mentor colleagues or trainees who have less. This could mean speaking up in a meeting, suggesting someone else when you are invited to speak, or publicly refusing to attend meetings that do not have a diverse speaker list.
2. Find and express gratitude when someone points out a way you could do better. No one enjoys hearing criticism. Push back against your own defensive reflexes. Do not yell, and do not cry. If we want honest feedback, we have to treat the messengers in a way that will encourage them to continue the conversation.
3. If you are a member of a majoritarian group in STEM, educate yourself on the experiences of minoritized groups and best practices you should be working on implementing. Ask other majoritarian members to help connect you to resources; minoritized community members should not bear the burden of enlightening you. Google before asking (see also the Resources sidebar).
4. Use mindful listening practices to help you actually hear what your colleagues or

mentees are saying (<https://hbr.org/2016/07/what-great-listeners-actually-do>).

5. Assess and reassess yourself and your organizations and institutions. Look for consistent overrepresentation and underrepresentation of particular groups. Try to figure out what factors in your decision-making processes might be reinforcing these biases. We encourage you to use DiversifyPlantSci or similar efforts to bring new names into the conversation.

We end with Voltaire's great insight into human nature and risk avoidance: "The best is the enemy of the good." We do not need any more studies to demonstrate that there is a problem around diversity and inclusion in STEM (though we do need studies that measure the impact of specific interventions). Rather, we must start changing our culture right now, imperfect as we are, and with the knowledge that we will make mistakes. If we never began an experiment until we had a perfect understanding of every protocol and knowledge of all relevant literature, our science would grind to a halt! The same humility, passion, and drive that we bring to addressing scientific challenges can be brought to making the plant sciences community the best it can be—and that includes opening the doors as wide as possible to anyone with great questions, creative ideas, and the desire to participate in the discovery and dissemination of knowledge. ■

Resources for Strengthening Diversity and Inclusion in STEM

Education Programs

- <http://bit.ly/InsideHigherEd-Views>
- <http://bit.ly/elifesciences>
- <http://bit.ly/frontiersin>
- <https://bit.ly/2CRtBq3>
- <http://bit.ly/mentoringinclusion>
- <http://bit.ly/minoritysuccess>
- <http://bit.ly/T-training>
- <http://bit.ly/Success-URMs>

Individual Efforts

- Needhi Bhalla's Twitter feed: @NeedhiBhalla
- Meghan Duffy and the Dynamic Ecology blog: <http://bit.ly/DynamicEcology>
- Terry McGlynn and Small Pond Science: <http://bit.ly/SmallPondScience>
- BethAnn McLaughlin and #MeTooSTEM: <https://metoostem.com>

Experiences and Best Practices

- <http://bit.ly/RobinDiangelo>
- <http://bit.ly/IjeomaOlueWriting>
- <http://bit.ly/NonhandicappingLanguage>
- <http://bit.ly/Protocol-sexual-harassment>
- <http://bit.ly/Privilege-and-PhD>
- <https://native-land.ca/>
- <http://bit.ly/LGBT-Topics>

Plant Scientists Elected to the 2019 Class of the National Academy of Sciences

BY TYRONE SPADY

ASPB Legislative and Public Affairs Director

Several plant scientists have been elected as members or foreign associates of the U.S. National Academy of Sciences (NAS) in recognition of their distinguished and continuing achievements in original research. These plant biologists are among the 100 new members and 25 foreign associates just elected. There are now 2,347 active NAS members and 487 foreign associates.

The following were elected to this year's NAS class. Please join us in recognizing their service to the plant science community and the important contributions they have made to the field.

Gloria M. Coruzzi

Gloria is the Carroll and Milton Petrie Professor of Biology in the Department of Biology and the Center for Genomics and Systems Biology at New York University. Her lab uses systems approaches in *Arabidopsis* to model and manipulate gene networks involved in nitrogen use efficiency. Gloria's team has also developed phylogenomic-based computational platforms to enable the identification of gene networks involved in key agronomic and evolutionary traits in plants.

Gloria joined ASPB in 1989 and is a Legacy Society Founding Member. She became an ASPB fellow in 2010 and was awarded the Stephen Hales Prize in 2016. She has served on the Science Policy Committee (1991–1995)



Gloria M. Coruzzi

and the Stephen Hales Prize Committee (2016–2017).

"I am deeply honored to become a member of the National Academy of Sciences. For me, it was especially meaningful to be elected to the Academy this particular year, when we achieved one of the long-term goals of systems biology: to predictively model and perform high throughput validation of the regulatory networks that underlie plant nitrogen use efficiency. Having entered the field of plant biology at the dawn of the gene cloning era, I feel that the arc of my scientific career has culminated in developing systems biology approaches to uncover genome-wide networks relevant to plant nutrition and agriculture."

Maria J. Harrison

Maria is the William H. Crocker Research Chair at the Boyce Thompson Institute. She also



Maria J. Harrison

holds an adjunct professorship in the School of Integrative Plant Science at Cornell University. Maria's team uses a combination of techniques ranging from cell and molecular to genomics approaches to understand the symbiotic relationships between plants and fungi.

Maria has been an ASPB member since 1994. In 2015, she was awarded the Dennis Hoagland Award, and she served on the Program Committee from 2014 to 2018.

"It is a tremendous honor to be elected to the National Academy, and much of the credit goes to the Harrison lab members (past and present) and collaborators who have contributed to our research on arbuscular mycorrhizal symbiosis. I was fortunate to start my research career at the Samuel Roberts Noble Foundation, and I am grateful to the foundation and all its staff for



Jane A. Langdale

support, but in particular to Richard Dixon, the director of plant biology at the time, for giving me the freedom and encouragement to initiate research on the molecular basis of AM symbiosis. I am equally fortunate to continue my career at the Boyce Thompson Institute, and I thank former and current presidents Dan Klessig and David Stern and all the staff, colleagues, and friends there for their support and for creating an exciting research environment that enables discovery."

