Plant Genomics: How Should ASPP React?

The area of genomics, including plant genomics, has received enormous attention in recent months. For example, the March 3rd issue of the Proceedings of the National Academy of Sciences contained 16 articles summarizing the results of a special symposium on plant genome research. The ASPP annual meeting this summer will include minisymposia on this topic, including one entitled “Identification of Gene Function in a Genomic Era.” Even scientific suppliers are running advertisements hyping the value of their products for genome research.

Why all the fuss? What is genomics, anyway? How will these recent developments in genomics affect ASPP? Should ASPP be involved? In this letter I briefly consider these questions, with emphasis on the last two.

Clearly the term genomics means different things to different people. Sometimes people even subdivide the topic into functional genomics and structural genomics. The latter includes mapping and sequencing efforts; it presumably has a defined endpoint—for example, the complete DNA sequence for the genome of a particular organism.

But what is functional genomics? This term is more difficult to define, as discussed in a recent “Viewpoint” in the October 24, 1997, issue of Science (vol. 278, no. 5338, p. 601). In their article, entitled “Functional Genomics: It’s All How You Read It,” Philip Hieter and Mark Boguski discuss the confusion over the use of the term, noting the sentiment from some quarters that the term refers to all of biological research and is therefore unnecessary.

Regardless of the debate surrounding these terms, the scientific advances they encompass are here to stay. Moreover, these advances will dramatically and permanently influence the way plant biology is studied. The availability, within the next two or three years, of the complete DNA sequence for the Arabidopsis genome will eliminate the need to clone genes via traditional methods. The ability to use DNA microarrays or oligonucleotide chips to examine the expression of thousands of genes at once will dramatically alter many areas of plant biology. For instance, it will be possible to investigate the effects of a particular growth regulator on the expression of thousands of different genes simultaneously. The list of examples goes on and on.

In addition to the impact of plant genomics on the research activities of the Society’s members, developments in this area have already affected, and will continue to affect, the activities of ASPP itself. For example, the Committee on Public Affairs and Brian Hyps, ASPP’s Director of Public Affairs, have spent considerable time on efforts to add to the National Science Foundation budget $40 million in new funds for plant genome research. The ad hoc ASPP Publications Visions Committee, chaired by Joanne Chory, also recognized the potential impact of plant genomics. In the report from its January 1998 meeting, it advised ASPP to investigate the impact of these developments on our publications. The Executive Committee has already acted on this recommendation and has formed a different ad hoc committee of plant genomics experts. Their charge is to provide the Publications and Executive...
Future ASPP Annual Meetings

1998
Saturday, June 27, through Wednesday, July 1
Madison, Wisconsin
Meeting to overlap with the meeting of the 9th International Conference on Arabidopsis Research

1999
Saturday, July 24, through Wednesday, July 28
Baltimore, Maryland
ASPP's 75th anniversary meeting

2000
Saturday, July 15, through Wednesday, July 19
San Diego, California

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Thousands Learn From ASPP Education Foundation Exhibit at Disney World

The ASPP Education Foundation's "Plants for the 21st Century" exhibit was held March 13 through April 4 at Walt Disney World's Epcot Center. Located in one of the most highly traveled areas of the "Science Jam," this exhibit drew up to 200 visitors per hour during peak times. Trained Epcot representatives gave interactive 12-minute presentations five times a day, and ASPP member Carol Reiss was on hand the first week of the exhibit for consultation with Disney staff.

The presentations gave visitors the opportunity to "shoot" DNA into a sunflower and to learn how transforming plants with new genes allows scientists to improve plants. For example, an improved potato resistant to the Colorado potato beetle was compared to an unprotected, infested plant. Pictures of unprotected corn, infested by larva, were compared to the healthy Bt corn growing in the ASPP garden on site. The vegetables and fruits in the ASPP garden were labeled with questions or statements to promote discussion about the plants. One tent featured a market display of fruits and vegetables and a "Periodic Table of Vegetables." Another tent contained a laboratory bench and equipment with information on the photosynthesis equation, seeds, earth, sun, and plants.

A "Wheel of Nutrition" initiated discussions of the important elements of fruits and vegetables and their benefits. A "Peek-a-Boo Box" lit with UV light demonstrated the use of green fluorescent protein in plant research. Younger visitors eagerly swung hammers to "ring the bell for good health" in a test of strength that also contained a measure depicting the nutritional and antioxidant values of various fruits and vegetables. Children stopped at the "Science Fun Stop," also sponsored by the ASPP Education Foundation, to make mini-microscopes through which they could view materials and learn about the structure of a lily, how seeds travel, and the effects of insects eating plants.

