# ASPB News

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## Inside This Issue



*President's Letter*

## Bridging the Culture Gap

Although I had known for some time of C. P. Snow's idea of "the two cultures"—science on one side of a "language barrier" and arts on the other—only recently did I actually read the original 1959 Rede Lecture (1) in which C. P. Snow laid out his thoughts. I encourage all of you to find and read a copy of this essay, which discusses some very interesting ideas not only about the two cultures—the topic I'll focus on here—but also about the potential of science, including agriculture, to improve the basic human condition.

"Personal biosphere" at the Massachusetts Museum of Contemporary Art.

Baron Charles Percy Snow (1905–1980) was both a scientist and a writer. He described his basic premise in the Rede Lecture as follows: "I believe the intellectual life of the whole of western society is increasingly being split into two polar groups…. Literary intellectuals at one pole—at the other scientists…. Between the two a gulf of mutual incomprehension…." (As Snow explains later in the lecture, his use of "literary intellectuals" is meant to be iconic of the educated non-scientist—the writer, artist, historian, and so on.)

Without reading Snow's original Rede Lecture, it might not be recognized that in the main he was exhorting the non-scientific community to become more scientifically literate, rather than the reverse. Here is a quote from his lecture that is amusing, yet also sobering, because, I believe, it remains as accurate in 2009 as it was 50 years ago. "A good many times I have been present at gatherings of people who, by the standards of the traditional culture, are thought highly educated and who have with considerable gusto been expressing their incredulity at the illiteracy of scientists. Once or twice I have been provoked and have asked the company how many of them could describe the Second Law of Thermodynamics. The response was cold: it was also negative. Yet I was asking something which is about the scientific equivalent of: *have you read a work of Shakespeare's?* I now believe that if I had asked an even simpler question—such as, What do you mean by mass, or acceleration, which is the scientific equivalent of saying, *Can you read?*—not more than one in ten of the highly educated would have felt that I was speaking the same language. So the great edifice of modern physics goes up, and the majority of the cleverest people in the western world have about as much insight into it as their Neolithic ancestors would have had."

As could be imagined, Snow's words fomented quite a debate both among his peers at Cambridge University and in the popular press, resulting in a large volume of commentary. In 1963, Snow wrote a follow-up article to his Rede Lecture entitled "A Second Look"(1). In this article, Snow addressed some of the controversy that his lecture had

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Deadline for November/December 2009 *ASPB News:* October 5, 2009

## ASPB Executive Committee & Staff




# ASPB News

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**President's Letter**
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engendered, clarified some of his positions, and mused on some of the changes in science that had struck him since his original lecture in 1959. One point that he makes in "A Second Look" will be of interest to many ASPB members: he wishes that instead of the Second Law of Thermodynamics, he had used the field of molecular biology to query the educated non-scientist as to his/her knowledge of fundamental scientific ideas. As Snow writes, "I should now treat the matter differently, and I should put forward a branch of science which ought to be a requisite in the common culture….This branch of science at present goes by the name of molecular biology….This branch of science is likely to affect the way in which *men think of themselves* more profoundly than any scientific advance since Darwin's…." I expect that many of us would be inclined to agree with Snow's analysis of the impact of molecular biology on both the practice and the philosophy of science.

One of my own personal encounters with the "two cultures" is a conversation I had when I was an undergraduate, and it has stuck in my mind to this day. I was speaking with one of my friends, who was majoring in political science. When I mentioned that I was planning to go to graduate school in plant physiology, she replied "Oh. I didn't even realize that plants had a physiology." And so the culture gap continues, and I am sure that we have all encountered it.

What is to be done? In his lecture, C. P. Snow argued for changes in the educational system at the university level; I think most of us would contend that education and outreach efforts aimed at K–12 students and at the general public are of at least equal value. But, while it seems obvious that the answer is better education, what sorts of education would address this issue?

First, one indubitable need is factual education: Yes, Virginia (not the real name of my undergraduate friend), plants do have a physiology! This is the type of education that many of us offer in our own college- and university-level courses, and ASPB has made a number of valuable contributions toward this aim (see http://www.aspb.org/education/). For example, ASPB has developed "The 12 Principles of Plant Biology" (http://www.aspb.org/education/12Principles.pdf). These basic concepts—starting with "*Plants contain the same biological processes and biochemistry as microbes and animals. However, plants are unique in that they have the ability to use energy from sunlight along with other chemical elements for growth. This process of photosynthesis provides the world's supply of food and energy.*"—encompass fundamental knowledge about plants that (analogous to the Second Law of Thermodynamics in physics) we believe any educated person should possess. ASPB Education Committee members Jeffrey Coker and Jane Ellis, along with Mary Williams (who recently became a features editor for *The Plant Cell)* have an Education Foundation GAP award (see http://www.aspb.org/education/foundation/gap.cfm) to develop activities at the K–12 level that will accompany and illustrate each of these principles.

One further notion to think about when conveying factual information, especially to adult non-scientists, is whether it is worth trading off some specifics in order to convey information using more accessible language. For example, as plant biologists, we could give a fairly technical explanation of how fruit ripening occurs, and an educated adult would likely be able to grasp the general idea. However, we can ask ourselves whether that explanation, or the following explanation, taken from Victoria Finlay's absorbing book, *Color: A Natural History of the Palette* (2), is more likely to resonant and remain with a painter, a singer, or a dancer:

"The atoms in a ripe tomato are busy shivering—or dancing or singing: the metaphors can be as joyful as the colors they describe—in such a way that when white light falls on them they absorb most of the blue and yellow light and they reject the red—meaning paradoxically that the "red" tomato is actually one that contains every wavelength except red. A week before, those atoms would have been doing a slightly different dance—absorbing the red light and rejecting the rest, to give the appearance of a green tomato instead."

Second, in addition to factual information, absolutely vital as it is, I think there is also a need to educate the non-scientist (and especially the young, potential future scientist) about the process of science, that science is itself a type of art. What I mean by this is that the process of scientific discovery, at the highest level, is at least as creative as the process of painting a portrait or writing a novel. What could be more creative than taking available knowledge and deriving from it some entirely new idea, and then imagining how one could experimentally test that new concept? It is the excitement of exploration and discovery that is so important to convey to K–college learners, and it is this aspect of science that is often lamentably absent from traditional textbooks.

Last, the third type of information that I would like to convey to Snow's "literary intellectuals" is that art is—or is based on—science. To continue for a minute with examples from the world of color, I think it would be equally intriguing to an artist as to an ecologist to learn how the red dye cochineal is produced (2,3). Cochineal, historically used in oil paints and as a fabric dye and also used today in foods and cosmetics (it is also known as "carmine," "crimson lake," "natural red 4," "C.I. 75470," and "E120"), is derived from the body of a particular species of scale insect (*Dactylopius coccus*) when those insects feed on prickly pear cactus, giving rise to a whole industry of insect farming in parts of Central and South America.

A second example of how art is (or can be) interwoven with science is conveyed by the photograph that I chose to accompany this article: unique, interactive terrariums such as the one featured in the photo were part of an art exhibit at the Massachusetts Museum of Contemporary Art (Mass MoCA) that my family and I visited last summer. To be more accurate, Mass MoCA described these installations by artist Vaughn Bell as *"Personal Biospheres* which give gallery visitors their own miniature landscapes to experience by popping their head into Plexiglas domes filled with small working ecosystems" (4).

Such information provides a path to reach out to those people who, by nature, by

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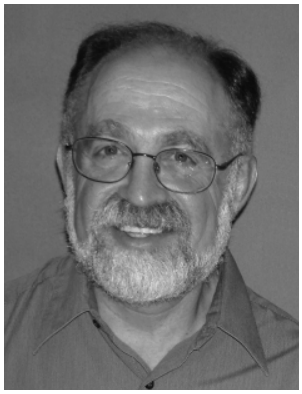
# ASPB Members Fischer, Hake, and Weigel Elected to National Academy of Sciences Class of 2009

ASPB members Robert Fischer, Sarah Hake, and Detlef Weigel have been elected to the National Academy of Sciences (NAS). Their elections were announced on April 28, 2009, at the Academy's 146th annual meeting. Each nominee was elected individually for distinguished work and original research in plant biology.



Robert Fischer

Sarah Hake

Detlef Weigel

## Robert Fischer

Robert (Bob) Fischer was educated in the University of California system: San Diego for his BS in biology, Berkeley for his PhD in molecular biology, and Los Angeles for his postdoctoral work in plant biology. The Golden State continued to suit Bob well as he became an assistant then an associate professor in UC Berkeley's Department of Plant Biology. In 1995, he became a professor in the Department of Plant and Microbial Biology at Berkeley, a position he currently maintains.

Bob's professional activities include coediting *The Plant Cell* and serving on the editorial boards of *Plant and Cell Physiology* and *Epigenetics and Chromatin*. He also has held advisory roles for the National Science Foundation Developmental Biology Program and the International Society for Plant Molecular Biology. Bob joined ASPB in 1987 and later served on its Publications Committee (2001–2007).

Since his postdoctoral Chaim Weizman and National Institutes of Health (NIH) fellowships, Bob has been recognized with many additional honors. For example, he is also a Japan Society for the Promotion of Science fellow and a Sir Frederick McMaster fellow. Most recently preceding his election to NAS, he became a fellow of the American Association for the Advancement of Science in 2007.

A prolific research and publication record forms the cornerstone of Bob's career. Currently he is studying the basic biology of DNA methylation and demethylation in Arabidopsis, as well as the links between DNA glycosylases and cancer. These projects are just the most recent of the many dozens of studies that he has had published in peer-reviewed journals, some of which have generated additional academic commentary also deemed worthy of publication in selective journals. Despite the wealth of expert knowledge Bob has generated in his field, he did not anticipate this honor from NAS. He reports: "To be honest, I was quite surprised when I discovered that I had been elected to the National Academy of Sciences. Receiving a telephone call at 5:45 a.m. on April 28, hearing all the excited voices and congratulatory remarks, I felt like I had just passed my qualifying exam, become a tenured professor, and celebrated my birthday all at the same time!

"My being elected reflects, to a great extent, the outstanding colleagues with whom I have had the privilege of working. First and foremost, I thank Robert Goldberg, my mentor when I was a postdoctoral fellow at UCLA. He taught me the value of persisting, of tackling a big question and addressing it with all the technologies and resources one can bring to it. Together with John Harada and Gary Drews, we set out to understand the regulation of seed development. Although we still have much to learn, I have greatly appreciated our sustained endeavor over many years, the sharing of data, new approaches, and ideas. During this time, a wonderful collaboration was created between our universities and Ceres, Inc., whose support allowed us to explore many aspects of plant reproduction with greater freedom than ever before.

"In addition, I am very grateful to my graduate adviser, Harrison Echols, and my lab mates in the bacteriophage lambda lab, who taught me the fundamentals of genetics and how to design experiments. I very much appreciate my current collaborations with Steve Henikoff and Daniel Zilberman on the study of DNA methylation. Finally, this award goes to the wonderful undergraduate and graduate students, postdoctoral fellows, and research assistants who have worked in my lab and contributed so much. Although there are simply too many people to name them all, I especially thank Leonore Reiser, Ramin Yadegari, Nir Ohad, Tetsu Kinoshita, Yuki Mizukami, Yeonhee Choi, Mary Gehring, Jin Hoe Huh, Wenyan Xiao, Tzung-Fu Hsieh, and Jon Penterman."

