ASPB News

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Inside This Issue

ASPB Members Elected to 2011 Class of National Academy of Sciences

ASPB members Steven E. Jacobsen and James A. Birchler were elected to the National Academy of Sciences (NAS) on May 3, 2011, at the Academy's 148th annual meeting. In addition, ASPB member Jiayang Li was named as a foreign associate of the Academy.

This election admitted a total of 72 new members and 18 foreign associates from 15 countries in recognition of their distinguished and continuing achievements in original research. The total number of active members is now 2,113, and the total number of foreign associates is 418. Foreign associates are nonvoting members of the Academy, with citizenship outside the United States.

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HHMI and GBMF Name 15 ASPB Members as Investigators

Two of the nation's largest private sponsors of research have taken a giant leap into plant science. The Howard Hughes Medical Institute (HHMI) and the Gordon and Betty Moore Foundation (GBMF) have named 15 of the country's most innovative plant scientists as HHMI-GBMF Investigators. These 15 plant scientists—all of whom are ASPB members—will share $75 million in flexible support from HHMI and GBMF over the next five years.

The two organizations formed their collaboration because of concerns that basic plant science research has been historically underfunded in the United States. HHMI President Robert Tjian explained that "we think the creation of our joint program underscores the importance of investing in fundamental plant science, and we hope it will encourage others in the United States to make analogous commitments."

Vicki L. Chandler, a former ASPB president who is GBMF chief program officer for science, said that the sponsors "believe the research will generate high-impact discoveries with implications for a range of intertwined concerns facing society: food production, human health, protection of the environment, and identification of renewable energy resources." With plant science at the center of so many contemporary national and international priorities, HHMI and GBMF felt that the time was right to make strategic investments to fuel discoveries that have a major impact.

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The *ASPB News* is delivered online as well as in print. Members will be alerted by e-mail when a new issue is posted. The *ASPB News* welcomes member feedback. Contact the editor at nancyw@aspb.org.

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Managing editor	**Patti Lockhart,** ext. 119	plockhart@aspb.org
Science writer, *Plant Physiology*	**Peter Minorsky,** 845-878-4570	peminorsky@aspb.org
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Production manager, *The Plant Cell*	**Susan Entwistle,** ext. 118	susan@aspb.org
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ASPB News

Headquarters Office
15501 Monona Drive
Rockville, MD 20855-2768 USA
Phone: 301-251-0560
Fax: 301-279-2996
info@aspb.org

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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.

Plants and Bioenergy


Nick Carpita

"…cell walls are an enormously important source of economically important raw material. Examples include the modification of pectin cross-linking or cell–cell adhesion to increase shelf life of fruits and vegetables, the enhancement of dietary fiber contents of cereals, the improvement of yield and quality of fibers, *and the relative allocation of carbon to wall biomass for biofuels*." [italics added]

Written in 1980, these lines are from the abstract of one of my first grant proposals to the Department of Energy (DOE). What might sound particularly prescient today is actually quite far from it. For the past 30 years or so, such a rationale could be found in *every* plant biologist's research proposal to study the structure and synthesis of the plant cell wall. This was particularly ingrained in many of us who were part of the DOE Plant Research Lab (PRL) on the campus of Michigan State University (MSU).

The DOE was supporting bioenergy research long before it was called the Department of Energy. Indeed, the history of the PRL traces back to 1959 when, in the wake of increased funding for basic research upon the Soviet Union's launching of Sputnik, a select committee of plant biologists was convened by the Atomic Energy Commission (AEC) to review the plant research programs supported by its Division of Biology and Medicine. The AEC considered research with plants central to its mission but was deeply concerned about the state of plant science, which it perceived as falling behind other disciplines (1). One recommendation was to develop centers of excellence in association with one or more land grant institutions, where a student's interest in plant research could be fostered specifically in energy-related disciplines. Some six years later, the PRL was sited at MSU, and among the legendary ASPB members who became its first faculty was the renowned biochemist Joe Varner, who cloned the first gene that encoded a cell wall protein.


The PRL's first faculty, 1966. From left to right: Phil Filner, Peter Wolk, Joe Varner, Jan Zeevaardt, John Scandalios, Hans Kende, Anton Lang (director), Lloyd Wilson, and Derek Lamport.

The OPEC oil embargo of 1973 was a call to action that a petroleum-based economy was dangerous for energy—and, indeed, national—security, if that economy was based on imported sources. Although the embargo ended a year later, huge increases in gasoline prices continued after President Jimmy Carter, himself a student of nuclear engineering, came into office. In response, Carter created the Energy Research and Development Administration (ERDA) that a year later organized into a full-fledged government agency, the DOE. In a single year, the MSU–AEC lab became the MSU–ERDA lab and then the MSU–DOE Plant Research Lab. The PRL began to hire faculty more directly involved with advancing basic energy sciences. Noted cell wall researchers would join the PRL, such as Debby Delmer, who discovered genes that encode cellulose synthases; Chris Somerville, who championed Arabidopsis as a genetic model for cell wall research; and Ken Keegstra, who focused on the biosynthesis of xyloglucan. Ken was a postdoc in the lab of another giant in ASPB, Peter Albersheim, whose AEC-funded group, now the Complex Carbohydrate Research Center in Georgia, proposed the first molecular model of the plant cell wall in 1973.

Resources for alternative energy research quintupled during the Carter administration (2). However, with the crash of the oil market in the 1980s, the subsequent administration deemed the programs, which Carter envisioned as critical for U.S. future prosperity and energy independence, unnecessary expenditures. Funding plummeted to pre-Carter levels, and the policy initiatives for promoting a domestic bioenergy industry all but disappeared. But among the leadership at DOE were those who steadfastly championed the basic biology of plants as fundamental to alternate energy solutions, and they stood behind its key institutions. The Basic Energy Sciences (BES) program of DOE generated competitive grants of its own, funding substantial areas of plant and microbial research devoted to the understanding of how biomass is made and how it is degraded and fermented to ethanol and other useful fuels. The DOE Office of Science urged certain national labs, like Brookhaven and Oak Ridge, to develop bioenergy programs. The Solar Energy Research Institute (SERI) began operations in 1977, and its activities extended beyond research and development in solar energy to include H_2 production by plants and ethanol production from biomass. In 1991, SERI became the National Renewable Energy Laboratory (NREL), establishing centers of research

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Northeastern Section Meets at University of New Hampshire

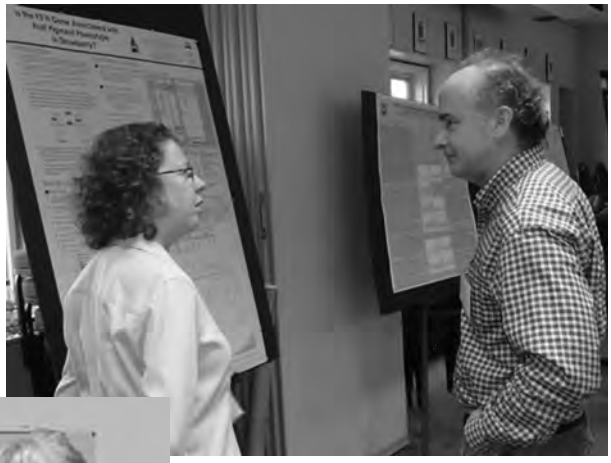
The 75th annual meeting of the Northeastern Section of ASPB was held at the University of New Hampshire on May 6–7, 2011. The meeting, organized by Estelle Hrabak (University of New Hampshire), drew more than 80 attendees from across the region, ranging from New York City to northern Vermont.

The meeting began with a minisymposium titled, "Next Generation Plant Biology." Symposium guest speakers were Rob Last (Michigan State University), "Hairy Genomics: Biochemical Genomics of Glandular Trichomes in Tomato"; Nengyi Zhang from Ed Buckler's group (Cornell University), "Genetic Dissection of Carbon and Nitrogen Metabolism in Maize"; and Ann Loraine (University of North Carolina at Charlotte), "Regulation of Alternative Splicing under Abiotic Stress in Arabidopsis." The minisymposium was followed by a poster session with 43 presentations and a banquet with musical entertainment by a jazz quartet.

The meeting continued on Saturday morning with six platform presentations on topics that included mechanisms of tolerance to abiotic stresses, micropropagation in mist bioreactors, T-DNA transfer in *Agrobacterium*, and the effects of iron limitation on photosynthesis in chlorophyte algae. The conference concluded with a business meeting and book raffle.

Estelle Hrabak
University of New Hampshire

(from left) Undergraduates Afaf Halo, Kiryl Montano, and Anna Banach from SUNY-Plattsburgh in front of their poster entitled "Melatonin Reversal of Light-Driven Cell Expansion in Chlamydomonas: V-ATPase Requirement." Research sponsors are Janice Marchut Conrad and Peter Conrad.



(above) Rob Last (Michigan State University), symposium speaker, talks with Lise Mahoney, doctoral student with Tom Davis at University of New Hampshire, about her poster on genes involved in fruit pigmentation in strawberry (Fragaria).

(left) Symposium speaker Rob Last (Michigan State University) chats with Pam Weathers from Worcester Polytechnic Institute in Massachusetts.

Over 50 Years of *Plant Physiology* Available

Anyone interested in old issues of *Plant Physiology* dating from 1949–2001 should contact Jim Ehleringer at jim.ehleringer@utah.edu.

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and development expertise in renewable electricity, renewable fuels, integrated energy systems, and strategic energy analysis (3). NREL provided a path to commercialization through construction and performance evaluation of production-scale facilities. From the late 1970s onward, academic and private centers and hundreds of individual investigators received consistent support for research on the basic understanding of the biochemistry and genetics of plant processes.

For all plant biologists, the impact of DOE extended well beyond energy research in the formation of the Joint Genome Institute under the direction of the Biological and Environmental Research program in the Office of Science. Partnerships with the USDA aim to integrate and implement the promise of an agroenergy economy into rural communities. Although the USDA and NSF have provided critical support in basic and applied plant biology, the Office of Science at DOE has had a unique role in funding use-inspired discovery–grand challenge science in application to the real-world problem of energy security.

Despite this long history, few plant biologists had heard of switchgrass until it was mentioned by President George W. Bush in his 2006 State of the Union address. A DOE workshop report *"Breaking the Biological Barriers to Cellulosic Ethanol"* had just been published (4), and the Energy Independence and Security Act of 2007 signaled a renewal of serious attention toward plants as sources of renewable energy. We had to step up our game and apply plant and microbial systems approaches to increase the pace of discovery. Funding like nobody had seen before in plant biology was committed, such as $125 million to establish three centers combining academia and DOE National Labs for systems approaches to optimize plants and microbes used in biological conversion routes from biomass to biofuels. Presidents of ASPB began writing about bioenergy in the newsletter. Mike Thomashow wrote about how our new genomic resources could be put to use in the development of bioenergy crops (5), and Rick Amasino wrote twice on the urgency of addressing climate change and the role of bioenergy crops in its mitigation (6). Rob McClung covered the potential downside of bioenergy cropping systems, the problems of ethanol production from corn grain, and the impact of indirect land use issues on global food supply (7); Sally Assmann followed with the benefits of perennial grasses and sustainable cropping systems (8).