Visitors had the opportunity to explore plant biotechnology and its products. They learned that although plant research has been conducted for many years, a "Green Revolution" for the 21st century is needed to meet a projected doubling in demand for food. Guests became acquainted with developments in crops resistant to diseases, pests, drought, and other severe climate stresses and learned of more nutritious foods, higher-yielding grains, and better quality fruits and vegetables created through plant research using biotechnology. Visitors also learned more about the expanding pharmaceutical uses of plants, as well as about plant-produced fuels and plants used for phytoremediation.

An 8-minute videotape and a 90- to 120-second video news release will help preserve and disseminate the information in the exhibit. The "Plants for the 21st Century" exhibit is also part of the Epcot International Flower and Garden Festival, which is being held April 17 through May 31.

This exhibit is funded entirely from ASPP Education Foundation funds. The ASPP Foundation is a partnership of leaders in science and industry working together to develop a broad understanding of the importance of the plant sciences. Foundation funds come from ASPP member donations, earnings from the Foundation's endowment, and corporate support.

CSWPP Receives Donations to Support Annual Luncheon

The ASPP Committee on the Status of Women in Plant Physiology (CSWPP), chaired by Ruth Alscher, has received generous donations from the Monsanto Company, E. I. DuPont DeNemours & Company, and Pioneer Hi-Bred International, Inc. Contributions will be used to support the attendance of graduate students and postdoctoral associates at the committee's luncheon at Plant Biology '98 this summer in Madison.

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ASPP member Carol Reiss was on hand to provide technical assistance to exhibit communicators at the ASPP Education Foundation exhibit "Plants for the 21st Century" at Walt Disney World's Epcot Center.
Travel Grant Award Winners for ASPP Annual Meeting

The winners of travel awards to attend Plant Biology '98 in Madison, Wisconsin, have been selected. Their names are listed below as well as on the ASPP Web site at http://aspp.org/meetings/trgrant.htm.

Joachim Austin
Mark Bacon
Deborah Bishop
Brent Black
Mariela Szwarcberg Bracchitta
Alejandro Calderon-Urrea
Heping Cao
Parin Chaivisuthangkura
Carmen Flores-Carmona
Chau V. Hoang
Mary Elizabeth Hoyos
Tu T. Huynh
Julie Krawetz
Oleg Kuznetsov
Jiaxu Li
Timothy Lynch
Colleen Marion
Joao P. Maroco
Ashwani Pareek
Tilak Ponappa
David Puthoff
Bala Rathinasabapathi
Michael Savka
Tanya Q.-T. Shang
Teresa Hernandez Sotomayor
Jun Tsuji
Laura Rodriguez Uribe
Kyujung Van
Jorge Vivanco
Konstantinos Vlachonasios
Michelle Watt
Glen Wheeler
Bonnie Wolffenden
Krzystof Wypijewski
Marcelo Javier Yanofsky

The pool of 75 applicants was very good, and the selections were difficult to make. The money being awarded to each applicant will be used to pay for travel expenses, food, lodging, meeting registration, and the cost of all additional events each person wishes to attend at the meeting. Letters will be written to each applicant, and checks will be mailed from headquarters during May. If there are further questions, please contact Deborah Weiner at ASPP headquarters.

Second ASPP-Sponsored U.S.—México Joint Symposium on Plant Biology a Resounding Success

Approximately 220 people attended the second U.S.—México Joint Symposium on Plant Biology, which was held concurrently with the Eighth National Congress of Biochemistry and Molecular Biology of Plants on March 15–18, 1998, in the beautiful city of Guanajuato in central México. Guanajuato prides itself on being one of the most charming small colonial towns of México. This meeting was an ASPP cosponsored event attended by president-elect Brian Larkins. The two general coordinators for the meeting, Alfredo Herrera Estrella, of CINVESTAV (Centro de Investigación y de Estudios Avanzados del I.P.N.), and Joe Chappell, of the University of Kentucky, invited an excellent group of speakers from both countries to present their most recent research in six different symposia. These ranged in topic from cell cycle studies in maize to phytoremediation of mercury contamination. In addition to the symposia, several minisymposia were scheduled in which younger Mexican researchers presented their work. As in the first joint symposium held in Cocoyoc in November 1995, there was also an extensive poster session for graduate students, postdocs, and young investigators from both countries. Funds from the National Science Foundation supported the participation of a number of U.S. scientists.