## Sarah Hake

Sarah Hake grew up in Iowa, moving to California with her family at the age of 10,

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**People**
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then back to Iowa to attend Grinnell College (BA, biology, 1975). An inspiring botany professor, Vern Durkee, took her on a field trip to the botanical gardens in St. Louis that led to her decision to enter the plant biology program at Washington University in St. Louis, Mo. (Wash U). Although she was focused on going to Wash U to do botanical field work, it was the evolution of maize that interested her, and she carried out her PhD with Virginia Walbot, receiving her graduate degree in plant biology in 1980. When Virginia left Wash U to take a position at Stanford, Sarah executed a similar move—but to Berkeley and work in the lab of Mike Freeling. There she was the first to clone a developmental gene using transposons, and she has worked in the area of developmental biology ever since. After a six-year postdoc and two children, she took a position at the USDA–ARS Plant Gene Expression Center in the nearby town of Albany. In 1998, Sarah became full adjunct professor of the UC Berkeley Department of Plant and Microbial Biology, a position she still holds. That same year, Sarah was named director of the Plant Gene Expression Center, which operates under a cooperative agreement between USDA–ARS and UC Berkeley. Sarah's research continues to focus on maize and development. With the recent sequencing of many plant genomes, including maize, the years of genetics are now being rewarded with rapid gene discovery that will allow improvements not only in maize but other cereal crops.

Sarah's research efforts have been well recognized. Since 1978, she has garnered nine notable research grants from NSF, NIH, DOE, and USDA for her work in genomics. Several of these grants have been renewed multiple times, underscoring—along with her several dozen research publications—the ongoing importance of her studies. Sarah joined ASPB in 1995. Among other professional awards, she received the 2008 ASPB Stephen Hales Prize. The citation for that award made note of her contributions to our fundamental understanding of plant developmental biology that span the scientific disciplines of evolution, genetics, cell biology, and plant molecular biology.

Sarah has made professional activities an important priority. From 1991 to the present she has helped manage NSF, USDA, and DOE panels. She also has worked as editor, chair, steering committee member, and secretary of various biological science organizations within her areas of expertise. ASPB benefited particularly from her membership since 1995 and her tenure on the Publications Committee (2003–2007) and as a member of the editorial board of *The Plant Cell* (1996–2003).

Sarah offers these insights about her career: "I have always felt lucky. What a great life to be a scientist and teacher, surrounded by energetic youth, puzzling over data, working with plants and using my hands. Don Kaplan would often tell me that it is the process, how and whom you mentor, that is important, not the product. I must have taken that to heart, as the careers of my students and postdocs have been most important to me and because of their success, I have also succeeded. So, this awesome recognition goes to the many undergraduates, graduate students, and postdocs who became enamored with developmental genetics when in my lab. Many names could be mentioned, but certainly George Chuck, Erik Vollbrecht, and Dave Jackson deserve recognition. I also want to recognize Ginny Walbot, who guided me as a graduate student in her lab, and Michael Freeling, for giving me the *knotted* project and inspiring in me a love of developmental biology. The Plant Gene Expression Center (PGEC) has been a wonderful incubator for research, and thanks go to my colleagues at the PGEC and the support of ARS."

Thirteen graduate students and 23 postdoctoral fellows since 1987 have received training and research guidance from Sarah. She has been an active educator since 1975, most recently as at UC Berkeley as the developer of and instructor for the undergraduate course "Plant Genetics and Molecular Biology."

Sarah summarizes her reaction to the NAS election by saying: "Even though I knew Peter Quail was heading to D.C. for the annual NAS meeting, it never occurred to me that I would be part of that meeting. The garbled messages on the machine sounded like someone's cell phone misbehaving. Listening to the messages a couple of times, I wondered whether I was imagining they were congratulating me, so checking the e-mails assured me that this was not just a dream."

## Detlef Weigel

Detlef Weigel currently is the executive director of the Max Planck Institute for Developmental Biology in Tübingen, Germany, a position he has held since 2007. For six years prior to that, he was the director of the institute's Department of Molecular Biology. Weigel also has been an associate adjunct and adjunct professor at the Department of Biology, UC San Diego in La Jolla, and the Plant Biology Laboratory at The Salk Institute for Biological Studies, also in La Jolla.

Trained as a *Drosophila* developmental biologist with an MS in biology from the University of Cologne, Germany, Weigel earned his PhD in genetics in 1988 at the Max Planck Institute of Developmental Biology and Eberhard Karls University. He switched to the study of plants during his postdoctoral career as a research associate (Institute of Genetics, University of Munich) and a research fellow (Division of Biology, California Institute of Technology–Pasadena). As an independent investigator, analyses of floral patterning led him to become interested in how the onset of flowering is controlled. Because flowering is a quintessential adaptive trait in the wild, Weigel, with his Salk colleague Joanne Chory, started in the late 1990s to investigate natural genetic variation in *Arabidopsis*

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# Following Your Heart

**by Elisabeth Schussler**
*Assistant Professor, Department of Botany, Miami University; schusse@muohio.edu*


Elisabeth Schussler

When I entered graduate school at Louisiana State University in 1992, I had every intention of getting a PhD in botany with a research focus in ecological physiology and (I think…) getting a job in academia. Five years later, I had acquired a PhD in plant biology with a focus in anatomy, a love of teaching and learning, an academic significant other (in the same department), and a fairly hazy view of my career prospects. What I quickly had to come to terms with was the fact that, by gaining an academic partner, "my" career decisions had become "our" career decisions, and that navigating science career paths in tandem was not for the faint of heart. Today my husband, Charlie, and I both have tenure-track jobs in academia (I as an assistant professor at Miami University and he as an assistant professor at Wittenberg University), but our path to these positions was neither linear nor quick and, along the way, I gained a new career.

My first realization of the difficulty of being part of an academic couple came as I was approaching my dissertation defense in 1997. My adviser was encouraging me to pursue postdoctoral opportunities, but Charlie was still collecting data and anticipated being in graduate school for at least two more years. I had a decision to make, and I chose to step out of the academic career path to stay in Baton Rouge with him. We've all heard of the leaky pipeline for women in science—as a founding member of the Association for Women in Science chapter at LSU, I was particularly well aware of it—and yet I found myself dripping from the pipe! I figured I wouldn't be heading for a tenure-track job in academia anymore, so I sought an alternative career in science. I had a strong interest in science education, so I worked briefly at the campus Museum of Natural History coordinating its education program, and then worked for two years as an instructor of introductory biology courses at LSU. Those years shaped me as a teacher (thanks to all my friends there!), and when it was time for us to move on, I left that job with regret.

Charlie, however, had acquired a two-year postdoc in South Carolina. I remember driving there thinking, "What am I going to do in South Carolina?" I went with literally no job prospects. My favorite part of the trip was when the car broke down in Atlanta, and my husband, I, our cat, and our dead car ended up at a Saturn dealer, but that's another story.… My point is that there are two emotions you will most likely experience as part of an academic couple: (1) One of you will follow the other with nothing but faith that things will "work out" at the new location, and (2) whomever is heading toward a job will feel guilty for asking their partner to take that leap of faith.

What I discovered in South Carolina was that PhDs can find jobs outside academia! I contacted museums, science centers, and nature parks (and even toyed with the idea of working at a coffee shop), and ended up landing a job as the education director at a nature park . . . a *swamp* nature park. Later, I worked as the education coordinator at a science center affiliated with a university. Both jobs entailed designing and delivering school field trip programs on science topics to (mostly) kindergarten through fifth-grade students. Working with young students will quickly help you appreciate the allegedly short attention span of university students, but it also makes you wonder why the 18-year-olds can't retain the same amount of information as the third graders! In the five years we were in South Carolina (oh yes . . . it's important to remember that two-year postdocs can mysteriously become five-year postdocs . . .), I had five job interviews and four job offers, so finding a job never turned out to be impossible.

Every good postdoc should come to an end, however. Charlie was applying for jobs, with the agreement that I could veto any I chose, when he ran across a job ad for me. Miami University (Ohio) was looking for an assistant professor of biology education in a science department. He handed the ad to me and I laughed. Then I thought, "Why not?"

Two months later I had a job offer in hand, and we were amused by the coincidence of Charlie also getting a job offer "at" Miami—sadly, though, his was in the city of Miami, Fla., and not at the university in Ohio. Deciding between the two positions was extremely difficult because neither job offer came with anything other than vague assurances that something would "come up" for the other one of us. We ended up heading for Ohio, and so my husband got to experience the leap of faith and I got stuck with the guilt. What goes around comes around, I guess.

At Miami, my research focuses on how people learn about plants and how students learn about the nature of science. My tenure home is in a science department, botany, which suits my graduate school origins perfectly. Looking back, I can see how my career path led to this job, but I would not have guessed this outcome. For Charlie, there was no tenure-track job at Miami, so he acquired a part-time visiting assistant professor position. We preferred it to be part-time because we knew that full-time teaching jobs often

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leave little time for research, and if his research went away, so would his opportunities for a tenure-track job. We were lucky we had the financial flexibility to make that choice, however. In the fourth year of my position, Charlie started his tenure-track job. However, because his university is located an hour and a half away, he spends four nights a week there and comes home on weekends. So now we have shifted our concerns from career sacrifices to quality-of-life sacrifices—a paradox confronted by many academic couples.

As an academic couple, we understand that we gain by understanding the other's academic field and lifestyle. As such, we can each provide a unique professional and personal support system to the other. But both of us have experienced sacrifices in our quest to have satisfying jobs while also living together (or at least in close proximity). I am lucky that my sacrifices were also gains; I might not be doing research in biology education if I had felt free to pursue a postdoc after graduation. That career shift allowed me to find my way back into the pipeline that I fell out of in 1997. Navigating a career path for two necessitates patience, faith, and the self-awareness to know what you are willing to sacrifice and what you aren't, and for one or both of you, career flexibility may be a necessary component as well.

## CALL FOR PROPOSALS

# WSSA Undergraduate Research Award—2010

The Weed Science Society of America has developed an Undergraduate Student Research Grant designed to encourage and involve exceptional undergraduates in agricultural research. Interested faculty members are encouraged to identify potential award candidates and discuss the possibility of sponsoring a research project. Awards may be used as a stipend, for research budget expenses (travel, supplies, etc.), to defer fees, to defray living expenses for summer research, or any combination of these items.

### AWARD

Up to $1000 for support of undergraduate research to be conducted over a minimum of one quarter/semester during 2010. This award may be used to defray the cost of research supplies or as a stipend. Support of a faculty sponsor is required. Awards will be made to the student, to be administered by the faculty sponsor's department.

### APPLICANT

The applicant is an Undergraduate student with a strong interest in weed science. Students majoring in all related disciplines may apply.

### TO APPLY

Applicants should prepare a 2-3 page research proposal including name, address, phone number, e-mail address, title, objective, experimental approach, discussion, budget and references. The discussion section of the proposal should describe the expected results and their possible significance to weed science. The student should provide a cover letter in which general academic and career goals are discussed. A copy of the student's academic transcripts must also be provided.

### FACULTY SPONSOR

Any faculty member who is actively engaged in weed science research is qualified to be a sponsor. The faculty sponsor should review the research proposal with special attention to the budget; the distribution of funds should be approved by both the student and sponsor. In addition, the sponsor should provide a letter of reference including a statement of his/her willingness to supervise the proposed research and to provide needed space, equipment and supplies above those requested in the proposal. The sponsor is encouraged to assist the student in presenting his/her results at a regional weed science meeting.

### HOW TO APPLY

The completed proposal, academic transcripts, cover letter and faculty letter of support should be forwarded to: Dr. John Jachetta, Dow AgroSciences, 9330 Zionsville Road, Indianapolis, IN 46268-1054; Phone: (317) 337-4686, Fax (317) 337-4649, e-mail: jjjachetta@dow.com. Proposals should be received no later than November 16, 2009. Funding decisions will be made by January 22, 2010 and presented at the 2010 WSSA National Meeting Awards Ceremony.

