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ASPB News

THE NEWSLETTER OF THE AMERICAN SOCIETY OF PLANT BIOLOGISTS

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President's Letter

Service and Recognition in Our Society

BY RICHARD DIXON
University of North Texas, Denton

On the front page of the November/December 2015 issue of the *ASPB News,* alongside my first President's Letter, was an exhortation to "On your mark, get set…nominate!" ASPB currently has about 4,000 members and is hoping to greatly increase this number through its new Plantae portal. It is really essential that members feel they are part of something important and are inspired to contribute to the Society's purpose. Since joining ASPB's management team, I have been very impressed with the dedication and hard work of the staff and large body of volunteers who constitute the chairs and members of the Society's various committees. These people give freely of their time, often on weekends, to brainstorm, argue, plan, and evaluate all aspects of the Society's operations. This effort is much more rewarding if they can see that the membership itself is engaged in the Society's activities.

Rick Dixon

So how can members express their interest in and support for the Society? Between the annual meetings, when members engage directly with one another in sessions and workshops, the best opportunity is through the nominations process. ASPB has many awards (more than 15), some awarded annually, some less frequently. Each award is handled by a dedicated committee with four to six members who meet, usually by teleconference, to review nominations. The 2016 Call for ASPB Award Nominations was sent to all members on January 4, 2016, and nominations will be due by Wednesday, February 17.

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

The PRL's Golden Anniversary

50 Years of Plant Science Exploration and Discovery

BY BETHANY HUOT
College of Natural Science, Michigan State University

Imagine a Gordon Research Conference crossed with a family reunion and you will have a pretty good idea of what it was like at the recent 50th anniversary celebration of the Michigan State University DOE-funded Plant Research Laboratory (PRL). Inspirational talks of current and future science intermixed with nostalgic reminiscences of the days, people, and science of the past. As a current graduate student of the PRL, I was both impressed and inspired by the history and future of this amazing group of plant scientists, and I thought I would share some of the highlights with you.

The original PRL "gang" in June 1966. Left to right: Phil Filner, Peter Wolk, Joe Varner, Jan Zeevaart, John Scandalios, Hans Kende, Anton Lang, Lloyd Wilson, Derek Lamport.

Tanya Pietrass sharing the long history between the PRL and DOE.

The Great Explorers

The list of alumni and current faculty of the PRL is impressive. It includes several members of the National Academy of Sciences, several of whom—Debby Delmer, Natasha Raikhel, and Chris Somerville—gave talks at the event. Although I was familiar with these scientists' names and some of their signature discoveries, it was fascinating to hear firsthand, personal accounts of their individual journeys in science. One thing I found they have in common is that they are all explorers. Debby Delmer, who was one of the first women hired by the PRL, said, "I decided that I'd look for something that looked like a big challenge" when first starting up her own lab. I guess she must have felt that after discovering the plant biosynthetic pathway for tryptophan as a graduate student and being one of the first to purify sucrose synthase and study its role in sucrose synthesis and degradation as a postdoc, it was time for a real challenge!

Natasha Raikhel's story was moving. Having come from the Soviet Union with her family in 1978, Natasha had to face the challenges of learning a new language and a new culture along with starting over as a postdoc here in the United States. Still, she did not seek something easy when it came to her scientific endeavors. She described the work she proposed to do during her PRL job interview as "impossible," saying she knew she had no chance to get the position because she "basically came from nowhere…and I was talking about something which is not really possible to do." Of course, she did get the job, which she says was because "the question was not bad" and also because they "saw something in me that interested them." I think that makes an impressive statement not only about Natasha but also about the group who hired her.

Chris Somerville is, of course, one of our more famous alumni, being credited as one of the instrumental drivers behind the development of *Arabidopsis thaliana* as a model system in plant biology. Chris told us that he and his wife, Shauna, set out with the explicit idea of establishing a new field. Looking back on it now, he said, "We were a couple of crazy kids from Alberta that didn't know any better." Students from more sophisticated schools surrounded by "ultrasuccessful, high-profile scientists" would have known that "you can't just go and make a paradigm change." They went for it because they "just didn't know

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any better," and "it turned out to be quite successful"—maybe the understatement of the event!

The "Heart and Soul" of the PRL

I think all of the alumni would agree that it is more than science that binds them together; it is the atmosphere of the place. Natasha described the environment at the PRL as both "stimulating and challenging." If you talk to any of the PRL alumni, or just sit at a table with them and listen to them chat, you quickly realize that they are more than colleagues, they are friends. This sense of togetherness did not happen by accident; it was achieved through the intentional, deliberate actions of the first two directors, Anton Lang and Hans Kende, and was carefully nurtured by those who followed them.

Debby Delmer recalled that when she first joined the PRL, Anton Lang gave her the official rules of the PRL (read with Anton's accent):

1. "Thou will submit thy papers to me before they get submitted" [to a journal], and
2. "Ve shall drink coffee every morning at 10 a.m."

She said, "If there was one thing that brought us together, I think it was those amazing coffee hours in the early days. The people who were there. We sometimes just laughed and joked, but we often sat and asked each other what we were doing. Asked each other questions about problems. What techniques for this? What to do about that? It was an amazing time."

Natasha spoke of Hans Kende as "the heart and soul of the PRL," referring to him as her "guru"

The current PRL crew. Top row, from left: Danny Ducat, Mike Thomashow, Cheryl Kerfeld, and David Kramer. Middle row, from left: Beronda Montgomery, PRL Director Christoph Benning, Sheng Yang He, and Jonathan Walton. Bottom row, from left: Federica Brandizzi, Gregg Howe, Jianping Hu, Kenneth Keegstra, and Peter Wolk.

who taught her not only to be the scientist she has become, but also how to be a "practical and very thoughtful leader." While Hans was the nucleating factor for the group, Chris Somerville promoted the open sharing and communication that solidified the team mentality. Chris himself mentioned the way every faculty member came to visit his lab when he first arrived at the PRL and told him to feel free to make use of anything in their labs he might need to get going. "It was an incredibly supportive environment for young faculty and something I've tried to propagate when I became an old faculty."

And it was not just science that was a team event. There was winter camping, the Oakhill gang, ballroom dancing, the gym ladies, the April birthday crew, and, of course, the PRL Christmas party. As Natasha recounted, "These Christmas parties people never missed. We loved it because we would come with our children…. And it was the only time where students and postdocs were allowed to make fun out of us up front. And boy, they took their time!"

Natasha also shared that she did not realize until she left the PRL exactly how special this atmosphere was: "We take things for granted. We just sort of thought that's how it's supposed to be. But later I knew that it was an enormous amount of work." It was clear from these stories and others that a great deal of time was invested in identifying and recruiting scientists with great potential and then providing them with an environment that would nurture and enable them to thrive. The result? Fifty years of amazing, groundbreaking science.

Into the Future

The founding model of the PRL, as described by former PRL Director Mike Thomashow, was "to conduct high-quality, basic plant biology and to train the next generation of scientists" and also "to make sure that the students were well versed in the latest thinking in plant science, to incorporate cutting-edge methodologies into their research, and when needed, to contribute to the development of novel experimental approaches and technologies." As all good scientists know, things change over time, and adaptation is key for survival. The PRL is no exception. Over the 50 years of the PRL's history, we have made major shifts to maintain our position at the leading edge of plant science. In the transition between the 1970s and 1980s, it was a shift away from physiology and toward molecular biology. Then there was a significant turnover in faculty in the early 1990s that resulted in a marked shift in research topics.

The most recent challenge? A change in our DOE-funded research to focus on "basic research of light energy capture, conversion, and deposition into energy-rich molecules," which has been met by a team-centered approach to address three project themes within this scope. For those of you who were not able to attend the PRL 50th anniversary celebration, I would like to give you an idea of what this new direction in big science within the PRL looks like by taking you on a virtual tour through three labs representing the three new PRL project themes.

The first stop on our tour is a place I like to call Kramerland. Kramerland is a magical place where scientists, engineers, and computational people are all "bumping into each other." As David Kramer admitted, this creates an atmosphere that may be chaotic at times but also is essential because "the scientist may know what the big question

is but doesn't know how to solve it. The engineer may know how to solve things but not know what the big questions are. And when they get to work together, they iterate toward something that's solvable, that's tractable." The amazing technology invented by the Kramer crew is driven by their goal of tackling the big question of how to achieve robust photosynthesis in dynamic environments, but the applications of the tools they develop extend way beyond this. In Kramer's words, "Integrating science, technology, and computation all in one: that's a theme. As we're moving forward, we're revealing the next big question."

The second stop on our tour takes us to the Kerfeld lab. As described by Cheryl Kerfeld, her team is working to "gain a mechanistic understanding of fundamental processes within photosynthesis—light perception, photoprotection, and carbon fixation—and their interrelationships. Using concepts borrowed from engineering such as modularity, which in the context of biology includes protein domains, metabolic pathways, and compartments, our team of PRL investigators is devising strategies to build 'smart' photosynthetic systems by (re)engineering modules and their connections."

The last stop on our tour takes us to the Howe lab. As Gregg Howe shared with us, his lab is part of a team studying how plants and cyanobacteria "sense and respond to changes in carbon status" as well as "carbon partitioning into different sinks." The most recent advance made by this group was to understand the role of photosynthesis in carbon partitioning in growth–defense trade-offs mediated by jasmonate and light signaling pathways. Although future work probing the effect of various environmental conditions may reveal currently unknown costs, this is a huge step toward engineering plants that are able to both grow and defend.