Although a three-day meeting starting everyday at 9:00 a.m. and ending at 7:30 p.m. is quite intense, there were times in the late evening to enjoy and explore Guanajuato, which is an old silver-mining town. One evening, the meeting participants were treated to a callejoneada. This walk around the city was accompanied by the singing of old Spanish songs and by a four-animal “burro bar,” where liquid refreshments were obtained from saddle bags hung over the backs of the burros.

The next joint U.S.—México symposium will meet in Merida in the Yucatan on November 1, 1999. The magnificent ruins of the Mayan civilization are found in historic towns such as Uxmal and Chichén Itza nearby. Mark your calendar now!

A Guanajuato church. Guanajuato was the site of the second U.S.—México Joint Symposium on Plant Biology.
Agricultural Research Agreement Would Create Five-Year, $600 Million Competitive Grants Program

The House/Senate Conference Agreement on the Research Reauthorization bill (S. 1150, H.R. 2534) creates a new competitive grants program for agricultural research. The Initiative for Future Agriculture and Food Systems will provide $600 million in mandatory funding from 1999 through 2003 for agricultural research. It will provide $120 million per year on a competitive grant basis for research on agricultural genome; food safety; food technology and human nutrition; new and alternative uses of agricultural commodities and products; agricultural biotechnology; natural resource management, including precision agriculture; and farm efficiency and profitability. In addition, the discretionary agricultural research programs, such as the National Research Initiative (NRI), are reauthorized, and reforms are included to ensure more collaboration and efficiency as well as to achieve greater accountability in research supported by the Department of Agriculture.

The conference report provides $100 million in new funding for the Fund for Rural America, which supports both research and rural development. The new funding would be added to the $200 million currently available for fiscal years 1999 and 2000 (combined). The total amount would be averaged over a five-year period to provide $60 million each year for the fund to be operated under existing rules. This agreement extends the Fund for Rural America, which the House version had slated for extinction, but it continues at a reduced amount of $60 million per year instead of $100 million.

With the Initiative for Future Agriculture and Food Systems, Senator Richard Lugar (R-IN) and his colleagues are moving ahead in increasing support for competitively awarded agricultural research by more than 120 percent over the level currently supported by the NRI ($97 million). There are no readily available additional funds in the federal discretionary accounts to give such large increases for the NRI. Fortunately, Lugar and the Committee on Agriculture have been resourceful in finding research funding using the mandatory accounts administered by USDA.

Reforms in the administration of food stamp programs (which are funded by federal mandatory funds) provide funding for the Initiative for Future Agriculture and Food Systems. Virtually all research programs in every science discipline are supported by federal discretionary funds. The other notable exception making use of mandatory funds is the Fund for Rural America, which some had predicted for extinction, but which carries on under the conference report at a reduced level. The Fund for Rural America was created following a Lugar initiative for competitive agricultural research that others revised by adding a rural development aspect.

Senator Phil Gramm (R-TX) has raised questions about some nonresearch provisions of the conference report. He opposes the report's provisions regarding restoration of food stamps for legal immigrants who are noncitizens. There is also some opposition to the report in the House. However, gaining these research provisions, including a major new competitive grants program, marks significant progress and keeps the research reauthorization in the running for future enactment if the conference report is adopted by the House and Senate and signed by the president. Enactment of the bill is needed before the FY99 Budget Resolution is adopted by Congress.

Committee on Public Affairs Conducts Hill and Executive Branch Visits to Support Plant Research

Members of the Committee on Public Affairs visited with nearly 25 congressional and executive branch offices March 2, 1998, to urge support for several legislative initiatives that would fund plant research programs within the National Science Foundation, the Department of Energy, and the Department of Agriculture. See related photos.

The visits occurred the day after the committee held a meeting at ASPP headquarters to analyze legislative and regulatory issues affecting plant science. ASPP President Ken Keegstra joined the committee members in this review.

