

ASPB News



THE NEWSLETTER OF THE AMERICAN SOCIETY OF PLANT BIOLOGISTS

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Inside This Issue

Vicki Chandler
Elected to NAS

Using the New
HighWire Portal

ASPB Welcomes New
Postdocs and Students

ASPB Exhibits at Minorities in
Science and Technology
Network Career Fair

The 2002 Get-A-Member Campaign!

Your participation in the 2002 ASPB Get-A-Member campaign is critical in helping us expand our membership ranks and in maintaining ASPB as a dynamic scientific membership organization. This year's Get-A-Member campaign goal is to recruit 1,500 new members to our Society. At this time, we're halfway there, but we still need your help!

The entire process of referring a new member is totally automated. It takes only a few minutes! We do the work for you! The bonus for your participation is that every time you refer someone, your name will be entered into a drawing to win terrific prizes, including a grand prize of **free airfare** to Plant Biology 2003 in Honolulu OR a **Nikon Coolpix 5000 Digital Camera** OR a **Cruise Certificate** for three days for two people! And, for every person you refer who actually joins ASPB, you will receive a **\$20 gift certificate** good toward membership renewal or publications. To access the online membership campaign, please direct your browser to <http://www.aspb.org/getamember/>. Remember that the more members you refer, the more chances you have to win!

The Membership Committee thanks you for participating in our Get-A-Member campaign. If you have any questions, please feel free to contact Kelley Noone, membership and marketing manager, at knoone@aspb.org.

Mark Your Calendars!

ASPB's New Specialist Conference Puts Total Focus on Plant Genetics

Get ready to immerse yourself in the gene pool! ASPB's first specialist conference, Plant Genetics 2003: Mechanisms of Genetic Variation, is set for October 22–26, 2003, at the magnificent Snowbird Resort & Conference Center in Snowbird, Utah. The event is expected to attract top plant geneticists from around the world.

Scientific symposia will focus on the effects of genetic variations on the evolution of plant form and function, plant speciation, and crop domestication. The event is designed to bring you leading-edge information in a retreat setting—offering full access to expert presenters throughout the conference.

If you're a plant genetics researcher, educator, postdoc, or graduate student, you won't want to miss this groundbreaking new meeting!

Look for full details online at <http://www.aspb.org/meetings/pg-2003/>.

Biologists Have Best Job in America

According to this year's ranking in *Jobs Rated Almanac*, the best job in the United States is that of biologist. The almanac rates jobs based on degree of autonomy, stress levels, pay, physical demands, job security, and market demand. Just a few years ago, biologists placed 23rd on the list.



ASPB Officers & Staff

CONTENTS

- 1 **Get-A-Member!**
Plant Genetics Specialist Conference
 - 3 **People—**
Chandler Elected to NAS
Keister Retires
Galston Is ISI Researcher
 - 4 **Perspectives—**
Underutilized Crops
Agent Orange
 - 6 **Membership Corner**
 - 7 **Call for Applications:**
APS Research Grants
 - 8 **Using the HighWire Portal**
 - 10 **Foothills Footnote**
 - 11 **New Postdocs and Students**
 - 12 **Public Affairs**
 - 20 **Education Forum**
 - 21 **Call for Proposals: 2003 WSSA**
Undergrad Research Award
 - 22 **New Staff**
 - 22 **Obituaries**
 - 25 **Gatherings**
 - 28 **Jobs**
- Deadline for November/December 2002
ASPB News: October 10, 2002

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Chandler Elected to National Academy of Sciences

ASPB President Vicki Chandler, a University of Arizona plant molecular biologist and geneticist known for her pioneering work in clarifying the mechanisms of gene regulation in maize, was elected to the National Academy of Sciences on April 30, 2002.

“I have top-notch people in my lab,” Chandler said, “a lot of great students. And I have had three exceptional professors as mentors along the way: Keith Yamamoto at UC San Francisco, Virginia Walbot at Stanford University, and Randy Schekman at UC Berkeley. All have been very influential in my training as a scientist.”

Chandler has spent 17 years studying the mechanisms that turn genes on and off in maize. She uses methods based on molecular genetics and classical Mendelian genetics to figure out how genes regulate one another when they communicate in the nucleus of the cell.

Chandler earned her undergraduate degree in biochemistry from the University of California at Berkeley (1978). She holds a doctorate in biochemistry from the University of California, San Francisco (1983), and was a National Science Foundation postdoctoral fellow in the Department of Biology at Stanford University from 1983 to 1985. From 1985 to 1997, she moved through the professorial ranks in the department and the Institute of Molecular Biology at the University of Oregon in Eugene.

In 1997, she continued her work at the University of Arizona, where she is a professor in the Department of Plant Sciences and a member of the Interdisciplinary Program in Genetics. She has a joint appointment in the Department



of Molecular and Cellular Biology. She was recently appointed associate director of the newly formed Institute for Biomedical Science and Biotechnology (IBSB) at the university. In addition to her research, Chandler teaches advanced genetics courses for graduate students.

Among Chandler’s numerous affiliations, she is on the board of trustees for the Gordon Research Conferences (1997–2003) and is past chair of that board. In addition to serving as president of the American Society of Plant Biologists, she is active in the Genetics Society and International Society of Plant Biology, where she served on the board of directors. She is also on the Biological Directorate Advisory Committee of the National Science Foundation.

Donald L. Keister Retires in July

Dr. Donald L. Keister, plant physiologist at the Beltsville Agricultural Research Service, USDA/ARS in Beltsville, Maryland, will retire in July after 43 years of research in plant physiology and microbiology. He is a longtime member of ASPB. He received his M.S. and Ph.D. degrees from the University of Maryland in 1959. His postdoctoral work was at The Johns Hopkins University with Dr. Anthony San Pietro. He worked with Dr. Bessel Kok at the Research Institute for Advanced Studies and then moved to The Charles F. Kettering Research Laboratory, where he worked on microbial photosynthesis. He is internationally recognized for his work on energy-linked reactions. Several original discoveries from this period included the mechanism of pyridine nucleotide reduction in photosynthetic bacteria and the utilization of inorganic pyrophosphate as an en-

ergy source for energy-linked reactions. In the area of nitrogen fixation, he co-discovered nitrogen fixation in free-living rhizobia.

He joined the Agricultural Research Service in Beltsville in 1984 as research leader of the Nitrogen Fixation and Soybean Genetics Lab (currently the Soybean Genomics and Improvement Lab) and has continued to contribute to the elucidation of symbiotic plant–microbe interactions, including the role of microbial cytochromes and cyclic b-glucans. He has contributed more than 100 peer-reviewed journal articles, book chapters, and reviews. Recently, he has served as acting associate director and director of the Plant Sciences Institute at the Beltsville Agricultural Research Center.

Dr. Keister is looking forward to more time for travel, sports, reading, and visiting colleagues and would enjoy hearing from you. You can reach him at dkeister@jhu.edu.

Arthur Galston Is ISI Highly Cited Researcher

ASPB member and former Society president Arthur Galston, Eaton Professor of Botany, Emeritus, Yale University, has been honored by the Institute of Scientific Information (ISI) as one of the most highly cited, influential researchers in the field of plant science.


Why Don't We Grow More Crops? Diversity of Crop Species and Cropping Systems

The rapid developments in agriculture in the first half of the 20th century were transformed in the second half by what became known as the “Green Revolution.” The advantages of potentially higher yielding varieties combined with better methods of growing, fertilizing, and harvesting them encouraged adoption of “Green Revolution Technology” by most farmers in the developed world. The very fact that global food production has kept pace with the demands of an increasing population is largely a credit to Green Revolution advocates and practitioners. However, the Green Revolution has not been successful everywhere, and its adoption has resulted in a loss of diversity, both in crop species and forms of management. It has also meant that we now rely on a narrow range of crop species for virtually all our global food requirements. Africa may have benefited the least from this reduction in global agricultural diversity compared to other regions where important crop species have their centers of diversity—e.g., wheat from Asia, maize from South America, and rice from Indo Burma. Africa, particularly sub-Saharan Africa, is therefore increasingly reliant on the selection and adaptation of germplasm from elsewhere in the world and by external agencies for the bulk of its agricultural production. It could be argued that the subsistence sector in Africa should seek an alternative strategy, one aimed at developing the potential of presently *underutilized* indigenous species and management systems. In many cases these species and systems have survived *despite* agricultural research and extension agencies, largely through the tenacity of the crops and commitment of the growers.

There are a number of important species that can be considered underutilized, ranging from fruits such as jackfruit to field crops such as bambara groundnut. Bambara groundnut (*Vigna subterranea* (L.) Verdc) is an indigenous grain legume grown mainly by subsistence women farmers in drier parts of sub-Saharan Africa. Its seeds can be eaten fresh (when semi-ripe) or as a pulse (when dry and mature) or can be ground into flour. Its common English name derives from the Bambara tribe that now lives mainly in Mali. However, its center of origin is thought to be from the Jos plateau and Yola regions of Northern Nigeria through to Garua in Cameroon and possibly as far as the Central African Republic. For many centuries bambara groundnut has been cultivated in tropical Africa, south of the Sahara. However, slaves also took the crop to Surinam, and it has been found in small quantities in South and Central America, India, Indonesia, Malaysia, the Philippines, Sri Lanka, and parts of Northern Australia.

Research on bambara groundnut is a rare example of a multidisciplinary, international effort to study and assess the potential of an underutilized crop. Since 1988, scientists in four European countries—United Kingdom, the Netherlands, Germany, and Italy—have joined forces with scientists, growers, traders, and consumers in Botswana, Tanzania, Sierra Leone, Swaziland, Namibia, and Zimbabwe to work on this indigenous African legume. Together, their efforts provide a comprehensive assessment of the ecophysiology, agronomy, nutritional biochemistry, agroprocessing, genetics, and market-

ing potential of bambara groundnut. The Tropical Crops Research Unit of the University of Nottingham (United Kingdom) has conducted detailed research on bambara groundnut since 1988. More details on bambara groundnut research can be obtained from Dr. Sayed Azam-Ali, University of Nottingham (sayed.azam-ali@nottingham.ac.uk), who is the director of the unit. The following web sites are also important sources of information on bambara groundnut: <http://www.genres.de/bambara> and <http://www.edv.agrar.tu-muenchen.de/pbpz/bambara/html/index.htm>.

Bambara groundnut is just one example of those underutilized species that have recently received research attention. We believe many more will, given current understanding of the need for agricultural biodiversity. Perhaps the most important achievement for those advocating the wider recognition of underutilized crops is the fact that the potential contribution of underutilized crops to food security, improved human health, and biodiversity conservation was recognized by the Global Forum on Agricultural Research (GFAR) and Consultative Group on International Agricultural Research (CGIAR) in their meetings in Germany in 2000. I have no doubt that the more people know about the importance of underutilized crop species, the more chance we stand of improving the productivity of these species. 

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Unfinished Business Agent Orange in Vietnam

From March 3 to 7, 2002, an international conference of predominantly American and Vietnamese scientists gathered in Hanoi under the auspices of the National Institute of Environmental Health Sciences (NIEHS, part of NIH) and its Vietnamese counterpart organization to examine the environmental and public health consequences of the massive use of Agent Orange during the Vietnam War. I was asked to join the American delegation, and at the end of the conference, also served as co-chairman with Vo Quy, a distinguished ecologist from the University of Hanoi, of an additional smaller convocation of appropriate botanists and environmentalists to plan for future cooperative international activities. At the end of all sessions, officials of both countries signed a memorandum of understanding, spelling out conditions under which such cooperative activities might be undertaken. These developments followed establishment of formal diplomatic relations between the two countries in 1995, and the conclusion of a trade treaty within the last year.


This meeting represented one of the first actions taken by the United States to recognize the existence of continuing problems resulting from our aerial distribution of the formulated abscission-inducing and herbicidal mixture of 2,4-D and 2,4,5-T that became known as Agent Orange. The development of such herbicides and defoliants resulted directly from fundamental investigations on plant hormones, especially auxin, performed mainly by plant physiologists. The defoliation campaign, which lasted from about 1964 to 1970, was undertaken primarily to reveal military activities along the Ho Chi Minh Trail, a network of pathways used to ferry

personnel and materiel from the North to regions of the South in which military activity was occurring. Once these activities were revealed, they were subjected to aerial interdiction. Under the code name Operation Ranch Hand, groups of four cargo planes outfitted with tanks and spraying booms would fly in formation over vast areas of upland forest and later over mangrove communities lining the estuaries below Saigon, releasing a spray of the herbicide that defoliated trees after several days. Some areas received multiple spray treatment, resulting in considerable killing.

By the time the operation was brought to a halt by President Nixon in 1970, it had become the largest chemical warfare operation in history, having covered an area equivalent to two-thirds of the state of Massachusetts. The ecological damage resulting from the operation was vast; in the upland forest regions, many valuable timber trees such as teak were killed, and the area they had occupied was taken over largely by a mixture of scrub bamboo and noxious weeds such as wire grass and Imperata grass. Mangrove communities proved remarkably sensitive to the herbicide, a single spray resulting in almost complete killing. In view of the importance of mangroves in the life cycles of fish and shellfish, one of the main protein sources for the Vietnamese people, this damage was serious. Neither mangrove nor upland forest communities have recovered substantially in the quarter century that has elapsed since the end of the war, despite energetic but poorly funded interventions by the Vietnamese.

Public health considerations became apparent after the discovery that Agent Orange was contaminated by dioxins that

arose as byproducts of the synthesis of 2,4,5-T. This herbicide is usually synthesized from 2,4,5-trichlorophenol and halogenated acetic acid under alkaline conditions. When the reaction goes as planned, the phenolic and acetic acid moieties couple to form the desired product; but when two of the phenolic moieties couple in a head-to-tail fashion, they form the unwanted highly toxic side products called dioxins, of which 2,3,7,8-tetrachloro-para dibenzodioxin (TCDD) is the most toxic. This compound is highly teratogenic and probably carcinogenic to rodents and probably humans in the parts-per-trillion range. Since the aerial spray of Agent Orange drifted over populated areas, it contaminated people, water, and food, producing still largely uncharacterized damage. It is known that soil around former airbases like Da Nang are still grossly contaminated with dangerous levels of dioxins and that various levels of TCDD have been detected in people, fish, plant materials, and soil. Obviously, there is much analytical and remediation work to be done in both the ecological and public health fields, but whether such work will be undertaken depends on the extent to which further activities will be funded by NIEHS.

It would seem appropriate for the American Society of Plant Biologists, as part of its public activities agenda, to lend active support to efforts to promote such investigation and remediation. 

Arthur W. Galston

Eaton Professor of Botany Emeritus
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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 Kelley Noone, ASPB membership and marketing manager, at knoone@aspb.org.



Name: STEPHEN EBBS

Title: Assistant Professor

Place of work or school: Department of Plant Biology, Southern Illinois University, Carbondale

Research area: Plant physiology, phyto-remediation

Member since: 1998

1. Has being a member helped you in your career? If so, how?

Being a member of ASPB has definitely helped my career. First and foremost, I have formed and maintained valuable professional relationships through ASPB meetings that have led to important collaborative opportunities. In addition, my paper and poster presentations at meetings have raised my visibility among scientific peers, which is extremely important for a young scientist like myself. Finally, I have benefited from the monetary support provided by ASPB, beginning with the complimentary membership that first introduced me to the Society, to a travel grant to present my first paper at the San Diego meeting in 2000, to other useful opportunities.

2. Why has being a member of ASPB been important?

Nearly all the scientists I hold in high esteem as experts in plant biology are

members of this Society, and my membership allows me to be considered within that elite group. Participation in ASPB events allows me to interact with these professionals and to share my work and ideas. The professional bar I've set for myself is based in no small part on the ideals reflected by the Society, its publications, and its members.

3. Was anyone instrumental in getting you to join ASPB?

My doctoral adviser, Leon Kochian, paid for my first trip to the Society's annual meeting in Madison (1998) and was probably the person who recommended me for a free membership that year. The previous year, my first year in his lab, my colleagues attended the meeting but I did not. I was admittedly jealous when I heard them talking about how good it was. When Leon took me to the meeting the following year, I finally understood what everyone was talking about. Because of this experience, I nominated two of my own students this year for complimentary memberships in ASPB.

4. What would you tell nonmembers to encourage them to join?

There are three benefits that I would stress to a potential member: contacts, opportunities, and resources. Membership and participation in ASPB meetings provide a venue to establish professional contacts, some of which you may not even realize you need until the circumstance arises. Second, these interactions and contacts will almost certainly provide important professional opportunities, including the opportunity for students and young faculty to present papers alongside established experts, travel support for meetings, and

other educational and scientific opportunities. Finally, the perks of membership, such as electronic access to *Plant Physiology* and *The Plant Cell* and online features like CiteTrack (the electronic personal research alerting service), are resources that will quickly become something that you can't believe you ever lived without.

5. Have you gotten a job using ASPB job postings or through networking at the meeting?

Although I have not gotten a job directly as a result of an ASPB posting, I think my membership and participation in ASPB had a definite impact on the search committee that hired me for my current position.

6. Have you hired anyone as a result of a job posting at the annual meeting, on our online Job Bank, or in the newsletter?

Not yet, but ASPB would be the first place I would look.

7. Do still read print journals? Where do you usually read them: work, home, library, in the car, on the bus?

All my journals are electronic, from *Plant Physiology* and *The Plant Cell* to my year-end CD-ROM copies of other society journals. When I do read papers from these journals, it is usually at home in the evening or while I'm traveling.

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

I think the next big thing in plant biology will be the effort to demonstrate the safety of transgenic plants. The justification for many scientific efforts is to understand and to increase plant tolerance, resistance, growth, and productivity for human ben-

efit. Yet large segments of the world's population resist these efforts, and we cannot yet allay all their concerns. If we are to use biotechnology to help mankind, I think we need to listen to these questions and respond accordingly, balancing caution against the world's more immediate needs.

9. What person, living or dead, do you most admire?

I would say I most admire the authors J.R.R. Tolkien and Frank Herbert. These men created entire universes in which they immersed themselves. These worlds have a magnetism of their own that continues to draw people in. The men and their creations inspire individuals to think, question, and explore for themselves—first in these fictional worlds and then in the real one. These authors had a tremendous impact on me when I was growing up and influenced the creativity and analytical abilities I use every day.

10. What are you reading these days?

I make an effort to skim through *Plant Physiology*, *Chemical and Engineering News*, and the articles picked up by CiteTrack and my e-mail alerts. We use articles from *Plant Physiology* and *The Plant Cell* every semester in a seminar course in my department, so I read those articles as well. I also reread at least one Tolkien or Herbert book each year for relaxation and inspiration.

11. Do you have any hobbies?

When I have the time, I like to read, watch sci-fi movies, and play computer games. I also try to spend as much time with my kids as possible.

12. What is your most treasured possession?

A first edition, autographed hardbound novel by Carl Sagan.

13. What do you still have left to learn?

Patience (particularly with students) and how to say no. 🌱

CALL FOR APPLICATIONS

American Philosophical Society Research Grants

Information and forms for all the society's programs (grants are not restricted to philosophy) can be downloaded from our web site, <http://www.amphilsoc.org>. Click on "Grants" on the homepage. Click on "About the APS" to learn more about the APS Research Programs.

Grants are made for research only. The society makes no grants for academic study or classroom presentation; for travel to conferences or workshops; for non-scholarly projects; or for assistance with publication or translation.

Eligibility

Applicants may be residents of the United States or American citizens resident abroad. Foreign nationals whose research can be carried out only in the United States are eligible. Grants are made to individuals; institutions are not eligible to apply. Specific requirements are given under each listing.

Application Forms

If forms cannot be downloaded from the web site, they may be requested by e-mail as Word documents or by mail; be sure to include

- indication of eligibility for the program
- nature of the research (e.g., archival, laboratory, fieldwork)
- proposed use of the funds (e.g., travel, purchase of microfilm).

Foreign nationals must state the objects of their research, available ONLY in the United States. Questions concerning the eligibility of a project or the use of funds are accepted at 215-440-3429.