Jane A. Langdale (Foreign Associate)

Jane is a senior research fellow at Queen's College and a professor in the Department of Plant Sciences at the University of Oxford (United Kingdom). Research in her group is focused on the identification of genetic mechanisms that control the development of

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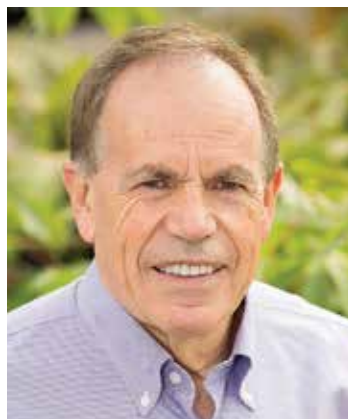
2019 CLASS OF NAS continued from page 9

the Kranz anatomy, specialized structures found in the leaves of some plants that are associated with C_4 photosynthesis. She is currently working within international consortia to introduce C_4 traits into C_3 crops. Jane served on the ASPB Innovation Prize for Agricultural Technology Committee from 2014 to 2020.

"I am honored to be elected a foreign associate of NAS. It is a huge endorsement of the research that my group members have carried out over the past 30 years. I also hope that, at least in part, it was recognition of my unwavering commitment to help students and postdocs in plant sciences to fulfill their potential in a career path that best suits them, which is often not the expected (academic) path."

Stephen P. Long

Steve is the Gutsell Endowed Professor and Ikenberry Endowed University Chair for the Departments of Plant Biology and Crop Sciences at the University of Illinois at Urbana-Champaign. He is also a distinguished professor and fellow of the Royal Society at Lancaster University (United Kingdom). Steve's research focuses on increasing crop productivity and sustainability through photosynthesis using both computer simulation and systems optimization coupled with bioengineering and genetic selection. A particular focus is on adaptation to global atmospheric change.



Stephen P. Long

Steve joined ASPB in 1999 and is a Legacy Society Founding Member. In 2009, he became an ASPB fellow, and in 2012 he was given the Charles F. Kettering Award. Steve has served on the Program (2001–2005), Publications (2005–2010), and Charles F. Kettering Award (2013–2015) Committees.

"This was a complete, but most welcome, shock. On reflection, though, this must be viewed as recognition of a team of amazing past and present graduate students, postdocs, and faculty colleagues. This would not have been possible but for the University of Illinois, which for 70 years and counting has held the number one photosynthesis research group in the world while simultaneously providing supercomputing, genomic, and instrumented farm facilities and expertise in one place, allowing translation from mathematical predictions to demonstration in replicated field crop trials."



Pamela C. Ronald

Pamela C. Ronald

Pam is the director of grass genetics at the Joint BioEnergy Institute and a distinguished professor in the Department of Plant Pathology at the University of California, Davis. The Ronald lab studies genes that control disease resistance and stress tolerance. In addition, she also directs the UC Davis Institute for Food and Agricultural Literacy.

Pam has been an ASPB member since 1991, and she is the 2019 recipient of the Leadership in Science Public Service Award. She chaired the Science Policy Committee from 2004 to 2006 and served on the committee from 2002 to 2010.

"I am incredibly honored by this recognition and feel very lucky to be part of a wonderful group of plant biologists. I am grateful to the amazing and hardworking scientists in my lab, past and present, and to my many stellar collaborators who helped make much of this work possible."



Daniel F. Voytas

Daniel F. Voytas

Dan is the director of the Center for Genome Engineering and a professor in the Department of Genetics, Cell Biology, and Development at the University of Minnesota, St. Paul. Dan's group works on the development of tools, such as the CRISPR/Cas9 system, that enable targeted genome modification of plants using sequence-specific nucleases.

Dan became an ASPB member in 2005 and currently serves on the editorial board of *The Plant Cell*.

"The news caught me completely off guard! I am very grateful for having had so many great mentors, students, and staff over the years. This is as much an acknowledgment of their work as it is of mine." ■

Natasha Raikhel Appointed Honorary Doctor at SLU's Faculty of Forest Sciences

Seven honorary doctors have been appointed at the Swedish University of Agricultural Sciences (SLU) this year, among them Natasha Raikhel, emeritus professor at University of California, Riverside (UCR). SLU will award the seven honorary doctors at the doctoral award ceremony on October 5, 2019. The honorary doctors will hold their broadcast lectures on October 4.

Natasha is one of the most highly cited researchers in plant science. She is emerita professor of plant cell biology at UCR and a member of the U.S. National Academy of Sciences. She founded

the Center for Plant Cell Biology (CEPCEB) at UCR, which became part of the Institute for Integrative Genome Biology (IIGB). Natasha studied biology in Leningrad and received her doctorate in 1975, based on her work on ciliates—small single-celled organisms living in water.

After emigrating to the United States in 1979, she switched to plant research, making several outstanding contributions. She became a full professor at Michigan State University in 1994 and later moved to UCR, where she was head of both the CEPCEB and the IIGB until her recent retire-

ment. Natasha has made important contributions to the knowledge of molecular processes in the cell walls of plants and in intracellular membrane trafficking. She is also a pioneer in using chemical biology in plant research, a method widely used today by both academics and the agroindustry.

In addition to her many scientific achievements, Natasha is the only woman to be editor-in-chief of the journal *Plant Physiology*. She not only is an outstanding scientist, but also has actively promoted women in science. ■



Natasha Raikhel

Plant Physiology Upcoming Focus Issues 2020/2021

Parasitic Plants

Publication: November 2020

Dynamic Membranes

Publication: December 2020

Redox/ROS (Reactive Oxygen Species)

Publication: January 2021

Mutual Integration of Transport and Signaling

Publication: February 2021

Digital Agriculture

Publication: April 2021

Sensors: For Plants and from Plants

Publication: May 2021

For information on Focus Issue submissions, please contact
Julia Bailey-Serres (serres@ucr.edu) or Mike Blatt (eic-plantphys@glasgow.ac.uk).

ASPB Legacy Society Update—And a Look Ahead to Our Centennial Campaign

The original concept for the ASPB Legacy Society, which was launched in late 2016, was to use dividend income earned on donations to support professional and student-centered programs and activities. These include education and outreach; good works, such as travel grants and summer internships; and other types of professional development. The primary goal was to nurture future generations of plant biologists and thereby ensure the health and longevity of the Society.