While the DOE-funded projects form the foundation of PRL research, PRL labs continue to contribute to a wide breadth of plant biology research both as individual labs and through collaborations within and outside the PRL. Our period of transition continues with a new director, Christoph Benning, at the helm. Having worked as a PhD student in the lab of Chris Somerville, Christoph has a long history with the PRL and so has a deep understanding of its rich heritage. His vision for the PRL moving into the future is to maintain that standard of scientific excellence and community that will continue to produce cutting-edge, high-quality plant research and provide an ideal environment for the training of a new generation of exceptional plant biologists.

Did you know?

- The PRL has had seven directors since its founding in 1965: Anton Lang, founding director (1965–1978); Hans Kende (1978–1980, 1984–1988); Charles Arntzen (1980–1984); Peter Wolk (1988–1992); Ken Keegstra (1993–2006); Mike Thomashow (2006–2015); and current director Christoph Benning (appointed August 2015).
- The PRL is operated jointly by Michigan State University and the Department of Energy (formerly the Atomic Energy Commission).
- During the past 50 years, more than 250 graduate students and 550 postdoctoral research associates received training and conducted research in the PRL. These alumni are well represented among world leaders in plant biology.
- PRL faculty members have served in leadership roles in many areas of the plant science community, including election as president of the American Society of Plant Biologists and the International Society for Molecular Plant–Microbe Interactions.
- Since its inception, 32 faculty members have held appointments in the PRL, 25% of whom have been elected to the U.S. National Academy of Sciences.

In Conclusion

To summarize, I learned quite a lot from the PRL 50th celebration, including the following:

Lesson 1: Big science is done by people who are not afraid to ask big questions. It is not enough just to dream big: you have to actually step out on that limb and *do* big. We all get into science with big dreams, big aspirations, and big questions in an effort to understand the world around us and potentially use that knowledge to make it a better place. But for many of us, it does not take long until we learn better than to challenge the established paradigms and begin to question our capacity to actually make a meaningful difference. The Great Explorers of the PRL have challenged me to not give up on these dreams, regardless of how competitive, risky, or daunting the task may be.

Lesson 2: Great explorers are most productive when given a vibrant, collaborative community in which they can thrive rather than merely survive. Although this may seem simple in concept, it takes a lot of effort and leaders with commitment and vision to both establish and maintain such an environment. In my opinion, the collective contribution to plant science made by PRL members both past and present provides substantial evidence to support that the effort is well worth it.

Lesson 3: The key to long-term survival is a strong, unwavering commitment to our fundamental, core values. Because change is the only constant, adaptation is a necessary, although sometimes painful, process. However, each new challenge we face brings with it the opportunity to rise above, to reach higher, to do even greater things. Here in the PRL, we are meeting these challenges head-on with determination, big ideas, and teamwork. As we continue in our most recent and most fundamental transition to date, we will be diligent in embracing the changes that lift us higher and in safeguarding against those that dilute and deteriorate the essence of who we are. For if in adapting to survive we sacrifice the fundamental, basal elements that define us, we have not truly survived at all.

See photos of the PRL 50th anniversity celebration at http://bit.ly/1IkjpVP. ■

PRESIDENT'S LETTER
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Please think hard about people whose work you respect and feel is important, whether for lifelong service to plant biology (e.g., Corresponding Membership or the Fellow of ASPB Award), for a specific area of our science (e.g., the newly endowed ASPB Innovation Prize for Agricultural Technology), or for exceptional promise early in one's career (e.g., the Eric E. Conn Young Investigator Award or the Early Career Award). Also, don't forget to nominate people who have shown excellence in education.

Finally, please let us know of other awards categories that you believe merit recognition but are not covered by the present list. ASPB management is actively considering new fundraising strategies for the Society, and endowment of new awards categories may appeal to more senior members looking to give back to the Society.

In addition to ASPB's own awards, the Society's management team often nominates individuals, or groups of individuals, for prestigious international awards such as the World Food Prize (awarded to Marc Van Montagu, Mary-Dell Chilton, and Robert Fraley in 2013) or prominent national awards such as the National Medal of Science and National Medal of Technology and Innovation. These nominations are submitted by the Science Policy Committee; this process would certainly be enhanced by more input from the membership.

This gets me to thinking about the various ASPB committees and ways in which members can serve the Society through participation on these committees. The committees are broadly divided into governance and nongovernance committees. The governance committees are the Board of Trustees and the Constitution and Bylaws Committee. The nongovernance committees are the Education Committee, International Committee, Membership Committee, Minority Affairs Committee, Program Committee, Publications Committee, Science Policy Committee, and Women in Plant Biology Committee. If you are not already familiar with the remits of these committees, please check the ASPB website to find summaries in the Constitution and Bylaws section.

Between now and October 1, 2016, Sally Mackenzie, the current president-elect, will be considering appointments to fill vacancies on many of these committees. Please consider making inquiries or nominations, either to Sally or to the relevant committee chairs. New blood and new ideas are critical for moving the Society forward. I particularly encourage members from industry to both nominate and volunteer. ASPB currently has about 100 members from industry (too few, in my opinion), and we particularly value their special insights and experience.

One of ASPB's major services to its members is advocacy for plant biology through dialogue with legislators at both the federal and state levels and in the broader community through outreach and education. The Science Policy Committee generally spearheads the approaches to legislators, but the membership at large can, and does, contribute in this area. The important point is that we deliver a clear and coherent message. The Society has supported the production and dissemination of the Decadal Vision document (http://bit.ly/1Fj1IC3), which provides just such a message and charts a path for plant biology research over the next 10 years. But promotion of this agenda, which should not in itself be seen as in any way controversial, is facing some pushback from certain groups who are opposed to many aspects of plant biotechnology. Their tactic has been to use the Freedom of Information Act (FOIA) to obtain e-mails from plant biologists who have been identified as having links to industry in an attempt to paint them as pawns and to discredit their strongly held beliefs in the importance of technological advances. A similar strategy had previously been targeted at climate change scientists.

As we are all aware, no new technology is ever without risks, and a vigorous debate about risks versus benefits is appropriate and welcome. The danger of the FOIA approach is that it either deliberately or collaterally drives a wedge between academia and industry at a time in history when interactions between the two are increasingly needed to develop broadly adapted crops and new, carbon-neutral sources of feed, fiber, and fuels.

The debate in the press and the blogosphere appears, in my opinion, to completely misunderstand the broad continuum of types of interactions between academia and industry; these vary from relatively open collaborations through funding agreements essentially little different from those supported by a federal agency to more restrictive agreements for, for example, testing of commercial cultivars. We should condemn any examples of academic scientists who "sell out" their principles and beliefs for monetary gain, but I have yet to be convinced of any real examples in our field. Why do we have land grant universities and offices of research and economic development? Why are links with industry regarded as just fine, or even essential, in engineering or computer science? This is a debate in which our membership needs to stand up and speak with a clear voice.

Please think about service to our Society beyond just nominating people for awards and committees. We need to be more active in the public debate; after all, it's about us and what we do. Please join those of our members who have contributed to blogs in support of plant science in all its aspects, and be active in engaging with your legislators at both the state and federal levels. Let them know that plant biology research is going to be critical for economic development over the next 20 years and that although their constituents are increasingly concerned about the negative information being disseminated, plants provide the key to economic development and future prosperity, as well as to a livable planet for future generations. ■

Plant Biology 2016

JULY 9–13 | AUSTIN, TEXAS

Get Ready for Plant Biology 2016

Preparations are well under way for Plant Biology 2016, to take place July 9–13 in Austin, Texas. As always, this event has something for everyone. This conference is designed to provide you with the latest research and developments in plant biology plus opportunities to have more than a bit of fun. Here's a sneak peek at what you can expect from this year's event:

- More than 1,300 scientists from nearly 40 countries
- 1,100+ posters
- Five major symposia, 30 minisymposia, and 14 workshops
- 100+ exhibitors demonstrating the latest technologies and services
- Lots of networking events for you to meet others and share ideas
- Special workshops specifically designed to help you advance your career in plant biology.

Don't forget about the location! Visitors rave about Austin's legendary live music, burgeoning restaurant scene, unique culture, and many other things that you just have to experience for yourself to truly understand what makes Austin so Austin.

Networking, Networking, and More Networking

Attendees consistently give Plant Biology's networking events high marks. Each event will provide you with opportunities to increase your connections within the industry. You'll make connections with like-minded scientists with whom you can share ideas and research. Here are some of the best opportunities, but stay tuned as more events get added to the schedule in the months ahead:

1. Join your friends for morning coffee in the poster hall Sunday, July 10, through Tuesday, July 12.
2. Meet up with colleagues at the new Plantae Pavilion.
3. Attend the town hall meeting on Tuesday, July 12, and join in dialogue and feedback with attendees and ASPB's elected leadership.
4. Don't forget the biggest networking event of them all—the annual party! This year's evening event will be better than ever and will include a bowling lane. Since 2014, the band for the meeting has been the Austin Nines, and we are proud to say they will rock Austin at the annual party.

Symposium I

Small RNA Regulation of Genes and Development

Organizer: Craig Pikaard
Indiana University
(Gibbs Medal Symposium)

The discovery of small regulatory RNAs, including microRNAs (miRNAs) and short interfering RNAs (siRNAs), has had a profound impact on our understanding of how genes and transposons are regulated during development. The Gibbs Medal Symposium will feature talks by several leaders in the field whose laboratories are investigating the biogenesis, turnover, and varied functions of miRNAs and siRNAs in plants.

