ASPB News

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Inside This Issue

President's Letter

A New Land-Grant Mission for the 21st Century


Nick Carpita

As I begin my term as president, I express my appreciation for the opportunity to serve the one society that has molded my entire professional career. Over my 35 years as a member of ASPB, I've seen the Society become a truly global community that promotes and serves plant biology research: almost one-half of our membership currently resides outside the United States. I also thank my immediate two predecessors, Tuan-hua David Ho and Sally Assmann, for their superb job in strengthening focus on the role ASPB continues to play in the globalization of plant biology. Together they provided guidance for the formation last year of the Global Plant Council (GPC), a new partnership of plant societies spanning six continents. Spearheaded by ASPB's Mel Oliver, with Willi Gruissem, president of the European Plant Science Organization, Zhihong Xu, president of the Chinese Society of Plant Biologists, Kasem Zaki Ahmed, former president of the African Crop Science Society, and 10 other representatives, the GPC strives to create partnerships and collaborations for plant scientists to address together the issues of world hunger, energy security, climate change, health and well-being, and environmental protection.

Never has there been a greater need for the collective work of plant biologists worldwide to be brought to bear on these grand challenges. By the time ASPB holds its 2011 annual meeting next August in Minneapolis, the world's population will have surpassed 7 billion. We have already passed the "inflection point" along the human population growth curve at which instabilities in food and energy security mount as resources of arable land and adequate fresh water diminish. We are on a trajectory to reach 9 billion people by 2030, increasing food, water, and energy demand by at least 50%, without considering aggravating factors of climate change, increased urbanization, and increased demand from developing countries to attain Western standards of living.

Developed countries have brought these issues into political focus as a basis of establishing new funding priorities for the research needed to meet unprecedented needs. Not only is it a moral imperative for the most prosperous countries of the world to meet the challenge, but it is also in the interest of global economic security. The European Commission's "Knowledge-Based Bio-Economy" (KBBE) continues a €1.94 billion ($3.1 billion), seven-year program to merge life sciences and biotechnology with sustainable agricultural production and management—an investment in what is viewed to be a €1.5 trillion industry (1). Brazil, a progressive developing country, is a world leader in the proportion of per capita spending in science, particularly in research to improve sugarcane as an energy crop that has provided energy independence (2). Brazil's investment in science will reach 2% of the country's entire GDP in the coming year. The funding investments by developed countries are not as rosy elsewhere. For example, the United Kingdom continues a two-decade-long stagnation in funding

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ASPB Executive Committee & Staff

ASPB News

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of basic science. And in Japan, researchers are breathing easier only after plans for austere cuts did not materialize, in part due to collective protests from almost every living Japanese Nobel laureate (3).

In the United States, the primary source of funding of agricultural research is the Department of Agriculture (USDA), which has endured decades of dismal research funding capacity compared to the National Science Foundation (NSF), Department of Energy (DOE), and National Institutes of Health (NIH). The recent reorganization of the USDA's competitive grants program into the National Institute of Food and Agriculture (NIFA) drastically changed the funding vehicle that ASPB members had grown to rely upon for single investigators to conduct basic research. In an open letter to Roger Beachy, director of NIFA, ASPB President Ho expressed the concerns of our members with respect to the apparent redirection of funding to large, coordinated projects centered around a few foci that left a significant number of our members unable to contribute (4). Director Beachy responded that the goal of restructuring in NIFA was to better address important challenge areas yet preserve support for single-investigator and small-team innovative projects—support that the Obama administration aims to see grow significantly in years to come, along with expanded priorities for investigation.

In one sense, the resolve of NIFA to apply fundamental plant biology to address U.S. national research needs echoes the historical land-grant mission. In 1862, just two months after the establishment of a commission that would become the USDA, the Morrill Act paved the way for the founding of "land-grant colleges" whose mission was to provide practical knowledge in engineering and agriculture in the developing states. With the addition of the 1890 schools, the land-grant institutions of today are home to almost one-half of ASPB's U.S. membership. The Hatch Act of 1887 created a system of state agricultural experiment stations (SAESs) at land-grant colleges and regional stations to conduct research of direct relevance to the growers. No one would argue that the impact of the USDA-SAES system on U.S. agriculture has been anything short of spectacular. However, by the late 1970s a perception grew that the decades of mission- and commodity-oriented successes would soon stagnate if not augmented with basic knowledge derived from fundamental science (5). The 1972 Pound Report of the National Academy of Sciences (6) gave a scathing assessment that the "outmoded, pedestrian, and inefficient" USDA-SAES research system was in need of reshaped administrative philosophies to address the support for basic sciences that underpin agriculture, and so take advantage of the revolutionary advances being made. The NAS report regarded the USDA-SAESs as "bystanders" to the revolution in molecular biology and recombinant DNA technology, and it concluded that any profound advances that served agriculture were coming primarily from support by NSF, NIH, and the Atomic Energy Commission (now DOE). Even at that time, the assessment was unfair to many in the USDA system who were already making seminal discoveries in basic biology, but the call to arms did energize the SAESs to change their own infrastructure as well as look to include many other contributors outside the USDA system.

Action came five years later, notably through the leadership of ASPB members Joe Key and David Krogman (5), in the formation in 1977 of the Competitive Research Grants Office (CRGO), which awarded its first grants the following year. The rationale for the CRGO clearly contrasted that of NSF because of its mission to apply basic research to directly advance agriculture. Nevertheless, over the next 30 years of the program's existence, the plant biology community began to rely on it as a new source of single-investigator grants for basic biology. Despite repeated attempts to undermine and eliminate the CRGO by certain sectors of the USDA who saw the competitive funds as a threat to the line item traditional noncompetitive support, the CRGO survived, evolved, and even grew: today it is known as the Agricultural and Food Research Initiative (AFRI). The $0.26 billion to support competitive research this year, while greater than the amount expended over the entire first decade of the CRGO's existence, is barely one-quarter of the amount spent by a single private company for plant biotechnology (7).

Even with such modest funding levels, the advances that plant biologists have already created in the combined university, government, and private sectors have made crop plants more productive, more nutritious, and better adapted to marginal environments. While an overhaul of regulatory constraints is badly needed to allow these advances to be put into practice (8), there is realization that we have to do more and with greater urgency, and this time it will need a serious and substantial increase in funding. If Congress expects NIFA to be agriculture's NIH, then a more balanced funding is needed on par with the $30 billion provided to NIH and the $7 billion to NSF. These are the levels that keep fundamental science in the public domain for the public good and solve problems that are global in scale (7).

In 2008, the National Research Council (NRC) convened a committee—with support from NSF, NIH, and DOE—that produced a report entitled *A New Biology for the 21st Century* (9). For the first time, a broadly constituted committee with experts from across the biological sciences underscored the need for a seriously upgraded infrastructure supporting agricultural research. Keith Yamamoto, chair of the Board on Life Sciences for the NRC and member of the New Biology committee, gave congressional testimony that spelled out the priority to find ways to provide food and energy to a growing population without destruction of our ecosystems and stated that a bold new action plan is needed because these challenges cannot be solved by a "business as usual" approach (10). While we need to continue to promote the creativity of individual scientists, Yamamoto reported that it is now time to address these challenges by channeling this single-investigator curiosity into coordinated team approaches across all federal agencies, including Agriculture, Interior, Education,

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ASPB Officers Assume Posts for 2010–2011

New ASPB officers and committee members assumed their responsibilities October 1.

Board of Trustees
Mary Lou Guerinot (11), *chair*
Jonathan D. Monroe (12), *treasurer*
Mary L. Tierney (11)
Danny J. Schnell (13)

Committee on Public Affairs
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Tuan-hua David Ho (11), *immediate past president*
Sally A. Mackenzie (11)
James N. Siedow (11)
Patrick S. Schnable (12)
Elizabeth E. Hood (13)
Norman Lewis (14)
Maureen McCann (14)
Julian Schroeder (14)

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Tobias Isaac Baskin (11)
Dan Bush (12)

Education Committee
Erin Dolan (13), *chair*
John C. Cushman (11)
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George Ude (13)
Sue Wessler (14)

International Committee
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Samuel Gudu (11)
Matthew E. Hudson (11)
Jurandir Magalhaes (12)
Thomas W. Okita (12)
Bijay Singh (13)

Membership Committee
Mel Oliver (11), *chair*
Colleen Doherty (11)
David P. Horvath (11)
Priyamvada Voothuluru (11)
Frank G. Dohleman (13)

Minority Affairs Committee
MariaElena B. Zavala (13), *chair*
John J. Harada (11)
Anthony L. DePass (11), *adjunct member*
Michele B. Garrett (11)
Linda Different Cloud Jones (12)
Beronda L. Montgomery (12)
Adán Colon-Carmona (13)
Jorge Vivanco (13)

Nominating Committee
Steven C. Huber (11), *chair, president-elect*
Nicholas C. Carpita (11), *president*
Tuan-hua David Ho (11), *immediate past president*

Program Committee
Judy Callis (11), *chair, secretary*
Steven C. Huber (11), *president-elect*
Danny J. Schnell (11), *past secretary*
Janet Braam (11)
Georg Jander (11)
Todd C. Mockler (12)
Jeffrey F. Harper (13)

Publications Committee
Sally A. Mackenzie (14), *chair*
Laurie G. Smith (11)
Neil E. Olszewski (12)
Caren Chang (13)
Gary Stacey (15)

Women in Plant Biology Committee
Marta Laskowski (12), *chair*
Yuh-Ru Lee (11)
Diane C. Bassham (12)
Michael M. Neff (12)
Wendy Peer (13)
Carolyn Wetzel (13)

EXECUTIVE COMMITTEE
Nicholas C. Carpita (11), *president*
Steven C. Huber (11), *president-elect*
Tuan-hua David Ho (11), *immediate past president*
Judy Callis (11), secretary
Jonathan D. Monroe (12), *treasurer*

Elected Members
Katherine W. Osteryoung (11)
Marguerite J. Varagona (12)
Gloria Muday (13)

Sectional Representatives
Zhongchi Liu (13), Mid-Atlantic
John Z. Kiss (11), Midwestern
Estelle M. Hrabak (12), Northeastern
Timothy D. Sherman (11), Southern
David Logan (13), Western

2010–2011 Awards Committees

Following is a list of the membership of the ASPB awards committees for 2010–2011 as announced by President Nick Carpita.

ASPB—Pioneer Hi-Bred Graduate Student Fellowship
Patty Springer (13), *chair*
Mark Cigan (13)
Patrick Schnable (13)
Bob Sharp (13)
Elizabeth Vierling (13)

Adolph E. Gude, Jr. Award
Ralph Quatrano (13), *chair, past winner*
Patrick H. Masson (13)
Barbara Baker (16)
Stan Roux (16)
Julia Bailey-Serres (16)

Charles Albert Shull Award
Ralph Quatrano (12), *chair*
Dominique Bergmann (11), *past winner*
Karen Schumaker (11)
David Stern (11)
Sam Zeeman (13)

Charles F. Kettering Award
Anthony Huang (14), *chair*
Sabeeha Merchant (12), *past winner*
Don Ort (16)
Marcos Buckeridge (16)

Charles Reid Barnes Life Membership Award
John Boyer (13), *chair*
J. Derek Bewley (11), *past winner*
Tom Guilfoyle (11)
Gretchen Hagen (11)
Ken Keegstra (13)

Corresponding Membership Award
Gloria Muday (11), *chair*
Patrick Masson (11)
Bo Liu (12)
Shiv Tiwari (13)
J. Derek Bewley (14)

Dennis R. Hoagland Award
Jan Leach (12), *chair*
Jorge Dubcovsky (12), *past winner*
Kendall Hirschi (15)
Elizabeth Hood (15)
Robin Buell (15)

Early Career Award
Kay Simmons (12), chair
R. Keith Slotkin (11), *past winner*
William Friedman (11)
Michael Palmgren (11)
Siobhan Brady (13)

Excellence in Education Award
Jeffrey Coker (12), *chair*
Jane Ellis (13), *past winner*
T. Kaye Peterman (13)
Amy Clore (13)
Sharman D. O'Neill (13)

Fellow of ASPB Award
Wendy Boss (12), *chair*
Julia Bailey-Serres (11), *past winner*
Heven Sze (11)
Neil Baker (12)
Stan Roux (13)

Lawrence Bogorad Award for Excellence in Plant Biology Research
Jen Sheen (14), *chair*
Nam-Hai Chua (12), *past winner*
Elizabeth Ainsworth (12)
Daniel Schachtman (14)
Maureen Hanson (16)

Martin Gibbs Medal
John Browse (11), *chair*
John Ohlrogge (11), *past winner*
Sally Mackenzie (11)
Neelima Sinha (13)
Steven Huber (13)

Stephen Hales Prize
Sheila McCormick (12), *chair*
Athanasios Theologis (11), *past winner*
Steven Huber (12)
Sarah Hake (13)
Rick Vierstra (13)

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Energy, NIH, and NSF, as well as public and private partners. While it is not yet close to the scale commensurate with the challenges ahead, NIFA has stepped up to the plate.