Committee on Research
American Philosophical Society
104 South 5th Street
Philadelphia, PA 19106

The e-mail address for grants inquiries is eroach@amphilsoc.org; include a postal address with your query.

BRIEF INFORMATION about Franklin Research Grants Eligibility

Applicants are normally expected to have a doctorate or to have published work of doctoral character and quality. Predoctoral students are not eligible, but the society is especially interested in supporting the work of young scholars who have recently received a doctorate. The program is designed to help meet the cost of travel to libraries and archives for research purposes, the purchase of microfilm, and the costs associated with fieldwork or laboratory research expenses.

The program does not accept proposals for journalistic writing; for the preparation of textbooks or teaching aids; or for the work of creative and performing artists.

Maximum Award: \$6,000

Deadlines: October 1, December 1

Decisions are reached in late January and in March.

Information updated: May 2002

Using the New HighWire Portal

How to Find Full-Text Articles and Tailor Your Search Results

The May/June 2002 issue of the *ASPB News* introduced you to the new HighWire Library of the Sciences and Medicine Portal. The portal allows free access to research literature in the biological sciences and medicine. That's over 430,000 free, full-text research articles published by the 330+ HighWire journals, including *Plant Physiology* and *The Plant Cell*.

In this issue of the *News*, we want to tell you how to quickly find full-text articles and tailor your search results.

FINDING FULL-TEXT ARTICLES

Once you have done a search in the new HighWire portal, the search result page contains a wealth of information. Invaluable to researchers is the ability to quickly find full-text articles to which you can gain immediate online access.

We decided to search for any recent articles by Georg Jander on *Arabidopsis* cloning. Here's the URL:

```
http://highwire.stanford.edu/cgi/searchresults?andorexactfulltext=and&resourcetype=1&author1=jander%2Cg&fulltext=arabidopsis+cloning&jc_favj=pnas%2Cjbc%2Cjoces%2Cbioinfo%2Cbmj%2Csci%2Cjnrc%2Cbiosts&src=hw&disp_type=
```

The search results return a list of several articles by Jander concerning *Arabidopsis* cloning. With each citation, an image of the cover of *Plant Physiology* appears, along with links to the abstract, full-text article, and PDF. Underneath the cover image, you'll see a block of text telling you whether the article is free to you, because your institution has purchased a subscription; free, because the publisher has made the article free to anyone on the Internet; or available for purchase, which means you can pay with a credit card and get immediate access to the full text.

As a reader of *Plant Physiology* full-text articles, you'll get free access to the full text of more than 330 other HighWire-based jour-

nals used as citations in *Plant Physiology*, whether or not your institution has a subscription. That means that from the Jander articles you can link immediately to cited articles if they say [Full Text] in the online reference section.

If you'd like to know which HighWire-based journals your institution has subscribed to, go to the HighWire home page and click on Institutional Subscriptions; if you are interested in which journals make back articles free to the world, click on

Free Back Issues on the home page; and if you are interested in which journals' articles are available for online purchase, click on Pay Per View.

TAILORING YOUR SEARCH RESULTS

The search result pages in the new portal let you easily change your view of the results. Let's look at how to amend, sort, condense, investigate, and download search results.

From the Jander search results, look at the top portion of the search result page to see your available options. The top section of the page makes it easy to adjust your result:

- **Amend the result:** Your search terms are pre-entered for you in the Quick Search box. You can add or replace terms there and click "go" or change the scope of your search from (as shown in this example) the 330+ highly cited journals whose full text is found at HighWire, to include all of the journals found in MEDLINE.

The screenshot shows the HighWire search interface. At the top, there's a navigation bar with links like Home, Search, My Email Alerts, For Institutions, For Publishers, About, Contact, and Help. Below that, a search box contains 'jander, g' in the Author field and 'arabidopsis cloning' in the Keyword field. There are radio buttons for search filters: 'In My Favorite Journals', 'In HighWire-based journals', and 'In HighWire-based journals + Medline'. The search results section shows two entries from *Plant Physiology*. The first entry is 'BREAKTHROUGH TECHNOLOGIES: Arabidopsis Map-Based Cloning in the Post-Genome Era' by Georg Jander et al. The second entry is 'PLANTS INTERACTING WITH OTHER ORGANISMS: Signals Involved in Arabidopsis Resistance to Trichoplusia ni Caterpillars Induced by Virulent and Avirulent Strains of the Phytopathogen Pseudomonas syringae' by Jianping Cui et al. Each entry includes a small image of the journal cover and a 'this article is FREE to you why?' badge. To the right of the search results, there's a 'For checked items:' section with radio buttons for 'View abstracts in new window' and 'Download to citation manager', and a 'Submit' button.

- **Sort the result:** The default sort for the search engine shows you "best matches," meaning those articles in which your search terms showed up most frequently. Clicking on "newest first" will reorder your search result by date.

- **See more per page:** By default, the search engine shows you 10 items on each page. You can ask for 25, 40, 60, or 80 results per page by clicking on the appropriate number.

- **Condense the result:** The standard form for each citation provides a lot of information, such as a full list of authors, full citation information, which section of a journal an article is in, whether the article is a review, and so on. The "condensed" option displays all the basic citation information you'd find in a reference list and takes up only a quarter of the space!

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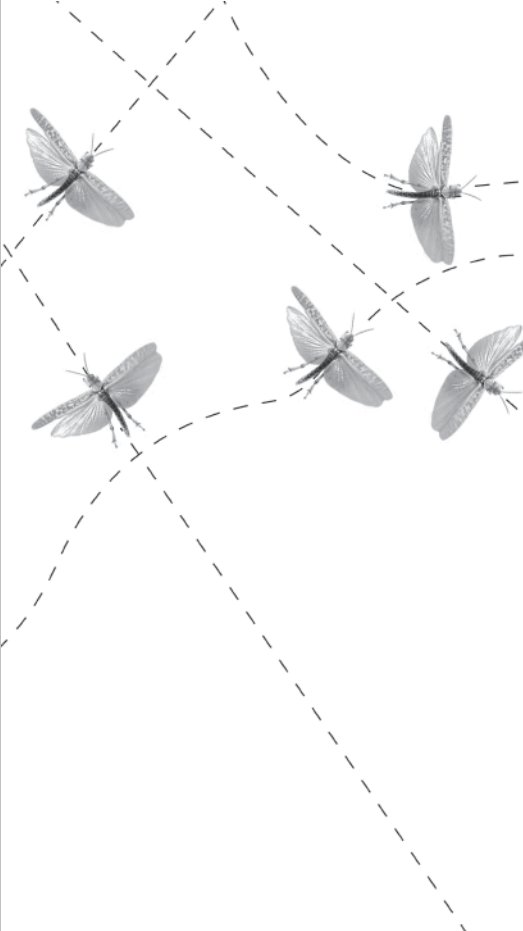
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vided to be sure everything is set up for an automatic transfer. You can also download an individual article’s citation/abstract to a reference manager when you are viewing it in a HighWire-based journal site, including *The Plant Cell* and *Plant Physiology* (look for the “Download to Citation Manager” link in the right-hand content box when viewing the abstract or full-text of the article).

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citations will come up in a separate window. Each abstract includes a full citation and a link to full text. As you review pages of search results, you can accumulate possible candidate articles to evaluate further by checkmarking them. Then you can read through the abstracts all at once, print them, or click through to full text.

In the September/October issue of the *ASPB News*, we’ll look at how you can personalize your favorite journals. 




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Reflections on a Landscape

More than 20 years ago, I went from a small town in rural Wisconsin to live for a year in Costa Rica. I lived for a time in the montane cloud forest of San Gerardo de Dota, where the Savegre River descends in sparkling cascades from the divide of the Sierra Talamanca through a verdant forest. Unlike the astonishing diversity of trees in the tropical lowland forest, perhaps 90 percent of trees in the montane cloud forest here are oaks. They are of the same genus, *Quercus*, as oaks of my homeland, but unlike my oaks, they are enormously tall and virtually evergreen with glossy, elongate, unlobed leaves, and they drip with vines and bromeliads accented here and there by the bright colors of trogons and calls of the resplendent quetzal. From this forest, I went to live for several months in Colorado, and I remember thinking that, with respect to the landscape, living in Colorado was a much bigger change for me—coming originally from the Wisconsin countryside—than it had been to live in the montane forest of Costa Rica. Although the details changed dramatically, the overall aspect of forest and field in San Gerardo (oak forests, no less, and fields with Holstein cows, bordered by apple orchards) did not seem incredibly foreign compared to the fields and forests of central Wisconsin.

Two years ago I again moved from a lush green countryside populated largely with oaks—this time that of central Pennsylvania—to

Colorado, where the front range of the Rocky Mountains meets the eastern plains, and I was again struck by the enormity of the change in the landscape. Although I have always loved the alpine meadows and ragged peaks of the high mountains, I wondered if I would ever get used to—much less grow to appreciate—the foothills landscape, which on first inspection appeared as an incredibly barren, almost entirely brown near desert. I remember climbing to a local highpoint, Horsetooth Rock, looking east across the plains in April, and thinking *oh my God... this is a desert! ...there is almost nothing green here... can I possibly enjoy living here?* As if to emphasize the point, we then chose to live on the western edge of town, up against the barren foothills, with the prairie dogs—and no trees. No trees?!

What a pleasant surprise, then, to find over the past two years that I have not just gotten used to this landscape, I have actually fallen in love with it. Almost daily I have gone for runs along trails in the foothills; runs punctuated by frequent walking breaks as I have stopped to become better acquainted with the flora and fauna of my new home. I love the many different muted shades of browns and reds and grays (and yes, even greens) of the foothills and grasslands. I almost feel that I have come to see colors more distinctly, and I take more notice of colors in the landscape wherever I go. I especially love to drive north and east to the high plains, where the ante-



Quercus gambelii
N. Eckardt

lope graze in the sagebrush, and endless grasslands roll along as far as the eye can see.

I have also enjoyed designing the landscape of our new garden. Rather than planting my favorite Eastern trees and shrubs, such as flowering dogwood, redbud, and azalea, we chose local natives, such as Colorado blue spruce, western river birch, and quaking aspen. We maintain a minimal lawn area and plant the rest with low-water-use rock-garden and prairie perennials. Looking back on my history of landscapes, it is no surprise that some of the first trees I planted here were oaks. Appropriately for this landscape, they are Gambel oaks (*Quercus gambelii*), a lovely small tree that is native to the central Rocky Mountains. These two little trees have taken root and this spring produced a fine crop of their delicate, light green, lobed leaves. We are at home in the Colorado foothills, the Gambel oaks and me.

Nan Eckardt

News and Reviews Editor
The Plant Cell
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New URL for Southern Section

The web page for the Southern Section has been changed to correspond to the section's adoption of the name change to "Plant Biologists." Please make a note that the old URL will be discontinued in September and update your bookmark to <http://www.ss-aspb.org>.

ASPB Welcomes New Postdocs and Students!

ASPB and the Membership Committee welcome the postdocs and students who were nominated by their professors for outstanding work in the field of plant biology. ASPB hopes to support the hard work and dedication of these young scientists for years to come.

Biswa Ranjan Acharya	Michele Engel	Yasuhiro Kadota	Abeer Mohamed	Kara M. Shaffer
Ana Raquel Adham	Jeffrey J. Esch	Udaya C. Kalluri	Michael Molhoj	Michael B. Sheahan
Elizabeth A. Ainsworth	Francisco Espinoza	Akihiko Kamoshita	Foad Moradi	Jason A. Shockey
Ali Alan	Inmaculada Farran	Tesfamichael H. Kebrom	Rosa Maria Morcuende	Najeeb U. Siddiqui
Jolana Albrechtova	Alicia Fernandez-San Millan	Armen Kemanian	Anil Neelam	Lyudmila Sidorenko
Ahmad Ali	Simone Ferrari	Miura Kenji	Weimin Ni	Tahere A. Sigari
Rahhamani Anandalakshmi	Saul F. Fraire	Anthony Kern	Marusa Pompe Novak	Stacey A. Simon
Maria Cecilia Arias	Kirk E. Francis	Ben R. Kiefel	Dietrich Ober	Jaswinder Singh
Angela Augusti	Chiushi Fu	Eunsoo Kim	Yoko Ogasawara	Vaniyambadi V. Sridhar
Rosa Maria Barroco	Yuri Fujikawa	Sunran Kim	Damian P. O'Neill	Suryadevara Srinivasa Rao
Cornelius S. Barry	Daniel Fulop	Tae-Houn Kim	Javier F. Palatnik	Dan Stessman
Michele Bellucci	Rafaelo M. Galvao	Wonseok Kim	Jutta Papenbrock	Lucia C. Strader
Catherine Bermudez-Kandianis	Walter Giordano	Tadashi Kishimoto	Alice Jean Paquette	Jayasankar Subramanian
Magdalena Bezanilla	Bridgit M. Goldman	Barbara Koehler	Ronald L. Parsons	Michael L. Sullivan
Sanghamitra Bhattacharyya	Diego F. Gomez-Casati	Priyum Koonjul	Jean-Benoit Mp Peltier	Francisco R. Tadeo
Sophia Biemelt	Kenji Gomi	Olga Ruiz Kopp	Iris B. Perez-Almeida	Ruhang Tang
Kenneth D. Birnbaum	Michael M. Goodin	Mark Krasnow	Daniel G. Peterson	Brian J. Thorson
Terrence Bissoondial	Christopher Dean Goodman	Khrish Kumar	Fabrizio Pietrini	Yonathan Tilahun
Leila Blackman	Abbie Gosselink	Vinod Kumar	Paola Pinelli	Jorge A. Tognetti
Frederik Bornke	Ravinder K. Goyal	Boney Kuriakose	P.V. Vara Prasad	Carolina A. Torres
Toby Bradshaw	Rachel Green	Sam Kuruvilla	Chunbo Qin	Shilpa K. Uchil
Robert C. Bugos	Johann Grelet	Myoung-ok Kwon	Sheng Quan	Helene Vanacker
Kim Burhenne	Mengjuan Guo	Hunter K. C. Laidlaw	Pauline E. Quesnelle	Wim Van Den Ende
Jason L. Burkhead	Woei-jiun Guo	Eric B. Lalanne	Rena Quinlan	Christell Van Der Vyver
Leeann E. Chandler	Serdar A. Gurses	Julien Lartigue	Samina N. Qureshi	Sigrid Elisabeth Von Gesjen
Rekha Chawla	Jameel M. Haddad	Johann Lavaud	Surabhi Raina	Wim H. Vriezen
Li-Ru Chen	Sheng-Cheng Han	Anthony V. Lebude	Balsubramanian Ramani	Tanya R. Wallas
Yih-Lin Chen	Tianfu Han	Danika LeDuc	Rebekah A. Rampey	Guanfang Wang
Yi-Jiun Chen	Gregory N. Harrington	Hsiao-ching Lee	Candace D. Randall	Jun Wasaki
Hyunsub Cheong	Richard P. Haslam	Yuh-Ru Lee	Latha Rangan	Chi-Kuang Wen
Injeong Cho	Adil Hassan	Dominika Lewandowska	Fawzi Razem	Jonathan D. Werner
Vern E. Collette	Daniel M. Hayden	Maoyin Li	Thomas H. Roberts	Tim C. Wherrett
Sandra Cortes	Isabelle M. Henry	Wei qi Li	Whitney R. Robertson	Craig Wm. Whippo
Leonardo Curatti	Ismael Hernandez-Rios	Xiaoe Liang	Miruna Roman	Neil R. Williams
Christian Dammann	David Hieber	Jiang Xiong Liao	Maria C. Romero-Puertas	Matthias Wissuwa
Sasha M. Daskalova	Katsumi Higashi	Igor Gl Libourel	Sergio Rosales	Andrew W. Woodward
Christopher D. Day	Joanna N. Hodson	Melisa Lim	Caleb Rounds	Ruqiang Xu
Bas Dekkers	Kevin C. Hollis	Olivier Loudet	Leila G. Rubia	Bing Yang
Desiree Den Os	Ben Holt	Alyson M. Mack	Linda A. Rymarquis	Hiroshi Yoda
Claudia R. B. De Souza	Yueyun Hong	Claudia Magioli	Benjamin K. Samson	Maria Ines Zanoer
Claudia Diaz	Guichuan Hou	Enrico Magnani	Anita Samuga	C Ryan Zarter
Tzvetanka D. Dinkova	Wei Hu	Manoj Majee	Renuka P. Sankaran	Qisen Zhang
Veronica S. Di Stilio	Andre O. Hudson	Alicia J. Manfre	May Santiago-Ong	Wei Zhang
Scott Douglas	Domingo J. Iglesias	Amanda Mangeon	Chiradeep Sarkar	Wenhua Zhang
Faping Duan	Ignacio Islas-Flores	Andrew J. Marry	Ruairidh J. Sawers	Xiaohong Zhang
Tim Dumonceaux	Guru Jagadeeswaran	Manuel Martinez-Estevez	Nikolaus L. Schlaich	Min Zhao
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Ruth Elena Ele Soria	Izabela Maria Juszcuk	Christina Mladek	Laura Serna	



Congressional Exhibition and Reception on NSF-Sponsored Research Features ASPB Exhibit on Lowering Food Allergies

NSF Director Rita Colwell, two members of Congress, and a number of congressional staff visited the ASPB poster exhibit at the annual Congressional Exhibition and Reception sponsored by the Coalition for National Science Funding (CNSF) May 15 in the Rayburn House Office Building.

The ASPB poster and related color brochure, "T(rx) Cereals: Lowering Food Allergies with Thioredoxin," explained research conducted by Committee on Public Affairs chair Peggy Lemaux and past president Bob Buchanan, both of the University of California at Berkeley. The brochure can be found on the ASPB web site at www.aspb.org in the plant biotechnology section. Barbara Alonso, also at UC-Berkeley, prepared the poster and brochure with Lemaux and Buchanan.

Lemaux explained this NSF-sponsored research to attendees who visited the ASPB booth, including Colwell; Congressman Bob Etheridge (D-NC) of both the Science Committee and the Agriculture Committee; Congresswoman Lois Capps (D-CA); Joel Widder, majority staff on the Senate VA, HUD and Independent Agencies Subcommittee (which annually determines spending for NSF); and other congressional staff.

Widder, who had visited Lemaux's lab a few months earlier to review major NSF research programs such as plant genome research, remarked that he was impressed with the research. Capps said that as a former nurse she certainly recognized the importance of research that inactivates allergens and leads to safer foods. Capps offered to provide any assistance that she could.

In discussions with Colwell, Lemaux traced the background of years of basic research sponsored by NSF on thioredoxin that led to this unexpected discovery related to lowering food allergies. Lemaux discussed hands-on displays, including wheat, teosinte, strings of beads representing genes, and other items with visitors.

There were more than 30 poster exhibitors at this exhibition, primarily representing science societies and universities. The program with the list of exhibitors can be found at <http://www.cnsfweb.org/exprogram02.pdf>.

Photos of the exhibition can be found at <http://www.cnsfweb.org/photos-ex2002.pdf> with pictures of Peggy Lemaux and Dr. Colwell at #65 and #66.

This was the eighth annual CNSF congressional exhibition, and ASPB has participated in each one. Again this year, ASPB had the only plant science exhibit there. The event provides an opportunity to explain the importance of leading research sponsored by NSF to congressional offices in a relatively festive reception setting. This is the major reception and exhibition of the year for NSF on the Hill, and the ASPB Public Affairs Office helped initiate this popular event about eight years ago.

Brochures developed for the exhibits in this and past years are also used in sub-

sequent communications and meetings with congressional staff and Executive Branch officials as appropriate. For example, the NRI also contributed to support of this research related to lowering food allergies with thioredoxin. ASPB staff provided a copy of the brochure "T(rx) Cereals: Lowering Food Allergies with Thioredoxin" to Rodney Brown, deputy undersecretary of Department of Agriculture Research, Education and Economics, during a May 30 meeting.

With anti-biotech interests making assertions related to allergen risks in modified foods, Lemaux and Buchanan's research offers an example of how, instead, biotechnology can be applied to inactivate allergens that would otherwise be found in a traditionally bred food crop.