Bob Rabson

The fruits of these investments are beginning to show, but DOE is not done. With renewed commitment to a green energy economy from the Obama administration and boosted by funds resulting from the American Recovery and Reinvestment Act of 2009, DOE's Office of Science realized the long-held desire to advance all alternative energy programs. Four of the 46 funded centers are focused specifically on bioenergy to probe the molecular structure of cell walls, develop algal biofuels, move toward biomimetic and artificial photosynthesis, and use chemical and thermal catalysis to convert biomass directly to energy-dense "drop-in" biofuels more like gasoline in molecular composition.

Through feast and famine, plant biology had a champion at DOE who engineered this development, from the promotion of the AEC PRL through to the competitive grants program and other centers of excellence that fostered energy research in plants. That champion was Bob Rabson. Bob saw development of a sustained and vibrant community through DOE as an essential strategy to drive the science of bioenergy. His philosophy was to provide innovative individuals with a continuity of funding collectively needed to protect the larger mission. For me, his philosophy was captured best when he said, "I like to think that DOE is different because we fund people, not proposals." Much of what is being done today in advancing basic bioenergy research we owe to the foundational support Bob provided through the BES program, which he led for many years, and inspired in the leadership that followed to this day. Winner of ASPB's Gude Prize in 1986 for his leadership, Bob is also an inaugural ASPB Fellow. Through a generous contribution that Bob and his wife, Eileen, made to ASPB, and with the added support of the many ASPB friends whose careers he fostered, we are happy to announce this year the creation of the biennial Robert Rabson Award, an honor for exceptional contributions to the field of bioenergy by a young investigator.

But where has all this support brought us today? Have DOE's 50-year investments in bioenergy research brought us closer to energy independence? Probably, but the impact is not yet realized in a flourishing biofuels industry that displaces significant quantities of imported oil. The investments are large by the standards we have learned to accept for plant biology research dollars, but they are small in the grander scheme. Indeed, the total investment in energy sciences is less than 2% of the national research budget. We have sufficient annual biomass and the paths to conversion to reach the congressionally mandated goal of 36 billion gallons of renewable liquid biofuel per year by 2022 (9). The remarkable advances in plant genomics and genetics of the past decade give deserved optimism for continued improvements in food and feed crops, as well as high-yielding, low-input new crops designed as energy crops that can push yields much further.

Scientists are working on many solutions, from algae to grasses to trees. As former USDA Undersecretary Gale Buchanan (and others) put it, "…we can't hope to accomplish this with a silver bullet—we'll need silver buckshot…"(10). But the financial stakes are so high that researchers are often too quick to explain why their bullet is superior to everyone else's. For all technologies, a "reality check" is necessary to emphasize the implementation bottlenecks that need to

be overcome. Oil production from algae seems a reasonable path to a high-density "drop-in" fuel, but the production capacity and water demands involved need substantial improvement (11). Perennial grasses are touted as the optimal high-yield, low-input solution for a bioenergy crop. However, their superior qualities for low input are compared to grain corn, and annual crops like tropical maize and sorghum are equally high yielding and low input but provide huge benefits to growers who can fit them into sustainable rotation and use the same harvesting equipment (12). The infrastructure already in place in the Midwest creates the likely launch region for the bioenergy agroeconomy, but "food versus fuel," life cycle analyses, and indirect land use issues cloud investment (13). However, we have no option but to move forward and muddle through, contributing our expertise for the necessary solutions.

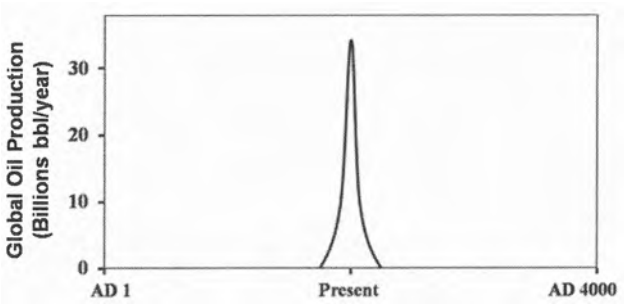

Figure 1. In the long view of recent human history, oil production will be a narrow window (14).

If our past experience in the chronicles of human culture and behavior are a measure, our prospects are gloomy. Humans have been using wood for energy and construction since we were *H. erectus,* and wood and biomass are still the principal form of energy for developing countries. Throughout human society, wood has been the essential resource, not only for fuel, but also for construction of fishing boats and vast armadas. In his engaging book *Life Without Oil* (14), Steve Hallett documents many examples where, despite the reliance of a people on wood for their survival, from the Polynesians of Easter Island to the Roman Empire, they consumed this valuable resource to their own societal collapse. The slope of change was shallow enough over a single generation to mask the inevitable, but consumption continued unabated even when the inevitable could be foreseen. According to Hallett, in the larger view, the consumption of oil will be an anomaly, a strange blip in human existence (Figure 1). Unfortunately, this blip is peaking just at the inflection point of the exponential growth of a human population that, for the most part, doesn't use oil but wants to. Liquid fuel for personal vehicles is today's luxury of rich and emerging nations. It isn't a matter of whether bioenergy and all other forms of carbon-neutral energy will be able to replace petroleum, but when, how, and to what extent.

We could have learned much from Brazil. In response to the rise in oil prices in the wake of the OPEC oil embargo, Brazil revived a 50-year-old mandate to develop ethanol from sugarcane—not without fits and starts, such as the corrosion problems and inability to run on gasoline that doomed the Pro-Álcool cars that immediately followed to commercial failure. Determined, the Brazilians pushed on to advance the technology of alternative fuel vehicles. Flex-fuel vehicles, which can run on any combination of gasoline or ethanol, were introduced and strongly promoted in 2003. Ironically, a great many of them were built in partnership with American companies, and these vehicles brought Brazil to liquid fuel energy independence (15). Over 90% of Brazilian cars today are flex-fuel. Today, self-sufficiency in energy plays a large role in Brazil being second only to China in economic growth.

One can't help but think back on that original "Sputnik moment," that wakeup call that U.S. complacency had allowed the country to slip as the world's technology leader. At a recent DOE Energy Frontiers Summit, Secretary Steven Chu reminded us of the 50th anniversary of President John F. Kennedy's call to action in his first State of the Union address. It was a time of a troubled economy, a jobless recovery from recession, a time of world disorder, one filled with threats of terrorism and instability in the Middle East (16)—an uncanny reflection of today. Kennedy vowed that "… this nation should commit itself to achieving the goal, before this decade is out, of landing a man on the moon and returning him safely to the earth." I was an 11-year-old school kid growing up 100 miles from Cape Canaveral when Kennedy spoke those words to Congress. To my generation, this was going to be a great adventure that, without question, would succeed. But I also recall that for the most part, our parents scoffed—pursuing a wild dream that couldn't possibly be realized was surely a waste of tax dollars at a time of such an uncertain economy.

The precipitous decline of oil as our major energy resource is our new "Sputnik moment" and demands a "Project Apollo" response. Sadly, too many among that inspired Apollo generation are now questioning the impact that bioenergy will have and are deriding the "waste" of tax dollars spent in developing a green economy. But bioenergy will indeed succeed as a major contributor to our sustainable future. Today's new generation of kids *know* it is achievable because it *has* to be. The prospects of failure are too dim.

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Jody Banks


Robert Blankenship


Joanne Chory

Jo Ann (Jody) Banks was featured on the May 5 episode of National Public Radio's *All Things Considered* discussing her work on the evolution of plants and their vascular systems (http://n.pr/jYrIRV). She was the lead author on the genome sequence of Selaginella, which was published by *Science* in early May (http://bit.ly/iwlAr9). Selaginella not only is one of the first plants to develop a vascular system to transport water and nutrients inside the plant, its genome also suggests it may be a potential source of new secondary metabolites, which can have important uses in a variety of areas. Jody is professor of botany and plant pathology at Purdue University. She is coeditor for *The Plant Cell.*

Robert Blankenship is quoted in a May 12 article in *Scientific American* about measuring whether plants or photovoltaics are better at capturing solar energy (http://bit.ly/md4lCw). The article is motivated by a review published in *Science* on May 13 authored by a team led by Bob that includes several other ASPB members (http://bit.ly/iLxvH7). They conclude that photovoltaic-driven electrolysis is more efficient than natural photosynthesis when measured annually but speculate that synthetic biology might be used to enhance photosynthesis for improved solar energy conversion efficiency. Bob is the Lucille P. Markey Distinguished Professor of Arts and Sciences and director of the Photosynthetic Antenna Research Center at Washington University in St. Louis. He received ASPB's Charles F. Kettering Award for excellence in photosynthesis in 2008.

Joanne Chory has been elected as a foreign member of the Royal Society, the UK's academy of sciences (http://bit.ly/lBZIIb). Fellows and foreign members are elected for life on the basis of scientific excellence; those elected include Isaac Newton, Charles Darwin, Albert Einstein, Dorothy Hodgkin, and Stephen Hawking. Joanne pioneered the analysis of plant responses to their environment using a molecular genetic approach in Arabidopsis and has helped understand how plants grow and develop, how they perceive light, and how chloroplasts signal to the nucleus, among other discoveries. She is a Howard Hughes Medical Institute Investigator as well as the Howard H. and Maryam R. Newman Chair and professor and director of the Plant Molecular and Cellular Biology Laboratory at the Salk Institute for Biological Studies. She is also a member of the U.S. National Academy of Sciences, the German National Academy of Sciences, and the French Académie des Sciences. She is a fellow of the American Academy of Arts and Sciences and the American Association for the Advancement of Science. She received ASPB's Charles Albert Shull Award for young investigators in 1995 and has served as associate editor for *Plant Physiology.*


Samuel Hazen


Norman Lewis

Samuel Hazen has been selected to receive an Early Career Research Award from the Department of Energy Office of Science (http://bit.ly/iE4h3F). These five-year awards are designed to bolster the nation's scientific workforce by providing support to exceptional researchers during the crucial early career years, when many scientists do their most formative work. Sam was one of 65 scientists selected from a pool of about 1,150 applicants at universities and national laboratories across the country. He is assistant professor of biology at the University of Massachusetts Amherst.