Areas receiving primary consideration for support include—

- The National Science Foundation (NSF) proposal in the fiscal year 1999 budget to provide $40 million for plant genome research to continue the plant genome initiative launched by Congress in FY98, which was authored by Senator Christopher Bond (R-MO).
- The NSF request for a 12.7 percent increase in FY99 for research supported by the Biological Sciences (BIO) Directorate to support basic plant research. (The overall increase sought by NSF is 10 percent.)
- The Senate proposal in S. 1150 to establish a new competitive grants program in addition to the National Research Initiative (NRI) to support agricultural research, including plant research (please see related story above), as well as reauthorization of the NRI contained in the same bill.
- The USDA FY99 request to increase funding for the NRI to $130 million and for the Agricultural Research Service to nearly $777 million.
- The Department of Energy FY99 request to add $5 million to the appropriation for the...
Division of Energy Biosciences for basic plant and microbial research related to carbon management.

Martha Krebs, director of the DOE Office of Energy Research, met with ASPP representatives the morning of March 2nd and discussed the proposed FY99 research budget. Dr. Krebs is supporting an 18.5 percent increase in research for the Division of Energy Biosciences in the FY99 budget.

Clifford Gabriel, deputy to the associate director for science in the White House Office of Science and Technology Policy, met with Committee on Public Affairs members at the Old Executive Office Building in Washington. Dr. Gabriel, who continues to be a strong supporter of plant research, explained the president's budget request for research for FY99.

The Committee on Public Affairs called for special recognition of Senator Bond for his successful campaign to enact the $40 million plant genome initiative at NSF in FY98 and for his continuing support of plant research. ASPP Board of Trustees Chair Douglas Randall, a former member of the committee, is preparing to recognize Senator Bond on behalf of ASPP at the University of Missouri this summer.

Representative Joseph Knollenberg (R-MI) is a member of subcommittees with jurisdiction over research spending for DOE and NSF. Knollenberg's staff met with ASPP President Ken Keegstra March 2, 1998.

Representative David Price (D-NC) serves on the appropriations subcommittee that determines research spending for the National Science Foundation. Price's staff met with Jim Siedow of the ASPP Committee on Public Affairs March 2, 1998.

House Science Committee Vice Chair Vern Ehlers (R-MI). Ehlers' staff, developing a major science report, met with ASPP President Ken Keegstra March 2, 1998.
ASPP Supports $5 Million Carbon Management Initiative for DOE Division of Energy Biosciences

In a statement submitted to the House Appropriations Subcommittee on Energy and Water Development, ASPP supported the DOE-proposed increase of 18.5 percent for the Division of Energy Biosciences, including $5 million for carbon management plant and microbial research, as part of a multiagency Climate Change Technology Initiative.

The statement, written by ASPP Public Affairs Chair Lou Sherman of Purdue University, explained that basic plant research on photosynthesis and carbon dioxide management could lead to the development of alternative energy sources that would stem the increase of greenhouse gas emissions.

"Photosynthesis is nature's way of utilizing sunlight to produce chemical energy and to bring carbon dioxide into biological organisms," Sherman said. "This is a very complex process. A researcher supported by the DOE Division of Energy Biosciences, Professor Paul Boyer, recently shared the Nobel Prize for his work on elucidating the mechanism of photosynthetic energy production. . . . Some of the major research areas that are needed to increase our understanding of plant growth and other plant processes include photosynthetic efficiency, in which we can study the impact of higher carbon dioxide concentra-

tions on plant growth. This will be critical to society as we go into a period of higher atmospheric carbon dioxide concentration."

The statement noted that other major areas of research supported by the Division of Energy Biosciences include harnessing the sun's energy to manufacture chemicals, manufacturing new products from plants and microbes, and using plants and microbes to clean up toxic wastes through a process called phytoremediation.

Plants and certain microbes are the earth's only source of renewable biomass, the statement noted. Research supported by the Division of Energy Biosciences on the fundamental mechanisms of photosynthesis is making it possible to better understand plant metabolism and plant growth and development. This knowledge contributes to improved yields in agriculture and forestry and to the development of efficient and economical devices such as photoelectric cells for capturing solar energy.

Sherman noted that biological systems perform many chemical transformations that result in products with unique characteristics. Understanding these natural processes of plants and microbes will allow scientists to exploit their benefits. "Some chemicals produced naturally by these organisms may prove to be highly beneficial to mankind and include compounds such as anticancer agents, cell growth enhancers, and molecules that regulate man's biological clocks," Sherman said. Scientists are now able to introduce into plants and microbes the ability to produce (biologically) such valuable substances as lubricants and plastics that may replace petroleum-based products.

Long-term basic research supported by the Division of Energy Biosciences is also enabling us to use bacteria that convert plant wastes, such as corn cobs, wheat straw, or grass clippings, into ethanol, which can be used as fuel for automobiles and as raw material for the manufacturing of other important chemicals, the statement said.