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*thaliana*. While initially geared toward problems of flowering and responses to light, this research has expanded to include a project on hybrid fitness and reproductive isolation, as well as to close relatives of *A. thaliana*. Although Detlef's work on genetic variation has a major focus on generating whole-genome resources, his laboratory continues to be active in hypothesis-driven analyses of plant development. To date, these ongoing studies have resulted in 44 published papers and one book, *Arabidopsis—A Laboratory Manual* (Cold Spring Harbor Laboratory Press, 2001), which Detlef coauthored with Jane Glazebrook.

Detlef's work has been recognized consistently throughout his career. Prior to his election to NAS, he has been elected to various prestigious international academies. He also has received awards and six different fellowships since his days as an undergraduate. Of particular note to the ASPB membership is Detlef's receipt of the Charles Albert Shull Award in 2001 in recognition of his seminal contributions to one of the most challenging problems in developmental biology: the induction of floral development.

Professional activities have also been an integral part of Detlef's career. He has served on numerous biotechnology advisory boards and grant advisory panels in the United States and Europe. He has applied his expertise to organizing and directing various professional meetings, networks, and steering committees within his field. At least a dozen different editorial boards, including that of *The Plant Cell,* have benefited from Detlef's insights on genes, cells, plant development, and the field of plant biology.

Weigel had this to say about learning of his election to the NAS: "My assistant came running down the hall, and told me that a Professor Meyerowitz was on the phone with an urgent message. What followed was one of the most memorable moments in my scientific career. First my postdoctoral mentor, Elliot, congratulated me on being elected to the NAS, followed by many other plant colleagues whose work I greatly admire. As a naturalized citizen living abroad, this is a very special honor indeed. It is both a reflection of the wonderful coworkers who I have been lucky enough to have had in my lab during the past 16 years, and of the fantastic work environments at the Salk, where I got my start as an independent investigator, and at the Max Planck Institute. And I am very proud to be in the company of so many colleagues and friends who have fundamentally influenced my research, from Elliot and Joanne to Marty Yanofsky, Caroline Dean, Maarten Koornneef, Steve Kay, Joe Ecker, and Jim Carrington, to name but a few."

Bob, Sarah, and Detlef were among the 72 members and 18 foreign associates from 15 countries elected this year. Election to NAS is one of the highest honors a scientist or engineer can receive. Potential NAS members can be nominated only by an existing NAS member. Membership is achieved only through a formal and confidential election process.

**President's Letter**
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nurture, or by some G×E interaction thereof, lack, or believe they lack, any interest in or predilection for science. We can feel that we have successfully reached across the "culture gap" if we provide opportunities for such individuals to develop an appreciation for plants, even if we do not convey any factual knowledge about plant biology. ASPB is also supporting endeavors in this arena; for example, the ASPB-sponsored plant biology YouTube video contest, ChloroFilms, conceived and led by ASPB member Daniel Cosgrove, has two artistic videos—*La Bloomba* and *Fertile Eyes*—as major prize winners (see http://www.chlorofilms.org). As described in the ChloroFilms press release, *Fertile Eyes,* "a collaboration with Anna Edlund of Spelman College, combines music, dance, sensual imagery, and puns to tell the story of pollination and fertilization in plants in an unforgettable way" (5). I encourage all of you to take a look at these and other winners of the ChloroFilms contest.

After composing most of this article, I was gratified to read in Snow's "A Second Look" a passage that parallels some of the thoughts I've been trying to develop here. In describing the fields of crystallography and structural biology, Snow noted, "What one needs most of all is a visual and three-dimensional imagination, and it is a study where painters and sculptors could be instantaneously at home."

As C. P. Snow wrote in *The Two Cultures,* and as is still true in this, the golden anniversary year of his lecture, for better or for worse, the dominant or "common" culture of our time is not the culture of science. Accordingly, if we can imagine new ways to make painters and sculptors (not to mention journalists and political leaders) feel "at home" in the field of plant biology, those efforts may have at least as large an influence on the future of our discipline as our efforts to identify and train the next generation of plant scientists.

**Sally Assmann**
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# Membership Corner

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

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**Title:** PhD candidate
**Place of Work or School:** Biological Sciences Department, Northern Illinois University
**Research Area:** I am doing research on the relationship among plant MADS-box genes, plant hormones, and plant development by using tomato *JOINTLESS* gene as a model. By understanding this relationship, I am hoping to figure out why MADS-box genes play important roles in diverse plant development processes such as abscission zone development, fruit ripening and development, meristem determinacy, and flower development.
**Member since:** 2007

1. **Why has being a member of ASPB been important to you?**
   It gives me a sense that I am connected to the professional network. Plus, it also gives me access to two of the most important journals in plant biology: *The Plant Cell* and *Plant Physiology.*
2. **Was someone instrumental in getting you to join ASPB?**
   No, I found it myself and immediately joined online.
3. **What would you tell colleagues to encourage them to join?**
   I tell my colleagues that the American Society of Plant Biologists is a very supportive community and that they can always find someone to exchange and share research ideas. Being a member also gives you other perks such as reduced fees for the ASPB annual meeting and access to *The Plant Cell* and *Plant Physiology.*
4. **Have you enhanced your career using ASPB job postings or through networking at an ASPB function?**
   Yes. I have attended two ASPB annual meetings now. I am very glad that I had the opportunity to get to know some researchers in my field and establish connections with them. Also, because I am graduating as a PhD student, I am paying very close attention to the job postings from the ASPB website. Although I am still looking for my ideal position, I can say that the ASPB website is the best place to look for job postings that are related to plant biology.
5. **Have you had any success at finding candidates as a result of a job posting at the meeting or via our online Job Bank?**
   No, I am not in that position now, but it would definitely be helpful to those people who are in a hiring position.
6. **Do you read print journals? If so, where do you usually read them?**
   I seldom read print journals now unless the paper I am interested in is too old to have an online version. In that case, I will go to the library to make a hard copy of it.
7. **What do you think is the next "big thing" in plant biology?**
   Biofuel. With less and less fossil fuel resources, it is urgent for us to find an alternative energy source now.
8. **What person, living or deceased, do you most admire?**
   I don't have a particular person that I admire most. I think everyone is worth admiring if you look carefully enough.
9. **What are you reading these days?**
   Besides the books that are related to my career, I like to read about lots of different topics, such as psychology, philosophy, spirituality, and Eastern and Western culture comparison.
10. **What are your hobbies?**
    I like reading a lot. I also like to travel to see different places and meet different people. These activities enrich my life.
11. **What is your most treasured possession?**
    My books. More accurately, I should say it is the knowledge from the books that I have read because it stimulates my imagination and extends my experiences.
12. **What do you still have left to learn?**
    To be myself.

# Basic Research to Enable Agricultural Development (BREAD)

The advances made over the past decade of the Plant Genome Research Program (PGRP) have led to the development of resources with potential benefit far beyond U.S. agriculture. The potential for international impacts was recognized from the beginning of PGRP, and its activities are coordinated through the National Plant Genome Initiative (NPGI), which also includes the U.S. National Science Foundation, U.S. Department of Agriculture, U.S. Department of Energy, and U.S. Agency for International Development.

A variety of mechanisms are available to support the downstream applications derived from advances in science and technology to improve developing country agriculture. But there have been fewer funding opportunities to support development of cutting-edge and creative new approaches that extend from basic discovery to the needs of smallholder agriculture. New collaborations among a broad range of scientists and engineers are needed that lead to new ways of thinking about the major problems facing developing country agriculture.

The National Science Foundation and the Bill & Melinda Gates Foundation are partnering to offer a new research program to foster these collaborations and the transformative research that will emerge from them. The goal of this new program, called Basic Research to Enable Agricultural Development, or "BREAD," is to build on the accomplishments of the NPGI, extending the opportunities to include international partners in efforts to generate innovative, science-based solutions to problems of smallholder agriculture in developing countries. Through new partnerships and projects, it is anticipated that BREAD will change parts of the research culture to one that is more broadly inclusive of these needs. BREAD provides the opportunity to engage international partners and for their activities to be funded.

BREAD is looking for new and fresh ideas—not extensions of ongoing basic research projects that could be supported by existing programs. BREAD is not just focused on plant genomics and, in fact, the scope of the program is quite broad: from research aimed at new ways to control parasitic plants to the development of nanoparticle-based approaches to fertilizers and more. Although the emphasis is on research that would be of downstream benefit, BREAD is not focused on translational or applied research. The program is looking for truly novel, basic research with the potential to address the needs of developing country farmers. The NSF urges you to bring your best ideas to BREAD. If you are not sure your project would be a good fit, you are invited to contact the program director, Deborah Delmer, at bread-wg@nsf.gov.

Additional information about the BREAD Program, including the Program Solicitation, is at http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503403&org=DBI&more=Y#more.

# ASPB Members Well Represented in EFRC Competition

The White House recently announced the award of 46 new Energy Frontier Research Centers (EFRCs) to accelerate scientific breakthroughs to develop new energy technologies for the 21st century. The U.S. Department of Energy (DOE) will invest $777 million in the 46 EFRCs over the next five years, supported in part by funding made available in the American Recovery and Reinvestment Act (economic stimulus legislation).

The 46 EFRCs will be funded at $2 million to $5 million each per year for an initial five-year period. The centers were selected from approximately 260 proposals and will engage over 110 institutions from 36 states and the District of Columbia, as well as some international partners. The participants include universities, DOE national laboratories, nonprofit organizations, and private firms. DOE reports that the EFRCs will involve nearly 700 senior investigators and employ (full- and part-time) over 1,100 postdoctoral associates, graduate students, undergraduate students, and technical staff. Many centers will use DOE scientific facilities for their research.

A review of the 46 awards shows that

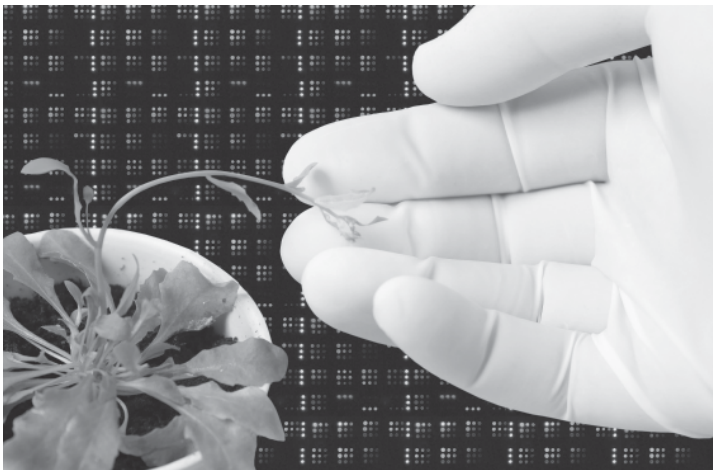
- 20 EFRCs will focus on renewable and carbon-neutral energy (solar energy utilization, advanced nuclear energy systems, biofuels, geological sequestration of $CO_2$);
- six EFRCs will focus on energy efficiency (clean and efficient combustion, solid state lighting, superconductivity);
- six EFRCs will focus on energy storage (hydrogen research, electrical energy storage); and
- 14 EFRCs will focus on crosscutting science (catalysis, materials under extreme environments, other).

The administration announcement, a list of awards, and synopses (including research partners) of the 46 EFRCs can be found at http://www.er.doe.gov/bes/EFRC.html.