Cynics may lament that we can never meet the challenges of food and energy security no matter how much money is thrown at the problems. However, I'm reminded of a comment that Bob Goldberg made many years ago. Speaking at an ASPB symposium shortly after the completion of the Arabidopsis genome sequence, a task that was finished years ahead of schedule, he related how scientists are really lousy at predicting how much time is needed to get something done. Over the short term, we *underestimate* the time required to complete an experiment. We expect to leave the lab at a reasonable hour but find ourselves at the bench well into the night. However, over the long term, we grossly *overestimate* the time needed to solve the really big problems, and we do this for two reasons: first, we don't take into account the advances in technology that enable us to do more and much faster, and second, we underestimate the power of a community working together.

Now is the time for ASPB members to step up. Young researchers beginning their career are asked to think beyond biological curiosity to a grander challenge. In turn, college administrators need to value the contributions of their young faculty working in teams and with metrics other than their individual grant support. While a great many of our ASPB members are at U.S. land-grant institutions, the majority are not. However, I suggest that, given the deep challenges of global food and energy security we face, a new land-grant mission belongs to us all.

Nick Carpita
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ASPB Travel Grant Program for Plant Biology 2011 in Minneapolis, Minnesota

Travel grant applications will be accepted beginning January 3, 2011.
The submission deadline is February 1, 2011.

All applications must be submitted electronically at http://www.aspb.org/travelgrants
Recipients will be notified by mid-March.

2011 Awards: Participate! Nominate!

It's Time to Recognize Our Fellow Plant Scientists

The 2011 Call for ASPB Award Nominations will be sent to all members on January 3. Nominations are due by Tuesday, March 1.

ASPB encourages you to participate in the 2011 awards program by nominating deserving individuals. Please watch for the Call for Nominations in your mailbox or on our website (http://aspb.org/awards/nominate.cfm). In the meantime, please visit ASPB's awards pages (start at http://aspb.org/awards/) so that you can see who among your colleagues has received these awards in the past and determine who else might be deserving in the future.

PLEASE NOTE: The nomination process has been streamlined. Letters of recommendation are no longer required for any awards **except the ASPB—Pioneer Hi-Bred Graduate Student Fellowship.** All that is required to make a nomination for ASPB's other awards is a one- to two-page letter of nomination and a detailed CV of the nominee. However, nomination committees may go back to the nominator and ask for more information if necessary. Nominations are submitted electronically as a single PDF file at http://aspb.org/awards/nominate.cfm.

The names of the award recipients will be announced in mid-April, via e-mail broadcast to ASPB members. These awards, which recognize the major contributions of recipients, will be presented at Plant Biology 2011 in Minneapolis, Minnesota. Most of the awards are monetary, and with the exception of the Fellow of ASPB Award, winners are reimbursed for a portion of their travel expenses to Minneapolis.

Awards to Be Given in 2011

ASPB—Pioneer Hi-Bred Graduate Student Fellowship

This award, made possible by the generosity of Pioneer Hi-Bred International (http://www.pioneer.com), recognizes and encourages innovative graduate research and innovation in areas of plant biology that relate to important commodity crops, including corn, soybeans, rice, wheat, and canola. One $22,000 fellowship will be given annually from 2010 through 2013, with an additional $1,000 awarded for the recipient to attend the ASPB annual meeting in the year of his or her award. Each nominee must attend a U.S.-accredited college or university and must demonstrate interest in the study of plant biology or a related discipline. Each nominee must be a PhD candidate (have successfully passed their preliminary examinations), must demonstrate an excellent academic record (have achieved undergraduate and graduate GPAs of 3.5 or greater), and must be a member of ASPB. An individual may receive this fellowship only once.

Charles Albert Shull Award

Created in 1971 to honor the Society's founding father and the first editor-in-chief of *Plant Physiology,* the Charles Albert Shull Award is designed to recognize young researchers. It is a monetary award made annually and is given for outstanding investigations in the field of plant biology by a scientist who is under 45 years of age on January 1 of the year of presentation or who is fewer than 10 years from the granting of the doctoral degree. The 2011 recipient will be invited to address the Society at the 2012 annual meeting in Austin, Texas.

Charles Reid Barnes Life Membership

Established in 1925 at the first annual meeting of the Society through the generosity of Dr. Charles A. Shull, the Charles Reid Barnes Life Membership is ASPB's oldest award. It honors Dr. Charles Reid Barnes, the first professor of plant physiology at the University of Chicago. It is an annual award for meritorious work in plant biology that provides a life membership in the Society to an individual who is at least 60 years old. Membership is not a requirement for the award, and, if appropriate, every fifth award should be made to an outstanding plant biologist from outside the United States.

Corresponding Membership

The Corresponding Membership honor, initially given in 1932, provides life membership and Society publications to distinguished plant biologists from outside the United States. The honor is conferred by election on the annual ballot. The committee selects no more than three candidates, and these are placed on the ballot for approval of the corresponding membership by majority vote. The president notifies successful candidates of their election. Election of a corresponding member is to be considered each year and held if warranted, provided the election would not increase the proportion of corresponding members beyond 2% of the dues-paying membership.

Early Career Award

The Early Career Award was instituted by the Society's Executive Committee in 2005 to recognize outstanding research by scientists at the beginning of their career. This is a monetary award made annually for exceptionally creative, independent contributions by a member of the Society who, on January 1 of the year of the presentation, is not more than five years post-PhD.

Eric E. Conn Young Investigator Award

The Eric E. Conn Young Investigator Award, first given by the Society in 2011, honors Eric E. Conn's contributions in plant biology by recognizing young scientists who will be inspired to follow in his footsteps. The award recognizes demonstrated excellence in outreach, public service, mentoring, or teaching by plant scientists at the beginning of their careers. This award is a monetary award made biennially for demonstrated commitment by a member of the Society who is not more than five years post-PhD on January 1 of the year of the presentation. It also provides a one-year membership to the Society.

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AAAS/ASPB 2011 Mass Media Science & Engineering Fellows Program

Are you interested in science writing?

Do you want to help people understand complex scientific issues?

Apply for the AAAS/ASPB Mass Media Science & Engineering Fellows Program and learn how to increase public understanding of science and technology. Fellows in the 10-week 2011 summer program will work as reporters, researchers, and production assistants in mass media organizations nationwide. Deadline: January 15, 2011.

Former host sites include:

- *Chicago Tribune*
- *Los Angeles Times*
- National Public Radio
- *Sacramento Bee*
- *Scientific American*

Visit http://www.aaas.org/programs/education/MassMedia/ for more details and to download an application brochure, or call 202-326-6441 for more information.

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AAAS

ADVANCING SCIENCE, SERVING SOCIETY

Teaching Tools Featured at the FESPB Congress in Valencia

ASPB traveled to Valencia, Spain, to participate in the 17th Congress and Exhibition of the Federation of European Societies of Plant Biology, held July 4–9, 2010. This was our third exhibition since 2006. This year we showcased Teaching Tools in Plant Biology, a feature of *The Plant Cell* since October 2009. More than 1,300 delegates had the opportunity to view a live demonstration of how to use Teaching Tools as part of their classroom work.

On hand to demonstrate this new feature to attendees was Mary Williams, former professor at Harvey Mudd College and now feature editor for the *The Plant Cell* and the developer and editor of Teaching Tools.

Over 100 individuals stopped by the ASPB booth to give feedback, ask questions, and learn more about using Teaching Tools to enhance their lectures. There were comments on how Teaching Tools made their jobs much easier, saved time, and were very useful in community outreach.

David Charles, ASPB's European sales agent, and Jean Rosenberg, ASPB's director of meetings, marketing, and membership, helped Mary demonstrate some of the key features of Teaching Tools to attendees. For these two nonscientists, it was a quick lesson in plant biology!

ASPB's presence, as always, was welcomed by our European colleagues, and the meeting afforded the Society a great opportunity to discuss ways to build relationships with plant biologists in Europe and around the world. We look forward to seeing everyone again in Germany in 2012!

Mary Williams demonstrates Teaching Tools in Plant Biology.

Want to Know More About Teaching Tools?

Check out the website for Teaching Tools (http://www.plantcell.org/teachingtools) and preview the first six tools if you are not a subscriber. The tools are customizable so that you can construct your own lecture, and they are peer reviewed.

Here is what a few people had to say:

"I found Teaching Tools in Plant Biology not only very useful for teaching but also very good for grad students and TAs, as they are very neat and well explained," noted Mini Kaviani, PhD student, Plant Agriculture Department, University of Guelph.

"These teaching presentations are up-to-date, carefully organized, and beautifully illustrated, mostly from the original literature. They can be used in whole or in part and are easily modified to fit the level of the class. Thanks for such a wonderful set of presentation materials," said Gary Tallman, professor of biology, Willamette University.

Contact Mary Williams with feedback or ideas for topics at mwilliams@aspb.org.

Nominate
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Excellence in Education Award (Excellence in Teaching until 2009)

This award, initiated in 1988, recognizes outstanding teaching, mentoring, and/or educational outreach in plant biology. It is a monetary award to be made annually in recognition of excellence in teaching, leadership in curricular development, or authorship of effective teaching materials in the science of plant biology.

Fellow of ASPB Award

Established in 2007, the Fellow of ASPB Award may be granted to current members in recognition of direct service to the Society and distinguished and long-term contributions to plant biology. Areas of contribution may include education, mentoring, outreach, research, and professional and public service. Examples of relevant Society service include, but are not restricted to, service on editorial boards of ASPB journals and active involvement in ASPB meetings. Current members of ASPB who have contributed to the Society for at least 10 years are eligible for nomination. Recipients of the Fellow of ASPB honor, which may be granted to no more than 0.2% of the current membership each year, receive a certificate of distinction and a lapel pin.

Martin Gibbs Medal

This monetary award, initiated in 1993, honors Martin Gibbs for his outstanding service to the Society as editor-in-chief of *Plant Physiology* from 1963 to 1992. This award is to be given biennially to an individual who has pioneered advances that have served to establish new directions of investigation in the plant sciences. The recipient is invited to organize a symposium at the annual meeting the following year.

Stephen Hales Prize

This award honors the Reverend Stephen Hales for his pioneering work in plant biology published in his 1727 book *Vegetable Staticks*. It is a monetary award established in 1927 for a scientist, whether or not a member of the Society, who has served the science of plant biology in some noteworthy manner. The award is made annually. The recipient of the 2011 award is invited to address the Society on a subject in plant biology at the 2012 annual meeting in Austin, Texas.

Please contact Donna Gordon with any awards questions or comments at dgordon@aspb.org or 301-251-0560, ext. 131.

Thank you for participating in our 2011 awards program!

Tales from the Undergraduate Research Lab

by Carolyn M. Wetzel
Assistant Professor, Smith College; cwetzel@smith.edu


Carolyn Wetzel

"Professor Wetzel, I digressed my proteins. Do you want to see my blot?"

I looked blankly at Clara,[1] a student in my lab, while I deciphered her question. Her project was to digest a plasmid and run the products on a gel. Ah, I figured it out: *digress = digest, proteins = plasmids,* and *blot = gel.* "Sure, Clara, let's take a look at your *gel*. And while we're at it, let's review your project again." Thus starts another day in the life of running a research lab in an undergraduate institution.

Admittedly, Clara represents the shallow end of the student pool at selective Smith College. I took her in based on another faculty member's recommendation that "she is enthusiastic and very motivated to get some research experience." Clara is proof that enthusiasm and ability are unlinked traits. In hindsight, I realize that if Clara had shown great potential for scientific research, she would have been snapped up by my colleague and not passed on to me. Fortunately, Clara was in—and quickly out of—my lab early in my career, leaving plenty of room for many more rewarding mentoring experiences. And she is now happily employed in a different field.

Why do we carry out original research with undergraduate students? To those of us who do it, this may seem a nonquestion, but each person who supervises undergraduate researchers needs to be mindful of his or her motivation. If it is to get publications out quickly, think again! But if it is to interact with young people while they explore the fascinating world of research, then you're in the right place. You can provide an environment of inquiry and the materials with which to learn. In turn, every day you can vicariously relive your early wonder of science. Go ahead, pour that extra liquid nitrogen in the sink and watch it bubble. Catch your breath when you flip on the UV transilluminator to see if your gel worked. Feel pride in your first poster presentation, even if few people come by to ask you questions. Undergraduates are usually inexperienced in lab techniques and lack deep foundational knowledge. They have limited time to devote to research, and they don't stay around very long. But the best will keep in touch over the years, and you can, with pride, track their success right back to your lab bench.

