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ASPB News

THE NEWSLETTER OF THE AMERICAN SOCIETY OF PLANT BIOLOGISTS

President's Letter

A New Order for Plant Biology PhD Training

BY ALAN M. JONES
ASPB President
University of North Carolina

Alan Jones

The perspective article by Bruce Alberts, Marc Kirschner, Shirley Tilghman, and Harold Varmus, titled "Rescuing U.S. Biomedical Research from Its Systemic Flaws" (Alberts et al., 2014), went viral on the Internet just one hour after it was published online by the *Proceedings of the National Academy of Sciences USA* in mid-April. The article offers an honest, blunt view of the unsustainable trajectory of biomedical research in the United States, the blatant flaws that

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ASPB Executive Committee 2014 Election Results

Many thanks to those members who took the time to vote this spring, and hearty congratulations to our new officers! They will begin their term of service to ASPB on October 1, 2014. Look for more information about each winning candidate in an upcoming issue of the *ASPB News*.

Incoming President-elect
Rick Dixon
University of North Texas, Denton

Incoming Secretary-elect
Alice Harmon
University of Florida, Gainesville

Incoming Elected Member
Joe Kieber
University of North Carolina at Chapel Hill

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

For quick response, e-mail us at info@aspb.org or visit our FAQ at www.aspb.org/faq.

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

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underlie this lack of sustainability, and some bold recommendations aimed at fixing what is broken. It is a must read paper, whether you are part of the U.S. research community or not, and it is the first time that prominent scientists have spelled out that simply providing more money is not, in the case of U.S. biomedical research, the fix.

The major flaw in the system, Alberts and coauthors write, is Malthusian, due to "demand for research dollars [that] grew much faster than the supply." This, they skillfully argue, is due to "perverse incentives [that] encourage grantee institutions to grow without making sufficient investments in their faculty and facilities." This perverse incentive applies, in particular, to the U.S. biomedical funding system. For those who may not be familiar with the U.S. approach, I will elaborate here what this means. For every dollar granted to the principal investigator (PI) to do the proposed research (to pay for salaries, supplies, and associated costs), the PI's institution, after negotiation, gets an additional amount called "indirect costs" that typically equates to at least 50% (and sometimes as much as 110%) of the amount the PI receives to spend on the project. In short, the institution has no incentive to support individual faculty and instead has an avid and perverse incentive to encourage further research spending: more grants = more overhead = more buildings = more PIs = more deans and administrators = more grants, as well as more PhDs in an increasingly out-of-control spiral. Figure 1 illustrates the huge increase in the number of life science PhDs in the United States, specifically in health-related areas. This is not sustainable, and we are now experiencing the consequences, with the most despairing being the lack of adequate jobs for biomedical postdocs and insufficient funding for all of us. In short, the unsustainable race to expand biomedical research with only limited resources has evidently crashed.

I find it ironic that the very Malthusian principle that drives us to work so hard—namely, to feed an exponentially growing population in a changing climate using an incrementally increasing crop supply—is, according to Alberts et al. (2014), the very mathematical principle that seems to challenge our efforts to meet that goal.

Or does it? The question is, how much of this gloomy scenario pertains directly to us in plant science? My April/May newsletter article laid out the plant research investments by country. However, other facts I did not discuss in that article need discussing now. There are several differences between the plant biology research and biomedical research systems that may represent rays of sunlight for plant biology if we can provide the necessary insight and vision to our governments (Jones, 2014). The most important is that there is a demand for PhDs in agriculture/plant biology research and development. The Coalition for a Sustainable Agricultural Workforce recently completed a confidential survey among AG biotech companies to ascertain near-term needs for hiring domestic agricultural scientists (2013). This survey generated an amazing result, given the tone of the Alberts et al. (2014) perspective. It is anticipated that by 2015 in the United States alone, 1,000 new employees are needed in the half-dozen largest companies in this area (Bayer CropScience, Dow AgroSciences, Dupont Pioneer Hi-Bred, Dupont Crop Protection, Monsanto, and Syngenta), with 84% in the disciplines of plant sciences, plant breeding/genetics, and plant protection. Almost half of these anticipated new hires will hold PhDs. In the United States, with what appears to be a dwindling pool of qualified applicants applying to plant science PhD programs, we may not be keeping up with this demand. The worry these companies articulate is the inability to recruit enough qualified applicants having the appropriate education and experience without needing considerable retraining.

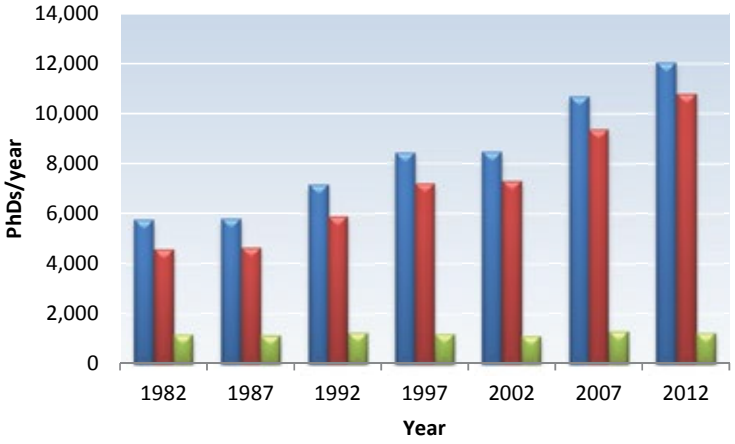

Figure 1. PhDs in the United States. *The data cover years 1982–2012. Total PhDs in the life sciences are shown in blue. These PhDs are predominantly in biological, biomedical, and health sciences. Analysis performed using data source http://www.nsf.gov/statistics/sed/2012/pdf/tab12.pdf. The rapid increase in the rate of PhDs in life sciences* ***(blue)*** *is consistent with the claim by Alberts et al. (2014) that a burgeoning increase of PhDs in the biomedical sciences* ***(red)*** *is both a manifestation and cause of the nonsustainable research system. However, this is not true for the agricultural and natural sciences* ***(green)****. Since 1982, approximately 1,000 PhDs in agricultural sciences (including animal related) are produced each year.*

Is academia training enough to meet the demands of the plant industry? Figure 2 shows that despite the steep increase in the number of PhDs in the life sciences, we have consistently trained roughly 1,000 PhDs in agricultural and natural sciences annually since 1982. Taking the analysis one step further, I extracted the number of PhDs relevant to plant science industries and compared them to a selected set of subdisciplines in the biomedical sciences. Again, it is clear that the glut of PhDs that Alberts et al. (2014) warn us about is not among the plant sciences; for more than a decade, about 100–200 basic plant science PhDs have been awarded per year. I worry that the plant sciences will get caught up in the lamenta-

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tions of Alberts et al. that we are producing too many PhDs and that we might suffer from the fix to what is, based on the data, a problem limited to biomedical research fields.

If there is such a dire need for plant biologists, and we are not training that many, why are academic careers in plant biology no longer flourishing? I believe it is because academic institutions want to hire faculty who have the highest chance of obtaining maximal federal funding; in other words, grantsmanship skills and hot research topics drive the current hiring decisions. Anecdotally, it seems to me that for two decades there has been a shift away from simply searching for and hiring the brightest colleagues, and I believe that this swing has affected plant biology hiring decisions disproportionately. This is because plant biologists in the United States, who historically have competed primarily for funds allocated by NSF and USDA, which have much smaller pots of money to distribute than NIH, are now expected to compete for biomedical funding too, especially since Arabidopsis was placed on par with other powerful genetic models that have had an impact on human health research (Jones et al., 2008). Along with that, Arabidopsis research is no longer nurtured by NSF, DOE is highly focused on bioenergy, and USDA primarily funds research on crop species, making it tough to obtain academic funding of basic "blue sky" plant research, at least in the United States. The paucity of funding for basic plant biology may also be felt in other ASPB-member countries, and understandably so if they are only fiscally able to focus on relevant crops. Consequently, basic research with model plants is not supported as much as we feel is needed globally either, nor are disciplines that study the basic fundamentals of agricultural systems and sustainable practice.