Several of the awards were made to ASPB members (please see http://www.er.doe.gov/bes/EFRC_Synopses.pdf):

*continued on page 13*

# You have the gene... now what does it do?



## Now you can easily add physiology measurements to your assay toolkit.

You know the reasons that make *Arabidopsis thaliana* an excellent model for gene expression studies (short generation time, sequenced genome, mutant collection, ease of cultivation, etc.). It is essential to add physiological assessment of *in situ* function to validate regulatory or functional genes identified by genomic, molecular or bioinformatics results. Regulation or loss/gain of function effects on photosynthetic and/or respiratory pathways can be measured through gas exchange with the LI-6400XT Portable Photosynthesis System and the new 6400-17 Whole Plant Arabidopsis Chamber. Gas exchange measurements are rapid, non-destructive and repeatable over the life span of the plant.

**To learn more about the 6400-17 and 6400-18, go to**

**www.licor.com/Arabidopsis**

LI-COR®
Biosciences

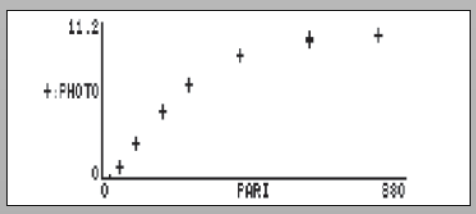
**800-447-3576**




**The 6400-17 can be combined with the new 6400-18 RGB Light Source to form a powerful tool for measuring whole plant gas exchange and light response on Arabidopsis or other plants with small growth habits.**

```
Light Curve
Desired lamp settings (µmol/m2/s)
600 800 600 400 250 175 100 50 25 15 8 0
Minimum wait time (secs) 120
Maximum wait time (secs) 200
Match if |ΔCO2| less than (ppm) 20 _

 DelLn  ♦ClrEnd ♦DelChar♦CapLock♦AnyChar
```



**EFRC Competition**
*continued from page 11*

## Center for Direct Catalytic Conversion of Biomass to Biofuels (C3Bio)

**Maureen McCann, Director**
Purdue University

*Objective: To use fundamental knowledge about the interactions between catalysts and plant cell walls to design improved processes for the conversion of biomass to energy, fuels, or chemicals.*

This EFRC will combine expertise in biology, chemistry, and engineering to increase much-needed knowledge of catalysis pertaining to plant cell wall chemistry. The EFRC includes planned collaborations with scientists at the University of Tennessee for development of "hybrid" catalysts and catalytic conversion of renewable materials; with National Renewable Energy Laboratory for advanced, high-resolution biomass imaging technology and computational modeling; and with researchers at the Argonne National Laboratory for advanced scattering and imaging techniques using the Advanced Photon Source. Additional scattering experiments using the Spallation Neutron Source at Oak Ridge National Laboratory are also planned.

Maureen McCann has been a member of ASPB since 2002 and currently mentors new members (see http://www.aspb.org/newsletter/marapr09/09mctwumasi.cfm). She was a speaker at the Pan American Congress on Plants and BioEnergy in Mérida, Mexico, in June 2008 (see http://www.aspb.org/newsletter/marapr08/03panam.cfm).

## Center for Lignocellulose Structure and Function

**Daniel Cosgrove, Director**
Pennsylvania State University

*Objective: To dramatically increase our fundamental knowledge of the physical structure of biopolymers in plant cell walls to provide a basis for improved methods for converting biomass into fuels.*

To achieve its objective, this EFRC will study the physical structure of lignocellulose at the nanoscale level and the rules and principles by which lignocellulose is created. An interdisciplinary team that includes plant and microbial molecular biologists, chemists, physicists, material scientists, engineers, and computational modelers will utilize advanced, cutting-edge approaches and methodology to bring about desperately needed advances in the fundamental understanding of the "rules of assembly" of plant cell wall. Specifically, the focus will be placed on understanding the cellulose synthesis, lignocellulose assembly, and the relationship between nanoscale structure and macroscale properties such as porosity and mechanics of the plant cell wall. This EFRC has a strong potential for transforming bioenergy and materials sciences through combined molecular, genetic, and nanomaterials engineering approaches and includes planned collaborations with scientists at North Carolina State University and Virginia Polytechnic Institute and State University.

Dan Cosgrove joined ASPB in 1979. In 1991, he won the ASPB Charles Albert Shull Award for his incisive work on the biophysics of plant cell enlargement. Cosgrove served as president of ASPB in 2000–2001. In 2008, he was an ASPB Education Foundation Grant Award Program (GAP) recipient for "A Competition for New Plant Biology Videos on YouTube™." His follow-up work, "Using YouTube™ and Animoto™ to Engage Students in Plant Biology Classes," won the 2009 ASPB Education Booth Competition for presentation in the exhibit hall during PB09 in Honolulu (http://www.aspb.org/meetings/pb-2009/).

## Photosynthetic Antenna Research Center (PARC)

**Robert Blankenship, Director**
Washington University, St. Louis

*Objective: To understand the basic scientific principles that underpin the efficient functioning of the natural photosynthetic antenna system as a basis for man-made systems to convert sunlight into fuels.*

PARC proposes a program in basic scientific research aimed at understanding the principles of light harvesting and energy funneling as applied to natural photosynthetic, biohybrid, and bioinspired antenna systems. The goal of this work is to elucidate the basic scientific principles that underlie the efficient functioning of natural photosynthetic antenna systems and how those principles can be translated into concepts that will form the basis for next-generation systems for solar energy conversion. This will be accomplished using structural techniques such as neutron scattering and diffraction at the Spallation Neutron Source and the High Flux Isotope Reactor at Oak Ridge National Laboratory, and advanced microscopy at the Center for Integrated Nanotechnology at Los Alamos and Sandia National Laboratories. PARC includes planned collaborations with scientists at the Donald Danforth Plant Science Center, Los Alamos National Laboratory, North Carolina State University, Oak Ridge National Laboratory, Sandia National Laboratories, the University of California–Riverside, the University of Glasgow (U.K.), the University of Pennsylvania, and the University of Sheffield (U.K.).

Robert Blankenship won ASPB's 2008 Charles F. Kettering Award. This award, established by the Kettering Foundation in 1962, recognizes excellence in the field of photosynthesis. As a major symposium speaker at PB05 in Seattle (see http://www.aspb.org/newsletter/mayjun05/04pb05h.cfm), Blankenship presented "Photosynthesis—From Photons to Sugar." He has been a member of ASPB since 2001.

## Center for Advanced Biofuels Systems (CABS)

**Richard Sayre, Director**
Donald Danforth Plant Science Center

*Objective: To generate the fundamental knowledge required to increase the efficiency of photosynthesis and production of energy-rich molecules in plants.*

CABS will focus its efforts on the model algae Chlamydomonas and the oilseed plant Camellina. Metabolic networks will be

*continued on page 14*

**EFRC Competition**
*continued from page 13*

modified to increase lipid and thus "bio-oil" synthesis, and new metabolic pathways will be designed for production of hydrocarbons from sunlight. Utilizing the skills of plant biochemists, biophysicists, and computational biologists, this innovative center will integrate all aspects of metabolism, from the early events in photosynthesis to the synthesis and accumulation of oils and biofuel precursors. This EFRC may lead to a transformational channeling of solar energy through carbon metabolism and, ultimately, into biofuels, and includes planned collaborations with scientists at the University of Nebraska, University of Missouri–St. Louis, University of Arizona, and Michigan State University.

Richard Sayre became an ASPB member in 1977. He has been a long-serving participant on the ASPB Committee on Public Affairs. In 2008, he joined the committee to nominate recipients of the ASPB Lawrence Bogorad Award for Excellence in Plant Biology Research. Additionally, from 2003 to 2005, he served as the elected secretary–treasurer for ASPB's Midwestern Section.

# Plant Biology 2009 Education Booth Competition Winners

## *A Pleasing Combination of "Virtual" and "Reality"*

The ASPB Education Committee is pleased to announce the winners of the 2009 Education Booth Competition. The winners' dynamic projects were featured in the Education Booth at the ASPB Annual Meeting in Honolulu, Hawaii, http://www.aspb.org/meetings/pb-2009/.

## VIRTUAL

### Using YouTube™ and Animoto™ to Engage Students in Plant Biology Classes

**Daniel Cosgrove with Marcia Buanafina and Gregory Richter**
*Biology Department, Pennsylvania State University*
http://www.bio.psu.edu/faculty/cosgrove/

Web-based video technologies, such as **YouTube™** (http://www.youtube.com) and **Animoto™** music videos (http://www.animoto.com), have the potential to awaken student interest and to engage students in projects that deepen their knowledge of the subject matter—in this case, plant biology. This exhibit explains what Dan and his team have learned about using web-based video technologies for plant biology education during the course of their first plant biology video contest powered by YouTube (see http://www.chlorofilms.org). This contest was sponsored by the ASPB Education Foundation's 2008 Grant Awards Program (http://www.aspb.org/education/foundation/gap.cfm).

## REALITY

### Real Plants, Real Tools, Real Science

**Martha Kirouac, Mike Kerkman, and Rachel Vourlas with The Huntington Library, Art Collections, and Botanical Gardens**
http://huntington.org/huntingtonlibrary.aspx?id=694&linkidentifier=id&itemid=694

As issues such as global climate change and genetically modified organisms grow in importance, there is an urgent need to invigorate public dialogue and education about plant biology. In general, there is a lack of public knowledge about the role of plants in daily life despite their vital importance in the biosphere. "Plant blindness" is a term coined by biological educators James Wandersee and Elizabeth Schussler to describe this inability to appreciate the unique biological features of plants. Lacking hands-on experience in growing, observing, and identifying plants, people have few opportunities to become aware of basic plant science. The permanent conservatory exhibition "Plants are up to Something" (PAUTS), http://www.huntingtonconservatory.org/, and its associated school program, "C.S.I.: Conservatory Science Investigation" (CSI), function as inoculants against plant blindness and scientific illiteracy through a policy of "real plants, real tools, real science." The Huntington's Education Booth exhibit highlights this award-winning approach with four sample activities and emphasizes how they can be used in outreach programming.

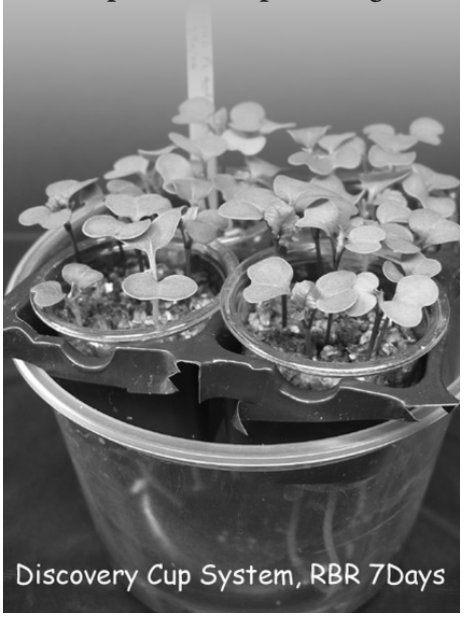
## *Thank You!*

### *DART Container Corporation*

The ASPB Education Committee brings hands-on plant biology activities to science and education outreach events around the world. A real crowd-pleasing activity allows event booth visitors to plant miniature gardens in plastic cups. Adding a lid ensures that these educators can transport their precious plant specimens to their own classrooms and teaching labs.