A small cohort of current and former Society leaders was initially invited to become Founding Members of the Legacy Society by making a contribution of at least \$5,000. Their response was terrific! Thanks to their contributions and those of other generous ASPB members, we have commitments of more than half a million dollars. These funds have been invested and will continue to grow until ASPB's centennial meeting in 2024, at which time the dividends generated will start to be used for the Society's good works.

Currently, ASPB's good works are funded by income generated from our investment portfolio, but this sum of money can fund only a fraction of many valuable activities. Knowing that the Society will be celebrating its 100th anniversary in 2024 and encouraged by the generous response of the Legacy Society Founding Members, we recognized this occasion as an opportunity to further increase ASPB's

endowment by launching the ASPB Centennial Challenge:

The ASPB Centennial Challenge proposes that, with substantial support from the Legacy Society, we will raise the level of our current endowment from \$12 million to \$20 million by the date of the 2024 Centennial Meeting. Dividend income generated from the enhanced endowment will be dedicated to good works that nurture the development of future generations of plant biologists to ensure the health and longevity of ASPB.

You can help us meet this challenge! The ASPB Centennial Challenge will use a number of fundraising strategies, and we plan to reach out to you for help. Our first step was to contact long-standing ASPP/ASPB members of 30 or more years, as well as corresponding and emeritus members, with the invitation to become Founding Members of the Legacy Society through a donation of \$5,000 or more. To quote Rob Last in his May/June 2019 President's Letter, "If you are contacted, please respond."

Please contact us if you would like to confirm the name of eligible candidates or wish to have additional information regarding the ASPB Centennial Challenge. ■

Debby Delmer
ddelmer@gmail.com

Brian Larkins
blarkins2@unl.edu

Ralph Quatrano
rsq@wustl.edu

Founding Members of the ASPB Legacy Society (as of July 2019)

Nikolaus Amrhein	Pamela Green	Mel Oliver
Charles Arntzen	Willi Gruissem	Neil Olszewski
Sally Assmann	Mary Lou Guerinot	Don Ort
Julia Bailey-Serres	Thomas Guilfoyle*	Kathy Osteryoung
Bonnie Bartel	Gretchen Hagen	Robert Paull
Christoph Benning	Michael Hahn	Ralph Quatrano
Sandra Berry-Lowe	Candace Haigler	Natasha Raikhel
Richard Blanton	Sarah Hake	Doug Randall
Wendy Boss	Andrew Hanson	Alison Roberts
Rebecca Boston	Maureen Hanson	Eric Roberts
John Boyer	John Harada	Stan Roux
Ray Bressan	Jeffrey Harper	Danny Schnell
Winslow Briggs*	Eliot Herman	William Schopf
Mark Brodl	Ann Hirsch	Lawrence Schrader
Bob Buchanan	Tuan-hua David Ho	Julian Schroeder
Dan Bush	Thomas Hodges	Tom Sharkey
Judy Callis	Mark Jacobs	Jane Shen-Miller
Nicholas Carpita	Andre Jagendorf*	Louis Sherman
Vicki Chandler	Alan Jones	James Siedow
Kent Chapman	Russell Jones	Wendy Silk
Alice Cheung	Stefan Kirchanski	Bijay Singh
Ray Chollet	Harry Klee	Neelima Sinha
Maarten Chrispeels	Karen Koch	Larry Smart
Mary Clutter	Leon Kochian	Chris Somerville
Jerry Cohen	Brian Larkins	Shauna Somerville
Marc Cohn	Robert Last	Edgar Spalding
Gloria Coruzzi	Peggy Lemaux	Gary Stacey
Daniel Cosgrove	Sharon Long	Christopher Staiger
John Cushman	Stephen Long	Heven Sze
Jeff Dangel	William Lucas	Lincoln Taiz
Deborah Delmer	Harvard Lyman	Indra Vasil
Machi Dilworth	Sally Mackenzie	Elizabeth Vierling
Richard Dixon	Martin Massengale	Richard Vierstra
Gerald Edwards	Don McCarty	Alessandro Vitale
Bob Fischer	Rob McClung	Linda Walling
Elizabeth Gantt	Sabeeha Merchant	Susan Wessler
Gary Gardner	Jonathan Monroe	Eli Wurtzel
Robert Giaquinta	Gloria Muday	MariaElena Zavala
Robert Goldberg	John Mullet	Jian-Kang Zhu
Sarah Grant	John Ohlrogge	

*Deceased

Plant Biology in the Mid-Atlantic Region

BY MARK HOLLAND, President of the Mid-Atlantic Section (maholland@salisbury.edu)
and SHUNYUAN XIAO, Chair, Organizing Committee (xiao@ibbr.umd.edu)

ASPB's Mid-Atlantic Section held a two-day spring meeting jointly with the annual University of Maryland Plant Biology Symposium on May 30–31, 2019. The sparkling new Learning and Teaching Center on the University of Maryland College Park (UMCP) campus provided an attractive venue for oral and poster presentations, socializing, lunch, and discussions. The meeting generated a lot of excitement among first-time attendees. More than 110 participants attended, including undergraduate and graduate students, postdocs and research associates, and faculty and research scientists from academia, USDA, and industry. They came from across the mid-Atlantic region, including Delaware, Pennsylvania, North Carolina, Virginia, Maryland, and Washington, DC.

This meeting featured 15 invited talks, 12 oral presentations by students and postdocs, and more than 40 posters. Importantly, students and postdoctoral fellows also got a chance to interact with outstanding scientists and learn more about different plant biology research avenues. The best student talks were selected by a panel of three judges for the Marsho Award, which is presented annually to honor the late plant biologist Thomas V. Marsho of the University of Maryland, Baltimore County. Awardees for the best oral presentations were graduate student Tim Chaya (University of Delaware) and postdoc Yun-Ting Kao (University of Maryland). Best poster awards went to undergraduate student Adam Schoen (University of Maryland), graduate student Alex Mahlandt (University of Maryland), and

postdoc Ying Wu (University of Maryland). Each awardee received a cash award.