The soil and water of a large number of manufacturing and mining sites, including many for which DOE is responsible, are contaminated with heavy metals, radionuclides, and organic pollutants. Sherman noted that the Division of Energy Biosciences supports research to modify plants and microbes so that they withdraw and detoxify pollutants, thereby averting the enormous expense to the nation incurred in excavating and hauling away polluted soil.

Sherman concluded that basic research on plants and microbes offers some of the most promising opportunities to reduce U.S. dependence on imports of foreign petroleum and to provide new, more cost-effective approaches to environmental remediation.

Representative Bob Etheridge (D-NC), a member of the House Science and Agriculture Committees, meets with Jim Sadow (left), of the ASPP Committee on Public Affairs.
ASPP Urges Fiscal Year 1999 Increases for Agricultural Research

In a statement submitted March 31, 1998, to the House Appropriations Subcommittee on Agriculture, Rural Development, Food and Drug Administration and Related Agencies, ASPP cited the need for increased support for agricultural research.

"A stagnant research budget for agriculture exposes the nation and its people to loss of leadership in agriculture. The agricultural sector contributes to national and world security; healthier lives and higher disposable incomes for all Americans; a substantial revenue-producing surplus in trade of agricultural products and gainful employment for 22 million Americans," ASPP Public Affairs Chair Lou Sherman said in the statement. "We urge the Committee to increase support for the NRI [National Research Initiative] to $130 million, as recommended by the president, and encourage increases of 7 percent for the Agricultural Research Service and other areas of the fiscal year 1999 research budget for the Department of Agriculture," Sherman said.

The statement noted that the 21st century will bring with it increased national and world demands for food and energy. Yet, available farmland is being converted to other uses. How can food, fiber, and energy producers meet increasing demands without the benefit of more land to farm? "The answer will come in large part through research in plant biology," Sherman said.

The ASPP statement pointed out the important role that plant research has occupied in human history since the time when plants were first domesticated some 10,000 years ago. George Washington, Thomas Jefferson, and other founders of the Republic had an avid interest in farming and plant research. While president, Washington asked Congress to create experimental farms for plant research like those found in Europe at the time, but Congress and the states were not yet ready to pool resources for research. Today, government-supported plant research drives an agricultural industry in the United States that leads the world, Sherman noted. "ASPP supports the Department of Agriculture’s proposal for plant genomic research in the FY99 budget... As more is learned of the structure of the plant genome (structural genomics) and of the plant functions controlled by genes (functional genomics), plant scientists will be able to make more rapid advancements using modern transformation technologies to develop enhanced varieties of plants," the statement said.

USDA is seeking $40 million for food genome research in FY99, which represents an increase of $19 million over the estimated $21 million in the FY98 budget. The food genome request would include support for plant, animal, and microbial research. Food genome research is a priority in the department’s FY99 budget request.

ASPP noted that USDA-supported research is leading to extraordinary advances in plant science. Basic studies in plant genetics and plant growth and development have led to the ability to regenerate transformed plant tissues, enabling industry to develop transgenic plants containing agronomically important genes.

Sherman said that increases in food production and improvements in food quality made possible through plant research allow U.S. exports of food to meet pressing demands worldwide and to combat the spread of malnutrition in the developing world.

See You in Madison June 27–July 1 for Plant Biology ’98!
Human Clinical Trials of Plant Engineered as Vaccine Are Successful; May Usher in New Era for Plant/Pharmaceutical Research

A report in the May 1, 1998, issue of Nature Medicine describes why 14 healthy adults ate raw potatoes in the interest of science. This clinical trial was the first ever to use a genetically engineered food (potato) to deliver a pharmaceutical. The Phase I trial was approved by the U.S. Food and Drug Administration (FDA) in 1997.

Over a three-week period, the volunteers each ate three doses of potatoes that had been designed to contain a vaccine to prevent travelers' diarrhea. This common disease is the result of intestinal infection by the bacterium Escherichia coli, which can contaminate food and water supplies. Although the disease primarily causes severe discomfort for tourists, it has far more serious consequences for the inhabitants of developing countries. World Health Organization studies show that diarrhea caused by bacteria is one of the most frequent causes of infant mortality worldwide, with nearly 3 million deaths per year among children. Unfortunately, there is no cost-effective vaccine available to prevent this problem.