**Thanks to DART's generous donation of cups and lids, ASPB's education outreach booths can continue to help plant biology bloom and grow everywhere!**

Learn how to make Lilliput Gardens at **http://www.fastplants.org/**



# Publishing Your Teaching Scholarship

Communicating the outcomes of our research is integral to our work as scientists. Through conference presentations and journal publications, we discuss our findings and their implications so that others can learn from and build on our efforts. Yet, what we actually do on a day-to-day basis includes not only bench and field research, but also the myriad ways in which we prepare the next generation of scientists, science teachers, and scientifically literate citizens. As instructors and research mentors, we have opportunities to systematically collect and evaluate evidence of our students' learning. In fact, a recurring theme in science teaching reform in higher education is exactly this: how we can bring a research mind-set to teaching practice. The movement has been called scientific teaching (1), teaching-as-research (2), and scholarship of teaching and learning (SoTL; 3,4). What all of these ideas have in common is the expectation that we will communicate what we learn from studying our teaching or our students' learning. In other words, we will publish it.

Publishing our teaching scholarship offers a number of benefits beyond meeting the expectations of colleagues, institutions, and the broader community. First, by opening up our work to peer review and critique, we can expand our thinking and use feedback to make improvements in our instruction and teaching scholarship. Second, thanks to Google Scholar (http://scholar.google.com/), a host of readers both within and beyond our discipline can learn from our work. Finally, promotion and tenure guidelines are continuing to change in ways that allow for documentation and evaluation of our teaching scholarship either alongside or in addition to our disciplinary research (12,6).

As an editorial board member for *CBE-Life Sciences Education,* which is published by the American Society for Cell Biology (ASCB) and features research articles and essays related to K–20+ science education, I have seen many manuscripts from scientist–educators who want to share their educational innovations and classroom-based research. My intention in this forum is to point out a number of resources, including websites, articles, and professional development activities, that I hope will be useful to ASPB members interested in sharing their teaching scholarship with the broader scientific and science teaching communities. I also offer more general advice for those who are ready to study their own teaching or move their teaching scholarship toward publication.

Most authors do a fantastic job of communicating their passion for science teaching and their genuine interest in student learning. Yet, manuscripts often suffer from three issues: (1) insufficient context (i.e., little description of what is already known and how it informed the work being described), (2) disconnection between the problem that the study aims to address and the methods for doing so, and (3) unsupported claims about what is known in the field and what can be concluded from the work. The following are strategies for avoiding these pitfalls and ensuring that manuscripts survive (and even flourish!) through the review process:

1. Inform your teaching scholarship with relevant literature. What can you learn from other studies that will help you in thinking about yours? What is already known that suggests your work is significant and meaningful? What is the "gap" that your scholarship fills? Publishable manuscripts include a solid review of relevant literature and a description of how the results contribute to the body of knowledge. Unfortunately, there is no PubMed for science education, but Google Scholar, including its "cited by" feature, is quickly and effectively addressing the need for a cross-disciplinary literature search and retrieval system. For more extensive reviews of how to go about locating, deciphering, and evaluating science education research and practice literature, see endnotes 5, 7, and 8.
2. Ensure that your research question and design are well aligned. Most important, will your study in its current design help you answer your research question? For more on designing and conducting studies of teaching and learning, see endnotes 1, 9, and 10.
3. Justify your arguments. Are your claims supported with evidence from the literature (i.e., citations) or from your own work (i.e., data)? How do your data indicate that the conclusion you are drawing is warranted? It is easy to make assertions based on your personal experience as a learner or teacher (e.g., "students learn best when student–teacher ratios are small" or "students learn science by doing it"). In the context of a scholarly article, however, these statements can be quite contentious and should be supported by references or data that serve as evidence for your argument.

Once your manuscript is submission-ready, where should you send it? Many lists of SoTL journals have been generated [see, e.g., endnotes 11 and 5, and websites noted in Selected Resources]. A number of scientific societies publish education articles in their journals. For example, ASPB periodically features education essays as commentaries in *The Plant Cell*. On a related note, *The Plant Cell* is inaugurating a regular online-only column called "Teaching Tools in Plant Biology." Teaching Tools will provide instructors who are teaching undergraduate-level classes in plant biology outside their own area of expertise with ready-to-go course outlines and PowerPoints on selected topics. The ways in which you integrate these resources into your curricula and the ways in which working with real data helps (or fails to help!) students learn

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# Bringing Professional Ethics Training for Plant Biologists to the Classroom

Mentoring students to conduct their research in a professional and ethical manner is obviously a critical component of their overall training as scientists. However, an article published in *Science and Engineering Ethics* last year (highlighted in the September/October 2008 *ASPB News* Addressing Ethical Standards series article "Mentor Involvement in Research Misconduct," http://www.aspb.org/newsletter/septoct08/05ethics08.cfm) revealed that two-thirds of mentors in trainee misconduct cases investigated by the U.S. DHHS Office of Research Integrity failed to teach specific research standards to their students. Such findings, along with a number of recent high-profile misconduct cases, emphasize the needs for all mentors and trainees to receive proper training in research ethics and for mentors to serve as good role models for their students.

Indeed, the call to introduce all postgraduate students to ethics training at all research universities and "to create an environment that is inherently consistent with minimizing scientific misconduct" has been made (*Nature*, 2007, 445:229). The National Science Foundation (NSF) has long recognized the need to support and encourage ethics training through its Education in Science and Engineering Initiative in all fields of science. The National Institutes of Health (NIH) has also made efforts to develop (and sometimes require) research ethics training in the medical disciplines and in research that involves human subjects.

Should we formally teach professional ethics to the next generation of plant biologists, and if so, how should we develop courses or modules on the subject(s)? Dina Mandoli, at the University of Washington, raised the first question in her excellent 36-part column titled "The Bioethics Imperative," which ended in 2008. Dr. Mandoli's column broke new ground (e.g., by giving a name to how our desire to be right unconsciously clouds our ability to be objective), while also listing resources that faculty can use to help educate themselves and their students about research ethics.

The best way to learn research ethics is through discussion and by active involvement and immersion in a research environment that includes ethics as a part of its culture. As mentors, we can seek to ensure that our students have access to resources such as the modules developed by Dr. Mandoli and that participation in an ethics course is strongly encouraged, if not required. In addition, these resources need to be reinforced in the research setting by face-to-face mentoring and open discussion. A spirit of open inquiry into the limitations and assumptions of research methodology should be welcomed. Moreover, principal investigators/mentors need to avoid creating conditions that lead to research misconduct and ensure that scientific rigor, rather than the pressure to publish, is of paramount importance in the lab.

Here, we briefly describe how the research ethics program evolved in the Department of Plant Biology at North Carolina State University, and we review the elements that we think are especially valuable for teaching the responsible conduct of research (RCR) and related issues. We also provide tips for teaching an ethics course for students involved in research at any level.

### Teaching ethics in plant biology: RCR and beyond

The first course addressing plant biology–specific ethics topics at NC State University was developed in 2001 as part of an NSF-sponsored grant to the university to provide ethics training for graduate students and faculty from all disciplines and to develop ethics learning modules and courses for the university community. A graduate student and faculty mentor (Chad Jordan and Niki Robertson) from the Department of Plant Biology participated in a three-credit philosophy course on research ethics as part of the grant. Thereafter, the same team developed and taught a graduate-level special topics course that focused on ethical issues related to genetically modified plants. Even though this course did not specifically focus on RCR topics, it generated student interest. It also helped raise awareness that students would benefit from studying current ethical issues affecting scientists. As a result, a permanent course that addressed core RCR topics as well as plant biology–specific issues was developed and is now a requirement for a graduate degree in plant biology from NC State University. There are several departments at NC State University that have similar requirements in their graduate programs.

This course, titled "Ethical Issues in Plant Biology," was first taught in 2003 and has since been taught every other year. The two faculty who currently co-teach the course have research programs in different areas of plant biology: one with expertise in plant cell and molecular biology (Chad Jordan) and the other with expertise in ecology and biodiversity (Tom Wentworth). One graduate student from each area who has received RCR training (most recently, Steve Bernacki and Kristen Kostelnik) also participate as co-instructors.

Our instructional approach to the course is to introduce students to the philosophical background of ethics and to provide a framework for ethical decision making at the beginning of the course. We then introduce important topics using short lectures and invited speakers, and we facilitate active learning and discussion during each weekly two-hour class meeting. Students are also required to complete a series of online readings (discussed below). They then practice using the framework on each topic by

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**Professional Ethics Training**
*continued from page 17*

analyzing and discussing case studies. Students are introduced to core RCR topics including falsification, fabrication, and plagiarism, again using case studies to work through real and fictional scenarios. Subsequent course meetings include assigned readings, speakers, and discussions on the following topics:

- Ethical codes
- Recordkeeping and data manipulation, proper and improper image manipulation
- Teaching and mentoring, expectations and responsibilities
- Chain of command, whistleblower protection
- Conflicts of interest
- Requirements for authorship and guidelines for establishing collaborations
- Reviewers and confidentiality
- Sustainability and pressures on natural resources (e.g., water permits)
- Design of field experiments: species introduction, invasive and rare species, when is collection/disruption justified?
- Biotechnology and genetic engineering: regulatory procedures, transgene escape, field testing, risk-benefits for lesser developed countries
- Intellectual property and the public domain
- Copyright and fair use
- Communicating with the media

The course culminates with each student selecting an ethical issue of interest, writing a position paper, making an oral presentation, and composing a novel case study and teaching rubric related to his or her topic.

The efforts to teach research ethics at NC State University are part of a larger, ongoing initiative to make ethics a component of graduate (and undergraduate) education at multiple doctoral degree-granting institutions in North Carolina and beyond. An NSF-sponsored project called Land Grant University Research Ethics (LANGURE) has brought together nine participating institutions (including the University of Hawaii, Iowa State University, Purdue University, and the University of Wisconsin) to establish an open discussion about research ethics education and to create ethics education resources. Several online, discipline-specific modules are available for free access at http://faculty.chass.ncsu.edu/comstock/langure/modules.htm and via the OpenSeminar in Research Ethics course website, http://openseminar.org/ethics/. OpenSeminar contains modules with readings, assignments, and case studies on a wide range of topics that can be used in conjunction with regular class meetings. Instructors can also generate a tailored distance education course based on selected modules. Some of the modules we use in our plant biology course have been developed for use at the OpenSeminar site.

## Tips for Teaching Your Own Course

Building your own course on professional research ethics may seem like an out-of-the-box task with respect to traditional science courses, but it does not have to be a time-consuming process. Here are a few quick tips that should make planning and teaching such a course a little easier and more efficient.

***Involve a trained ethicist to provide a framework for ethical decision making.***
Most plant biologists are not trained research ethicists, so it is important to solicit the assistance of someone who can provide students with an introduction to ethics and ethical decision making through guest lectures and/or written materials. Start by contacting faculty in the philosophy or humanities departments at your institution, as well as your institution's office of research administration or graduate school to find out who provides RCR training on campus.

***Recognize that a one-semester course cannot be comprehensive.***
Although it is important to introduce students to the fundamental concepts of RCR, course organizers should realize that it is impossible to provide comprehensive coverage of all issues of professional ethics that students are likely to encounter. It is a more appropriate and realistic objective that students leave the course with the skills needed to recognize situations that present ethical challenges and to address those situations using a rational framework for ethical decision making.

***Invite speakers from different professional backgrounds to address diverse topics.***
Guest speakers can often clarify policies regulating research, specialized areas (IP, copyright, field permits), and expected research standards and conduct. When discussing authorship, collaboration, and conflicts of interest, for example, invite senior faculty members in your program who have served on grant panels and journal editorial boards to discuss their experiences. Invite working scientists from industry, state agencies, and nonprofit groups to discuss codes of conduct in their day-to-day operations.