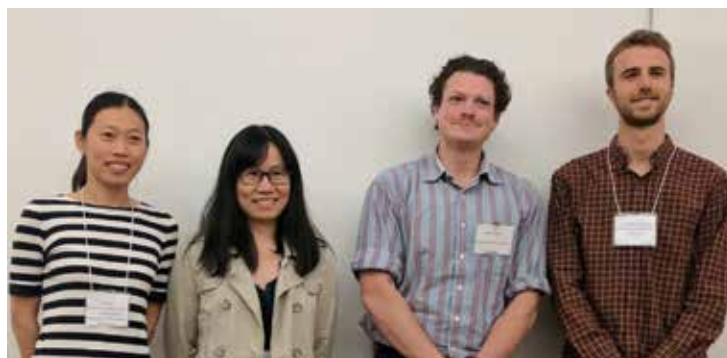
The highlights of the meeting included a lecture on networks by ASPB president Rob Last (Michigan State University) and a keynote talk by Xinnian Dong

(Duke University) titled “Live and Let Die.” Trainees appreciated the career development panel discussion organized by graduate student Lovepreet Singh. Panelists included Kim Gallagher

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Participants at the Spring 2019 Mid-Atlantic Section meeting at the University of Maryland (left to right): Shunyuan Xiao (chair, Organizing Committee), Lovepreet Singh (organizer, career development discussion), Xinnian Dong (keynote speaker), Quedeng Qui (Syngenta), and Yiping Qi (member, Organizing Committee). PHOTO BY HEVEN SZE



Award recipients (left to right): Ying Wu (best poster by a postdoc), Yun-Ting Kao (best oral presentation by a postdoc), Adam Schoen (best poster by an undergraduate student), and Alex Mahlandt (best poster by a graduate student). Not shown: Tim Chaya (best oral presentation by a graduate student). PHOTO BY S. MOUNT



Organizers Shunyuan Xiao (left) and Mark Holland, Mid-Atlantic Section president (right). PHOTO BY S. MOUNT

ASPB's Southern Section Holds a Successful Annual Meeting at Clemson

The 2019 annual meeting of ASPB's Southern Section was held March 16–18 at the home of the Clemson Tigers, Clemson University in South Carolina. The meeting was organized by Magaly Rincón-Zachary (secretary/treasurer) and Julia Frugoli (local organizer), and Shahid Mukhtar and Aruna Kilaru served as chair and vice chair, respectively. Presentations and exhibitions took place in the Watt Family Innovation Center, a beautiful state-of-the-art venue. A total of 103 attendees from 11 higher education institutions and three research centers, including USDA, were engaged in disseminating the most recent plant science advancements and discoveries in a total of 71 featured poster and oral presentations. Winners of the Marc Cohn Graduate Student Oral Presentation and Aubrey Naylor Undergraduate Student Poster Competitions were recognized at the annual banquet.

The featured speakers for the 2019 Kriton Hatzios Symposium “Foundational to Translational: The Impact of Plant Science Research” were Harry Klee (University of Florida), Toni Kutchan (Donald Danforth Plant Science Center), Henry Daniell (University of Pennsylvania), and Tony Kinney (Corteva Agriscience). The speakers shared their academic journeys while illustrating how their basic research was driven by the needs of society. To budding scientists,

the speakers emphasized the need for multidisciplinary training and the ability to integrate diverse approaches in their research.

Check out the Southern Section's June newsletter at <http://bit.ly/ss-aspb-news> for more details. ■



2019 presentation winners (left to right): Front row, Julia Frugoli (local organizer), Frances Lowder (second place—poster, Western Carolina University), Neha Mittal (first place—oral, University of North Carolina at Charlotte), Amanda Askins (honorable mention—oral, University of South Carolina Aiken), Joseph Goode (first place—poster, Florida Institute of Technology), Aruna Kilaru (vice chair, Southern Section). Back row, Shahid Mukhtar (chair, Southern Section), Sean James (second place—oral, University of North Carolina at Chapel Hill), Amanda Storm (mentor, Western Carolina University), Nathan Hancock (mentor, University of South Carolina Aiken), Andrew Palmer (mentor, Florida Institute of Technology), Timothy Howton (third place—oral, University of Alabama at Birmingham). Not shown: Minye Seok (third place—poster, University of Alabama at Birmingham).



2019 Kriton Hatzios Symposium speakers (left to right): Harry Klee, Tony Kinney, Toni Kutchan, and Henry Daniell, with their host, Aruna Kilaru (center). PHOTO BY ASHLEE MCCASKILL, UNIVERSITY OF NORTH GEORGIA

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

Beverly Agtuca

Title: Doctoral researcher, ASPB intern coordinator

Place of Work or School: Legume–Microbe Interactions Laboratory, University of Missouri

Member Since: 2017

Research Area: Interactions of nitrogen-fixing bacteria in legumes and nonlegumes



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

ASPB is a diverse plant science community, where all members share the goal of communicating with one another to promote the growth of plant biology and solve worldwide problems in agriculture. Anyone, including those who do not have expertise in plant science, can join the organization and attend its annual meetings to learn the most up-to-date research and instrumentation while networking with scientists. I am glad I joined ASPB because it helped me to be confident in the path I wanted to take for my future career and, most of all, to create innovative ideas for research.

Was someone instrumental in getting you to join ASPB?

Yes, my research PI, Dr. Gary Stacey, in graduate school at the University of Missouri encouraged me to join ASPB to gain professional development and opportunities to learn new information outside the class-

room. Because of my dedication and perseverance in research, my PI encouraged me to present my work and results to the whole plant biology community. The Collegiate Science and Technology Entry Program (CSTEP) also provided encouragement and funding for me to become an ASPB member during my undergraduate years. CSTEP's purpose is to promote students' academic success to help them prepare for their future professional career.

Have you enhanced your career, lab, research, or education using ASPB, the Plant Biology meetings, section meetings, *Plantae.org*, *The Plant Cell*, *Plant Physiology*, or *Plant Direct*?

Yes, of course! I went to Plant Biology 2017 in Hawaii as a third-year PhD student and attended workshops and concurrent symposia. I was able to gather ideas for prospective research projects from talking with other scientists in my field of study. In addition, I learned about the Convirion Scholars

Program at the exhibit hall. I was eager to discuss this program with ASPB staff, who encouraged me to apply. While participating in this program, I had the opportunity to make new friends, meet with wonderful scientists, find a mentor who guided me in developing my future plan, and most of all participate in outreach and volunteer programs. ASPB introduced me to volunteering at the ASPB Education & Outreach booth at the National Science Teachers Association conferences in 2018 and 2019.