Moving up the quality scale are the students who have plenty of ability but are less motivated—or focused, to be more precise. Like Lisa. I was familiar with Lisa's keen insight and knowledge about plants from having her in my class. One day after class she approached me: "Are you taking on any summer research students this year? I'd like to do a project on rare and endangered plants." "Great!" I said. We spent a few weeks figuring out a project, enlisting the aid of my husband, a plant ecologist. He and Lisa searched the literature for potential endangered plants in the region, contacted state authorities and landowners to get permissions, and developed an experimental plan. We found summer support for her.

The short field season started, and Lisa and my husband set up study plots to collect data during the brief flowering period. Then silence. After a week, "Lisa, how's it going? How are the plants?" Silence. Another week, "Lisa, do you need help with data collection?" Silence. Another week, "Lisa, are you OK? Are you still here?" A response. "Sorry, I've been busy. My friend had to go out of town, and I said I'd watch her dog. It has to be walked twice a day, so I don't have time to get out to the field sites. She'll be back in a week, and then I can get back to the project." I was not so silent. Lisa will remember the lecture she got from me for the rest of her life, I hope. If not the whole lecture, at least the parts about priorities, responsibility, and the fact that *"dog walking"* is not a repressor of the *"flowering time"* (FT) locus!

Erin was a good student in numerous respects. She was brilliant, engaging, and fortunately for her, could write publishable first drafts. Erin would light up a room with her intellect and energy. She lit up many rooms on campus, but not often the lab. When it came time to write her honors thesis, with one week to deadline, she appeared and miraculously produced a silk purse thesis out of the sow's ear of data she had to work with. She graduated with high honors and is still in science, fueled by her undergraduate experiences (in and out of the lab).

Should small colleges invest heavily in the infrastructure for undergraduate research? Arguments can be made for and against such investments. In their favor is the promise of supporting high-quality research facilities for faculty and students. Faculty can engage in meaningful scholarship on their own campus. Students can carry out projects that will intellectually prepare and teach them skills for graduate or professional school. A community of scholars can be built. Weighing against heavy research investment is the problem of maintaining the infrastructure over time. Given the fast pace of advances in technology, state-of-the-art facilities are quickly outdated—leaving the institution constantly scrambling to find money to ren-

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ovate and update. In turn, the administration raises its expectations of faculty research productivity and external funding to justify the investment. We then pressure students to get publishable results, altering the research lab environment to one of product instead of process. Is this the best real-life training students can get early in their career? Or are we dissuading potential scientists before they gain the maturity necessary for this kind of competition?

Unfortunately, to locally provide the advanced research experience that we strive for requires a large minimum investment. We must start chasing the money trail or switch to a lower cost and more flexible model: If we cannot bring the advanced instrumentation lab to the students, we could bring the students to the advanced labs. Small colleges could divert their limited research support into incentives for collaborative projects with scientists at larger institutions. This would have the advantages of lowering infrastructure investment, exposing students to a greater range of research approaches and role models than are available on their own smaller campus, and facilitating faculty involvement in high-profile research interactions.

Erin's counterpart and contemporary was Hannah. Hannah was the hardest working and most dedicated lab student I've ever had. She lived for lab. She even arranged to work in a lab while on study abroad. She was not, however, a quick study. After her first experiment in my lab, in which half of the plants died including the controls, she asked me, "Do you want me to start writing this up for publication?" We refined her understanding of the scientific method over time, and eventually she produced a solid publication from her efforts. Hannah showed me better than any other student that hard work and persistence, combined with what others might call an average intellect, was a winning combination. She graduated with high honors and is still in science, stalwart in her love of research.

How should we deal with the diversity of abilities of the students who want to do research? Many institutions face this question as the faculty is under increased pressure to provide meaningful research experiences for students, while resources—i.e., time and money—for doing so are limited.[2] If we take on all the students who inquire about it, are we still providing a "meaningful" experience? Should we skimp on our course preparation or on our families to make time for all of them?

One solution that many supervisors use is to create research teams that focus on a common project. The students combined traits of motivation, ability, intelligence, and luck all meld in a chimera of productivity in the best situations. They create a Frankenstein in the worst. Another option is limiting the length of time a student can stay in the lab to make room for other students. The downside to this is obvious: as soon as a student becomes comfortable in the lab and starts being productive, they have to leave. Alternatively, space in the lab could be limited to just the very best students, who would have to "earn" the right to get in. But as we know from experience, classroom performance and lab performance are not always correlated. Another model that some people use is to bring in large external grants and create a lab that mimics a research institution, with postdocs and graduate students to help supervise the undergraduates. Some undergraduates thrive in this setting, while others get lost in the crowd and feel short-changed on the one-on-one faculty contact that their high tuition dollars were supposed to buy.

The best hybrid of student traits that I've had was in Alice. She was motivated and bright. She was hardworking and had great lab hands. She was personable and focused. She could work independently and had the self-assurance to remind me to eat my lunch. I didn't want her to graduate. My letter of recommendation for Alice sounded like the profile of a saint (sans walking on water). Alice would have continued in science with or without the undergraduate research experience, but both her life and mine were enriched by her scientific involvement.

Why do we carry out original research with undergraduate students? It is time-consuming, expensive, frustrating, joyful, exhilarating, and rewarding. At the end of the day, it is the creative challenge of working with the full range of students—the Claras, Lisas, Erins, Hannahs, and Alices—that gives me the energy to persist. How do we, or the students, know who will be Alice and who will be Clara without giving them the opportunity to try on the lab coat for themselves? This is powerful motivation for continuing an undergraduate research program, whether on campus, in collaborations, or farmed out in summer programs.

I have to wonder what stories my former advisers tell about me. Like the time when, as a freshman, I used ascorbic acid instead of abscisic acid because I couldn't find the ABA and figured the other sounded close enough to be alike. Or the time I discarded the supernatant instead of the precipitate, sending two months of work down the drain.

But I digress . . . .

[1]All the situations I describe really happened, but I've changed the names to protect the guilty.

[2]In a recent survey of attendees at the ASPB annual meeting's Primarily Undergraduate Institution lunch, 68% responded that "Time to think about and/or carry out research" was the factor that most limited their PUI-based research. Other response options were money, ideas, people to do it, and equipment/infrastructure (Wetzel, Pre-Meeting PUI Survey, July 2010).

The following article is derived, with permission, from an Early Career column originally published in the May 2010 issue of CSA News, *55(5): 29. Dr. Judy Brusslan, former chair of ASPB's Women in Plant Biology Committee, felt that portions both of the* CSA News *article and of the book authored by Dr. Richard Cooper that it highlights might be of interest to the ASPB membership.*

Navigating Academic Politics: Advice to Early Career Members

by Indi Braden
Southeast Missouri State University, Cape Girardeau

In order to connect early career members with some of our leaders and mentors, the Early Career Members Committee has decided to include Q&A/advice columns in CSA News *magazine. This month, we interview Richard (Dick) L. Cooper, who retired after 40 years in agricultural research, first as a state university scientist for five years, and then as a USDA–ARS scientist located at two different land grant universities for 35 years. As a mentoring tool, Dr. Cooper recently published a book,* An Introduction to the Academic Politics in Agricultural Research, *based on his experience and accumulated knowledge of the realities of politics in academia and agricultural research.*

Q: How have you been involved in the Societies?
A: I joined the American Society of Agronomy as a graduate student, and I am a charter member of the Crop Science Society of America. I attended all of the Annual Meetings during my career, except two when I was out of the country, and nearly always presented a paper, or in more recent years, a poster. I strongly recommend graduate students and scientists to join their professional societies and to participate in their annual meetings.

Q: Would an Early Career Members Committee have been beneficial to you?
A: Pairing me with a mentor who would have advised me about the realities of the academic politics I would encounter in my career would have been very helpful. Unfortunately this opportunity was not provided early in my career. I compliment the leadership of the Societies who have organized the Early Career Members Committee. This fills an important need in the education of graduate students and early career scientists, and I strongly encourage participation in this program. There is a glaring omission in the education of our graduate students and early career scientists in agricultural research. Nothing is formally taught about the realities of the academic politics they will encounter as they pursue their career. I was raised on a farm in Indiana, served in the military during the Korean war, and went to college for nine years to obtain my Ph.D. in agricultural research. Nothing in these experiences prepared me for the reality of the academic politics I was to encounter when I entered agricultural research. Thus I had to learn about politics the hard way, by trial and error. Some graduate students are fortunate to have a good mentor to advise them about academic politics, but many students do not.

Later in my career, I could see young scientists making some of the same mistakes I made. I found that advising them of the problems they were headed for helped them avoid some of the political pitfalls I encountered. To achieve a successful career in agricultural research, the importance of doing good research and publishing the results of your research in scientific journals is well recognized. The importance of being politically astute and developing your political skills is much less well understood.

Q: What do you mean by academic politics?
A: Academic politics refers to the interpersonal interaction with your co-workers and administrators in an academic environment.

For example, in some environments, doing a good job may be enough, but more likely than not, to ignore the importance of academic politics can lead to serious problems. Most organizations have a seniority system. To ignore this can lead to problems. What do you think would happen if the results from your research contradict the recommendations being made by an influential senior faculty member? Another example is that we tend to think of politics in a negative sense, but politics can be used for good. As young scientists gain their political skills, they can use these skills to achieve their desired objectives.

Q: Do you have more advice to offer?
A: Politics plays an important role in agricultural research and to ignore it can cause significant problems in a young scientist's career. Unless they have a good mentor, many young scientists must learn about politics in agricultural research by trial and error, often resulting in undesirable consequences. The purpose of writing my book was to provide basic information on some of the political scenarios that young agricultural research scientists may encounter throughout their careers. This information should help scientists avoid some of the political pitfalls in agricultural research and help fill a major void in the education of existing and future agricultural research scientists.

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: Martín Calviño
Title: MSc
Place of Work or School: Waksman Institute, Rutgers University
Research Area: Plant Molecular Genetics
Member Since: 2007

1. **Why has being a member of ASPB been important to you?**
   It gives me the opportunity to keep updated with different types of events going on within the plant science community. I also like the section in the *ASPB News* that briefly describes the grants obtained by ASPB members. As a student, I think it is interesting to know the current research topics that funding agencies are giving money to.

2. **Was someone instrumental in getting you to join ASPB?**
   Yes, Wolfgang Goettel, a postdoc in the lab, is a member, and he encouraged me to join.

3. **What would you tell nonmembers to encourage them to join?**
   If you want to have a career in plant sciences, sooner or later you should belong to a community of plant scientists. You cannot do research in isolation.

4. **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?**
   Yes, in the refreshing room [lounge] of the lab. By having a look at a print journal, you might have the opportunity to run across an interesting article not strictly related to your research.

5. **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?**
   Yes, as a student from Uruguay, I would be very interested in the involvement of ASPB in any activity that fosters collaboration between the United States and any South American country.

6. **What do you see as the most important role for scientific societies such as ASPB?**
   I see the involvement of ASPB in the policy-making process of the country as an essential role.

7. **What could ASPB do better?**
   Find a way to increase the salaries in science careers.

8. **What advice would you give to a plant scientist just starting out?**
   Science is all about curiosity. If you are curious about a particular process in nature, a scientific career gives you the chance to transform yourself from someone who reads scientific articles into someone who is being read.

9. **What do you think is the most important discovery in plant biology over the past year, and why?**
   I think the discovery reported in the August issue of *Cell* describing the roles that miR156 and miR172 have in the regulation of juvenile-to-adult phase transition and flowering time regulation in Arabidopsis is important, especially regarding flowering because the discovery highlights the existence of a pathway independent of the floral regulator FT. Although I am working with sorghum now, I was interested in the topic because I was trying to correlate FT expression with flowering time in a dozen different Arabidopsis ecotypes during my years as a master's student.

10. **What do you think is the next "big thing" in plant biology?**
    From a practical point of view, I think that higher yields in crop productivity and the generation of renewable energy, coupled with sustainable development to feed and provide energy to an increasing population, will be a challenge, especially in a future where the reduction in arable land and the environmental consequences of global warming will get worse. In terms of basic plant science, I think the field of "system biology" is the next "big thing."

11. **What are you reading these days?**
    I am reading several books regarding agricultural and rural development in developing countries. About two-thirds of the poor people in this world live in rural areas, so the field of plant biology could help society a lot.