***Use case studies to give students practice in dissecting ethical dilemmas and making decisions.***
Case studies, based on real or hypothetical scenarios, allow students to examine situations that they or their colleagues may face at some point in the future. Case studies can be a useful way to introduce a topic, and they provide a way for students to put to use the ethical decision-making skills they have learned. Having students work on case studies in teams also facilitates open discussion between students on areas that may be politically sensitive or otherwise controversial. A real benefit of case studies is the identification of all people (and other entities) that have a stake in a given issue. More satisfactory decisions can be made after there is a thorough understanding of the potential consequences of the decision on different groups or individuals.

***Keep an eye out for current events to keep the material relevant.***
*Science*, *Nature*, and other journals that include commentary sections frequently discuss issues that relate to ethical aspects of

research. For example, a new computer program for detecting similar writing in journal articles is flagging articles that have slipped through the review process. Is it really ethical when up to 80% of an article's content is republished from previous reviews? See the article on "Plagiarism Sleuths" by Couzin-Frankel and Grom (*Science*, 2009, 324:1004).

***Don't limit participation to graduate students.***

Research ethics training isn't just for graduate students. An increasing number of undergraduate students are becoming involved in research early in their careers, and they would benefit from research ethics training at the outset. Invite undergraduate students who are thinking about careers in research to participate in your graduate-level course, or consider developing a course targeted at undergraduates. Also encourage participation by postdoctoral researchers. Postdocs can benefit from research ethics training as they prepare to lead their own labs, and can contribute to the course by sharing their own unique experiences with students.

To find out more about ethics education for plant biology students, contact ASPB Education Committee member Chad Jordan at chad_jordan@ncsu.edu.

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**Publishing Your Teaching Scholarship**
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are prime targets for scholarly study. Some societies (e.g., ASCB) have even started their own journals of science education research and practice. If you choose to publish in a discipline-specific journal, your immediate colleagues are more likely to see (and even read!) your work. On the contrary, publishing in cross-disciplinary journals such as the *International Journal for the Scholarship of Teaching and Learning* (http://academics.georgiasouthern.edu/ijsotl/sm.htm) helps ensure that lessons learned in physics instruction can be applied in biology classrooms and vice versa (13). Consider your target audience (e.g., plant biologists, life scientists, anyone who teaches an undergraduate science course for nonmajors) and select a journal accordingly.

An expanding number of organizations are supporting faculty from all disciplines in scholarly work on teaching and learning (e.g., International Society for the Scholarship of Teaching and Learning). Scientific societies are also offering professional development and venues for presenting teaching scholarship (see Professional Development section in Selected Resources). For example, you can share your teaching scholarship at the Plant Biology 2009 meeting as an education poster or during the Education Symposium and Education Workshop. Your own campus may offer a wealth of resources, including training in teaching scholarship and discussion groups for like-minded colleagues. The University of Central Florida hosts a SoTL workshop series for faculty (http://www.fctl.ucf.edu/researchandscholarship/sotl), and Western Carolina University presents an annual summer institute on the topic (http://www.wcu.edu/8859.asp). Similarly, colleges and departments of education are home to colleagues who may be interested in collaborating with you, offering advice on previous studies and established methodologies, and engaging in ongoing discussion about SoTL (11). Take advantage of your colleagues across campus to create synergy regarding SoTL right where you work.

Many professional societies and related stakeholders are actively seeking innovative curricula and novel solutions to meet the challenges of 21st century science teaching and learning. The American Association for the Advancement of Science, American Institute of Biological Sciences, and Howard Hughes Medical Institute are just a few of the organizations bringing increased attention, creativity, and resources to science learning across the K–20+ continuum. By publishing your SoTL, you will add to the growing body of knowledge these groups can tap into to achieve these important goals.

Please direct any comments or questions on this topic to Erin Dolan at edolan@vt.edu.

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**Publishing Your Teaching Scholarship**
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## Selected Resources*

### Recommended Reading

- Allen and Tanner (2005). Includes list of relevant journals.
- Dolan (2007). Includes a list of relevant journals.
- McKinney, K. (2009). Getting SoTL articles published—a few tips. Illinois State University website, http://www.sotl.ilstu.edu/resLinks/sotlMats/getPub.shtml.
- Weimer, M. (2006). *Enhancing Scholarly Work on Teaching and Learning.* San Francisco: Jossey-Bass.
- Assembled by Illinois State University: http:// www.sotl.ilstu.edu/pubOuts/index.shtml; http://my.ilstu.edu/~sknaylor/sotl.htm.

### List of SoTL Publications

- Assembled by the International Society for the Scholarship of Teaching and Learning: http://www.issotl.org/SOTL.html#Publications.
- Assembled by University of Central Florida: http://www.fctl.ucf.edu/ResearchAndScholarship/SoTL/journals/.
- Annual Conference of the International Society for the Scholarship of Teaching and Learning: http://issotl09.indiana.edu.
- Biology Scholars Residencies, sponsored by the American Society for Microbiology. New cohorts accepted annually. http://www.biologyscholars.org.
- Online SoTL Tutorial from the International Society for the Scholarship of Teaching and Learning: http://www.issotl.org/tutorial/sotltutorial/home.html.

### Professional Development

- Teaching Professor Conference: http://www.teachingprofessor.com/conference.
- Workshop on Scholarship of Teaching and Learning at the Symposium on Student-Centered Education in Molecular Life Sciences, sponsored by the American Society for Biochemistry and Molecular Biology: http://www.asbmb.org/Page2.aspx?id=2092.

*All URLs accessed May 27, 2009.

**home**WORK ~ grassroots ideas for cultivating knowledge in your community

# Green Cures for the Summertime* Blues

What's a responsible plant scientist to do when it seems that everyone's brain cells are drying up in the hot summer sun? Well, as ever, plants and the scientists who love them are a lush resource for dealing with sticky, stultifying situations. Try suggesting these plant-minded activities to your kids, neighbors, or colleagues and help them kick the summertime blues. Although many of these options have an educational bent, mostly they're just a bit of fun.

## Tune In

Listen live, access the archives, or podcast these fun and informative shows supported by ASPB and the ASPB Education Foundation:

***The Plant Detective,*** http://www.floradelaterre.com/index.php?id=15, starring Flora Delaterre (voiced by ASPB member Beth Judy), is a series of 90-second shows featuring the worldwide adventures of Detective Delaterre as she searches for specific medicinal plants and discourses on their benefits, risks, and efficacy. A coordinated coloring book is available through the website.

***MicrobeWorld,*** http://www.microbeworld.org/look/radio.aspx, offers hundreds of unique 90-second radio episodes that highlight the process of discovery, historical changes in research, and a variety of scientific careers. Each radio feature includes an interview segment with a leading scientist in the field, including plant biology.

***A Moment of Science* (AMOS),** http://amos.indiana.edu/library/audio.html, offers two-minute radio programs on the wonders of science. Listeners learn cool facts about plant biology and many other areas of science. Site users can e-mail requests for new topics to be aired.

## Play on the Computer

***Genomics Digital Lab*** (GDL), http://www.genomicsdigitallab.com/gdl/default.cfm, is a top-notch online game set in a continually expanding interactive biological environment. It's so good, it took first place in the NSF 2008 Science & Engineering Visualization Challenge, http://www.aspb.org/newsletter/novdec08/17edsalt.cfm. GDL is part of ASPB member David Salt's *Genomics eXplorer* interactive walk-through plant cell museum exhibit. ASPB provides free online versions of three game modules that allow gamers to explore interactions in chloroplasts, mitochondria, and the nucleus at http://www.aspb.org/education/GDLProject.CFM.

***Greenseedling.com*** is a visually appealing, fun-to-navigate plant science news source that was launched in 2006 by ASPB member Jen Moon (University of Texas at Austin). Site content is written by student writers skilled at attracting readers in a Web 2.0 world. Enjoy some plant-centric news you can use or simply jump on the Fun Stuff page (http://www.greenseedling.com/fun-stuff) to play Sci-Duko or learn how to grow a glowing tomato.

***Meta!Blast*** is a 3D game being created by a research team headed by ASPB member Eve Syrkin Wurtele (Iowa State University). Dr. Clara Phyllton and her crew must save the world's last plant—a soybean—and thus the human race. But they get stuck in a soybean's cell, leaving only a lowly dishwasher in their lab to get them out and save the world. *Meta!Blast* is under development, but check out the site anyway to see what's germinating in the virtual plant world at http://www.las.iastate.edu/newnews/metablast0211.shtml.

## Watch a Movie

**Feature Films**

The "Killer Tomato" series (PG)—Make some spaghetti with red sauce and host a four-part film fest about what happens when good produce goes very, very bad:

1. ***Attack of the Killer Tomatoes*** (1978). The title *is* the plot. Fans of wacky horror movie spoofs or bad special effects will lap it up.
2. ***Return of the Killer Tomatoes!*** (1988). Mad genetic scientist Professor Gangreen creates a race of mighty tomato warriors and one tomato alpha-woman. Funnier than its predecessor, this one also features a young George Clooney.
3. ***Killer Tomatoes Strike Back*** (1990). Gangreen returns with a plot to turn "couch potatoes" into "rad tomatoes" for his evil Tomatocracy.
4. ***Killer Tomatoes Eat France*** (1991). A new strain of invasive tomatoes from Gangreen's lab is released during the crazed geneticist's attempt to take over Paris.

***Little Shop of Horrors*** (1986, PG13). In this musical comedy of kitschy horror, Seymour is a flower shop clerk and exotic plants hobbyist. As customers flock in to see an amazing specimen named Audrey II, Seymour discovers the plant needs human blood to survive. Audrey II's hunger pangs grow and so do Seymour's worries about where to get her next meal.

***Godzilla vs. Biollante*** (1989, not rated). Biollante is a huge plant monster created from the genes of a rose, a foolish scientist's daughter, and Godzilla. With Venus

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**HomeWork**
*continued from page 21*

flytrap-ish skills, corrosive juices, and off-the-charts mutation rates, Biollante is 200,000 tons of horror! Spoiler Alert: Their final battle is available on YouTube at http://www.youtube.com/results?search_type=&search_query=Final+Battle+biollante+godzilla&aq=f.

For more carnivorous plants on film, check out http://www.sarracenia.com/faq/faq1395.html. The plant perps in each film are identified by their scientific names, and commentary is peppered (sometimes using salty phrasing) with biological insight ASPB members may truly appreciate.

***Medicine Man*** (1992, PG13). A research scientist can't duplicate his methods for extracting a cure for cancer from Brazilian rain forest flora. Pressure builds as developers threaten the forest, and—even worse!—an American bureaucrat who controls the scientist's grant money arrives with demands for immediate results. The horror!

***Adaptation*** (2002, R). Screenwriter Charlie Kaufman must adapt Susan Orlean's listless novel, *The Orchid Thief.* Kaufman's script pairs Orlean with a difficult Florida man arrested for stealing a rare orchid from a wilderness preserve; sometimes funny crank-meets-swank interactions ensue. Meanwhile, Orlean and Kaufman both struggle with existential angst in real life.

***Bee Movie*** (2007, PG). Barry B. Benson is a disillusioned bee craving action outside the hive. He joins the "pollen jocks" and his adventures begin. This animated amalgamation buzzes with all the most important themes: social justice, young love, and the critical role of flowering plants in the world's survival.

## YouTube Videos

This new niche of web-based videos is designed to awaken student interest in the really cool stuff that goes on in plant biology. Plant videos for YouTube, http://www.chlorofilms.org/index.php?module=Pages&func=display&pageid=13, were developed from a contest initially sponsored by the ASPB Education Foundation's 2008 Grant Awards Program, http://www.aspb.org/education/foundation/gap.cfm, and created by ASPB member Daniel Cosgrove (Pennsylvania State University).