The vaccine-containing potatoes were developed and grown by scientists led by ASPP members Charles J. Arntzen, Ph.D., and Hugh S. Mason, Ph.D., of the Boyce Thompson Institute for Plant Research in Ithaca, New York. The institute, which is affiliated with Cornell University, has pioneered new approaches to the use of biotechnology to benefit people in developing countries. Arntzen and Mason's studies of edible vaccines have shown that uncooked potatoes can trigger immune responses when fed to animals. The recently completed clinical trials confirm that humans can also be immunized simply by eating the pharmaceutical foodstuff.

The clinical trial was designed to determine the safety and efficacy of an edible vaccine. It was conducted at the University of Maryland School of Medicine's Center for Vaccine Development under the direction of Professor Carol Tacket, M.D. Funding for the study came from the National Institute of Allergy and Infectious Diseases, of the National Institutes of Health.

In the six-month, double-blind study, volunteers ate 50- or 100-gram doses of either genetically modified potato or garden-variety, unaltered potato. There were no significant signs of adverse effects of the potatoes in the study. Laboratory tests on blood and stool samples taken before and after the volunteers ingested the potatoes were used to measure the vaccine’s effectiveness. Antibody-secreting cells were found in the blood serum of the volunteers after eating the modified potatoes, and antibodies (which can fight bacterial infection) were found in both blood and stool samples.

The report in Nature Medicine documents both the safety and the usefulness of vaccines delivered in biotechnology-derived plants. The next steps will involve a request to FDA to extend the studies to further clinical trials that will test the immunity conferred by the edible vaccine by challenging immunized volunteers with the disease-causing form of E. coli.

Arntzen and his colleagues believe that edible transgenic plants can serve as a vaccine delivery system that will solve many of the problems encountered by vaccination programs in developing nations. In many of these countries, the cost of transportation, lack of refrigeration for storage, health hazards of using needles to administer vaccines, and the natural human resistance to injections have presented daunting obstacles to the distribution of current vaccines. A food plant delivery system could be inexpensive and plentiful. Delivery of vaccines in plant cells also may protect the antigen as it passes through the acid environment of the stomach. Of course, children in the United States will also probably prefer vaccination by an edible vaccine rather than a needle, Arntzen noted.

The scientists involved in this study see potatoes as a prototype for studying plant-based vaccines. Techniques to create edible vaccines in bananas are now under way at the Boyce Thompson Institute, but a banana crop takes much longer than potatoes to mature and produce edible fruit. However, bananas do offer an appropriate technology for transferring vaccine technology to countries where vaccines are urgently needed.

Charles J. Arntzen
Plant Scientists Elected to National Academy of Sciences

Four plant scientists were among 60 new members and 15 foreign associates elected April 28 by the National Academy of Sciences (NAS) in recognition of their distinguished and continuing achievements in original research.

ASPP members Susan Wessler, Jan A. D. Zeevaart, and Maarten Koornneef received this award, considered one of the highest honors that can be accorded a U.S. scientist or engineer. Also elected was University of California plant biology professor Brian J. Staskawicz.

As one of the groundbreaking genetic researchers, Susan Wessler was first to demonstrate that elements can function as introns, that short inverted-repeat elements predominate in normal genes, and that plant retrotransposons are the major cause of spontaneous insertion mutations. Dr. Wessler headed a group of graduate students and postdoctoral associates in research that led to the most comprehensive picture to date of how plant transposable elements create genetic diversity. As a postdoctoral fellow, Dr. Wessler was involved in the isolation of the maize waxy gene and the Ac and Ds transposable elements. Her subsequent studies utilized the large collection of waxy alleles to generate the most detailed picture to date of the molecular basis of mutation in plants and to demonstrate the importance of retrotransposons in plant genomes. Her work with Steve Dellaporta in isolating the enigmatic maize R gene provided access to its numerous naturally occurring alleles that condition diverse pigmentation patterns. The transposable elements and R genes that she has isolated during her career have been incorporated into protocols worldwide, facilitating the isolation of many plant genes.

Dr. Wessler graduated from the Bronx High School of Science; received her bachelor’s degree in biology, with honors, from the State University of New York at Stony Brook; and earned her Ph.D. in biochemistry from Cornell University. During her postdoctoral fellowship at the Carnegie Institution, she worked with Nina Federoff. She began her career at the University of Georgia in 1983, becoming full professor of botany in 1992. She became professor of botany and genetics in 1993 and research professor in 1994. In addition, she directed the Center for Plant Cellular and Molecular Biology from 1991 to 1996. She is a recipient of the Creative Research Medal (1991) and the Lamar Dodd Creative Research Award (1997) from the University of Georgia. She was a co-editor of THE PLANT CELL from 1990 to 1996. Dr. Wessler is also the mother of two children.

