ASPB News

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President's Letter

Thanksgiving and Giving Thanks

Sally Assmann

Although this article is slated for the January/February 2009 issue of the *ASPB News,* which means you will be reading it after the winter holidays, as I write it is just a few days since the U.S. holiday of Thanksgiving. Traditionally, although not entirely accurately, the first Thanksgiving in the New World is said to have occurred at Plimoth Plantation in New England in 1621. The celebration lasted for three days and included both Native Americans and English colonists. Despite this U.S.-centric focus, Thanksgiving is similar to many celebrations around the world in that it is a harvest festival. So, for the newsletter of a professional society in plant biology, Thanksgiving could be an appropriate lead-in to topics such as crop biodiversity, or agroecosystems, or even (in parallel with the privations faced by the early colonists), a discussion of current global food shortages.

However, another focus of Thanksgiving is on "giving thanks," and that is the focus I would like to emphasize in this article. Specifically, I would argue that it is both appropriate and important to "give thanks" to the community of plant biologists that sustains our field, and that one way to do so is to nominate individuals for ASPB awards, during the open period for nominations, which runs from January 2 through February 27, 2009.

A click on the "awards" link at the ASPB homepage (www.aspb.org) reveals 15 different ASPB awards, with a diversity of emphases. Many of the awards are not limited to members of ASPB. Please note, though, that not all of these awards are made every year; a listing of the awards that will be made in 2009 can be found in the November/December 2008 issue of the newsletter.

Several of the ASPB awards are to recognize individuals who have made outstanding research contributions to the field of plant biology. The names of many of these awards read like a partial who's who of plant biology: the Stephen Hales Prize, the Dennis Robert Hoagland Award, the Charles Reid Barnes Life Membership Award, the Charles Albert Shull Award, the Charles F. Kettering Award for Excellence in Photosynthesis, the Martin Gibbs Medal, and the Lawrence Bogorad Award for Excellence in Plant Biology.

Just in case you are a little fuzzy on the history of science, here are some tidbits on the people behind these names. The **Reverend Stephen Hales** is recognized as one of the founders of the field of plant physiology with his publication in 1727 of the text *Vegetable Staticks.* The first recipient of the Stephen Hales Prize was **Dr. Dennis R. Hoagland,** a UC Berkeley faculty member from 1927 to 1949 and a pioneer in the field of plant mineral nutrition. Hoagland's name remains immortalized in "Hoagland's solution," a complete nutritive solution for plant growth that is still routinely used. Ironically, according to Wikipedia (that source of all knowledge!), Hoagland initiated research into plant mineral nutrition to debunk exaggerated claims regarding the value of hydroponics made by Dr. William Frederick

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Gericke, also a professor at UC Berkeley and author of the book *Complete Guide to Soilless Gardening.*

The Charles Reid Barnes Life Membership Award is actually the first award that was established by ASPB, at its initial annual meeting in 1925. The award is given in honor of **Dr. Charles Reid Barnes** (1858–1910), who was a noted bryologist, the first professor of plant physiology at the University of Chicago, and the author of textbooks such as *Outlines of Plant Life, with Special Reference to Form and Function* (1900) and *Handbook of Plant Morphology: Being the Handbook of Plant Dissection* (1904).

Dr. Charles Albert Shull (1879–1962) was also a plant physiologist at the University of Chicago. Shull had seven siblings, two of whom also became life science professors: George Shull was a professor of botany and genetics at Princeton, and Aaron Shull was a professor of zoology at the University of Michigan. Charles Shull was the first president of ASPB (then ASPP, the American Society of Plant Physiologists) and also was the first editor in chief of *Plant Physiology,* from 1925 to 1945. The words of Dr. Shull in the foreword to the first issue of *Plant Physiology* seem as relevant today as they were more than 80 years ago: "Research in plant physiology must proceed in two general directions. It must continue to spread out into the practical fields of human service, such as agriculture, horticulture, agronomy, ecology, pathology, forestry, climatology, and medicine. At the same time it must constantly delve more deeply into the problems of developmental metabolism under the leadership of physiologists well trained in the methods of biophysics and biochemistry."

Like Charles Shull, **Charles F. Kettering** (1876–1958) was also a midwestern farm boy, which probably influenced his interests in photosynthesis. He founded and led a photosynthesis laboratory at Antioch College, where he worked with plant physiologists, physicists, and chemists to demonstrate the existence of different forms of chlorophyll, a research topic later expanded by C. Stacy French at the Carnegie Institution of Washington at Stanford. However, Kettering was truly a Renaissance man. After his wife succumbed to cancer, he developed equipment to produce X-rays, in order to test whether radiation treatment could be used as an effective therapy against cancer. Kettering helped found the Memorial Sloan-Kettering Cancer Center in New York City, recognized today as one of the premier centers for oncology research and treatment worldwide.

If you Google Charles F. Kettering, yet more evidence of his multifaceted talents surfaces. Kettering worked for General Motors as vice president for research for many years and was responsible for many innovations in the auto industry, including invention of the self starter and leaded gasoline. Perhaps we should acknowledge Kettering and his research as early harbingers of the biofuels era: one article on Kettering (Vernon, 2003) states, "In addition to his interest in growth of corn, he was amazed that plants could capture the energy from the sun and this energy would be expressed in the gasoline used in autos." In a brief biography of Kettering, Dr. Bill Kovarik (1999) writes, "they [Kettering and his GM associates, Thomas Midgley and T. A. Boyd] became interested in work on cellulose hydrolysis being performed by Harold Hibbert at Yale University. Hibbert pointed out that the 1920 USGS oil reserve report had serious implications for his work. 'Does the average citizen understand what this means?' he asked. 'In from 10 to 20 years this country will be dependent entirely upon outside sources for a supply of liquid fuels…paying out vast sums yearly in order to obtain supplies of crude oil from Mexico, Russia and Persia.' But chemists might be able to solve the problem, Hibbert said, by working on abundant cellulose waste from farm crops, timber operations and sea-weed." The article then quotes a statement from Boyd that cellulose is "readily available, it is easily produced and its supply is renewable." The interests of Kettering and his colleagues now seem eerily prophetic.

In more recent times, **Dr. Martin (Marty) Gibbs** (1922–2006) and **Dr. Lawrence (Laurie) Bogorad** (1921–2003) continued the tradition of Kettering in pioneering new discoveries in photosynthesis. Both researchers also played pivotal roles in journal editorship: Dr. Gibbs as editor of *Plant Physiology* for more than 30 years and Dr. Bogorad as chair of the editorial board of the *U.S. Proceedings of the National Academy of Sciences* from 1991 to 1995.

Although we may now look back at all of these individuals as "larger than life," it is certainly the case that plant biology has equally accomplished scientists today who would be worthy recipients of the awards that bear the names of these illustrious predecessors. But no one can receive an award if they are not nominated! For the simple nomination procedure, click on this link: http://www.aspb.org/awards/nominate.cfm. ASPB also has several awards that are not "named" but are no less important. Some of these awards are given to individuals fitting certain demographic profiles, such as the Early Career Award, made to individuals fewer than 5 years post-PhD, and the Corresponding Member award, which recognizes distinguished non-U.S. plant biologists. The Society is grateful to Pioneer Hi-Bred International for its generosity, especially given the current economic climate, in continuing to fund the ASPB–Pioneer Hi-Bred International Graduate Student Prize. (Because it's possible to parse this award name incorrectly, please note that this is not a prize restricted to international graduate students; rather, it is a prize funded by Pioneer Hi-Bred International for outstanding graduate student members of ASPB who are pursuing graduate study in plant biology at a U.S. institution.) And please don't forget to consider the ASPB SURF (Summer Undergraduate Research Fellowships; http://www.aspb.org/education/undergrad.cfm) awards to undergraduates, which provide funding toward the student's stipend and lab supplies, as well as travel funds toward attendance of the student at the next ASPB meeting (Plant Biology 2010 in Montreal).

The newest ASPB award is the "Fellow of ASPB" award. Initially proposed by Dr. Nick Carpita and approved by the ASPB Executive Committee in 2007, it recognizes individuals who are not only accomplished plant

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Plant Biology 2009

July 18–22, 2009
Hawaii Convention Center, Honolulu

Joint Annual Meeting of the American Society of Plant Biologists and the Phycological Society of America

Highlights

Six major symposia will be held in 2009:

ASPB-CSPP Joint Symposium
Crop Functional Genomics
Jeffrey Bennetzen, University of Georgia, and
Xioaya Chen, Shanghai Institute of Plant Physiology

ASPB-PSA Joint Symposium
Genomics Approaches for Systematics, Energy Metabolism, and Acclimation in Algae
Sabeeha Merchant, UCLA, and Alison Sherwood, University of Hawaii

President's Symposium
Sarah M. Assmann, Pennsylvania State University

Darwin's Legacy: Evolution and Plant Biology
Barbara Schaal, Washington University

Illuminating Plant Photomorphogenesis
Richard Vierstra, University of Wisconsin

Plant Natural Products—Chemical Evolution in Time and Space
Robert Last, Michigan State University

Key Dates

Registration and abstract submission open: **December 1, 2008**

Early Bird registration fees **(until April 24, 2009)**

Member $325
Nonmember $495
Postdoc $245
Nonmember Postdoc $365
Graduate Student $150
Nonmember Graduate Student $245
Undergraduate Student $50

For more details and to register online visit
www.aspb.org/pb-2009/

Partnering Societies

The American Society of Plant Biologists is delighted to partner with the following organizations, whose members are invited to register at ASPB member rates:

Australian Society of Plant Scientists

Botanical Society of Korea

Canadian Society of Plant Physiologists

Chinese Society of Plant Physiologists

Japanese Society of Plant Physiologists

New Zealand Society of Plant Biology

PHOTOS COURTESY OF THE HAWAII TOURISM AUTHORITY (HTA) / TOR JOHNSON

biologists, but also have given generously of their time in supporting the missions of ASPB. Such service can take many forms, including service as editorial board members; service as ASPB officers or committee members; service as organizers of ASPB meetings, symposia, and workshops; and the like.

Finally, if you would like to "give thanks" to a particular mentor whose teaching has inspired you, or to a plant biologist who has made outstanding contributions to pedagogy or curricular development, consider nominating that individual for ASPB's Excellence in Teaching Award (the award is not given this year, so please make a note to remember this for 2010!). The most recent winner of this award, Dr. Roger Hangarter, is well known to many of us for his development (with artist Dennis DeHart) of the award-winning art installation about plant biology, s*L*owlife, as well as for his innovative website "Plants in Motion" (http://plantsinmotion.bio.indiana.edu/plantmotion/starthere.html), which I, and I'm sure many of you as well, link to in classes to get undergraduates excited about plant biology.

So, in conclusion, please take a good look at the article "Call for 2009 ASPB Award Nominations" and follow the instructions to nominate the Haleses, Barneses, Shulls, and Ketterings of the present day (who, in one fortunate change from the past, are not only white males, but also women and people of color). And…thanks!

Sally Assmann
sma3@psu.edu

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SURF

ASPB Summer Undergraduate Research Fellowships (SURF)

The 2009 SURF Application Process is now open!