### GRAND PRIZE WINNER

***Fertile Eyes*** by Ela Lamblin, http://www.chlorofilms.org/index.php/crpVideo/display/videoid/44. Read **You Gotta See 'Em to Believe 'Em: Plant Biology Videos from ChloroFilms** on page 23 of this issue for full contest details and a list of winners.

### Other Short Films

***Petunias & RNA Interference (RNAi),*** http://www.pbs.org/wgbh/nova/sciencenow/3210/02.html, shows how a wayward petunia helped plant biologists unveil how RNAi molecules can provide enormously important medical treatment options. This fun and accurate cartoon video featuring ASPB member Rich Jorgenson (University of Arizona) clarifies the basics of gene expression and explains the function of RNAi—all in just 15 minutes!

***Plants-In-Motion,*** http://plantsinmotion.bio.indiana.edu/. Meditate with this site's peacefully beautiful and technically accurate images of the varied motions plants make during their life cycle. This cleverly artistic resource created by ASPB member Roger Hangarter (Indiana University) pairs well with the close-up views of plants Roger also provides at his s*L*owlife site, http://plantsinmotion.bio.indiana.edu/usbg/toc.htm.

***Purdue Agronomy Cartoons,*** http://www.ag.purdue.edu/agry/Pages/K12_books.aspx, are simple, accurate, and fun for the youngest biologists. Titles created with direction from ASPB members Susan Cunningham and Sherry Fulk-Bringman include *Travels of Bob, the Soil Bacterium; Freddy's Friends;* and *Splish-Splash—The Adventures of a Water Drop.* Print versions and follow-up puzzles are also available at the site.

## Get Lost in a Good Book

### Picture Books

***A Plant Called Spot,*** by Nancy J. Peteraf and Lillian Hoban, demonstrates that plants *are* pet worthy.

***Plantpet,*** by Elise Primavera. Really, they are!

***Jack and the Beanstalk,*** by Steven Kellogg, is a beautiful retelling of the classic tale.

***Jack and the Meanstalk,*** by Brian and Rebecca Wildsmith, by contrast, offers a rather different perspective on the classic.

### Chapter Books for Youth

***The Plant That Ate Dirty Socks,*** by Nancy McArthur (series), shows that, pet worthy or not, some plant pets are trickier than others.

***Weslandia,*** by Paul Fleischman, proffers the wonders of a truly plant-based economy.

***Fables from the Garden*** (Hawaii), by Leslie Ann Hayashi and Kathleen Wong Bishop, is a must read for those on their way to Honolulu for Plant Biology 2009.

### General Market Fiction

***Buzzword,*** by Walton Cook, has plant biologists striving to save the world (see sidebar on page 23 for details).

***Prodigal Summer,*** by Barbara Kingsolver, explores the wild interplay among forest, farm, and human biology.

***The Family Tree,*** by Sheri S. Tepper, has sentient plants taking on global eco-disaster amid multiple human traumas.

Be sure to enjoy a few of these fun summertime diversions yourself. You're bound to be entertained and you may even find something useful for the students crowding back into your lab or classroom this fall.

*Apologies to any ASPB members in the Southern Hemisphere who have only the span of a midwinter break to enjoy these activities (or who must wait until their summer arrives to give ample time to enjoy each option).

## A Bit of Buzz on *BUZZWORD*

Alex Wyckham and his wife, Sharon, both work for CIP, Centro Internacional de la Papa (International Potato Center), in Peru. This real-life facility is one of the international agricultural centers around the world that focuses on improving production of major food crops through plant breeding, disease and insect control, and other agricultural practices. Alex is a plant pathologist, Sharon a plant geneticist. Although Alex's position deals with improving disease control, he also has had a long-term interest in using plant pathogens for a very different purpose: deliberately killing narcotic plants. Very early in the novel, Sharon and her colleagues go on an expedition and stumble upon a hidden facility run by a major drug lord. Sharon and most of her group are instantly killed, setting the novel's events into motion. Alex will have his revenge and help save the world from some of the horrors of drugs, by using plant pathogens to destroy the drugs' source.

**This review excerpt is used with permission from**
***Plant Pathology Fiction***
By L. V. Madden, Department of Plant Pathology, Ohio State University, Wooster, OH 44691

BioScience 52(7):619-619. 2002
doi:10.1641/0006-3568(2002)052[0619: PPF]2.0.CO;2

# You Gotta See 'Em to Believe 'Em: Plant Biology Videos from ChloroFilms

## *Cosponsored by the ASPB Education Foundation*

On May 15, ChloroFilms announced the winners of its competition for new plant biology videos on YouTube. Cash prizes totaling over $8,000 were awarded in this first competition, which promotes the creation of fresh, attention-getting, and informative videos about plant life. The grand prize winner (with a $1,000 cash prize) is Ela Lamblin of Vashon, Wash., for his entry titled *Fertile Eyes.* Lamblin's video (http://www.youtube.com/watch?v=6pHGN04CPEM), a collaboration with Anna Edlund, combines music, dance, sensual imagery, and puns to tell the story of pollination and fertilization in plants in an unforgettable way. More from this creative team is available at http://www.lelavision.com/.

First prizes ($500 cash awards) go to Daniel von Wangenheim, of Cologne, Germany, for his entry *Fantastic Vesicle Traffic* (http://www.youtube.com/watch?v=7s RZy9PgPvg); Kris Holmes, of Rochester, N.Y., for her entry *La Bloomba* (http://www.youtube.com/watch?v=m1ag6BSzvQQ); Burkhard Schulz, of Purdue University, for his production *PSI—Are my soybeans wearing different genes?* (http://www.youtube.com/watch?v=xMKN9Q5F Jh4); and Mike Wilder, of Portland, Oreg., for his video series *The Carnivorous Syndrome in 3D* (http://www.youtube.com/watch?v=9d0_-XduCPU). In addition, 17 second prizes ($250 each) and 15 honorable mentions ($100 each) were awarded by the ChloroFilms judges. All the prize-winning videos can be viewed at http://www.chlorofilms.org.

ChloroFilms is a nonprofit collaborative project started by Dr. Daniel Cosgrove at Pennsylvania State University with initial funding from the Education Foundation of the American Society of Plant Biologists and additional support from the Botanical Society of America and the Canadian Botanical Association. 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 for and understanding of plant life and to make the best plant biology videos easy to find from its website at ChloroFilms.org.

### ASPB & ChloroFilms Proudly Present

**GRAND PRIZE WINNER**
***Fertile Eyes,* Author: Ela Lamblin**


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**ASPB & ChloroFilms Proudly Present**
*continued from page 23*

**FOUR FIRST PRIZE WINNERS**
**First Prize Technical**
*Fantastic Vesicle Traffic,* Author: Daniel von Wangenheim

**First Prize Artistic**
*La Bloomba,* Author: Kris Holmes

**First Prize General/Student Film**
*PSI—Are My Soybeans Wearing Different Genes?* Author: Burkhard Schulz

**First Prize Series**
*The Carnivorous Syndrome in 3D* (parts one, two, and three), Author: Mike Wilder

**17 SECOND PRIZE WINNERS**
**General/Student**
*Angiosperms: The Secrets of Flowers,* Author: Kate March
*Serotiny in Jack Pines (Growing Better),* Author: Chris Martine and Dave Fleming
*Photosynthesis 101: Presented by Dr. Undergrad,* Author: Thomas Miller
*Photosynthetic Peep Show,* Author: Renato Buanafina
*Mitochondria,* Author: Michelle Bell
*Sweet Home Apparatus—The Ultimate Golgi Music Video,* Author: Anne Osterrieder
*The Pines,* Author: Nancy Gabriela Santos Hernández
*The Pine Tree and the Pressure Chamber,* Author: Ken Shackel
*The Fastest Flights in Nature: A Fungal Opera,* Author: Hayley Kilroy

**Technical**
*From Flowers to Seeds,* Author: Debbie Swarthout
*Pollination Methods: Cucurbits,* Author: Karl Haro von Mogel
*The Science of Cool,* Author: Sharon Robinson
*Measuring Leaf Area with Adobe Photoshop CS3,* Author: Zach Jarou
*Resurrection Plant,* Author: Stephen Saupe

**Series**
*Fields of Study: Pepper Breeding,* Author: Karl Haro von Mogel
*Fields of Study: Switchgrass Breeding,* Author: Karl Haro von Mogel
*Fields of Study: Corn Breeding,* Author: Karl Haro von Mogel

**15 HONORABLE MENTIONS**
**General/Student**
*Foil Flower,* Author: Craig Dehner
*A Day in the Life of Jenny Artichoke,* Author: Amelia Min-Venditti
*Wild Oats,* Author: William E. Dyer
*Etiolation in Action,* Author: Joseph T. Carr
*Grassland,* Author: Amanda C. Lease
*Plants Get Sick Too!* Author: Sarah D. Ellis
*What Is Urban Forestry?* Author: Marla McIntosh
*The Science of Christmas Trees,* Author: Brady Haran
*Taxodium mucronatum chiapas,* Author: Margarita Vazquez
*Pigment,* Author: Burkhard Schulz

**Technical**
*Dying to Live: Programmed Cell Death in Lace Plant Cells,* Author: Arunika Gunawardena
*Alternative Transposition Generates New Genes by Exon Shuffling,* Author: Jianbo Zhang
*Plants and Memory,* Author: John Davis
*Plant Cell Motility and Laser Microsurgery of Cytoplasmic Strands,* Author: Franz Hoffmann
*The Legend of the Three Sisters,* Author: Justin Brigham

CALL FOR PAPERS

# *Plant Physiology*® Focus Issue on Plant Systems Biology

**Deadline for Submissions: October 1, 2009**
**To submit an article, please go to http://submit.plantphysiol.org.**

*Plant Physiology* is pleased to announce a Focus Issue on Plant Systems Biology to be published in February 2010. The issue will be edited by Jacques Joyard and Sheila McCormick. It will focus on many different aspects of plant science, ranging from collections of physiological data with quantified molecular parts lists (e.g., genes, expression levels, localizations) to abstract mathematical modeling of biological processes. This new Focus Issue aims to provide an update on the progress made in this field. Research articles that provide mechanistic insight into the regulation and function of complex systems in diverse areas of plant biology and/or interactions of plants with other organisms will be considered.

Authors interested in contributing should indicate this in their cover letter when submitting papers online at http://submit.plantphysiol.org/. Please select "Plant Systems Biology (February 2010)" from the Focus Issue list in the online submission system. Articles published within 2 years before and after the Focus Issue will be considered for inclusion in an online Focus Collection of articles relevant to the focus topic (see http://www.plantphysiol.org/cgi/content/full/142/2/379 for an editorial about Focus Collections).

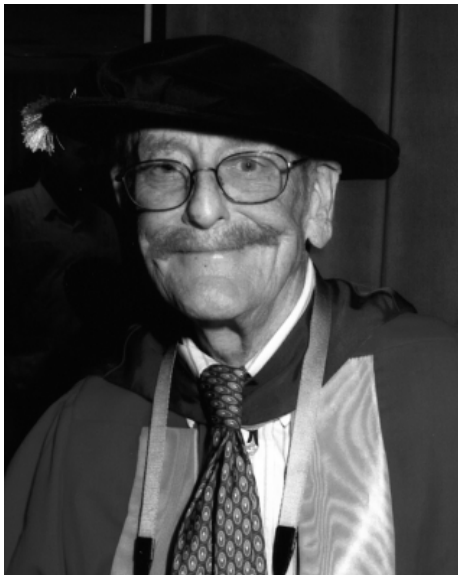
**Contact Jacques Joyard (jacques.joyard@cea.fr) or Sheila McCormick (sheilamc@nature.berkeley.edu) for more information.**

## Bernard O. Phinney

UCLA and plant biology lost an important member of their respective communities with the death of Bernard O. Phinney of heart failure on April 22, 2009, in Los Angeles. Bernie was well known to ASPB members, attending the meetings almost every year. With his red hair, beret atop his head, and a twinkle in his eye, he was always easy to spot.