12. **What do you still have to learn?**
    I still need to learn how to balance a career in science with a personal life.

Howard Hughes Medical Institute and Moore Foundation Emphasize the Importance of Plant Science

The Howard Hughes Medical Institute (HHMI) and the Gordon and Betty Moore Foundation (GBMF) have made a major statement on the importance of plant science research. These two large, private sponsors of scientific research are joining together to provide critical support for some of the country's most innovative plant scientists by announcing a competition to name up to 15 HHMI–GBMF Investigators in plant sciences to share $75 million in research funding over the next five years.

ASPB Immediate Past President Tuan-hua David Ho said that this new program "sends an important signal to the entire scientific community that plant biology research is essential to addressing some of the biggest challenges we face."

"Having such well-respected organizations as HHMI and GBMF step up for plant science will have a major impact well beyond the funding dollars they will provide," added ASPB President Nicholas Carpita.

Despite the central role of plants in health, energy, food, and environment, basic research in the plant sciences has been historically underfunded. "The small amount of federal support for plant biology research has limited our ability to answer fundamental questions about plants," said Vicki L. Chandler, chief program officer for science at GBMF and a past president of ASPB. "We hope that investing in some of the nation's top plant scientists will lead to enhanced understanding of plants and demonstrate the opportunities in plant biology for the next generation of scientists."

The plant scientists who will be named as HHMI–GBMF Investigators will join the ranks of nearly 340 existing HHMI Investigators, many of whom are among the leaders in biomedical research. The current group of HHMI Investigators includes 13 Nobel laureates and more than 140 members of the National Academy of Sciences. HHMI is known for supporting "people, not projects," investing in visionary leaders rather than specific research projects. The three plant biologists among the current group of HHMI Investigators described the tremendous value of being selected to join this elite group of researchers.

Joanne Chory, professor at the Salk Institute for Biological Studies and HHMI Investigator since 1997, said that being named an Investigator was a "life-changing" experience that allowed her to "do things that would otherwise be impossible."

Joseph P. Noel, another HHMI Investigator at the Salk Institute, agreed, crediting HHMI with giving his laboratory "amazing flexibility to rapidly jump on new problems, shift directions, and access technology, much of which we are not experts in, to address emerging and fundamental questions in biology. These new problems almost always are unanticipated by the specific aims and timelines of traditional grant proposals or even early hypotheses underlying our overall scientific program. In short, we don't feel wedded or tied to addressing the specific aims of a grant or the expertise for which our laboratory is most widely recognized; rather we are free to take chances, learn new things, and ultimately chase the most exciting phenomena emerging in the laboratory."

Steve Jacobsen, professor at the University of California, Los Angeles, had similar experiences, commenting that "becoming an HHMI Investigator dramatically changed my mindset and increased the scope of what was possible. The increased funding allowed us to enter the area of plant genomics, and the stimulating interactions with other HHMI Investigators at the HHMI science meetings caused me to start thinking big."

This will be a one-time, targeted competition for plant scientists. But rather than suggesting a fleeting interest, it actually means that plant science research is considered so integral to the overall missions of

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About HHMI and GBMF

The Howard Hughes Medical Institute (HHMI) is a nonprofit medical research organization that ranks as one of the nation's largest philanthropies. It was founded in 1953 by aviator and industrialist Howard R. Hughes and has an endowment of $14 billion. In addition to supporting researchers at more than 70 campuses across the country, HHMI operates the Janelia Farm Research Campus in Ashburn, Virginia, and an international research center on tuberculosis and HIV in South Africa. HHMI is also a major supporter of science education through its campus grants, HHMI Professor, and other training programs. In fiscal year 2009, HHMI spent $730 million for research and distributed $101 million in grant support for science education.

The Gordon and Betty Moore Foundation (GBMF) was established in 2000 by Intel cofounder Gordon Moore and his wife Betty to advance environmental conservation and scientific research around the world and improve the quality of life in the San Francisco Bay Area. Through a combination of stand-alone projects and large-scale initiatives in areas such as marine conservation and a Thirty Meter Telescope, GBMF pays out approximately $200 million per year in grants from its $5 billion endowment.

Howard Hughes Medical Institute
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HHMI and GBMF in supporting research and science education that plant scientists will be fully incorporated into the HHMI Investigator program. Jack E. Dixon, HHMI vice president and chief scientific officer, pointed out that HHMI and GBMF hope that their approach will signal the need for more investment in the plant sciences. "For example, we are optimistic that, over time, we will receive more applications from plant scientists when we conduct general competitions for new HHMI Investigator positions," Dixon said.

The competition is open to doctoral degree recipients holding a tenured, tenure-track, or equivalent position at one of the more than 200 eligible U.S. institutions who began their first faculty position before the end of 2006. Applicants must have a history of sponsored research and serve as principal investigator on one or more active, national, peer-reviewed research grants.

The application period closed on November 9, 2010, and awardees are expected to be named in spring 2011.

Adam P. Fagen, PhD
ASPB Public Affairs Director

Note: ASPB informed all regular members with U.S. addresses about this unprecedented opportunity within minutes after it was announced. If you did not receive an e-mail from ASPB about this competition, please be sure your membership profile is up-to-date.

This column provides just a small sample of the content in the ASPB Washington Report, *which is published approximately twice a month by the ASPB Public Affairs Department and includes material provided by ASPB's legislative affairs consultants, Lewis-Burke Associates, LLC. Complete issues of the* ASPB Washington Report *are posted on the ASPB website at http://www.aspb.org/publicaffairs/washington.cfm.*

To keep up-to-date on ASPB's public affairs activities, please join the Public Affairs group (http://my.aspb.org/members/group.asp?id=68890) on the ASPB website and look for us on Facebook and Twitter. 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.

Funding Opportunities

ASPB is updating its website to provide information about selected funding opportunities for plant biology research and education. We are also developing a set of background documents about key public and private sponsors of plant biology research to help ASPB members access funding opportunities, learn about the review process, and provide other information about these major sponsors. Check out http://aspb.org/researchfunding for complete information.

Featured Opportunity: Plant Genome Research Program

The National Science Foundation has issued its latest solicitation (http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5338) for the Plant Genome Research Program (PGRP). Four kinds of activity will be supported in the current fiscal year:

1. Genome-Enabled Plant Research (GEPR) awards to tackle major unanswered questions in plant biology on a genome-wide scale
2. Transferring Research from Model Systems (TRMS) awards to apply basic biological findings made using model systems to studying the basic biology of plants of economic importance
3. Tools and Resources for Plant Genome Research (TRPGR) awards to support development of novel technologies and analysis tools to enable discovery in plant genomics
4. Improving Plant Genome Annotation (IPGA) awards to improve existing tools or develop new tools for improved annotation of the genomes of plants of economic importance.

Proposals addressing these opportunities are welcomed at all scales, from single-investigator projects through multi-investigator, multi-institution projects, commensurate with the scope of the work proposed. The PGRP welcomes proposals from early career as well as more senior investigators and considers proposals submitted to NSF's CAREER program (http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503214&org=BIO). Early career investigators are encouraged to contact a PGRP program director for further guidance (http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5338). The target date for submission of full proposals is January 28, 2011.

New Leadership in Key Federal Positions

Over the past several months, the U.S. Senate has confirmed several individuals to key positions in the federal government:

- **Subra Suresh,** *director, National Science Foundation*. Suresh, a mechanical engineer interested in materials science and biology, was previously dean of the engineering school and Vannevar Bush Professor of Engineering at the Massachusetts Institute of Technology.
- **Catherine Woteki,** *undersecretary for research, education, and economics, USDA*. Woteki was previously global director of scientific affairs at the food company Mars, Inc., and has also served as dean of agriculture at Iowa State University. She was the undersecretary for food safety at USDA during the Clinton administration.
- **Carl Wieman,** *associate director for science, Office of Science and Technology Policy*. Wieman was previously professor of physics and astronomy and director of the Carl Wieman Science Education Initiative at the University of British Columbia and director of the Science Education Initiative at the University of Colorado. He received the 2001 Nobel Prize in Physics (http://nobelprize.org/nobel_prizes/physics/laureates/2001/) for discovering a new state of matter, the Bose-Einstein condensate.

White House Science and Technology Priorities

The White House Office of Management and Budget (OMB) and Office of Science and Technology Policy (OSTP) issued their annual memorandum on Science and Technology Priorities (http://www.whitehouse.gov/sites/default/files/microsites/ostp/fy12-budget-guidance-memo.pdf) for the fiscal year 2012 budget. The memorandum continues the emphasis on investing in science and technology to tackle societal challenges. Four challenge areas are continued from last year: (1) science and technology to drive economic growth and job creation, (2) innovative new energy challenges, (3) improved health and reduced health care costs, and (4) national security. This year's memorandum adds two more areas: (5) understanding, adapting to, and mitigating the impacts of global climate change and (6) managing the use of ecosystems for food, fiber, and energy in a sustainable way. A particular focus of this year's memorandum, as a cross-cutting area and as part of general program guidance, is innovation. This includes approaches to accelerating technology commercialization

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Funding Opportunities
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and innovation, such as prizes, university–industry partnerships, proof-of-concept centers, and regional innovation clusters, as well as policies to reward research, entrepreneurship, and innovation. Collaborations to achieve U.S. foreign policy, global health, energy, climate change, and global development objectives are also newly emphasized in the memorandum, reflecting the Obama administration's embrace of science diplomacy.

New Organizational Structure for NIFA

The U.S. Department of Agriculture's National Institute of Food and Agriculture (NIFA) has implemented a new organizational structure (http://www.nifa.usda.gov/about/offices/nifa_transition.html) built around the establishment of four institutes, each of which will be co-led by a principal scientist, who will provide broad scientific and technical leadership to the institute's programs, and an assistant director, who will provide broad outcome-based leadership for the administration of programs and day-to-day operational management of each institute. Each institute will have a series of divisions that manage individual programs and areas of responsibility.

The list of institutes and their assistant directors at press time is as follows:

- Institute of Food Production and Sustainability: Deborah Sheely
- Institute of Bioenergy, Climate, and Environment: Frank Boteler
- Institute of Food Safety and Nutrition: Ralph Otto (acting)
- Institute of Youth, Family, and Community: Dan Kugler

NIFA will be recruiting broadly to fill the principal scientist positions for each institute and to fill the assistant director position for the Institute of Food Safety and Nutrition.

NIFA also created two deputy director positions to provide sustained, career-level support to the NIFA director. Meryl Broussard will serve as the deputy director for agricultural and natural resources; Ralph Otto will serve as the deputy director for food and community resources.

Secretary of Energy Advisory Board Reestablished

The Department of Energy (DOE) has reestablished the Secretary of Energy Advisory Board (SEAB) (http://energy.gov/organization/9423.htm). The 12-member board will serve as an independent advisory committee to Energy Secretary Steven Chu, providing advice and recommendations to the secretary on DOE's basic and applied research, economic and national security policy, educational and operational issues, and other activities. Members of the SEAB include former Lockheed Martin CEO Norman Augustine, National Academy of Sciences President Ralph Cicerone, former Undersecretary of Energy John Deutch, former DuPont CEO Chad Holliday, Jr., former Labor Secretary Alexis Herman, and former Defense Secretary William Perry.

At its first meeting in September, Secretary Chu shared a draft of his strategic plan and invited senior DOE leadership to brief the board on major initiatives and challenges, many of which were related to developing and deploying clean energy technologies. Although chartered in 1990, the SEAB was eliminated during the last administration, with then Energy Secretary Samuel Bodman saying he preferred to receive advice from DOE employees.