Norman Lewis was elected as a corresponding fellow of the Royal Society of Edinburgh, Scotland's national academy (http://bit.ly/jRVXz4). He joins more than 1,500 members, including 61 corresponding fellows, who have "attained high international standing in any subject within our disciplinary domains, and who are not normally resident in the UK."

Just a week later, Norman became a U.S. citizen, as described in a May 25 article in *The Spokesman Review* of Spokane, Wash-

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ington (http://bit.ly/mKYbUK). He was quoted as saying, "We've had a wonderful time here. We've been able to do research on plant biology . . . . It's a great privilege to be a citizen in this country."

Ottoline Leyser and Elliot Meyerowitz


Ove Nilsson


Hugh Nimmo


Pamela Ronald

His lab conducts research on the metabolism of phenylpropanoids, with a particular emphasis toward understanding vascular plant cell wall formation. Norman, who emigrated from Scotland in 1985, is Regents Professor and director of the Institute of Biological Chemistry at Washington State University. He is a member of ASPB's Public Affairs Committee and a former monitoring editor for *Plant Physiology.*

Elliot Meyerowitz is the inaugural director and **Ottoline Leyser** is the first associate director of the Sainsbury Laboratory at the University of Cambridge, UK. The new facility in the heart of the university's Botanic Gardens was officially opened by Her Majesty Queen Elizabeth II and the Duke of Edinburgh on April 27 (http://bit.ly/m5UDCg). The laboratory will eventually house 120 scientists working to elucidate the regulatory systems underlying plant development.

Elliot studies the genetics of flowering plants and has cloned many genes associated with flower development and hormone receptors. He is the George W. Beadle Professor of Biology at the California Institute of Technology and a member of the National Academy of Sciences, the Royal Society, the American Academy of Arts and Sciences, and the American Philosophical Society. He is a fellow of ASPB and received the Society's Martin Gibbs Medal in 1995.

Ottoline studies the role of plant hormones in plant developmental plasticity, especially the hormonal control of shoot branching in Arabidopsis. She was previously professor of plant developmental genetics at the University of York. She is a fellow of the Royal Society and a member of the European Molecular Biology Organization and was appointed Commander of the Order of the British Empire in 2009.

Ove Nilsson was quoted in an April 4 article in *The Washington Post* about why trees bloom when they do (http://wapo.st/lesG70). Although flower buds flush in the spring, flower initiation and development actually occur during the previous summer, controlled by the production of FT protein based on hours of sunlight. The article was motivated by the annual explosion of cherry blossoms in Washington, D.C. Ove is a professor in the Swedish University of Agricultural Sciences Department of Forest Genetics and Plant Physiology at the Umeå Plant Science Centre in Sweden.

Hugh Nimmo was elected as a fellow of the Royal Society of Edinburgh, Scotland's national academy, joining more than 1,500 members (http://bit.ly/jRVXz4). He works on the biochemistry and physiology of circadian clocks and outputs, particularly in Arabidopsis. These clocks affect agronomically important traits such as flowering and tuberisation. Hugh is professor of plant biochemistry at the University of Glasgow.

Pamela Ronald has been named by *Fast Company* magazine as one of the 100 Most Creative People in Business 2011 (http://bit.ly/l4ypPh). She was cited for her work in rice genetics. Her laboratory used positional cloning to isolate the first pattern recognition receptor and submergence-tolerance gene, both of which have been used by breeders to develop disease-resistant and submergence-tolerant crop varieties. Joining her on the *Fast Company* list is a diverse group of individuals, including the chief architect of the iPhone software; White House chef Sam Kass; and television personalities Conan O'Brien, Tina Fey, and Oprah Winfrey.

Pam is professor of plant pathology at the University of California, Davis, and vice president of feedstocks for the Joint Bioenergy Institute. She is coauthor, with her husband, an organic farmer, of *Tomorrow's Table: Organic Farming, Genetics, and the Future of Food,* which was praised by Bill Gates as "a fantastic piece of work." She blogs at *Tomorrow's Table* (http://bit.ly/a0WDyc). Pam is a former member of ASPB's Public Affairs Committee and served as a monitoring editor for *Plant Physiology.*

Paul Williams was one of the "notable college-level educator-researchers" interviewed for the May 2011 issue of *The Scientist* for "tips on how to make teaching more enjoyable and effective" while leaving time for your research (http://bit.ly/r7H1Ew). He developed a rapid-cycling Brassica for his research on disease-resistant vegetables and

then realized that it would be useful for teaching about plants and biology. The resulting educational program—Wisconsin Fast Plants—has been utilized in thousands of classrooms around the world and has even flown on the Space Shuttle. Paul is quoted as saying that student engagement with research materials "is associated with a measure of responsibility and uncertainty that heightens awareness" about the scientific process and forces students to "investigate the questions themselves," which allows the instructor to be a "conductor" of learning rather than a sage on the stage. Paul is professor emeritus of plant pathology at the University of Wisconsin–Madison, where he also served as the first director of the Center for Biology Education. He received ASPB's inaugural Excellence in Teaching Award in 1991.


Paul Williams


Elli Wurtzel

Eleanore (Elli) Wurtzel is featured in a May 16 article in the *New York Daily News* on research to study the genes responsible for making corn rich in the precursors to vitamin A, enabling genetic tests for the most nutritious corn (http://nydn.us/iFawLe). The article follows from an effort to designate sweet corn as the official vegetable of New York State. Elli, who oversees the only research cornfield in New York City, is professor of biological sciences at Lehman College of the City University of New York. She is a monitoring editor for *Plant Physiology* and a former member of ASPB's Minority Affairs Committee.

Compiled by Adam P. Fagen, PhD
ASPB Public Affairs Director

Do you have news to share with the ASPB community?
Please let us know by e-mailing afagen@aspb.org.

Leaf Area Measurements

LI-COR Biosciences

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Measuring Insect Damage: Using the LI-3100C to Assess Lost Leaf Area

When Dr. Wyatt Hoback, associate professor of biology, began studying the effects of insect defoliation on crop yields, he needed an instrument that could quickly and accurately measure leaf area. Now that he has a LI-COR leaf area meter in his lab, he knows he made the right choice. "We have found the LI-3100C generates rapid and very precise measurements of leaf area for both large-scale crop applications and small-scale feeding studies," he says.

Dr. Hoback uses the area meter to measure defoliation of potato plants by chewing insects. During the growing season, his field crew collects samples of leaflets on a daily basis. The LI-3100C Leaf Area Meter proves itself time and time again by providing accurate leaf area measurements for large numbers of samples.

On a finer scale, Dr. Hoback also uses the area meter to assess consumption of individual leaves by single insects. Starting with a baseline measurement, Dr. Hoback and his students determine the area consumed by an insect after a feeding period. He adds, "The LI-3100C has been used extensively in my laboratory. It's great for determining overall leaf area and to quickly and precisely quantify defoliation by chewing insects."

2011 Class of NAS
continued from page 1

2011 Members from ASPB

Steven E. Jacobsen
Howard Hughes Medical Institute and University of California, Los Angeles

Steven E. Jacobsen is a Howard Hughes Medical Institute Investigator and professor of molecular, cell, and developmental biology at the University of California, Los Angeles (UCLA). He completed his BS at California Polytechnic State University, San Luis Obispo, and his PhD in plant biology at the University of Minnesota. He conducted postdoctoral research at the California Institute of Technology before moving to UCLA in 1998.

Steve said, "I was surprised and greatly honored to receive the congratulatory early morning phone calls from Sue Wessler, Jim Carrington, and several colleagues. I am still floating on air! I have been very fortunate in having two great mentors, Neil Olszewski from the University of Minnesota and Elliot Meyerowitz from Caltech. I also owe much of the honor to the fantastic postdocs and graduate students whom I have had the pleasure of working with at UCLA."

The Jacobsen lab applies genetic, biochemical, and genomic techniques to the study of DNA methylation and epigenetic gene silencing in Arabidopsis. Much of the work started with the study of a peculiar set of heritable epigenetic mutations that affect flower development or flowering time. These epialleles have been used in classical forward genetics to define the machinery that establishes and maintains DNA methylation and gene silencing. The lab has also developed techniques for whole genome analysis of DNA methylation patterning.

Steve received ASPB's Charles A. Shull Award in 2009 and was named a fellow of the American Association for the Advancement of Science (AAAS) in 2004. He also received a Searle Scholar Award and a Beckman Young Investigator Award in 2000. He became an HHMI Investigator in 2005.

James A. Birchler
University of Missouri–Columbia

James A. Birchler is Curators' Professor of Biological Sciences at the University of Missouri–Columbia. After obtaining a BS in botany and zoology from Eastern Illinois University, he pursued graduate study in genetics and biochemistry at Indiana University, earning his PhD in 1977 for research on maize genetics. He performed postdoctoral work at Oak Ridge National Lab in Oak Ridge, Tennessee; Roswell Park Cancer Institute in Buffalo, New York; and the University of California, Berkeley. The focus of this work was on dosage compensation and dosage effects in Drosophila. He was assistant and associate professor at Harvard University beginning in 1985 and joined the faculty at the University of Missouri in 1991.

James serves on the editorial boards of *The Plant Cell*, *Genetics*, *BioMed Central Plant Biology*, *Tropical Plant Biology*, *GM Crops*, *Journal of Genetics and Genomics*, *Molecular Biotechnology*, *Journal of Biomedicine and Biotechnology*, *Genomic Insights*, *McGraw-Hill Yearbook of Science and Technology*, *PLoS One*, *Frontiers in Plant Genetics and Genomics*, *Maydica*, and *Annual Review of Genetics*. He is a fellow of AAAS and has served on the council of the American Genetic Association.

Research interests of the Birchler laboratory include mechanisms of gene silencing in Drosophila, the mechanism of dosage compensation in Drosophila, gene expression in polyploids of maize, the molecular basis of aneuploid syndromes, the molecular basis of heterosis, the structure and behavior of chromosomes and centromeres in maize, plant engineered minichromosomes, and the consequences of dosage-sensitive gene regulatory mechanisms in multicellular eukaryotes in general.

2011 Foreign Associate from ASPB

Jiayang Li
Institute of Genetics and Developmental Biology, Chinese Academy of Sciences

Jiayang Li has been a professor at the Institute of Genetics and Developmental Biology in the Chinese Academy of Sciences (CAS) since 1995. Jiayang earned his PhD in biology from Brandeis University in 1991, an MS in biology from the Institute of Genetics in CAS in 1984, and a BS in agronomy from Anhui Agricultural College in 1981. He completed postdoctoral research at the Boyce Thompson Institute for Plant Research. Jiayang was elected a CAS Academician in 2001 and a fellow of the Academy of Sciences for the Developing World (TWAS) in 2004. He also serves as president of the Genetics Society of China.