Just as Alberts et al. (2014) recommend for the biomedical sciences, we need predictable, long-term, stable funding for the basic plant sciences. However, unlike for the biomedical research community, we do not have the luxury to level off spending on plant biology research. The growing world population needs to eat, and it is past time that our governments elevate basic, translational, and applied plant research to the priority they give to biomedical research, or more boldly, defense spending. Indeed, stabilizing food supplies in a changing environment may serve to reduce global unrest, so I would argue that funding plant sciences is integral to the security of all our nations. One way to drive innovation is to shift government funds currently used for noncompetitive research opportunities to competitive-based research funding. Ideas alone, not spending formulas or pork-barrel politics, should drive research spending. At least for the U.S. system, we should revisit how overhead is defined in order to motivate academic institutions once again toward research output, not revenue growth.

Another approach toward predictable, long-term research funding is to build private–public partnerships. The United States is experimenting with this idea by forming a government–industry foundation to fund at least another $400 million of research related to agriculture (see the Policy Update in the March/April issue of the *ASPB News*). Another idea for funding is to get buy-in from the growers. An effective example of this approach is in Australia, which has a system whereby growers tax themselves, matched by the government, to fund one-third of all agricultural research (for example, see http://www.grdc.com.au/About-Us). These funds are competitively awarded by an independent body that has representatives from both the government and farmers (Alston et al., 1999).

As mentioned, there is a demand for PhDs in plant sciences, but there is also a call for focused training by making students and postdocs aware of and well prepared for opportunities in industry and elsewhere in society. We also need to make

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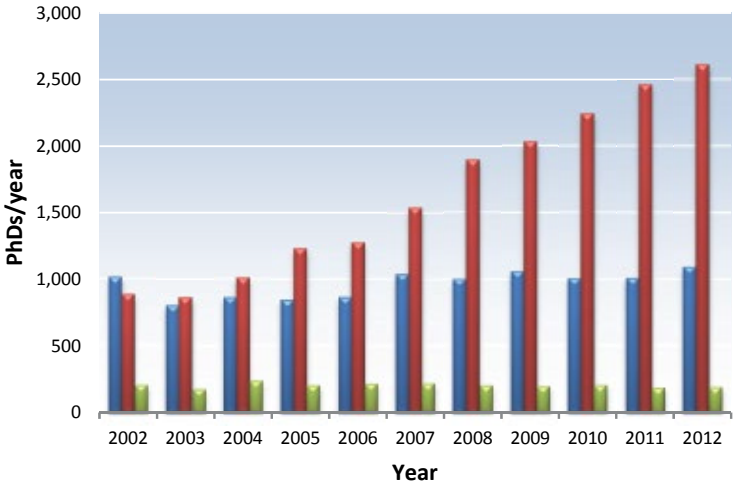

Figure 2. U.S. PhDs in selected subdisciplines relevant to a workforce in plant industry (blue and green) versus selected subdisciplines that are not plant science related. Red symbols *are the sum of PhDs in these biomedical subdisciplines each year: bioinformatics, biomedical sciences, biometrics and biostatistics, cancer biology, computational biology, developmental biology/embryology, neurosciences and neurobiology, structural biology, and virology.* ***Blue symbols*** *are the sum of PhDs in applied agriculture subdisciplines each year: agricultural and horticultural plant breeding, agricultural economics, agronomy and crop science, forest engineering, forest sciences and biology, forestry and related science, horticulture science, plant pathology/phytopathology (applied), plant sciences (other), soil chemistry/microbiology, soil sciences, entomology, plant genetics, plant pathology/phytopathology (applied), and plant physiology (applied).* ***Green symbols*** *are the sum of PhDs in basic plant biology subdisciplines each year: botany/plant biology, plant genetics, plant pathology/phytopathology, and plant physiology.*

Plant Scientists Elected to U.S. National Academy of Sciences

Several distinguished plant scientists—most of them members of ASPB—have been elected to the U.S. National Academy of Sciences (NAS), one of the most prestigious honorific societies in the United States. Each year, NAS elects new members on the basis of their exemplary achievements in original research. Please join us in congratulating the following ASPB members.

Ed Buckler

Ken Keegstra

Scott Poethig

Ed Buckler

USDA Agricultural Research Service and Cornell University

Ed received his PhD in biological sciences from the University of Missouri, Columbia. He then went on to do a postdoc in statistical genetics at North Carolina State University, where in 1998 he became an assistant professor in the Department of Genetics and a research geneticist with the USDA Agricultural Research Service (ARS). Maintaining his affiliation with ARS, Ed moved to Cornell University in 2003, initially as an associate professor. By 2009, he had been promoted to the position of adjunct professor of plant breeding and genetics.

Ed's research focuses on developing genomic, statistical, bioinformatic, and germplasm resources to scan plant genomes for functional polymorphisms using association mapping of traits related to abiotic stress, kernel nutrition, and basic development.

Ken Keegstra

Michigan State University

Ken received his PhD from the University of Colorado and performed postdoctoral studies at the Massachusetts Institute of Technology. He went on to become the chair of the Department of Botany at the University of Wisconsin. He currently serves as the director of DOE's Plant Research Laboratory at Michigan State University and is a university distinguished professor in the Department of Biochemistry and Molecular Biology and the Department of Plant Biology. His work investigates the biogenesis of chloroplasts and the biosynthesis of plant cell walls.

A former president of ASPB, Ken has received numerous recognitions for his work. In 2006, he was named an AAAS fellow; he became an ASPB fellow the following year. He is also a recipient of the ASPB Stephen Hales Prize.

When asked for his thoughts about his election to the Academy, Ken responded, "I was very surprised, but very pleased, to receive the call. I am grateful to the students and postdoctoral associates from my lab, as well as my colleagues elsewhere, whose research activities have made this honor possible. The honor also carries responsibility, and I hope that I can contribute to the important work of NAS."

Scott Poethig

University of Pennsylvania

Scott received his PhD from Yale University before going on to complete postdoctoral training at the University of Missouri. He is currently the Patricia M. Williams Professor of Biology at the University of Pennsylvania. His principal areas of research interest are the genetic regulation of juvenile-to-adult transition in plants and the role of RNAi in plant development.

Scott responded with words of gratitude upon hearing the news: "I was pleased, honored, and very surprised to learn that I was elected to the NAS. We work on a difficult problem that not many people consider important—vegetative phase change—and I did not expect my colleagues to recognize our work in this way. I hope that the students and postdoctoral fellows who have devoted their energy and intelligence to this problem over the years feel that this honor is theirs as much as mine."

These plant biologists are among the 84 new members and 21 foreign associates elected to NAS this year. There are now 2,214 active NAS members and 444 foreign associates. The complete list of new members can be found at http://bit.ly/1hN0G5D. ■

Chronobiology: Past, Present, and Future

25 Years of the Kay Laboratory (1989–2014)

BY PRATEEK TRIPATHI
ASPB Student Ambassador, University of Southern California

The Kay Symposium was celebrated May 30, 2014, to honor Steve Kay's 25 years of successful chronobiology research. The silver jubilee of the Kay Laboratory was hosted at University Park Campus at the University of Southern California. This one-day event of scientific talks covered the past, present, and future of chronobiology research across disciplines.

Steve's research has focused on plants, flies, and mammals. He started his lab in 1989 at Rockefeller University, and since then he has pioneered many groundbreaking discoveries in circadian biology. Apart from great discoveries, another significant contribution of his research over the past 25 years has been providing successful mentorships. The people trained in his lab are successful scientists in their independent capacities who are now committed to passing the baton of scientific learning to the coming generation. Eminent guests of the symposium included Joanne Chory, Joe Ecker, Elliot Meyerowitz, Susan Golden, John Mullet, Frank Doyle III, and Peter Schultz.

The guests and speakers gathered from across the world to congratulate Steve for his successful journey. His lab alumni didn't hesitate to carve time from their busy schedules to attend this special occasion. From his first graduate student and postdoc to present lab members, they gathered together to make the event remarkable.

"The greatest thing of the past 25 years was the absolute privilege to know my present and past lab members. These people are good human beings: smart, funny, weird, goofy, tall, short… such a diverse group of uniformly intelligent men and women. Most of all, I just enjoyed the company of people of this caliber, and to see them go on and thrive is the greatest joy of all."