So yes, ASPB has enhanced my career and professional development. In addition, the community at the conferences got a chance to hear my perspective and feedback on what ASPB has done for me so they could share it with their students and peers.

In what ways has being an ASPB member been of value or importance in your career or education?

Being an ASPB member has helped prepare me for my prospective future career and

education. As a Convirion Scholar, I was paired with a mentor, Dr. Aaron Wyman from Spring Arbor University in Spring Arbor, Michigan. We met once per month by videoconference and discussed a variety of topics, including how to write a CV, cover letter, and teaching philosophy; what questions I should expect in one-to-one and videoconference interviews; what tasks and opportunities are part of being a teaching professor; what differences there are between large universities and small colleges; and most of all, how to figure out what I want for my future career. I received my PhD this past spring semester from the University of Missouri, and since then I have continued to benefit from the mentor–mentee relationship, which has given me huge confidence in applying for teaching assistant professor positions. As a result, I was recently offered, and accepted, a position at Adams State University at Alamosa, Colorado, as a visiting

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In June, University of Missouri's Students for the Advancement of Plant Pathology (SAPP) graduate student association volunteered at Columbia's 'Art in the Park Festival.' The students set-up a plant-microbe interactions booth and demonstrated to families and children, soybean plants that were infected by cyst nematodes and nitrogen-fixing bacteria (nodules). Pictured are some of our SAPP students (left to right): Nhung Hoang, Ha Duong, Beverly Agtuca, Morgan Bruhn, Vinavi Lakshman. Not pictured: SAPP advisor Dr. Melissa Mitchum.

MEMBERSHIP CORNER *continued from page 15*

assistant professor and will be starting this coming August 2019.

How or why did you get into plant science?

I am a Filipino-American who was born in Queens, New York. When I was 8 years old, I visited my parents' hometown in the Philippines. I saw how my parents had grown up in this developing country, where they had to grow and harvest a lot of plants for their everyday meals. When I visited there, I had to do these tasks as well with my siblings and other children, and I thought to myself that these were difficult responsibilities at such a young age. Since then, I have wanted to become a plant scientist so I could improve agricul-

ture practices for developing countries, especially the Philippines.

What is your favorite thing about being a plant biologist?

I can garden and grow any plant I want for my house because of my plant biology knowledge!

What are your hobbies?

My hobbies are gardening and growing plants. I also love setting up plant-microbe demonstrations for families and children at farmers markets, elementary school events, state fairs, and park events with the University of Missouri's Students for the Advancement of Plant Pathology graduate student association. The children enjoy learning about and looking at plants that are infected by nitrogen-fixing bacteria, nematodes, viruses, and fungi. ■

MID-ATLANTIC MEETING *continued from page 13*

(University of Pennsylvania), Derek Bartlem (KWS USA), Quedeng Qui (Syngenta), and Walter Nelson (KeyGene USA). The meeting was organized by Shunyuan Xiao (Institute for Bioscience and Biotechnology

Research and UMCP); president and treasurer of the Mid-Atlantic Section Mark Holland (Salisbury University); and Wendy Peer (University of Maryland), with additional support from other committee members.

The meeting was generously supported by ASPB; SZE

Education Fund; KWS USA; KeyGene; GenScript; *Frontiers in Plant Science*; Division of Academic Affairs, Provost Office, UMCP; Department of Cell Biology & Molecular Genetics, UMCP; Department of Plant Science & Landscape Architecture, UMCP; Institute

for Bioscience & Biotechnology Research, UMCP; Department of Biological Sciences, Salisbury University; Fisher Scientific; Integrated DNA Technologies; LifeSct.com; and Longwood Gardens. ■

Policy Update

BY MICHAEL BUSE
Lewis-Burke Associates, LLC

The information in this article was accurate at the time of writing.

Joanne Tornow Addresses BIO Advisory Council

On May 21, the director of the Biological Sciences Directorate (BIO), Joanne Tornow, attended her first meeting of the BIO advisory council since transitioning from her role as acting assistant director to permanent director. She used the opportunity to roll out her new vision for BIO, entitled “Life Innovates, Biology Integrates.” Tornow hopes to increase interdisciplinary research at all scales of the directorate and across all programs. Some topics of interest include genomics, quantum biology, and ecological forecasting. It remains to be seen how this vision will be implemented; NSF has yet to publish any material on this subject.

During the meeting, Tornow also expressed her desire to continue the current policy of no limits and no deadlines for proposal submissions.

USDA Proceeds with NIFA and ERS Relocation

At the beginning of May, USDA released the final short list of prospective new locations for the National Institute of Food and Agriculture (NIFA) and Economic Research Service (ERS). Proposed locations have been narrowed to Indiana, Kansas City, and the North Carolina Research Triangle, with each proposal including several possible sites. Although USDA has remained opaque about the move, intel suggests that the agency has

completed site visits to all three finalists. At the time of this writing, USDA was expected to announce a final decision in several weeks, with the projected relocation in August or September. The House Agriculture Biotechnology, Horticulture, and Research subcommittee had scheduled a hearing on the relocation for June 5.

The agency’s plans may be complicated by the recent decision of ERS scientists and staff to unionize, potentially delaying the relocation because employees would have legal standing to pursue collective bargaining with the agency. NIFA employees had scheduled a vote on unionizing for June 9.

Sources and Additional Information

- The USDA press release announcing the short list can be found at <https://tinyurl.com/yxdeu826>.
- More information on the ERS vote to unionize can be found at <https://tinyurl.com/y38tsfu0>.
- More information on the Agriculture Committee hearing can be found at <https://tinyurl.com/y64hksff>.