SURF fellowships are designed to assist promising undergraduate students in conducting meaningful research in plant biology early in their college careers. Ideally, students should conduct their 10 weeks of research the summer following their second year. Exceptionally well-prepared first-year students and third-year students who provide evidence of a strong commitment to plant biology will also be considered. Students must work with a mentor who is an ASPB member. All students (including any following nontraditional calendars or in the Southern Hemisphere) will complete their SURF research for presentation at Plant Biology 2010, held July 30 to August 5, 2010, in Montréal, Canada.

Funding

Each fellowship provides a $3,000 student stipend, $500 for mentor's lab supplies, a one-year student membership in ASPB, and a $500 travel allowance to attend the ASPB national meeting. The student must be a coauthor of an abstract registered at the conference to qualify for the travel money. Students traveling overseas or who have very limited travel resources may contact Katie Engen (katie@aspb.org) to initiate a case for additional travel funds.

Eligible Students

Application is open to all undergraduate students who are enrolled full-time and seeking a degree. International students or students following nontraditional academic calendars will have the opportunity to define their status on the application. Applicants must propose a research project to be pursued in the laboratory of a faculty mentor. Applicants may not receive other direct financial support for their research (institutional stipend, Sigma Xi Grants-in-Aid of Research, Council on Undergraduate Research Fellowship, etc.).

Selection Criteria

Competitive student applicants should have high academic achievement, strong motivation for research, skills for conducting the research, and career objectives relevant to the aims of the fellowship program.

Faculty Mentors

Students cannot apply without first securing a mentor. A mentor must be a member of ASPB and have an ongoing research program. Mentors should demonstrate a commitment to undergraduate education and research and be conducting a research program that is of high scientific merit. Mentors will actively guide the student's proposal writing and so must be secured at the onset of the project.

Need a Mentor?

Students without plant biology faculty at their home institution may apply to SURF by collaborating with a mentor at another institution. Such students are encouraged to seek a mentor by checking ASPB's Diversity Bank at http://www.aspb.org/DiversityBank/ or reviewing the list of institutions with plant biology programs at http://www.aspb.org/resourcelinks/scripts/cats2.cfm?cat=34. Further assistance for finding a mentor can be initiated by contacting Katie Engen. Contact Katie (katie@aspb.org) very early in the process (prior to writing the proposal). A mentor cannot be found at the deadline.

Proposal Evaluation

The proposed SURF project should clearly support and enhance the goals of the mentor's ongoing research program, be appropriately targeted for undergraduate work, and guarantee the student regular access to appropriate research facilities. Preference is given to proposals that demonstrate the mentor's close supervision along with the institution's financial commitment to the work.

ASPB supports undergraduates at all types of institutions. Therefore, the proposals are grouped according to the applicant's institution type within the Carnegie classification scheme. Group A is for research and doctoral universities. Group B is for all other colleges and universities. The number of proposals awarded funding in each group will be weighted according to the number of proposals received. The Carnegie Foundation has updated its system to include more classification factors. Applicants who cannot designate Group A or B can find their school's category at http://www.carnegiefoundation.org/classifications/index.asp?key=807 or select a category from the list of institutional descriptions at http://www.carnegiefoundation.org/classifications/sub.asp?key=786.

Applications

Students and their mentors can apply online at www.aspb.org/education/summerundergrad.cfm.

SURF 2009 applications will be accepted December 12, 2008, to February 27, 2009.

Questions?

Contact Katie Engen at katie@aspb.org, 301-251-0560, ext. 116.

American Society of Plant Biologists

15501 Monona Drive, Rockville, Maryland 20855-2768 • telephone 301-251-0560 • fax 301-279-2996

Dear ASPB Member:

The Center for Scientific Review (CSR) at the National Institutes of Health (NIH) has asked ASPB for some assistance. CSR would like us to help it identify senior, experienced scientists who are willing to volunteer to sit on study sections (review panels) and serve as reviewers of grant proposals submitted to the NIH.

Clearly, the NIH already recognizes that plants can often provide the most tractable experimental systems for addressing questions in basic biology (cf. those plant scientists already funded by the NIH). However, it is also clear that this point can be passed over by inadequately informed or representative study sections. Thus, we feel that the CSR's request represents an important opportunity for plant scientists, because it promises to offer us a more direct say over the projects funded by the NIH.

The CSR's parameters are straightforward. It is looking for plant scientists from around the world who

- are experienced and senior (i.e., tenured if in academia, or in positions of equivalent seniority if involved in industry or government research)
- have received substantial peer-reviewed research support (i.e., individual investigator-initiated grants in excess of $250,000) from the NIH or from other major research funding agencies in the US or elsewhere
- understand the grant review process, and
- are willing to serve as study section members.

If you meet these parameters and are interested in serving as an NIH reviewer, please download the single-row Excel spreadsheet at http://www.aspb.org/downloads/nih_csr.xls. Fill out each column in the spreadsheet row, save the file, and send it as an e-mail attachment to Diane Stassi at the CSR (RecruitReviewers@csr.nih.gov). Please pay particularly careful attention to your selection of keywords (Column J). NIH study review officers make extensive use of keywords to identify reviewers, yet are often unfamiliar with plants. So including broad phrases (e.g., "plant physiology," "plant biochemistry," or "plant molecular biology") along with more specific phrases is recommended. For a list of study sections (Column K), please see http://www.csr.nih.gov/Roster_proto/sectionI.asp, although please note that it is not required to identify specific study sections.

Thank you for your attention.

Sarah M. Assmann
President, ASPB

C. Robertson McClung
Past President, ASPB

Tuan-hua David Ho
President-elect, ASPB

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How to Choose a Mentor

by Jane F. Reckelhoff

Professor in the Department of Physiology at the University of Mississippi Medical Center ; jreckelhoff@physiology.umsmed.edu

Jane Reckelhoff

Choosing a mentor is something that, as a scientist, you will do many times throughout your professional life, regardless of your scientific career stage or what career path you choose. What a mentor is, what a mentor does for you, what responsibilities the mentor has to you, what responsibilities you have to the mentor, and ethical considerations regarding the mentor/mentee relationship are subjects that will be discussed. The discussion will focus mainly on information needed by graduate students and postdoctoral fellows in choosing appropriate mentors.

What Is a Mentor?

The dictionary definition of a mentor is "an experienced and trusted advisor," "trusted counselor, guide, tutor or coach," or a "person who imparts wisdom." The term "mentor" traces back to the Odyssey of Homer in which the goddess, Athena, assumed the form of Odysseus's friend, Mentor, who was entrusted with the education of Odysseus's son, Telemachus.

Throughout your career, you will choose many mentors. Mentors will change depending on your career level, the career path you have chosen, and the specific area of counseling you need.

For example, as a new **graduate student,** you will choose a mentor who is likely to be a graduate advisor, research advisor, and thesis advisor. In this case, the mentor will provide advice in several areas, such as teaching you how to perform research, how to keep scientific records, how to observe ethics in research, how to make oral and written presentations of your work, and how to choose a postdoctoral position. The mentor will also foster your socialization with peers, particularly in the laboratory environment. In addition, the mentor may teach you how to interact with colleagues at scientific meetings, including what is appropriate dress and behavior for scientific meetings, and may introduce you to colleagues to help you begin the networking process that is so important in a scientific career. Alternatively, you may choose more than one mentor to advise you on these different areas of your career.

As a **postdoctoral fellow,** you will choose a mentor with whom you can perform research, but also someone to assist you to learn how to write research proposals, including research grants. A mentor can also help you to obtain a position after completion of your postdoctoral fellowship, whether it is an industry position, an academic position, or a non-traditional position. This may be the same person as your postdoctoral advisor or another scientist whose work you respect.

As a **young independent scientist,** you will choose a mentor who can guide you through the early start-up of your laboratory, writing your first independent Federal or foundation grant proposals, or learning what is expected of you and how to perform in an industry position. These mentors may be the same as those who have advised you as a graduate student or postdoctoral fellow or the mentor may be a new individual. In academics, as an assistant professor, you will also seek a mentor to help you with promotion and tenure issues. The mentor may also be proactive in suggesting additional funding agencies for grant submissions, such as young investigator grants or established investigator grants with which you may not be familiar or not be sure you are qualified to receive. The mentor may also help to promote you in your scientific society, such as by nominating you for society awards, committee service, and/or proposing you as a speaker in society meetings.

As a **senior scientist,** you may ask a mentor for advice on how to be head of a study section, journal editor, chair, dean, provost or president of a university, or CEO of a pharmaceutical company.

Therefore, mentors are important at all stages of your career. The mentors that you have relied on in the past may continue to be mentors in the future, but likely new mentors will be found as your career progresses and needs change. A mentor will serve as an advisor, a confidant, and a critic. Mentoring is a dynamic process and works best one on one.

What a Mentor Is Not

A mentor is not merely the person who provides money for research to be performed. This person, called a "patron" during the Renaissance, provided money to the artists of the time, exemplified by the de Medici family for Leonardo Da Vinci, but had little interaction with them on a personal or professional level. A mentor is not just a supervisor or one who oversees the dissertation or the research in the laboratory. A mentor is also not just someone who only serves as a link between the institution, the academic administration, its rules, and you. Finally, a mentor is not just a role model. However, a true mentor can be, and often is, all of these things.

What Are the Characteristics of a Successful Mentor/Mentee Relationship?

The characteristics of mentor/mentee relationships will vary depending on the personalities of you and your mentor and your

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respective needs. Similar research interests and/or work styles may promote good relationships. However, one of the key characteristics of a successful mentor/mentee relationship is trust. You have to be assured that the mentor has your best interests at heart, and that what you tell the mentor will be kept confidential. As such, the relationship between your mentor and you is exclusive and will outlive the time spent in formal training. Mentors are also often judged in light of the success of their former trainees, so your success will be important to your mentor.

The mentor may become a personal friend of yours, but this is not necessarily so, especially if you are a graduate student or postdoctoral fellow. More importantly, you and your mentor must have respect for each other and exhibit professional courtesy toward each other. There are research advisors at the graduate student or postdoctoral fellow level who do not have the personality to be a mentor outside of the bare minimum to direct research, help with manuscript preparation, and ensure minimal presentation skills. In that case, you must then find other mentors to meet your needs, either within your department or university, or perhaps via national mentoring centers, such as MentorNet.

To facilitate a strong mentor/mentee relationship, your mentor must clearly communicate his/her expectations for you. The boundaries in the relationship must be clearly stated at the outset and be consistent with each interaction. Because your mentor provides constructive criticism, the mentor must clearly explain the reasoning behind decisions that affect you, in order to allay any fears that could erode the mentoring relationship.

Finally, you and your mentor should adhere to the ethical rules accepted by the scientific community. In fact, if your mentor is also your graduate or postdoctoral advisor, then he/she will be responsible for teaching you ethical skills in various areas, such as research methods, scientific record keeping, peer reviewing, and writing. Ethics within the mentor/mentee relationship will be discussed more in detail below.