The Jiayang lab is seeking to understand the molecular mechanisms underlying rice plant architecture by studying genes that control rice tiller numbers, tiller angle, plant height, panicle size, and culm strength. The lab is also working toward the molecular design of super rice with ideal properties, such as high yield, good quality, nutrient use efficiency, and resistance to stresses, by pyramiding the desired properties through molecular marker-assisted selection and transgenic approaches.

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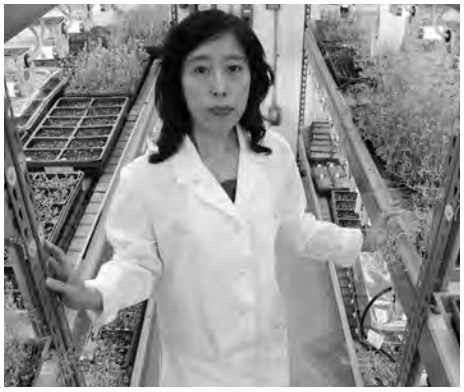
Philip Benfey. PHOTO BY JIM BOUNDS/AP, © HHMI.


Dominique Bergmann. PHOTO BY TONY AVELAR/AP, © HHMI.


Simon Chan. PHOTO BY STEVE YEATER/AP, © HHMI.


Xuemei Chen. PHOTO BY CARLOS PUMA/AP, © HHMI.

HHMI and GBMF
continued from page 1

The new HHMI-GBMF Investigators were selected on the basis of individual scientific excellence from a group of 239 applicants. HHMI is known for supporting "people, not projects," investing in visionary researchers rather than specific projects. Each HHMI-GBMF Investigator will receive an initial five-year appointment to HHMI, beginning in September 2011, and the support to develop their research in creative new directions. Investigators will continue to be based at their host institution and retain their faculty position, but HHMI will provide full salary and benefits to the investigators with research support coming from both HHMI and GBMF.

These new HHMI-GBMF Investigators will join nearly 340 existing HHMI Investigators, of whom 13 have received Nobel Prizes and more than 140 have been elected to membership in the National Academy of Sciences. The HHMI-GBMF Investigators will be eligible for additional five-year terms after a successful scientific review.

Three other plant scientists—each of whom is an ASPB member—currently serve as HHMI Investigators: Joanne Chory (Salk Institute for Biological Studies), Joseph P. Noel (Salk Institute), and Steven Jacobsen (University of California, Los Angeles).

HHMI-GBMF Investigators

Philip N. Benfey
Duke University

Philip Benfey studies how plants control the form and function of their root systems using the Arabidopsis model system. In addition to identifying key genes that guide root development, his laboratory has created several technologies for tracking gene expression and root growth patterns.

Philip is the Paul Kramer Professor of Biology at Duke University and director of the Duke Center for Systems Biology. He is a member of the National Academy of Sciences and a fellow of the American Association for the Advancement of Science (AAAS). He served ASPB as monitoring editor and associate editor for *Plant Physiology*.

Dominique Bergmann
Stanford University

Dominique Bergmann studies the plant stomata as a way of asking questions about development and stem cells that would be difficult—if not impossible—to ask in animals. She is especially interested in asymmetric cell division since plants use a different mechanism than animals. She looks forward to studying stomata development in a variety of organisms, especially grasses.

Dominique is assistant professor of biology at Stanford University and an associate of the Stanford Institute for Stem Cell Biology and Regenerative Medicine. This past year she received a Presidential Early Career Award in Science and Engineering (see the January/February 2011 issue of the *ASPB News*). She received ASPB's Charles Albert Shull Award in 2010, which recognizes young researchers, and will deliver her award lecture at Plant Biology 2011 in Minneapolis. She has also served as a mentor for ASPB's Summer Undergraduate Research Fellowship (SURF) program.

Simon Chan
University of California, Davis

Simon Chan studies chromosomal inheritance and only began working on plants as a postdoc. His work on the centromere identified an easy way to create Arabidopsis plants that contain genetic materials from only one of their parents. The next step is to extend this work to crop plants such as tomato, cabbage, and canola. He has also been working to understand the DNA sequences at the centromere and their potential role in speciation.

Simon is assistant professor of plant biology at the University of California, Davis. He received ASPB's Early Career Award in 2006 and has served as a mentor for the Society's SURF program.

Xuemei Chen
University of California, Riverside

Xuemei Chen studies the stem cells that give rise to flowers and how undifferentiated cells acquire their fates. She discovered that floral development is controlled not only at the level of gene transcription, but also by regulation of protein production. Her lab also works on microRNAs, especially focusing on their inhibitory effect on translation.

Xuemei is professor of plant cell and molecular biology at the University of California, Riverside. She received ASPB's Charles Albert Shull Award in 2006 and has served as a monitoring editor for *Plant Physiology*.

Jeffery Dangl
University of North Carolina at Chapel Hill

Jeff Dangl is a leader in studying plant immunity and helped developed Arabidopsis into a model for studying plant–pathogen defense. He identified plant receptors that guard key host proteins and mount an immune attack when damaged. Similar such receptors have been identified across living systems, from sea urchins to humans. In addition to continuing this work on pathogen defense, Jeff will also explore how plants influence the microbial communities that live in association with their roots.

Jeff is the John N. Couch Professor of Biology at the University of North Carolina at Chapel Hill, a member of the National Academy of Sciences, a foreign member of the German Academy of Science, and a fellow of AAAS. He received ASPB's Stephen Hales Prize in 2009 and has served as a mentor for the Society's SURF program.

Xinnian Dong
Duke University

Xinnian Dong works to understand plant immunity and uncover the detailed mechanisms of plant–pathogen defense. She identified a signaling gene that helps promulgate an immune response throughout the plant, even if infection is localized to one region. Her lab also found that the Arabidopsis immune response varies by the plant's circadian clock. She plans to further her work in understanding the relationship between DNA damage repair and plant defense.

Xinnian is an arts and sciences professor at Duke University. She is a coeditor for *The Plant Cell* and previously served as a monitoring editor for *Plant Physiology*.

Jorge Dubcovsky
University of California, Davis

Jorge Dubcovsky has worked to improve wheat, especially by boosting the grain's protein, zinc, and iron content to make it more nutritious; this is especially important since 20% of what every person around the world eats is wheat. His work is helping to understand critical stages of wheat plant development, such as flowering time, which can help breed varieties that are matched to the climate and local environment.

Jorge is professor of plant sciences at the University of California, Davis. He is a fellow of AAAS and received ASPB's Dennis R. Hoagland Award in 2009 for outstanding plant research in support of agriculture.

Joseph R. Ecker
Salk Institute for Biological Studies

Joe Ecker was an early leader in the effort to sequence the Arabidopsis genome, and in 2008 he helped launch the 1001 Genomes project, which will sequence 1,001 natural strains of Arabidopsis around the world. He has more recently been trying to decipher the epigenome that controls gene activity and has found similar methylation patterns in humans and plants.

Joe is a professor in the Plant Molecular and Cellular Biology Laboratory at the Salk Institute for Biological Studies. He is a member of the National Academy of Sciences and received ASPB's Martin Gibbs Medal in 2005. He also served as a monitoring editor for *Plant Physiology*.

Mark Estelle
University of California, San Diego

Mark Estelle has been working to understand the role of the plant hormone auxin, which helps plants respond to their environ-

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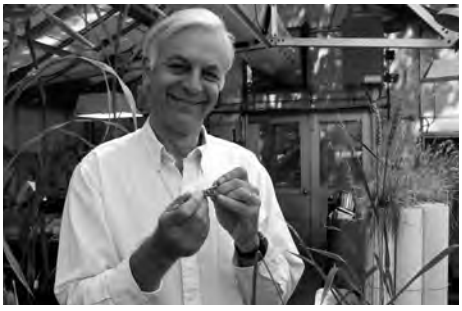
Jeffery Dangl. PHOTO BY JIM BOUNDS/AP, © HHMI.

Xinnian Dong. PHOTO BY JIM BOUNDS/AP, © HHMI.

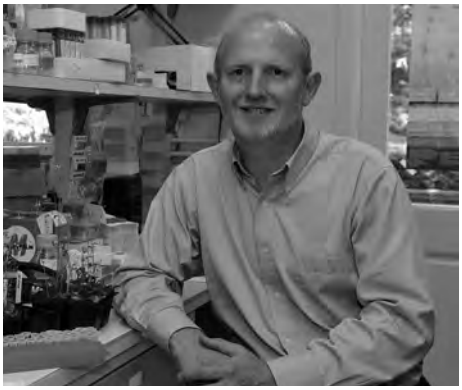


Jorge Dubcovsky. PHOTO BY STEVE YEATER/AP, © HHMI.

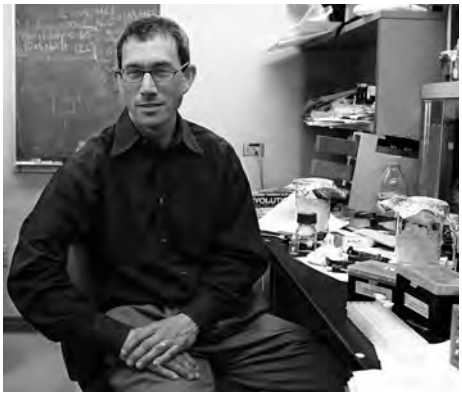
Joseph Ecker. PHOTO BY DENIS POROY/AP, © HHMI.

Mark Estelle. PHOTO BY DENIS POROY/AP, © HHMI.


Sheng Yang He. PHOTO BY GARY MALERBA/AP, © HHMI.


Robert Martienssen. PHOTO BY KATHY KMONICEK/AP, © HHMI.


Elliot Meyerowitz. PHOTO BY RENE MACURA/AP, © HHMI.


Krishna Niyogi. PHOTO BY STEVE YEATER/AP, © HHMI

HHMI and GBMF
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ment. He discovered that auxin leads to the degradation of regulatory proteins that prevent DNA transcription, and he identified the auxin receptor and its mechanism. He plans to study the pathways activated by auxin, starting with the growth of cotyledons.

Mark is distinguished professor and chair of the Department of Cell and Developmental Biology at the University of California, San Diego, a fellow of AAAS, and a member of the National Academy of Sciences. He has served as monitoring editor for *Plant Physiology* and as coeditor for *The Plant Cell*.

Sheng Yang He
Michigan State University

Sheng Yang He studies what makes plants susceptible to disease. He first learned that bacteria actually deliver proteins into the plant cell by needle-like structures and determined that some of the proteins suppress the plant's immune response; similar suppression has been shown by some human pathogens, including the bacterium that causes bubonic plague. Sheng Yang plans to continue his work on pathogenesis mechanisms, the stomata defense system, and the role of toxins and hormones in plant disease. He also hopes to find natural inhibitors of a major bacterial pathogenesis pathway.