—Dr. Steve A. Kay
Dean, USC Dornsife College of Letters, Arts & Sciences

Colleagues (from left) Ross Bersot, Frank Doyle III, Susan Golden, Peter Schultz, Steve Kay, Antony Dodd, Elliot Meyerowitz, Joe Ecker, and Joanne Chory.

Kay Symposium Speakers: Steve Kay (center) with (from left) Takato Imaizumi, Fernanda Ceriani, John Hogenesch, Stacey Harmer, Andrew Millar, and Satchin Panda.

PHOTOS BY ERIC LARSEN IMAGES

I asked Steve what drives him in the field of chronobiology. Being nostalgic, he shared memories of his undergraduate years when his professor, Dr. Trevor Griffiths at the University of Bristol, asked him to investigate how light influences the developmental processes of plants. He recalls that in those days he never realized the dynamics with which plants modulate these developmental phenomena. This sparked his interest, and he was curious to answer the question.

I asked Steve what he thought would be the next big thing in plant biology. He replied, "Well, the next big thing is deep versus wide." In his view we should be very clear where we need to go deep and where we need to go wide. He firmly believes that since we don't have the legacy of multiple model organisms/species in plant biology, we still should go deeper to harness our only reference, Arabidopsis. In his opinion, we are still struggling to solve the enigma of plant cellular dynamics. He recalls the legendary example of the CO-FT module describing flowering mechanism (which came from his lab): "Today, the CO-FT module is active to all crop and noncrop plants and species, which was first described in Arabidopsis. In order to link the phenotype to

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genotype with understanding of detailed dynamics, we still need to persevere and still need to drill down the model plant system. We need to agree to focus on developing a knowledge base that will help us to quickly determine the low-hanging fruit that we get by doing deep sequencing that gives various levels of omics information. So, the problem is that there is a temptation to abandon the in-depth hypothesis-driven knowledge base. Thus, it is time for all of us to raise our voices unequivocally for more investment in basic science research."

When asked for a message to the incoming generation of researchers, Steve summarized the present situation about extended learning with high expectations and decreasing opportunities. "You have to be a Renaissance man or woman," he remarked. Thus, the most competitive postdocs should integrate different approaches, develop deep knowledge, and show core skill sets. He also advocated the idea of training grad students and postdocs beyond scientific learning and publishing good papers—by equipping them with skills that prepare them to be adaptable. ■

Kay group

PHOTO BY ERIC LARSEN IMAGES

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students aware of alternative career opportunities to the traditional academic track. Cornell University, assisted by a $1.8 million grant from NIH, is one of several institutions attempting to do just that with their biomedical students (http://www.best.cornell.edu/). They are training in four new areas: science communication, science policy, governance/risk, and industry/entrepreneurship. These areas pertain exactly to plant biology students and postdocs as well, and we should quickly adopt them in our training regime. Properly organized and funded training programs of this kind will be highly desirable; therefore, we can be more selective in admissions. Once admitted, these students should be supported by centralized funding for training rather than by individual research grants. By being far more selective in admissions, we will have less remedial training and we can produce better qualified PhDs in less time. Our training should reflect our needs, which differ from country to country. Customized training must begin as soon as possible in the PhD program. Traditional training in analytical skills is critical, but we should move our students into their specialized fields earlier. This means partnering with industry and the private sector for internships for our students. The Decadal Vision (ASPB, 2013) from the United States and Future Challenges from the United Kingdom Plant Science Federation (2014) clearly define this new training modality.

Finally, it is time to convene an academia–industry summit to discuss ways in which we can provide relevant training for our PhDs for successful, enjoyable, and productive careers that meet the needs of the world. Academia already knows how to train a workforce and is willing to prepare for our needs, so that is not the problem. The most difficult component of training our plant science workforce will be the ability to predict the marketplace's needs and adapt the requisite training quickly. Industry workforce needs are driven by volatile markets, and it will be challenging to retool training to meet future needs for that sector in real time. Consequently, I believe that the most difficult discussion at the proposed academia–industry summit will be how to cooperate effectively to meet that goal. I hope that ASPB will take the lead in this new endeavor, and I will do what I can to make this happen. If you are interested in getting involved, please let me know. ■

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I thank Jim Carrington, Jeff Dangl, Tyrone Spady, Crispin Taylor, and Detlef Weigel for discussions.

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.

Aaron J. Wyman

Professional Title: Assistant professor of biology
Member Since: 2001
Place of Work or School: Spring Arbor University, Spring Arbor, Michigan
Research Area: Science Education, Biomineralization, Peroxisome Development and Function

"Investigating Photosynthetic Life (with the short, bald biology professor)." (from left) Ken Wedgwood, Biology, 2nd Education, SAU; Cassie Dunbar, Oregon Health & Science University; Doug Minier, Michigan State University; and Aaron Wyman.

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

I encourage anyone interested in plant biology to join ASPB for myriad reasons. The mentoring and networking efforts of ASPB are simply fantastic. The group is diverse in interests, approaches, backgrounds, locations, and personalities. The Society is large enough to generate political clout while still creating smaller group opportunities for personal attention and focus. I've truly enjoyed and appreciated what ASPB has done for my career.

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

There is a growing desire by the general public to understand what photosynthetic life truly means for their daily lives. Diverse topics such as the creation and use of "genetically modified" plants, production and promotion of biofuels, and environmental concerns have placed photosynthetic life directly on the public's radar, thereby providing us with fertile teaching opportunities. The medical sciences have used the past 50 years to establish "educational platforms" (anti-smoking, cancer, HIV, diabetes, obesity, and so on) for the public. I believe the time for similar campaigns involving photosynthetic life has come and will be well received.

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

While building your lab acumen, library skills, networking system, and lunch-spot preferences, do not neglect your teaching toolbox. While not all plant scientists become faculty, all will work with other people of different learning styles, background, and interests. Your ability to effectively translate and transmit your knowledge and skills-sets to others is imperative. Further, an optimal way to master skills and command topics is to teach them to others. This process forces early recognition of what we don't know, requires competent communication skills in all formats and team-building skills, and imparts patience. Plus, it feels good when we help others understand a new topic.

How has membership in ASPB been important to you?

My membership in ASPB has aided me in obtaining a fantastic postdoctoral position, enhanced my CV in earning tenure-track faculty positions, established several research and teaching collaborations, helped me make numerous great friends, and given me the opportunity to travel with my wonderful wife, Anne.

Was someone instrumental in getting you to join ASPB?

Laura Olsen has been a mentor, colleague, confidant, and friend to whom I owe much. Thanks again, Laura!

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

I was fortunate to have Charles Yocum as my PhD adviser. Charlie is a truly great mentor, and I frequently find myself using his examples, words, and lab and life lessons with my own students.

Norman Borlaug continues to inspire this midwestern farm boy to work toward improving our fellow citizens' lives on a daily basis.

What are you reading these days?

Lab reports, reflection papers, indecipherable text-mails, primary literature my research students put on my chair, the King James Bible, ASPB publications, and *Sports Illustrated.*

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ASPB Western Section 2014 Annual Meeting

Cell and Developmental Biology in Plants

BY RENATE WEIZBAUER, Carnegie Institution for Science, and
JESSICA LUCAS, Santa Clara University

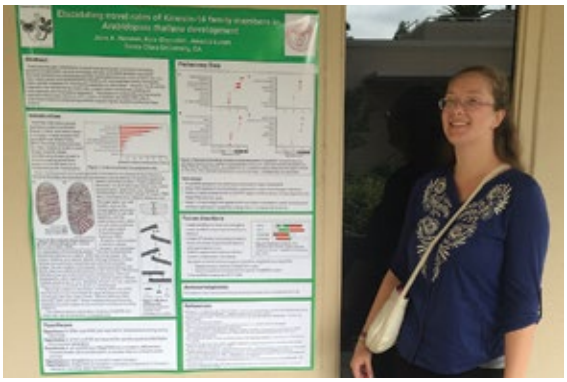
This year's Western Section meeting, Cell and Developmental Biology in Plants, was held jointly with a local American Society for Cell Biology (ASCB) meeting on Quantitative Imaging Across the Bay during the weekend of May 3–4 at Santa Clara University, California. The organization of the meeting was a collaborative effort by an extraordinary team led by Rich Jorgensen and Renate Weizbauer and including Kathryn Barton, Matthew Evans, and David Ehrhardt from, Carnegie Institution for Science, Stanford, as well as Jessica Lucas from Santa Clara University.