Jan Zeevaart and his group at the University of Michigan have studied the biosynthesis of abscisic acid and provided conclusive evidence that this hormone is a breakdown product of carotenoids. Mutants of Arabidopsis deficient in abscisic acid and gibberellin have played an important role in working out the biosynthetic pathways of these hormones. Much of this work with hormone mutants was conducted in collaboration with Maarten Koornneef. Earlier work by Dr. Zeevaart dealt with the physiology of flowering, especially transmission of the floral stimulus (florigen) by grafting. Following this work, he investigated the role of gibberellins in stem growth of long-day rosette plants and how light regulates gibberellin biosynthesis in this group of plants.

Dr. Zeevaart received his undergraduate and graduate degrees at the Wageningen Agricultural University, Wageningen, the Netherlands. After service in the Dutch army, he was a postdoctoral fellow at the California Institute of Technology in Pasadena, working with James Bonner and Anton Lang. After two years as an associate professor at McMaster University, in Ontario, he joined the newly founded Atomic Energy Commission (now the U.S. Department of Energy) Plant Research Laboratory and the Department of Botany and Plant Pathology at Michigan State University. He has been a faculty member at MSU since 1965. Dr. Zeevaart is a corresponding member of the Royal Dutch Academy of Sciences and was awarded a Guggenheim Fellowship at the Milstead Laboratory of Chemical Enzymology, Sitingbourne, England. In 1991 he received the silver medal for outstanding research on plant growth substances from the International Plant Growth Substances Association. In 1996 he received the Michigan State University Distinguished Faculty Award.

Maarten Koornneef was elected as one of the 15 foreign associates by the National Academy of Sciences. Dr. Koornneef is extraordinary professor in the Department of Plant Genetics at the Wageningen Agricultural University, Wageningen, the Netherlands. The ASPP NEWS will publish information on Dr. Koornneef’s research in the July/August 1998 issue.

Brian Staskawicz’s research on the molecular basis of plant disease resistance has contributed to an understanding of the molecular basis of gene-for-gene disease resistance and may contribute to efforts to improve disease control by engineering broader-spectrum disease resistance into agronomically important crops.

Dr. Staskawicz received his B.A. in biology from Bates College, his M.P.S. in forest pathology from Yale University, and a Ph.D. in plant pathology from the University of California, Berkeley. He joined the International Plant Research Institute in 1980, was appointed assistant professor at Berkeley in 1983, and became full professor in 1992.

This election brings the total number of current active NAS members to 1,798. The National Academy of Sciences was established in 1863 by a congressional act of incorporation, signed by Abraham Lincoln, that calls on the academy to act as an official adviser to the federal government, upon request, on any matter of science or technology. The National Academy of Sciences is a private organization of scientists and engineers dedicated to the furtherance of science and its use for the general welfare. Additional information about the institution is available on the Internet at www.nas.edu.
The Virtual Forest came from my own ecology lab experience. The idea actually arose in 1988 when every one of my ecology field trips was rained out. I tried several times to take trips in spite of the rain. However, it is very hard to concentrate when you’re cold and wet. I decided to develop a virtual field trip to serve as a substitute whenever the weather was uncooperative. Therefore, I developed “A Trip to a Forest,” a Hypercard program that allowed students to practice different sampling techniques and tree identification. As technology progressed, so did my forest.

The Virtual Forest CD-ROM is based on Davis Woods; a central hardwoods stand southeast of Muncie, Indiana, that has been sampled frequently over the past 80 years by the School of Forestry at Purdue. It uses QuickTime virtual reality to allow the user to view the forest from 25 different locations. Within each panoramic scene, the user can click on a “hot” tree. Included are an identification key, a caliper to measure DBH, (diameter at breast height), and a tape measure to measure distances on the ground (necessary for some sampling techniques). It also allows the user to query a variety of experts about the central hardwoods (requires sound capability).

I discovered another way to use the simulation when I found that my students in the field were misidentifying trees and making mistakes when using quadrat and point-quarter sampling. I now use the CD to prepare the students for their real field trip. I found that students have higher correct identifications and actually collect more data when I have them practice the sampling techniques (quadrat and point-quarter) in the computer lab prior to going to the field. In the computer lab, it is easy to respond immediately to a student’s questions about some critical identifying characteristics. The repetition that they get in the lab improves their efficiency when they go to the field.