Speakers

Xuemei Chen, University of California, Riverside

Mike Axtell, Pennsylvania State University

Rob Martienssen, Cold Spring Harbor Laboratory

Symposium II

Developing Healthier Foods: Quality, Nutrition, and Molecular Gastronomy

Organizer: Harry Klee
University of Florida

Speakers

Andy Allan, Plant and Food Research

Cathie Martin, John Innes Centre

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Find out more about Plant Biology 2016 (#PlantBio16) at plantbiology.aspb.org.

Plant Biology 2016

JULY 9–13 | AUSTIN, TEXAS

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Symposium III

New Biological Insights from Large-Scale Biology

Organizer: Ute Kraemer
The Plant Cell

This symposium will highlight how high-throughput genomic, proteomic, metabolomic, and modeling approaches are providing novel insights into principles of biological phenomena. The speakers will show that state-of-the-art methodologies coupled with computational approaches can reveal complex biological networks in all areas of plant biology, including development, metabolism, interactions with the abiotic and biotic environment, and dynamics in the molecular ecology and evolution of plant populations. Conceptual slides will be used to address a general plant biology audience and focus on novel biological insights in the context of how they were obtained using large-scale biology tools.

Speakers

Seung Yon (Sue) Rhee, Carnegie Institution for Science

Siobhan Brady, University of California, Davis

Zoran Nikoloski, Max Planck Institute of Molecular Plant Physiolog

Blake Meyers, University of Delaware

Symposium IV

Long Distance and Cell-to-Cell Signaling

Organizer: Philip Benfey
Duke University

To respond to developmental and environmental changes, plants use a range of signaling strategies. Molecules that act as signals include hormones, peptides, proteins, and RNAs. Some act between adjacent cells, whereas others function between distant organs. Speakers in this symposium will describe their research aimed at uncovering the mechanisms behind both short- and long-range signaling in plants.

Speakers

Yoshikatsu Matsubayashi, Nagoya University

Jennifer Nemhauser, University of Washington

Yrjö Helariutta, Sainsbury Laboratory

Symposium V

ASPB President's Symposium: Plant Specialized Metabolism

Organizer: Richard Dixon
University of North Texas and
ASPB President

One of four major priorities in ASPB's Decadal Vision document, *Unleashing a Decade of Innovation in Plant Science,* is to develop an understanding of the synthesis and biological purposes of plant-derived chemicals. Although about 30% of the genes in most plant genomes are involved in metabolism, the specialized metabolites of only a small number of the approximately 400,000 species of flowering plants on our planet have been characterized. Plant specialized metabolism has, for many years, been treated as a "specialized" subject, primarily because many metabolites are restricted to specific plant families or occasionally even species and therefore are not seen to be of general interest to plant scientists, of broad relevance to plant biology, or attractive to funding agencies. This situation is now changing. The purpose of the 2016 President's Symposium is to highlight aspects of plant specialized metabolism that relate to broader aspects of biology, namely genome organization, evolution, ecology, and exploitation for biobased products.

Speakers

Ann Osbourn, John Innes Centre

Joe Noel, Salk Institute

Ian Baldwin, Max Planck Institute for Biogeochemistry

Gregg Beckham, National Renewable Energy Laboratory ■

Find out more about Plant Biology 2016 (#PlantBio16) at plantbiology.aspb.org.

Save the Date!



The 5th Pan American Congress on Plants and BioEnergy

August 4–7, 2016

Santa Fe, New Mexico

Since its inception in 2008, the Pan American Congress on Plants and BioEnergy has strived to build bridges and encourage collaboration among scientists throughout the Americas to discuss the increasingly important topic of bioenergy. The fifth congress, taking place August 4–7, 2016, in Santa Fe, New Mexico, will continue to build on this essential goal. If your interests, research, or work involve bioenergy and you haven't attended this meeting in the past, you owe it to yourself to seriously consider attending this event.

One of the few regularly held conferences on this topic, the congress attracts academics, scientists, and representatives from the industrial sectors in the field of bioenergy from all the major Pan American countries—including the United States, Brazil, Mexico, Argentina, Chile, and Canada, to name just a few.

What's New for 2016?

In 2016, we'll be focusing on the importance of biofuels and the need to make these alternative fuel sources more economically viable by increasing sustainability while reducing costs. Additionally, we'll discuss emerging technologies in the industry.

There's Fun to Be Had, Too

The congress isn't all sessions. There will be plenty of time to take advantage of everything Santa Fe has to offer—great food, amazing scenery, and beautiful artwork. And plenty of networking events will provide you with the opportunity to meet your peers from around the world and share ideas.

Call for Abstracts

Submissions will open in February 2016, so start thinking about your abstracts now.

More to Come

More information about the 5th Pan American Congress on Plants and BioEnergy will be available soon, so keep an eye out for more details. Registration opens February 2016. ■

ASPB Members Elected to 2015 Class of AAAS Fellows

Thirteen members of the ASPB community were elected to the 2015 class of AAAS fellows. Each year, the AAAS Council elects fellows on the basis of their contributions to science and technology in the areas of research; teaching; technology; services to professional societies; administration in academe, industry, and government; and communicating and interpreting science to the public.

Fellows are AAAS members "whose efforts on behalf of the advancement of science or its applications are scientifically or socially distinguished." New fellows will be honored with a certificate and a blue and gold rosette to symbolize their distinguished achievements on February 13, 2016, during the AAAS annual meeting in Washington, D.C.

Congratulations to the following members of the plant science community:

Jerry David Cohen
University of Minnesota

Michael Andrew Grusak
USDA–ARS/Baylor College of Medicine

Hailing Jin
University of California, Riverside

Watson M. Laetsch
University of California, Berkeley (Retired)

Philip Gordon Pardey
University of Minnesota

Reuben J. Peters
Iowa State University

Daniel P. Schachtman
University of Nebraska–Lincoln

Ravi Prakash Singh
International Maize and Wheat Improvement Center (Mexico)

C. Neal Stewart, Jr.
University of Tennessee

Joe M. Tohme
International Center for Tropical Agriculture (Colombia)

Zhiyong Wang
Carnegie Institution for Science

Frank F. White
University of Florida

Roger Philip Wise
USDA–ARS/Iowa State University

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.

Molly Hanlon

Title: PhD Candidate
Place of Work or School: Penn State University
Member Since: 2009
Research Area: Root Biology

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

I always tell people that ASPB allows you to be part of something that's bigger than what you see on a regular basis in your lab, your program, or your institution. Whether it's interacting with others in the field or just keeping up with pertinent developments, membership makes it easier to be an active and knowledgeable member of the community.

Was someone instrumental in getting you to join ASPB?

My undergraduate adviser at Allegheny College, Catharina Coenen, was always a member and active participant in ASPB, so I was following her lead when I joined.

Why has being a member of ASPB been important?

I've met great collaborators and made great friends at meetings. I've also been exposed to all kinds of different career paths that I could follow after my PhD.

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

Surround yourself with great mentors! I've had wonderful support and guidance from many people whom I consider mentors, including those whom I've had formal relationships with and those whom I've just gotten to know through collaboration and interaction. They've challenged me and guided me, and this, more than anything, has helped me really enjoy being a plant biologist.

What are your hobbies?

When I'm not in the lab, I'm usually swimming, riding my bike around the roads of central Pennsylvania, or playing a game of soccer.

What do you think is the most important discovery in plant biology over the past year, and why?

I was, and still am, really fascinated by the results in Gao et al. (2015) about the role of ABP1 in development. I've always thought of ABP1 as this really important but totally mysterious player in the auxin signaling pathway, and this paper made me rethink all of that. The real importance is that new technologies can really change the way we view and think about questions related to our research.

What do you think is the next "big thing" in plant biology?

I think we're going to see a move toward studying the ins and outs of natural variation. We've spent a long time using mutant lines of Arabidopsis to further our basic understanding, but looking at natural populations and getting a better picture of what's going on at a whole plant or system level will really enhance our knowledge. With all of the new technology in phenotyping and analysis, coupled with all of the advances in every kind of -omics, we're at a point where we can detect and begin to explain nuances between genotypes. Combining this with new forms of precision genome editing will help us see how genotype and phenotype are linked in a new light and with extreme detail.

What do you still have to learn?

I have so much to learn! I've had the opportunity to work with many great scientists and specialists in different fields, and I learn something new from all of them almost every day. I've been working to learn how to handle and interpret the large amounts of data we've been collecting in experiments, and I know I'll have to continue to learn more about these practices as the amount of data we work with continues to increase. On a more personal level, I'm going to have to learn where I best fit in within the plant biology community. As I move from being a trainee to an independent scientist, I'm working to figure out both where I'll be happy and where my skills can best advance science and society.

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

Societies should help provide infrastructure in which scientists can continue to innovate and make new discoveries. One of the most dangerous things we can do in science is to stop challenging assumptions, and I think the same goes for societies. This could mean providing new and different

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Policy Update

BY LAUREN BROCCOLI
Lewis-Burke Associates, LLC

Congress Passes Budget Deal, FY 2016 Appropriations

In November, the House and Senate passed the *Bipartisan Budget Act of 2015*, which alleviated sequestration for fiscal years (FY) 2016 and 2017 and extended the nation's debt limit until March 2017. Specifically, the legislation increased discretionary spending by $80 billion over two years, split evenly between defense and non-defense spending. Overall spending levels are set at $1.067 trillion for FY2016 and $1.069 trillion in FY2017. This legislation provided the framework for the FY2016 omnibus appropriations bill, which passed Congress on December 18 and was signed into law by President Obama.