Sheng Yang is professor of plant biology at Michigan State University (MSU) and the MSU–Department of Energy Plant Research Laboratory.

Robert Martienssen
Cold Spring Harbor Laboratory

Rob Martienssen began studying maize transposons in the mid-1980s, discovering that they regulate genes through methylation. These methylated transposons also lose their ability to move, so methylation provides a host defense mechanism. He has also studied the role of small RNAs in gene regulation, linking RNA interference to the inactive form of chromosomal DNA, and the role of regulatory RNAs in reinstating transposon silencing during reproduction; he speculates that it may be possible to grow a plant from egg cells without fertilization.

Rob is a professor at Cold Spring Harbor Laboratory, a fellow of the Royal Society, and an associate member of the European Molecular Biology Organization.

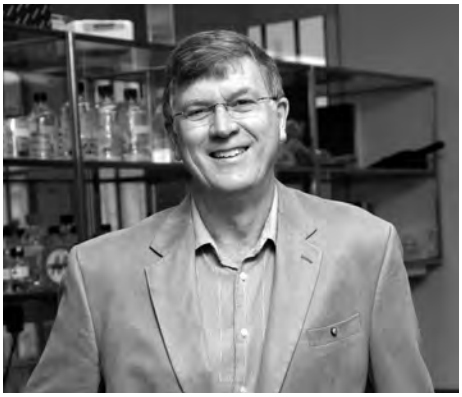
Elliot Meyerowitz
California Institute of Technology

Elliot Meyerowitz was one of the first to identify a plant hormone receptor, and he helped discover how plants create their characteristic pattern of leaves and flowers. He is using a variety of tools, including live imaging and mathematical modeling, to understand how plant cells use auxin to communicate and how the growing tip of the plant, the apical meristem, differentiates into different tissues. His lab found that plant regeneration is enabled by a population of adult stem cells.

Elliot is the George W. Beadle Professor of Biology at the California Institute of Technology but is currently serving as the inaugural director of the Sainsbury Laboratory at the University of Cambridge (see Members in the News, page 10). He is a fellow of AAAS, a member of the National Academy of Sciences, and a foreign member of the Royal Society. He received ASPB's Martin Gibbs Medal in 1995 and was named a fellow of ASPB in 2010. Elliot was also a founding editor with Chris Somerville of *The Arabidopsis Book* and received a grant from the ASPB Education Foundation in 2007 to help create a teacher training program in using plants as a model system to address state biology education standards.

Krishna K. Niyogi
University of California, Berkeley, and Lawrence Berkeley National Laboratory

Kris Niyogi has been studying photosynthesis for more than a decade as well as how plants thrive with an unsteady supply of sunlight. Using both Arabidopsis and the green alga Chlamydomonas, he has focused



Craig Pikaard. PHOTO BY AJ MAST/AP, © HHMI.

Keiko Torii. PHOTO BY STEPHEN BRASHEAR/AP, © HHMI.

on non-photochemical quenching in which plants release heat as a line of defense when they absorb too much light; greater understanding of this process could help develop more efficient biofuels and food crops.

Kris is a professor in the Department of Plant and Microbial Biology at the University of California, Berkeley, and a faculty scientist in the Physical Biosciences Division at Lawrence Berkeley National Laboratory. He received ASPB's Charles Albert Shull Award in 2005 and a Presidential Early Career Award for Scientists and Engineers. He served as coeditor for *The Plant Cell* and as a member and chair of ASPB's Publications Committee.

Craig Pikaard
Indiana University Bloomington

Craig Pikaard has been investigating how plant cells silence gene expression, focusing on epigenetics, which are inherited changes not affecting the DNA sequence. He looked at nucleolar dominance, when ribosomal RNA is only expressed from one parent in a genetic hybrid. He will further his research on gene silencing, including through the use of single atom cryoelectron microscopy, to understand how the cell chooses which genome to suppress.

Craig is the Carlos O. Miller Professor of Plant Growth and Development at Indiana University Bloomington and a fellow of AAAS.

Keiko U. Torii
University of Washington

Keiko Torii was among the first to discover receptor kinases in plants, proteins that span the cell membrane to transmit chemical signals from other cells. Knocking out these kinases had an effect on the pattern of pores known as stomata; further investigation revealed that several genes that led to stomatal stem cells were in the same class as master regulatory proteins for neuron and muscle development in animals. She is now working across disciplines to understand the regulatory dynamics and signaling pathways that create stomatal patterns. Greater understanding of this process can help predict how plants will cope with changing climates, including droughts and other environmental challenges.

Keiko is professor of biology at the University of Washington. She currently serves as a monitoring editor for *Plant Physiology,* a member of the editorial board for *The Arabidopsis Book,* and a mentor for ASPB's SURF program.

Adam P. Fagen, PhD
ASPB Public Affairs Director

In Their Own Words…

On the Value of HHMI and GBMF Investment in Plant Science

"I believe it sends a strong message that plants are a really great system of study. Knowledge of plant functions has contributed—and will continue to contribute—to fundamental knowledge on many levels."
— Joe Ecker

"This HHMI-GBMF funding is, in part, a recognition of the immense opportunity that exists today in the basic plant sciences. Many of the world's most pressing problems, including food security, renewable energy, and climate change, relate directly to plant biology. The potential for advances in the basic plant sciences to address these issues has never been greater. At the same time, this is an underfunded area of research when compared to biomedical science, allowing this generous funding to have even greater impact. It can only be hoped that other funding sources will follow the lead of HHMI and GBMF in providing additional resources to take advantage of the opportunities in this field."
— Philip Benfey

"This investment by HHMI-GBMF immediately signals to the broader biomedical research community and the public that plant science is intrinsically interesting and can drive important discoveries that matter to society—a message that can get lost on occasion."
— Jeff Dangl

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HHMI and GBMF
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"I think it's great that HHMI and GBMF are recognizing the importance of plant science and enabling research that would likely be considered too 'high risk' by most grant panels." — *Kris Niyogi*

"I think we, as a society, underinvested in agricultural research, and we are lagging behind in our increases in productivity. Increases in food prices have a very serious impact on those who have limited resources. Investments in agricultural research can help us meet this demand faster." — *Jorge Dubcovsky*

"The impact of this program is huge for plant biology. The history of biomedically relevant plant research is so easily forgotten, as I know all too well being in a field populated by cancer biologists. Now that we collaborate with plant breeders around the world, I also realize that we have to emphasize the global importance of agricultural research, especially to funding bodies in developed countries." — *Simon Chan*

"The animal field is sort of considered the default. People are allowed to be completely illiterate about plants and that was okay . . . . HHMI and GBMF are saying that plants have something to contribute." — *Dominique Bergmann*

On the Freedom to Pursue New Research Directions

"These are experiments that we've talked about over beer that we'd really like to do—but none of us thought we'd get the chance to do." — *Dominique Bergmann*

"The biggest opportunity for me will be to regain time to think creatively and entertain the notion of moving in completely new directions. It is very difficult to get funding for crazy new ideas or to make sharp turns in research direction in the U.S. funding system. The HHMI-GBMF funds, in my view, obligate us to do so!" — *Jeff Dangl*

"It gives me the opportunity to think broadly about what needs to be done in my field and go after it, rather than spending my time trying to write proposals that adjust to grants' RFPs with a small chance of success. The HHMI long-term support gives me a lot of flexibility to address important questions." — *Jorge Dubcovsky*

"HHMI-GBMF will allow me to significantly accelerate the progress of my laboratory's research and to conduct innovative experiments that require more resources." — *Xinnian Dong*

"I hope that the HHMI-GBMF funding will allow me and collaborators to make new contributions to the emerging field of plant disease susceptibility and to expand the use of pathogen virulence factors as unique probes in the discovery and characterization of fundamental cellular mechanisms in plants." — *Sheng Yang He*

"It's a fantastic opportunity, and I can't wait to start some crazy new projects related to improving photosynthesis." — *Kris Niyogi*

"The major impact I anticipate for my laboratory's research is the ability to accelerate our movement into new areas, particularly epigenomics, bioinformatics, and physical biochemistry." — *Craig Pikaard*

"Our work is a nice example of how completely basic research can lead directly to applications (in our case, new plant breeding technologies). With the HHMI-GBMF funding, we can keep doing the exploratory, avant garde work that proved successful for us yet is hard to fund through traditional panels." — *Simon Chan*

"It is such an incredible honor to be named as one of the HHMI-GBMF Investigators. At the time, I was reconsidering my career as a basic plant developmental biologist in the United States; due to the difficulty of acquiring federal funding, I thought I might have to reorient my focus to applied crop/energy biomass research. This extraordinary opportunity from HHMI-GBMF enables me to go back to the basics and explore the fundamental questions in plant development: how plant cells interact to coordinate organogenesis and tissue patterning. Stomatal development is a great system to understand positional signals, cell–cell communication, stem cell renewal, and cell fate specification in plants. I would like to take this great opportunity to explore new, cross-disciplinary approaches to investigate such questions." — *Keiko Torii*

On the Impact Beyond Their Own Labs

"HHMI will . . . provide the university with funds for the use of my laboratory space and has already benefited my home department, which is in the midst of an extensive renovation project to improve the research and teaching space in one of our historic buildings. . . . The support from HHMI-GBMF has changed the financial landscape sufficiently for the administration to commit funds to complete the project as needed. This is one of the ways that HHMI-GBMF funding provides benefits beyond individual investigators' laboratories." — *Craig Pikaard*

"This funding will help me develop functional genomic tools for the wheat community. We would like to sequence our wheat TILLING populations using high-throughput sequencing so people can access mutations in all genes with a simple web search. This will empower everybody to do deeper functional gene analyses in wheat." — *Jorge Dubcovsky*

"I can actually invest in some experiments that are a bit risky or things that will build an infrastructure that will serve my lab and the university and the broader plant community."
— *Dominique Bergmann*

On Getting the News

"I received the good news from HHMI-GBMF on my iPhone midway through the PhD defense of one of my students, just as we were moving from the seminar room to the conference room where his thesis committee would ask their detailed questions. (He did a masterful job.)"
— *Craig Pikaard*

"Elation and relief, quickly followed by the recognition that from those to whom much is given, much is expected. We have a responsibility to make the most of this wonderful opportunity and to leverage our success across our community."
— *Jeff Dangl*

"I did not believe that I had the slightest chance to receive the award, as I've always thought that such awards were for 'star' or 'celebrity' scientists who have both the pedigree and prestige. I've come a long way since the days in Japan where I was an unnoted student. I am truly grateful to the committee who selected me, and I would very much like to do my best to demonstrate that exciting plant science can come from anywhere." — *Keiko Torii*

"I was thrilled to learn that I was selected as an HHMI-GBMF Investigator. I felt grateful to my PhD and postdoctoral advisers, David Stern and Elliot Meyerowitz, for the training they had given me; my former and current students and postdocs for their dedication and hard work; and the entire Arabidopsis community for making Arabidopsis a superb model to unveil the molecular secrets of life."
— *Xuemei Chen*

When those selected as HHMI-GBMF Investigators were being contacted, Dominique Bergmann was on a plane from Europe to San Francisco. After 13 hours of flying, she opened her phone to find an e-mail from a colleague congratulating her on an honor she didn't yet know she had won.