House Moving Quickly on Appropriations Despite Lack of Budget Deal

The House Appropriations Committee is on track to advance all 12 fiscal year (FY) 2020 appropriations bills before the end of June. As of June 4, the House Appropriations Committee had advanced 10 bills, mainly along party lines, as well as one more

bill out of subcommittee. The only bill left for consideration was the Homeland Security bill, with its markup scheduled for June 5. Funding levels for agencies relevant to ASPB include the following:

- NSF would be funded at \$8.64 billion, \$561 million or 6.9% above the FY2019 enacted level.
- NIH would be funded at \$41.1 billion, \$2 billion or 5.1% above the FY2019 enacted level.
- DOE would be funded at \$37.1 billion, \$1.4 billion or 3.9% above the FY2019 enacted level. Basic Energy Sciences would be funded at \$2.14 billion, a 1.1% decrease from FY2019, and Biological and Environmental Research would receive \$730 million, a \$25 million or 3.5% increase above FY2019.
- In USDA, ARS would be funded at \$1.39 billion, a \$290 million or 17.2% decrease from FY2019; this decrease comes in part from the FY2019 bill’s inclusion of funds for setting up the National Bio and Agro-Defense Facility. NIFA would be funded at \$1.59 billion, including \$445 million for the Agriculture and Food Research Initiative, a \$30 million increase over FY2019.

The House Commerce, Justice, and Science (CJS) subcommittee included language submitted by ASPB expressing support for the Plant Genome Research

Program. This language was also included in the FY2019 CJS report. Additionally, the House Agriculture bill also includes a provision that would encourage USDA to support research that “leverages plant genomic information with phenotypic and environmental data through an interdisciplinary framework, resulting in an understanding of plant processes that affect productivity and the ability to predict plant performance.”

As of this writing, the Senate had not yet started consideration of any appropriations bills and was waiting for a formal budget agreement to be approved by Congress and the president before moving forward.

Sources and Additional Information

- The FY2020 House Agriculture Appropriations Bill Committee report is available at <https://tinyurl.com/y6qzu95b>.
- Lewis-Burke’s complete analysis of the FY2020 House Agriculture Appropriations bill can be found at <https://tinyurl.com/y69ftqos>.
- The FY2020 House Energy and Water Development Appropriations Bill Committee report is available at <https://tinyurl.com/y48mhdqf>.
- Lewis-Burke’s complete analysis of the FY2020 House Energy and Water Development bill can be found at The FY2020 House Labor,

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POLICY UPDATE

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Health and Human Services, and Education Bill Committee report is available at <https://tinyurl.com/y4qoswm9>.

- Lewis-Burke's complete analysis of the FY2020 House Labor, Health and Human Services, and Education bill can found at <https://tinyurl.com/y2rwshsvw>.
- The FY2020 House Commerce, Justice, and Science Bill Committee report is available at <https://tinyurl.com/y5zgyu8r>.
- Lewis-Burke's complete analysis of the FY 2020 House Commerce, Justice, and Science bill can found at <https://tinyurl.com/y4mh4lv6>.
- The House Appropriations committee website with remaining markup schedule is

available at <https://tinyurl.com/y3axdqwl>.

Senate Agriculture Committee Advances Scott Hutchins Nomination

On May 14, the Senate Agriculture Committee approved the nomination of Scott Hutchins to be the Undersecretary of Agriculture for Research, Education, and Economics. Hutchins, who has been serving in the deputy undersecretary role since January, will now await confirmation by the full Senate. Hutchins, a former president of the Entomological Society of America, was originally nominated during the last Congress but failed to receive a full vote by the Senate. To circumvent the backlog of nominations awaiting a vote in the Senate, the USDA nominees were

appointed to deputy undersecretary positions.

Hutchins's nomination has received substantial community support. Senate Agriculture Committee Chairman Pat Roberts (R-KS) urged his colleagues to confirm Hutchins as quickly as possible.

Source and Additional Information

- The press release announcing the committee's approval of Hutchins's nomination can found at <https://tinyurl.com/y5k6ogt5>.

Path Cleared for Confirmation of Remaining DOE Nominees

A procedural hurdle slowing the progress of DOE nominees was removed at the end of April, allowing the Senate to quickly confirm

appointees to lead the Office of Science, Office of Nuclear Energy, and Advanced Research Projects Agency-Energy. Sen. Catherine Cortez Masto (D-NV) had placed a hold on the nominations after DOE transported plutonium to her state in response to a court order that the department remove it from the Savannah River Site in South Carolina. She agreed to stand down after DOE stated it would remove the plutonium from Nevada beginning in 2021. With the hold removed, the nominees could receive an expedited vote, although it remained unclear whether the Senate planned to do so soon.

Source and Additional Information

- More information on DOE's decision to remove plutonium from Nevada can be found at <https://tinyurl.com/y5l4ho5t>. ■



Tyrone Spady at Plant Summit 2019 at Biosphere 2 in Arizona, February 2019.

Fond Farewell to Tyrone Spady, ASPB Legislative and Public Affairs Director

The ASPB staff offer our appreciation and best wishes to Tyrone Spady, PhD, who is leaving his position as Legislative and Public Affairs director for a new opportunity at the NIH Office of Science Policy. Tyrone joined ASPB in 2013 to oversee the legislative and educational program portfolios. During this time, he expanded ASPB's goal to increase federal support and public awareness of plant science through active

engagement with the Supporters of Agricultural Research, the National Coalition for Food and Agricultural Research, the Plant Science Research Network, and other groups. Throughout his tenure with ASPB, Tyrone brought valuable science policy experience and perspectives to the staff senior leadership team, ASPB governance, and the Society.

Before joining ASPB, Tyrone earned his PhD in evolution-

ary biology from the University of New Hampshire, conducted postdoctoral research at NIH, and worked as a science policy analyst and lobbyist at the Federation of American Societies for Experimental Biology.

Learn more about ASPB science policy in the *Between the Palms* interview with Tyrone at Plant Biology 2017: <http://bit.ly/2NKynNH>. ■

Plant BLOOME 2019 Winners Announced

ASPB established the Plant Biology Learning Objectives, Outreach Materials, & Education (Plant BLOOME) grant program with the goal to enhance public awareness and understanding of the essential roles of plants in all areas of life (<https://bloome.aspb.org>). Congratulations to the 2019 ASPB Plant BLOOME grant recipients!