The omnibus provided increases for the ASPB priority agencies detailed below. *All figures are compared to FY2015 enacted levels:*

- NIH received $32.1 billion, an increase of $2 billion, or 6.6 percent.
- DOE Office of Science received $5.35 billion, an increase of $279 million, or 5.5 percent. The Biological and Environmental Research (BER) program received $609 million, an increase of $17 million (2.8 percent). DOE Office of Science's largest funding increase was for Basic Energy Sciences, which received $1.849 billion, or $116 million (6.6 percent) above FY2015, equal to the president's request.
- USDA National Institute of Food and Agriculture is funded at $1.326 billion, an increase of $37 million (2.9 percent). The Agriculture and Food Research Initiative received $350 million, a significant increase of $25 million (7.7 percent).
- NSF received $7.46 billion, an increase of $119 million, or 1.6 percent.

The catch-all spending bill is the result of weeks of closed-door negotiations among Republican and Democratic leaders who were grappling with hot-button policy issues that some legislators wanted included in the bill. In the end, most of the controversial provisions, including barring Syrian refugees from entering the United States, blocking federal funding for Planned Parenthood, and removing a ban on federal gun control research, were not included in the omnibus.

While the *Bipartisan Budget Act of 2015* provides a budgetary framework for next year's appropriations process, a budget battle may still be unavoidable in FY2017 for a couple of key reasons: The FY2017 budget discussions will occur during a presidential election year, when Congress traditionally has a difficult time moving legislation, and the FY2017 budget cap increases discretionary spending by only $3 billion, or 0.3 percent, above FY2016. In essence, funding for federal programs in FY2017 will remain flat, and any significant increase in one program would require cutting another program.

Sources and Additional Information

- For more information, see the Lewis-Burke Associates analysis of the FY2016 omnibus at http://tinyurl.com/gswoea9.
- The text of the *Bipartisan Budget Act of 2015* is available at http://tinyurl.com/oo9a8eg.

Senate Agriculture Committee Holds Hearing on Biotechnology Regulation

On October 21, the Senate Agriculture Committee held a hearing entitled "Agriculture Biotechnology: A Look at Federal Regulation and Stakeholder Perspectives." The committee convened two panels for a diversity of perspectives. The first panel comprised agency officials from USDA, the Food and Drug Administration, and the Environmental Protection Agency. The second panel comprised representatives from organic and conventional producers and other stakeholder groups. The hearing focused on the safety of genetically modified organisms (GMOs) and whether legislative intervention was needed for labeling of GMOs. The vast majority of senators present at the hearing agreed that the most important thing was to be guided by the "best available science."

This hearing marks the first time in 10 years the Senate committee has reviewed biotechnology. The review comes in connection with a broader, government-wide assessment of how biotechnology is regulated at the federal level.

Source and Additional Information

- More information about the hearing, including an archived webcast and full testimony statements, can be found at http://tinyurl.com/ocuss96.

Foundation for Food and Agriculture Research Hosts First Public Meeting

On October 28, the Foundation for Food and Agriculture Research (FFAR) held its first public session during the board of directors meeting. The stated goal of the session was for outside organizations to offer comments on the seven initial research target areas identified by the FFAR board. The main themes of the comments were the value of public–private partnerships, zoonotic disease and antimicrobial resistance, basic versus applied portfolio balancing, and the importance of cross-disciplinary science.

Dr. Sally Rockey, FFAR executive director, also announced two new initial projects FFAR will be funding. First, the foundation plans to launch the New Innovators in Food and Agriculture Science program with the stated purpose of giving substantial, unfettered awards

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to early career investigators to incentivize them to remain in the field of agricultural research. The second project is the Rapid Response program, which will fund emerging or time-sensitive areas of research in a more nimble way than federal programs are able to do. Both programs anticipate publishing calls for applications in the very near future.

Sources and Additional Information

- To view the text of public comments, visit http://tinyurl.com/h2v62nk.
- To view the text of ASPB's private comments to FFAR board member Debby Delmer, visit http://tinyurl.com/oay9o8p.

Presidential Memo: Mitigation of Environmental Harm

President Obama recently released a memorandum establishing a new "net benefit goal" for natural resource use that directs five federal agencies to streamline regulations and promote mitigation efforts. The "Mitigating Impacts on Natural Resources from Development and Encouraging Related Private Investment" memo was sent to the Departments of Defense and Interior, as well as to the USDA, Environmental Protection Agency, and National Oceanic and Atmospheric Administration. The net benefit goal requires no net loss of water, wildlife, land, or ecological resources from federal actions and affects a wide range of activities from government construction to energy production on public lands. As part of the directive, the USDA Forest Service must develop a mitigation handbook, whereas the Fish and Wildlife Service must finalize all mitigation policies within one year.

Source and Additional Information

- The full memorandum is available at http://tinyurl.com/p5wdbhz.

USDA Announces New Partnership with Association of Science-Technology Centers

The USDA announced a new memorandum of understanding (MOU) with the Association of Science-Technology Centers (ASTC) that would provide USDA agricultural science and research resources for ASTC members. The ASTC is an international organization of science centers, museums, companies, and other groups interested in informal science education. The MOU is part of USDA's expanded extension efforts aimed at workforce development. This particular initiative was spearheaded by USDA Undersecretary for Research, Education, and Economics Dr. Catherine Woteckl, who credits her interest in agricultural sciences to childhood museum visits.

Source and Additional Information

- More information about the new partnership is available at http://tinyurl.com/pzwgeze.

NSF Releases LTER Solicitation: Three New Sites

NSF released a solicitation for its cross-foundation Long-Term Ecological Research (LTER) program to support three new LTER sites: one with a focus on arid or semiarid ecosystems and two focused on coastal or ocean ecosystems. The purpose of the LTER program is to "address ecological questions that cannot be resolved with short-term observations or experiments" at specific sites; supported research "emphasizes the study of ecological phenomena" over a long period of time. NSF anticipates a total funding amount of $3.15 million for the first year of funding for the three estimated awards. Preliminary proposals are due February 1, 2016.

Source and Additional Information

- The full solicitation is available at http://tinyurl.com/ptp2bsh.

USDA Report on the Impact of Climate Change on Food Security

On December 2, USDA Secretary Tom Vilsack released the agency's newest report regarding the impact of climate change on global food security at the United Nations Conference of the Parties on climate change (COP-21) in Paris. The report details production and transportation disruptions, price increases, and decreased food safety as the main adverse effects of a changing climate. The report also details effective adaptations to minimize these risks for the global food system.

Source and Additional Information

- The full report is available at http://tinyurl.com/zsu5jje. ■

MEMBERSHIP CORNER
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avenues by which we, as scientists, communicate and share information with each other or radically changing the way in which we publish and disseminate our data. Science is facing many challenges from the general public, and societies can help to ensure that we have the best conditions in which to tackle these challenges and move forward. ■

Reference

Gao, Y., Zhang, Y., Zhang, D., Dai, X., Estelle, M., and Zhao, Y. (2015). Auxin binding protein 1 (ABP1) is not required for either auxin signaling or Arabidopsis development. *PNAS* **112:** 2275–2280.

ASPB Educates Congress

BY TYRONE SPADY
Legislative and Public Affairs Director, ASPB

As part of an ongoing effort to educate members of Congress and their aides, ASPB partnered with the National Coalition for Food and Agricultural Research (NCFAR) (www.ncfar.org) on two recent congressional briefings.

The first ASPB–NCFAR joint briefing was held October 5, 2015, and featured ASPB member and prominent agricultural biotech advocate Kevin Folta, who is professor and chairman of the Horticultural Sciences Department at the University of Florida, Gainesville. After a series of sensational articles in the national press scrutinizing the relationship between academics and "Big Ag," ASPB invited Kevin, who was relentlessly attacked as the poster child for corporate corruption of agricultural academics, to discuss the appropriate role of scientists in our public discourse. He presented in conjunction with Kent Messer, an economist, who discussed the release of a new Council for Agricultural Science and Technology (http://www.cast-science.org/) issue paper that examines what is known about consumer reaction to process labels, identifies the legal framework for process labeling, and provides policy recommendations that highlight when process labeling is beneficial or harmful to the agricultural sector and consumers (http://tinyurl.com/hebwtge).

In his presentation, Kevin pointed out that although the technologies thought of as "genetic engineering" have been used without incident for the past 30 years in medicine and 20 years in agriculture, these tools are much maligned in the current public discussion (http://tinyurl.com/hgfun8o). He argued that these technologies have been shown to be helpful to farmers, have kept food affordable, and even have had environmental benefits that outweigh their limitations. New technologies are poised to expand the usefulness of these tools to more people, especially in the developing world.

Although discussion of this science has dominated the public discourse, Kevin noted, there is little science being discussed. TV chefs, Oz doctors, and Food Babes, he went on, profit from propagating misinformation and fear, constructing compelling narratives that are thin on facts and soft on science. Scientists who attempt to correct the record are attacked and harassed through misrepresentation of documents obtained through public records requests. This distortion makes scientists reluctant to participate in the discussion, leaving the conversation to contentious sniping between activists and corporations. Kevin concluded that future policy decisions must be based on science, and our policy makers must connect better with the scientific community to sort reality from fiction in discussions around this and other key topics.