Peggy Lemaux (left) and Rita Colwell, director of the National Science Foundation



Peggy Lemaux and Joel Widder of the Senate Appropriations Committee staff

AAAS Representative Responds Favorably to ASPB, AIBS on Question of Balance

Some representatives of physical sciences interests, particularly in the area of physics, have been conducting a campaign for “more balance” in federal funding. Citing a doubling of funding for life sciences research supported by the National Institutes of Health (NIH), the physical sciences campaign for “more balance” argues that federal support for physical sciences research has been somewhat scant by comparison.

However, the “more balance” campaign is arguably less than collegial in design, and it wrongly includes targeting of non-biomedical life sciences. The campaign has the potential to unfairly divert support for non-biomedical life sciences research, which has not been on a doubling track, to research programs in the

physical sciences at various federal agencies. (See related story on NSF Budget Authorization on page 15 of this issue.)

ASPB and the American Institute of Biological Sciences (AIBS) contacted the American Association for the Advancement of Science (AAAS) on the need to present federal budget analyses that distinguish trends in federal funding for biomedical research from life sciences research in other areas. For example, AAAS is providing input to the President’s Council of Advisors on Science and Technology (PCAST) assessing the federal investment in science and technology R&D.

Kei Koizumi of the AAAS R&D Budget and Policy Program responded to ASPB and AIBS that he agrees that the catch-all category of

“life sciences” masks the divergent trends for the biomedical sciences and natural biology. He said he would work with RAND, a non-profit institution that addresses policy and decision making through research analysis, and PCAST to make the links between agency funding decisions and impacts on science disciplines very clear to show varying degrees of federal support within the life sciences.

While ASPB has commended Congress for its strong support of NIH, it would be incorrect to say that federal support for all life sciences research has increased at the level of biomedical research. ASPB and AIBS are working with other life sciences groups on further actions needed to seek more fairness in assessing the “more balance” campaign. 🌱

Enacted Farm Bill Includes ASPB-Supported Provision on Risk Assessment

The enacted Farm Bill includes a provision on biotechnology risk assessment research supported by ASPB. The provision not only addresses risks that might be posed by plants and animals that are products of agricultural biotechnology, but also looks at comparative risks of these products with traditionally bred plants and animals.

Senate and House Conference members accepted this broader provision addressing comparative risks approved by the House. The conference agreement on the Farm Bill was later approved by Congress.

ASPB Public Affairs staff had worked with House Committee staff in addressing the question of comparative risks early in the drafting stages of the Farm Bill. Discussions in an earlier meeting of the Committee on Public Affairs had cited the need to look not only at

risks in genetically modified crops, but also at how these risks compare with risks associated with other crops.

As Senate and House Conference members were considering the Farm Bill, ASPB President Vicki Chandler wrote to House and Senate members who were heading up the conference and noted the following:

“With regard to the issue of risk assessment, ASPB supports House Agriculture Committee Report Section 747 on Biotechnology Risk Assessment Research. This provision takes the needed holistic approach to risk assessment,” Chandler commented in the letter. “A comparative analysis between biotechnology systems and other production systems, as provided in the House provision, will provide more complete,

balanced and accurate information for consumers, farmers and policymakers to consider.”

The Joint Explanatory Statement of the Conference Committee notes that “The conference substitute adopts the House provision with an amendment adding genetically engineered microorganisms as a priority topic for risk assessment research, including international partnerships on bio-safety as a research priority and reducing the amount withheld from biotechnology research funding [for risk assessment research] from 3 percent to 2 percent.”

President Bush signed the Farm Bill, and it became Public Law 107-171 on May 13, 2002. 🌱

House Approves Bill Supporting Research on Plant Genomes, Plant Biotechnology

The House of Representatives approved on May 14 Congressman Nick Smith's (R-MI) legislation (H.R. 2051) to develop regional plant genome research centers and includes Congresswoman Eddie Bernice Johnson's (D-TX) proposal to promote research partnerships to study plant biotechnology in the developing world.

ASPB president Vicki Chandler, Committee on Public Affairs member Daphne Preuss, past president and past Committee on Public Affairs member Ken Keegstra, ASPB member Mike Thomashow, past Committee on Public Affairs member Jim Cook, past president Charles Arntzen, and other ASPB members have testified before Smith, Johnson, and the Science Research Subcommittee in recent years and discussed the importance of NSF-sponsored plant research, including plant biotechnology and plant genome research. Committee staff noted that Smith's bill would provide a significant new source of funds for plant genome research and research on the ap-

plications of biotechnology. Following is the news release that the committee issued May 14 after House passage of the bill:


WASHINGTON, DC—The House today approved legislation by voice vote that would strengthen research into plant biotechnology. The bill establishes a program through the National Science Foundation to develop regional plant genome research centers. Additionally, the legislation would promote research partnerships to study plant biotechnology in the developing world.

Research Subcommittee Chairman Nick Smith (R-MI) said, "The tremendous potential of plant genomics is limited only by the resourcefulness and imagination of our scientists. We have already made great strides, but it is only the beginning. This bill will help create the next generation of plants that will provide consumer benefits, lower costs, protect the environment, and help feed a growing world population."

"A particularly important component of this legislation is the requirement that U.S. universities and non-profits partner with institutions in the developing world," said Subcommittee Ranking Member Eddie Bernice

Johnson (D-TX). "By working with their colleagues in developing countries, U.S. scientists will not only help strengthen the scientific capacity of developing countries but will ensure that the basic research that is performed on developing world crops focuses on what developing countries perceive their own needs to be. It was my pleasure to work with Chairman Boehlert, Ranking Member Hall, and Subcommittee Chairman Nick Smith on this bipartisan legislation that makes an important contribution to address the critical problems of hunger, malnutrition, and disease in the developing world."

The research centers would focus on areas of basic research such as cultivating plants in extreme conditions, developing alternative uses for crops including energy production, and disseminating information on the ecological or other consequences of genetically engineered plants. The bill authorizes \$9 million for fiscal year 2002 and \$13.5 million for each of the two following years.

The bill now moves to the Senate for consideration. 

Questions from Public Abound at NC Museum Program "Tinkering With Nature"

The North Carolina Museum of Life and Sciences in Raleigh sponsored an evening program May 30 on "Tinkering with Nature: Food and Medicine in the Genomic Age." The program featured ASPB Committee on Public Affairs member James Siedow of Duke University, who discussed safety and environmental issues related to genetically modified crops.

Michael Yudell, a fellow at the American Museum of Natural History, spoke on ethical issues related to the genomics revolution, primarily with regard to its application to medicine. Adrienne Massey moderated the program and spoke on both topics in her opening remarks.

The nearly 150 people who attended the program appeared to have a fairly broad,

non-technical background and considerable interest in the issue, Siedow noted. There were a lot of questions asked during the program, which ended at 9:00 p.m. and continued in informal groups until museum officials moved everyone out of the building at 9:45 p.m.

Two representatives of a group called the North Carolina Coalition for Safe Foods set

continued on page 15

House Science Committee Supports ASPB Request to Include Biology in NSF Budget Authorization Bill “Trends” Section

ASPB Public Affairs staff and public affairs representatives from three other associations met with House Science Committee staff representing committee leadership in May and asked that the NSF budget authorization bill H.R. 4664 be amended so that language in section 5 of the bill no longer exclude biological sciences (and the social sciences).

Section 5 of the bill had called for submission of an annual plan by NSF describing how allocation of research funding will “(2) affect trends in research support for major fields and subfields of the physical sciences, mathematics and engineering including for emerging multidisciplinary research areas; and (3) ensure that research in the physical sciences, mathematics and engineering is adequate to address important research opportunities in these fields.”

Committee representatives led by Chairman Sherwood Boehlert (R-NY) agreed with ASPB and the three other organizations and subsequently made the change with an amendment approved by the full committee later that month. The House of Representatives subsequently approved the bill with the amended provision.

In paragraph two (trends) of the bill, “physical science” became “science” so that everything is tracked to develop a better

baseline. Paragraph three was changed to read: “...is designed to achieve an appropriate balance among major fields and subfields of science, mathematics and engineering....”

These changes from “physical science” to the broader term “science” address ASPB’s biology community concerns. ASPB is also asking the Science Committee to guard against combining the non-biomedical life sciences with biomedical research when looking at federal funding trends.

Some physical science groups have called on Congress to provide what they call “more balance” in federal funding. These same interest groups have been citing the doubling of funding track that has been followed for the National Institutes of Health. However, most non-medical life sciences have not been on a doubling track and are threatened to be adversely affected by the purported need for “more balance” campaign of some physical science representatives.

The physical science representatives have maintained that the large budget increases for NIH provide a disproportionate amount of funding for the life sciences. The campaign by these groups is unfairly broad as it does not mention the distinction between biomedical research and non-biomedical research in the life sciences. To mount a highly visible

campaign seeking “more balance” can also take science interests off more important messages and make them appear instead like they are engaged in interdisciplinary squabbling.

There is still more work that needs to be done by the biology community in response to what is the purported need for “more balance” campaign of many physical scientists. ASPB is working with the American Institute of Biological Sciences (AIBS), which also attended the May meeting, and some other biological science groups on conducting future efforts as part of a broader community response to the aggressive campaign by some physical science groups to obtain what they label “more balance” in the federal research portfolio. (See related story on page 13.)

ASPB has commended Congress for its significant budget increases for NIH. The example shown at NIH may have helped Senators Christopher Bond (R-MO), Barbara Mikulski (D-MD), and their colleagues in their strong and successful efforts to obtain increases for NSF that have been several times higher than the rate of inflation. In addition to non-medical life sciences, physical sciences and other science disciplines also benefited from these increases for NSF. 🌱

continued from page 14

up a booth outside the auditorium and passed out literature on “The Health Hazards of Genetically Engineered Foods,” written by Laurie Lynch. One of the two representatives added a doom-saying prediction, warning that eating genetically modified foods will lead to the extinction of the human race. Siedow, a genetically modified food consumer still very much in existence, noted that this comment

did appear to weigh on the coalition representative’s credibility.

The program was held in conjunction with an exhibit at the museum called the “Genomic Revolution.” The exhibit was originally developed by the American Museum of Natural History in New York and is now traveling throughout the country. The first stop was Raleigh, where the exhibit is being shown

from April 20 through September 2. A portion of the exhibit is devoted to presenting benefits and risks of genetically modified crops. 🌱

USDA, Siedow Visit Poland to Discuss GMOs with Public Officials, Media, Scientists

After spending much of the past three centuries subjected to domination by powerful neighbors, including the ruthless reigns of Adolf Hitler and Joseph Stalin, Poland is looking west for help in its relatively early years as an independent, democratic nation with a free-market economy.

Poland plans to join the European Union (EU) in coming years in a move that could help strengthen its economy. To join the EU, Poland must develop policies in a number of areas, including plant biotechnology.

To help in further understanding issues related to plant biotechnology in the United States, Poland hosted a delegation including ASPB Committee on Public Affairs member Jim Siedow of Duke University in June. The delegation was sponsored by the U.S. Department of Agriculture Foreign Agricultural Service.

In meetings with government officials, researchers, and the news media, Siedow addressed scientific and environmental issues related to modified foods. Tom Zinnen, biotechnology policy and outreach specialist from the University of Wisconsin, addressed regulation of modified foods in the United States. Andy Benson, director of international outreach for the International Food Information Council, spoke on biotechnology communications, public opinion, and food safety.

In addition, this delegation was joined by Professor Tomasz Twardoski of the University of Poznan and the Polish Academy of Sciences, who spoke on the value-added features of crop biotechnology. Mark Hawthorne

of USDA was the team leader, and Wayne Molstad of the U.S. Embassy in Warsaw was the local organizer.

Siedow and others in the U.S. delegation met with representatives of 18 Polish government ministries and representatives of a few nongovernmental organizations (NGOs) on Monday, June 3. Each member of the delegation gave a 45-minute talk (with simultaneous translation) and fielded questions for 15–20 minutes afterward. After the entire session, there was another open question period. Siedow noted that there were a number of thoughtful questions raised. Just as is found in the United States, an anti-biotechnology NGO representative took part in the question-and-answer period and delivered a speech against modified foods.


The session was followed by a formal luncheon, which coincided with the Poland–South Korea World Cup soccer game, so further discussions on genetically modified organisms (GMOs) were minimal at the luncheon, Siedow noted.

On Wednesday, June 5, the U.S. delegation went to the Agricultural University of Warsaw (AUW), located in a Warsaw suburb, where Siedow and his colleagues met with some 20 faculty members. Discussions on modified crops continued for about two-and-a-half hours. Siedow said that for the most part, the Polish faculty members were supportive of research on the plant biotechnology and critical of their government's current restrictive regulations on modified foods.

On Thursday, June 6, Siedow and the rest of the U.S. delegation met with about 15 representatives of various media (radio, TV, and print). The program followed generally the same format as the meeting with ministry officials. Siedow said there were a lot of leading questions from the media (including an unusual question about a possible linkage between obesity in the United States and the general introduction of modified foods).

“Afterward, we did two interviews with two TV stations, including TV 2 (which has one of the largest viewer markets in Poland). We were featured on the 10:00 p.m. news, and I was informed that the story was very positive,” Siedow commented. “We also appeared on a second TV program that aired on Saturday morning on another channel. I also just heard that good articles have appeared in two magazines.”

The entire last page of the June 8–9 *Magazyn Trybuna* is devoted to the issue of plant biotechnology and modified foods. The article cited strength in the U.S. regulatory system for modified foods, including regulatory authority of USDA and the Environmental Protection Agency.

Some U.S. officials are hoping that this independent nation, which took the lead in overthrowing Soviet rule that led to freedom for Eastern Europe, will embrace an open, science-based view toward modified foods as it prepares to become a voting member of the EU. 

Plant Biotechnology Reduced Pesticide Use by 46 Million Pounds

Plant biotechnology has increased crop yields significantly while reducing use of pesticides in the United States, the National Center for Food & Agricultural Policy (NCFAP) reported.

The NCFAP report on its study said that for year 2001 in the United States, six crops currently in the marketplace developed through biotechnology—soybeans, corn, cotton, papaya, squash, and canola—produced an additional 4 billion pounds of food and fiber on the same acreage, improved farm income \$1.5 billion, and reduced pesticide volume by 46 million pounds.

Assuming that an additional 21 crops evaluated in the study are eventually planted, production would increase 10 billion pounds, farm income would improve \$1 billion, and pesticide volume would be reduced 117 million pounds. The study evaluated regional production in 27 of America's crops, or slightly more than half of the U.S. crop value.

According to Leonard Gianessi, NCFAP senior research associate and senior author of the report, "As opposed to previous studies, our work goes well beyond the traditional agricultural commodities and evaluates the impact biotechnology can have on a much wider range of crops, including fruits and vegetables. In fact, the study shows every region in the country stands to benefit from the development of the new varieties evaluated in this study."

The report was commissioned with a grant from the Rockefeller Foundation and was later expanded to cover 40 case studies of 27 crops with funding from the Biotechnology Industry Organization, CropLife America, Council for Biotechnology Information, Grocery Manufacturers of America, and Monsanto. NCFAP is a private, nonprofit organization based in Washington, DC. The complete study is available at <http://www.ncfap.org>.

Alan McHughen, a member of ASPB, worked with the ASPB Committee on Public Affairs and Knight Ridder/Tribune Information Services in submitting this commentary, which was published by The Columbus Dispatch May 22 (and The Record of Northern New Jersey May 21) among newspapers subscribing to Knight Ridder/Tribune.

Urban Sprawl Is Threat to Biodiversity

Alan McHughen

Wednesday, May 22, 2002—Is biodiversity in Mexico under threat? Yes, but not by biotech corn. Emotional excitement is clouding the real issues.

First was the publication of a short paper in *Nature*, a respectable British scientific journal, showing monarch butterflies, an insect, might be harmed by eating pollen containing insecticide provided by a type of biotech corn.

Popular wisdom, if not the authors, concluded that the survival of the migrating Mexico-based monarchs was therefore threatened by these plants.

Thus the hand-wringing began, along with calls for banning biotech crops because of the apparent threat to biodiversity as exemplified by the lovely monarch.

The angst subsided only after a blue-ribbon panel of public scientists conducted experiments and published a series of research articles showing that the biodiversity threat to monarchs from biotech corn was negligible; that a much greater hazard to monarchs was car windshields. Since no one seemed willing to campaign against windshields on cars, the furor died down.

Then came a report arguing that the genetic integrity of Mexican teosinte, the ancestor of modern corn, was being contaminated by genetic material from biotech corn.

Once again, hand-wringers were out in force, demanding an end to modern plant breeding because this paper, also published in *Nature*, showed biotech crops threatened biodiversity in Mexico.

And once again, the angst subsided when *Nature* disowned the paper last month, agreeing with technical experts that the research findings were flawed and that the paper should not have been published in the first place.

The experts do agree that corn pollen—whether from a biotech variety or an ordinary modern corn hybrid—can mate with its genetic ancestor, teosinte, to add their genetic material to that of the teosinte.

Such genetic mingling is a natural event, so the mere presence of modern corn plants growing in Mexican farm soil virtually guarantees that, sooner or later, genes from corn will be detected in teosinte.

With all the media coverage and anxiety over threats—real or imagined—to biodiversity in Mexico, a more crucial issue is overlooked.

That is, does cross-pollination constitute a threat to biodiversity? Is the survival of ancestral populations of teosinte threatened by genetic material from modern corn?

To some, cross-pollination is genetic pollution and the offending corn must be banned, because, according to the argument, the philandering corn genes dilute the genetic purity, and therefore the biodiversity, of the teosinte.

To others, moving genes from plant to plant, even species to species as with corn and teosinte, is completely natural, does not constitute a threat to biodiversity and

continued on page 18

continued from page 17

is a phenomenon we need not be too concerned with.

The scientific evidence indicates that ordinary pollination between modern corn and older strains and even teosinte does not constitute a significant threat to biodiversity.

Modern corn varieties have been available to Mexican farmers for half a century. Yes, there is evidence that some cross-pollination events have occurred over that time. And yes, the modern genes can persist in the populations.

But the modern genes do not overtake or crowd out the ancestral genes.

There is no indication that biodiversity of teosinte has suffered from the introduction of modern corn genes in the mid-20th century. Unless the modern genes provide some ecological advantage to the recipient teosinte plant, they either eventually die off or remain a tiny proportion of the teosinte's gene population.

Biotech corn does not cross-pollinate with any greater efficiency than modern nonbiotech

corn. In short, biodiversity in teosinte is not jeopardized by genes or pollen from modern corn, including biotech varieties.

The real threat to teosinte and other maize-strain populations emanates from human populations, with their increasing demands for land and food.


As cities grow, they encroach on the best farmland. As remaining farmers attempt to meet the demand for more food, they replace older, less productive varieties with new, high-yielding hybrids. Both activities displace traditional plants.

If society wants to preserve teosinte and old strains, we must support well-funded and organized gene banks and reserve lands, where the genetic heritage can be protected.

We must establish a regulatory system for new crop varieties based on their health, safety and ecological fitness, not on the breeding method used.

Finally, we must encourage the cultivation and consumption of biotech varieties with higher nutritional quality and yields to satisfy the demand for more and better foods without converting more land.

Biodiversity in Mexico—and elsewhere—is certainly under threat. Emotional distractions accelerate the problem by delaying the implementation of real solutions.

Alan McHughen, a biotechnology specialist in the Department of Botany and Plant Sciences at the University of California, Riverside, is author of *Pandora's Picnic Basket: The Potential and Hazards of Genetically Modified Foods*. Distributed by Knight Ridder/Tribune Information Services. 

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Kelley Noone at knoone@aspb.org.

The Spokane Spokesman-Review and Akron Beacon Journal newspapers published the following op-ed written by ASPB member Jim Cook. Cook explains findings on modified crops in a new report by the National Center for Food and Agricultural Policy. This commentary is the second by Cook in recent months that explains plant biotechnology to the public. Knight Ridder/Tribune Information Services distributed this commentary to subscribing newspapers.