Bringing Plants to Life Through Theater Arts

PI: Carol Goodwillie
East Carolina University

The most satisfying part of my career so far has been to watch students get turned on to plants. In a new collaboration with Patricia “Patch” Clark, a professor of theater education, we hope to make that process happen for undergraduates, children, and citizens in our community by bringing theater to plant biology education. At the centerpiece of the project, undergraduate students in a plant biology course will work with theater education students to develop a play for children about trees, their biology, and the important ecosystem services they provide. To reach a diverse audience, our play will be performed in local public schools, at a community center, and at a science education center. How many children have played a silent tree as an extra in a school play? Now the trees will play the starring role.

Undergraduate biology students will solidify their understanding of plant biology as they teach theater students about the



Carol Goodwillie

scientific content of the play. Knowledge of plants gained by theater education students will serve them in future K–12 careers. In working together, we anticipate that both groups of students will gain new perspectives and ways of thinking and communicating.

We propose that theater can be an effective way to convey some of the more complex topics in plant biology. Even abstract concepts such as carbon cycling and water potential might be conveyed through drama and movement. In addition to developing theater for children, we will use students in the playwriting class as an incubator to develop improvisational drama exercises that can be integrated into undergraduate courses in plant biology to teach difficult concepts. We’re looking forward to all that we’ll learn in this collaboration and greatly appreciate the support of the Plant BLOOME program!



Left to right: Alex Borowsky, Meg Kargul, Kinnari Atit, and Lorelee Larios

Alleviating the Outreach Drought with Scientists in the Classroom

PI: Lorelee Larios
University of California, Riverside

The formidable years of middle school are often defined by the social challenges students face, but a less-known fact is that these years are also critical to the STEM trajectory of a student. A key element to encourage scientific literacy at this pivotal age is promoting educational experiences that enhance students’ self-efficacy—that is, their self-confidence in their ability to successfully conduct STEM activities. Complementary to these efforts is the need to bridge the gap between people who do science as a living and students who are learning science.

Therefore, our outreach program has three main goals: (1) improve science literacy and plant science awareness with plant

science lab activities, (2) increase middle school students’ self-efficacy and identity in STEM, and (3) increase interactions between plant scientists and students. We aim to achieve these goals by developing a sustained partnership among teams of undergraduate and graduate students and post-docs, a teacher, and middle school students over the course of the school year. As part of this partnership, our teams will visit a class on average once a month throughout the school year and present a series of exercises that help the students explore plant biology within the context of the pressing challenge of drought facing southern California.

As plant scientists, we earnestly try to understand the impacts of drought from the cellular level to the ecosystem level to provide more insights into how drought stress can impact a range of services, from crops to

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PLANT BLOOME WINNERS *continued from page 19*

biodiversity, in both urban and natural settings. As citizens, we are asked to conserve water and be “water wise,” but too often the science motivating water-wise decisions is omitted from these discussions. Drought, therefore, provides a unique backdrop to our classroom activities to promote student scientific literacy within plant biology. Students will be directed to explore how plants cope with stress from the cellular to the ecosystem level, contextualizing these experiences within a genuine challenge they face in their day-to-day lives. We are excited about implementing this plant biology–focused outreach program to improve middle school students’ scientific literacy in plant sciences and self-efficacy in STEM, as well as to help bridge the gap between people doing science and people learning science.

Increasing Minority Student Recruitment to Plant Sciences by Enhancing High School Curriculum Through a Teacher Training Workshop

PI: Rupesh Kariyat

University of Texas Rio Grande Valley

Recent statistics show that there is a huge demand for a skilled workforce in the plant and agricultural sciences. Most studies and opinions have focused on recruitment efforts at the undergraduate, graduate, and postgraduate levels, often ignoring a fast-growing majority—high school students. Steering fresh graduates into plant, agricultural, and food sciences will be a massive boost to addressing the current workforce shortage in these areas. Compounding the issue, the teachers responsible for guiding and educating this young workforce have received little attention. And, as we are also aware, research and education in these fields lack students from minority and underrepresented groups.

Through the Plant BLOOME award, I plan to address these concerns by recruiting plant science teachers (in agriculture and plant biology) from the Pharr–San Juan–Alamo Independent School District (PSJA ISD) in the Rio Grande Valley of South Texas to participate in an intense, boot camp–style workshop at the University of Texas Rio Grande Valley (UTRGV). UTRGV and



Rupesh Kariyat

the Rio Grande Valley are on the United States–Mexico border and have a very high Hispanic population. In fact, UTRGV has >90% Hispanic student enrollment.

PSJA ISD is a state and national leader in creating academic opportunities for all students, and the school district offers prekindergarten through 12th-grade curriculum to about 32,000 students. The main objective of the project is to train PSJA ISD teachers to teach plant sciences and assist them in updating their curriculum using active learning methodologies and hands-on work experience. The basic outline of the weeklong workshop includes classroom-based lecture-style teaching during mornings (8:30 a.m. to 12:00 noon), followed by a hands-on experiential learning exercise in the lab or field. Each day will be led by a UTRGV faculty member

with expertise in one of the major areas of agriculture, food, and plant sciences.

After six days, the faculty and teachers will sit down together and revise the current curriculum to include a hands-on activity. The eight teachers will receive a certificate of completion and distance learning credits applicable toward their annual review and promotion at PSJA ISD. The long-term impact of the project will be evaluated on the basis of student interest in agriculture and STEM-related career fields as measured, for example, using statistics from PSJA ISD, UTRGV, and other postsecondary enrollments. In addition, the number of students taught will be tracked to gauge how many students are introduced to topics related to plant science and agriculture.

The project is unique; this is the first-ever attempt by UTRGV and PSJA ISD to coordinate a workshop that focuses on teacher education in a plant sciences–focused curriculum. The high school teachers get an opportunity to work and learn from faculty members who conduct cutting-edge research in various aspects of plant sciences (insect–plant interactions, plant physiology, weed ecology, soil biology, food microbiology, and agroecology), and the workshop will generate critical data on student and teacher learning outcomes to be used for further improvement of the curriculum. ■

Announcing the 2019 Summer Undergraduate Research Fellows (SURF)

The ASPB Summer Undergraduate Research Fellows (SURF) program funds promising undergraduate students so they can conduct research in plant biology during the early part of their college career over the course of 10 consecutive weeks. This year's SURF recipients will present their research at Plant Biology 2020. Congratulations to these 2019 Summer Undergraduate Research Fellows and their mentors!