The weekend began with the local ASCB meeting on Saturday, focusing on cellular mechanisms involved in cell growth, division, and motility as well as the organization and functions of cytoskeletal structures, with outstanding talks from Julie Theriot (Stanford University), K. C. Huang (Stanford University), Wallace Marshall (UC San Francisco), David Ehrhardt (Carnegie Institution for Science), Ke Xu (UC Berkeley), and several graduate students, postdoctoral fellows, and young faculty members who invited extensive discussions throughout the meeting. An inspirational joint ASPB–ASCB keynote session featuring James Spudich from Stanford University opened the meeting on Saturday night with a historical depiction of four decades of research on the structure and function of myosins.

A diverse set of topics was introduced and discussed during the Western Section's ASPB meeting on Sunday, May 4. Laurie Smith (UC San Diego) described an intricate MAPK signaling circuitry involved in stomata development in maize, a topic discussed further throughout the meeting and complemented by talks on a new bioinformatics platform for transcription regulators, hybridization barriers, and gametophyte development in maize, as well as on a new imaging system to study the rhizosphere.

After an interactive lunch and poster session, the second session was opened by Lacey Samuels from University of British Columbia, Vancouver, who introduced a model for how distinct lignification patterns are established in the cell wall of protoxylem cells. Further topics of this session included "hydropatterning" of the root architecture, plant

James Spudich from Stanford University delivering his keynote.



Undergraduate student Julie Herman from Santa Clara University presenting her research poster.

Oral presentation awards to Kaisa Kajala (UC Davis) and Alexander Jones (Carnegie Institution for Science, Stanford), pictured with John Cushman.

Poster presentation awards to Arthur Liu (San Francisco State University) and On Sun Lau (Stanford University), pictured with John Cushman.

responses to various biotic and abiotic stresses, the development of two novel hormone sensors and polysaccharide trafficking during cell plate formation.

After a brief coffee break, session three began with a study on chemical disruption of CesA complex localization, followed by works on free xylose in plants, increased alkane biosynthesis in tobacco chloroplasts, homoplasmy of transformed chloroplasts in tobacco, and aminotransferases and their involvement in vitamin B6 homeostasis, as well as a study on plant-specific promoter signatures performed in Arabidopsis. Dominique Bergmann (Stanford University) ended the session with an engaging talk on key transcriptional regulators and their many targets during stomata development. Peggy Lemaux (UC Berkeley), former ASPB president, concluded the meeting with a reminder of all the benefits we enjoy being a member of this great plant biology organization.

Several young investigators gave excellent poster or oral presentations. Alexander Jones (Carnegie Institution for Science) and Kaisa Kajala (UC Davis) won awards for their oral presentations. On Sun Lau (Stanford University) and Arthur Liu (San Francisco State University) received their poster presentation awards from John Cushman (University of Nevada, Reno), current chair of the Western Section. ■

MEMBERSHIP CORNER
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What are your hobbies?

Spending time with Anne and our children, Evan and Tessa, both of whom love picking dandelions, pushing tractors, reading books, using sidewalk chalk, and stealing Dad's TV remote control.

What do you still have to learn?

I still struggle with appropriately interlacing plant cell/molecular biology concepts with plant ecology/organismal topics. I want my molecular biology students to recognize why they need to understand nutrient cycles and species diversity. I need my ecology students to understand why they should care about gene transfer and cloning techniques. My current position is providing me fantastic opportunities for practice in these areas.

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

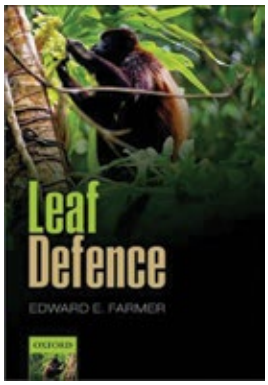
ASPB has a mandate to further educate the general public on the essential roles of photosynthetic life in their daily lives. ASPB continues to do wonderful work in promoting enhancement of K–12 and collegiate plant biology education. It drives home the critical need to fund plant biology research to our governmental systems. The general public requires a fundamental and functional understanding of photosynthetic life, however, to both improve their own lives and ensure stimulation and continuation of future plant biology research and technologies resulting from these efforts.

What is the most interesting thing you have learned this year?

I have three, in no particular order:

- Former undergraduates really appreciate your "tough" course standards after their first semester of professional/graduate school.
- Helping mentor first-generation college students and watching their success is a blessing.
- Evan asking for, and heartily consuming, more squash over a five-day span this summer than Anne and I have eaten in our entire lives (with interesting physiological outcomes). ■

ASPB Member Edward Farmer Authors New Leaf Defense Book



ASPB member Edward E. Farmer has published a new book, *Leaf Defence* (Oxford University Press, ISBN 978-0-19-967144-1). This novel text focuses on the leaf, on the herbivorous organisms that attack leaves, and on how plants defend these ecologically important organs. It begins with an overview of the global scale of herbivory before examining the physical, chemical, and molecular protection mechanisms that operate on leaf surfaces and deep within the leaf itself. Leaf survival is in large part due to two processes: first, upon attack, leaves defend themselves vigorously; second, leaf-eating organisms fall prey to predators. Remarkably, these processes can be controlled and coordinated by the leaf itself. Throughout the book, perspectives from both the laboratory and the field are combined and illustrated with plants from temperate and tropical regions. Some of the defense-related strategies that occur in New Zealand and on the Indian Ocean island of Socotra are used to exemplify unusual evolutionary trajectories in plant defense. Finally, a central feature of the work is its emphasis on the coevolution of leaf defenses and the digestive tracts of animals, including humans, making the book of relevance in understanding the significance of leaf defenses in agriculture. ■

CID Bio-Science Inc.

Portable Instruments for Precision Plant Measurement

Instruments designed with **Plant Biologists** in mind.

CI-900 Portable Ethylene Analyzer

The lightweight design and simple operation of the CI-900 enables trace measurements of ethylene concentration in any location or field site. With the CI-900 there is no need to transport samples back to the lab.

Range: **0-200 ppmv** Resolution: **1 ppbv**

CI-202 & CI-203 Laser Leaf Area Meters

High speed scanner and scan board with built in data logger, the **CI-202** is our most popular leaf area meter.

The **CI-203** is, without question, the best leaf area meter available. Built-in GPS tagging adds a location for each data set. Barcoded data enables easy collection of leaf characteristics.

CI-340 Handheld Photosynthesis System

The CI-340 Handheld Photosynthesis System is a much improved version of the first lightweight, hand-held photosynthesis system introduced by CID in 1997. The latest version, the CI-340, features a simple design concept in a compact, solid-state structure. Everything required to measure ambient photosynthesis, transpiration, stomatal conductance, PAR and internal CO2 is conveniently included in one easy to operate instrument.

ASPB Participates in Congressional Event to Showcase NSF

BY TYRONE SPADY
ASPB Legislative and Public Affairs Director

On May 7, more than 275 congressional staffers and members of the NSF advocacy community convened in Washington, D.C., for the 20th Annual Coalition for National Science Funding (CNSF) Exhibition and Reception. The event, essentially a science fair for the congressional audience, showcased 35 NSF-sponsored researchers and was organized by CNSF, an alliance of more than 120 professional societies (including ASPB), universities, and businesses that advocates on behalf of NSF. Among the attendees were eight members of Congress (Reps. Joyce Beatty OH-3, Chaka Fattah PA-2, Rush Holt NJ-12, Daniel Lipinski IL-3, Jerry McNerney CA-9, Jim Moran VA-8, Mark Takano CA-41, and Paul Tonko NY-20) and senior science policy staff from the White House.

ASPB was well represented at the event. David Nelson of Georgia State University was there formally representing ASPB. In addition, Society members Mary Gehring (Massachusetts Institute of Technology) and Gary Felton (Pennsylvania State University) also presented their research.