Biotech Crops, an Environmental Ally

R. James Cook

Pullman, Washington, Monday, June 17, 2002—Anyone uncertain about the merits of biotechnology for food and agriculture should read a new report by the National Center for Food and Agricultural Policy, a nonprofit research group in Washington, DC.

The food report, released a week ago, notes that a mere eight varieties of genetically modified crops provided an overall value to U.S. agriculture of \$2.5 billion through higher yields and lower costs of production in 2001.

The lower production costs produced a major environmental benefit as well—reducing pesticide use by 46 million pounds. The report can be found on the web at www.ncfap.org and ought to be required reading for everyone involved in the ongoing debate, including America's farming community.

The eight biotech varieties included in this NCFAP analysis were widely disparate. They include insect-resistant cotton and corn, herbicide-tolerant soybeans, corn, cotton and canola and virus-resistant squash and papaya.

The greatest increase in production occurred with insect-resistant corn, which yielded an additional 1.75 million tons. The greatest cost savings occurred with herbicide-tolerant soybeans that reduced the use of herbicides by an estimated \$1 billion.

Herbicide-tolerant crops also made it easier for farmers to adopt a no-till system of farming, which reduces the potential for soil erosion in addition to the cost of production.

According to the Conservation Technology Information Service at Purdue University in Indiana, about 25 million acres of soybeans, one-third of the total U.S. soybean crop in

2001, were grown with the no-till method of farming—the most of any crop.

As startling as these numbers may seem, similar gains could be cited for the hundreds of pests and diseases controlled over the past 100 or more years by the methods of genetic modification referred to collectively as “traditional” plant breeding.

These gains account in large part for why we Americans today spend only about 10 percent of our incomes for the highest-quality and most-abundant food in the world.

What is particularly exciting about the National Center for Food and Agricultural Policy report is that someone actually put the numbers together to document what happens or can happen when pests or diseases are controlled using genetic modification.

Despite the proven safety and efficacy of biotech crops, misinformation has created lingering skepticism. A biotech variety of potato with one gene that resists the Colorado potato beetle, and another that resists the potato leaf roll virus—two pests currently managed with pesticides—was rejected by the fast-food industry out of fear that consumers would consider these potatoes unsafe to eat.

The National Center for Food and Agricultural Policy report pointed out that the genetically modified insect/virus resistant potato, along with five other biotech crop varieties in the pipeline, have the potential to increase the net value of Idaho, Oregon and Washington agriculture by an estimated \$1.8 billion if fully adopted.

At the same time, the new crops could decrease the amount of pesticide used in the Pacific Northwest's tri-state potato region by about 20 million pounds annually.

The five genetic modifications in the pipe-

line for Northwest crops are raspberry with resistance to the region's most devastating virus disease, wheat with resistance to two important virus diseases, and potatoes with tolerance to an herbicide and resistance to the verticillium wilt fungus now controlled by soil fumigation.

Like most other pests and diseases still controlled by pesticides, none of the four crop diseases targeted for control by biotechnology in the Pacific Northwest has been brought under control anywhere in the world using traditional breeding practices.

While most alternatives to pesticides have tended to make food more expensive, controlling plant pests and diseases through genetic modification lowers the cost of production.

Food produced from these crops is no more expensive, and eventually becomes less expensive as the lower costs of production are passed on to consumers.

In addition, crops protected from pests and diseases leave less fertilizer unused in the soil and return more organic matter to the soil, and the harvested products are almost always of a higher quality than products from crops damaged by pests and diseases.

At a time when each day's news seems to be dominated by depressing stories, the National Center for Food and Agricultural Policy's report confirms that we're still capable of making progress with major benefits for the human race.

That's a bit of refreshing good news for all Americans.

The writer holds the endowed chair in wheat research at Washington State University and is a member of the National Academy of Sciences. This commentary was distributed by Knight Ridder/Tribune Information Services.



ASPB Exhibits at MIST Career Fair

The ASPB Education Foundation sponsored an exhibit at the 11th annual Career Fair of the Minorities in Science and Technology (MIST) Network held April 30–May 2, 2002, at The George Washington University in Washington, DC.

The three-day MIST career fair introduces middle school and high school ethnic minority students to careers related to science and technology by exposing them to a wealth of hands-on exhibits. More than 1,800 students, teachers, and parents participate in the career fair annually, with more than 30 scientific associations and corporations staffing booths and/or conducting workshops. Exhibitors included the American Association for the Advancement of Science, the U.S. Environmental Protection Agency, the Society of Manufacturing Engineers, the American Society for Biochemistry and Molecular Biology, and the Central Intelligence Agency.

At the ASPB booth, ASPB member Robin Buell answered questions and described the different types of jobs available to those students interested in the field of plant science. When asked about future plans for college, many of the 11th graders, who were either biology majors or taking advanced placement courses in biology, expressed an interest in

attending medical school. Robin explained that research conducted by plant physiologists is very beneficial and that plant physiology is actually a sub-field of biology. In addition, Robin stated, “Plant scientists are involved in many different types of research that include the growth of plants for food, fuel, and, yes, even medicine.”

When asked how and why the participants attend the Career Fair, one student from North Bend Elementary School in Baltimore stated, “It’s fun! The exhibit hall is best because it shows me things that I never knew about.” The parent of a sixth grader who attends Fallston Middle School in Baltimore told ASPB staff, “It’s really wonderful! My son doesn’t know what direction to go, so this is great to start at this age.” Another student, who attends North Bend Elementary, described an experiment to ASPB staff that involved growing a plant with a kidney seed. “My sister grew a lima bean plant but it died! My experiment is to see if it can grow indoors.”

Students, teachers, and parents expressed enthusiasm for *The Plant Cell* and *Plant Physiology* posters, the two-sided Principles of Plant Biology bookmarks, brochures about plant science studies, *Principles of Plant Biology—Concepts for Science Education*, and “The ‘What’s so cool about plants?’ Cube,” which was a huge hit, particularly among the students.

For additional information on ASPB Education Foundation programs, visit www.aspb.org/ed_foundation/programs.cfm or contact Robin Lempert at rlempert@aspb.org.

Lauren A. Ransome
Production Manager
Plant Physiology
lransome@aspb.org



Students Adam Steward, Amecnaha Peoples, and Raven Jackson from Fallston Middle School, Baltimore, talk to ASPB Education Foundation assistant Paula Brooks at MIST.

ANNOUNCEMENT Phi Sigma


Phi Sigma Society is the oldest academic honor society for the biological sciences, established at Ohio State University on March 17, 1915. It is the only honor society for all biological subdisciplines recognized by the Association of College Honor Societies. Its mission is simple: The Phi Sigma Honor Society is devoted to the recognition of research and academic excellence in all the biological sciences.

Members of Phi Sigma are a cross-section of upper-level undergraduate and graduate students majoring in the life sciences who have demonstrated superior academic achievement, as well as professional biologists involved in research in academia, government agencies, and industry. Membership is for a lifetime, with no annual dues after initiation. Among the many benefits of membership are a reduced subscription rate for the AIBS journal, *BioScience*, and eligibility to apply for Phi Sigma Student Travel Grants to help reimburse students for travel expenses to present their research at professional meetings.

For more information on the history, purpose, and advantages of membership, please visit www.phisigasociety.org. This site also contains useful links to employment sites, information on how to establish a new chapter of Phi Sigma at your college or university, and further details about the Student Travel Grant Program.

Virtual Reality

As part of its Education Programme, the Society for Experimental Biology (SEB; www.sebiology.org) held a very successful workshop on Virtual Learning during its annual main meeting in Swansea (Wales, UK) in April this year. Organized in collaboration with LTSN Bioscience (www.bio.ltsn.ac.uk), we were honored to welcome ASPB member Dr. John Markwell (University of Nebraska—Lincoln) as our plenary speaker. Formerly ASPB's Education Committee chair, John treated the audience to his extensive teaching experience by speaking on the subject of student learning. His theories on the dynamics of learning in the context of both traditional and virtual environments were very well received, as was his interactive style of delivery. A summary of the talk is published in the *SEB Bulletin* (July issue) and can also be seen at www.sebiology.org/bulletin/July2002.

Delivered by other experienced educators, the rest of the workshop talks focused on virtual learning and assessment methods. These were followed by two parallel hands-on sessions on e-tutoring, including the implications of widening access for disabled students. A wider range of posters on innovative teaching techniques was presented later in the day, with John Markwell's poster on the decay of web links receiving media attention from the *New Scientist* (April 13 issue). All the workshop abstracts are posted at <http://bio.ltsn.ac.uk/NV/sebabstracts.htm>, and some will also be published as full papers in the *Journal of Biological Education* later this year. 

Sarah Blackford

SEB Education & Public Affairs Officer

CALL FOR PROPOSALS WSSA Undergraduate Research Award—2003


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

AWARD: Up to \$1000 for support of undergraduate research to be conducted over a minimum of one quarter/semester during 2003. This award may be used to defray the cost of research supplies or as a stipend. Support of a faculty sponsor is required. Awards will be made to the student, to be administered by the faculty sponsor's department.

APPLICANT: The applicant is an undergraduate student with a strong interest in Weed Science. Students majoring in all related disciplines may apply.

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

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

HOW TO APPLY: The completed proposal, academic transcripts, cover letter and faculty letter of support should be forwarded to: Dr. John Jachetta, Dow AgroSciences, 9330 Zionsville Road, Indianapolis, IN 46268-1054; Phone: (317) 337-4686, Fax (317) 337-4649, E-mail: jjjachetta@dow.com. Proposals should be received no later than November 15, 2002. Funding decisions will be made by January 25, 2003, and presented at the 2003 WSSA National Meeting Awards Banquet. 



New Staff

Suzanne Moore

Suzanne Moore joined the ASPB staff in April as the institutional subscription and fulfillment assistant and will provide customer service to institutional members, as well as more outreach to the institutional community. Her experience includes working at the American Association for the Advancement of Science to build and market an online database of funding opportunities for early career scientists in conjunction with the Howard Hughes Medical Institute, directing web site production at sciencewise.com, product management consulting for a custom software company, and working as a partner in a landscaping business. She has a degree in earth science from Frostburg State University and hopes to become a certified professional horticulturist this fall. 🌿



Obituary

Simon Harold Wender

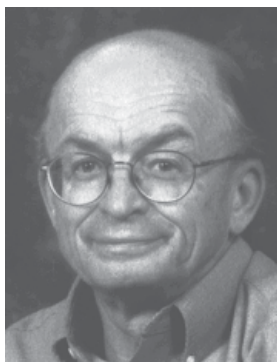
ASPB member Simon Harold Wender, 88, died Thursday, March 28, in Bainbridge Island, Washington. Dr. Wender was born September 4, 1913, in Dalton, Georgia. He earned his bachelor's and master's degrees in chemistry from Emory University and his doctorate in biochemistry from the University of Minnesota. After teaching four years at the University of Kentucky and two years as a research chemist at the Texas Agricultural Experimental Station, he embarked on a 37-year career at the Univer-

sity of Oklahoma, where he was instrumental in establishing a biochemistry doctoral program and building the department. While at OU, where he became known as the grandpa of biochemistry, he authored or coauthored 176 research publications, secured key grants to fund his department, and won numerous achievement awards. He also taught and mentored thousands of students. He is survived by his wife, Ruth, and his children, Joseph Wender, Barbara Rothlein, and Sherri Wender. 🌿



Robert V. Klucas

Robert V. Klucas lost his battle with cancer on February 28, 2002. The following messages pay tribute to his contributions to science, his service to the university and the profession, and to his role as mentor and friend.



Three Decades at the University of Nebraska–Lincoln by John Markwell and Terry Riordan

Bob Klucas came to the University of Nebraska as an assistant professor in 1970 and served for the next three decades. His colleagues remember him as altruistic, decent, honest, dependable, ethical, and self-sacrificing. He was truly a gentle man with a great deal of integrity. He was a supportive father to Pete and Gillian and an encouraging husband to Carol. Bob made many friends during his long career and was thought of very highly by his peer group as well as his students. He was a superlative teacher and mentor for graduate students and postdocs. He had high standards for academic achievement and often provided refuge and support for floundering graduate students.

Bob became head of the Department of Biochemistry in 1996. His administrative style was based on democratic input from all parties, a process of conciliation and commitment to work toward the general good. He continued to serve the university and the department even after the seriousness of his illness became evident. He spent much of his remaining energy supporting and mentoring junior faculty and working with his graduate and undergraduate students. Bob truly gave 32 years of service to his colleagues and his university, and he is missed.

A Research Career Fixing Nitrogen by Bob and Linda Shearman

Bob's research involving symbiotic and associative nitrogen fixation was both careful and cutting-edge. From his earliest work challeng-

ing a theory posed by a notable N_2 -fixation researcher to his final paper on non-symbiotic hemoglobins, he insisted on a conservative interpretation of data. He felt strongly that evidence had to be clear and supported by other approaches before he would propose a theory. Because of

this, Bob's work has contributed to our better understanding of the N_2 -fixation process. For example, his research established the site of N_2 -fixation in soybean nodules as being in the soluble rather than the membrane fraction. Later, his research with H. J. Evans demonstrated strong evidence supporting the conclusion that both N_2 -fixation and acetylene reduction were catalyzed by nitrogenase. This information led to the basis of a scheme for electron transport for N_2 -fixation by soybean nodule bacteroids. His research demonstrated that two components of nitrogenase, one containing iron and the other iron and molybdenum, were necessary for maximum activity. Bob's research further substantiated the acetylene reduction assay for N_2 -fixation assessment in free-living and symbiotic systems.

His research with associative nitrogen fixation with temperate grasses was unique. He demonstrated that those associations with bacteria located in the roots or rhizosphere most closely resembling symbiotic systems were most effective but were still ineffective in deriving useful levels of nitrogen. The final stages of his research involved the cloning of rice non-symbiotic hemoglobin, the description of its intracellular location and appearance in normal and stress situations and, in collaboration with Mark Hargrove, determination of the properties of recombinant rice hemoglobin.

By comparison, other researchers seemed content with attempting to attack a much smaller portion of the action. Bob's interests broadened based on a desire to understand the conditions that influenced nitrogenase activity but led into divergent areas of research—ammonium transport, enzyme oxidation state,

nodule senescence, leghemoglobin and its modified states, ferric leghemoglobin reductase, non-symbiotic hemoglobins and their function. Through all these years of research, his standards remained high, and many co-authors and students learned to appreciate his careful approach to publications.

Leghemoglobins by Manuel Becana

I first met Bob Klucas back in 1989. Dr. Klucas already had a well-established reputation as an excellent scientist and as an expert on leghemoglobin and senescence of legume root nodules. He had also worked on other important aspects within the field of biological nitrogen fixation, such as bacteroid metabolism and the essentiality of nickel as a micronutrient for grain legumes, but I was particularly attracted by his pioneering work on the mechanisms of nodules to maintain functional leghemoglobin. At that time, he had supervised or was supervising important Ph.D. dissertations on that subject. I recall those of Drs. Leonard Saari, Lin Ji, Steve Wood, and Keuk-Ki Lee, among others, all of which found guidance and inspiration in Dr. Klucas's open mind for science and teaching. I will never forget the wonderful companionship that I found in Bob's lab, as well as the interaction and friendship of its members with Dr. Gautam Sarath, at that time already a staff scientist in charge of the protein core facility of the UNL. Despite his heavy teaching duties and faculty meetings, Bob had always time to discuss science with us, to congratulate us on successful experiments and to continue in the track, or to suggest new ones, for those that failed. His very special human qualities, including deep concern about our well-being, made him sensitive to our distress. This is why, very soon after my arrival in his lab, my mentor, Dr. Klucas, became also my dear friend. Bob, and his at-that-time students, taught me generously all that I needed. We purified low molecular mass compounds that were able to reduce ferric leghemoglobin and identified some of them as flavins, and we studied the involvement of free radicals

and the protection by antioxidants in nodule senescence. Drs. Klucas and Sarath showed me how to work with proteins from nodules. I am particularly indebted to them for their insightful comments in seminars and their rigorous planning of experiments. I have, and will have forever, fond memories of the afternoons and sunsets spent at Bob's house and the dining excursions with him and Carol in the United States and Spain, where some years later they visited us. Bob, we will all miss you as a wonderful mentor and human being.

Leghemoglobin Degradation

by *Gautam Sarath*

I first met Bob when I joined the Biochemistry Department as a postdoctoral fellow. I became interested in mechanisms that degrade leghemoglobins (Lbs), and it was great to have one of the world's experts on Lbs next door. Although our formal collaboration had to wait for a few more years, Bob generously supplied me with highly purified samples of the different soybean root nodule Lbs. With time, this interaction evolved into a completely integrated collaboration on various aspects of plant hemoglobins and root nodule metabolism. In early 1993, we had discussed at length the existence of heme oxygenase (HO) and nitric oxide synthase (NOS) in plants, particularly root nodules. Although our studies failed to reveal the presence of either enzyme using standard biochemical techniques, it was reassuring to note the eventual discovery of the two enzymes in plants. Bob's original insights had been proved correct.

In addition to his scientific duties, Bob Klucas became the head of the Biochemistry Department in 1996 and held this role through his illness. His steady guidance and extremely fair treatment of all his staff were truly remarkable. He was one of the few really good scientists I have known who was also fair and decent to a fault. He was a strong proponent of the public education system and an exceptional mentor to students of all backgrounds, and he was willing to see the best in the people who worked for him. He was also a resource for

many students and postdocs who experienced difficulties in their individual labs. He never shut his door on a person and tried his utmost to build a strong and vibrant department. Bob touched a lot of people during his career.

Plant Non-Symbiotic Hemoglobins

by *Raúl Arredondo-Peter*

Obtaining the first clone of a plant non-symbiotic hemoglobin (nsHb) took several years of hard work and innumerable problems and obstacles. This situation would disappoint almost anyone, but not Dr. Klucas, who was always patient and confident. He frequently used to say, "Someday, very soon, we will have the (nsHb) clone." His enthusiasm and optimism were contagious, and thus we never gave up. Dr. Klucas had a strong passion for plant hemoglobins. This passion was evident in his face when I described the richness of vegetation after a trip I made to the tropical Mexican state of Quintana Roo. His comment to my description was, "If you want, you can bring to the lab any, any legume or other plant for the isolation of hemoglobins."

Dr. Klucas was always intellectually satisfied by any kind of new knowledge, and he enjoyed the period when we analyzed rice hemoglobin genes; however, he was especially excited about the possibility of obtaining a recombinant rice Hb1 for biochemical characterization. Bob Klucas was always concerned about other people's welfare. After my return to Mexico in 1997, he provided me with materials to continue working on plant hemoglobins, and he called or sent e-mail messages every Saturday morning to continue "traditional" Saturday lab chats with his "Mexican friend," as he used to call me. Bob Klucas was gone too early. However, a person's memory is alive if others remember him. I will never forget that for several reasons our future work aimed to understand plant nsHbs will be possible because of him.

Memories of a Mentor and Friend

by *Dan Arp, Paul Ludden, and Leonard Saari*

We were each fortunate to have had Bob as a mentor early in our careers. As an undergraduate next door, a laboratory assistant, and a graduate student, we all benefited from Bob's remarkably strong but quiet and non-intrusive mentoring style. He allowed each individual the space to reach for his or her full potential. Each of our careers was largely shaped by those early interactions with Bob. First, he set a standard for excellence. Second, he provided an environment in which we could grow. He was always ready to move us to the next challenge. Third, he provided a sounding board for whatever might be on our minds, and he always managed to make time for those conversations. And finally, he served as a wellspring of advice that was always considered, scholarly, and right on target.

But with Bob, the mentoring didn't stop when you left the lab. Throughout our scientific careers, Bob was always there. Not interfering, not strong-arming. But his steady influence was always felt. We were able to spend time with Bob just weeks before his death. Although clearly in the grips of the cancer that would soon take his life, he was still our mentor—offering advice, checking to see how things were going, what new discoveries we had made, what new directions we were pursuing.