Considerations in Selecting a Mentor

As a graduate student and postdoctoral fellow, you will select a mentor who has similar research interests. The mentor should have a strong publication record and have current extramural research funding in order for you to learn how to be a successful scientist in a very competitive scientific community. Ideally the mentor should have national recognition.

Often graduate students or postdoctoral fellows do not choose junior faculty for mentors because they are less well known. However, if the junior faculty member is extramurally funded and was well-trained, the choice of a junior faculty member as a mentor is often beneficial for both of you. The junior investigator may have more time for mentoring than a senior investigator who may delegate interactions with you to senior technicians or postdoctoral fellows in the laboratory.

Consideration of a mentor should include university rank and tenure status. In addition, you should be cognizant of the proximity to retirement of a senior investigator, since the mentor may be slowing down his/her laboratory efforts as retirement approaches, with the caveat that senior scientists, even those who are slowing their research efforts, make excellent mentors due to their considerable experience.

Finally, as a graduate student or postdoctoral fellow, you should choose a laboratory in which the number of other graduate students or fellows is small enough to foster consistent, on-on-one interaction with the mentor rather than a surrogate, such as a senior postdoctoral fellow or laboratory manager. Another consideration in selecting a mentor is the current positions of former mentees, since one mark of a mentor's success is perceived to be the success of former students/trainees.

Another important consideration in choosing a mentor is the mentor's personality. You should seek out information from current or previous mentees regarding their interactions with a potential mentor. Questions that should be asked include, is the mentor approachable; how does the mentor manage the laboratory; does the mentor have an "open door" policy with mentees or does the mentor require preset appointments for discussions; does the mentor have a reputation for recognizing the mentees' accomplishments rather than taking credit for them by him/herself; does the mentor promote mentees with other investigators, granting agencies, scientific societies?

Responsibilities of the Mentee to the Mentor

Within a mentor/mentee relationship, you should act in a mature and ethical manner, being cognizant of the mentor's time constraints and professional demands. Honesty is a major component in the mentor/mentee relationship for both parties. You should maintain open communication with your mentor, and be proactive in your training and education, seeking out the mentor for advice instead of waiting for the mentor to come to you. This said, you should devote appropriate time and energy to achieving academic excellence, such as being familiar with the scientific literature important in your field of research, developing technical skills to be able to perform the experiments, work to develop oral and written communication skills, and finally, with time and experience, learn to design experiments. You should also recognize that the mentor has a responsibility to monitor the integrity of the research, writing, and presentations.

Ethical Issues in Mentoring

The mentor/mentee relationship should adhere to the highest level of ethics and integrity. Unfortunately, because you are dependent on your mentor for such things as research funds, salary support, successful completion of a thesis project, or future positions in academics, abuses of power can occur. These can take the form of acts of commission or omission and run the gamut from minor abuses, such as not providing enough time for interaction with you, to more egregious behavior, such as prolonging thesis work to foster the mentor's agenda, or even sexual harassment. For lesser problems with the mentor, you should discuss the situation with the mentor in a nonconfrontational way. If you do not get satisfaction, you have recourse to the department chair and eventually to the dean of the graduate program if you are a student. For more flagrant violations, there will be a

grievance committee at the university that will protect your confidentiality to which you can appeal for help.

Women and Mentors

Several studies have found that women are less likely to have adequate mentoring relationships than men, and do not ask advice from professors as often as men. This may have been due in part to the low numbers of women faculty in the past, to discomfort with a man as a mentor, or due to discomfort on the part of women to ask for advice. However, this situation has been alleviated somewhat by the increased numbers of women faculty. For whatever reasons, women have not availed themselves of mentors in the past. Therefore, it is imperative that women realize that having a mentor at every level of their careers is imperative to becoming a successful scientist.

Summary

Mentors will play important roles in the careers of most successful scientists. Mentors are trusted advisors that give constructive criticism and provide information in many areas of a scientific life. Mentors will likely change throughout your career as your position changes and thus the areas of advice needed changes. Despite the fact that you gain new mentors, the relationships with the old mentors likely will continue and often grow into strong friendships.

The American Physiological Society is a member of MentorNet, which is an award-winning, free, one-on-one electronic mentoring program for graduate students, postdoctoral fellows, and early career scientists who are APS members. Mentees and mentors are matched based on their responses to several questionnaires regarding research interests, mentoring needs, time needed, etc. Once assigned, mentors and mentees are allowed to approve their matches, and once done, contact information is given to each pair. A new mentor can be assigned every 8 months. These electronic mentoring relationships are especially helpful if you are not comfortable discussing certain things with your thesis or postdoctoral advisor. APS encourages all members to participate either as a mentee or mentor in this valuable program.

The APS Career Mentoring Forum can be found at http://www.theaps.org/careers/careers1/mentor/info.htm.

Jane F. Reckelhoff, Ph.D. is a Professor in the Department of Physiology at the University of Mississippi Medical Center in Jackson, MS. She received a B.S. in Chemistry from the College of William & Mary, and a Ph.D. in Biochemistry from the Medical College of Virginia/Virginia Commonwealth University in 1985. She did two postdoctoral fellowships, one at the University of Texas HSC in Dallas and the other at West Virginia University. In 1991 she received her appointment as Assistant Professor in the Department of Physiology & Biophysics at the University of Mississippi, followed by tenure and promotion to Associate Professor in 1996 and full professor in 2001. She is the current Chair of the APS Women in Physiology Committee.

The ASPB Women in Plant Biology Committee encourages readers to learn more about MentorNet, the e-mentoring network for diversity in science and engineering, and to consider signing up as a mentor or as a protégé. Check it out at http://www.mentornet.net/.

View past columns of Women in Plant Biology at http://www.aspb.org/newsletter/wipb.cfm.

Important Dates in 2009

February 13
Abstracts (minisymposia) deadline for Plant Biology 2009

February 27
Award and Executive Committee nominations deadline

February 27
Deadline for ASPB Summer Undergraduate Research Fellowship (SURF) applications
http://www.aspb.org/education/summerundergrad.cfm

February 28–March 2
Southern Section Annual Meeting, Doubletree Guest Suites, Austin, Texas

March 21–22
Midwestern Section Meeting, Wildlife Prairie State Park, Peoria, Illinois

April 24
Early bird registration cutoff for Plant Biology 2009

April 24
Abstract deadline for Plant Biology 2009 program book

May 1–2
Northeast Section Annual Meeting, SUNY, Plattsburgh

May 29
Executive Committee election closes

June 5
Preregistration cutoff for Plant Biology 2009

July 15–16
International Plant Science Society Summit, Honolulu, Hawaii
http://www.aspb.org/meetings/2009

July 18–22
Plant Biology 2009, Honolulu, Hawaii
http://www.aspb.org/meetings/pb-2009

September (date to be determined)
Mid-Atlantic Section Crab Feast, ASPB Headquarters
Rockville, Maryland

Membership Corner

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

Name: Clifford Louime
Title: Assistant Professor
Place of Work or School: Florida A&M University
Research Area: BioEnergy
Member since: December 2005

1. **Why has being a member of ASPB been important to you?**
   True plant biologists are a dying breed. Somehow ASPB managed to keep us well and alive. The shared networking opportunities offered by the Society not only though its website, but also through its yearly summit, are well worth fighting for. Therefore, I promise to continue my support to the Society in the years to come.
2. **Was someone instrumental in getting you to join ASPB?**
   A former ASPB scholarship recipient convinced me to join the Society two years ago. As a MAC Award recipient myself, I can attest that MAC Award recipients can be used as one of the best assets of the Society to get the word around.
3. **What would you tell colleagues to encourage them to join?**
   Because I'm a member of a minority institution, it will not take a lot of convincing from me to get my colleagues to join, due to the vast networking opportunities offered by ASPB. The Society goes the extra mile to get minority scientists, who have been and continue to be underrepresented in the sciences, involved in its multitude of activities. One of ASPB's most prominent opportunities is its Diversity Bank, which allows scientists all across the board to connect and exchange. This platform can easily be used as a recruiting tool.
4. **Have you enhanced your career using ASPB job postings or through networking at an ASPB function?**
   Not too long ago I submitted a project request under the Diversity Bank for specialized training in Bioinformatics. I got in contact with several colleagues who are now trying to make this happen for me. Thank you, ASPB, for the opportunity.
5. **Do you read print journals? If so, where do you usually read them?**
   As an ASPB member I have online access to *The Plant Cell* and *Plant Physiology*. However, for other journals that I cannot access online, I visit our library on campus.
7. **What do you think is the next "big thing" in plant biology?**
   Global warming seems to have an unprecedented detrimental effect on several crops. Higher temperatures promote new diseases and old pests in areas where they were nonexistent before. The next big thing in plant biology will have to come from a concerted effort requiring different disciplines to bring their expertise together in order to address these new and emerging challenges. Fundamental research using local nontraditional crops that have shown tolerance or resistance to pests and diseases will emerge and serve as a basis for improving commercial cultivars. We might even see a major geographical shift in cultivation of specialized crops known for a specific location.
8. **What person, living or deceased, do you most admire?**
   Nelson Mandela's ability to forgive and forget has always amazed me.
9. **What are you reading these days?**
   Obama's *The Audacity of Hope.* His compelling story of how the child of an African immigrant and a woman from Kansas managed to make it to the "big time" fascinates me.
10. **What are your hobbies?**
    Computers and sports.
11. **What is your most treasured possession?**
    I guess I can call the fact that I still have my parents one of my most treasured possessions. They are well and living together after more than 40 years of marriage. Something to shoot for!
12. **What do you still have left to learn?**
    Everything! I called my doctorate degree "a license to learn," although some might consider it a final degree.

Call for Proposals: DEADLINE JUNE 5, 2009

ASPB Education Foundation—Grant Awards Program

In this call for proposals, the ASPB Education Foundation seeks projects that address the aims of the Foundation (see sidebar) and at the same time catalyze new opportunities for ASPB members to educate the public about the importance of plant biology.

Proposals must be submitted to the Foundation by June 5, 2009. No forms are needed. Send proposals by e-mail to the Education Foundation Assistant at info@aspb.org. Include full name and ASPB member number in the body of the submitted e-mail. Attach documents in Word (.doc extension) or as PDF files. Proposal reviews will begin after the closing date. Questions? Contact Katie Engen at katie@aspb.org.

Each grant proposal should include

1. Cover page
   - project title
   - project manager's name
   - ASPB membership number
   - address, phone, e-mail, and fax
   - co-investigator name(s)
2. Project description
   - topic, purpose, and outreach impact
   - five-page limit
   - double spaced
3. Itemized budget
   - up to $30,000
   - justification for each component

Quality **GAP Proposal Samples** are available for review at http://www.aspb.org/education/foundation/gap.cfm.

Project managers from winning GAP 2004–08 projects can be found in the **Winning GAP Project Summaries** at http://www.aspb.org/education/foundation/gap.cfm.