NSF is exceptionally well regarded within the halls of the U.S. Capitol. However, the intense focus on deficit and debt reduction over the past several years has increased the frequency and severity of misguided attacks on the agency and the projects it supports. It has, unfortunately, become a cottage industry for some politicians to screen the agency grant databases for "funny-sounding" project titles in the name of shining a spotlight on "wasteful" federal spending.

Lawmakers need to be able to put faces to the projects funded by federal science agencies, and they need to hear our stories. Given the challenges of the current political environment, events such as the CNSF exhibition are more important than ever, and ASPB will continue to be an active participant and strong supporter. ■

ASPB member David Nelson discusses his NSF-supported research with Rep. Chaka Fattah PA-2, ranking member of the House Appropriations Subcommittee that funds NSF.

Policy Update

BY LAUREN BROCCOLI
Lewis-Burke Associates, LLC

ASPB Cohosts Capitol Hill Briefing on Plant Breeding

As the debate on genetically engineered food intensifies on Capitol Hill and across the country, misinformation clouds the science of plant breeding. On April 28, ASPB partnered with the Tri-Societies, the National Coalition for Food and Agricultural Research, and the Council for Agricultural Science and Technology to host a Capitol Hill briefing titled "Crop Breeding: The Root of Modern Agriculture" to educate Hill staffers on this topic. ASPB members Sally Mackenzie, University of Nebraska–Lincoln, and Jorge Dubcovsky, University of California, Davis, presented to the audience consisting of congressional staff, federal agency employees, and other stakeholders. Congressman Adrian Smith (NE-3), cochair of the Modern Agriculture Caucus, provided opening remarks highlighting the critical importance of federal research funding for plant breeding methods to meet the needs of a growing population and ensure food security. The discussion also served as a platform to promote the Plant Science Decadal Vision, outlining the communities' detailed research agenda to meet these urgent international needs.

FY2015 Appropriations Update

At the time of writing, the House and Senate have started consideration of the fiscal year (FY) 2015 appropriations bills. On June 5, the Senate Appropriations Committee approved its Commerce, Justice, Science (CJS) appropriations bill for FY2015. The CJS bill has jurisdiction over NSF, which would be supported at $7.25 billion, an increase of $83 million over FY2014. The House passed its CJS bill on May 30 and would provide NSF with $7.4 billion. This proposed level is $237.3 million, or 3.3%, above the FY2014 level and $154.2 million, or 2.1%, above the president's FY2015 request. Once the Senate has passed its CJS bill, the House and Senate will conference to work out the differences between the two bills.

On May 22, the Senate Appropriations Committee approved its Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations bill for FY2015. The Senate bill recommends the following funding levels:

- Agricultural Research Service (ARS): 14 billion
- National Institute of Food and Agriculture: $1.29 billion
- Agriculture and Food Research Initiative: $325 million

The committee did not provide funding for the president's proposed USDA Innovation Institutes

FIRST Act

On May 28, the House Science, Space, and Technology Committee completed its mark up and approved the Frontiers in Innovation, Research, Science, and Technology (FIRST) Act. The FIRST Act is the House Republican version of the COMPETES reauthorization covering NSF, the National Institute of Standards and Technology, and the White House Office of Science and Technology Policy. As expected, the markup was highly partisan and contentious, with Democratic members of the committee expressing serious concerns with several provisions in the bill. It is unclear if or when the bill will be considered on the House floor. The Senate has not yet released its version of COMPETES, but it is expected to be substantially different from the House version. ■

ASPB Roots for Plant Science @ USASEF 2014

BY KATIE ENGEN
ASPB Education Coordinator

Several thousand kids, teens, and adults visited the ASPB booth during the 2014 USA Science & Engineering Festival (http://www.usasciencefestival.org) in Washington, D.C. April 25–27. The curious crowds enjoyed digging in to activities featuring important knowledge and cool concepts that plant biology has to offer, including

- Dissecting big seeds (lima beans) to find the "baby plant" inside
- Creating mini garden cup necklaces to plant small seeds (carrots or lettuce) or plants that don't need seeds to reproduce (Mother of Thousands)
- Getting temporary tattoos to show off their love of plant biology
- Testing to see what nutrients seeds use before they can photosynthesize
- Taking selfies at the "Plants Make/Are/Do Hot Stuff" photo-op station
- Collecting *My Life as a Plant* coloring books (http://www.aspb.org/coloringbook) and 12 Principles of Plant Biology bookmarks (http://tinyurl.com/ASPBbookmarks).
- Helping grow a participant graph showing key traits for becoming a plant scientist. Curiosity was the winning trait. Determination, Success in Math & Science, Fascination with Plants, and Motivation for College had strong showings, too.

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A trio of garden necklaces means 3 times the growth experimentation at home! PHOTO BY MELANIE BINDER

This young visitor was one of many who were enraptured as ASPB volunteer Janet Slovin shared stories about the busy lives of plants and how plants do so much to improve our daily lives. PHOTO BY MELANIE BINDER

ASPB volunteer Janet Slovin (USDA-ARS) is a true outreach expert. Booth visitors never want to leave once they engage with Janet. PHOTO BY DENNIS PRICE

ASPB Director of Legislative and Public Affairs Tyrone Spady (left) shares with visitors some key concepts on seeds, soil, water, light, and air. PHOTO BY DONNA FAVON

White House Easter Egg Roll 2014

Because We're Happy . . . Over Plants

BY KATIE ENGEN
ASPB Education Coordinator

"We had a lot of fun and enjoyed our time with the kids at the White House. It was great to work with such energetic volunteers, too. What a day!!"

—Burkhard Schulz, ASPB Education Committee

"Hop into Healthy, Swing into Shape" was the theme of the 2014 White House Easter Egg Roll (http://www.whitehouse.gov/EasterEggRoll) set up to support the First Lady's *Let's Move!* initiative (http://www.letsmove.gov). The soundtrack for the healthy hubbub on the South Lawn was filled with cheering egg race fans, bouncing basketballs, aerobics instructions, thwacked tennis balls, giggles, and guffaws, all mixed with live and DJ-spun music. Fittingly, the most popular tune of the day was "Happy," by Pharrell Williams (http://tinyurl.com/HappyASPB).

Down by the First Lady's garden, the ASPB booth was hopping with plenty of happy youngsters and families during each of the five two-hour visitor shifts (~3,000 ticketed entries per shift). They came to the ASPB booth to

- dissect lima beans and discover the "baby plant" inside;
- poke their face through the photo-op banner for a fun selfie as a sunflower;
- assemble puzzles revealing the many things that come from or are closely connected to plants;
- create a mini garden cup necklace of lettuce or carrots; and
- talk about how plants keep themselves and all living things healthfully hopping along each day.

The event album is located at http://tinyurl.com/WHEER14photos. Thanks to clever Q&A with our volunteers, these happy young minds were humming with new ideas.

Happy Visitors

A saucer-eyed girl responded, "AWESOME," to everything ASPB Director of Publications Nancy Winchester told her about the baby plant inside every seed and about the many things in her life made from plants, including her cotton sweater.

One eager five-year-old dissected about a dozen lima bean seeds and even came back at the end of her South Lawn "shift" as a self-appointed assistant for our booth. ASPB volunteer Rick Vierstra offered her a job in his lab. Her dissections truly were expert.

Happy News Travels Fast

ASPB President Alan Jones and his wife, Cathy, volunteered on Monday. Back home in North Carolina, word of their outreach adventure hit their local broadcast news in Pittsboro (http://tinyurl.com/JonesNews) one day later. How nice that this news item gave ASPB practically as much mention as President Obama reading the children's classic, *Where the Wild Things Are* (http://tinyurl.com/bsknj2o), and First Lady Michelle Obama making smoothies with kale (the coolest veggie of the year) with the cast of the Disney Channel show "Jessie" (http://disneychannel.disney.com/jessie).