But somewhere during those years, while the mentoring continued, a deep friendship grew. And the friendships included our families. Of course, there were always the scientific meetings where we could meet and catch up. In addition to the scientific meetings, we also found many opportunities to visit Bob and his family when we passed through Lincoln. And then there were the family vacations. We were part of a group that came together one week every five years in locations like the Grand Tetons of Wyoming, Crater Lake in Oregon, the Sawtooth Mountains in Idaho, and Gunnison, Colorado. Our families spent endless hours hiking, cooking, sharing stories, and receiving our regular doses of advice and encouragement from our friend and mentor.

ASPB News publishes dates, titles, locations, and contact names and addresses for meetings, courses, seminars, and the like that are of interest to ASPB members. **Submit announcements via the Web at <http://www.aspb.org/calendar/addevent.cfm>.** Questions? Contact Donna Gordon at dgordon@aspb.org. You may also reach us at *ASPB News*, 15501 Monona Drive, Rockville, MD 20855-2768 USA. **Faxed transmissions are not accepted.**

2002
AUGUST
August 1-4
Tissue Remodeling
**Scheman Continuing Education Building
Iowa State University, Ames**

Deadline for abstracts is May 31, 2002. Registration deadline is July 1, 2002. Travel grant application due May 31, 2002. Contact Growth Factor and Signal Transduction Conferences, Symposium Office, 3208 Molecular Biology Building, Iowa State University, Ames, IA 50011-3260; telephone 515-294-7968, fax 515-294-2244, e-mail gfst@iastate.edu <http://molebio.iastate.edu/~gfst/homepg.html>

August 1-6
**13th International Congress of the Federation of European Societies of Plant Physiology (FESPP)
Heraklion, Crete, Greece**

For information please contact Professor Kalliopi A. Roubelakis-Angelakis; telephone +30-81-394073; 304459, fax +30-81-394459, e-mail poproube@biology.uoc.gr or fespp@biology.uoc.gr <http://www.biology.uoc.gr/meetings/fespp>

August 3-7
ASPB Plant Biology 2002
Adams Mark Hotel, Denver, Colorado

<http://www.aspb.org/meetings/pb-2002/>

August 10-14
FASEB meeting on Plant Developmental Mechanisms
Vermont Academy, Saxton's River, VT

<http://www.faseb.org/meetings/src>

August 11-14
**The 9th Biennial Conference of the Cellular and Molecular Biology of the Soybean
Urbana, Illinois**

For details e-mail soy2002@aces.uiuc.edu or see the Web site <http://www.soy2002.uiuc.edu>

August 11-16
Gordon Research Conference on CO₂ Fixation & Metabolism in Green Plants
Mount Holyoke College, South Hadley, Massachusetts

For detailed information see the Web site, the February 15th, 2002, issue of *Science*, and/or contact one of the co-chairs, Ray Chollet (RCHOLLET1@unl.edu) or Christine Foyer (christine.foyer@bbsrc.ac.uk) <http://www.grc.uri.edu/programs/2002/co2.htm>

August 11-17
XXVI International Horticulture Congress and Exhibition—Horticulture: Art and Science for Life
Toronto, Canada

The Toronto Knowledge & Scholarship Forum is planned August 13, 2002. Offers of oral or poster presentation specifically intended for this forum must be received by e-mail (crom@uark.edu) by November 30, 2001. To see the third announcement and call for abstracts, visit the Web site. <http://www.ihc2002.org/>

August 22-26
**2nd Silicon in Agriculture Conference
Tsuruoka, Yamagata, Japan**

For information, please contact ian Feng Ma, Faculty of Agriculture, Kagawa University; telephone +81-87-891-3137, e-mail maj@ag.kagawa-u.ac.jp <http://cpln.kais.kyoto-u.ac.jp/silicon>

SEPTEMBER
September 9-12
**International Conference on Polyphenols
Marrakech-Morocco**

See the Web site or <http://www.worlcalendar.com> (keyword: polyphenols). For additional information contact Professor Ismail EL HADRAMI, Laboratoire de Physiologie Végétale, Département de Biologie, Faculté des Sciences Semlalia, BP. 2390, 40 001 Marrakech-Maroc; telephone +212-44-439997/434649 poste 521, fax +212-44-439997/330251/436769, e-mail hadrami@ucam.ac.ma or hadramii@hotmail.com <http://www.ucam.ac.ma/fssm/jie2002>

September 15-19
**6th International Conference on Pseudomonas Syringae Pathovars and Related Pathogens
Maratea (PZ), Italy**

For information contact Nicola Sante Iacobellis, Dipartimento di Biologia, Difesa e Biotecnologie Agro-Forestali, Università degli Studi della Basilicata, Campus Macchia Romana, 85100 Potenza, Italy; telephone +39 0971 205498, fax

Future ASPB Annual Meeting Sites
2003: Honolulu, Hawaii

Saturday, July 26, through
Wednesday, July 30

2004: Orlando, Florida

Saturday, July 24, through
Wednesday, July 28

+39 0971 205503, e-mail pseudomonassyringae@unibas.it <http://www.unibas.it/utenti/pseudomonassyringae>

September 16-27
Genomic Approaches to Forest Tree Stress Tolerance
**EU-funded short course/advanced research workshop
Crete, Greece**

For information contact Dr. Andreas Doulis, National Agricultural Research Foundation of Greece, PO Box 2229, GR-71003, Iralion, Crete, Greece; fax +30 810 245873, e-mail andreas.doulis@nagref-her.gr <http://www.maich.gr/environment/news/genomics.html>

September 18-21
**Genetic Engineering Workshop
Genetic Engineering and the Intrinsic Value and Integrity of Animals and Plants
Royal Botanic Garden, Edinburgh, UK**

Coordinator: Ifgene UK <http://www.anth.org/ifgene/2002.htm>

September 19-22
**Molecular Targets for Dietary Intervention in Disease
Scheman Continuing Education Building
Iowa State University, Ames**

Abstracts due July 19, 2002; registration deadline: August 19, 2002. Travel grant application due July 19, 2002. Contact Growth Factor and Signal Transduction Conferences, Symposium Office, 3208 Molecular Biology Building, Iowa State University, Ames, IA 50011-3260; telephone 515-294-7968, fax 515-294-2244, e-mail gfst@iastate.edu <http://molebio.iastate.edu/~gfst/homepg.html>

September 23-25

**1st Spanish Congress on Physiology, Biochemistry and Molecular Biology of Carbohydrates
Public University of Navarra, Navarra, Spain**
For detailed information see the Web site or contact Javier Pozueta-Romero (javier.pozueta@)

unavarra.es), Edurne Baroja-Fernandez (ebaroja@unavarra.es), or Francisco Jose Munoz (francisco.munoz@unavarra.es). <http://www.unavarra.es/carbohidratos/indexE.html>

September 29–October 01

Heavy Metals and Plants: From Ecosystems to Biomolecules—the 9th New Phytologist Symposium

University of Pennsylvania, Philadelphia

For information, contact Philip A. Rea, Plant Science Institute, Department of Biology, University of Pennsylvania, Philadelphia, PA 19104-6018; e-mail parea@sas.upenn.edu

OCTOBER

October 7–9

Biotechnologie Vegetales: VIII JS-AUF Marrakech-Morocco

See the Web site. For additional information contact Professor Ismaïl EL HADRAMI, Laboratoire de Physiologie Végétale, Département de Biologie, Faculté des Sciences Semlalia, BP. 2390, 40 001 Marrakech-Maroc; telephone +212-44-439997/434649 poste 521, fax +212-44-439997/330251/436769, e-mail hadrami@ucam.ac.ma or hadramii@hotmail.com <http://www.bioveg.refer.org>

October 10–19

Optical Microscopy & Imaging in the Biomedical Sciences

Marine Biological Laboratory, Woods Hole, Massachusetts

Application deadline is July 25, 2002. . Contact: Carol Hamel, Admissions Coordinator, Marine Biological Laboratory, 7MBL Street, Woods Hole, MA 02543-1015; telephone 508-289-7401, e-mail admissions@mbi.edu

October 23–25

XI Reunion Latinoamericana De Fisiologia Vegetal

XXIV Reunion Argentina De Fisiologia Vegetal I Congreso Uruguayo De Fisiologia Vegetal Conrad Resort & Casino Punta del Este, Uruguay

For information on the meeting see the Web site: <http://www.fvegetal.edu.uy>. For information on the location see www.conrad.com.uy

NOVEMBER

November 10–14

ASA-CSSA-SSSA Annual Meetings, Uniting Sciences Solutions for the Global Community Indianapolis, Indiana

For more information, view our web site or contact Keith Schlesinger, e-mail headquarters@agronomy.org <http://www.asa-cssa-sssa.org/anmeet/>

November 13–15

Plant species-level systematics: patterns, processes and new applications Gorlaeus Laboratory, Leiden, The Netherlands

For information contact symposium2002@nhn.leidenuniv.nl or see web site <http://www.nationaalherbarium.nl/symposium2002/>

November 24–29

Biotechnology Havana 2002: “Agro-Biotech in the New Millennium”

Center for Genetic Engineering and Biotechnology Havana City, Cuba

For information contact call +53-7-2718008, +53-7-2718466, fax +53-7-331779, e-mail bioagro@cigb.edu.cu or see the web site <http://bioagro.cigb.edu.cu>

2003

JANUARY

January 8–12

2nd International Congress of Plant Physiology On Sustainable Plant Productivity Under Changing Environment New Delhi, India

Contact Dr. G. C. Srivastava, Secretary General (ICPP 2003), Division of Plant Physiology, Indian Agricultural Research Institute, New Delhi 110012, India; telephone +91-011 5782815/5788773/5740616, fax +91-011-5766420/5751719, e-mail girish_chand_srivastava@rediffmail.com <http://www.ispponline.org>

January 15–19

Frontiers of Plant Cell Biology: Signals and Pathways, the 22nd Symposium in Plant Biology Riverside Convention Center Riverside, California

For more information contact Kathy Barton; telephone 909-787-4588, e-mail kathryn.barton@ucr.edu <http://www.cepcb.ucr.edu/news/news.htm#1>

January 26–31

Gordon Research Conference on Temperature Stress in Plants Ventura, California

For information contact Kay Walker Simmons, USDA/ARS National Program Staff, Beltsville, Maryland; telephone 301-504-5560, e-mail kws@ars.usda.gov <http://www.grc.org>

APRIL

April 6–9

Phytochemistry and Biology of Lignans Cloister St. Albert, Rheindorfer Burgweg 39, D-53332 Bornheim-Walberberg, Germany

Contact Professor Dr. Maïke Petersen, Institut für Pharmazeutische Biologie, Philipps-Universität Marburg, Deutschhausstr. 17A, D-35037 Marburg, Germany. Telephone 49-0-6421-2825821, fax 49-0-6421 2825828, e-mail petersen@mail.uni-marburg.de

April 10–16

Keystone Symposia “Plant Biology: Functions and Control of Cell Death”

info@kestonesymposia.org phone 800-253-0685 or 970-262-1230; fax 970-262-1525 <http://www.kestonesymposia.org>

MAY

May 18–22

Third International Symposium on Molecular Breeding of Forage and Turf

For more information, visit our web site or contact us at mbft2003@noble.org <http://www.noble.org/mbft2003>

May 25–29

Plants and Microbe Adaptations to Cold Quebec City, Canada

For more information on the meeting visit the web site at <http://www.pmac2003.org>. You can also contact Dr. Annick Bertrand, Agriculture and Agri-Food Canada 2560 Hochelaga Blvd., Sainte-Foy, Quebec, Canada G1V 2J3; email: bertranda@em.agr.ca

JUNE

June 7–12

Tree Biotechnology 2003, Umeå Plant Science Center, SLU

For more information please contact Ulrika Hjelm; e-mail ulrika.hjelm@genfys.slu.se <http://www.treebiotech2003.norrnod.se>

AUGUST

August 9–13

The Annual Meeting of the American Phytopathological Society (APS) Charlotte, North Carolina

For information, contact Kathy Aro; telephone 651-454-7250, e-mail karo@scisoc.org <http://www.apsnet.org>

August 17–23

Fourth International Symbiosis Congress Halifax, Nova Scotia

Organizers: Douglas Zook and David Richardson (david.Richardson@stmarys.ca). For more information visit our web site <http://people.bu.edu/dzook/>



ASP Placement Service Form

This form may be used only by members of the American Society of Plant Biologists. Please print or type your placement information on this form (curriculum vitae will not be accepted) and send to: **Donna Gordon, ASPB Headquarters, 15501 Monona Drive, Rockville, MD 20855-2768 USA; e-mail dgordon@aspb.org**

LAST NAME TITLE FIRST NAME INITIAL

STREET ADDRESS

CITY STATE ZIP COUNTRY

TELEPHONE FAX E-MAIL

I am seeking the following position (check all that apply):

- Permanent Temporary Postdoctoral Industrial
- Academic Government USA only Outside USA

US citizen? Yes No **Date available:** _____

Fields of interest, specialties, and publications titles: _____

Thesis, dissertation topics, professor: _____

Professional societies and honors: _____

Degree/year	Major	Minor	College/university and location

Postdoctoral study (specialty and with whom, where, and when): _____

Employer and location	From	To	Position, title, and duties

References (names, addresses, and telephone numbers): _____



I. Registering with the ASPB Placement Service and Obtaining Placement Files

ASPB operates a placement service in which are kept active two files of résumés of individuals who are seeking employment. Employers are urged to survey the résumé files for those seeking permanent positions and those seeking postdoctoral or similar positions. The files cost \$25 each and may be ordered from Donna Gordon, ASPB Placement Service, 15501 Monona Drive, Rockville, MD 20855-2768 USA. Those seeking employment should complete the Placement Service Form on the previous page to be included in the service.

II. Placing a Position Ad in the ASPB News and on the ASPB Homepage

Please note that **you may now submit jobs directly online**. Simply go to <http://www.aspb.org/jobbank/> and select **Submit a Job**. If you have any questions, please contact Donna Gordon at dgordon@aspb.org.

- **Academic/Government/Industry Permanent Positions (Ph.D. level):**
Fee: \$150. Includes listing in one issue of the *ASPB News* and 12 weeks on the ASPB online Job Bank.
Word Limit: 200 for print ad; no limit for online ad.
- **Postdoctoral Positions**
Fee: No charge for universities, nonprofit organizations, and government installations; \$150 for commercial companies. Includes listing in one issue of the *ASPB News* and 12 weeks on the ASPB online Job Bank.
Word Limit: 200 for print ad; no limit for online ad.
- **Research/Technical Positions (non-Ph.D.)**
Fee: No charge for universities, nonprofit organizations, and government installations; \$150 for commercial companies. Includes listing in one issue of the *ASPB News* and 12 weeks on the ASPB online Job Bank.
Word Limit: 200 for print ad; no limit for online ad.
- **Assistantships, Fellowships, Internships**
Fee: No charge; ad will appear in two issues of the *ASPB News*—the first time at full length and the second time in an abbreviated form—and 12 weeks on the ASPB online Job Bank.
Word Limit: None.

ACADEMIC/GOVERNMENT/INDUSTRY POSITIONS

Assistant Professor Position Université de Montréal—Montréal, Canada (Received 05/02)

The Department of Biological Sciences of the School of Arts and Sciences invites applications for an assistant professor position. Applicants eligible to the NSERC-UFA program (<http://www.nserc.ca/programs>) are especially invited to submit an application. We are looking for candidates in the field of Plant Molecular Biology. Research specialization in plant development and signal transduction are especially encouraged. The position will start from January 1, 2003. The deadline for applications is September 1, 2002, or until the position is filled. Applicant must have a Ph.D., postdoctoral experience, a strong publication record, and must be able to teach in their field in French in a reasonable time. Interested applicants should send their curriculum vitae, a description of the proposed research, reprints, copies of their university diplomas, and arrange for three

confidential letters of reference be sent, before September 1, 2002, to Dr. Thérèse Cabana, Chairman, Department of biological sciences, Université de Montréal, C.P. 6128, Succ. Centre-ville, Montreal, QC, Canada H3C 3J7; e-mail therese.cabana@umontreal.ca, website www.fas.umontreal.ca/BIOL. In accordance with Canadian immigration requirements, priority will be given to Canadian citizens and permanent residents in Canada. Université de Montréal is committed to a program of access to equity in employment for women.

Faculty Positions University of Toledo, Ohio (Received 05/21)

The Department of Earth, Ecological and Environmental Sciences, a new and rapidly growing academic unit at the University of Toledo, invites applications for three tenure-track faculty positions (rank open) in microbial ecology, plant ecology, and plant physiology to complement existing strengths in hydrology, geology, and ecology. Successful candidates must have a Ph.D. and postdoctoral experience. They

will be expected to have, or develop, an externally funded research program and to participate in undergraduate and graduate instruction. Candidates will join an interdisciplinary team of scientists focused on the Lake Erie basin and/or bioremediation research utilizing the university's new Lake Erie Research Center and Plant Science Research Center. Joint appointments in the appropriate centers are planned. These positions may begin in either January 2003 or August 2003 at the discretion of the successful candidates. Review of applications will begin September 1, 2002, and continue until the positions are filled. Salary, fringe benefits, and start-up funds are competitive. The department offers B.S., M.S., and Ph.D. degrees. Applicants should submit curriculum vitae, descriptions of teaching and research interests, and the names and addresses of three references to Chair, Search Committee, Department of Earth, Ecological and Environmental Sciences, Mail Stop #604, University of Toledo, Toledo, OH 43606-3390. The University of Toledo is an equal opportunity, equal access, affirmative action employer and educator. M/F/V/D are encouraged to apply.

THE DEADLINE FOR ADS FOR THE SEPTEMBER/OCTOBER ISSUE OF ASPB News IS AUGUST 31, 2002.

Check ASPB's web site (<http://www.aspb.org/jobbank/>) every Friday for new job listings. Jobs with early application deadlines are listed on the web site but might not appear in the *ASPB News*.

**Academic Coordinator II, Proteomics
Genomics Institute and Center for Plant Cell
Biology (CEPCEB)**

**University of California, Riverside
(Received 05/31)**

Under the general direction of the Director of the UCR Genomics Institute and the Director of CEPCEB, the Academic Coordinator in Proteomics will be responsible for supervision, maintenance and operation of the core Proteomics facility. The successful applicant will be expected to plan and organize all functions of the instrumentation facility, including establishment of workflow and procedures and selection and supervision of facility staff. Applicants must have a Ph.D. in biochemistry or chemistry with two to five years of demonstrated experience with capillary LC/MS/MS instruments and analysis of protein digests. The successful candidate should have experience in protein/biological mass spectrometry. Hands-on experience with the operation and maintenance of LC-MS instrumentation, specifically a Finnigan LCQ ion trap and a Micromass qToF, is desirable. Familiarity with bioinformatics tools for protein identification using mass spectrometric data is also preferred. Letter of application, including a curriculum vitae and three letters of reference should be sent to E. A. Nothnagel, Chair, Botany and Plant Sciences, University of California, Riverside, CA 92521-0124. For details see <http://www.cepceb.ucr.edu>. Evaluation of applications will begin September 1, 2002. The University of California is an affirmative action/equal opportunity employer.

**Research Agricultural Engineer
USDA/ARS, Madison, Wisconsin
(Received 05/31)**

The U.S. Department of Agriculture, Agricultural Research Service is accepting applications for a Research Agricultural Engineer at the U.S. Dairy Forage Research Center. Incumbent will conduct research leading to new harvest, storage, and conversion processes of plant materials to advance dairy farm profitability and introduce new value-added products including energy. Research objectives are to improve the technical and economic feasibility of bio-based products and feedstocks including fuels. Specific objectives include: 1) harvesting and transport strategies that minimize cost and maintain quality; 2) storage technology to allow year-round utilization; and 3) processing for conversion of herbage to value-added fractions, and feedstocks for biological conversion and/or fuels. Salary range: \$54,275–\$83,902 annually or commensurate with experience. A Ph.D. in engineering, a related field, or equivalent experience is required.