Guidelines for the 2009 program

1. The project manager must be a current member of ASPB.
2. Proposals that leverage funds from the Foundation with support from other sources are encouraged, particularly with regard to larger grant requests.
3. No indirect costs (overhead) will be covered by the Foundation for project awards.
4. No language translations, direct publishing, or support of other foundations will be covered.
5. No projects that would more appropriately receive their money from another source, especially when that project serves a limited audience (i.e., one campus), will be covered.
6. The Foundation seeks projects with wide and/or long-term dissemination.
7. ASPB expects to have the right to the use of projects developed with grant funding.
8. Proposals are encouraged from members both within and outside the United States. Projects may serve communities from any country.
9. Projects may run beyond one year. The total funding will not exceed $30,000.
10. All recipients agree to advise future applicants who seek their consultation on developing winning proposals.

Awardees will be notified by e-mail and announced during Plant Biology 2009 in Honolulu, Hawaii, July 18–22.

ASPB's Education Foundation seeks proposals from ASPB members to support education and outreach activities that advance knowledge of and appreciation for basic concepts and contributions of plant biology.

In support of the mission of ASPB, the Education Foundation was established in 1995 to provide information and education to increase the public's knowledge about the role of plants in all areas of life.

The Foundation reaches its goals through programs that

- promote a broad understanding of the importance of plant science in providing an ongoing supply of affordable, high-quality food, fiber, and renewable resources
- provide education on the importance of plants to agriculture, medicine, the environment, and more
- make available accurate information on the latest developments in genetic modification of crops and plant biotechnology to contribute to the knowledge of plant biology among K–12 students

ASPB Member Doug Randall Appointed to Second Term on National Science Board

Seeks to Communicate and Expand the Value of Plant Biology to the Economy and Global Competitiveness of the Nation

National Science Board (NSB) and ASPB member **Douglas Randall** has been appointed to his second consecutive six-year term on the governing board of the U.S. National Science Foundation (NSF).

The NSB is composed of 24 part-time members appointed by the president and confirmed by the Senate. They are selected on the basis of their eminence in basic, medical, or social sciences; engineering; agriculture; education; research management; or public affairs.

Randall is enthusiastic about continuing his work because "the NSB is made up of talented people from across the science and engineering fields. The 24 board members are an outstanding group of dedicated people."

Focused on contributing to the synergy of the group, Randall explains, "The majority of the board members are not working at the bench or lab level, so I believe I must ensure that I provide a voice from the 'trench or bench' when we are discussing and making policy decisions."

Randall wants the science and engineering community and the public to be aware that NSF allocates almost 95% of the funds it receives to support science and engineering research and education. He believes such an effective funding mechanism shows "the incredible dedication of the people working at NSF from the bottom to the top. NSF is a truly outstanding agency and the board is dedicated to maintaining this excellence."

According to Randall, NSB will continue to encourage NSF to fund transformative research. This future-focused attitude will ensure that the directorates can continue to have the means to support excellence and creativity. He hopes that such effort will also provide a means of putting goals out there for students and postdocs to address in their most creative and bold ways.

One difficulty of funding any research is that plant biology is a part of the Directorate for Biological Sciences (BIO; where most plant biology research is funded), which is currently budgeted for a smaller increase than the other directorates. Randall explains that this budgeting decision stems largely from the perception outside NSF that *all* things BIO are funded by NIH. Of course, the current reality is that NIH will support only research that has a link to "health/biomedical," and the vast majority of BIO research is not biomedically related. Randall hopes to work with others to change this perception. He states, "It is my personal belief that the plant biology community needs to identify its grand challenge questions and then use them as a central, but not exclusive, guide to communicate the message to Congress, to the administration, and to the public."

Randall is well aware of the obstacles created by the nation's current fiscal situation. He believes that in the next couple of years, research may be perceived as a luxury by many decision makers in Washington as we try to climb out of this recession. He states, "I expect there will be very tight and reduced budgets. It will be critical that we don't lose a number of researchers during this downturn, and I see this as a major policy issue that we as a board must look at during these tight times."

When asked specifically about NSF's plans for funding high-risk/high-payoff, transformative research in plant biology, Randall commented, "Personally I would favor a separate initiative that would consider research that is potentially transformative, e.g., paradigm shifting or that could create a new field or direction of research. It need not be large—$10 million to $20 million per year across the Foundation and with a somewhat different merit review process should be sufficient to start."

According to Randall, the NSB and the Foundation also consider improving and enhancing K–20 science education, including the integration of plant biology, as critical to the future of cutting-edge research. He states, "It is a constant effort and it needs the attention of all researchers. Science and engineering education will be on the board's table constantly in the coming years."

To facilitate improvements in undergraduate education, Randall indicates that researchers should join together with the education community to address specific program needs. He also plans to keep supporting the role of expert involvement with informal science education (e.g., public understanding, science museums, exhibits), since this coordination is integral to science and to our nation's ability to remain competitive. He encourages all kinds of involvement including all researchers talking with their program directors about education issues because "we cannot separate education across the entire spectrum from excellence in research." He adds, "I think ASPB as a whole, along with efforts of individual members, has done a great job in the education arena, and the entire plant biology community must continue such involvement at all levels."

Communication is integral to involvement and improvement at any level and so Randall welcomes input from experts in the plant biology community: "I really want to hear about NSF policies that impact (positively or negatively) ASPB members' abilities to do research and do science and engineering education. Oftentimes policies have unforeseen impacts, and sometimes the 'impact' is due to a misunderstanding of the policy or to perceptions that are not there." He reminds us that since the NSB is a policy and oversight board for the Foundation (and provides advice to Congress and the administration when asked), the most valuable input is based on those things that impact the bigger picture for our community.

To share your experience and ideas with Randall, it is best to e-mail him at randalld@missouri.edu. If needed, he can be called at 573-882-4847.

Doug Randall received his BS in chemistry in 1965 from South Dakota State University and PhD in biochemistry from Michigan State University in 1970 under the mentorship of Ed Tolbert. He was an NIH postdoctoral fellow at the University of Texas–Austin with Lester Reed.

Currently, Randall is a professor of biochemistry and Thomas Jefferson Fellow at the University of Missouri. He joined the faculty in 1971 and worked as a plant biochemist in the Agricultural Chemistry Department. His research at the university has focused on plant metabolism; signal transduction; regulation of plant enzymes; and understanding the metabolic interactions between photosynthesis, photorespiration, and respiration. The characterization of the plant alpha ketoacid dehydrogenase multi-enzyme complexes, including the identification of the genes, the import and assembly of the component subunits, and the regulation of the complexes in various organelles has been a primary theme.

Randall's research team established the first plant enzyme to be regulated by reversible phosphorylation (the addition or subtraction of a phosphate group to a protein or small molecule) and verified that this biochemical switch mechanism regulates which pathway supports mitochondrial energy production during photosynthesis.

To promote research on plant protein phosphorylation and the kinases and phosphatases that catalyze this biological switch mechanism, Randall founded the Plant Protein Phosphorylation Working Group. This group is composed of more than 45 research teams across the nation. While working with plant biology colleagues at MU, Randall helped establish the Interdisciplinary Plant Biochemistry and Physiology Group in 1981. Under Randall's directorship and MU's Food for 21st Century Program, this group has grown from nine to more than 40 research teams. Randall was also active in developing the Life Sciences Center on the Columbia campus and the Donald Danforth Plant Sciences Center in St. Louis.

Randall has served on the editorial boards of Plant Physiology, Annual Reviews of Plant Physiology and Plant Molecular Biology, Protein Expression and Purification, Biochemical Archives, *and* Current Topics in Plant Biochemistry and Physiology. *He is a past officer and chair of the board of trustees of the American Society of Plant Biologists. He currently serves on the Science Liaison Committee for the Danforth Plant Science Center and works to facilitate interdisciplinary research and training.*

Randall's work has been recognized many times. He has received honors including the MU system's Thomas Jefferson Professorship in 2005, MU's William H. Byler Distinguished Professor Award, a Faculty/Alumni Award from MU, South Dakota State University's Distinguished Alumni Award, Michigan State Biochemistry Department's Alumni Award, and MU's Gold Chalk Teaching Award.

Nature Features ASPB Members Sayre and Zhang: Crop Biotechnologists Fighting World Hunger

In its December 4, 2008, issue, *Nature* highlighted top scientists whose work could have significant impact on world hunger. The full article, "Five Crop Researchers Who Could Change the World," is available to *Nature* subscribers at http://www.nature.com/news/2008/081203/pdf/456563a.pdf. Two of the scientists featured in the article are ASPB members: Richard Sayre and Zhang Jianhua.

Richard Sayre serves on the ASPB Public Affairs Committee and is the director of the Enterprise Rent-A-Car Institute for Renewable Fuels at the Donald Danforth Plant Science Center in St. Louis, Mo. (http://www.danforthcenter.org). Sayre is working with a team at the institute that is producing biofuel from algae. He also is supporting the start-up of Phycal, a renewable energy firm in Cleveland, Ohio. But it is his role as the head of the BioCassava Plus project (http://biocassavaplus.org/) that caught *Nature's* attention. The BioCassava Plus collaboration is a five-plus year, $12 million project aimed at turning cassava into a supernutritious food throughout the regions in Africa where it is a staple crop. This project, which is funded by the Grand Challenges in Global Health arm of the Bill & Melinda Gates Foundation (http://www.gcgh.org/Pages/default.aspx), involves 19 scientists on five continents. The primary objective is to reduce malnutrition among sub-Saharan Africans by delivering more nutritious, higher yielding, and more marketable cultivars of cassava. The program has six major objectives for improving traits that will enhance bioavailable levels of zinc, iron, protein, vitamin A, and vitamin E, as well as reduce quantities of toxic cyanogenic glycosides, improve post-harvest durability, and improve resistance against viral diseases.

Zhang Jianhua is a plant physiologist at Hong Kong Baptist University but still considers himself an active member of the impoverished rural community in China in which he once lived. Early experiences on a collective farm afforded Zhang the chance to study crop production at a local agricultural college. He taught himself English, and in 1985 the Chinese government sent him abroad to work in Bill Davies's lab at Lancaster University in the United Kingdom. Since then Zhang has published extensively, becoming an expert on "deficit irrigation" and "partial root zone drying," two crop management techniques that can impel a plant to devote the bulk of its nutritional resources to the grains if drought seems imminent. Zhang is now based in Hong Kong and travels throughout China helping farmers—many still living in poverty—understand how his research can be applied to improve agricultural efficiency. Zhang is highly motivated to initiate and maintain contact with farmers and other agricultural experts in China. His direct approach continues to make significant inroads to improving both water resources management and the quality of daily life and food supply for villagers across the country.

Peter Dodds (CSIRO), Jerry Glover (Washington State University), and Julian Hibberd (University of Cambridge) were the other three scientists highlighted by *Nature.* Hibberd is a member of the C_4 Rice Consortium (http://seeds.irri.org/c4rice/index.php/home), which is affiliated with the International Rice Research Institute. Members of this consortium are organizing a workshop titled C_3 to C_4: A Workshop to Evaluate Strategies for Engineering C_4 Photosynthesis into C_3 Plants on July 23, 2009, immediately following ASPB's annual meeting in Honolulu, Hawaii. The workshop will be held at the Hilton Hawaiian Village hotel. More information about Plant Biology 2009 is available at http://www.aspb.org/meetings/pb-2009/. An abstract for the C_3 to C_4 workshop can be found at http://www.aspb.org/meetings/pb-2009/C4toC3workshop.pdf.