The following month, in collaboration with NCFAR and the American Phytopathological Society, ASPB brought Society member Jan Leach to D.C. on November 13 to conduct a briefing on plant microbiomes (http://tinyurl.com/oo3gguk). Jan is a plant pathologist studying plant–microbe and insect–plant–microbe interactions with a focus on understanding plant disease and insect resistance and susceptibility. She is university distinguished professor at Colorado State University, where she also serves as associate dean for research in the College of Agriculture.

During the congressional briefing, Jan discussed how plant microbiomes influence the responses of plants to pathogens, pests, and environmental stresses (drought, heat, and nutrient limitation), as well as the efficient use of water resources and the long-term health of soils. Modern technologies, such as high-throughput sequencing, computational biology, and many -omics technologies, are enabling exploration of the composition, function, and activities of microbiomes.

The application of these technologies has revealed a vast potential for exploiting microbiomes to sustainably increase crop quality and production and agroecosystem health, she argued. Rapid advances and the realization of these benefits for agriculture will require investing in interdisciplinary research and training in plant microbiomes, particularly to capture and decipher complex data reflecting plant microbe–environment interactions in diverse cropping systems. Given the technological and analytical advances resulting from study of the human microbiome, Jan told attendees that the time is right to promote an understanding of plant microbiomes targeted at improving agriculture.

Although ASPB has organized briefings in the past, NCFAR's unique strength lies in education and outreach initiatives like its highly successful Capitol Hill lunch-and-learn seminar series. Over the past decade, NCFAR's 105 seminars have reached more than 6,900 attendees. These seminars are part of a longer-term investment undertaken to build a stronger foundation of awareness and information for Hill staff and policy makers to help them be more informed about and supportive of agricultural research issues and, in particular, funding. ■

Council for Agricultural Science and Technology Annual Meeting Summary

BY DANIEL SCHACHTMAN
CAST Board of Representatives

I am your ASPB representative on CAST. CAST is the Council for Agricultural Science and Technology and is a nonprofit organization composed of scientific societies, many individuals, students, companies, nonprofits, and associate scientific and industry society members. The primary work of CAST is to organize scientists to write papers on different important topics. CAST assembles, interprets, and communicates credible science-based information to legislators, regulators, policy makers, the media, the private sector, and the public.

CAST is an interesting organization because the papers that it sponsors are in many different areas, including: animal sciences, food sciences, agricultural technology, plant and soil science, and plant protection. The communications produced each year cover most aspects of agriculture and take a number of different forms such as commentaries, issue papers, and task force reports.

Each year there is an annual meeting for the board of representatives, whose members are mainly scientists from participating organizations. This past year the meeting was held in Des Moines, Iowa, which is where the CAST office is located. A new executive vice president just took the helm, and so there was a strategic planning exercise as well as the normal business of discussing and mapping out a plan to tackle the writing of papers on important issues such as the regulatory environment in the United States and pollution due to fertilizer run off. This year the plant group was energetic and came up with six ideas for papers that could be written throughout the year pending approval from various CAST committees.

The meetings are interesting to attend because of the diverse range of scientists and policy makers who attend. Multiple speakers also participate to discuss issues such as the use of social media to disseminate messages and the current U.S. regulatory environment as it applies to biotech crops. This year we were privileged to attend a dinner at the World Food Prize Hall of Laureates. The spectacular refurbished Carnegie Library in Des Moines is where the World Food Prize is awarded each year and is a stunning well-preserved architectural landmark steeped in agricultural history and art.

If you as a member of ASPB have ideas for topics that CAST should consider writing papers or comments about please feel free to drop me an e-mail at Daniel.schachtman@unl.edu. ■

ASPB Responds to FDA Request for Information on Biotech Regulations

BY TYRONE SPADY
Legislative and Public Affairs Director, ASPB

On October 16, the Food and Drug Administration (FDA) released a Request for Information (RFI) on "Clarifying Current Roles and Responsibilities Described in the Coordinated Framework for the Regulation of Biotechnology and Developing a Long-Term Strategy for the Regulation of the Products of Biotechnology" (http://tinyurl.com/zogb4m6) and announced a public meeting. The RFI and meeting form the next step in a process initiated in July 2015 by the White House Office of Science and Technology Policy. At that time, a memorandum was issued directing the agencies that regulate biotechnology to update the Coordinated Framework, a comprehensive federal policy governing the safety of biotechnology.

The agencies involved in regulating these products include the Environmental Protection Agency, FDA, and USDA. For the purposes of the framework, *biotechnology* is defined as "products developed through genetic engineering or the targeted or in vitro manipulation of genetic information of organisms, including plants, animals, and microbes." Human drugs and medical devices are not covered by the policy.

In addition to being one of the few professional scientific societies to attend the public meeting, ASPB submitted a response to the RFI reaffirming the Society's support of the 1992 update of the Coordinated Framework but highlighting the importance of periodic review of biotech regulations. ASPB's comments emphasized the effectiveness of the current regulatory focus on the product rather than the process. One downside of the current regulatory system, however, is that it stifles innovation from start-up, small, and medium-sized companies as well as public and nonprofit research institutions and has resulted in the consolidation of commercialized biotechnology products within a small number of major companies. The full ASPB response can be viewed at http://tinyurl.com/hmzrp3l. ■

ASPB Joins Forces on NSF Incubator Grant

Next Generation Careers—Innovation in Environmental Biology Education

BY KATIE ENGEN
ASPB Education Coordinator

ASPB, through its Education Committee and aligned resources, looks forward to participating in the Next Generation Careers—Innovation in Environmental Biology Education (NGC) grant. This grant is sponsored by the Ecological Society of America (ESA). ASPB is pleased to have been invited to collaborate with ESA on this program which will advance undergraduate biology education.

Career Development

The NGC grant will seed a new network to support workforce development for college graduate career progression into environmental biology. New groups of professionals will be brought together through this Research Coordination Network (RCN) for Undergraduate Biology Education Incubator that include academic faculty, industry, government, and nonprofit organization personnel. The NGC team is directed by lead principal investigator Teresa Mourad (Ecological Society of America) and co–principal investigator Geri Unger (Society for Conservation Biology). By working together, the network will develop materials, programs, and career development tracks designed for 21st-century STEM professionals in environmental biology and inform the broader community of the nature of education and skills that are necessary for future jobs in this ever-changing field.

Academia's Limits

NGC recognizes that academia is able to absorb only a limited number of biology graduates. Data summarized by the American Society for Cell Biology show that fewer than 8% of entering PhD students become tenure-track faculty. The rest must find their way into industry, government, or other applied and nonscience jobs (Cyranoski et al., 2011; McCook, 2011). A recent study indicated that nearly one-fifth of life science students in the later stages of their PhD programs found faculty research careers to be less attractive than when they first started (Sauermann and Roach, 2012).

Disciplinary Society Collaborations

Disciplinary societies fill a special role in facilitating exchange and setting professional expectations and standards. The NGC project will work with the following environmental biology–based societies and their leadership to create interactive special sessions at societal meetings:

- American Society of Plant Biologists
- Botanical Society of America
- Ecological Society of America
- Society for Conservation Biology
- Society for Economic Botany
- Society for the Study of Evolution

NGC milestones slated for completion by January 2017 include

1. Two survey instruments and two survey summary reports on the perspectives of chairs of biology departments, career development officers, and higher education faculty
2. Report on analysis of job ads
3. Brief reports from disciplinary society meeting workshops
4. Incubator network workshop recommendations
5. Next Generation Careers article

NGC at Plant Biology 2017

NGC relies on interactive discussion sessions at disciplinary society annual meetings to set program goals and review progress. During Plant Biology 2017, there will be a small session for those interested in nonacademic career options. The hour-long session will be based on unified discussion guidelines and report formats from NGC. ASPB will share the findings of the NGC surveys, gather input on what a full-fledged RCN should look like, and determine the ways disciplinary societies might contribute. For more information on this session, contact Katie@aspb.org. ■

References

Cyranoski, D., Gilbert, N., Ledford, H., Nayar, A., and Yahia, M. (2011). The PhD factory. *Nature* **472:** 276–279.

McCook, A. (2011). Rethinking PhDs: Fix it, overhaul it, or skip it completely—Institutions and individuals are taking innovative approaches to postgraduate science training. *Nature* **472:** 280–282.

Sauermann, H., and Roach, M. (2012). Science PhD career preferences: Levels, changes, and advisor encouragement. *PLoS ONE* **7(5):** e36307.

U.S. Botanic Garden + ASPB = Creating a Plant Presence

ASPB Leading a Team to Produce Public Outreach and Education Materials

BY KATIE ENGEN
ASPB Education Coordinator

The U.S. Botanic Garden and ASPB, through its Education Committee, are working together to develop five new "edu-taining" activities using hands-on learning to help youngsters understand and appreciate plant science, its connection to everyday life, and its importance to a sustainable future. To expand the collaborative synergies, ASPB will bring together a team of organizations to create, pilot, and evaluate these new resources.

The target audience is third to ninth graders; at least one activity will be scalable for audiences outside that range. The five activities will combine to create a substantial plant presence at larger events. They will be piloted at the fourth USA Science & Engineering Festival (USASEF; www.usasciencefestival.org) to be held April 16–17, 2016, in Washington, D.C. Each activity will work independently for explorations in smaller settings.

As a founding USASEF official partner, ASPB has met with thousands of our exhibit's visitors at each USASEF event since 2010. This year, we are proud to expand our footprint and the overall presence of plants in the massive convention hall, thanks to science education and outreach specialists from

- U.S. Botanic Garden
- Botanical Society of America
- Donald Danforth Plant Science Center
- Society for Economic Botany.