2011 Class of NAS
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Jiayang said, "I am honored to be elected. This reflects the outstanding contribution of my colleagues in the lab and the constant support from my institute and CAS. I am also grateful to those in China and the USA who have influenced my own thinking as a biological scientist. I am sure that my election will provide me a better opportunity to push forward the collaboration between Chinese and American scientists in natural sciences, especially in life sciences and agriculture."

ASPB Affiliates in NAS

In addition, two former members of ASPB were honored by NAS. Athanasios (Sakis) Theologis was elected to NAS membership. Until his recent retirement from active research, Sakis was an adjunct professor in the Department of Plant and Microbial Biology at the University of California, Berkeley, and a research scientist at the USDA/Agricultural Research Service–UC Berkeley Plant Gene Expression Center. He received ASPB's Stephen Hales Prize (http://my.aspb.org/?page=AF_Awards#hales) in 2010 and will speak at the awards symposium at Plant Biology 2011.

Akira Endo was named a 2011 NAS foreign associate. He is president of Biopharm Research Laboratories after a long career at the Tokyo University of Agriculture and Technology.

The National Academy of Sciences is a private honorific society of distinguished scholars engaged in scientific research. Established in 1863 by a congressional act of incorporation signed by Abraham Lincoln, the Academy acts as an official adviser to the federal government through its operating arm, the National Research Council, administered with its sister organizations, the National Academy of Engineering and the Institute of Medicine. Additional information about the Academy and its members is available online at http://www.nasonline.org.

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Membership Corner

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.

Name: Amit Dhingra

Title: Assistant Professor

Place of Work or School: Washington State University

Research Area: Chloroplast biology, photobiology, fruit genomics, and biotechnology

Member since: 2004

1. **Has being a member of ASPB helped you in your career? If so, how?**
   Being a member of ASPB has been tremendously rewarding for my career. I have had the chance to get critical feedback on my research in real time at annual meetings. Membership continues to provide me ready access to thousands of experts in any area of plant biology.
2. **Why has being a member of ASPB been important to you?**
   It has given me an opportunity to interact and network with pioneers and friends in plant biology, and it has allowed me to stay updated on the latest developments in plant science.
3. **Was someone instrumental in getting you to join ASPB?**
   ASPB is THE happening plant biology society. As I progressed in plant biology, joining ASPB was the logical choice.
4. **What would you tell nonmembers to encourage them to join?**
   ASPB is a career-enhancing organization vital for every plant biologist. ASPB serves as the collective eyes, ears, and voice of plant biologists. Nonmembers are missing opportunities to showcase their research at meetings where they can get instant feedback from experts in the field; as members, they can test their ideas with their peers and also have representation to bring policy changes in science via ASPB.
5. **Have you found a job or hired anyone using ASPB job postings or networking at the annual meeting?**
   Yes, I did hire one of my postdocs through an ASPB job posting and also have several connections that I can choose from when a postdoc or graduate student position opens in my program.
6. **Do you still read print journals? If so, where do you usually read them: work, home, library, in the car, on the bus, or somewhere else?**
   Not much. I guess I got on the "in silico" bus a few years ago. When I do need to read older journals predating the electronic revolution, I head to the library.
7. **Have there been any issues in plant biology in which you thought ASPB should be involved or that led you to consider becoming active in the governance of the Society, and if so, what were they?**
   The engagement of undergraduate students, underrepresented groups, and high school teachers and students in plant biology is close to my heart. In addition, I think ASPB should be involved in making an impact on plant biology education beyond American soil. I have attended one International Committee meeting and would be interested in volunteering if an opportunity presents itself.
8. **What could ASPB do better?**
   ASPB could champion the cause of high school science teachers by furthering a policy at the federal level that would allow teachers to engage in research during summer with appropriate compensation and effectively update the curriculum. This is the only way we can ensure having a constant stream of well-prepared students choosing science as a career. Also, ASPB can focus on having a larger global presence to further the cause of plant biology.
9. **What do you see as the most important role for scientific societies such as ASPB?**
   Scientific societies facilitate exchange of ideas, people, and science and invigorate research through face-to-face interactions. Beyond the scientific realm, ASPB can make a profound impact on spreading the tenets of scientific thought among society at large.
10. **What advice would you give to a plant scientist just starting out?**
    Get involved and get engaged because the golden era in plant biology is just starting. You don't want to miss it.
11. **What do you think is the most important discovery in plant biology over the past year, and why?**
    The role of RNA in regulation of biological processes.
12. **What do you think is the next "big thing" in plant biology?**
    I believe the next "big thing" is integration of all the "omics" and

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biotechnology approaches to design plants for maximum food and energy production to feed the burgeoning human population and meet the global energy budget.

13. What are you reading these days?
The Omnivore's Dilemma by Michael Pollan.

14. What do you still have left to learn?
This quote by Isaac Newton made a great impression on me while I was growing up: "I do not know what I may appear to the world, but to myself I seem to have been only like a boy playing on the sea-shore, and diverting myself now and then finding a smoother pebble or a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me." Guess that says it all: lots!

President's Letter
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Public Affairs Update

This column provides just a small sample of the content in the ASPB Washington Report *and the* Plant Biology Policy Blog. *The* ASPB Washington Report, *available at http://www.aspb.org/publicaffairs/washington.cfm, is published by the ASPB Public Affairs Department and includes material provided by ASPB's legislative affairs consultants, Lewis-Burke Associates, LLC. The policy blog may be found on the ASPB website at http://www.aspb.org/policyblog.*

Nick Carpita (left) talks about the potential of biofuels with NSF Deputy Director Cora Marrett.

To keep up-to-date on ASPB's public affairs activities, please join the Public Affairs group (http://www.aspb.org/publicaffairs) on the ASPB website and look for us on Facebook (facebook.com/myASPB) and Twitter (twitter.com/ASPB). To receive an e-mail copy of the *ASPB Washington Report*, e-mail afagen@aspb.org and ask to be added to the distribution list.

ASPB Participates in Capitol Hill Exhibition

ASPB was one of the exhibitors at the 17th Annual Capitol Hill Exhibition organized by the Coalition for National Science Funding this May. ASPB President Nick Carpita presented a poster, titled "Maximizing Conversion of Biomass Carbon to Liquid Fuel," which highlighted an interdisciplinary program that fuses plant genetics and cell wall composition with chemical catalysis and engineering for direct conversion of biomass to liquid biofuels. The research he described is supported by the National Science Foundation's (NSF's) Emerging Frontiers in Research and Innovation program.

Several members of Congress attended the event, including members of the House Science Committee and the House Appropriations subcommittee with jurisdiction for NSF. Among those who stopped by Nick's poster were Rep. Jerry McNerney (D-CA) and Cora Marrett, who was just confirmed by the U.S. Senate as NSF's deputy director.

Updated Public Affairs Website

ASPB is in the process of updating the public affairs section of the website to provide members with timely access to news and funding opportunities. In particular, members may be interested in receiving e-mail updates or RSS feeds of four public affairs features on the website:

- **Plant Biology Policy Blog** for updates on policy news impacting the plant biology community: http://www.aspb.org/policyblog
- **Funding Opportunities Blog** for information about new opportunities for grants and fellowships: http://www.aspb.org/fundingblog
- **Plants in the News,** which highlights news coverage of plant science and plant scientists: http://www.aspb.org/plantsinthenews
- **ASPB Press Releases** to keep up with news from ASPB: http://www.aspb.org/pressreleases

To receive an e-mail message whenever there is a new post in any of these areas, just click the green checkmark to subscribe at the top of any of these pages; RSS feeds are available from the orange RSS icon at the top right.

All of this—and more—is available from the public affairs section of the ASPB website: http://www.aspb.org/publicaffairs.

ASPB Shares Funding Priorities with House Members

As Congress deliberates over fiscal year (FY) 2012 funding legislation, ASPB is educating members of Congress on the benefits of plant science as well as seeking their support to provide robust funding for federal science agencies. Building on the advocacy meetings ASPB's Public Affairs Committee had with congressional offices in March, the ASPB public affairs team sent House members programmatic request letters outlining ASPB's support for plant research programs at NSF, DOE, USDA, NIH, and U.S. Agency for International Development. The letters requested specific funding amounts for research agencies and provided background information to inform House members as they communicate their FY2012 funding priorities to the House Appropriations subcommittees that set federal spending levels. Despite a challenging fiscal environment, ASPB continues to lead advocacy efforts to sustain critical investments in plant science.

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House Appropriations Committee Releases FY2012 Subcommittee Allocations

On May 11, the House Appropriations Committee released its proposed spending caps for each of the FY2012 appropriations bills, also known as 302(b) suballocations. According to a statement released by House Appropriations Committee Chair Rep. Hal Rogers (R-KY), the funding limits are based on the budget resolution that passed the House on April 15. The budget plan outlines nearly $46 billion in further reductions for civilian programs in FY2012. Among the allocations, the Defense appropriations bill was the clear winner, with the committee increasing the spending cap by $17 billion (3.3%) over FY2011 levels. All of the other allocations were down from FY2011: Agriculture down $2.7 billion (13.4%), Commerce/Justice/Science down $3.1 billion (5.8%), Energy/Water down $1.0 billion (3.3%), and Labor/Health and Human Services/Education down $18.2 billion (11.6%).

The House and Senate seem far apart on spending cuts and tax increases, with some Senate Democrats proposing tax increases or cuts to defense spending. These large differences are likely to lead to another continuing resolution, as Congress will have difficulty coming to a resolution on spending before the start of FY2012 on October 1, 2011.

House Appropriations Marks Up FY2012 Agriculture Appropriations

In late May, the House Appropriations Subcommittee on Agriculture and Rural Development approved its version of the FY2012 appropriations bill that funds USDA, Food and Drug Administration, and related agencies. Despite statements by the committee and subcommittee chairs that protecting research was a priority in the bill, both internal USDA research programs through the Agricultural Research Service (ARS) and extramural programs administered by the National Institute of Food and Agriculture (NIFA) would experience significant reductions under the proposed bill.