ASPB Infuses Plant Science and Fun at 2008 Funfest

The Southern Arizona Regional Math, Science, and Technology Funfest is an annual event offering hands-on exploration of the math and science principles relevant in today's society. Funfest aims to ignite excitement in its young participants for future careers in the science, technology, engineering, and mathematics (STEM) fields. This year Ramin Yadegari, an ASPB member and University of Arizona assistant professor of plant sciences, made sure that plant biology was included in all the fun.

Ramin organized an engaging booth with the primary theme of plants and food science. He explains, "We tried to provide a hands-on opportunity for the students, their families, and teachers to understand the relationship between basic research in plant biology and food production."

Funfest's plant science experts: Ian Justus, Katy Larkin, and Ramin Yadegari.


Future plant biologists get ready for hands-on fun at Funfest.

Booth visitors explored materials from the ASPB Education Committee and studied displays from ASPB Education Foundation Grant Awards Program winner Peggy Lemaux. Peggy's displays highlight the connections between food and genetics, as well as mapping out the amazing diversity and distribution of plants in global society. The other materials included both English and Spanish versions of *The 12 Principles of Plant Biology* and a variety of interactive learning ideas for delving into these concepts.

Ramin adds, "Our booth was pretty successful—we guesstimate that we had 600 to 700 participants visiting our booth every day of the three-day event." After such a successful inaugural year, Ramin intends to bring plant biology back to Funfest in 2009. ASPB will gladly support his efforts.

Feeling infested with the fun of Funfest? Consider creating a similar outreach experience in your community. To do so, Ramin says, "it would be advisable to participate in existing events or collaborate with groups who have a broad interest in science and math education/outreach. Frequently, private sector and particularly engineering, IT, and biotech firms have a vested interest in raising public awareness about science, math, and engineering in their community by engaging local schools and community groups. Funfest was initiated six years ago and has been organized ever since by engineers at Raytheon, the largest private employer in the Tucson area." For more advice contact Ramin at yadegari@email.arizona.edu.

General information about Funfest can be found at http://www.mathsciencefunfest.org. Questions sent to mathsciencefunfest@comcast.net will reach the event staff.

homeWORK ~ grassroots ideas for cultivating knowledge in your community

You Say You Want a *REvolution**?

So you say that science education in our great nation needs improving. In fact, you say it's so weak in some areas that for students to really learn science, *you say you want a revolution. Well you know…we all want to change the world,* so hold on to that passion—we'll get to it in a minute.

In the meantime please realize that while you may be a biologist of action, some of your coauthors say that when it comes to fundamental changes in curricula, *nothing* happens quickly. In fact, *[they] tell me that it's evolution* that will bring real improvements in our schools. (And in this Year of Science, they feel pretty secure about their stance on all things evolutionary.)

Well you know…whether it's by revolution or evolution, most anyone invested in science education agrees that *we all want to change the world.* Or at least improve those areas of the world that can be impacted by high-quality plant biology education. A daunting goal for sure, but *don't you know it's gonna be alright?*

A recent *Washington Post* article, "Science Evolves in Classrooms" (October 27, 2008; http://www.washingtonpost.com/wp-dyn/content/article/2008/10/26/AR2008102601954.html), offers one reason why improvements are coming. Staff writer Daniel de Vise postulates that the 2002 No Child Left Behind (NCLB) law has revitalized an emphasis on the oft undertaught subject of science. NCLB's mandate to states to start science testing last year combined with the common state requirement of passing a biology test to graduate high school has pushed the evolution of science curricula into a higher gear. Newly inspired educators now want to revolutionize science content and teach it every day.

Of course neither legislation nor increased motivation can guarantee that science education will improve in a neighborhood near you any time soon. But there is an answer!

At this point you may be thinking, "*You say you got a real solution? Well you know… we'd all love to see the plan.*" The solution is real. And the plan involves you.

By now you're probably beginning to panic. "*You ask me for a contribution? Well you know, we're all doing what we can.…* And with classes, committees, and carpools—not to mention my research and publishing efforts—well, even though I really do care about science outreach, I'm afraid I have no plans to get involved in any curricular revolution or evolution in the near future."

All I can tell you is brother [and sister] you [don't] have to wait. As a concerned citizen who just happens to be a plant biologist, you can create change now. How? Well, you're not just a researcher or lecturer. You're a parent, grandparent, neighbor, scout leader, group instructor, school visitor, committee member, or a friend to many of these folks. Cultivate these community connections and change will come.

Become an outreach army of one. To enlist, add http://www.aspb.org/education to the Favorites folder in your browser. Now explore the site's links to research and news, plant science radio programs and podcasts, classroom-ready teaching materials (including some translated into Spanish and Chinese), and even a few interactive plant biology games. Can you find something to forward to at least one person in your Contacts list? Send it now and your first mission is accomplished.

Check back in with this column to find more simple ideas. Remember, if you do your part to revolutionize the evolution of plant science education, *don't you know it's gonna be alright? Alright, alright, alright!*

**John, Paul, George, and Ringo may never have aspired to be plant biologists, but as the Beatles singing* Revolution, *they sure prepared the soil for this musical metaphor.*

Revolution

Lennon/McCartney

You say you want a revolution
Well you know
we all want to change the world
You tell me that it's evolution
Well you know
We all want to change the world
But when you talk about destruction
Don't you know you can count me out
Don't you know it's gonna be alright
Alright Alright

You say you got a real solution
Well you know
we'd all love to see the plan
You ask me for a contribution
Well you know
We're doing what we can
But when you want money for people with minds that hate
All I can tell you is brother you have to wait
Don't you know it's gonna be alright
Alright Alright

You say you'll change the constitution
Well you know
we all want to change your head
You tell me it's the institution
Well you know
You better free your mind instead
But if you go carrying pictures of Chairman Mao
You ain't going to make it with anyone anyhow
Don't you know know it's gonna be alright
Alright Alright

Teaching Tips for Higher Education

This is the third in a series of general teaching tips for university or college instructors submitted by John Cushman (University of Nevada), member of the ASPB Education Committee. These simple ideas can help create a motivating classroom atmosphere for your students. Not only will this enhance your teaching and improve their learning, but it just may inspire a few of your students to think, *Hey, this plant science class is pretty cool.…I could see myself majoring in this!*

Tip #3: "Engage Students Through Active Learning"

Effective teaching means effective learning. Effective learning means actively engaging students in the learning process and transitioning them from passive learners to active learners. The following simple approaches can help students become more active participants in your class and improve learning outcomes.

Class attendance

- Always take attendance.
- Include a grading policy that lowers grades according to the number of class sessions missed.
- Provide materials and lecture content that the students can obtain only by attending class.

Class participation

- Count class participation toward the final grade (1).
- Post lecture outlines that the students can use for taking notes but that do not serve as a substitute for attending class (1).
- Give regular quizzes (pop or announced) before or after lectures to reinforce assigned readings or test comprehension, respectively (1).
- Give weekly in-class homework assignments that can be completed in less than 30 minutes (1).
- Engage students in the exam process by asking them to write exam questions (any format you like) with correct answers to allow students to demonstrate they have mastered course material.

Change your lecture style from passive to active

- Adopt the Socratic method of asking questions of your students during lectures.
- The following question formats (prompts or stems) can help students find correct answers:[2]
  - Description: "What is the difference between…?"
  - Purpose: "What is the function of…?"
  - Process: "How was this done…?"
  - Possibility: "What else could be done…?"
  - Prediction: "What will happen if…?"
  - Justification: "What evidence led you to…?"
  - Rationale: "What is the reason…?"
  - Generalization: "What is the same about…?"
  - Definition: "What does _____ mean?"
- Break up lectures into segments of 7 to 10 minutes and then pause to ask questions and allow students to record their answers. Alternatively, pause and ask for a show of hands of how many agree or disagree with a given question and ask a volunteer from the class to respond with an explanation (2).
- As part of outside reading assignments, ask students to submit a list of three to five questions, each with a different question stem related to the topic to be discussed at the next class meeting, which can then be used in a subsequent class. Randomly assign questions and collect responses and correct answers as necessary via discussion (2).
- Above all, exhibit passion for the topics being discussed and be intellectually stimulating to capture and retain the interest of students.

Class assignments

- Students can never have enough practice in polishing their communication and critical thinking skills. Have students complete the following assignments:
  - Use in-class brainstorming sessions to stimulate discussion and to demonstrate that cooperation within a group can create better-informed outcomes than those from a single individual.
  - Have students prepare written reports describing the "state of the art" in selected topic areas.
  - Have students write grant proposals about key topics covered in the course.
  - Have students prepare oral and written critiques of grant proposals written by fellow students.
  - Conduct mock grant panels to hone critical thinking skills. (These last three exercises tend to be more successful in graduate-level classes.)
- Replace in-class exams with take-home exams. Design exam questions so that they require in-depth reading and weighing of one alternative against another. Answering such questions increases the amount students read, the number of times they re-read, and the degree to which they engage in active processing about what is read (3).

Replace lectures with active learning activities

- In small classes have each student do an oral presentation.
- In large classes have students present group oral presentations.
- Ask students to engage in inquiry-based or problem-based leaning assignments in a specific topic area as a means of mastering the basic content in a particular topic area. This is particularly useful for laboratory courses.
- Have students work alone or in teams on

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HHMI, NSF, and AAAS Host Undergraduate Education Summit

Attendees Agree: *wonderful meeting—great group—vital mission!*

Leaders of a select group of science societies met November 19–21 at the Howard Hughes Medical Institute (HHMI) in Chevy Chase, Md., for a proactive, solution-generating meeting titled "Vision & Change in Biology Undergraduate Education: A View for the 21st Century—The Role of Disciplinary Societies." This meeting was organized by the American Association for the Advancement of Science (AAAS) and funded by the National Science Foundation (NSF) Division of Undergraduate Education (DUE) and the Directorate for Biological Sciences (BIO). In attendance for ASPB were immediate past president Rob McClung, treasurer and Education Foundation Board member Mark Brodl, Education Committee chair Jane Ellis, and executive director Crispin Taylor. This summit joins similar important events such as those developed by the American Institute of Biological Sciences (AIBS), the National Association of Biology Teachers (NABT), and the Gates Foundation for the purpose of improving undergraduate science education.

The summit featured plenary talks from leaders at AAAS, HHMI, NSF, and Project Kaleidoscope (PKAL). Representatives from each society gave five-minute presentations highlighting their work in enhancing undergraduate science education. However, the bulk of the meeting consisted of discussions in either small working groups composed of various mixtures of representatives from the societies in attendance or society-based working groups. The primary goal of the discussions was to generate ideas that will continue to shape individual and collective agendas for action. Each participating society drafted goals and strategies they will take back to their membership as options for next steps, including those serving their particular membership and those involving the community of biological science societies (see sidebar). The results from group discussions were shared and from this, overarching issues and goals were identified.