Typically, USASEF is flush with engineering, human health, and physics-oriented presentations that ask, Why did dinosaurs go extinct? What do magic tricks and hip-hop have to do with math? What will the next medical breakthrough be? What does baseball have to do with physics?

This year, we will ask visitors to join the plant movement! Our exhibit description reads as follows:

Plants Move, Plants Matter: Join the Plant Movement!

Move it, move it! Plants respond. Plants respire. They root around. They change matter (and make changes that matter). Plants stir up ecosystems and economies. Even YOU move through your day thanks to plants performing as food, fibers (cotton, paper), medicines, fuels, building materials, and so much more. Understanding plants means moving to a sustainable future. So visit our booth to move through five hands-on explorations and join the plant movement.

The fourth USASEF promises to be an excellent harvest of science-curious people for the plant movement. Sneak Peek Friday, April 15, is open to schools, homeschoolers, and military families.

For the main event on April 15–17, the event organizers expect more than 350,000 K–12 students and parents, 5,000 teachers, and 3,000 STEM professionals to experience this immense celebration of science, technology, engineering, and mathematics.

Sources and Additional Information

- For more information about the overall event, visit www.usasciencefestival.org.
- To volunteer in the ASPB-organized exhibit, contact Katie@aspb.org. ■

Textbooks Being Donated

Professor John Hendrix has some old textbooks that he'd like to donate, including a few "classics" dating back to the 1930s. If you're interested, contact Nancy Winchester at nancyw@aspb.org, and she'll put you in touch with Professor Hendrix.

ASPB Collaborates on PALM Network Grant

NSF Research Coordination Network for Undergraduate Biology Education

BY KATIE ENGEN
ASPB Education Coordinator

ASPB has joined the American Society for Cell Biology (ASCB) and Genetics Society of America to establish the new Promoting Active Learning & Mentoring (PALM) Network grant program (http://www.ascb.org/PALM/) to promote improvement in undergraduate classroom teaching and learning outcomes. The PALM Network is an NSF Research Coordination Network for Undergraduate Biology Education (#1539870). Sue Wick (University of Minnesota), a member of ASPB and ASCB, is the lead principal investigator. The grant specifies the active participation of professional organizations, so Sue is one of several society-based co–principal investigators.

Mentoring Matters

PALM was established to spark sustained biology education reform at diverse institutions through one-on-one, long-term mentorships for undergraduate educators new to approaches based on Vision and Change recommendations (http://visionandchange.org/chronicling-change). PALM provides faculty and postdoctoral fellows with resources that allow them to gain hands-on experience and long-term mentorship support to bring evidence-based, active learning strategies into their classrooms. The longer-term goal is to lead enduring change that will positively influence the teaching culture at each PALM fellow's institution.

PALM offers

- up to $2,000 in travel funds per fellow
- a $500 stipend for mentors
- up to $1,000 for network meeting travel for fellows and mentors.

Networking Works

The PALM Network is designed to combine the shared educational interests of scientific organizations working for Vision and Change. PALM founders will expand the network by bringing in other organizations seeking collaboration on reform efforts as they work hard to promote the Vision and Change principles.

The PALM Network steering committee members represent professional societies, minority-serving institutions, and community colleges; this is an intentional combination aimed at ensuring diversity in program management and participation. The PALM steering committee's links to minority- and tribal-serving institutions and community colleges will support this grant's goals for broadening participation in active learning reform. These organizations educate over half the underrepresented minorities in the United States, so PALM is primed to bring Vision and Change reforms to populations of faculty and students who have not factored prominently into past pedagogical reform plans.

Linking Synergizes

The PALM Network features a unique PALM protocol that complements existing sister programs offered by network societies. For example, the ASPB Master Educator Program, which supports ASPB members pursuing specific professional development training and related mentoring to create new undergraduate biology teaching materials, is one sister program aligned with the network. ■

Applying for a PALM Fellowship

The PALM Network uses rubrics and validated evaluation tools to review applications, outcomes, and participant feedback to manage, sustain, enhance, and expand the program. Applicants must

- Be or become a member of an organization that belongs to the PALM Network
- Demonstrate an abiding and sustainable interest in undergraduate biology education
- Establish a mentor relationship before formally applying
  - Mentors must be skilled in active learning strategies and evidence-based teaching aligned with Vision and Change principles (http://www.visionandchange.org).
  - Mentors must belong to or join one of the PALM Network organizations.
  - Assistance with mentor matching is available; the PALM steering committee can make recommendations based on geography and specific teaching interests.
- Explain alternatives if they have no immediate access to their own teaching setting
- Prepare a proposal to be included in the Logistics & Guidelines section of the application, available at http://www.ascb.org/PALM/.
- Apply by June 15, 2016, or January 15, 2017.

PlantingScience Partnership

Fall 2015 Update

KATIE ENGEN
ASPB Education Coordinator

ASPB collaborates with www.PlantingScience.org, a learning community in which scientists provide online mentorship to student teams in middle school through undergraduate settings so students can design and think through their own inquiry projects. The fall 2015 online meeting space was filled with some great conversations between mentors and teams; some very interesting questions were investigated. The student research teams finished a busy session by posting conclusions, lab reports, and presentations and saying their good-byes (at least until they meet again in some other plant science lab!).

Thank You, Scientists!

Scientists serving as mentors to the student research teams make this program possible. More than 60 members of ASPB served as mentors in the fall 2015 session alone. Hundreds more have volunteered since this partnership was established in 2006. To get involved as a PlantingScience scientist, see http://bit.ly/1N7DNFd or e-mail Katie@aspb.org.

Student teams posted some final thoughts (note the clever research team names):

I wanted to thank you for helping us with our science project. I really learned a lot throughout this project and plan on continuing this project for my school's science fair. I also think it's really cool how we can interact with you, even though you are halfway across the world from us!

—The ATOMS Family

I just wanted to say thank you very much for all of your help. It's been quite a blast, this journey of ours. Every last moment will be in my memories for years to come. Without your help, we would have been very lost on the expedition. I hope you get many more great groups to come, and that you succeed in your efforts of research. All the best for you.

—John Seed-A

Teachers shared their appreciation of the mentors. One stated,

My students, without exception, enjoyed their first high school team challenge/mentoring experience. Needless to say, your interactions with them made that possible. Thank you.

—Anonymous

Classroom teacher Michael T. Roche reported to PlantingScience, "Your efforts have added so much to this introductory biology course and the introduction to research mini-course that I present to these academically motivated young people." Michael surveyed the class, and one student responded,

In the past, I have had many teachers who taught me how to conduct experiments. But they always spent less than a period on it, and never talked about it again. It's only thanks to the year-after-year repetition that I can even remember what the scientific method is. PlantingScience was a project that forced me to understand the scientific method and go through the process of designing an experiment. There were also many things about drawing up an experiment on our own that I never had to do before, like deciding on an independent and dependent variable instead of blindly following directions.

—Ivy, PlantingScience student–researcher

This article was written with significant input from Catrina Adams of PlantingScience.

Who's Doing What?

PlantingScience Modules and Schools

Arabidopsis Genetics

HIGH SCHOOL

David & Mary Thomson Collegiate Institute, Toronto, Canada
Monroe Technology Center, Leesburg, Virginia

Brassica Genetics

HIGH SCHOOL

Springfield Central High School, Springfield, Massachusetts
JC Harmon High School, Kansas City, Kansas
Service High School, Anchorage, Alaska
Shroder Paideia High School, Cincinnati, Ohio

C-Fern

MIDDLE SCHOOL

Alaska Native Cultural Charter School, Anchorage, Alaska

Pollination

MIDDLE SCHOOL

Stark County Jr. High, Toulon, Illinois
St. Sebastian School, Akron, Ohio
Nottingham Elementary, Nottingham, New Hampshire

Power of Sunlight/ Photosynthesis

COLLEGE

Western State Colorado University, Gunnison, Colorado

HIGH SCHOOL

Central High School, Cheyenne, Wyoming
Wellsboro Area High School, Wellsboro, Pennsylvania
Eureka High School, Eureka, Illinois

MIDDLE SCHOOL

Long Branch Middle School, Long Branch, New Jersey
Key Destiny Academy, Huntsville, Alabama

Wonder of Seeds/ Germination

MIDDLE SCHOOL

Millennium Middle School, Tamarac, Florida
Alaska Native Cultural Charter School, Anchorage, Alaska
Sebastian Charter Jr. High, Sebastian, Florida
Weir Middle School, Weirton, West Virginia
St. Thomas Aquinas, Woodbridge, Virginia
St. Michael School, Orland Park, Illinois
Bangor Christian School, Bangor, Maine
Nottingham Elementary, Nottingham, New Hampshire
Murray Avenue Middle School, Huntingdon Valley, Pennsylvania

HIGH SCHOOL

Northwest R1 High School, Cedar Hill, Missouri
Cumberland Regional High School, Bridgeton, New Jersey
High Technology High School, Lincroft, New Jersey
Monroe Technology Center, Leesburg, Virginia
Glenbard East HS, Lombard, Illinois
Waimea High School, Waimea, Hawaii
Service High School, Anchorage, Alaska
Mount Saint Mary Academy, Watchung, New Jersey
Suncoast High School, Riviera Beach, Florida
Sibley East High School, Arlington, Minnesota
Springfield High School, Springfield, Minnesota
Medford High School, Medford, Minnesota
Glencoe-Silver Lake High School, Glencoe, Minnesota
Eureka High School, Eureka, Illinois ■

Plants in Providence

ASPB Booth a Hub for Bringing Plant Science to K–16 Life Science Educators

BY CATRINA ADAMS, PlantingScience Program Director, Botanical Society of America, MARY HESKEL, Postdoctoral Scientist, The Ecosystems Center Marine Biological Laboratory, and ABIGAIL MOORE, Postdoctoral Scientist, Ecology and Evolutionary Biology Department, Brown University

It seemed like plants were everywhere at this year's National Association of Biology Teachers conference in Providence, Rhode Island. From workshops on algae beads, leaf disk flotation, and "Inquiring About Plants" to Chris Martine's plenary talk "Plants Are Cool, Too: Wily Nightshades and the Glossy Age of Biodiversity," attending teachers couldn't help getting a dose of chlorophyll over the course of the conference.