New Reports on STEM Education and Science Innovation

A number of prominent advisory committees have released reports about science, technology, engineering, and mathematics (STEM) education and fostering innovative research:

- The President's Council of Advisors on Science and Technology (PCAST) released *Prepare and Inspire: K–12 Education in Science, Technology, Engineering, and Math (STEM) for America's Future* (http://www.whitehouse.gov/sites/default/files/microsites/ostp/pcast-stemed-report.pdf), which outlines the need for improvements in STEM education, both to increase students' proficiency in STEM subjects and to inspire more people, especially women and underrepresented minorities, to pursue STEM careers. The report makes several recommendations to accomplish these goals, including supporting the creation of state-led common science standards, supporting teacher preparation programs that emphasize STEM content knowledge, establishing an advanced research projects agency for education to develop innovative technologies for teaching and assessment, creating a new initiative to support informal science education, and supporting the creation of 1,000 new STEM-focused schools.
- The National Science Board's report *Preparing the Next Generation of STEM Innovators: Identifying and Developing Our Nation's Human Capacity* (http://www.nsf.gov/nsb/stem/innovators.jsp) describes the action needed to foster STEM innovators who represent the best talent in the country. It contains three major keystone recommendations—with a coordinated set of policy actions—to provide opportunities for excellence through coordinated and sustained interventions, cast a wide net to identify and develop talent among all students, and foster a supportive academic ecosystem that celebrates excellence and innovative thinking.
- The National Academies Committee on Science, Engineering, and Public Policy has released a progress report on its landmark 2005 report, *Rising Above the Gathering Storm*. The new report, *Rising Above the Gathering Storm, Revisited: Rapidly Approaching Category 5* (http://www.nap.edu/catalog.php?record_id=12999), concludes that the nation's competitive outlook has worsened since 2005. While there has been progress in

certain areas, the report's authors are concerned that the ability to fix problems has been severely diminished by the economic recession and growth of the national debt. At the same time, other nations have made substantial progress; for example, more than half of U.S. patents in 2009 were awarded to non-U.S. companies, and China has taken over the top spot as the world's number one high-technology exporter. The report finds there are "ingredients" essential to enhancing America's position through innovation: knowledge capital, human capital, and an innovation ecosystem. The report was the subject of a September 29 hearing held by the House Committee on Science and Technology.

- The National Academies has also released *Expanding Underrepresented Minority Participation: America's Science and Technology Talent at the Crossroads* (http://www.nap.edu/catalog.php?record_id=12984), which explores the role of diversity in the STEM workforce and its value in keeping America innovative and competitive. The report suggests that the federal government, industry, and postsecondary institutions work collaboratively with K–12 schools and school systems to increase minority access to and demand for postsecondary STEM education and technical training. *Expanding Underrepresented Minority Participation* identifies best practices and offers a comprehensive road map for increasing involvement of underrepresented minorities and improving the quality of their education; it offers recommendations that focus on academic and social support, institutional roles, teacher preparation, affordability, and program development.
- Finally, the National Academies has released *A Data-Based Assessment of Research-Doctorate Programs in the United States* (http://www.nap.edu/rdp/). Based on data collected from more than 5,000 doctoral programs at 212 universities, the report and accompanying dataset provides unparalleled information that can be used to assess the quality and effectiveness of doctoral programs based on measures important to faculty, students, administrators, funders, and other stakeholders. The independent website PhDs.org is providing easy access to the data, including that for plant sciences (http://graduate-school.phds.org/rankings/botany).

Federal Budget

At press time, the entire federal government has been operating on a Continuing Resolution (CR) since the start of the 2011 fiscal year, which began on October 1. This generally means that agencies are continuing to operate under the parameters of their 2010 budget, excluding stimulus funding from the American Recovery and Reinvestment Act. Funding agencies are likely to reduce normal funding allocations during the period of the CR. For example, NIH generally funds ongoing grants at about the 80% rate during a CR period. Any new programs or initiatives are on hold until Congress approves the actual funding in the regular appropriations bills.

Although it is not clear when the final funding bills will be approved, the table below summarizes the appropriations for federal agencies of interest to ASPB before Congress went on recess going into the midterm election.

Please check recent issues of the *ASPB Washington Report* for updated information about the federal budget and appropriations for individual agencies.

Adam P. Fagen, PhD
ASPB Public Affairs Director

Proposed FY2011 Budget for Selected Federal Agencies

President Obama's FY2011 budget request and proposed allocations (in millions) from House and Senate Appropriations Subcommittees with jurisdiction for the listed agency. Each proposed amount is compared with the final FY10 enacted budget. Compiled by ASPB Public Affairs Department and Lewis-Burke Associates.

	FY10 Enacted	FY11 President's Request	Percent Comparison to FY10	House Appropriations Subcommittee	Percent Comparison to FY10	Senate Appropriations Subcommittee	Percent Comparison to FY10
USDA *AFRI*[1]	$ 262	$ 429	↑ 64%	$ 312	↑ 19%	$ 310	↑ 18%
USDA *ARS*[1]	$ 1,251	$ 1,200	↓ 4.1%	$ 1,220	↓ 2.5%	$ 1,261	↑ 0.8%
NSF	$ 6,873	$ 7,424	↑ 7.2%	$ 7,424	↑ 7.2%	$ 7,353	↑ 6.2%
R&RA[1]	*$ 5,564*	*$ 6,019*	*↑ 8.2%*	*$ 5,960*	*↑ 6.1%*	*$ 5,967*	*↑ 6.2%*
EHR[1]	*$ 873*	*$ 892*	*↑ 2.2%*	*$ 958*	*↑ 9.8%*	*$ 892*	*↑ 2.2%*
DOE Sc	$ 4,904	$ 5,121	↑ 4.4%	$ 4,900	↓ 0.08%	$ 5,012	↑ 2.2%
BER[1]	*$ 604*	*$ 627*	*↑ 3.8%*	*Not Yet Known*	—	*$ 614*	*↑ 1.7%*
BES[1]	*$ 1,636*	*$ 1,835*	*↑ 12%*	*Not Yet Known*	—	*$ 1,739*	*↑ 6.3%*
NIH	$ 31,005	$ 32,007	↑ 3.2%	$ 32,007	↑ 3.2%	$ 32,007	↑ 3.2%

[1]Italicized numbers are subsets of the overall agency budget.

SURF

ASPB Summer Undergraduate Research Fellowships (SURF)

The 2011 SURF Application Process Will Open on December 1, 2010

SURF fellowships are designed to enable promising undergraduate students to conduct meaningful research in plant biology early in their college careers. Students must work with a mentor who is an ASPB member. All students will complete their SURF research over a consecutive 10-week period in preparation for presentation at Plant Biology 2012, July 20–24 in Austin, Texas.

Funding

Each fellowship provides a $4,000 student stipend, $700 for mentor's lab supplies, a $575 travel allowance to attend Plant Biology 2012 (if the student is a coauthor of a submitted abstract), a one-year student membership in ASPB, and $50 toward registration for Plant Biology 2012. Students traveling excessive distances for unusually high fees or who have very limited travel resources may contact Katie Engen (katie@aspb.org) to discuss potential options.

Eligible Students

Application is open to all full-time undergraduate students in a degree-granting program. Students completing their second year are preferred, but well-prepared first- and third-year students who provide evidence of a strong interest in plant biology will be considered. Undergraduates needing more or less than the standard four years to earn a degree may still be eligible. International students or students following nontraditional academic calendars are welcome and will have the opportunity to define their status on the application. Applicants must propose a research project to be pursued in the laboratory of a faculty mentor. To provide support to the maximum number of students, SURF awards are limited to those without other research stipends (institutional stipend, research experience for undergraduates fellowship, Sigma Xi Grants-in-Aid of Research, Council on Undergraduate Research Fellowship, etc.).

Selection Criteria

Competitive student applicants should have high academic achievement, strong motivation for research, skills for conducting the research, and career objectives relevant to plant biology.

Faculty Mentors

Students must secure a mentor before submitting an application. A mentor must be a member of ASPB and have an ongoing research program of high scientific merit. Mentors should demonstrate a commitment to undergraduate education and research.

Need a Mentor? Students without plant biology faculty at their home institution may apply to SURF by conducting research with a mentor at another institution. Such students are encouraged to seek a mentor by checking ASPB's Diversity Bank at http://www.aspb.org/committees/minorityaffairs/DiversityBank/ or reviewing the list of institutions with plant biology programs at http://www.aspb.org/resourcelinks/scripts/cats2.cfm?cat=34.

If needed, further assistance for finding a mentor can be initiated by contacting Katie Engen (katie@aspb.org) preferably no later than mid-January.

Proposal Evaluation

The proposed SURF project should clearly support and enhance the goals of the mentor's ongoing research program, contribute to the student's scientific and career development, and be appropriately targeted for undergraduate work. Applications should describe the relevant research structure and the student's access to appropriate facilities. Proposals must demonstrate the mentor's close supervision of the SURFer and the institution's commitment to the proposed research.

ASPB supports undergraduates at a wide variety of institutions. The proposals are grouped according to the applicant's institution type. Group A is for research and doctoral universities. Group B is for all other colleges and universities. The number of proposals awarded funding in each group will be weighted according to the proposals received.

Applications

Students and their mentors can apply online at **www.aspb.org/SURF**.

SURF 2011 applications will be accepted December 1, 2010, through February 25, 2011, until 11:59 p.m. (ET).

Questions?

Contact Katie Engen at katie@aspb.org or 301-251-0560 x116.

ASPB Education Foundation Grants

Promoting Plant Biology Education and Outreach

The ASPB Education Foundation seeks proposals from ASPB members to support education and outreach activities that advance knowledge and appreciation of plant biology. The Foundation was established in 1995 with the main goal of enhancing public awareness and understanding of the role of plants in all areas of life. To this end, the Foundation supports education and outreach projects (i.e., NOT science research projects) that enrich and promote youth, student, and general public understanding of the

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

The types of projects that fit the Foundation's goals include but are not limited to

- development and use of instructional materials in K–12 schools, undergraduate courses, science centers and museums, after-school science clubs, etc.
- professional development about plant biology for educators (e.g., teachers, museum educators, 4-H agents)
- professional development about education and scientific communication for plant biologists and plant biologists in training
- development and implementation of educational exhibits or displays in science museums, science centers, libraries, and other public venues
- development and dissemination of multimedia educational resources such as radio or video pieces, websites, and animations
- development of and support for education and outreach collaborations between plant biologists and educators.

The Foundation especially seeks projects that will produce resources that can be widely shared and disseminated and programs or relationships that can be sustained over time. Proposals are encouraged from members both within and outside the United States, and projects may serve communities from any country. Proposals that leverage funds from the ASPB Education Foundation with support from other sources are encouraged, particularly for proposals that request a full $30,000 budget.

Sources that may be helpful in preparing successful proposals include

- project summaries from previously funded projects, which are available at the Education Foundation section of the ASPB website at http://www.aspb.org/educationfoundation
- project managers from winning Education Foundation Grants who can advise future applicants who seek their consultation on developing winning proposals.

Apply for a Grant

Please note: The application format changed as of 2011; previous formats will not be accepted.

Proposals must be submitted to the Education Foundation by June 3, 2011. No forms are needed. Send proposals by e-mail to the Education Foundation Assistant at katie@aspb.org. Include your full name in the body of the submitted e-mail. Attach documents as PDF files or Word documents (.doc extension). Proposal reviews will begin after the closing date.

Questions? Contact katie@aspb.org.

Each eight-page grant proposal should include the following:

1. **Cover Page**
   - project title
   - project manager's name
   - address, phone, e-mail, and fax
   - coinvestigator name(s) and institutional affiliation(s) (if any)
2. **Project Description:** The project description is limited to **five pages,** including references, figures, and images. Text should be **single-spaced, 12-point font,** with at least **1-inch margins.**

   The project description should be divided into six sections:

   a. **Goals and Objectives:** For example, what is this education/outreach project trying to achieve? Why is the project important? What previous education/outreach work has been done by the investigator(s) or others that lays the groundwork for the project? In what ways do the project goals and objectives align with the goals of the ASPB Education Foundation?

   b. **Methods and Approaches:** For example, how will the project be implemented? Who will be involved? What is the target audience(s)? What activities will take place? What is the anticipated timeline for the project? How are the proposed activities aligned with the project's goals and objectives?

   c. **Anticipated Outcomes:** For example, what is expected to happen as a result of the project? How many participants will be involved? What should they know, appreciate, or be able to do as a result of participating in the project?

   d. **Evaluation Plan:** For example, what evidence will be collected that will be useful for determining whether goals or objectives are achieved? How will project outcomes be documented (e.g., number of target audience members

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Foundation Grants
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reached; knowledge or skill gains; changes in interests, attitudes, or intentions)? Who will be responsible for executing the evaluation plan?

e. **Dissemination Plan:** For example, how will project products and outcomes (e.g., instructional materials, professional development materials, exhibits, evaluation results) be shared with others who may be interested in using them (e.g., conference posters or presentations, peer-reviewed publications, newsletter articles)?

f. **References:** Include citations for any books, journal articles, websites, or other resources cited in the project description.

3. **Statement of Education/Outreach Experience and Expertise:** This section is limited to one page.
   - The investigator(s) should describe previous education and outreach experiences and expertise of those involved in the project.
   - Statements should include, if appropriate, brief descriptions of previous education and outreach projects, including project outcomes and impacts.
   - If appropriate, relevant references that provide evidence for the qualifications of the investigator(s) should be included (e.g., URLs for the investigators' education/outreach websites, publications). (Background on the proposal itself should be contained within the project description.)
4. **Itemized Budget:** This section is limited to one page.
   - The budget limit is $30,000, including salary, benefits, materials, equipment, travel, and other costs.
   - Each cost should be justified.