Everyone at the HHMI summit was impressed by the similarity of the issues that were identified. Such a coordinated perspective has motivated the societies to aim for synergetic progress on three overarching issues:

1. **Collaborate with other societies to ensure clear and timely communication across the profession.**
   In coordination with the ongoing conversations and other efforts spearheaded by NSF, Terry Woodin suggested that NSF would like a single "point person" per society to ensure effective communication. A list of core communicators can also be used as a way of keeping everyone informed about upcoming regional and national society meetings. Opening communication channels during the planning stage of such meetings could catalyze the introduction of education themes within the meetings, as well as interactions between the societies that support these goals.

2. **Provide professional compensation and integrated support to encourage more faculties to value undergraduate education and to adopt effective teaching methods.**
   The current consensus is that not enough institutions effectively motivate faculty to focus on undergraduate instruction. Institutions must have policies in place that convince individuals that it is rewarding both financially and pedagogically to take the time to help students develop better skills and understand more content as a result of being engaged in an active learning environment.

   There are methods already available for emphasizing the importance of work with undergraduates. Societies offer teaching awards, summer undergraduate research experiences, events at meetings to improve the undergraduates' experiences (orientation sessions, "meet and greets," undergraduate poster sessions), networking opportunities at national meetings for any faculty member interested in undergraduate teaching, and workshops for improving teaching (either as part of a main meeting or as a specialty meeting). All of these have some limited potential, and the hope is that collectively they will have some power to change attitudes.

   However, the toughest nut to crack is how to increase the value of undergraduate teaching and learning in the realms of tenure and promotion, salary, and grant getting. NSF has brought attention to education through Criterion 2's broader impact statements. But NSF is only one funding agency, and its effect is tangential on tenure and promotion committees. Faculty members make up both review panels and tenure and promotion committees. Changing their attitudes is the linchpin.

   Additionally, accreditation programs are an option for encouraging more progressive teaching. Experience will lead the way on the successes and pitfalls of accreditation, so societies should proactively share what they have established (or shelved) in this area. No discussion about accreditation is complete without keeping in mind that while accreditation leverages good opportunities, there are also some serious limitations imposed by what can be confining requirements.

3. **Revitalize and refocus introductory biology courses using student-centered active learning.**
   This issue was the "biggie" of the meeting. Dissatisfaction with the introductory biology experience seemed to be on everyone's mind. It was not hard to derive

two main components from this dissatisfaction:

a. Content-Driven Courses: In our information age, content is an ever-expanding proposition. The excitement of science we know as scientists can't be captured by survey courses.

Courses at the introductory level must excite students about each of the subdisciplines and provide them with skills and some core knowledge that underpins all of biology. This is critical to inspire interest and to help students clarify which area of biology they may wish to pursue.

There was great enthusiasm for introductory courses that emphasize process over content. One insight from the meeting suggested process *as* content. Any content brought to the course should make process come alive, but there should be no overt effort to "cover" all of biology. Content coverage can come in subsequent courses as necessary. The primary goal is to ignite deep interest in biological science.

To identify what biological processes and principles transcend the disciplines, our societies could independently solicit from our membership their view of the discipline. For example, the American Society for Biochemistry and Molecular Biology (ASBMB) will develop and disseminate a list of core skills and knowledge that are related to biochemistry and molecular biology and filter the list through the membership present at their national meeting (April 2009) to gather feedback and ensure maximum buy-in. If each society could do something similar (or share what has already been done), a compendium of these inventories could be created. It would be the foundations from which institutions and individuals would build a meaningful introductory biology experience as well as biology

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A PROPOSED VISION FOR ASPB

Developing Undergraduate Science Education

ASPB's summit attendees incorporated their expertise, knowledge of ASPB's current and developing resources, and input from this summit to create talking points for ASPB to consider over the coming months. Rob McClung used both humor and keen analysis to present these ideas to the other summit attendees.

Vision I

A new first-year biology learning experience: meta-cognitive concept and scientific processes *as* content.

Articulate education goals—desired outcomes/competencies in plant biology and in biology from a plant perspective (transpiration sucks, dude!).

Suggestions to Consider, Evaluate, and Revise

- Appoint ad hoc committee (February 2009)
- Survey the membership (March)
- Filter feedback; draft the curriculum (April/May)
- Share with larger community (NSF meeting in June)
- Share with ASPB (July in Hawaii)

Create or collaborate on an online toolkit.
It is not yet clear whether the pending revamp of the BEN portal will add sufficient heft and flexibility to accomplish these challenging goals, but given BEN's strengths and current adherents, it seems like a good place to start.

Suggestions to Consider, Evaluate, and Revise

- Define architecture, functional specs, and management structure for toolkit (12 months)
- Program toolbox; solicit modules; begin to populate (24 months)
- Launch (36 months)
- Tools might include illustrative videos, animations, clicker questions, images, lab materials, lab exercises, demos, case studies, problem-based learning approaches, think/pair/share

Vision II

Increase intercalation of undergraduate education into Society's activities.

Suggestions to Consider, Evaluate, and Revise

- President's letter in *ASPB News* (early 2009)
- Annualize Excellence in Teaching award (effective 2010)
- Add "Criterion 2" to abstracts (done) and to plenary lectures (2010?)
- iBioSeminars—Public lectures in plant bio (coming)
- Active mentoring of (undergraduate) plant biologists (coming)

One Idea for Enhancing Criterion 2 Impacts

ASPB could launch an experiment aimed at increasing the profile of the broader impact of the research done by plant biologists. A sample announcement could include: "As a symposium speaker we offer you the opportunity to add an additional five minutes to your talk to discuss how your work has impacted science education in the broader context. This time should not be used to present more data or research findings. It is a mechanism to disseminate outcomes such as classroom/teaching laboratory implementation of your work, outreach to K–12 students, or general science education."

Education Summit
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courses for nonmajors. To make the compendium transcendent, it would be best to have the processes and principles abstracted to their most fundamental forms.

The processes for properly using technology also must be incorporated into undergraduate studies. For example, it is increasingly important to teach students how to construct intelligent search strings and make smart choices about which results to accept when using the vast and instantly accessible glossary–dictionary–encyclopedia known as the Internet.

b. Textbooks: They are encyclopedias better used as references than as foundations for courses. As "supportive material," textbooks are less supportive than they should be.

Textbooks were seen as limiting the potential for building such courses because their narratives are too constraining. People supported incorporating a truly robust set of teaching resources that came straight out of the very best of what we "know" in our research societies. The BioSciEdNet (BEN;http://www.biosciednet.org/portal/) is one example of an evolving toolkit with an underlying, centrally administered architecture, funding model, and set of community standards (e.g., for peer review and content types). Ideally, toolkit users should rely on one another to contribute society-certified, of-the-moment, museum-quality teaching materials that faculty could access free of charge. To be truly useful, the toolkit's search engines would be able to identify relevant resources ranging from outstanding essays, to proven "clicker" questions, to robust lab designs and materials (there's a long list limited only by imagination), enabling a teacher to custom-assemble a course that broadly covers the fundamental biological processes, principles, and mechanisms with just enough content to build a relevant context.

Furthermore, the collection would have helpful insights about the usefulness and quality of individual resources provided by the users themselves. The portal to the toolkit should actively solicit feedback/follow up from visitors downloading resources (since it is usually not until several months later that such materials can be assessed meaningfully). Feedback would be the ultimate arbiter of what this collection provided and where/how the collection needed to improve, closing the loop and bringing to the collection the rigor of a sort of peer review. Society reputation would also help secure an interest in putting forth what is truly the best (by whatever mechanism the societies used to make that decision).

The societies all intend to continue this dialogue on these and other points raised at the meeting. The hope is that momentum will produce results to be shared at the next summit, which should occur in about six months. Readers with suggestions for progress on the many issues facing us should e-mail them to Katie Engen at katie@aspb.org.

List of Societies Invited to HHMI Summit on Undergraduate Biology

American Association for the Advancement of Science (AAAS)

American Institute for Biological Sciences

American Physiological Society

American Society for Biochemistry and Molecular Biology (ASBMB)

American Society for Cell Biology

American Society for Microbiology (ASM)

American Society of Plant Biologists

Biophysical Society

Botanical Society of America (BSA)

Ecological Society of America

Genetics Society of America

National Academy of Sciences (NAS)/ National Research Council (NRC)

National Association of Biology Teachers (NABT)

Society for Integrative and Comparative Biology (SICB)

Society for Neuroscience (SFN)

Society for the Study of Evolution (SSE)

Teaching Tips
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project-based learning assignments that explore real-world issues. Student can develop oral presentations that take opposing viewpoints (pro or con) and then conduct an in-class debate about a particular topic (e.g., benefits and risks of genetically engineered crops).

- If working with undergraduates, let them know about ASPB's Summer Undergraduate Research Fellowship (SURF). For details and a printable information sheet to hand out, go to http://www.aspb.org/education/undergrad.cfm.

Endnotes

1. Ives, S. *A Survival Handbook for Teaching Large Classes.* http://www.fctel.uncc.edu/pedagogy/focuslargeclasses/ASurvivalHandbook.html#part1.
2. Drummond, T. *A Brief Summary of the Best Practices in Teaching.* North Seattle Community College. http://webshare.northseattle.edu/eceprogram/bestprac.htm.
3. Boyd, D. Association of Psychological Science website. http://www.psychologicalscience.org/teaching/tips/tips_0603.cfm.

ChloroFilms.org announces a video contest!

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Who? Anyone may enter the competition. See Contest Rules for details.

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Announcing the 10th Annual ASPB Education Booth Exhibitor Competition

Winners to present at Plant Biology 2009

The Education Committee seeks new and creative techniques, technologies, or strategies to teach plant science in the laboratory, classroom, or during outreach events.

Have you developed effective interactive tools or activities you'd like to share? The Education Committee cordially invites you to enter them in the Plant Biology Education Booth Exhibitor Competition. An emphasis on plant evolution in celebration of the Year of Science (2009) is welcome but not required.

Winners each receive a cash grant of $500 and full conference registration costs for up to three presenters at Plant Biology 2009, July 18–22, in Honolulu, Hawaii. Winners will exhibit their methods to the ASPB membership as part of the Education Booth at the conference. Awardees are expected to staff their exhibit during the entire period that the Education Booth is open.

We can't think of a better opportunity to showcase your new approaches to teaching evolution and presenting innovative methods for the plant biology classroom. We hope that you will consider submitting a proposal and will join us at the booth for these exciting exhibits!

Proposal Requirements

Include a project title. List the presenter(s') name(s) and contact information, including e-mail address. Limit proposals to four double-spaced pages. Proposals must address the following:

- State a clear rationale for the exhibit. Innovations in teaching plant evolution are strongly encouraged but not required.
- How is this presentation exciting and new? Highlight the use of innovative techniques, pedagogies, and/or technology. Describe how booth visitors will interact with your teaching innovation at the display.
- Provide a clear, detailed summary of how the exhibit will function and how visitors will access the activities. A diagram or picture would be helpful. Exhibits should take up no more than 8 feet of table space. Final layout will be coordinated with Chad Jordan, the booth organizer.
- List the equipment required for the exhibit (e.g., computers, Internet connection, DVD player, monitor). Indicate what you will provide and what you would need ASPB to provide. We will make every effort to meet your needs.
- Submit your proposal as an e-mail attachment (Word or PDF) to Education Committee member Chad Jordan at chad_jordan@ncsu.edu. The proposal deadline is **midnight March 14, 2009.** Winners will be notified by April 9, 2009.