The centrally located ASPB booth was a hub for plant science in the exhibit hall. The bright glow of the grow lights drew a steady crowd of teachers, especially during coffee breaks. Over the course of the conference, we talked with self-described "plant people" looking to get new ideas for teaching plants. We also talked with teachers who leaned toward zoology but were intimidated by new plant biology teaching responsibilities, seeking resources and support. Many teachers were looking for resources they could adapt right into their classrooms. We spoke with veteran middle school biology teachers, Advanced Placement environmental science teachers, community college professors, college professors teaching biology to preservice elementary school teachers, and many others interested in sharing new techniques with their students.

Abigail Moore sharing her experiences as a PlantingScience mentor. Photo by Scott Woody.

ASPB Curates Resources from Partnering Organizations

The ASPB booth this year featured curated resources from a number of partnering organizations: the Howard Hughes Medical Institute's BioInteractive, the GMO corn project, the Life Science Teaching Resource Community digital resource library, and PlantingScience. Two of us (Mary and Abigail) attended the conference as PlantingScience ambassadors, as we are both experienced volunteer mentors with the program. We had a great time sharing our experiences with teachers who had not yet integrated this online project mentoring program into their classrooms. We also enjoyed showing teachers around the ASPB booth, and the diverse spread of resources made it easy to convince them that plants are important and easy to include in their curricula at any level.

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PLANTS IN PROVIDENCE
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Teacher Excitement over Opportunities for Authentic Science in the Classroom

Many of the teachers we spoke with were very interested in expanding plant-focused activities in their classrooms but had challenges in finding student-led original labs that focus on plants; one of us (Mary) is a former high school teacher and relates strongly to this challenge. There is a huge need to educate students on plants, and there are many relevant avenues to approach topics in plant science, including agriculture, climate change, and conservation. The ASPB booth materials spanned a wide range of classroom levels and interests and covered many of these topics.

Booth leader and Education Committee veteran Scott Woody's FPsc *Brassica rapa* plants sparked a lot of interest and conversations around the future of genetics and best ways to integrate plants into larger lessons on genetics. The looping video showing phenotype recovery after adding a gibberellic acid solution to a particular GPsc dwarf mutant had teachers oohing and aahing, even more so when Scott revealed that the dramatic time-lapse video was student produced. The frequent sound of coin "alleles" rattling was an indicator of the popularity of the Mating Game, which demonstrates independent assortment.

The GMO Corn Challenge poster prompted many teachers to pull out their phones to capture the details for participation. In this citizen science project, teachers or individuals can request samples of GMO and non-GMO corn to use in a test of whether or not animals prefer non-GMO corn. Many teachers appreciated the links to biotechnology and current events and the opportunity to model use of the scientific process to investigate claims.

As PlantingScience ambassadors, we were especially excited to share details of our Celery Challenge module (one of eight modules we currently offer). In this module, teams of students learn about osmosis and plant tissue anatomy through guided inquiries. Then the teams compete to cause the most bending in a celery stalk. We outlined the basics of the module with a demo, and then we shared what makes PlantingScience unique: that each team can work with a scientist mentor online throughout the investigation. Many teachers expressed how excited they were to learn about this free program. Taking advantage of the program will give their students the opportunity to get to know and work with scientists and to gain experience designing their own investigations and reporting their results to the community. Booth visitors appreciated the generosity of the volunteer scientists who make programs like PlantingScience possible.

Sharing Our Passion for Plants

It is critical to help bring plants into the classrooms of teachers, who have the opportunity to catalyze a big impact on students' interest in science and biology, and plants in particular. We asked many of the plant people when they first became interested in plants, and many tracked it back to a particular course they took or outdoor experience with a teacher or professor who was passionate about plants and who sparked their own ongoing interest and appreciation.

Scott Woody talking genetics with a visitor. Photo by Catrina Adams.

It's our responsibility to the next generation of plant biologists to reach out and help biology teachers deliver authentic experiences that help students realize that plants are not just critical to our existence; they are pretty darned interesting, too. It is also really fun to step outside of your day-to-day routine to participate in an event like this one. The enthusiasm of nonexperts can give you a boost and a new perspective on your own field. Please consider sharing your passion for plants with teachers, students, and the public at the ASPB booth at a future event.

Thanks for Sharing!

We'd like to thank ASPB for being such great hosts, especially Katie Engen for her help in organizing and giving us the opportunity to spread the word about PlantingScience. We're also grateful to Scott Woody and new Education Committee member Valerie Haywood for their hospitality and for giving us the inside scoop on all of ASPB's offerings for teachers so that we could help share the power of plants with visitors. ■

STEM Workforce and the Disruptive Innovation in Higher Education Summit

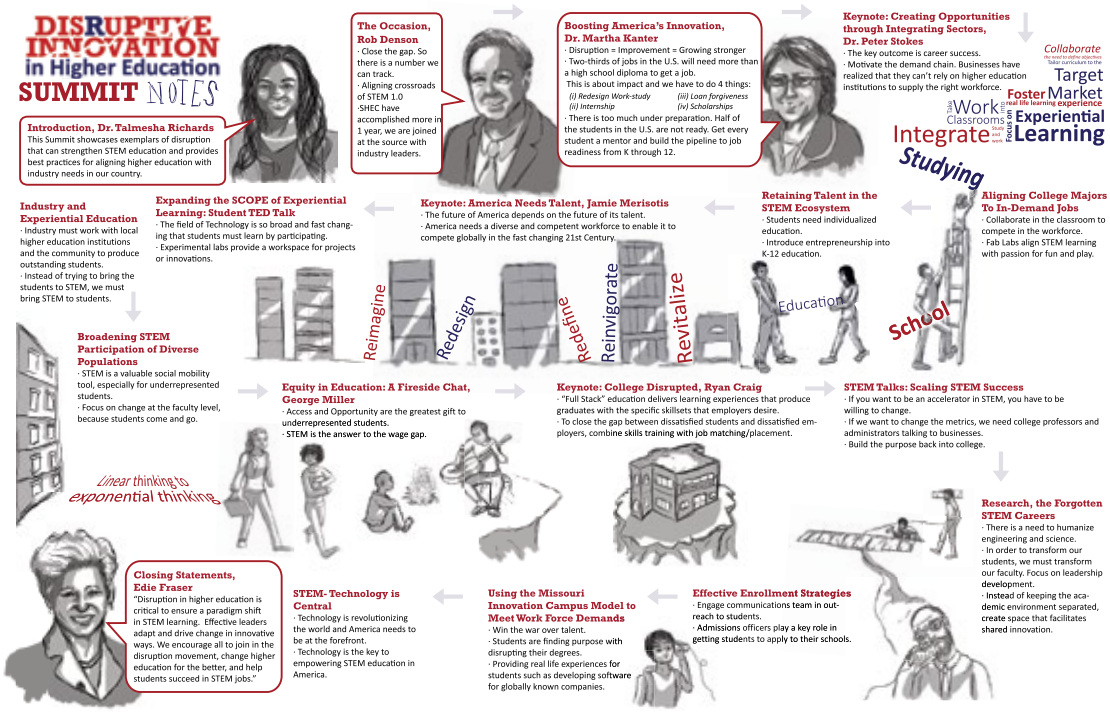
New Visions and Multifaceted Collaborations to Remaster STEM Higher Education and Its K–12 Pipeline

BY KATIE ENGEN
ASPB Education Coordinator

The Disruptive Innovation in Higher Education Summit is aimed at advancing a national (U.S.) effort to meet the education and training needs of the global STEM workforce and educate the scientists, technologists, and innovators needed for a vibrant economy. Presented by the STEMconnector® Higher Education Council and sponsored by Cengage Learning, myCollegeOptions®, and Monsanto, this keystone event, presented on November 9, 2015, in Washington, D.C., inaugurated the next wave of collaborative solutions to come.

This summit is one of many events ASPB has participated in with STEMconnector consortium members. The event focused on sharing model teaching and mentoring programs, high-impact policy, and collaborative opportunities to enhance higher education initiatives. Attention also was paid to the importance of the K–12 pipeline that feeds effective higher education.

- Larger Summit Notes infographic: http://bit.ly/1R1D2ng
- Summit slides (with contact information): http://bit.ly/1lFuCpz
- Summit program: http://bit.ly/1InSFnA ■



Summit Notes: Key takeaways from the Disruptive Innovation in Higher Education Summit.

Check out #SHECSummit for in-the-moment Twitter highlights.

About STEMconnector®

http://www.stemconnector.org

STEMconnector® is a consortium of companies, nonprofit associations and professional societies, STEM-related research and policy organizations, government entities, and universities and academic institutions concerned with STEM education and the future of human capital in the United States.