A total of $2.2 billion would be provided for agricultural research, which is almost 14% below both the FY2011 level and the president's request for FY2012. Within this amount, ARS would see a decrease of 12% below the FY2011 enacted level, while NIFA would be reduced by 16%. The Agriculture and Food Research Initiative (AFRI) competitive grants program would receive $229.5 million under the full House Appropriations Committee proposal, which represents a sizable decrease below both the FY2011 enacted level ($265 million) and the president's FY2012 request ($325 million). The agricultural research community will need to keep up pressure on appropriators to sustain funding for AFRI, which Secretary of Agriculture Tom Vilsack has advocated for growing closer to its authorized level of $700 million, especially following the departure of NIFA Director and competitive research champion Roger Beachy earlier this month. (See below for more about support for AFRI.)

Timing for movement on a Senate companion bill remains unclear, but it is expected that total discretionary spending in that version of the bill will be higher than the amount provided by the House.

Senate Appropriations Subcommittee Questions Energy Secretary on FY2012 Request

On May 18, the Senate Appropriations Subcommittee on Energy and Water Development held a hearing to review the FY2012 budget request for DOE. Secretary of Energy Steven Chu was the hearing's lone witness and received widespread praise from subcommittee members for his tenure at the agency. However, despite their expressions of personal admiration for the secretary, subcommittee members criticized the proposed DOE budget request for FY2012 as out of touch with current budgetary realities. Subcommittee Chair Dianne Feinstein (D-CA) opened the hearing by characterizing the request as "not reflective of the current fiscal environment" and asked Secretary Chu to outline his top priorities, as Congress will have to make difficult choices about what to fund for the coming fiscal year.

Sen. Feinstein and subcommittee Ranking Member Lamar Alexander (R-TN) specifically called out programs including the DOE Office of Science and Advanced Research Projects Agency–Energy (ARPA-E) as deserving of continued support in the face of a challenging budgetary environment. Sen. Alexander touched on the wider debate regarding the role of government in supporting clean energy, stating that he and most of his Republican colleagues believe that supporting fundamental and early applied energy research is an appropriate function for the federal government but oppose long-term subsides to prop up mature technologies in the global marketplace.

Echoing the subcommittee's bipartisan support for research, Secretary Chu used his prepared testimony to describe how the FY2012 DOE budget request emphasizes President Obama's goal to "win the future," and he identified clean energy research as critical to U.S. competitiveness.

NSF Releases New Strategic Plan

NSF recently released its strategic plan for the next five years (http://1.usa.gov/lR-FKM6). The plan, *Empowering the Nation Through Discovery and Innovation: NSF Strategic Plan for FY2011–2016,* outlines three strategic goals: transform the frontiers, innovate for society, and perform as a model organization. The agency states that it will continue to use intellectual merit and broader impacts as metrics for awarding grants and as tools to engage current and future scientists.

To develop the updated strategic plan, NSF created a working group that received input from NSF staff and from NSF's numerous advisory committee members who represent the science and engineering communities.

ICE Adds Plant Science to Fields Qualifying for Extensions

U.S. Immigration and Customs Enforcement (ICE) announced on May 12 that it has expanded the list of science, technology, engineering, and math (STEM) degree programs that qualify eligible graduates on student visas for an Optional Practical Training (OPT) extension. The additions are an effort by the Obama administration to fix problems in the U.S. immigration system by expanding access to the nation's pool of talented, highly skilled graduates in the science and technology fields.

By expanding the list of STEM degrees to include such fields as plant science, horticultural science, neuroscience, medical informatics, pharmaceutics and drug design, mathematics, and computer science, the Obama administration is hoping to address shortages in certain high-tech sectors of talented scientists and technology experts, permitting highly skilled foreign graduates who wish to work in their field of study upon graduation to extend their postgraduate training in the United States.

Under the OPT program, foreign students who graduate from U.S. colleges and universities are able to remain in the United States and receive training through work experience for up to 12 months. Students who graduate with one of the newly expanded STEM degrees can remain for an additional 17 months on an OPT STEM extension.

Senate Democrats Call for Full AFRI Funding

A group of Democratic senators led by Sen. Al Franken (D-MN) has sent a letter to Senate Appropriations Agriculture Subcommittee Chair Sen. Herb Kohl (D-WI) and Ranking Member Sen. Roy Blunt (R-MO) in support of USDA research funding. The senators asked that AFRI be funded at $324.6 million, the level requested by President Obama for FY2012 and a $60 million increase over FY2011 levels.

"We appreciate the constraints you face in allocating scarce dollars for discretionary programs at USDA," the senators wrote. "However, investing in research is investing in America's future. If America is going to be competitive in the global economy in the coming decades, we have to address long-term challenges by making strong investments in agricultural research today. We urge you to make AFRI a priority as you make your FY2012 appropriations decisions."

The senators especially singled out biomass feedstocks as a critical contribution of USDA research, saying that they "are especially encouraged that AFRI has made biomass feedstock development a high priority for its upcoming grant awards."

Joining Sen. Franken on the letter were Sen. Jeff Bingaman (D-NM), Sen. Carl Levin (D-MI), Sen. Ron Wyden (D-OR), Sen. Dick Durbin (D-IL), and Sen. Jeff Merkley (D-OR).

Adam P. Fagen, PhD
ASPB Public Affairs Director

Changing Practice to Meet Vision: A Call to Action

The Changing Nature of Biology

Biology as a discipline is evolving rapidly. The tools we have at hand, the questions we ask, and the ways in which we answer them and communicate with one another have all changed radically over the past 20 years. This is especially true with respect to the study of plants.

As observed in the National Research Council's *A New Biology for the 21st Century* (1), plant biology is of increasing importance to national economies and the health of the planet. The growing global population challenges plant scientists to tackle such complex issues as the sustainable and adaptable production of food, the cost-effective production of biofuels, and how to ensure that these efforts do not compete with one another. Knowledge of plant processes, plant–plant interactions, and plant–environment interactions are key to addressing these issues. A strong plant biology workforce is critical to obtaining that knowledge. A public with an understanding of scientific processes and the workings of science is essential to ensuring that the knowledge is used wisely. The challenge to plant biologists is clear: 1) help generate knowledge of plant processes and interactions and 2) engage students in generating, synthesizing, and evaluating this knowledge in ways that are consistent with current scientific practice.

Educational Responses to Disciplinary Challenges

In July 2007, the National Science Foundation (NSF) convened a meeting of interested stakeholders to discuss the educational opportunities and challenges afforded by the changing nature of biology. This meeting was followed by a series of conversations, culminating in a summit in July 2009 of some 500 biologists, including these stakeholders, representatives of major funding agencies, and the National Academy of Sciences. Results of these efforts were captured in *Vision and Change in Undergraduate Biology Education: A Call to Action* (2), a report conceived at the summit and released in February 2011. The report represents a community effort to address the challenges of a changed discipline and a changing student body. It builds on the efforts of preceding reports (3, 4) and the knowledge and experience of contributing scientists, science educators, and students, many of whom are plant biologists.

In this article, we discuss the role of ASPB in the process of producing the *Vision and Change* (V&C) report, and we summarize some of the report's recommendations. We also raise questions about how ASPB can help implement V&C recommendations within the plant biology community. ASPB has scheduled a V&C workshop at Plant Biology 2011 to explore these issues (Monday, August 8, 12:00 noon to 1:30 p.m.). The workshop is designed to help the Society and its members put themselves clearly in the forefront of meeting the challenges set forth by V&C advisory board cochair Carol Brewer during her presentation of the V&C report at the most recent AAAS meeting (February 2011, Washington, D.C.). She urged her audience to act forcefully and become agents of change for biology undergraduate education, noting, "If not now, when? If not us, who?" (5). Our hope is that the plant biology community will be motivated to act and, especially, that discussions at Plant Biology 2011 and beyond will produce plans of actions that support plant biologists in implementing V&C recommendations.

ASPB's Role at the Forefront

ASPB and its members have been involved in V&C efforts from the beginning. ASPB was one of the first societies to host a mini-conversation (6). ASPB representatives were prominent participants in the V&C meeting for professional societies and the July 2009 summit. ASPB has now come full circle with its V&C workshop, which is being supported in part by an NSF award (#1125988). As stated in the abstract for this award, the workshop is designed to "serve as a starting point for the members and the society to identify resources for responding to V&C recommendations, gaps in those resources, opportunities to disseminate existing resources, and opportunities to develop new resources to address identified gaps." As documented by Ellis and Engen (6), ASPB members have already identified "top priorities for improving plant science education" that are mirrored in the V&C report, including the following:

- attitudes toward teaching need to be changed, especially at major universities;
- professors need additional support to become effective teachers and to disseminate their effective techniques; and
- measurable learning objectives must be defined, and the relevance of the content to students' lives must be specified.

Table 1 lists other priorities set forth by Plant Biology 2007 conferees. In addition, because many ASPB members are in positions of influence in their own institution and ASPB itself is an important voice in the biology community, the Society is well positioned to be a leader in the process of putting V&C recommendations into practice.

Key Findings of Vision and Change

The V&C report stresses that to be scientifically literate, students need to understand a few core concepts: evolution; pathways and transformation of energy and matter; information flow, exchange, and storage; structure and function; and the interconnectedness and interactions of living systems. The report further states that undergraduates should master the following competencies, as evidenced by their abilities to apply the process of science, use quantitative reasoning, use modeling and simulation, tap into the interdisciplinary nature of science, communicate and collaborate with other disciplines, and understand the relationship between science and society. To

achieve these aims, the report stresses that

- students should be involved in authentic research experiences to help them critically analyze biological data from a range of perspectives; and
- curricula should
  - move away from teaching students to simply recite facts and terminology,
  - move toward challenging students to ask better questions and develop deeper and more nuanced responses, and
  - involve students actively in discussions of concepts.

The Association of American Medical Colleges (7) and the College Board Advanced Placement Study Program (8) have recently published similar calls for a concept- and competencies-based approach to education. In addition, the V&C report and the *New Biology* report (1) both note the increasing interdisciplinary nature of biological research and the resulting need for interdisciplinarity in biology education. Both reports highlight the need to develop students' computational and modeling skills so that they are prepared to utilize the increasingly large and complex body of biological data, pursue questions that capitalize on these data, and design new approaches made possible by advancing technologies.

In discussing how to bring about change, the V&C report notes that biology departments need to foster communities of stakeholders—including undergraduates, graduate students, faculty, and administrators—who will develop, use, assess, and disseminate best practices in biology teaching and learning. The report also indicates the need for professional development for faculty—including graduate and postdoctoral trainees as future faculty—so that they are prepared to adopt, adapt, and develop effective approaches to undergraduate biology education. The report recognizes that this will require a cultural shift and deep commitment from all stakeholders. It is also clear that there will be differences in approaches to change and degrees of change across the biology community, which reflects the healthy diversity within the discipline of life science.