Dig In to More Happy Ideas

For more cool and classic plant options, check out

- *My Garden,* by Kevin Henkes (and read by Mrs. Obama at the Egg Roll)
- *From Plant to Seed,* by Gail Gibbons
- *10 Plants That Shook the World,* by Gillian Richardson and Kim Rosen
- *The Mangrove Tree: Planting Trees to Feed Families,* by Susan L. Roth and Cindy Trumbore
- *Weeds Find a Way,* by Cindy Jenson-Elliott and Carolyn Fisher
- *Acorn to Oak Tree,* by Camilla De la Bédoyère
- *Coolbean the Soybean,* by Shawn Conley
- *No Monkeys, No Chocolate,* by Melissa Stewart and Allen Young ■

"The kids all liked the experience of making their necklaces, and we enjoyed all the discussions we had with them during the process."

—Melanie Binder, ASPB staff, and her daughter, Rachel

"I was really proud to be a part of the ASPB public outreach today. Everyone who volunteered today did a great job for the kids on the South Lawn."

—Alan Jones, ASPB president

"The vast majority of children who came to our booth seemed interested in building the garden necklaces and completing the jigsaw puzzle. Since this was my first time volunteering with ASPB, I had no idea of how the event would work, but, in the end, it worked very well."

—Dan Czerny, ASPB grad student member

"I was amazed by how much those little kids know (even about photosynthesis) and how interested they are in plants. My favorite moment was the big smiles on the kids' faces when they put on the garden necklaces they made themselves. One parent repeated several times, 'This [the garden necklace] is a brilliant idea!'"

—Qiong Zhang, ASPB grad student affiliate

"The event was a grand success. It was great to see that the plant necklace was such a hit. Almost all the kids in the event seemed to have one of those."

—Hemayet Ullah, ASPB member

In a letter dated May 21, 2014, Mrs. Obama wrote to ASPB:

I want to thank you for joining us at the White House, and I hope you know how much I appreciate your participation in this year's Easter Egg Roll.

Each year, the president and I look forward to hosting this time-honored tradition. As parents, we know that the families who attend this event will cherish the memories they made for years to come. This year, over 30,000 visitors from across our country joined us on the South Lawn, and I want you to know that your participation made this day even more special for our guests.

ASPB is so happy to have such amazing volunteers! Many thanks to

Rachel Binder
Elizabeth Cummings
Daniel Czerny
Alan Jones
Cathy Jones
Justin Kuan
Burkhard Schulz
Stacey Simon
Janet Slovin
Alison Tisaranni
Ashley Tisaranni
Jordan Tisaranni
Hemayet Ullah
Rachel Vierstra
Rick Vierstra
Qiong Zhang

…and staff helped, too!

Melanie Binder
Katie Engen
Stephanie Liu-Kuan
Tyrone Spady
Nancy Winchester

"Everyone absolutely loved" digging in to plant their own garden necklaces.
PHOTO BY MELANIE BINDER

USASEF 2014
continued from page 15

- Stamping their Evolution Thought Trail passport (http://sdbonline.org/evotrail) after exploring plant traits and variations
- Chatting with ASPB scientists and educators about the importance of plants in our daily lives

In the words of ASPB volunteer Mary Clutter, "The kids, well . . . *everyone*, absolutely loved it!" Outreach is fun and rewarding! To plant some seeds and cultivate interest for plant biology in your community, consider sharing these resources with young people:

For Young People

My Life as a Plant coloring book (http://www.aspb.org/coloringbook)
What's for Dinner? (http://tinyurl.com/PlantsDinner)
How to Host a Plant Biology Film Fest (http://tinyurl.com/PBfilmfest)

Teens & Up

- *It's a Little on the Seedy Side* (http://tinyurl.com/hoodsteading)
- The "Doomsday" Arctic Seed Vault (http://tinyurl.com/kjrorbz)
- Plant Biology videos on YouTube: (http://www.chlorofilms.org)
- Phyllotaxis and Fibonacci: (http://tinyurl.com/PBandFib) ■

Many thanks for the hard work, energy, and expertise of these phenomenal ASPB booth volunteers:

Catrina Adams
James Anderson
Sabrina Bare
Rachel Binder
Mary Clutter
Elena Colliver
Lauren Colliver
Dan Czerny
David Puthoff
Nicholas Ruppel
Stacey Simon
Janet Slovin
Barbara Swedo
Alison Tisaranni

(with great support from staff members Melanie Binder, Tyrone Spady, and Crispin Taylor, too)

This event could not have happened without the local Girl Scout troops who helped prepare thousands of garden cup necklaces. Thanks, girls!

ASPB also appreciates the cultivation and donation of thousands of seedlings by Ryan Cooper of the Institute for Bioscience and Biotechnology Research (https://www.ibbr.umd.edu) and the Xiao Laboratory, directed by ASPB member Dr. Shunyuan Xiao.

ASPB Biotechnology Awareness with Teachers in Kumasi, Ghana

BY VICTOR A. AMANKWAAH
Research Scientist, CSIR-CRI, Kumasi, Ghana

With funds from a 2013 ASPB education grant (http://bloome.aspb.org), a seminar for 54 senior high school biology teachers from selected second-cycle institutions from all over Ghana was held May 21 at the Council for Scientific and Industrial Research (CSIR)–Crops Research Institute (CRI) Biotechnology Laboratory in Kumasi. The seminar's primary goal was to create awareness of biotechnology for teachers initially brought together by a training program dubbed Investigative Science Teaching. This goal complemented the ongoing ASPB-funded project, Introducing Basic Biotech Teaching Techniques in High Schools in Sub-Saharan Africa-Ghana (http://tinyurl.com/GhanaQuain), developed by ASPB member and grant PI Marian Dorcas Quain and her team.

Teachers attending the event were eager for the opportunity to learn more about biotechnology, especially to gain insights into genetically modified organisms (GMOs). The teachers visited CSIR-CRI under the leadership of Augustus Agyemfra, the coordinator for Science and Resource Centre, Accra, and Margaret Delyth, Science and Resource facilitator from the United Kingdom.

The event featured Marian Dorcas Quain, ASPB Ghana coordinator for the aforementioned project; David Appiah-Kubi, tissue culture specialist; and Henry Akrofi Doku, molecular biologist, who presented on Introduction to Biotechnology and GMOs, Basic Concept in Plant Tissue Culture, and Concept of Polymerase Chain Reaction (PCR), respectively.

Victor Amankwaah

(above and below) Practical demonstration of DNA isolation with seminar participants.

First, Marian welcomed the teachers and outlined the day's program, which included the three presentations and a practical demonstration of DNA isolation, facilitated by Belinda Akomeah, a technologist at the CSIR-CRI Biotechnology Laboratory. Marian enlightened the teachers on what biotechnology and GMOs are all about and convinced them of the need to take these areas seriously, especially at a time when

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More DNA isolation practice.

Teachers listening to the presentations with rapt attention.

BIOTECHNOLOGY AWARENESS
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Ghana is preparing to introduce GMOs into its farming systems. The second presenter, David, explained plant tissue culture, accompanied by a brief history and its applications. He then narrowed down and expatiated on micro propagation, limitations of conventional vegetative propagation, and advantages and problems associated with this application, and ended with the steps involved. Third, Henry spoke about PCR as a means of amplifying a particular piece of DNA. He further talked about the steps involved and its application in agriculture and forensic science. After each of the presentations, teachers were given the opportunity to ask questions. During these exchanges, issues concerning GMOs and their introduction into Ghana were prominently featured.

The presentations were followed by a practical demonstration of DNA isolation in which teachers were divided into four groups. The teachers were very enthusiastic about this exercise. In an interview after the practical session, Augustus stated that he was very impressed. He indicated that biotechnology has now been introduced into the syllabus of the senior high schools of Ghana, and as such he finds this program appropriate for teachers. He remarked that it would help with the information flow of issues concerning biotechnology and GMOs and thereby reduce the falsehoods in the Ghanaian system. He recommended that this program be organized for as many teachers as possible for the greater benefit of students. Some teachers were interviewed as well, and all evaluated the program on paper. The general impression was that the program was very useful and insightful, and they recommended that it be continued.