STEMconnector is both a resource and a service designed to link all things STEM through a comprehensive website that connects national, state, and local STEM entities. The STEMconnector team advises and counsels members and partners to ensure their participation in the best STEM practices and scalable investments.

Natalie Henkhaus Joins ASPB as Executive Coordinator for Plant Science Research Network

ASPB is pleased to announce that Natalie Henkhaus has joined the staff as executive coordinator for the Plant Science Research Network (http://bit.ly/1Lrh3iy). She will also work to raise the prominence of the Decadal Vision with the National Plant Science Council (http://bit.ly/1TNrKSv). Connect with her on Plantae (http://plantae.org/) to learn more about these organizations; it's free, and anyone can become a Plantae user!

Before joining ASPB, Natalie worked as a communications associate at the Boyce Thompson Institute and was also very active in the Postgraduate Society, an organization focused on improving training for graduate students and postdoctoral researchers by exposing scientists to diverse career options in the plant sciences. Natalie received her BS in molecular and cell biology from the University of Puget Sound, where she was involved in undergraduate research studying polyploidy in Arabidopsis. Subsequently, Natalie attended Cornell University and earned her PhD in genetics under the mentorship of Eric Richards, studying epigenetic variation in Arabidopsis.

Having grown up in the Pacific Northwest, Natalie has a long love of plants and spends her spare time developing a balcony garden, cooking, baking, traveling, and exploring outdoor recreation in the D.C. area. ■

ASPB Welcomes Stacy Loewentritt as New Conference Coordinator

ASPB is delighted to welcome Stacy Loewentritt as conference coordinator. Stacy will work with Jean Rosenberg in the new Meetings and Events business unit. Her primary responsibility will be to support plant biologists who organize meetings with logistical support coordinated by ASPB.

Stacy comes to us with over 15 years of conference planning experience. Most recently, she was senior manager, education at the American Pharmacists Association. There she coordinated logistical support for the education programming at its annual meeting and military pharmacist meeting. Additionally, she coordinated site selection and logistics for 20 to 30 smaller training meetings a year. She lives in Gaithersburg, Maryland (near ASPB), and is the proud mom of five-year-old Ilyssa.

Welcome, Stacy! ■

Niels C. Nielsen

1942–2015

BY BRIAN A. LARKINS, University of Nebraska, Lincoln
and ROBERT B. GOLDBERG, University of California, Los Angeles

Niels C. Nielsen died November 3, 2015, from complications of stomach cancer. Niels was a USDA–ARS professor in the Agronomy Department at Purdue University from 1978 to 2006, where his research focused on improvement of soybean seed traits. After retiring from ARS in 2006, he was appointed university professor in the Department of Crop Science at North Carolina State University (NC State), where he worked until recently.

Niels was born in Madison, Wisconsin, on July 24, 1942. Following his military service, he received his undergraduate degree in biochemistry from the University of Wisconsin in 1966, and he completed his PhD in 1972 at Vanderbilt University, where he worked on the characterization of D-β-hydroxybutyrate dehydrogenase with Sidney Fleisher. Niels received a Marshall Fellowship through the Danmark–Amerika Fondet in 1972, and from 1972 to 1974 he studied chloroplast membrane biogenesis as a research fellow in the Genetics Institute at the University of Copenhagen in Copenhagen, Denmark, with R. M. Smillie and Diter von Wettstein.

He then moved to the University of California, Davis, where he was an associate instructor in the Department of Biochemistry and Biophysics, working with Paul Stumpf on lipid metabolism. Niels began working as an assistant professor in the Agronomy Department at Purdue University in 1977 and became a USDA–ARS scientist the following year. Brian Larkins, an assistant professor in the Botany and Plant Pathology Department at Purdue, and his graduate student, Maurilio Moreira, collaborated with Niels, helping him during the initial phase of his soybean storage protein research.

Niels's foundation in plant biochemistry served him well in his research on soybean seed storage protein and lipid biosynthesis. Working along with Mark Hermodson in the Biochemistry Department at Purdue, Niels's laboratory purified the soybean 11S (glycinin) and 7S (conglycinin) storage proteins and characterized their structure. These studies were done in the late 1970s and early 1980s when little was known about the amino acid sequences of these canonical storage proteins and the way they are synthesized and assembled in protein storage vacuoles. Niels's lab demonstrated that certain acidic and basic subunits of glycinin associate in a precursor and went on to characterize the protease responsible for processing these precursors.

Bob Goldberg collaborated closely with Niels, characterizing glycinin genes and showing

they exist in a small gene family, with some members encoding proteins containing higher levels of methionine, the most limiting essential amino acid in soybeans. It was Niels's exquisite biochemical work on glycinin proteins that enabled gene structures to be described and the positions of introns and exons defined, an important accomplishment at the time. Similar biochemical and molecular approaches were used to characterize the 7S conglycinin proteins and their corresponding genes, as well as the molecular basis of several soybean storage protein gene mutations. This research provided the conceptual basis for understanding the evolutionary relationship of 7S and 11S storage globulins in higher plants.

In addition to his research on storage proteins, Niels was at the forefront of lipoxygenase research to improve soybean food quality. Oxidation of the polyun-

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NIELS NIELSON
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saturated fatty acids in soybean seeds causes the oil to become rancid, reducing the quality and value of processed food products. Soybean seeds contain three different lipoxygenase enzymes. To eliminate their activity, Niels and others identified mutations in the corresponding genes and then stacked the mutant alleles in commercially valuable soybean cultivars. This effort was successful and resulted in registration of soybean germplasm that lacks lipoxygenase isozymes. Niels's interactions with major soymilk and tofu manufacturers to create a small-scale method for tofu production was effectively integrated into this work.

Other research from Niels's lab provided a comprehensive characterization of the complex network of enzymes and associated genes that constitute soybean acetyl-CoA carboxylase, a key enzyme in fatty acid biosynthesis. In later years, Niels's research also included methods for improving soybean transformation efficiency, the first soybean TILLING population, and the development of a swine inbred line that is hypersensitive to soy and peanut antigens. During his time at NC State, Niels conducted research to identify the proteins responsible for allergens in peanut and soybean. This work led to identification of protein subunits that cause peanut allergies, which were traced back to the respective wild species progenitors of peanut.

Niels's accomplishments exemplify the value of integrating basic and applied research, and they were recognized by the American Oil Chemists Society with the Archer Daniels Midland Award for Chemistry and Nutrition (1986 and 1988). Niels received the American Soybean Association Meritorious Service Award in 1992 and a Certificate of Merit from USDA–ARS in 1995 and 1997.

Niels was known as an excellent teacher and mentor who guided and provided a good example to his graduate students and postdocs. On first meeting him, one might have had the impression that he was very serious and all about business. However, students quickly found that they were warmly welcomed into his lab, and Niels became a friend and someone with whom they could share life events unrelated to science. One of his former students recalls applying to graduate school at five agronomy departments in the Midwest, and while waiting for answers, Niels called him at home and made an offer. That personal contact sealed the deal.

Niels struck a balance between leading students into projects and giving them a measure of independence to develop their studies. This was excellent preparation for their professional career, and its success is borne out by the many students who subsequently established themselves in academia, industry, and other professional pursuits. Niels was quick to adopt cutting-edge tools and biochemical and molecular approaches, which benefited students and provided them the opportunity to publish in prominent journals and be competitive for job opportunities. While expecting excellent work, Niels was not overbearing, and his students felt a partnership doing important research with him. With a knock on his office door, he would stop whatever he was doing and listen to a recent result, no matter how small. Niels was not one to overstate his enthusiasm, but it was not difficult to read a raising of the eyebrows, brightening of the eyes, and subtle smile as genuine delight over a recent success.

Niels was an effective collaborator with many scientists and junior faculty members, as he always had good insight and made useful suggestions. Sally Mackenzie, who started her career in the Agronomy Department at Purdue and was the only female member of the department at that time, attributes her early success navigating the academic ladder to Niels's counsel and advice. Likewise, Eliot Herman, a USDA–ARS scientist who worked on soybean allergens, attributes his early success in soybean allergen research to the foundation Niels created for soybean molecular biology.

Niels's family was among his highest priorities. He was very supportive of his wife Judy's career, which included a doctor of veterinary medicine degree from Purdue University. On his retirement from USDA, his move to North Carolina was prompted by her taking a faculty position in the Department of Pathology and Laboratory Science at the University of North Carolina, where she is now a professor. Both of his children—Erik, an associate professor in the Department of Molecular, Cellular, and Developmental Biology at the University of Michigan, and Kirsten, an associate professor at the University of Minnesota—received their PhD degrees and have become successful scientists.

When not engaged in research, Niels had diverse interests and hobbies. Among them were his boat and salmon fishing on Lake Michigan and the North Carolina coast, flying, playing the mandolin, his woodworking shop where he built furniture for his family, and all things Scandinavian, befitting an American–Dane. Like his biochemical research, his hobbies required technical skill and knowledge in order to maintain and enjoy them, and this contributed to making him an interesting personality. Niels enjoyed the finer things in life, including good food, good wine, and good beer, which we shared at many scientific meetings. He was an early advocate for craft beer and created fine products for his own indulgence.

Niels was generous sharing his knowledge and expertise and was a remarkable scientist and a caring person. Niels left a personal and scientific legacy that will be remembered and missed by those of us who knew him, as well as by the entire plant science community. ■

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