Table 1. Goals Arising at the ASPB 2007 Conversation
All goals are directly quoted from the article summarizing the meeting (6).

Goal
The scientific method should be taught to everyone, not just science majors, and should include probability instruction.
Attitudes toward teaching need to be changed, especially at major research universities. Professors need additional support to become effective teachers and to disseminate their effective techniques.
K–12 education majors need more science education. Science majors need to be taught to teach.
Longer terms (although not necessarily more money) are needed for funding—for example, five years rather than three. Projects need at least that long to produce verifiable results.
Biology should be taught to all undergraduates. It is the platform for all scientific thinking.
The needs of majors (i.e., expertise) versus nonmajors (i.e., literacy) should be distinguished and thoroughly defined.
Measurable learning objectives must be defined, and the relevance of content to students' lives must be specified.
Science classes should use the same evaluation standards for all students, raising the bar for nonmajors. (For example, there's no such course as "English Literature for Nonmajors.")
More support is needed for pedagogical development, especially as related to interdisciplinary connections. No discipline stands alone.
Change is required in teaching approaches. Spouting all the answers is an outdated method. Professors should a) model good research techniques and collaborative processes, b) build learning communities around specific problems, and c) teach students to innovate and evaluate.
Bring back the excitement of discovery! Educators should create discovery-based courses that address real, significant problems. They should find ways to do innovative, active learning with large classes.
Science teaching is a process, not a litany of facts. Graduate students should be given teaching and research tools and allowed to go through the process.
Students must be oriented toward global citizenship.

In order to transform the above ideas into actions, we encourage plant biologists to explore how current lists of concepts and competencies in plant biology, such as the 12 Principles of Plant Biology (http://www.aspb.org/12principles), fit within the concepts and competencies noted previously. We also encourage plant biologists to translate these concepts and competencies into examples specifically relevant for plant biology teaching and learning. More broadly, we encourage the plant biology community to ask the following:

- How can ASPB and its members work within institutional and departmental structures to effect change?
- How can a roadmap or a strategy for

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changing institutional culture and attitudes be developed?

- How do the concepts and competencies important to plant biologists fit into the broad categories found in the V&C report?

The V&C workshop at Plant Biology 2011 will be a venue for initiating these discussions.

Useful Reading and Resources

In preparation for this workshop and subsequent discussions, we recommend that plant biologists read *Vision and Change* (2), *A New Biology* (1), and a seminal article by Jay Labov and others (9) highlighting the synergy created by near concurrent publication of both reports. We have included a table of funding opportunities and other resources for supporting efforts to put V&C recommendations into practice (Table 2). We have also included examples of funded projects in undergraduate education in plant biology that are consistent with V&C recommendations (see Table 3). Our hope is that these resources will be useful to

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Table 2. Programs and Resources Supporting Educational Change
This table details selected funding opportunities at NSF, NIH, and USDA as well as general resources for biology/plant science faculty.

Program	Foci of Support	Special Considerations	Solicitation
NSF Programs			
TUES	Curriculum development, pedagogy, engaging students in the scientific process, community building, faculty development, developing computational competence	Three levels: Type 1—exploratory Type 2—expansion Type 3—comprehensive	NSF 10-544
STEP	Curriculum development, pedagogy, engaging students in the scientific process, faculty development	Projects must be designed to increase the number of STEM graduates	NSF 08-569
RCN-UBE	Community building	Supports projects to build communities of biology faculty	NSF 11-531
REU	Engaging students in the scientific process	Cross-directorate at NSF	NSF 09-598
NIH Programs			
IRACDA	Faculty development	Postdoctoral student teaching development	http://www.nigms.nih.gov/Training/CareerDev/MOREInstRes.htm
USDA Programs			
HEC	Curriculum development, student and faculty development	Supports projects to improve formal, postsecondary-level agricultural sciences education	USDA-NIFA-CGP-003378
SPECA	Curriculum development, student and faculty development for K–14	Supports projects to promote and strengthen secondary and two-year agricultural sciences education	USDA-NIFA-SAECP-003355
Additional Resources			
AAAS BiosciEdNet (BEN): http://biosci.aaas.org/portal **Commissioned Papers on Discipline-Based Education Research:** http://www7.nationalacademies.org/bose/DBER_Meeting2_commissioned_papers_page.html **HMMI Cool Science:** http://www.hhmi.org/coolscience **iPlant:** http://www.iplantcollaborative.org/leaflet/2010/05/12/the-iplant-leaflet-10-02		

Table 3. Sample Plant Science Education Projects

This table highlights selected plant science education projects funded by NSF and USDA. Although housed in one directorate, some NSF projects are jointly supported by the Division of Undergraduate Education and the Directorate for Biological Sciences.

Project Title	Principal Investigator	Focus	Project Number
Projects Supported by NSF Division of Undergraduate Education TUES Program			
Pathways for new laboratory modules in undergraduate genetics and cell physiology education: Characterization of Puerto Rican cassava	D. Siritunga	Students in genetics and cell biology courses contribute to a research project on cassava lineage in Puerto Rico by providing plant tissue from cassavas found close to their homes, extracting and quantifying the DNA, and assessing their genetic diversity through the use of SSR DNA markers.	0736727
2.0: Botany through Web 2.0, the memex and social learning	J. Greenberg	An innovative technological approach to recruiting students and retaining their interest in the biological and botanical sciences; addresses the lack of diversity in the student population pursuing the botanical sciences.	0737466
Development and use of laboratory curriculum targeting student deficiencies to establish regional higher learning communities in the biological sciences	K. Blee S. Wakim	Collaborative effort enabling students in laboratories at a state college and a neighboring community college to engage in investigations using state-of-the-art techniques to identify the functions of unknown genes in a model organism, *A. thaliana.*	0837066 0837588
Projects Supported by NSF Directorate for Biological Sciences			
SGER: Big Science at Small Schools Collaboration: Genomics of *Chamaecrista fasciculata,* a native prairie plant with potential for mixed prairie biomass	S. Singer	Brings new-generation sequencing technology and the opportunity to work with whole sequences of expressed or active genes in *Chamaecrista fasciculata* to an undergraduate school.	0746571
The iPlant Collaborative: A cyberinfrastructure-centered community for a new plant biology	S. Goff	Cyberinfrastructure collaborative for the plant sciences; a community-building and educational enterprise designed to facilitate education and outreach.	0735191
Transforming undergraduate education through increased faculty access to nextgen sequencing runs	M. Boyle	Creating a regional network of faculty from small colleges to work toward the development of teaching approaches that incorporate unanalyzed investigator-requested DNA sequencing into research and undergraduate teaching activities.	1061893
Projects Supported by USDA-NIFA Programs			
Growing the environmental science curriculum	S. Dahlberg	Refinement of new mycological modules across the ES curriculum; support professional development for the ES instructor in the fields of mycology and aquatic science.	2010-38421-21292
Hydroponics for the advancement of experiential learning in environmental horticulture, soil science, and agricultural education	C. Niedziela, Jr.	Experiential learning opportunities in hydroponics for undergraduate and graduate students by constructing and operating hydroponic systems; train high school agriculture teachers (AGED graduate students) how to build hydroponic demonstrations for their classrooms.	2006-38820-17469
Supporting instruction in soil and plant sciences: Filling the gaps in key STEM understanding for undergraduate students	B. Chamberlin	Curriculum development and faculty development in plant science.	2010-38422-21211

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biologists in transforming undergraduate biology education to truly reflect the discipline it serves.

Bethany Holm, Terry Woodin,* and Virginia Celeste Carter
National Science Foundation
*Corresponding author (twoodin@nsf.gov)

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Scenes from the grounds of ASPB headquarters, July 27, 2011

ASPB Welcomes Patti Lockhart as New Managing Editor

ASPB is delighted to welcome Patti Lockhart as its new managing editor. Patti will oversee the daily operations of peer review and production for the Society's two premier plant science journals: *Plant Physiology* and *The Plant Cell*.

Patti was most recently a senior production specialist with Dartmouth Journal Services (DJS), which supplies copyediting and composition services for both ASPB journals as well as many others. Prior to that, she was a DJS editorial manager and copyeditor trainer. Many years ago, she was a production editor and composition group leader at Capital City Press, a forerunner of DJS and compositor for many years for *The Plant Cell*.

Patti did take a brief break from the world of scholarly publishing to teach business English to managers in the legal and technology departments of Telecom Italia in Rome, but she was soon lured back to the United States when DJS was first formed to oversee the transition of several peer-reviewed scientific journals—including *Plant Physiology* and *The Plant Cell*—to fully digital workflows. She also was responsible for recruiting, training, and managing an extensive team of copyeditors, editorial assistants, and freelancers. She has worked closely with authors throughout the publication process and has attended many DJS client–society annual meetings to present workshops on manuscript, figure, and table preparation.

ASPB Executive Director Crispin Taylor said, "The combination of prior experiences and accomplishments that Patti brings to the managing editor position, together with her enthusiasm and strong interest in ensuring that both ASPB journals maintain their very high levels of performance, will stand the Society in very good stead as the scholarly publishing landscape continues to evolve."

Patti succeeds John Long, who is leaving to pursue a career as a lawyer after nine years at ASPB, including nearly seven as managing editor.

Kathy Munkvold Selected as ASPB Plant Science Policy Fellow

Kathy Munkvold will be working with ASPB over the next six months as a plant science policy fellow, helping support the Plant Science Research Summit and other aspects of ASPB's public affairs activities.

Kathy comes to ASPB from the Boyce Thompson Institute for Plant Research in Ithaca, New York, where she previously worked as a postdoctoral associate, and more recently a research associate, studying the molecular interactions between tomatoes and a bacterial pathogen. She obtained a BS in biology at Lycoming College in Williamsport, Pennsylvania; a master's degree in botany from the University of Georgia; and a PhD in plant pathology from Cornell University.

At the Boyce Thompson Institute, Kathy served as the chair of the Career Perspective Series, which is committed to informing the Cornell University community of alternative careers in science. She also pursued volunteer opportunities in undergraduate teaching, including the development of a comparative immunology class for freshman biology students at Cornell University with her adviser, Gregory Martin.

Kathy is interested in transitioning from research into a career in science policy and is eager to work with ASPB on the upcoming Plant Science Research Summit. In her spare time, Kathy enjoys cooking, outdoor activities, and family time and looks forward to exploring all that the Washington, D.C., area has to offer.

ASPB News

American Society of Plant Biologists
15501 Monona Drive
Rockville, MD 20855-2768 USA

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