Other Guidelines

1. The project manager must be a current member of ASPB.
2. No indirect costs (overhead) will be covered by the Foundation for project awards.
3. No funds may be requested for endowments or granting programs.
4. Although projects may be implemented with a small audience for initial development and pilot testing, the Foundation expects that project products and results will impact a broader audience and generally reach beyond a single institution.
5. ASPB expects to have the right to the use of projects, materials, and results developed with grant funding.
6. Funding is awarded for a period of one year. The Foundation will consider requests for extension of time if received before the award expiration date.
7. All recipients agree to advise future applicants who seek their consultation on developing winning proposals.

Awardees will be notified by e-mail.

12th Annual ASPB Education Booth Competition for Innovative Instruction

Apply Now to Present at Plant Biology 2011

The Education Committee seeks to highlight new and creative techniques, technologies, or strategies developed by ASPB members for teaching and learning plant science in the laboratory, the classroom, or other venues.

Have you developed effective curricula or activities you'd like to share? The Education Committee invites you to present them at the Plant Biology 2011 Education Booth through the Plant Biology Education Booth Competition for Innovative Instruction. Exhibits emphasizing plants and sustainability in celebration of the International Year of Sustainability (2011) are welcome but not required.

Each winning project will receive one cash grant of $500 and full conference registration costs (not including ticketed events) for up to three presenters at Plant Biology 2011 in Minneapolis, Minnesota. Winners will exhibit their materials and methods to the ASPB membership as part of the Education Booth at the conference. Awardees are expected to staff their exhibit during a predetermined schedule when the Education Booth is open.

Proposal Requirements

Include a project title. List the name(s) of presenters and their complete contact information, including e-mail. Proposals, which are limited to four double-spaced pages, must address the following:

1. State a clear rationale for the exhibit. Innovations in teaching plant-oriented sustainability topics are encouraged but not required.
2. How are the materials or strategies featured in the exhibit exciting and new? Highlight the use of innovative techniques, pedagogies, instructional materials, and/or technologies.
3. Provide a clear, detailed summary of how the exhibit will function and how visitors will interact with the exhibit. A diagram or picture would be helpful. Exhibits should take up no more than eight feet of table space. Final layout will be coordinated with Chad Jordan, the booth organizer.
4. Include a specific and complete list of equipment required for the exhibit (e.g., DVD player, monitor, Internet connection, etc.). Indicate what you will provide and what you would like ASPB to provide. We will make every effort to meet your needs, subject to cost and space limitations. (Please note that the list of equipment requested from ASPB cannot be changed after the proposal is submitted.)
5. Submit your exhibit proposal to Education Committee member Chad Jordan (chad_jordan@ncsu.edu) as an e-mail attachment (Microsoft Word or PDF) no later than March 11. Winners will be notified by April 15.

This is an ideal opportunity to showcase your instructional innovations for your plant science colleagues. We hope that you will consider submitting a proposal so that your work can be a part of the exciting exhibits at Plant Biology 2011!

The ASPB Education Committee

Jiffy Products

www.jiffypot.com

The ASPB Education Committee brings hands-on plant biology activities to science and education outreach events around the world. Lilliputian Garden Cups—mini gardens in cups lined with Jiffy-7 pellets—are one of the most popular activities. The Jiffy-7 pellets provide a clean rooting medium suitable for propagating many types of seeds for booth visitors to bring to their own labs and classrooms.

Once again, Jiffy's generous donation of Jiffy-7 pellets allows ASPB to help plant biology bloom and grow everywhere.

Learn how to make Lilliputian Garden Cups at http://tinyurl.com/28von2b.

* The garden cups project is based on the work of Dr. Paul Williams, ASPB member and creator of Wisconsin Fast Plants.

Teaching Plant Biology Through Distance Education

Two Faculty Share Their Experiences and Tips for Teaching Success

It is not difficult to notice that distance education (DE) has gained significant momentum in higher education during the past several years. According to a December 2008 report from the U.S. Department of Education, approximately two-thirds of the 4,200 two- and four-year institutions in the United States offer some sort of distance education courses for college credit. About 61% offer online courses, and 35% offer hybrid on-campus/distance education courses (1). Indeed, several institutions now have dedicated offices or programs that help faculty develop materials for and offer DE versions of their courses. There is also a growing body of scholarly work that documents various DE teaching efforts and pedagogical approaches and analyzes the costs and benefits of teaching DE versus on-campus courses.

Certainly, there are some inherent benefits and challenges to DE instruction. It is an attractive option for some faculty and students because it offers schedule flexibility, especially in courses that are taught in an asynchronous format. It also generates the potential to reach a broader population of students, many of whom may not be able to attend on-campus courses. In some cases, DE opens up the possibility for students who are enrolled in on-campus courses at one institution to take a course at another in a subject that their home institution does not offer. At the same time, it can be difficult to replicate the synergy of the classroom-learning environment in DE courses, and student–faculty and student–student communication and feedback often require additional time and effort. Developing new course materials, lecture (and sometimes lab) delivery strategies, activities, and assessments specifically for the DE environment often requires a substantial time investment and a different approach. There are also important considerations about whether a course can be taught entirely online or whether a hybrid course is more appropriate.

While there are not yet firm metrics on the number of plant biology courses that are now being taught using a DE approach, there are faculty at several institutions that have either developed DE plant science courses de novo or converted their existing on-campus courses to the DE format. Here, two faculty who are actively involved in teaching DE courses at different levels share their experiences and provide some tips for successful DE instruction.

Niki Robertson has taught popular courses in plant biotechnology and plant development at the upper-level undergraduate and graduate levels at North Carolina State University for several years. In 2009, she completely transitioned her Introduction to Plant Biotechnology course (PB 480) to an online-only offering. She has developed materials, assignments, and case studies that foster critical thinking and open communication between students, as described below. Niki uses the learning management service Moodle as the primary method of delivery for her course.

Leslie Towill (Arizona State University) has taught a DE version of Concepts in Plant Biology (PLB 108), an introductory course that is designed for non-science majors, since 2008. Working with three other faculty members and four graduate teaching assistants, and partnering with Arizona State's Instructional Support unit in the Division of Information Technology, Leslie created an online lecture *and* a distance laboratory. Faculty and graduate students wrote lectures and storyboarded graphics that the Instructional Support group then created. Leslie has used Blackboard to deliver the online components of her course.

Advanced Plant Biotechnology Course

(Niki Robertson)

I have been teaching plant biotechnology for 17 years and have taught it online for the past two years. The course is aimed at juniors and seniors who have had an introductory genetics course. My first year teaching it online was a disaster; the second year was one of my best years! What happened? I learned the value of discussion-based courses and of listening instead of being a "talking head."

The first time I taught the course online, I used Elluminate-Live (http://www.elluminate.com/) and we met twice a week online in real time. I used the web, showed short videos, had one exercise where they broke into groups to solve problems, and answered questions online. This was a much richer environment than in a classroom, and I did get more questions online. But were most of the students really paying attention? The first midterm was a rude awakening. Because I allowed unlimited tries on the quizzes, they were just guessing. I could see them sign in for the Elluminate session, but I had no way of knowing what they were actually doing in their dorm room (or wherever they were). The last half of that class was taught in the classroom, by majority vote. While Elluminate-Live worked well for some of the students, and it's a great application, I wasn't able to use it effectively for most of the students.

The second time I taught the class, I used suggestions from an article by Bill Pelz (2) and emphasized asynchronous discussion. This worked out much better for me and for the students. I break up the slides into 5- to 15-minute LecShare sessions and also post the slide notes as PDF files. Each week I send out a to-do list with hyperlinks to different activities. The heart of the course is discussion (25% of their grade). They have one

term paper, which includes a critical analysis of one primary research article. I also ask them to make two 5-minute videos of their topic (using a free application at Screenr.com), one that introduces their topic and one on their research paper, which are peer reviewed by others in the class.

As suggested by Pelz (2), the first week of the course is spent talking about critical thinking. According to student feedback, critical thinking is often mentioned but rarely used in other courses, and some of the students were not really sure what it meant. Plant biotechnology has a lot of hype surrounding it and is a great forum for learning about critical thinking.

Some of the discussions ask students to find and critique websites. Initially, they tend to think that genetically modified organisms probably have long-term health effects, a mutant is something bad, superweeds could evolve that will kill all of nature, and transgenic DNA is recombinogenic. Other than that, the students are optimistic about plant biotechnology. It is interesting to watch them change.

I also developed three case studies (and would be happy to share them). These cases take recent events and tell a story that is emotionally compelling. Students are then asked to determine the real issues and to evaluate the situation from the point of view of different stakeholders. Judging from the evaluations, the case studies are the best part of the course.

I have specific things that I really want students to come away with. I want them to be able to find information, read primary literature for themselves, and critically evaluate it. I want them to be able to assess whether information from a website can be trusted and to constantly be on guard against empty rhetoric. And I want them to come to their own conclusions about the benefits and risks of plant biotechnology. I also emphasize that being able to identify a research topic or problem and logically address it in writing or through a presentation will help their career.

According to recent studies in cognitive behavior, we have to believe something is true in order to be able to understand it. It's only when we take time to think about it that we ask if it really makes sense or not. Simple discussion prompts (such as "Is this really true? How do you know?") can be really useful in getting students to take that extra time to think. I have been pleasantly surprised at the level of thinking that has been shown in the online discussions, especially when I think back to the results of my first online midterm!

Suggestions for instructors who are thinking about teaching their own DE course:

- Be responsive. Answer e-mails promptly and maintain a presence online.
- Several short activities/slides/etc. are better than one long lecture module. You can break a long activity into parts.
- It's easier to grade discussions if the class size is 25 students or fewer.
- For a smaller class (25 or fewer), having at least one face-to-face meeting can be helpful. For plant biotechnology, a trip to a lab doing transformation really helps students to understand what they're reading about.
- Don't make significant format changes mid-semester. Be consistent.
- A to-do list really helps students understand what they're expected to do. Many have said they would be lost without it.

Introductory Course

(Leslie Towill)

The lecture portion of our PLB 108 course consists of 18 modules with one or two modules assigned per week. Each module is illustrated with images, click-and-drag exercises, test your understanding, and other activities. For a full description, please see Bradley et al. (3) and parallel course development site at http://is.asu.edu/plb108/course/index.html. After students have completed the modules for the week, they take a multiple-choice quiz on the material in Blackboard. The student receives his or her score, the correct answers, and feedback as to why each choice is incorrect or correct. Four open note/open book examinations are given during the semester.

The laboratory portion of the course consists of weekly exercises that have both a hands-on component and computer activities. Additionally, students must plant seeds and grow seedlings ahead of time for the various exercises. Hands-on experiments are done with laboratory materials that we supply. Home kits are assembled using inexpensive, disposable materials that are nonhazardous. Students living near campus are asked to pick up a box containing the home kits for the entire semester. Boxes are mailed to students living away from campus. Step-by-step instructions with illustrations are built into each investigation. To assess student learning, students are required to turn in weekly assignments on each laboratory exercise via Blackboard. The assignments consist of the data they obtain from the hands-on experiments, questions dealing with interpretation of the data, and questions concerning the computer activities associated with each laboratory investigation.

On the basis of our experiences, I would like to offer the following suggestions about teaching an introductory plant biology lecture online:

- We have tried the lecture portion of the course with and without a textbook. I suggest that a textbook accompany the lecture modules for a course at the introductory level. Although students can e-mail me any time for clarification of course material, and I respond within 24 hours, many students do not avail themselves of this means of assistance. The textbook is something they can consult.
- Academic dishonesty is a real concern in an online environment where assessments cannot be proctored. If the learning management system allows, I suggest randomizing the questions on quizzes and exams. Because of the possibility of academic dishonesty, students receive only their scores but no correct answers or feedback.

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Plant Clippings: 10 Short Films Featuring the 12 Principles of Plant Biology

High School Student Productions Posted Online for Peer Outreach

Plant mafia on the moon? Death by darkness? A cereal killer on the loose? All these criminal possibilities are explored in a new web-based teaching resource for K–12 teachers and students developed with support of an ASPB Education Foundation grant. Plant Clippings is a website centered on a collection of 10 short videos, each highlighting different aspects of the 12 Principles of Plant Biology (http://www.aspb.org/education/foundation/principles.cfm). The episodes show how Detectives Appleby and Root solve plant-based crimes for the Photosynthetic Organism Detective Service, or PODS. The videos were developed through a collaboration between plant biologists Lacy Nelson and ASPB member Ken Korth at the University of Arkansas Department of Plant Pathology and students in the TV Production program under the direction of Peggy James at Fayetteville (Arkansas) High School.