For an overview of Educational Highlights and Education Booth Exhibits from last year's meeting, go to the September/October 2008 issue of the *ASPB News*.

The ASPB Education Committee

Passionate Geneticist, Teacher, and Encyclopaedist

The proof of being a classic is that nobody reads it anymore in original, although it is frequently cited and even more frequently misquoted. Some of the perceptions proceed like funeral corteges from author to author; everybody sidesteps the statements and adds some new twists to the myths. Arabidopsis is not an exception to the general situation. There is an essential difference, however, between knowing things and knowing about them.

—G. P. Rédei, 1992

George P. Rédei (1921–2008)

Over the 50 years of his scientific career, George P. Rédei retained his passionate love of genetics and Arabidopsis, his favorite research tool, which found its way into the pantheon of genetic models with fully sequenced genomes after a period of neglect. In shaping the future of plant science, Rédei was one of the most influential geneticists. With his outstanding research papers and recurrent reviews, he persuaded the younger generation of molecular biologists to focus their research on Arabidopsis in the 1980s.

George Rédei was born in Vienna (June 14, 1921, to Kálmán and Margit Rédei), but he grew up in Hungary. His father was an agronomist of a large estate and published studies on hybrid vigor in maize. After finishing high school, the "Benedictine Real Gymnasium" in Pápa, Rédei registered at the College of Agriculture at Magyaróvár, the alma mater of his father, in 1941. However, World War II interrupted his studies. In 1943 he was deported as a forced laborer to a work camp. Luckily he escaped, but upon wandering home, he found that the war took away his beloved parents and brother. As he remained completely alone, he cultivated the family's land to earn money to finish his agronomy studies and survive the post-war famine. The new Stalinist regime confiscated his farm. In 1951 he moved to Budapest, where he worked in a nursery with the eminent geneticist Vilmos Teichmann. In 1953 he received a student award to prepare his

PhD thesis at the Institute of Genetics of Hungarian Academy under the supervision of Barna Györffy. In 1949 Györffy received the highest state award, the Kossuth Prize, but was soon denunciated as he and most of his students, including Rédei, resisted implementing the official Lysenkoist doctrines in their research. Thus, Rédei's PhD work had to focus on practical breeding problems such as studying the inheritance of tomato fruit weight, hybridization of rye with *Triticum turgidum* and *T. durum,* and establishment of a tissue culture system for embryo rescue of endosperm deficient *Triticale* hybrids. In 1953 he married Magdolna M. Rédei ("Magdi"), who helped him in completing his PhD and with many experiments throughout his life.

In 1955 the political control of research weakened and Rédei began to search for a better experimental tool that would facilitate his biochemical genetic studies. He read publications by Friedrich Laibach, who managed to regenerate flax embryos. However, Laibach favored Arabidopsis for genetic studies, as this plant had only five pairs of chromosomes, a short life cycle, and high seed yield and could be easily crossed and cultivated in vitro. Furthermore, Laibach's collaborator, Erna Reinholz, succeeded in inducing mutations by X-radiation in Arabidopsis in 1947. Rédei obtained some seed from Laibach and soon shared his opinion that Arabidopsis was indeed well suited as a model for plant genetic studies. In 1956, after Rédei moved to the Agricultural Research Institute in Martonvásár and started X-ray mutagenesis with Arabidopsis, an uprising broke out in the country. As it was not clear how "Morganists" (those recognizing the importance of T. H. Morgan's genetic work on fruit flies) would be treated by the new political system, Rédei decided to leave his homeland after the Soviet army circled Budapest in November 1956.

In January 1957 Rédei received permission to emigrate from an Austrian refugee camp to the United States, where he obtained a job as assistant professor in the Department of Genetics (later Agronomy) at the University of Missouri–Columbia. In the famous "headquarters" of maize and cytogenetics, the old Curtis Hall, he inherited the former laboratory of Barbara McClintock along with L. J. Stadler's old X-ray machine and greenhouse. From 1957 to 1967, with his first students, Y. Hirono and S. L. Li, Rédei established a powerful genetic system for Arabidopsis. His most significant scholarly contributions from this period were the isolation of over 200 mutations at five genetic loci controlling thiamine biosynthesis, which represented the first examples of auxotrophic mutations in higher plants; the demonstration of allelic complementation in Arabidopsis; the characterization of unstable mutations affecting the pyrimidine pathway; the identification of nuclear loci that enhance the mutability of extranuclear genomes; the development of genetic techniques for isolation of mutant homoplastidic lines; the identification of mutations affecting flowering time (e.g., *ld, co, gi*), megaspore differentiation, male transmission, chlorophyll biosynthesis, and leaf development; and the construction of the first rough linkage map for three of five Arabidopsis chromosomes.

In the 1960s Rédei, alone in his appreciation of the extraordinary value of Arabidopsis in the United States, contacted Laibach's lab in Frankfurt and also developed interactions with all other Arabidopsis researchers in Europe and Australia. With G. Röbbelen, Rédei edited a regular newsletter, the *Arabidopsis Information Service,* and organized the first Arabidopsis conference in 1965 to celebrate Laibach's retirement and the establishment of a common stock collection. Despite publishing in *Science, Nature, Genetics,* and other high-ranking journals, the years following 1969 were very bitter for Rédei. The NSF declined funding for Arabidopsis research, whereas USDA and DOE shared the view of those breeders who believed that, despite some differences in the cost of cultivation, plant genetics could be done perfectly with maize, tomato, or wheat without a need for an Arabidopsis model. Rédei was promoted to professor in 1969 and, because of lack of funding, invested part of his salary into his experiments. Because this was not much, he also began working on theoretical aspects of genetics and writing university textbooks. One of these, the handbook *Genetics* (Macmillan, 1982), was translated into Chinese and Hungarian and used by thousands of students. Rédei's best friend, Ernie Sears, the outstanding wheat cytogeneticist, encouraged him to concentrate on other important occupations as well, such as the organization of 14 Stadler Genetics Symposia, which brought many excellent geneticists to the University of Missouri for more than three decades. In 1974 Rédei published several important papers on the mathematical theory of planning mutagenesis experiments and a fabulous compilation on the history of genetics titled "Steps in the Evolution of Genetic Concepts" (*Biol. Zentralblatt* 93:385–424). In the late 1970s he participated in a large-scale international mutagen-testing project and demonstrated the extreme sensitivity of Arabidopsis mutagen assay system. In 1970 and 1975 he published two seminal reviews on the genetics and biology of Arabidopsis and its value as a model system, respectively (*Bibliographia Genet.* 20:1–151; *Annu. Rev. Genet.* 9:111–27). The latter attracted particular attention because it purged a major scientific forgery of L. Ledoux and associates. These researchers reported in *Nature* that they achieved a correction of Rédei's thiamine auxotrophy mutations to wild type by soaking Arabidopsis seeds in a solution of transducing lambda phage DNA carrying the *E. coli* thiamine locus. These and related reports gave the hope for funding agencies and breeders that transformation of plants could be easily and rapidly implemented. However, a simple segregation experiment performed by Rédei eliminated these hopes, unfortunately together with the hope of better support for Arabidopsis genetics.

After the second Arabidopsis meeting in 1976, most of Rédei's European colleagues, including A. Müller, G. Röbbelen, J. H. van der Veen, and others, shifted to work with other plant species. During these dark years for Arabidopsis, Rédei was inspired by and closely followed the development of new plant transformation technologies, which used the transferred DNA (T-DNA) of Agrobacterium Ti and Ri plasmids and led ultimately to the birth of plant molecular biology. Jeff Schell, a pioneer of these developments, invited Rédei as guest professor to the Max-Planck Institute of Plant Breeding Research (Cologne, Germany) in 1986, where he established basic methods of tissue culture, regeneration, and Agrobacterium-mediated transformation of Arabidopsis. He was 66 when Arabidopsis finally entered the long-awaited triumphal path at the third International Arabidopsis meeting, organized by Chris Somerville at Michigan State University in 1987. Rédei et al. and three other laboratories reported on Agrobacterium-mediated transformation of Arabidopsis at the meeting. This opened the way to molecular studies of Arabidopsis gene functions, first using recombinant DNA constructs and later by high-frequency Agrobacterium T-DNA–mediated insertion mutagenesis. Elliot Meyerowitz, who followed Rédei's footsteps by proposing general acceptance of Arabidopsis as a plant model in genetics (*Annu. Rev. Genet.* [1987] 21:91–111), reported at the same meeting that the Arabidopsis genome size was in the range of 100–120Mb, the smallest known in dicots. Thus, it became evident that Arabidopsis was also an excellent choice for genome sequencing. The long-awaited success of Arabidopsis and an unexpected smaller grant from NSF revitalized Rédei, who asked the university authorities to prolong his active research time. He retired in 1991, but continued to collaborate as professor emeritus with the MPI in Cologne on the analysis of T-DNA–tagged insertion mutants, generation of new mutant collections, study of the T-DNA integration mechanism, and confirmation of hormonal functions of brassinosteroids. By 2006 Rédei had published 250 research papers, notes, letters, book chapters, and books. By his retirement he had deposited 6,728 specimens at the Arabidopsis Biological Resource Center.

For recognition of his life work, Rédei was elected foreign member of the Hungarian Academy of Sciences in 1990. The Arabidopsis community dedicated to him the first practical training course in Arabidopsis Molecular Genetics (1992, Cologne, supported by the European Molecular Biology Organization and European Commission) and the first handbook on Methods in Arabidopsis Research (1992). In 2004 the University of Missouri dedicated a section of its local Plant Growth Facilities to him. From 1994 to 1997 Rédei returned nearly every year to Hungary for a few months as visiting professor, teaching at the Institute of Genetics in the Eötvös Lóránd University of Budapest. In 1996 he taught as Fulbright lecturer and edited a book titled *Genetic Bases of Physiological Responses to Environmental Effects in Plants* at Pannon Agricultural University at Keszthely.

In 1996 Rédei learned practical computing from his daughter, Mari. In addition to communicating from his home in Columbia, Mo., with his beloved grandchildren, Paige, Grace, and Anne in Nashville, Tenn., Rédei used the computer to initiate a huge project based on his extremely wide and deep knowledge in genetics and other fields of biology. He collected more than 18,000 genetic concepts, 600 illustrations, and thousands of references to books and databases in a *Genetics Manual,*

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A Formative Encounter with George Rédei

In the spring of 1978 we were living in Paris, thinking about what we should do next. The writings of people like Paul Ehrlich and Norman Borlaug had impressed on us the related facts that human population growth was creating environmental problems and technology could help avert some aspects of the problem by intensifying production, thereby reducing the demand for undeveloped land. Therefore, we were thinking about how we might participate in bringing new technology to plant improvement. We spent our mornings reading in the beautiful, small library at the Institute Pierre and Marie Curie, where Antoine Danchin had graciously permitted us to visit, and our afternoons in the cafés of Paris discussing what we had read.