Related update: Since the seminar, Marian and her team received funding from the 2014 ASPB Plant BLOOME grant for phase 2 of this biotechnology education project (see related story on page 21). ■

2014 Plant BLOOME Grant Recipients

BY KATIE ENGEN
ASPB Education Coordinator

To support Society members as they create innovative instructional resources, ASPB funds an education and outreach grant program called Plant BLOOME (http://bloome.aspb.org), or Plant Biology Learning Objectives, Outreach Materials and Education. As the newest iteration of a grant established under a different name in 2004, Plant BLOOME aims to help ASPB members advance knowledge of and appreciation for plant biology. Successful projects enrich K–12 student and general public understanding of the

- importance of plants for the sustainable production of medicine, food, fibers, and fuels;
- critical role plants play in sustaining functional ecosystems in changing environments;
- latest developments in plant biotechnologies, including genetic modifications of crops;
- contributions and discoveries from plants that improve human health and well-being; and/or
- range of careers related to plant biology or available to plant biologists.

Congratulations to the 2014 ASPB Plant BLOOME winners!

Alan Berkowitz

Alan Berkowitz

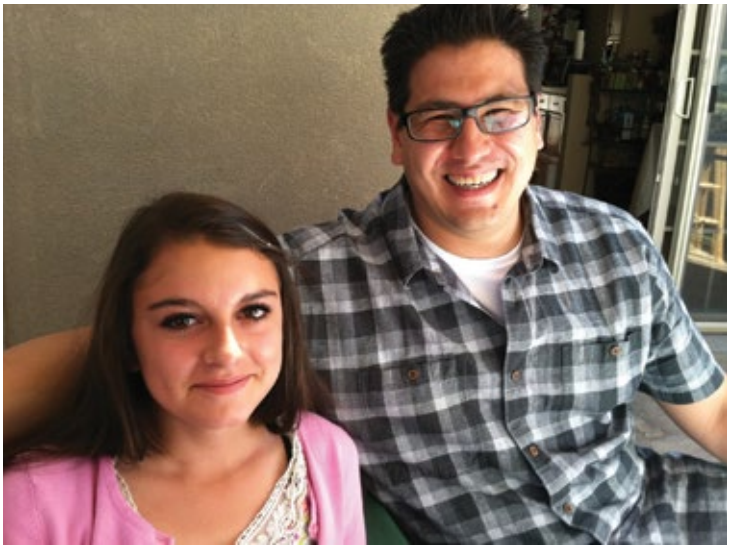
Cary Institute of Ecosystem Studies

School Woodland Ecosystem Study Project (SWESP)

In this program, a professional learning community of teacher fellows, Cary Institute scientists, and educators will develop a robust curriculum module focused on five key ideas concerning the ecological significance of tree species differences. A learning progression that describes how middle and high school students develop more sophisticated understanding of biodiversity will be integral to the SWESP module.

The primary goal of SWESP is to increase teachers' and students' understanding of schoolyard tree diversity so they can develop and test claims that compare functions and services between different communities over time. The project will help teachers establish long-term schoolyard study plots, and then use these plots supported by a curriculum (lesson plans, data collection protocols, guidelines for statistical analysis, background information, and real-life applications) that engages students in primary research.

Teacher fellows will pilot the curriculum with their students and then train other area teachers during a 2015 summer institute. Evaluation will be done through formative and summative assessment of teachers and students (surveys, content knowledge tests, and authentic artifacts). The SWESP team will seek to publish evaluation results in education journals. SWESP will be disseminated and sustained through the Cary Institute and its partners' websites and by training additional students and teachers to use SWESP as part of the institute's ongoing programs.



PEER logo designer Sophia Salazar and Mario Izaquirre-Sierra.

Mario Izaquirre-Sierra

Northern New Mexico College

Plant Educational Experience in Research (PEER) at Northern New Mexico College boot camp/outreach program

PEER is a new program created to elevate interest in plant science and agriculture for K–12 students in a region that has almost no programming or resources in this area of science education.

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Cary Institute of Ecosystem Studies

PEER logo design by Sophia Salazar, seventh-grade student. The Zia Sun symbol is featured on the flag of New Mexico. The Zia Sun appears at the center of an Arabidopsis flower.

2014 PLANT BLOOME
continued from page 21

The integrated team of experts set to manage PEER includes undergraduates and faculty from Northern New Mexico College (NNMC) and teachers in community schools. Students engaged with PEER will experience relevant and stimulating laboratory activities designed to catalyze curiosity and understanding about science, biology, technology, plant science, and using plants as a tool. Additionally, they will gain awareness of and experience with higher education resources. Two important long-term goals for PEER are to

- increase the number of Hispanic and Native American students intending to pursue higher education, particularly in science; and
- boost the recruitment and retention of the current NNMC biology, chemistry, and environmental science undergraduate student population because of their involvement with the PEER outreach and boot camp.

The PEER team will disseminate its experiences, materials, and approaches at national science and education meetings. PEER mentors will present seminars or posters annually during the NNMC symposium. A PEER program website will promote student-to-student interactions and archive the program's multidisciplinary, bilingual, and bicultural story.

Marian Dorcas Quain

CSIR–Crops Research Institute

Introducing Basic Biotech Teaching Techniques in High Schools in Sub-Saharan Africa-Ghana, Phase 2

Phase 1 (http://tinyurl.com/QuainPh1) of this project identified and addressed specific gaps in the teacher training and student learning opportunities available for plant biology and biotechnology in Ghana. The project's new website, http://tinyurl.com/GhanaQuain, offers some of what has been developed; more will be posted soon.

Phase 1 stimulated curiosity and revealed misconceptions about biotechnology and genetically modified organisms (GMOs) among teachers and students.

Marian Dorcas Quain

Phase 2 will respond to the crucial need to provide intensive education about modern biotechnology. Phase 2 also will expand the program to infuse modern biotechnology, biology, and integrated science curriculum throughout more schools across Ghana.

In Phase 2, high school teachers will learn basic concepts and skills related to GMOs. Other key program objectives are to

- encourage constructive debate on the topic among high school students;
- introduce the use of molecular biology teaching models in high school and teacher training colleges;
- train teachers who benefited from Phase 1 to train other teachers; and
- ensure heads of schools and/or science departments in the participating schools have a basic concept of biotechnology and genomics.

Evaluation results and resources will be disseminated with an eye to revising Ghana's entire science curriculum. The Phase 2 team will communicate with the Ghana Education Service, the Ghana Ministries of Education (ME), Environmental Science, Technology and Innovation (MESTI); the Director General and Director of Education of the Council for Scientific and Industrial Research (CSIR) Ghana, the Parliamentary select committee on education; the Ghana Association of Science Teachers (GAST); Science, Technology and Mathematics Innovations Education of Ghana; the International Training and Educational Consultancy program in Ghana; and the USAID representative in Ghana. Project information also will be shared with the West and Central African Council for Agricultural Research and Development biotechnology platform (http://www.coraf.org/en.html) to encourage program adoption in the West African subregion. ■

plantingscience

The American Society of Plant Biologists invites members to join the 2014–2015 PlantingScience Master Plant Science Team

The Master Plant Science Team is designed to provide compensation for a cohort of 12 graduate students who make a substantial contribution as an online scientist mentor. To support your extra efforts, there are extra benefits and support systems.

Members of the Master Plant Science Team receive

- free membership to ASPB for the year commitment
- 50% off meeting registration
- PlantingScience T-shirt

Joining the Team involves

- participating in online mentorship training
- mentoring ~4 student teams via the web during **BOTH** fall and spring sessions (each session lasts ~2 months)
- posting to student web pages ~3 times per week
- providing extra support and facilitating communication for one classroom teacher and his/her teams

"Participating as a mentor with PlantingScience has been a tremendously valuable experience! I feel like I have an opportunity to communicate my life's passion as a scientist and researcher to students in a medium that makes such communication possible like no other resource I have seen....

How could any scientist not want to do this? Learning from the students and understanding how they approach scientific topics and the scientific method helps me communicate my research to a more general audience. Simply put, PlantingScience makes me a better researcher and teacher." — 2009–2010 PlantingScience Mentor

One year as a member of the Master Plant Science Team has the potential to positively affect the rest of your professional life and inspire life-long appreciation for plant science in young learners.

Apply at www.plantingscience.org

Please apply by **August 29, 2014.** For questions contact the PlantingScience team: psteam@plantingscience.org.