The project was initiated to provide a fun way for teachers to introduce any of ASPB's 12 Principles. As Ken put it, "I was aware of the quality work that Peggy and her students had produced, and so was convinced that this was a perfect opportunity to get young people involved in spreading the word about plant biology." Over the course of about six months, students and mentors met weekly, while the students wrote, performed in, and produced all of the episodes. Fayetteville High School senior Will Sharp, a.k.a. Detective Appleby, said that the project gave him a great opportunity to learn: "When we started these videos, none of us [students] really knew anything about plant biology, so we had to learn many new things to incorporate into the scripts. The whole process was a great opportunity for us."

Unforeseen benefits also came to the project mentors, as teacher Peggy James

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Will Sharp and Robby Korth as Detectives Appleby and Root. PHOTO BY LACY NELSON.

Cynthia Swaffar and Sam Morgan behind the scenes in the television production control room at Fayetteville High School. PHOTO BY LACY NELSON.

(above) Will Sharp, Jacob Pinter, Robby Korth, Sam Morgan, Cynthia Swaffar, and Jason Christy preparing to film a scene in the detectives' office. PHOTO BY LACY NELSON.

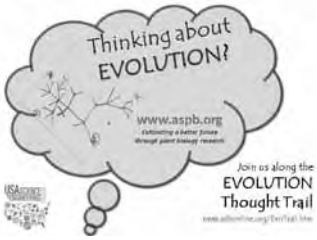
(left) Sam Morgan, Jason Christy, Robby Korth, Will Sharp, and University of Arkansas herbarium staff member Sarah Nunn at the University of Arkansas Museum Collections filming the episode "Serious Cereal Selections." PHOTO BY KEN KORTH.

ASPB Brings Plant Biology Resources to USASEF on the National Mall

Educators, Families, and Biologists Get Inspired for STEM

ASPB and USASEF

On October 23–24, ASPB joined thousands of other science community stakeholders gathered on and around the National Mall in Washington, D.C., to inspire citizen-scientists of all ages to join in cultivating a better future through research and education. As an official partner of the USA Science & Engineering Festival and a stop on the event's Evolution Thought Trail, ASPB provided a variety of ways for booth visitors to explore plant biology concepts. Everyone completing a booth activity or discussing key concepts of plant biology with one of our expert volunteers earned an "I dig plants" stamp on their Evolution Thought Trail passports. Those passport holders with enough stamps from various stops along the trail received a free Darwin doll.



USASEF Booth Activities

Lilliputian Garden Cup Necklaces

ASPB offered booth visitors easy-to-make-and-take portable garden necklaces. This hands-on activity germinated fertile discussion about plant development and biodiversity. To do this activity in your own class or kitchen, download a free copy of the Lilliputian Garden Cup protocol (http://my.aspb.org/resource/resmgr/Docs/LilliputianGarden.pdf). This project is based on the work of ASPB member and Wisconsin Fast Plants creator Dr. Paul Williams.

Seeds of Change

Booth visitors used a magnetic puzzle board to lay out photos showing the relative evolution of plants ranging from aquatic algae to angiosperms. This puzzle board is based on Seeds of Change, a complete lab for middle school students to develop inquiry-based investigations based on key concepts of plant biology. Seeds of Change is one of 12 inquiry-based activities for exploring key principles of plant biology. ASPB offers a full set of inquiry-based activities designed to stimulate exploration of each of the 12 Principles of Plant Biology. All 12 lab activities are available at http://www.aspb.org/education/12Labs. Each protocol includes materials ready for classroom use that are easily individualized and scalable.

Multimedia Displays

In the booth, ASPB aired a rotation of video presentations created by various Society members or contest winners. The videos each were designed to appeal to a general audience as well as to convey interesting and important issues of plant biology. Presentation titles included the following:

s*Lowlife*
Roger Hangarter, Indiana University
ChloroFilms—plant videos on YouTube
Dan Cosgrove, Penn State
Teaching Tools: Why Study Plants?
Mary Williams, ASPB
Education Foundation Grant Winners' Montage
Members of ASPB
Plant Clippings
Ken Korth, University of Arkansas and Fayetteville High School
Purple Shamrock Dance
Elena Del Campillo, University of Maryland

Free USASEF Satellite Event

ASPB member David Puthoff (Frostburg State University) worked with Allegany County (Maryland) Public Schools, his Frostburg State University colleagues, and the University of Maryland Center for Environmental Science Appalachian Laboratory to organize a free science celebration for students, families, educators, and biologists. This event was called The Western Maryland Science & Engineering Festival, and it took place Saturday, October 23, at Frostburg State University. Festival organizers invited science, engineering, and education faculty and undergraduate and graduate students, as well as local science- and engineering-based businesses, to provide hands-on Science, Technology, Engineering, or Mathematics (STEM) activities to inspire the next generation of scientists and engineers in the local area. To complete the cycle from interest to education to a fulfilling career, this event offered presentations that appealed to all levels: elementary, middle, and high school. High school students were especially welcomed so that they could hear about STEM opportunities that exist now and will exist in the future.

Katie Engen
ASPB Education Foundation Assistant

Plant Clippings
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pointed out: "My classes are journalism-based, so we are accustomed to a news reporting format. The grant allowed us to expand into new areas with dialogue, character development, lighting, continuity issues, and *long* production days. These were new areas [for our TV production students], and the kids enjoyed the variety of work. Learning the science was interesting for us. Drs. Korth and Nelson had a lot of teaching to do! I am a plant person, and I picked up a few tips to help out in my yard!"

In addition to the videos, which have been posted to YouTube, the Plant Clippings website (http://plantclippings.uark.edu) contains links to information and specific home or classroom activities to accompany each principle, some of which were produced through other projects also supported by the ASPB Education Foundation. The Plant Clippings website will be continually monitored and updated. You can also check out Plant Clippings on Facebook (http://www.facebook.com/pages/Plant-Clippings/122300004488611). As another means to distribute the video material, DVDs containing all episodes are being produced for distribution at teacher workshops and meetings.

Ken Korth
University of Arkansas

ASPB 2009 Grant Project Keeps Growing

ChloroFilms Plant Biology Video Contest Announces Latest Winners

Winners of an international competition organized by ASPB member Dan Cosgrove (Penn State University) for new plant biology videos on YouTube were announced September 7. The winners, who will receive a share of over $5,000 in cash prizes, are the second group of awardees in a series of competitions organized by the nonprofit collaborative project ChloroFilms, which was started by Dan, the Eberly Chair of Biology at Penn State. ChloroFilms has awarded $13,600 in prizes since the competitions began in 2009. "ChloroFilms promotes the creation of fresh, attention-getting, and informative videos about plant life," Dan said. The winning videos, as well as all the contest entries, are on the ChloroFilms website at http://www.chlorofilms.org/.

Two grand prizes of $1,000 are being announced for the current group of winners. One will go to Noah Flanigan (Middle Tennessee State University) for his entry titled "Kenaf Callus Hoedown," a lively and quirky music video using stop-motion techniques to illustrate the process of culturing plant tissue. Another grand prize goes to ASPB member David Livingston (North Carolina State University) for his video "Arabidopsis Flower in 3D," which illustrates the internal anatomy of flower stalks using microscopic sectioning and 3D reconstruction. The awards also include four first prizes of $500 each and five second prizes of $250 each.

The most recent ChloroFilms competition is accepting submissions until December 8. For more information about contest requirements, see http://www.chlorofilms.org/.

ChloroFilms is a nonprofit collaborative project started by Dan at Penn State University with support from the ASPB Education Foundation, the Botanical Society of America, the Canadian Botanical Association, and the Penn State Institutes for Energy and the Environment. With the help of volunteers at colleges and universities around the globe, ChloroFilms is working to combine video, Internet, and social-networking technologies to promote a greater appreciation and understanding of plant life and to make the best plant biology videos easy to find from its website at http://www.chlorofilms.org.

Dan Cosgrove
Penn State

2010–2011 Master Plant Science Team Named

ASPB Sponsors Six Members of the Team

PlantingScience provides a collaborative online setting that supports mentors from the plant sciences community, middle and high school students, and educators as they work together to engage in real plant science research. This program promotes scientific knowledge as well as the communication and investigative skills needed to conduct valid research with peers, educators, experts, or mentors. The research and mentoring program is guided by the plant themes and teaching modules provided by PlantingScience.

Mentors play a key role in the PlantingScience program. Some mentors are established professionals, while others—known as the Master Plant Science Team (MPST)—are graduate students and postdoctoral researchers. The mentors use online communication to support both the students doing self-initiated research and the teachers overseeing classroom progress through the modules. Insight from past mentors about the experience is available at http://www.aspb.org/newsletter/marapr10/06plantscience.cfm.

ASPB became an official partner in the PlantingScience project in 2006, and the first ASPB members participated as online scientist mentors that year. More recently, ASPB sponsored five graduate student MPST mentors during the 2007–2008 and 2008–2009 academic years. Seven more were sponsored during the past school year. This year ASPB is sponsoring six MPST mentors. Congratulations to these 2010–2011 MPST members:

Robert Barlow
University of Missouri–St. Louis
Erica A. Fishel
Washington University in St. Louis
Betsy Justus
Ohio University
Sasha Ricaurte
Michigan State University
Kaiyu Shen
Ohio University
Madhura Siddappaji
University of Illinois at Urbana–Champaign

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Distance Education
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- Lack of feedback on examination is of concern to many online students. Students may contact me for personal feedback after everyone has taken the examination.
- Upgrades in management systems can and have been problematic with respect to the graphics used in the course. Animations and click-and-drag activities may be lost because they were created with an older program. It is important to review posted course content to ensure that all material being presented is functional.
- In our experience, the time commitment for the online lecture is about half that of preparing and giving lectures to the on-campus students. We have had to be prepared for daily responses of students' e-mail and weekly preparation of quizzes.
- Partnering of plant biology faculty with personnel with expertise in computer graphics resulted in a course that was rich in graphics. However, unless you maintain that relationship or have expertise in computer graphics, an online course can be less flexible and evolving than an on-campus course where changes can be made quickly.
- If there is general misunderstanding of a topic, additional material may be needed to correct the misunderstanding. Unlike an on-campus course, where you get immediate feedback by students' facial expressions and body language, it is difficult to judge students' understanding until they take the quizzes or complete the assignments.

I would also like to share the following about our offering of a DE lab:

- It is essential to have calendars of weekly activities, including when to plant seeds for later exercises. An announcement reminding the students of the week's activities is also necessary.
- For the hands-on experiments, we supply students with a PDF file of the directions as well as the complete laboratory investigation. The reasoning for PDFs is to provide instructions that the student can print out and use while doing the experiment away from the computer. Our experience has been that students are reluctant to print out the PDF. Providing a set of instructions for hands-on experiments with the kits is a possible solution.
- To prevent submission of assignments without doing the experiments, the assignments require submission of the results of the experiment and a photo of the experimental setup. Most students have the means of submitting photos of their experiments.
- It is important for instructors to return assignments to students promptly with adequate feedback.
- Time commitment for online labs can be greater than that for on-campus labs. Teaching assistants are required for helping the students with the hands-on experiments and for grading laboratory assignments. Two full-time teaching assistants were assigned for our class of 100 students.

For more information about teaching plant biology courses via distance education, please contact Education Committee member Chad Jordan.

Chad Jordan
North Carolina State University
Niki Robertson
North Carolina State University
Leslie Towill
Arizona State University

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Master Plant Science Team
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MPST mentors work with up to five teams of students during the fall and/or spring PlantingScience sessions. Mentors sponsored by ASPB receive free ASPB membership and 50% off ASPB meeting fees during their mentorship. Of course the skills, insight, and satisfaction they garner from the experience are all priceless.

Full information about getting involved is available at http://www.plantingscience.org.

Even if you're not able to serve as a PlantingScience mentor now, the general advice it offers mentors has broad application for almost any mentoring or teaching arrangement. For example, PlantingScience offers two key tips:

- **Establish realistic expectations.** Set a friendly expectation for active engagement at the outset. Most students (and grade-level teachers) have little or no prior experience studying plants or designing science investigations. Make every effort to help them establish ownership of the process.
- **Communicate early and often.** Explain terminology and tasks very carefully as you develop a working vocabulary. Several short, simple comments or questions are usually more effective than multiple paragraphs or long speeches.

Katie Engen
ASPB Education Foundation Assistant

CALL FOR PAPERS

Plant Physiology® Focus Issue on Plant Phosphorus Nutrition

Deadline for Submission: March 1, 2011
To submit an article, please go to http://submit.plantphysiol.org.