SURFers from Doctoral Granting Institutions



Tayah Bolt

University of California, Davis

Project: *Fungal Toxin Influence over Transcriptional Regulation of the Plant Shikimate Pathway*

Mentor: Daniel J. Kliebenstein

I am grateful to ASPB for the honor of receiving this fellowship and to my lab group members who have supported me through this process. Receiving the SURF award has opened many doors of opportunity for me and will allow me to further develop my future career goals in plant biology research. It is exciting to imagine the possible applications for all the work that is currently being done in the field of plant biology and the impact it can make on the world when it comes to agricultural innovation and sustainability.



Ava Heller

Ohio University

Project: *Characterization of AHA2 at the Interface of Gravitropism and Phototropism*

Mentor: Sarah E. Wyatt

I am immensely excited to be a recipient of a 2019 SURF grant (all thanks to the amazing support of my mentor and lab mates)! This program will undoubtedly propel me forward in my research career by allowing me to focus wholeheartedly on my own research project, honing my skills as an upcoming plant biologist as I prepare to write a thesis and enter graduate school.



Jeremiah Lukes

University of Vermont

Project: *Is the Retromer Required for Polarized Cell Growth in Brachypodium distachyon?*

Mentor: Mary L. Tierney

The SURF award will give me the opportunity to hone my scientific writing skills and totally immerse myself in my research project. I am very excited to spend my summer working alongside my mentor to unravel the mystery behind the loss of VPS26C in monocots. Special thanks for the constant support of my mentor and the rest of the University of Vermont plant biology department.



Viviana Martínez-Martínez

Universidad Politécnica de Pachuca

Project: *Studies of the Function of miR156 in Plant Embryogenesis Using Genome Editing*

Mentor: Stewart Gillmor

It is an honor to receive a 2019 SURF award. It's an amazing opportunity that will allow me to further my interests in plant biology. My SURF research will contribute to understanding the regulatory mechanisms that promote seed development. In the future, I am interested in completing a master's degree in plant biotechnology. Doing SURF-sponsored summer research at a top institute for plant biology brings me closer to my goal.

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2019 SURF WINNERS
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Suprene Mohamedzein

Wake Forest University

Project: *High-Temperature-Induced Reactive Oxygen Species and Stress Response in Arabidopsis thaliana*

Mentor: Gloria Muday

The SURF award provides me with the opportunity to further develop my skills as a researcher and delve deeper into my research on the modulation of heat-induced reactive oxygen species by antioxidants in Arabidopsis shoots. The experiences and knowledge I gain through this research will be invaluable and will help me prepare for graduate school and a future in plant biology.



Bo Price

Utah State University

Project: *Verifying Signaling Pathways That Induce Apomixis de Novo in Arabidopsis*

Mentor: John G. Carman

The SURF grant will allow me to gain experience in molecular research as I strive to understand the effects our pharmacological treatments have on the induction of apomeiosis. ASPB is a major catalyst to my professional career through support of my research and introduction to tremendous opportunities at the Plant Biology meetings!



Benjamin Styler

Brown University

Project: *Understanding Thermotolerance in Crop Plants: Investigating Genetic Variation of the Unfolded Protein Response in Vegetative Tissue and Pollen Tubes*

Mentor: Mark Johnson

I am excited to continue my research with the help of a SURF grant. This work will help address crop failure because of rising global surface temperatures while at the same time preparing me to continue on to perform graduate research.



Samantha Surber

University of Nebraska–Lincoln

Project: *Cytosolic Acidification Effect on Freezing Tolerance Through Investigation of Proton Pump Inhibition*

Mentor: Rebecca Roston

This SURF award will assist me in completing a research project I have been working on for most of my junior year. This experience will allow me to better understand my research and to prepare for my search for a graduate school and program.



Ashley Turner

University of Florida

Project: *Effects of High pH Stress on Oxidative Status in Rhododendron Roots*

Mentor: Gerardo Nunez

Being awarded a SURF grant is a great honor. This award will allow me to continue working on what I am most passionate about—plants. I am extremely grateful to my mentor, who encourages me to pursue my goals.



Paige Wiebe

Kansas State University

Project: *Niche Divergence in Big Bluestem Grass Ecotypes in Response to Experimental Drought: Mechanisms of Local Adaptation*

Mentor: Loretta Johnson

I am honored to have been selected for a SURF award, and extremely grateful to be able to continue my research over the summer. This experience will greatly enhance my skills as a researcher and will help prepare me for a successful career in research.

Kwan Yoon

University of Massachusetts Amherst

Project: *Applying CRISPR/Cas9 to Unveil the Role of the Early Nodulins in Nitrogen-Fixing Symbiosis*

Mentor: Dong Wang

The SURF grant gives me the opportunity to fully dedicate myself to research this summer. My intention is to build on my existing research skills to advance our understanding of nitrogen-fixing symbiosis and further equip myself for a future career in research.



Malay Nanavaty

The College of New Jersey

Project: *Uncovering the Biochemical Function of CYP72A14 in Plant Stress Metabolism*

Mentor: Leeann E. Thornton

Receiving a SURF award provides me with the unique opportunity to continue my research involving the genetic engineering of cyanobacteria over the summer. With this experience, I will be well equipped to propel my professional career in plant research forward. I am excited to make use of all the opportunities provided by this amazing organization.



Kristen Edgeworth

Kenyon College

Project: *Assessing the Functional Conservation of ELF3-like and COP1-like Proteins from Bryophytes to Angiosperms*

Mentor: Karen A. Hicks

Having the honor of conducting research this summer with a SURF award is the first step toward my future career as a plant scientist. Through this oppor-



Claire Ravenburg

James Madison University

Project: *Investigating a Putative Dual-Function β -amylase Gene in Rice*

Mentor: Jonathan Monroe

Receiving a SURF award will enable me to further explore my interests in plant biology through summer research at James Madison University. This experience is invaluable and will enhance my undergraduate education while also preparing me for my ultimate goal of earning a PhD. I am excited to present my work in 2020! ■

SURFers from Primarily Undergraduate Institutions



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