Just before arriving in Paris we had been playing around with a gift of EcoRI from Howard Goodman and had read a paper from Mary Dell Chilton and collaborators proposing that *Agrobacterium tumefaciens* transferred DNA into the host genome during pathogenesis. We inferred that it was going to be possible to transform plants using the Ti plasmid and began thinking about what that meant. One insight we had was that in order to exploit the emerging tools of molecular biology, plant biologists needed a better model organism for molecular genetics; something diploid and small with a rapid life cycle and a low DNA content that was suited to laboratory work. This led us to a compelling article written the year before by George Rédei for *Annual Reviews of Genetics,* extolling the virtues of Arabidopsis for plant genetics. The fact that George had been able to identify auxotrophic mutants and had good numbers for the frequency with which such mutants could be isolated was quite exciting for us because we took it as an indication that it was going to be relatively easy to isolate mutations in a wide variety of genes. During the next several months we tracked down and read as many of George's papers as we could obtain access to in the Rothschild and Institute Pasteur libraries. George's papers were extremely helpful because they had good numbers about frequencies of genetic events and detailed methods sections. On the basis of his papers, we were able to envision how to do experiments without having ever seen the plant; we were able to carry out gedankenexperiments that led us to the ideas we eventually carried to Bill Ogren's lab at Illinois.

After our money ran out, we returned to the University of Alberta, where we had both been graduate students, to wait for our visas and to write fellowship proposals to work with Bill. The graduate students had funding to invite a speaker and we convinced them to invite George Rédei and to let us be his hosts. We cannot remember how it happened, but somehow George ended up visiting for almost three days. Presumably in our enthusiasm for his work, we talked him into coming for an extended visit. We could not get enough faculty members to meet with him to fill three days, so, to our delight, we had the better part of several days with George, during which we talked through everything he knew about Arabidopsis in particular and plant genetics in general. We talked about the details of every manipulation, such as crossing the minuscule flowers, and we tested our ideas against his view of reality and feasibility. It was really a wonderful and memorable occasion—for us. We think George also enjoyed it. He was passionate about his work and had probably not experienced a level of interest in his work comparable to ours. It probably helped that we had read all of his papers that were available in the libraries we had access to. He was certainly very patient with us, and after he returned home he showered us with resources, such as the marker lines he had developed for mapping and our first M2 population, which allowed us to begin screening for mutants immediately. We think back to that time now as our micro-postdoc with George.

We never had the opportunity to spend a lot of time with George after that brief but formative encounter. However, from our correspondence and chance encounters at meetings, we had the impression that he took considerable satisfaction in seeing the explosion of Arabidopsis research and in having directly helped many of the early members of the Arabidopsis community get started. The use of the Columbia wild type (named by George for Columbia, Mo.) as the standard accession for Arabidopsis research memorializes George's founding contributions.

Chris Somerville and Shauna Somerville
University of California at Berkeley

Passionate Geneticist
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and then doubled these in a revised encyclopedic dictionary printed by Wiley in 2003. After five years of exhausting work, he finished correcting the third edition of his extraordinary lexicon, titled *Encyclopedia of Genetics, Genomics, Proteomics, and Informatics,* this past summer, which was published by Springer in two volumes covering 3,335 pages. In August he said, "It seems to me unrealistic to continue the encyclopedia because a single person cannot track any more properly the new developments in genomics, proteomics, and systems biology. The problem is that the encyclopedia gave me some meaningful work, without which I feel useless." Soon after, his health declined unexpectedly fast and he died on November 10, 2008, in Nashville.

With the passing of George Rédei, we lost a legendary geneticist and teacher who devoted his life to promoting the progress of plant genetics and, in particular, Arabidopsis research—a task that should remain our responsibility.

Contributed by Csaba Koncz
Max-Planck Institute for Plant Breeding Research

The Arabidopsis Book Posts New Content!

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

Founded by Chris Somerville and Elliot Meyerowitz, *TAB* now has more than 60 chapters online and receives nearly 100,000 full-text downloads every year.

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

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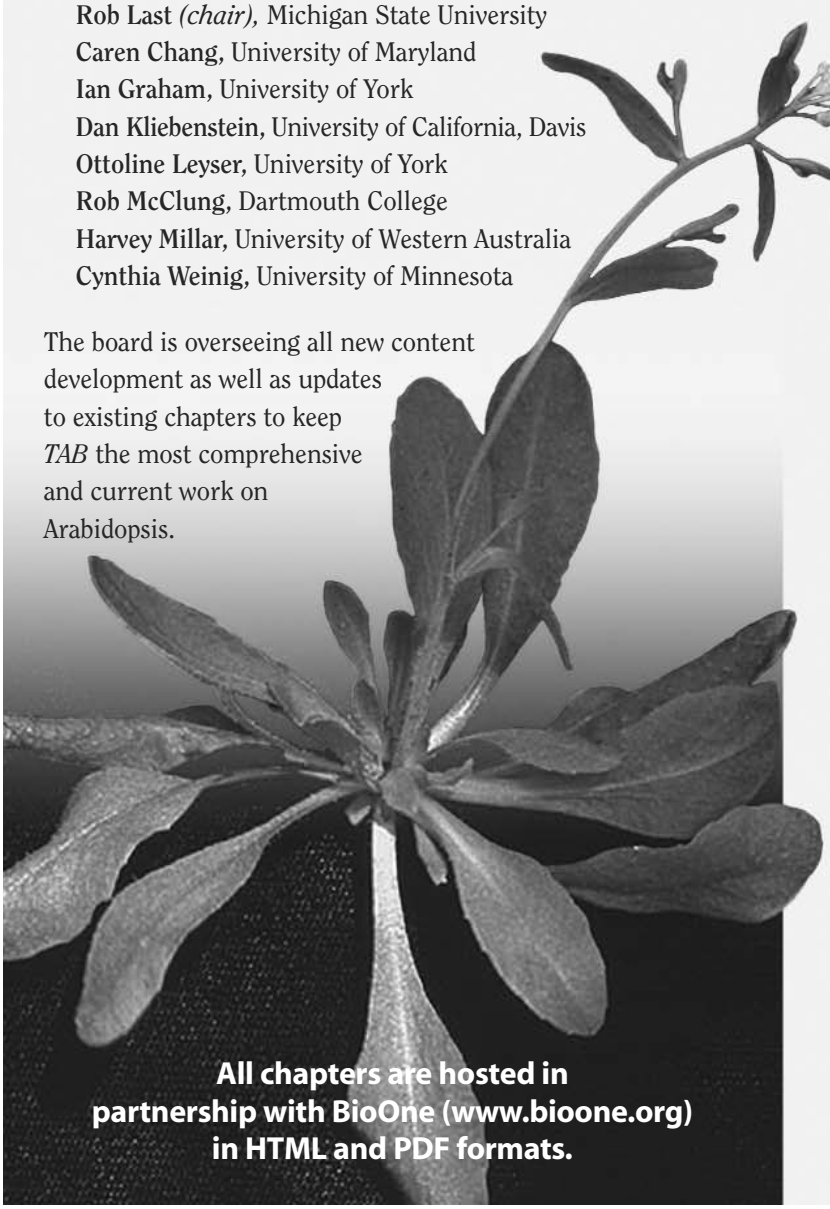

All chapters are hosted in partnership with BioOne (www.bioone.org) in HTML and PDF formats.

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New Chapters!

Seed Dormancy and Germination
Leónie Bentsink and Maarten Koornneef
December 30, 2008

The Clickable Guard Cell, Version II: Interactive Model of Guard Cell Signal Transduction Mechanisms and Pathways (update)
June M. Kwak, Pascal Mäser, and Julian I. Schroeder
November 26, 2008

Web-Based Arabidopsis Functional and Structural Genomics Resources
Yan Lu and Robert Last
October 28, 2008

Sugar Sensing and Signaling
Matthew Ramon, Filip Rolland, and Jen Sheen
October 22, 2008

The Powdery Mildew Disease of Arabidopsis: A Paradigm for the Interaction Between Plants and Biotrophic Fungi
Cristina Micali, Katharina Göllner, Matt Humphry, Chiara Consonni, and Ralph Panstruga
October 2, 2008

The Secretory System of Arabidopsis (update)
Diane C. Bassham, Federica Brandizzi, Marisa S. Otegui, and Anton A. Sanderfoot
September 30, 2008

Gibberellin Metabolism, Perception, and Signaling Pathways in Arabidopsis
Tai-ping Sun
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July 22, 2008

Two-Component Signaling Elements and Histidyl-Aspartyl Phosphorelays (update)
G. Eric Schaller, Joseph J. Kieber, and Shin-Han Shiu
July 14, 2008

Powerful Partners: Arabidopsis and Chemical Genomics
Stéphanie Robert, Natasha V. Raikhel, and Glenn R. Hicks
July 10, 2008

Mitochondrial Biogenesis and Function in Arabidopsis (update)
A. Harvey Millar, Ian D. Small, David. A. Day, and James Whelan
July 9, 2008

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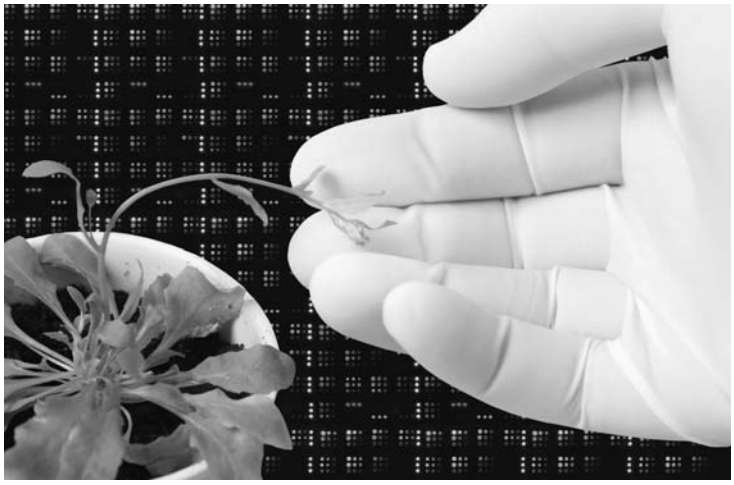

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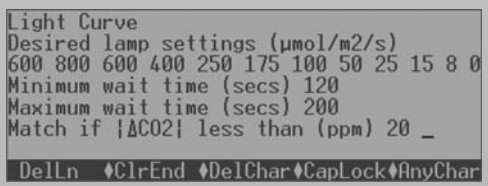

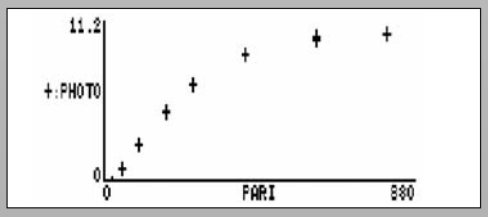

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