Plant Physiology is pleased to announce a Focus Issue on Plant Phosphorus Nutrition, to be published in July 2011. The issue will be co-edited by Carroll Vance and Tzyy-Jen Chiou. This issue will focus on the recent developments in phosphorus acquisition and use ranging from soil transformations to signal transduction and genomics. Phosphorus acquisition and use are a conundrum. While phosphorus is critical for plant growth, its overuse in developed countries leads to phosphorus loading of prime agricultural land, but it is frequently the limiting nutrient in the soils of developing countries. Continued production and application of phosphorus fertilizer relies on a nonrenewable resource that will peak in about 2050. This will result in significantly increased cost, particularly for developing countries. Research aimed at understanding phosphorus acquisition and use is required to maintain and improve agricultural productivity in developed and developing countries, respectively. Research articles on all aspects of phosphorus acquisition and use will be considered.

Please contact Carroll Vance (vance004@tc.umn.edu) or Tzyy-Jen Chiou (tjchiou@gate.sinica.edu.tw) for additional information.

FOCUS

Image courtesy of Bruna Bucciarelli, USDA-ARS

New Chapters!

The Arabidopsis Book Posts New Content!

The American Society of Plant Biologists has published *The Arabidopsis Book* (TAB) as a free online compendium since 2002. ASPB is providing funds for the production of TAB as a public service.

Founded by Chris Somerville and Elliot Meyerowitz, TAB now has more than 80 chapters online and received over 77,000 full-text downloads in 2009.

The current editorial board is working hard to continue TAB's ongoing expansion:

Rob Last *(chair)*
Michigan State University

Caren Chang
University of Maryland

Georg Jander
Boyce Thompson Institute

Dan Kliebenstein
University of California, Davis

Rob McClung
Dartmouth College

Harvey Millar
University of Western Australia

Keiko Torii
University of Washington

Doris Wagner
University of Pennsylvania

The board is overseeing all new content development as well as updates to existing chapters to keep TAB the most comprehensive and current work on Arabidopsis.

Proline Metabolism and Its Implications for Plant-Environment Interaction
Paul E. Verslues and Sandeep Sharma
November 3, 2010. Edited by Georg Jander.

The Arabidopsis Nuclear Pore and Nuclear Envelope
Iris Meier and Jelena Brkljacic
October 7, 2010. Edited by Rob Last.

The Cryptochrome Blue Light Receptors
Xuhong Yu, Hongtao Liu, John Klejnot, and Chentao Lin
September 23, 2010. Edited by Rob McClung.

Progress and Promise in Using Arabidopsis to Study Adaptation, Divergence and Speciation
Ben Hunter and Kirsten Bomblies
September 23, 2010. Edited by Dan Kliebenstein.

Phototropism: Mechanism and Outcomes (update)
Ullas V. Pedmale, R. Brandon Celaya, and Emmanuel Liscum
August 31, 2010. Edited by Rob McClung.

Branched-Chain Amino Acid Metabolism in *Arabidopsis thaliana*
Stefan Binder
August 23, 2010. Edited by Georg Jander.

Necrotroph Attacks on Plants: Wanton Destruction or Covert Extortion?
Kristin Laluk and Tesfaye Mengiste
August 10, 2010. Edited by Dan Kliebenstein.

Glucosinolate Breakdown in Arabidopsis: Mechanism, Regulation and Biological Significance
Ute Wittstock and Meike Burow
July 12, 2010. Edited by Georg Jander.

All chapters are hosted in partnership with BioOne (www.bioone.org) in HTML and PDF formats.

Photos courtesy of The Arabidopsis Information Resource and the RIKEN Plant Science Center.

In Appreciation: Robert H. Burris—A Mentor for All Seasons

Robert H. Burris passed away on May 11, 2010, in Madison, Wisconsin, at age 96. On his bedside table were the latest issues of *PNAS, Science,* and, of course, *Plant Physiology.* If there is an afterlife, and if it has a journal club, Bob will arrive prepared, as was his nature. If not, he will likely organize one and contribute regularly on a wide range of topics. Anyone who passed through Bob's lab during his 50-year experiment in discovery and learning will have three weekly times stamped on their consciousness: Monday noon seminar, Friday journal club, and—most important—Friday morning lab meeting. Lab meetings were at 8 a.m. Fridays in Room 281 Biochemistry. The "yellow sheets," or carbon copies of lab notebooks, were handed in by 5 p.m. the previous afternoon. One learned quickly that Bob read them, in detail, the night before. One also learned to be concise in reporting and to prepare graphs that were legible and meaningful. No matter how important the outcome of an experiment, it was not complete until properly presented.

I first met Bob and joined his lab the Wednesday following July 4, 1972. He and his wife, Katherine, had spent the long weekend at their cabin on the Wisconsin River, near Muscoda, where everyone knew him as "Bob" at Ike's Store in town. "Dr. Burris" was back in his office by 7:30 a.m. on July 5, as he was every day, Monday through Saturday. I had been directed to Bob by his former student and one of my undergraduate advisers, Robert Klucas. Former Burris students and colleagues around the world felt they could do no better by their students than to get them into Bob's lab. It was one of the greatest gifts anyone ever gave to me, and I am certain that all who studied under Bob's watch felt the same about their time in his lab in the Biochemistry Department at the University of Wisconsin. Students not only learned in the Burris lab, they also enjoyed working for and with Bob. And Bob enjoyed mentoring his

Bob Burris

students. Much of the mentoring was by example, and students were allowed to struggle through a problem, learning that they could figure it out. On occasion, just the right suggestion would come in the form of a reference card, handwritten on a computer punch card, notched on two edges in the personal system that allowed Bob to sort by topic or author. (Only those who have been in his lab will appreciate the efficiency with which he used this system before Endnote or PubMed existed.) The reference card might lead to just the right method to address the bottleneck in a thesis project or might provide a whole new avenue of research. Just a thought from a mentor.

Born in South Dakota on the same day as his lifelong friend, Pete Peterson, Bob was a true son of the prairie—inventive, self-sufficient, modest, disciplined, frugal, curious, and confident. The son of a printer, he worked as a youth in the print shop, setting and inking type. I mention this because it clearly contributed to his phenomenal skill as an editor. The ability to read a page upside down and backwards allowed him to scan for errors quickly and thoroughly. During a recent discussion on a new "writing across the curriculum" initiative at my current institution, a colleague asked the group: "Who taught you to write?" I answered first and without hesitation, "Bob Burris taught me to write." He edited with a merciless red pen and kind suggestions for alternative, more concise, correct wording. First drafts of papers were often returned with more red ink than black. I mean . . . Often, first drafts of manuscripts were returned with more red than black ink. Bob both wrote and edited with amazing clarity. He would have edited this column to a single sentence, wanting to be remembered, he said, with a single line: "Bob Burris was a good guy."

Bob was as frugal in running his lab as he was in his writing, a trait well matched with his inventiveness. At his festschrift in 1984, he noted that his "start-up package" in 1944 was $400. His department chair, Hector DeLuca, then rebutted that there was still $100 left in that account! One Saturday morning, I heard a tapping in his office. When I investigated, I found Bob with a jeweler's hammer and a jeweler's cone pounding gold wire into seals for the mass spec. Bob was aghast at what they charged for seals and was sure that he could make them. (He did, and they worked well.) It is not clear whether this cost-saving approach to mass spec maintenance led to his jewelry-making hobby or if the jewelry making led him to craft his own seals from gold wire. Regardless, the office staff, female grad students, and the wives of his male students prized his jewelry items. My wife, Linda, still wears her "Bob Burris originals" on occasion.

It is difficult to summarize a man who was a biochemist, bacteriologist, plant physiologist, chemist, environmentalist, ecologist, public citizen, leader, adviser to governments, and more. Thirty-five years ago, Bob was espousing the concept that burning oil to move cars was a squandering of natural resources and that oil should be reserved for use as a feedstock for synthesis. He decried the release of helium from natural gas wells, recognizing it as an irreplaceable resource. He was an early and ardent supporter of Gaylord Nelson's proposals to protect the environment.

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Robert Burris
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When one recalls his many attributes (dependable, organized, incisive, creative, thoughtful, wise, the list goes on) and attempts to select the essence of Bob, it was that he was approachable. Any student could ask a question or inquire about a technique. His lab was open to anyone, his equipment was available for any good experiment, and his time was never rushed. He was fond of quoting the automotive inventor Kettering, who said, "When you lock the lab door, you lock more out than you lock in." Bob's lab was not locked. At national meetings or at a Gordon conference, he would go to the poster sessions and walk up to a first-year student saying, "Tell me about your poster." He would listen and then make suggestions, offering any advice that came to mind. Every student he visited benefited, and more than one person joined Bob's unlocked lab because of such an experience.

At the 1984 Steenbock Symposium, many of his former students, colleagues, and friends gathered to celebrate his career. And yet it was merely another beginning for Bob. He moved gracefully from one career stage to the next, from rising star to young leader to department chair to senior statesman to aging hero. Into his 90s, he continued to come to the lab and always found a way to set an example.

He was slightly embarrassed when *Madison Magazine* listed him Number 1 among "The Smartest People in Madison," an opinion that his students shared and even his competitors had to concede if they took an objective look at the data. Bob did not seek to overpower anyone or impress anyone; yet, when all is considered, he discovered more, helped more, assisted more, and contributed more than most scientists of his caliber. No less an observer than the great botanist Folke Skoog opined, "Bob Burris was the most important faculty member at the University of Wisconsin." He set the standard for scientific integrity, mentoring, and contributions to the university and his community. When Bob received the Wolf Award, a journalist called to ask about him. After a few minutes of discussion, she said, "Well, I've got to ask. Everyone starts out with what a great guy he is. Did he get this award just because he is a nice guy? I mean, has he done anything substantial?" So, for the record, Bob was practically and intellectually creative, brilliant, incisive, and productive. For 40 years, he was the leading scientist in his field, and his discoveries affected a broad range of scientific areas. He reinvented his lab repeatedly and successfully to address new questions. He made seminal observations ranging from ecology to enzymology and from acetylene reduction to *Zea mays* productivity. Perhaps we were all amazed to find such genuine humility and humanity in one so talented. It is not just that Bob was kind and generous. It is that he was never *un*kind or *un*generous—to anyone.

I share an anecdote that is very characteristic of Bob. When "cold fusion" was announced and articles in the *New York Times* and lesser journals speculated on the implications, the unlikelihood of its reality, and a myriad of other points, Bob did not really engage in the discussion. Rather, he modified a Teflon leak apparatus to allow him to run an electrical current under a mixture of H_2O and D_2O and attached it to the MAT isotope ratio mass spec that he kept in the basement. He set his conditions to those of the original report and calculated that he should observe a mass for ^3He if any fusion occurred. Instead of calling a press conference, he reported his results at lab meeting at 8 a.m. the following Friday. Unable to reproduce the original result, he concluded that the report of "cold fusion" by others was most likely due to some other cause. Bob embodied curiosity mixed with skepticism and analysis.

As dedicated to the lab as he was, Bob was not a slave to the lab alone. He devoted time to many interests. His gardens both at home and at the river cabin were productive—one year producing so many eggplants that we would sneak out of the lab, fearing that he would offer, "Wouldn't you want an eggplant for dinner?" In his later years, he became skilled in producing jewelry, and the women in the department office would enjoy choosing from his creations. He was a skilled photographer and an early adopter of photographic technology. By the time I joined his lab, his children were grown and scattered around the country, but he and Katherine reveled in visiting them, and he was quite pleased when one of them could take a trip with him. When his grandchildren began traveling, he kept maps, tracking their routes as they traversed the Appalachian Trail or the African continent.

Bob occasionally attributed his longevity and good health to his daily intake of butter pecan ice cream, usually with chocolate sauce, from Babcock Dairy store on campus. Perhaps his daily bike ride to and from campus, his positive outlook on life, his avoidance of other vices, his exercise regimen, and his otherwise good nutrition (Katherine was an excellent dietician, also UW-trained) contributed. But he was pretty sure it was the butter pecan. As he often said, the human capacity for self-deception is absolutely amazing—and Bob was as human as the rest of us when it came to butter pecan ice cream.

It was perfectly characteristic that Bob left clear instructions for the interment of his remains. Years earlier, he had selected a large, copper Kjeldahl flask to serve as the urn for his ashes with directions that it be labeled: "Herein lies a representative sample of the inorganic remains of Robert Harza Burris." Precise, concise, and with a touch of humor, all at 0.365 atom % ^{15}N. Thanks, Bob. You were a good guy . . . and more.

Paul Ludden
Provost, SMU, Dallas, Texas

The author thanks Gail Stirr, Dan Arp, and Jason Ludden for comments, suggestions, and editing.

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