Bernie was born July 29, 1917, in Superior, Wis. He attended the University of Minnesota, earning a BA in 1940 and a PhD in 1946 with botanist Ernst C. Abbe, who served as his adviser. While a PhD student, Bernie heard a seminar given by George W. Beadle, which so impressed him that he went to Caltech to work with Beadle as a postdoctoral researcher from 1946 to 1948. It was this experience that led Bernie to do the experiments that contributed in a major way toward understanding the function and metabolism of gibberellins. His observations were some of the first to show that this class of plant hormones, which affect such critical developmental phenomena as seed germination, stem elongation, and fertilization, could be understood using a biochemical genetics approach.

In 1947, Bernie was hired as an instructor at UCLA and became a full professor in 1961. It was during his early years at UCLA that he began to test the concept of linkage between phenotype and genotype. In this research, he showed that dwarf mutants of maize became tall if given an external application of gibberellin, showing that dwarfness was linked to a deficiency of this hormone. Because maize dwarfness segregates as a Mendelian recessive, the results strongly suggested that the mutation occurred in a single gene. This seminal research paper was published in 1956 in the *Proceedings of the National Academy of Sciences,* and the findings were so important that they were later incorporated into textbooks, along with the classic picture of dwarf maize before and after gibberellin treatment. A subsequent paper in 1957 in the same journal, with



Bernie Phinney

Charles A. West, Mary Ritzel, and Peter M. Neely of UCLA, identified gibberellin-like substances from a broad range of families of angiosperms. Although Japanese scientists had already discovered gibberellin production by the fungus, Bernie and his graduate student, Calvin Spector, identified a gene controlling a step in the synthesis of gibberellins by *Gibberella fujikuroi*, the causative agent of "foolish seedling disease." These two papers set the stage for Bernie's lifelong ambition of combining chemistry, genetics, and physiology to answer questions about gibberellin. He and his coworkers, many from the U.K., such as Jake MacMillan and Clive Spray, or from Japan, including Nobutaka Takahashi, Saburo Tamura, and Masayuki Katsumi, elucidated the various biochemical pathways required for the synthesis of a number of distinct gibberellins.

Bernie earned numerous awards during his career including a Research Medal from the International Plant Growth Substances Association (1982) and the Stephen Hales Award from ASPB (1984). In 1985, he was elected to the U.S. National Academy of Sciences. Bernie received a Certificate of Merit (1986) and a Centennial Award (2007) from the Botanical Society of America and was elected Honorary Foreign Member of the Japanese Society of Chemical Regulation of Plants (1988). He served as president of ASPB from 1989 to 1990, and in 2007, he was honored as a member of the inaugural class of ASPB Fellows. Bernie was awarded an Honorary DSc from the University of Bristol in the U.K. in 1989, and a Research Fellowship from the Japanese Society for the Promotion of Science in 1991. The honorary DSc degree from Bristol meant that Bernie could wear a bright red robe and black tam o'shanter with a gold tassel for academic events. Indeed, Bernie wore his red robes for every UCLA graduation that he attended.

Bernie become professor emeritus at UCLA in 1988 but continued his research and outreach activities. Well into his 90s, he came to the UCLA Plant Growth Center almost daily, continuing his quest to understand the physiology and biochemistry of plants. He spent a great deal of time both in the greenhouse and on the third floor of the life sciences building, where he moved after spending most of his career in the botany building, talking with students and postdocs, writing them letters of recommendation, telling them anecdotes about science, and dispensing advice. Maskit Maymon, who earned her PhD in Chentao Lin's lab, wrote after hearing about Bernie's death, that this is "truly a great loss. I will miss his visits to the Lin lab, his interest in my research, his philosophy on life, and his love not only for smoked salmon in particular, but also for life in general." Steve Knowles, a postdoctoral researcher in Elaine Tobin's lab, finds that he "misses Dr. Phinney greatly." Many people at UCLA miss Bernie—faculty, postdocs, and students—but also many staff members who were often the recipient of an in-bloom *Phalenopsis* or an ear-to-ear smile.

His wife Jean, four children—Scott Phinney, Katcha Burnett, Peter Phinney, and David Phinney—and eight grandchildren survive him. The Phinney family held a memorial service for Bernie at their home in Los Angeles. Contributions in Bernie's memory can be sent to the Bernard and Jean Phinney Graduate Fellowship in Plant

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## Dmitry Belostotsky

Dmitry Belostotsky died March 17, 2009. He had been an associate professor in the School of Biological Sciences, University of Missouri–Kansas City (UMKC) since 2007. At the age of 44 and in the midst of a blossoming career, Dmitry's passing shocked and immeasurably saddened his friends and colleagues in the scientific areas in which he tirelessly worked and served.

Born in Moscow, Dmitry received his MSc from Kiev State University in Ukraine and the Institute of Molecular Genetics, and his PhD from the USSR Academy of Sciences, studying under Drs. Evgeny Ananiev and Yuri Gleba. In 1990, he received a British Council Fellowship to work with Dr. David Lonsdale in the Cambridge Laboratory of the John Innes Centre for Plant Science Research in the United Kingdom. Subsequently, he was a postdoctoral fellow (1991–1995) in Dr. Richard Meagher's laboratory at the University of Georgia in Athens.

Dmitry joined the faculty of the Department of Biological Sciences at the State University of New York (SUNY) at Albany in 1995. Together with his wife and long-time collaborator, Dr. Julia Chekanova, who is currently a faculty member at UMKC, he devoted his scientific career to studying the molecular mechanisms that underlie a broad array of processes at the RNA level. His critical and perceptive scientific mind is evident from the elegant work that his laboratory has been known to produce. Notably, he beautifully combined yeast and Arabidopsis genetics and biochemistry to probe fundamental molecular processes and address the function of PolyA binding proteins (PABPs). His group used a wide variety and constantly evolving set of tools that ranged from classical to the latest systems biology approaches to uncover the intriguing connections between PABPs and nuclear dynamics.

Dmitry's major interests were in different aspects of RNA metabolism, in particular the mechanisms and functions of

Dmitry Belostotsky

polyadenylation, deadenylation, and RNA stability. Building on his postdoctoral work, Dmitry continued exploring functional specialization among Arabidopsis PABPs at SUNY Albany. Combining functional and phylogenetic analyses, his work suggested that the distinct classes of plant PABPs are ancient and that their functional specialization contributed to their conservation during evolution. He proposed that, unlike in other organisms, multiple plant PABPs function together at the posttranscriptional level to regulate growth and development.

In an elegant series of work in yeast, some in collaboration with Michael Rosbash at Brandeis University, Dmitry and Julia's team recently described a complex of four proteins that mediate posttranscriptional tethering of active genes to the nuclear periphery as well as to non-nascent mRNPs. These studies represent one of the first efforts to unravel the poorly understood nuclear dynamics of compartmentalized transcriptional and posttranscriptional processes.

Dmitry's group has been a major force behind the research on the Arabidopsis exosome, a multi-subunit 3' to 5' exonuclease complex that acts in mRNA decay in both the nucleus and the cytoplasm. In a seminal paper published in *Cell* in 2007, Dmitry's lab, in collaboration with Joe Ecker's group, used transcriptome profiling by tiling arrays not only to decipher the composition of the Arabidopsis exosome complex, but also to reveal the genomic landscape of the substrates of the Arabidopsis exosome. This provided an unprecedented view into the hidden features of the Arabidopsis transcriptome. A striking association between exosome substrates and heterochromatic loci that give rise to endogenous small interfering RNAs was discovered, suggesting a novel function of the exosome in epigenetic regulation in plants. The full value of the large body of transcriptome information revealed by this study will only be appreciated in the years to come.

Dmitry is remembered by many of his colleagues as talented in many different ways and as one of the smartest people they have encountered. Michael Rosbash commented that Dmitry was "incredibly curious and passionate about science" and his was "a rare combination of memory, intelligence, and imagination," sentiments echoed by many, including his long-time colleague Joseph Mascarenhas, who also remarked that Dima (as he was fondly called) ran a most-respected research program throughout his independent career. Dmitry was passionate about everything he believed in and never did anything halfway. This intensity was evident in the dedication he showed in organizing the Frontiers of Sexual Plant Reproduction conferences. These meetings were initiated to honor Joseph, his senior colleague, mentor, and eminent pollen biologist at SUNY Albany. Largely because of Dmitry and Julia's meticulous organization of the first two meetings in Albany, the symposium has blossomed into a centerpiece activity, a scientific forum that has considerably advanced the sense of community among colleagues in the plant reproductive biology field. As Scott Russell of the University of Oklahoma and editor of the journal *Sexual Plant Reproduction* said so well, "Dima was a great organizer for this area, and he gave extremely generously even though he was really an onlooker when it

came to gametophyte biology" (although we all remember his fascination and understanding of the topic). Scott also remembered Dima's energy as "just incredible and his understanding of our area so deep that it was clear that he could succeed on any task that we saw him try."

We also remember Dmitry in more personal ways. Ravi Palanivelu, a graduate student contemporary in the Meagher lab, remembers Dima as an inspiration and an extremely generous mentor. He is remembered for his daring personality—he never hesitated to venture into new arenas—and his demand for perfection from himself and others who worked with him made everyone better. Orna Elroy-Stein, whose collaborative study with Dima on the effect of PABPs on the performance of internal ribosome entry sites from crucifer-infecting tobamovirus was just accepted for publication weeks after Dima's passing, remembers him as a sincere, most enthusiastic and responsive collaborator, a very good friend, and someone always ready to help. Ueli Grossniklaus, who visited Dima and his family on several occasions in Albany and collaborated with him on the characterization of exosome mutants, will miss him dearly as a good friend. They had many plans for future collaborations and undertakings that are now, so unexpectedly and sadly, cut short. We also remember Dima's clever sense of humor such that one often had to think twice before understanding his witty comments. Dima was also intensely dedicated to his family: his wife Julia, whom he met in 1986 when both were graduate students, and their son Andrey, who studies at the University of North Carolina, Chapel Hill. Dima's untimely death is felt deeply among colleagues as a loss to the plant RNA metabolism and sexual reproduction fields, but it is perhaps the saddest when we ponder the loss of Dima as a friend, and remember his love and affection for Julia and Andrey.

**Acknowledgments**

We are grateful to Drs. Wenbo Ma, Joseph Mascarenhas, Scott Russell, and Michael Rosbash for comments and input on the article and many others who sent words and thoughts that we incorporated.

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*continued from page 25*

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When I remember Bernie, I remember many things, but I particularly recall his broad smile and his love for plants. He enjoyed growing ferns and orchids in his home greenhouse, but he had many other interests as well. He was enthusiastic about skiing, fishing, going out for sushi, and listening to classical music, often while driving around L.A. in his fiery red convertible with the top down. Above all, in his retirement, Bernie loved being around students. When Bernie came into my office to "bend my ear," if a student stopped by to talk, he would always end our conversation and give the student priority. "He became as good a friend, as good a master, and as good a man, as the good old city knew, or any other good old city, town, or borough, in the good old world."

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