Current ASPB membership is not required. Please pass this information on to others who might be interested.

Now Available from PULSE

The Vision & Change Rubric Data Collection Portal

You are invited to help catalyze life science departmental transformation by entering the Partnership for Undergraduate Life Sciences Education (PULSE) Vision & Change Rubric Data Collection Portal

http://www.pulsecommunity.org/page/v-c-certification

The portal offers rubrics that provide the necessary structure for departmental reflection and discussion regarding topics relevant to program transformation.

Eight institutions piloted the rubrics and PULSE certification program in the spring of 2014. Results are being used to update the rubrics for more general use and to design research studies on the program.

PULSE needs input from more institutions of all types to obtain a national snapshot of the positioning of undergraduate life sciences departments implementing Vision & Change ideals. You or your institution can

- review the rubrics, instruction manual, and BioCore guide;
- engage in a self-reflective process; and
- act as self-study pilot members.

To review the rubrics and survey or request more self-study information, please visit http://www.pulsecommunity.org/page/v-c-certification.

About PULSE

PULSE (http://www.pulsecommunity.org) supports ASPB initiatives for undergraduate education that stem from 2007 and continue today. PULSE partners include NSF, Howard Hughes Medical Institute, NIH/National Institute of General Medical Sciences, ASPB, and many other life science societies. Two of 40 PULSE Leadership Fellows are from ASPB. PULSE goals are

- to work collectively to transform undergraduate biology and life science education with programs and resources based on principles and recommendations of the Vision & Change report, http://visionandchange.org/finalreport. A second report is due in fall 2014.
- to provide key stakeholders, such as ASPB members, direct access to leadership groups effecting change.

Joe H. Cherry

(1934–2013)

BY BOB LOCY
Auburn University

Joe H. Cherry, professor emeritus of the Department of Biological Sciences, Auburn University, Auburn, Alabama, passed away on October 22, 2013, at age 79. Joe was born in Newbern, Tennessee, on June 3, 1934, and earned his BS from the University of Tennessee at Martin. He received his master of science degree in 1959 and subsequently his PhD in 1961 from the Department of Agronomy at the University of Illinois in plant physiology and biochemistry while working in Dr. Richard Hageman's laboratory.

Following completion of his PhD degree, Joe accepted a postdoctoral position with USDA at the Seed Protein Pioneering Research Laboratory in New Orleans, Louisiana, prior to accepting a position as assistant professor of horticulture at Purdue University in 1962, where he served in that capacity for the remainder of his 27 years at Purdue University. He subsequently took an administrative post as professor and head of the Department of Botany and Microbiology at Auburn University in 1989. He retired in 2006 but remained at Auburn as professor emeritus in the Department of Biological Sciences.

During his tenure at Purdue University, Joe trained 19 graduate students and 23 postdoctorals/visiting scientists. He made a major contribution to the plant physiology program at Purdue University by developing and teaching a graduate level course in biochemical and physiological laboratory techniques, which is fondly remembered by plant science graduate students from Purdue during Joe's tenure as their introduction to state-of-the-art techniques used to study nucleic acids and proteins. In 1973, the content of that course was turned into a text: *Molecular Biology of Plants: A Text and Manual*, which was published in both English and German and used worldwide for at least a decade after its publication.

Joe Cherry

Graduate student training inevitably sustained Joe's research program. The breadth of research programs on which he and his students worked was impressive, focusing on the area of protein and nucleic acid metabolism associated with hormone responses of plants. His definitive studies of auxin regulation of RNA polymerase activity in soybean represented a major scientific breakthrough at the time, which became confirmed in greater detail as more modern molecular techniques evolved.

Joe was chosen as a Fulbright Scholar and taught graduate students plant biochemistry at the Aristotelian University in Thessaloniki, Greece. While teaching in Greece, he also gave several lectures in Israel. In November and December 1980, he taught biochemistry to graduate students in Locknow, India, as a lecturer with the United Nations Educational, Scientific, and Development Program.

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Joe Cherry (center), with Ed Tolbert (left) and Charles Arntzen (right), at an ASPB executive meeting.

OBITUARY
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In the later stages of his career, Joe turned his research attention to cellular responses to environmental stresses. In this field, he organized three NATO Advanced Research Workshops that dealt with biochemical and molecular aspects of environmental stress of plants. The workshops were held in Norwich, U. K., in 1987; Matarea, Italy, in 1993; and Mragowa, Poland, in 1999. The proceedings of these workshops, edited by Joe, were published in three books as the *Proceedings of the NATO Advanced Research Workshop* series.

Besides emphasis on fundamental research, Joe always demonstrated an aptitude for the application of plant physiological research in the real world. Among his accomplishments was the founding of a company that produced environmentally safe and effective postharvest chemical treatments to preserve fruits and vegetables based on his six patents in this area. Under his guidance, this company grew into a publicly held corporation.

Joe Cherry (seated) with Purdue colleagues (standing, left to right) Ray Bressan, Mike Hasegawa, Narendra Singh, and Jian-Kang Zhu at a NATO ASI conference Joe hosted.

Joe's formal science administration career began with an appointment as assistant director of the Division of Sponsored Programs at Purdue in 1982 and continued as head of the Department of Botany and Microbiology at Auburn University. In both of these positions, Joe had responsibilities for building new facilities and in staffing these facilities with high-quality, capable young scientists. Additionally, I believe Joe's administrative acumen was further demonstrated when he served as secretary (1982–1984) and president (1984–1985) of the American Society of Plant Physiologists (which evolved into ASPB). During that critical period in the development of our Society, we hired our first executive director and moved to become the professionally managed, high-quality scientific society that we are today. The foundation laid by Joe during his tenure as head of our Society in part made this possible. In recognition of this outstanding service, Joe was awarded the Charles Reid Barnes Life Membership Award in 2004.

Joe is survived by his wife of 30 years, Patricia (Richter) Cherry. Joe and Pat, a former ASPP officer, met while Joe was serving as ASPP secretary/president and married shortly thereafter. Also surviving are daughter, Kandy (David) Spahr; two sons, Richard (Leslie) W. Cherry and J. Michael (Jeanne) Cherry; and five grandchildren, Keith Spahr, Angela Spahr, Kaitlyn Cherry, Morgan Cherry, and Graeme Cherry.

All of his friends, family, colleagues, and students remember Joe as a caring mentor and friend who enriched our lives by knowing and interacting with him. ■

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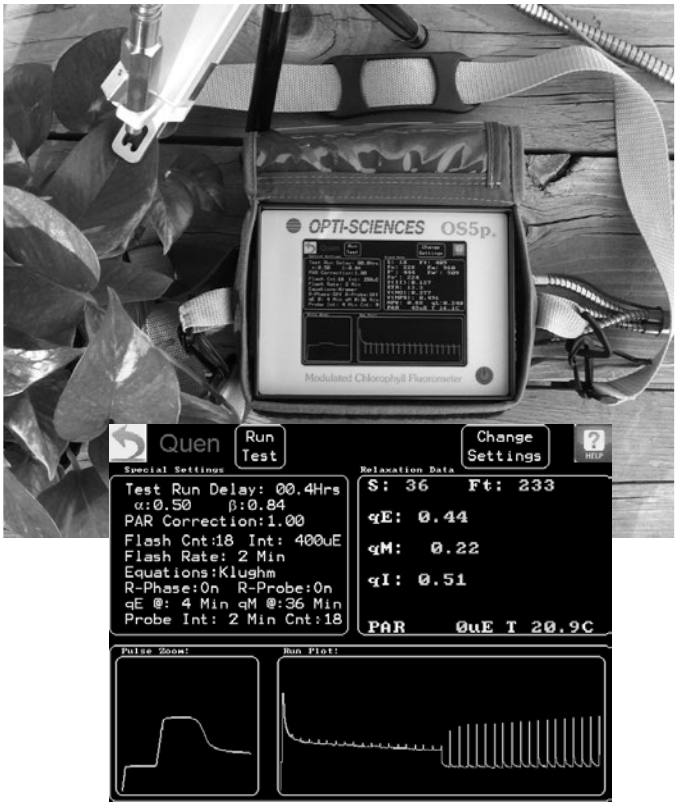

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