Candidates must be U.S. citizens. For information contact Neal Martin; telephone 608-264-5240, e-mail npmartin@facstaff.wisc.edu. For vacancy announcement and application forms contact Jean Weinbrenner; telephone 608-264-5357, e-mail jweinbr@facstaff.wisc.edu or visit website <http://www.ars.usda.gov/opportun.htm>. Applications should be marked ARS-X2W-2265, and must be postmarked by August 5, 2002; or by second cut-off date, October 7, 2002; or until position is filled. USDA is an equal opportunity provider and employer. Women and minorities are encouraged to apply.

**Plant Biologists Monsanto Company,
St. Louis, Missouri
(Received 06/28)**

Responsibilities: Monsanto Company, publicly-traded on the NYSE, is a leading provider of agricultural products to farmers. With our unique combination of products and our unparalleled resources in genomics and plant biotechnology, we create integrated solutions to improve farm productivity and reduce the costs and risks of farming. Join us in this integral role located in our St. Louis, MO offices. We are seeking four individuals to participate in a functional genomics program to discover genes that enhance agronomic and quality traits in crop plants. These individuals will participate in the analysis of phenotypic data derived from a large collection of transgenic plants, to identify genes for additional study and development into products. We are looking for two plant biologists to play the following role in this project: -Mine analyzed phenotypic data to prioritize genes for further development—Integrate transgenic phenotypes to hypothesize gene function - Develop strategies to confirm preliminary observations and test hypothesized modes of action. Required Skills: A Ph.D. in plant molecular biology, plant physiology or genetics is required, post-doctoral experience preferred. Experience with complex data sets, basic understanding of statistical principles and databases a strong plus. Minimal travel required. Full relocation benefits. Monsanto values diversity and is an equal opportunity affirmative action employer. To respond to this job, access our website at www.monsanto.com.

**Assistant Professor
Washington State University, Pullman
(Received 06/28)**

The Institute of Biological Chemistry at Washington State University invites applications for a tenure-track Assistant Professor position to begin August 2003. Applicants must have a

Ph.D., or equivalent, as well as a strong record of research and publications in plant biochemistry, molecular genetics, genomics, or another area of modern plant biology. The ability and commitment to build a dynamic, well-funded program of international stature is essential. The Institute (<http://ibc.wsu.edu>) provides an excellent research environment with more than 120 scientists, excellent equipment and facilities, and ready access to specialized techniques in biochemistry, cell biology, and genomics. Candidates should submit curriculum vitae, statement of research interests, and a description of future plans. In addition, applicants should arrange for three letters of reference to be sent to Dr. John Browse, Search Committee Chair, Institute of Biological Chemistry, Washington State University, P.O. Box 646340, Pullman, WA 99164-6340; telephone 509-335-5496, fax 509-335-7643, e-mail maertens@wsu.edu. Review of applications will begin on September 17, 2002, and continue until the position is filled. EEO/AA/ADA.

**Research Scientist
Pioneer, A DuPont Company, Des Moines, Iowa
(Received 07/01)**

Pioneer Hi-Bred International, Inc. is the world leader in the discovery, development and delivery of elite crop genetics. We have an immediate opening for a Seed Physiologist to lead research aimed at understanding mechanisms underlying superior stand establishment and improving assessment of seed quality and product performance. Duties and responsibilities include 1) identifying genes, pathways and markers for cold germination and seedling stress tolerance, 2) developing predictive tools for stand establishment under stress, and 3) supporting efforts to improve seed quality through developing and evaluating new vigor tests. A Ph.D. in seed biology, plant physiology or crop science with at least 2-3 years relevant experience is required. Additional qualifications include demonstrated ability to independently conceive and implement research projects, strong technical background including relevant physiological, molecular and statistical tools, strong communication skills, and ability to work cross functionally across business units. Strong project management and supervisory skills are also essential. Visit www.pioneer.com for a complete job description. You must reference Job Code RES/PP159/PAP in order to be considered. Please send a resume/cover letter and three references to: Resume Processing Center, Pioneer, A DuPont Company, PO Box 14453, Des Moines, IA 50306-3453, or e-mail apply@pioneerjobs.com. EOE

POSTDOCTORAL POSITIONS**Postdoctoral Position****Southern Illinois University, Carbondale
(Received 05/03)**

A position is available September 1, 2002, on a federally funded project to study the intercellular transport of heavy metals in hyperaccumulating plant species such as *Thlaspi caerulescens* and *Arabidopsis halleri*. These plants actively hyperaccumulate metals into the leaves, yet store these metals in different cell types, either throughout the leaf or in specific cell layers. The primary questions to be addressed include (1) the heavy influx and efflux characteristics of mesophyll cells from hyperaccumulators that contribute to these patterns of cellular sequestration, (2) the lability of heavy metals in these cell types, and (3) the apoplastic loading of metals in the leaves of hyperaccumulators. Applicants should have demonstrated skills in protoplast and vacuole isolation as well as experience with and/or knowledge of techniques used to study plant membrane transport. Applicants with additional skills in radioisotope techniques, cellular or molecular biology, plant biochemistry, fluorescent or electron microscopy, atomic absorption spectroscopy, x-ray absorption spectroscopy, or membrane biology are particularly encouraged to apply and to pursue these and related questions from those perspectives. Additional projects related to this topic are also in progress. Interested individuals should send a letter describing research training and interests, curriculum vitae, names of references, and representative publications (if available) to Dr. Stephen Ebbs, Southern Illinois University Carbondale, Department of Plant Biology, 420 Life Science II, MC 6509, 1125 Lincoln Drive, Carbondale, IL 62901, or send these materials via e-mail to sebbs@plant.siu.edu. The position will remain open until filled.

Postdoctoral Position**Université de Neuchâtel, Switzerland
(Received 05/06)**

A postdoctoral fellowship is available immediately until September 2004 at the Laboratoire de Biochimie (Institut de Botanique) group of Professor J. M. Neuhaus. The successful candidate will participate in a project funded by the Swiss National Science Foundation that addresses the mechanisms of protein sorting to different types of vacuoles (*Plant Cell*, 13, 781; *Plant Physiol.* 126, 78; <http://www.unine.ch/bota/bioch.html>). Candidates should have experience in cell biology and fluorescence, confocal, and/or electron microscopy. A Ph.D. in plant physiology is recommended. Send a full curriculum vitae and a cover letter, including the names and addresses

of two academic referees, to Jean-Marc Neuhaus, Laboratoire de Biochimie, Université de Neuchâtel, rue E.-Argand 9, CH-2007 Neuchâtel, Switzerland; e-mail Jean-Marc.Neuhaus@unine.ch.

**Postdoctoral/Research Associate Position in
Evolutionary Biology****Rutgers University, Piscataway, New Jersey
(Received 05/07)**

The Plant Genome Initiative at Rutgers University (<http://pgir.rutgers.edu/>) seeks an applicant who applies evolutionary studies to comparative genomics in cereal plants (see NSF Award #9975618 for abstract). Applicants with experience in large molecular weight DNA analysis, DNA sequencing, and computational tools are preferred. Requirements include a Ph.D. in evolutionary biology or related field and good writing skills because of the opportunity to publish extensively. Candidates with postdoctoral experience would qualify for research associate level. Please e-mail (messing@waksman.rutgers.edu) or mail your application and ask three references to e-mail or mail their recommendation to Dr. Joachim Messing, Director, Waksman Institute, Rutgers–The State University of New Jersey, 190 Frelinghuysen Road, Piscataway, NJ 08854-8020.

**Postdoctoral and Graduate Student Fellowships
University of North Carolina, Chapel Hill
(Received 05/08)**

Several positions are immediately available for postdoctoral and predoctoral fellows to work on the mechanism of heterotrimeric G protein signaling in *Arabidopsis*. Successful applicants will engage in research using both genetic and cell biology approaches. Experience in *Arabidopsis* genetics, FRET analysis, bioinformatics, or mammalian G-protein signaling is advantageous. Applicants should first send a curriculum vitae and a research statement to alan_jones@unc.edu. The research statement must contain how the applicant's expertise would specifically contribute to this project and ideas on how one can advance our understanding of G-protein signaling in plants.

Postdoctoral Position**NovaFlora, Inc, Philadelphia, PA
(Received 05/14)**

NovaFlora (www.novaflo.com) is seeking a Plant Molecular Biologist to optimize and develop screening protocols for transgenic plants. Previous experience and expertise in high throughput analysis of transgenic plants through PCR, Southern and Western analysis is required. NovaFlora, Inc is a leader in ornamental plant

biotechnology. With a powerful toolbox of trait and enabling gene technology, NovaFlora is well positioned to commercialize a unique range of ornamental plants. Through a license with PBL and the John Innes Center, UK, NovaFlora owns rights for ornamental plants to GAI, CONSTANS and CEN. NovaFlora is using these genes to create novel dwarf plants, early flowering plants and plants with altered architecture. Established in 1993, NovaFlora is a privately held company with a strong entrepreneurial spirit. As a part of our team, you will be expected to contribute to the scientific and commercial success of NovaFlora. In addition to expertise in plant molecular biology, you should be a multifaceted, highly motivated individual with excellent communication skills. E-mail applications including a resume, list of publications and the names and e-mail addresses of three references to Michael Dobres at jobs@novaflo.com or by mail to NovaFlora, Inc., 3401 Market St, Ste 350, Philadelphia, PA 19104; telephone 215-387-5060, ext 204.

Postdoctoral Positions**Mississippi State University, Starkville
(Received 05/16)**

Two postdoctoral research assistant positions are available immediately to study molecular mechanisms of plant cell dedifferentiation. One position is to characterize and clone T-DNA tagged mutants in *Arabidopsis*. The other position is to study cell dedifferentiation using a proteomic approach. Candidates with background in plant molecular biology or biochemistry are encouraged to apply. Please e-mail your curriculum vitae to Dr. Zhaohua Peng, Department of Biochemistry and Molecular Biology, Mississippi State University, Starkville, MS 39762; e-mail: zp7@ra.msstate.edu, telephone 662-325-0685, fax 662-325-8664.

Postdoctoral Position**University of Nebraska, Lincoln
(Received 05/16)**

An NSF-funded research position is available, starting as soon as possible (but no later than October 2002), to study either (a) the structure-function relationships and regulatory phosphorylation of green leaf (C4) and algal PEP carboxylase (PEPC), or (b) the (multisite) seryl-phosphorylation of legume root-nodule sucrose synthase (SuSy [nodulin-100]). The <http://biochem1.unl.edu/> and <http://psiweb.unl.edu/faculty.html> sites can be consulted for related publications and federal grants from 1996-present, and research facilities. Advanced research experience in molecular cloning, recombinant proteins and site-directed mutagenesis, enzymology and protein chemistry, and/or

reversible protein phosphorylation is RE-QUIRED. Please send curriculum vitae, reprints, and names, e-mail addresses and telephone/fax numbers of two references to Dr. Raymond Chollet, University of Nebraska-Lincoln, Department of Biochemistry, George W. Beadle Center, Lincoln, NE 68588-0664; e-mail RCHOLLET1@unl.edu, telephone 402-472-2936, fax 402-472-7842.

**Seven Postdoctoral Positions
EC Research Training Network DAGOLIGN
(Received 05/16)**

“Development and Growth of Leaves: Identification of Genetic Networks.” Start–end: September 2002–September 2005. Applicants (age 35 yrs) will be trained in general and specialized techniques in plant developmental biology in the host lab. They will report at regular meetings within the network, and short training periods in participating labs will be possible. Mieke Van Lijsebettens, coordinator: Dept. Plant Systems Biology, University Gent/ VIB, Belgium. Cathie Martin: Dept. Cellular and Developmental Biology, JIC, Norwich, UK. Cris Kuhlemeier: Institute Plant Sciences, University Bern, Bern, Switzerland. José Luis Micol: Dept. Genetics, University Miguel Hernandez, Alicante, Spain. Christine Granier: INRA-LEPSE, Montpellier, France. Miltos Tsiantis: Dept. Plant Sciences, University Oxford, Oxford, UK. Willy Dillen: CropDesign, Gent, Belgium. Key words: Arabidopsis and close relatives, simple and dissected leaves, rice, leaf growth and morphogenesis, auxin, phyllotaxis, yield potential and stability, mutants, gene cloning transcript profiling, microarrays, overexpression, knowledge database. The applicants have to be nationals of an EC member or associated state and need to have a different nationality than the country to which they make their application. Administrative coordinator: Christine Tire (chtir@gengenp.rug.ac.be), web site <http://www.psb.rug.ac.be/DAGOLIGN>.

**Postdoctoral Positions
The Ohio State University, Columbus
(Received 05/21)**

Postdoctoral positions are currently available, or will be available soon, to study aspects of (1) the biochemistry/enzymology of enzymes involved in CO₂ fixation including RubisCO, RubisCO-like proteins, and pyruvate/(–)ketoglutarate synthase from photosynthetic organisms and archaea (Proc. Natl. Acad. Sci. USA 98, 4397–4402, 2001; Photosyn. Res. 60, 1–28, 1999; J. Biol. Chem. 276, 44027–44036, 2001) and (2) the molecular regulation of CO₂ fixation in purple nonsulfur photosynthetic bacteria (J. Mol. Biol. 300, 1079–1099, 2000; J. Bacteriol. 184, 1905–

1915, 2002; J. Biol. Chem. 275, 19224–19230, 2000). Further details of our research projects and laboratory may be found at our web sites <http://www.biosci.ohio-state.edu/~microbio/frt.html> and <http://www.biosci.ohio-state.edu/~cbobst/ourlab.htm>. Applicants should have considerable experience with molecular biological and biochemical procedures and have worked on a molecular/biochemical problem during recent doctoral or other postdoctoral studies. Please e-mail or send a curriculum vitae and the names and addresses of three references to Professor F. Robert Tabita, Department of Microbiology, The Ohio State University, 484 West 12th Avenue, Columbus, OH 43210-1292; telephone 614-292-4297, fax 614-292-6337, e-mail tabita.1@osu.edu. The Ohio State University is an equal opportunity/affirmative action employer. Women, minorities, Vietnam-era veterans, disabled veterans, and individuals with disabilities are encouraged to apply.

**Postdoctoral Positions
University of California at Berkeley
(Received 05/29)**

Postdoctoral positions are now available to study the function of immunophilins and tyrosine phosphatases in signal transduction in Arabidopsis by biochemical and genetics approaches (PNAS, 93, 6964; PNAS 96, 4718; Plant Cell 10, 849; Nature 417, 567). Candidates with Ph.D. degree and experience in biochemistry, molecular biology, and Arabidopsis genetics are welcome to apply by sending a curriculum vitae and names of references to Dr. Sheng Luan, Department of Plant and Microbial Biology, University of California, Berkeley, CA94720; e-mail sluan@nature.berkeley.edu.

**Postdoctoral Position
Bioriginal Food & Science Corporation,
Saskatchewan, Canada
(Received 05/23)**

Bioriginal is the world's leading manufacturer of essential fatty acid products. Bioriginal supplies some of the most respected names in the health, nutrition, skin care, animal care and pharmaceutical industries. We are currently seeking three to four postdoctoral fellows or Molecular Biologists to join our collaborative research on production of nutraceuticals in plants. The position will be allocated in the Plant Biotechnology Institute, National Research Council of Canada, Saskatoon, Saskatchewan. The successful candidate must have a Ph.D. degree in molecular biology or related areas. Experience with lipid metabolism and its manipulation is an asset. As a member of the team, you will be responsible for identifying the genes involving lipid biosynthesis in oil-producing organisms and then examining the

function in oilseed crops. Bioriginal is pleased to offer its full-time employees a leading edge compensation and benefits package. Please send resume along with salary expectations and three references to Xiao Qiu, Director of Research, Bioriginal Food & Science Corp., C/O: Plant Biotechnology Institute National Research Council, Saskatoon, Saskatchewan, Canada S7N 0W9; e-mail Xiao.Qui@nrc.ca, telephone 306-975-9558, fax: 306-975-4839. Only eligible candidates will be contacted.

**Postdoctoral Position
Virginia Polytechnic Institute and
State University, Blacksburg
(Received 05/31)**

A postdoctoral position is available for two years in the Department of Biology at Virginia Tech to work on flavonol biosynthesis in Arabidopsis. The project aims to determine the role of flavonoid 3'-hydroxylase and six flavonol synthase isozymes in controlling flux into the flavonol branch pathway of flavonoid biosynthesis. The work will involve the construction and analysis of transgenic plants to address this question and to begin to assess the biological functions of specific flavonols in plants. Analysis of protein interactions with other flavonoid enzymes may also be initiated. A Ph.D. degree in a relevant area and experience in molecular biology are required. Virginia Tech is a land-grant university located in Blacksburg, a college town in the beautiful Appalachian mountains. Virginia Tech has a strong commitment to the principle of diversity, and in that spirit, seeks a broad spectrum of candidates including women, minorities, and people with disabilities. Individuals with disabilities desiring accommodations in the application process should call 1-800-828-1120. Applications and three letters of reference may be sent to Dr. Brenda Winkel-Shirley, Department of Biology, Virginia Tech, Blacksburg, VA 24061-0406.

**Postdoctoral Position
Plant Biotechnology Institute, Saskatoon, Canada
(Received 05/31)**

A postdoctoral position is available with the National Research Council of Canada at the Plant Biotechnology Institute to investigate gene expression changes associated with embryo induction in Brassica microspores. The PDF should be skilled in standard molecular techniques and preferably have interests in plant development, embryogenesis (or seed biology) and plant biochemistry. The program will involve cDNA library construction (including subtractive hybridizations) and EST sequencing to identify candidate up- and down-regulated genes. The candidate is expected to have experience with

vector constructions, plant transformation and gene expression analysis techniques (Northern, RT-PCR etc.). An interest in microarray analysis is desirable. The position is funded by a recent NRC genomics initiative (Enhancing Crop Value and Performance Through Genomics) and will have additional technical support for cDNA library constructions, EST sequencing and BLAST analysis through a shared genomics laboratory. This project is part of a large collaborative program at the Plant Biotechnology Institute funded by NRC that will focus on Brassica seed development. This is initially a two-year position starting at 39,805 (CAN\$) plus a travel allowance. Interested applicants should send a curriculum vitae and a letter of interest to Dr. Joan Krochko at the Plant Biotechnology Institute, National Research Council, 110 Gymnasium Place, Saskatoon, Saskatchewan, Canada S7N0W9; email joan.krochko@nrc.ca, telephone (306) 975-4993, fax: (306) 975-4839. Hiring for this position also requires the applicant to submit a formal NSERC-NRC postdoctoral application (<http://hr.nrc.ca:8080/HRB/CareerPg.nsf/GradE/NSERC>).

**Postdoctoral Fellow Position
University of Ottawa, Canada
(Received 06/03)**

Seeking transformation specialist for insect resistance in rice, sorghum and cowpea. Candidates should have demonstrated ability in molecular biology; generated and analysed transgenic plants; prior experience with native Bt and synthetic gene systems and their manipulation. Applicants should send curriculum vitae and three names of referees to I Altosaar, Biochem Dept, University of Ottawa, Ottawa K1N 6N5 Canada.

**Postdoctoral Positions
University of Wisconsin, Madison
(Received 06/03)**

Two postdoctoral positions are available. The first position is to study potato gene expression profiles using microarray-based methods. We will use 10,000-spot cDNA arrays to investigate several unique biological phenomena in potato, including tuberization and polyploidization. The second position is to study the structure and function of plant centromeres using cereal species as models. Candidates with training in plant molecular biology or biochemistry are encouraged to apply. Research experience using microscopic techniques is desirable but not required for the centromere position. Please send your applications, including contact information for three references (email addresses and telephone), to Dr. Jiming Jiang, Cellular and Molecular Biology Program and Department of

Horticulture, University of Wisconsin-Madison, Madison, WI 53706; e-mail jjiang1@facstaff.wisc.edu, telephone 608-262-1878.

**Postdoctoral and Graduate Student Fellowships
Université de Montréal, Canada
(Received 06/05)**

A postdoctoral and a Ph. D. student positions are available immediately to work on genomic analysis of signaling during embryogenesis, and on receptor-kinase/ligand function in Solanaceous species. The program has already identified numerous protein kinases and receptor-like kinases (RLK) expressed in reproductive tissues through a negative selection screen and the sequencing of 10,000 ESTs corresponding to rare mRNAs. The project involves the development of DNA microarrays for genes involved in signaling and the regulation of embryogenesis, and the search for new RLK ligands. The annual salary (PDF) will be from \$32,000 to \$35,000 (CDN) depending on experience, and the initial appointment will be for one year with a possibility of renewal for one or two additional years. The positions are funded by an ongoing NSERC genomics grant and a Canada Research Chairs fund. For the Ph. D. student fellowship, the annual stipend may vary according to the availability of special student exchange programs between the Université de Montréal and the country of residence of the student. The candidates are expected to have experience with vector constructions, plant transformation and gene expression analysis techniques. A strong background in protein biochemistry (protein immunodetection, expression, and purification) is highly desirable for the RLK/ligand project, and an interest in microarray analysis and RNA interference is desirable for the functional genomic aspects of signaling during embryogenesis. English language is sufficient at the PDF level, and oral understanding of french is a strong asset for Ph. D. candidates. Please send (preferably via e-mail to mattond@irbv.umontreal.ca) your application with curriculum vitae including the names, phone numbers, and e-mail addresses of three references to Dr. Daniel P. Matton, Institut de Recherche en Biologie Végétale, Université de Montréal, 4101 Sherbrooke Street East, Montréal, QC, Canada H1X 2B2; web site: www.irbv.umontreal.ca.

**Postdoctoral Position
University of Arizona, Tucson
(Received 06/06)**

An NSF-funded postdoctoral position is available for up to three years to use modern biochemical, genomics and analytical tools to study the biosynthesis of natural products in model

aromatic plants. The work will involve the use of metabolic profiling, gene expression profiling, and biochemical and chemical analysis to elucidate metabolic pathways, to identify and characterize unknown steps in these pathways, and to investigate how these pathways are regulated. For more information, please see <http://ag.arizona.edu/research/ganglab>. Qualified candidates will have a Ph.D. in biochemistry, chemistry, plant biology, or a related field. In addition, they will have experience in mass spectrometry (LC/MS and GC/MS) or protein heterologous expression, purification, and characterization. Experience in both areas would be preferred. In addition, experience in molecular biology techniques such as PCR, cDNA library construction and RACE would also be beneficial. Start date is on or after September 1, 2002. Please send applications, curriculum vitae (including a list of publications), contact information for three references, and a letter describing research interests to David Gang, University of Arizona, Department of Plant Sciences, Box 210036, Tucson, AZ 85721-0036; telephone: 520-621-7154, fax: 520-621-7186, e-mail gang@ag.arizona.edu.

**Postdoctoral and Research Assistant
Positions Université Laval, Québec, Canada
(Received 06/06)**

A large-scale project in functional genomics applied to forest trees funded by Genome Canada is now offering several employment opportunities at Université Laval and the Canadian Forestry Service, both located in Québec city, Canada. The project will investigate the regulation of wood formation (secondary xylem differentiation) and defense response in trees by utilizing functional genomics methods including transcriptome analysis and manipulation of gene expression. Positions include: Project Manager (Position #1); Scientific Coordinator – Bioinformatics (Position #2); Research Assistant - Molecular Biology and Bioinformatics – Several Positions (Position #3); Postdoctoral Fellowships, Molecular Biology and Functional Genomics (Position #4); Research Assistants: Platform in Plant Transformation (Forest Trees) – Several positions (Position #5). Complete descriptions of positions and application deadlines are available at <http://forgenome.rsvs.ulava.ca>. Apply by e-mail to genome.fore@rsvs.ulaval.ca. Submit a current résumé, a cover letter, and the name and address of three references. Send requested information in a single attachment (MS Word or pdf files only) with applicant's name in filename, or insert information in body of message. Write the position number in subject line.

Postdoctoral Position**State University of New York, Buffalo
(Received 06/18)**

A postdoctoral position is available immediately to study mRNA/protein interactions and regulation of Rubisco gene expression in C4 plants. This project will focus on expression of rbcL gene expression and characterization of an associated mRNA binding protein (McCormac et al., 2001, J. Biol. Chem. 276:3476-3483). Familiarity with RNA/protein interactions or transgenic plants preferred but not essential. For consideration, applicants should have publications in peer-reviewed international journals. The initial appointments will be for two years, with possible renewal. Please send a letter of application outlining previous research experience and accomplishments, curriculum vitae, and the addresses of three references to Dr. James Berry, Department of Biological Sciences, University at Buffalo, Buffalo, NY 14260; telephone 716-645-3488, fax 716-645-3369, e-mail camjob@acsu.buffalo.edu. The State University of New York is an equal opportunity employer/recruiter.

Postdoctoral Position**Institute of Botany, Academia Sinica,
Taipei, Taiwan
(Received 06/18)**

An NSC-funded postdoctoral position is available for up to three years to identify, isolate and characterize genes associated to plant pathogen-mediated hypersensitive response (HRAG), and furthermore to use transgenic technology to generate hrag-transgenic crop to study gene functions and to improve target crops diseases resistance. The work will involve the use of micro-array, tissue culturing, gene cloning, gene transferring, molecular and pathological methods to evaluate the transgenic crops. For more information, please see <http://botany.sinica.edu.tw/english/personnel/224-n.html>. Qualified candidates will have a Ph.D. in biochemistry, plant biology, or a related field. In addition, experience in molecular biology techniques such as PCR, cDNA library construction and RACE would also be beneficial. Start date is on or after August 1, 2002. Please send application, curriculum vitae (including a list of publications), and a letter describing research interests to Dr. Teng-Yung Feng by e-mail bofung@sinica.edu.tw.

Postdoctoral Positions**Boyce Thompson Institute, Ithaca, New York
(Received 06/18)**

Available January 2003 to join a research group studying the rbuscular mycorrhizal symbiosis. Current efforts focus on signaling, development and regulation of the symbiosis and the

mechanisms underlying symbiotic phosphate transport. A model legume, *Medicago truncatula* is used for these investigations. Selected publications from the lab: *Trends in Plant Science*, 2 : 54-60 (1997), *Plant Journal*, 25: 281 (2001), 9: 491(1996), 6: 9 (1994), *MPMI* 14:1140 (2001), 12: 171 (1999), *Ann. Rev. Plant Phys and Plant Mol. Biol.*, 50: 361 (1999), *Nature*, 378: 626 (1995). Projects available include, (1) Gene expression profiling and RNAi to dissect signaling, development and regulation of the symbiosis, (2) characterization and cloning of mycorrhizal mutants and (3) biochemical and genetic analyses of mycorrhizal-specific phosphate transport. Requirements: post-doctoral applicants must have a Ph.D. and demonstrated expertise in molecular biology, genetics or biochemistry. A strong publication record is essential. For project 1, experience with microarray technology is advantageous. For all positions, experience with plants, mycorrhizal associations and basic microscopy is preferred. To apply send a letter summarizing research interests, a curriculum vitae and names of three references to Boyce Thompson Institute, Tower Road, Ithaca, NY 14853, Attn: Human Resources, Job # 2002-08, or e-mail curriculum vitae to lbp8@cornell.edu. BTI is an independent not for profit research institute affiliated with Cornell University and located on the Cornell campus. Boyce Thompson Institute is an equal opportunity employer.

Postdoctoral Position**INRA-URGAP Legume Unit, Dijon, France
(Received 06/18)**

A post-doctoral position is available from September 2002 initially for one year, for a non-french applicant to join a team studying seed development in the model legume, *Medicago truncatula*. The applicant would be expected to contribute to the setting-up of a TILLING-based resource for mutant isolation in *M. truncatula*. TILLING involves organising a chemically mutagenized population so that it can be screened by PCR for point mutants in any gene of interest. This facility will be exploited to isolate mutants in selection of candidate genes for important agronomic traits including those related to seed development. The lab is engaged in genetic and proteomic analyses of seed development and composition for *M. truncatula*. The INRA-URGAP institute at Dijon is devoted to legume breeding and genetics, with laboratories well-equipped for molecular genetics and providing an environment of complementary genetic and molecular expertise in pea and *Medicago truncatula* helpful to this project. The appointee will collaborate with other INRA teams linked in their study of different aspects of *Medicago* biology. Dijon is an attractive city in

the heart of Burgundy with a lively university and good social facilities. Please send applications, preferably by e-mail, and including a curriculum vitae, summary of current research experience and perspectives, names and contact information for two referees to Dr. Richard D. Thompson, INRA-URGAP Legume Unit, BP 86510, 21065 DIJON; telephone 0033-380-693-141, fax 0033-380-693-263, e-mail thompson@epoisses.inra.fr.

Postdoctoral Positions**Donald Danforth Plant Science Center,
St. Louis, Missouri
(Received 06/18)**

Several positions in plant lipid metabolism are available starting immediately. Projects with openings involve structure-function studies of fatty acid condensing enzyme, production of unusual fatty acids in oilseeds, analysis of metabolites of fatty acid and lipid metabolism using LC-MS and GC-MS, and characterization of plant lipid metabolism in different plant organs. A Ph.D. with a strong background in biochemistry is a minimum requirement, and experience with plants and molecular genetics is highly desirable. This research will be carried out at the Donald Danforth Plant Science Center in St. Louis. The Center has recently moved into a new state-of-the-art facility dedicated to basic and applied plant research. Please send resume and three references to Jan Jaworski Lab, c/o Janet Oriatti, Donald Danforth Plant Science Center, 975 North Warson Rd, St. Louis, Missouri 63132. The Donald Danforth Plant Science Center is an equal opportunity/affirmative action employer and encourages applications from underrepresented groups, including minorities, women, and people with disabilities.

Postdoctoral Positions**Carnegie Institution, Stanford, California
(Received 06/18)**

Two positions for postdoctoral associates are available in the Department of Plant Biology. Our research focuses on brassinosteroid (BR) signal transduction, which involves the cell-surface receptor kinase BRI1 (Wang et al., *Nature* 410, 380-382, 2001), the GSK3-like kinase BIN2 (Li and Nam, *Science* 295, 1299, 2002), and the nuclear proteins BZR1 and BZR2 (Wang et al., *Dev. Cell* 2, 505, 2002; He et al., *PNAS*, in press, 2002). Research projects for these positions include study of BR signal transduction pathways using genetic and proteomic approaches and studies of the functions of BZR1 and its homologs using molecular, genetic, biochemical and cell biological tools. More information about the lab and the Carnegie Institution can be found at our web site (<http://www-ciwdpb.Stanford.EDU>). Candidates with research experience in

molecular genetics, protein biochemistry, 2-D PAGE/proteomics are particularly encouraged to apply. Salary and benefit will be highly competitive. To apply, please send curriculum vitae, and names and e-mail addresses of three references to Dr. , Department of Plant Biology, Carnegie Institution, 260 Panama Street, Stanford, CA 94305; e-mail zywang@andrew2.stanford.edu, telephone 650-325-1521 ext 205, fax: 650-325-6857.

Postdoctoral Research Associate

Rutgers University, New Brunswick, New Jersey (Received 06/18)

A post-doctoral associate position is available immediately in cranberry stress physiology. Potential areas of study include effect of drought stress on processes such as water relations, gas exchange, chlorophyll fluorescence, rooting characteristics, and on crop impacts including fruit quality and productivity. This is a temporary position of 100% research up to two years, subject to annual reappointment. A Ph.D. in woody plant physiology, Horticulture, Plant Science, or related field is required. Experience with LICor 6400 and root imaging system desirable. Interested candidates should send curriculum vitae and three letters of reference to Dr. Bingru Huang, Dept. Plant Biology, Cook College, 59 Dudley Road, New Brunswick, NJ 08901; e-mail huang@aesop.rutgers.edu.

Postdoctoral Research Position

Purdue University, West Lafayette, Indiana (Received 06/18)

A postdoctoral research position is available immediately to investigate the role of chromatin (especially histone) genes in *Agrobacterium*-mediated plant transformation. We have previously shown (Mysore et al. 2000. An *Arabidopsis histone* H2A mutant is deficient in *Agrobacterium* T-DNA integration. Proc. Natl. Acad. Sci. USA 97: 948-953) that the *Arabidopsis histone* H2A-1 gene is involved in T-DNA integration into the host genome, and other data in our laboratory indicate that mutations in other histone genes also result in decreased transformation. Additionally, over-expression of the H2A-1 gene in transgenic plants, or from an incoming T-DNA, results in increased *Agrobacterium*-mediated transformation of *Arabidopsis* and *Brassica napus*. We wish to examine the effect of over-expressing other histone genes on the transformation efficiency of recalcitrant plant species. This work will have a substantial "basic science" component as we attempt to define the mechanism by which histone gene over-expression increases transformation-competence of plant cells. Applicants should have extensive plant molecular biology experience and,

especially, an interest in answering basic science questions, not just in transforming plants. Salary will be NIH scale and commensurate with experience. Please send or e-mail your curriculum vitae and three letters of recommendation to Dr. Stanton B. Gelvin, Department of Biological Sciences, Purdue University, West Lafayette, IN 47907-1392; telephone 765-494-4939, fax 765-496-1496, e-mail gelvin@bilbo.bio.purdue.edu. Purdue University is an affirmative action/equal opportunity employer.

Two Postdoctoral Positions

University of Florida, Gainesville (Received 06/18)

Two postdoctoral positions are available in the Department of Plant Pathology for studies on disease resistance signaling. Applicants should have a strong background in biochemistry and molecular biology. Starting salary is commensurate with training and experience. Applicants should submit a letter of application, curriculum vitae, and contact information for references to Dr. Wen-Yuan Song, Department of Plant Pathology, University of Florida, P.O. Box 110680, Gainesville, FL 32611; e-mail wsong@mail.ifas.ufl.edu.

Postdoctoral Position

The Donald Danforth Plant Science Center, St. Louis, Missouri (Received 06/19)

A postdoctoral position is available in the laboratory of Dr. Oliver Yu. The successful applicant will use a variety of modern techniques to study the transcriptional regulation of phenylpropanoid/isoflavonoid pathways. Helpful, but not essential areas of experience include molecular biology, biochemistry, genomics/proteomics. Experience with promoter analysis will be a plus. The Danforth Center is a not-for-profit organization housed in a new building with excellent facilities for modern plant research. Salaries offered will be commensurate with degree and years of experience. Includes comprehensive health/dental insurance, life insurance and retirement plan. Please send a cover letter with a short summary of research experience, curriculum vitae, and names of three references to Ms. Billie Broeker, Director of Human Resources, RE: Oliver Yu Laboratory, Donald Danforth Plant Science Center, 975 North Warson Road, St. Louis, Missouri 63132; e-mail bcbroeker@danforthcenter.org. The Donald Danforth Plant Science Center is an equal opportunity/affirmative action employer and encourages applications from underrepresented groups, including minorities, women, and people with disabilities.

Postdoctoral Position

Purdue University, West Lafayette, Indiana (Received 06/20)

A postdoctoral position is available for two years in the Department of Horticulture to work on Multiple Drug Resistance p-glycoproteins involved in auxin transport in *Arabidopsis* (*Plant Cell* 13: 2441-2454). The project will examine the role of MDR type proteins in auxin transport and the mechanisms involved in the asymmetric distribution of membrane transporters. The work will involve the construction and analysis of transgenic plants as well as biochemical assays of loss-of function mutants. Protein-protein interactions will be examined using native proteins, two hybrid analysis, FRET microscopy, and expression in heterologous systems. A Ph.D. degree in a relevant area and experience in molecular biology are required. Purdue is a land-grant university located in West Lafayette, Indiana. Housing is readily available and moderately priced. Purdue has made a substantial commitment to plant genomics and supports one of the largest plant biology faculties in the United States. Purdue emphasizes cultural diversity and strongly encourages women, minorities, and people with disabilities to apply for this position. Applications and letters of reference may be sent to Dr. Angus Murphy, Department of Horticulture, 1165 Horticulture, Purdue University, West Lafayette IN 47907-1165.

Postdoctoral Position

The Ohio State University, Columbus (Received 06/24)

A postdoctoral position is currently available for molecular-genetic and biochemical studies of the light regulation of photosynthetic pigment biosynthesis, plastid development and membrane formation in *Arabidopsis*. The project will focus on the biochemical/biophysical characterization and genetic complementation of mutants defective in these processes. A Ph. D. degree in a relevant area and a strong background in molecular biology and/or biochemistry are essential. Experience in plant biology and photosynthesis is desirable. Familiarity with plant transformation methods, microscopy, HPLC and fluorescence techniques would be helpful. For further information please see <http://www.biosci.ohio-state.edu/~plantbio/Faculty/armstrong.html>. Start date is on or after August 1, 2002. Please e-mail or fax an application, including a curriculum vitae, list of publications (with e-reprints, if available), description of research interests, and names, telephone/fax numbers and e-mail addresses of three references to Dr. Greg Armstrong, Department of Plant Biology, The Ohio State University, 108 B & Z Building, 1735 Neil Avenue, Columbus, OH

43210-1293; telephone 614-292-4817, fax 614-292-6345, e-mail armstrong.275@osu.edu. The Ohio State University is an equal opportunity/affirmative action employer. Women, minorities, Vietnam-era veterans, disabled veterans, and individuals with disabilities are encouraged to apply.

**Postdoctoral and/or Research Assistant Positions
The Samuel Roberts Noble Foundation,
Ardmore, Oklahoma
(Received 06/28)**

Three postdoctoral or research assistant positions available in October in the Plant Biology Division of The Samuel Roberts Noble Foundation, Inc., to work on genomics of plant-pathogen interactions in the newly-established laboratory of Dr. Kirankumar Mysore. Successful candidates will contribute to projects involved in understanding *Pto* mediated disease resistance in tomato and non-host resistance in *Medicago truncatula*. Hands-on experience in basic molecular biology techniques is required. Experience in gene expression profiling and virus induced gene silencing in plants is desirable. Starting salaries begin at \$36,500 for Postdoctoral and \$28,800 for Research Assistant, based on experience. Applicants should send a curriculum vitae, cover letter and names and addresses of three references to The Noble Foundation, Attn: Human Resources, Postdoctoral Fellow –Job #PB-S095-28 or Research Assistant–Job #PB-S095-28RA, P.O. Box 2180, Ardmore, OK 73402, or you may e-mail your curriculum vitae and application (please include position number) to NFHR@noble.org. Applications are available on the web at www.noble.org or by calling 580.223.5810 or toll free 866.223.5810. Equal opportunity employer.

**Postdoctoral Research Associate
The Ohio State University, Wooster, OH
(Received 06/25)**

A postdoctoral position is available to study the molecular and biochemical regulation of programmed cell death during flower senescence in petunia. Transgenic petunias with modified biosynthesis or perception of cytokinins or ethylene will be used to investigate the role of plant hormones in the initiation and execution of the senescence process. Investigations will include the identification of senescence up and down regulated genes using petunia flower DNA microarrays in collaboration with Dr. David Clark at the University of Florida. Applicants should have research experience with plants and a solid background in molecular biology and/or

biochemistry. Experience with plant transformation and DNA microarray analysis is preferred. Please send letter of application outlining research interests and goals, curriculum vitae, and three reference letters to Dr. Michelle L. Jones, Dept of Horticulture & Crop Science, 1680 Madison Ave, OARDC, Wooster, OH 44606; fax 330-263-3887. If you have questions about the position please contact Dr. Jones at 330-263-3885 or jones.1968@osu.edu. Screening of candidates will begin immediately and will proceed until a suitable candidate is found. The Ohio State University/ OARDC is an equal opportunity/ affirmative action employer. Women, minorities, veterans, and individuals with disabilities are encouraged to apply.

**Postdoctoral Positions
USDA/ARS, Wyndmoor, Pennsylvania
(Received 06/25)**

Two postdoctoral positions are available to study primary metabolism in the symbiosis between plants and arbuscular mycorrhizal fungi. We are seeking highly motivated researchers to fill one position at the USDA-ARS Microbial Biophysics laboratory in Philadelphia and another at the Department of Plant Biology at Michigan State University. The research is part of a multidisciplinary collaboration among Dr.'s Lammers (New Mexico State U), Pfeffer (USDA, Philadelphia) and Shachar-Hill (Michigan State U) that is exploring primary carbon and nitrogen metabolism in the AM symbiosis. The work to be done involves the use of isotopic labeling and biochemical and chemical analysis to study metabolic pathways and their regulation. For more information, please see our publications in the recent literature and www.arserrc.gov/mbb/AMFungi.htm and www.ars.usda.gov/is/AR/archive/may01/fungi0501.htm. Qualified candidates will have a Ph.D. in biochemistry, chemistry, plant biology, or a related field. In addition they will have expertise in one or more of the following: mass spectrometry (GC and/or LC); NMR spectroscopy; using isotopic labeling to study metabolism; arbuscular mycorrhizal physiology; primary carbon and nitrogen metabolism. Start date is on or after September 15, 2002. Inquiries should be sent by e-mail to ppfeffer@arserrc.gov or yairhill@msu.edu; applications including curriculum vitae, list of publications, three letters of reference and a letter describing research interests and experience either to Philip Pfeffer 600 E. Mermaid Lane, Wyndmoor, PA 19038; or to Yair Shachar-Hill, Department of Plant Biology, Michigan State University, East Lansing, MI 48826.

**Postdoctoral Position
Pulp and Paper Research Institute of Canada,
Vancouver
(Received 06/26)**

Responsibilities: Development of molecular markers and gene discovery for wood and fibre quality traits. Challenges and major issues facing the incumbent for the next year: Assisting in development of an in-house bio-informatics system. Collaboration with Genome BC on gene discovery for wood and fibre traits – building on existing QTL database. Education and experience requirements: Ph.D. in molecular biology. Must be eligible for an NSERC fellowship. Technology knowledge requirements: Genetic marker technologies (EST, RAPD, SSR). Familiarity with genetic marker techniques and software. Competency requirements and their prioritization: Ability to relate science to practice through the planning and execution of experimental research. Good writing and presentation skills. Applicants should send their resume to Ann Peters, Human Resources, Pulp and Paper Research Institute of Canada, 3800 Westbrook Mall, Vancouver, BC, Canada, V6S 2L9; fax 604-222-3226, e-mail apeters@paprican.ca.

**Postdoctoral Position
University of Burgundy, Dijon, France
(Received 06/27)**

A 12 month postdoctoral position is immediately available to participate in a research program on the biogenesis and function of the vacuolar apparatus in plant cells (Marty, 1999, The Plant Cell 11, 587-599). The successful applicant will join a group of cell and molecular biologists working on the role of vacuoles in the cellular response to osmotic stress in plants. Research will involve intensive cellular work using transformed cells exhibiting altered expression levels of a drought-inducible tonoplast aquaporin (Barrieu et al., 1999, Planta 209, 77-86). A Ph. D., obtained within the last 5 years, in cellular biology is required. Applicants should have a solid background in the purification and biochemistry of membranes. Basic knowledge in microscopy is a plus. Due to the funding source, applicants must not be French citizens and must not have received a previous salary in France. The annual net salary is 22,000 euros (not liable to be taxed). Applications will be accepted until the position is filled. For fastest consideration, qualified candidates should send, fax or e-mail a letter expressing their interest and skills, a curriculum vitae, and the names and e-mail addresses of three referees to Dr. N. Leborgne-Castel, UPR.ES 469 phytoBiologie Cellulaire, BP 47 870 Université de Bourgogne-21078 Dijon Cedex ; telephone 33-0-3 80 39 62 84, fax: 33 - 0-3 80 39 62 87, e-mail Nathalie.Leborgne-Castel@u-bourgogne.fr.

**Postdoctoral and/or Research Assistant Positions
The Samuel Roberts Noble Foundation,
Ardmore, Oklahoma
(Received 06/28)**

Three Postdoctoral or Research Assistant positions are available in September at the Samuel Roberts Noble Foundation, Inc., to work on functional genomics/molecular genetics of legume root development in the newly-established laboratory of Dr. Rujin Chen. Successful candidates will contribute to projects on molecular characterization of components of polar auxin transport and ATP-binding cassette (ABC) transporters in the model organisms *Medicago truncatula* and *Arabidopsis thaliana*. Experience in molecular and cell biology is required. Starting salaries begin at \$36,500 for Postdoctoral and \$28,800 for Research Assistant, based on experience. Applicants should send a curriculum vitae, cover letter and names and addresses of three references to The Noble Foundation, Attn: Human Resources, Postdoctoral Fellow–Job #PB-S095-17 or Research Assistant–Job #PB-S095-17RA, P.O. Box 2180, Ardmore, OK 73402, or you may e-mail your curriculum vitae and application (please include position number) to NFHR@noble.org. Applications are available on the Web at www.noble.org or by calling 580.223.5810 or toll free 866.223.5810. Equal opportunity employer.

RESEARCH/TECHNICAL POSITIONS

**Plant Molecular Genetics/Biology
Research Support Specialist
Cornell University, Ithaca, New York
(Received 05/03)**

Position available immediately in the Department of Plant Biology to join a team investigating the genetic mechanisms responsible for tolerance to toxic levels of soil aluminum in sorghum and maize. Responsibilities include (1) map-based cloning of tolerance genes, (2) characterization of recombinants (physiological assays), and (3) identification and validation of candidate tolerance genes (screen genomic libraries; perform detailed molecular genetic and physiological experiments). Qualifications: B.S., M.S. or Ph.D. in molecular biology, genetics or related fields. Skills: Experience in molecular biology with particular emphasis in genetic mapping using molecular markers (RFLP and PCR), DNA isolation, basic cloning, and in developing STS markers (desirable, not essential). The qualified candidate is a self-starter, good problem solver, and capable of working largely independently. Our research is interdisciplinary, such that the candidate must also work well in a team and have excellent communication and organizational skills. Pay scale: depends on experience and

qualifications. Duration: two years. For more information contact Dr. Leon Kochian by e-mail lvk1@cornell.edu. To apply, send cover letter, resume, and the names and contact information for references to Dr. Leon Kochian at: the U.S. Plant, Soil and Nutrition Laboratory, Tower Road, Cornell University, Ithaca, NY 14853.

**Postdoctoral and Research Assistant
Positions Université Laval, Québec, Canada
(Received 06/06)**

See our ad under Postdoctoral Positions.

**Research Assistant
Boyce Thompson Institute, Ithaca, New York
(Received 06/18)**

Temporary Research Assistant position available January 2003 to join a research group studying the arbuscular mycorrhizal symbiosis. Current efforts focus on signaling, development and regulation of the symbiosis and the mechanisms underlying symbiotic phosphate transport. A model legume, *Medicago truncatula* is used for these investigations. Selected publications from the lab include: *Trends in Plant Science*, 2: 54-60 (1997), *Plant Journal*, 25: 281 (2001), 9: 491(1996), 6: 9 (1994), *MPMI* 14:1140 (2001), 12: 171 (1999), *Ann. Rev. Plant Phys and Plant Mol. Biol.*, 50: 361 (1999), *Nature*, 378: 626 (1995). The incumbent will participate in functional genomics projects including gene expression profiling and RNAi to dissect signaling, development and regulation of the symbiosis. Requirements: Applicants must hold a B.S degree in a biological science subject and have experience with basic molecular biology techniques. Experience with plants, mycorrhizal associations and basic microscopy is advantageous. To apply, send a letter summarizing research experience, a curriculum vitae and names of three references to Boyce Thompson Institute, Tower Road, Ithaca, NY 14853, Attn: Human Resources, Job # 2002-09, or e-mail curriculum vitae to lbp8@cornell.edu. BTI is an independent, not for profit research institute affiliated with Cornell and located on the Cornell campus. Boyce Thompson Institute is an equal opportunity employer.

**Research Associate
Ceres, Inc., Malibu, California
(Received 06/24)**

Reference RA-MB/PG-0602-Ceres is utilizing high-throughput genomics and molecular genetic approaches for developing new tools and strategies for crop improvement and plant breeding. We are seeking highly qualified and exceptionally motivated candidates to conduct research in a discovery-oriented team setting. We are seeking skilled and exceptionally motivated candidates to join a team using transcription and

chromatin level control strategies for crop improvement. Candidates must possess MS/BS/BA degree in molecular biology, genetics, cell or developmental biology and several years experience in chimeric gene construction, site-directed mutagenesis, gene function analysis and/or promoter analysis using plant, fungal, or animal systems. Ceres is located in state-of-the-art facilities overlooking the Malibu coast. We offer competitive salaries and excellent benefits including equity participation and 401K. Contact Human Resource Manager, Ceres, Inc., 3007 Malibu Canyon Rd., Malibu, CA 90265; fax 310-317-8998, e-mail ssnitman@ceres-inc.com. Ceres, Inc. is an equal opportunity employer.

**Postdoctoral and/or Research Assistant Positions
The Samuel Roberts Noble Foundation,
Ardmore, Oklahoma
(Received 06/28)**

See our ads under Postdoctoral Positions.

**Research Associate
Louisiana State University, Baton Rouge
(Received 06/30)**

The School of the Coast & Environment/Wetland Biogeochemistry Institute at Louisiana State University. Qualifications: Master's degree in botany, agronomy, ecology, plant physiology or similar field. Desired: Ph.D. in same fields and related training. Experience in wetland ecology and in the measurement of plant response to environmental stressors; experience conducting plant flood tolerance research. Major Responsibilities: Plant Eco-Physiologist- plant physiological ecologist to conduct laboratory, greenhouse, and field experiments investigating flood tolerance mechanisms of wetland vegetation; measurements of anatomical and physiological responses to rooting hypoxia, design and execution of growth chamber experiments; data analysis and interpretation; manuscript preparations. Salary: Commensurate with qualifications and experience. Anticipated Hire Date: August 1, 2002. Application Deadline: July 31, 2002 or until suitable candidate selected. Submit application/transcripts/description of interests/ three references to Dr. I.A. Mendelsohn, Ref. #023999, Wetland Biogeochemistry Institute, Louisiana State University, Baton Rouge, LA 70803-7511; telephone 225-578-6425.

**ASSISTANTSHIPS, FELLOWSHIPS,
INTERNSHIPS**

**Postdoctoral and Graduate Student Fellowships
University of North Carolina, Chapel Hill
(Received 05/08)**

See our ad under Postdoctoral Positions.

**Graduate Research Assistantships
Colorado State University, Fruita
(Received 05/13)**

Two M.S. graduate research assistantships are available at the Colorado State University, Agricultural Experiment Station, Western Colorado Research Center. Graduate students will have an opportunity to participate in establishing a new research project to develop sunflower into a rubber-producing crop for the U.S. This new project is a collaborative research effort among five institutions. One assistantship will focus on tissue culture of sunflower. The other assistantship will focus on latex extraction, purification, and determination. A new laboratory and graduate student office has been constructed to support this research, along with the purchase of new state-of-the-art laboratory equipment. Graduate students will have a unique opportunity to interact with graduate students at the participating institutions. With a B.S. degree, the half-time stipend is \$1125/month plus tuition. Positions are available immediately. Please send letter of application, resume, official transcripts, and names and addresses of three references, or for more information contact Dr. Calvin H. Pearson, Colorado State University, Western Colorado Research Center, 1910 L Road, Fruita, CO 81521; telephone 970-858-3629, fax 970-858-0461, e-mail calvin.pearson@colostate.edu.

**Graduate Research Assistantship
Louisiana State University
(Received 05/14)**

A graduate research assistantship is available for a student to work within the sugarcane improvement program. The major research focus initially is to develop molecular markers for use in the breeding program. A second phase will use these markers for marker assisted breeding. Other projects of interest to the candidate will be considered and developed through discussion with other members of the sugarcane improvement program. More information can be obtained by contacting Dr. Collins A. Kimbeng, Louisiana State University, Department of Agronomy, 104 M. B. Sturgis Hall, Baton Rouge, LA 70803; telephone 225-578-7577, fax 225-578-1403, e-mail ckimbeng@agctr.lsu.edu.

**Postdoctoral and Graduate Student Fellowships
Université de Montréal, Canada
(Received 06/05)**

See our ad under Postdoctoral Positions.

**Graduate Assistantship
Iowa State University, Ames
(Received 06/06)**

Assistantship available in the Department of Horticulture. Graduate degree program (MS or

PhD). Possible research areas include: physiology, molecular biology and/or molecular genetics of low temperature stress in plants. Some of the previous research has involved membrane alterations during freezing injury and recovery (Plant Physiology, 1991, 95: 846-852), physiological and molecular investigations of cold acclimation and dormancy in *planta* (*Plant Physiology* 1994, 105: 95-101; *Physiologia Plantarum* 1997, 101: 8-16; *Physiologia Plantarum* 1999, 107: 98-109; *Theoretical & Applied Genetics* 1999, 99: 912-920). The specific research program of the successful candidate will evolve from discussions with the major professor. Candidates should possess a BS or MS in plant-related discipline such as horticulture, botany or biology and have strong interest/expertise in plant physiology, biochemistry or molecular biology. Effective oral and written communication skills are desirable. Stipend pays \$14,500 (MS degree) and \$16,000 (PhD degree) annually. Position available in August 2002. Applications must be submitted as soon as possible. Contact and/or send resume with names and addresses of at least three references to Dr. Rajeev Arora, 139 Horticulture Hall, Iowa State University, Ames, IA 50011; telephone 515-294-0031, fax 515-294-0730, e-mail rarora@iastate.edu. For information about the research/teaching

**Graduate Fellowship Program
Louisiana State University, Baton Rouge
(Repeat)**

The Gordon Cain Biotechnology Education for Students and Teachers (BEST) Program and Louisiana State University are offering graduate fellowships specializing in the study of agricultural biotechnology. Preferred starting dates are fall 2002 or spring 2003. Research will focus on the following areas: development of transgenic plants to enhance human health, disease or herbicide resistance, and production of useful pharmaceutical or medicinal compounds. Stipends for these fellowships are \$20,000 per year, and each fellowship includes a \$5,000 per year research support grant. Requirements: A bachelor's degree from a regionally accredited U.S. 4-year institution (or the international equivalent); score of 1000 or better on the GRE; GPA of at least a 3.00 on undergraduate and graduate coursework already completed; score of 550 (paper based) or 213 (computer-based) on the TOEFL (required for certain international applicants); official transcripts from each college or university you have previously attended; a completed Application for Admission to Graduate Degree Program form. An application fee must accompany the application or it will not be processed. Graduate School Application Forms can be found at: [\[gradlsu.gs.lsu.edu/application.htm\]\(http://gradlsu.gs.lsu.edu/application.htm\). Send all application material to: Dr. Fred Enright, Veterinary Science Dept., Louisiana State University, Baton Rouge, LA 70803.](http://</p>
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**Graduate Fellowships
Louisiana State University, Baton Rouge
(Repeat)**

Research fellowships to support graduate study leading to a Ph.D. in agricultural biotechnology will be available starting the fall and spring semester of 2002/2003 in the Department of Plant Pathology and Crop Physiology at Louisiana State University and LSU Agricultural Center. These fellowships are a part of The Gordon A. Cain Biotechnology Education for Students and Teachers (BEST) program at LSU. The areas of research interest are development of transgenic plants of Louisiana's major crops (cotton, rice, soybean, sugarcane, and wheat) to (1) improve agronomic traits (disease/ herbicide/ insect/nematode resistance), (2) enhance nutritional quality for humans and cattle, or (3) produce pharmaceutical or medicinal products of economic importance. Stipends for these fellowships are \$20,000 annually. Research facilities include state-of-the-art equipment for molecular and cellular biology, biochemistry, biophysics, and computation. Candidates should have a strong background in molecular biology, genetics, plant physiology, biochemistry, or related fields. Please complete an application form for Admission to Graduate Degree Program at <http://gradlsu.gs.lsu.edu/application.htm> and submit the form along with a letter of interest, undergraduate and graduate transcripts, and GRE /TOEFL scores. Arrange to have three letters of reference sent to Dr. Norimoto Murai, Department of Plant Pathology and Crop Physiology, Louisiana State University and LSU Agricultural Center, Baton Rouge, LA 70803-1720; tel 225 578-1380, fax 225-578-1415, e-mail nmurai@lsu.edu.

**Graduate Assistantship
University of Manitoba, Winnipeg, Canada
(Repeat)**

Funds will be available in fall 2002 to support an MSc. student interested in plant stress physiology. The research program focuses on woody plant response to salinity stress. The aim of the research is to provide information for selecting salt-tolerant species for use on saline sites including reclamation of degraded sites and to develop strategies for improving salinity tolerance in woody plants. The successful candidate will undertake research on salt tolerance of red-osier dogwood (*Cornus stolonifera*) using physiological and biochemical

techniques. Applicants should send a curriculum vitae, a letter of interest, and three references to Dr. Sylvie Renault, Department of Botany, University of Manitoba, Winnipeg R3T 2N2, Manitoba, Canada; telephone 204-474-6914, fax 204-474-7604, e-mail renaults@cc.umanitoba.ca. For information on the Department of Botany, please consult our Website at <http://www.umanitoba.ca/faculties/science/botany/>.

**Graduate Research Assistantship
University of Arkansas, Fayetteville
(Repeat)**

Research evaluating the physiological associations of novel yield and quality related traits of cotton germplasm under environmental stresses. The funding will be used in our biotechnology and plant breeding programs to enhance yield and quality traits in commercial cultivars. The research will involve physiological, biochemical, and anatomical evaluation of novel germplasm for tolerance to high temperature and drought

stress. Research will include field and controlled environment studies. Opportunities exist for working with geneticists, molecular biologists, and agro-industry. Experience with cotton is desirable but not necessary. B.S. or M.S. in plant or crop physiology or related degree. Stipend \$12,000 with a B.S., and \$14,000 with a M.S., plus fringe benefits, and tuition fees waived. Available immediately. Send letter of application, resume, official transcripts, and names and addresses of three references to: Dr. Derrick M. Oosterhuis, Alzheimer Laboratory, 1366 Alzheimer Drive, University of Arkansas, Fayetteville, AR 72704; telephone 479-575-3979, fax 479-575-3975, e-mail oosterhu@uark.edu.

**Research Assistantships
University of Missouri, Rolla
(Repeat)**

Funding for M.S. students is available in the newly formed Environmental and Applied Biology graduate program within the Depart-

ment of Biological Sciences at the University of Missouri–Rolla (UMR). Positions are available to study various aspects of plant biology including cellular signaling, plant responses to stress, and root ion transport physiology. These studies will be based on a combination of molecular/biochemical and biophysical approaches. These studies will take advantage of novel sensor technologies that are being developed in the Biological Sensor Laboratory at UMR. Students might also choose to work on the development of biosensors in this program. Because of the technology development activities within the lab, students will join a team of interdisciplinary researchers and students that work and interact across disciplines ranging from biology and chemistry to electrical and environmental engineering. Good communication skills in English, coursework or experience in molecular biology or biophysics, and good GPA and GRE scores are highly desirable. Please contact D. Marshall Porterfield for more information at mporterf@umr.edu.



A Special Collection of Articles from *The Plant Cell*
September 1999–January 2001

Plant Genomics: Emerging Tools

As we enter the new millennium, the age of genomics is in full swing. Much more than the study of individual genes and their functions, genomics implies the study of the interacting networks of genes, proteins, and metabolites that make up a whole organism. Large-scale genome sequencing projects form the base of all genomics studies, but radiating out from this base is a host of other tools that allow us to figure out the biology that is governed by DNA sequence.

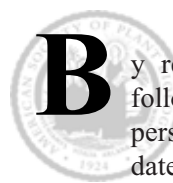
Between September 1999 and January 2001, *The Plant Cell* published a series of articles on genomics technologies and

approaches specially written for the plant science community. These articles, together with a number of research papers on plant genomics published during this period, have been bound into a volume called *Plant Genomics: Emerging Tools*. This compilation provides readers interested in the applications of genomics to plant science with a single resource covering the most recent developments in this emerging field.

Plant Genomics: Emerging Tools
ISBN 0-943088-42-9. Item 30044. Price \$25.00

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