There are a variety of studies that can be undertaken with the CD. For example, besides a density analysis with the calculation of density frequency and coverage, one can develop a size distribution analysis, a species diversity study, a comparison of different sampling techniques (belt transect, quadrat, and plotless), and more.

We are in the process of developing four more Virtual Forest CDs through the Indiana Department of Natural Resources. In spring 1998 we will release the Northern Boreal Virtual Forest, which is based on stands in the region of the Boundary Waters Wilderness and Canoe Area. During 1998, my team will be visiting southern pine forests (Tallahassee, Florida), Rocky Mountain Forests (Whitehall, Montana), and temperate rain forests (Forks, Washington). These CDs are tentatively scheduled to be released in early 1999. For more information, check out our Web site at http://www.biology.iupui.edu/v_forest/index.html.
OBITUARY

Dr. Richard H. Shimabukuro, a plant physiologist in the Plant Science Research unit, USDA/ARS Biosciences Research Laboratory, Fargo, North Dakota, died unexpectedly in Fargo on March 25, 1998. "Shim" was very active until the time of his death, working out religiously and looking out for his health. He was heavily involved in his research program and was making plans to participate in the International Congress of Pesticide Chemistry in London in August as a presenter and panel member. Shim was known worldwide for his research on the fate and mode of action of pesticides in plants. In recent years, he had developed an active research program on the physiology and biochemistry of leafy spurge, a perennial weed.

Shim was born in Hawaii in 1933 and graduated from the University of Hawaii. He joined the U.S. Army and served as an officer in the Chemical Corps at Aberdeen, Maryland. He received his graduate training at the University of Minnesota, St. Paul, where he met Mary Abrahamsen, a fellow graduate student in plant physiology, whom he later married. In 1964, he completed his Ph.D. degree and joined the newly built ARS laboratory in Fargo to help determine the fate of pesticides in the environment.

During his next 33 years at the laboratory, Shim made many highly significant discoveries regarding the fate of pesticides in plants. He identified N-dealkylation as an alternative pathway for atrazine detoxification in higher plants. In collaboration with his colleagues, he found a major pesticide degradation and detoxification pathway (glutathione conjugation) in plants that is responsible for the ability of some plants to survive herbicide treatment. He found a genetic basis for atrazine resistance of corn and discovered that pesticide degradation varies among different plant organs. He determined that differential metabolism of diclofop-methyl is the biochemical basis for selectivity between resistant wheat and susceptible wild oat. More recently, Shim investigated a two-way antagonism between diclofop-methyl and auxinic compounds. At the time of his death, he was elucidating the details of this process.

Dr. Shimabukuro was the author or coauthor of 145 research papers and abstracts, 10 invited symposium presentations, and 7 comprehensive reviews. He was an adjunct professor in the Department of Plant Science, North Dakota State University, where he taught graduate-level courses and held class lectures and seminars. Shim received many awards, including the Japanese Government Research Award for Foreign Specialists, the USDA Superior Service Award (a team award for pesticide degradation pathway), the Weed Science Society of America Outstanding Research Worker Award, and the Ciba-Geigy Corporation Outstanding Agricultural Scientist Recognition Award. He also cooperated with many foreign scientists both overseas and in his own laboratory and visited many foreign countries, including India, Spain, Japan, Sudan, Philippines, and Australia, to assist those countries with their research programs.

Shim is survived by Mary and their three children, Tom, Peter, and Ann. A memorial in his name has been arranged at the University of Hawaii to support student scholarships.

David G. Davis
Biosciences Research Laboratory
USDA/ARS
Fargo, North Dakota

U.S.—Japan Cooperative Science Program

Implemented by the National Science Foundation (NSF) and the Japan Society for the Promotion of Science (JSPS), the U.S.—Japan Cooperative Science Program supports travel and subsistence costs necessary to advance U.S.—Japan cooperative science, including cooperative research and joint seminars.

Cooperative research involves U.S. and Japanese scientists and engineers in collaborative projects of up to three years' duration. The U.S. portion is sponsored by NSF, and the Japanese portion is sponsored by JSPS. A series of exchange visits of three months or less is also included.

Joint seminars feature topics of current interest to both countries and involve 30 participants or fewer. They are held either in Japan or the United States, with the U.S. portion sponsored by NSF and the Japanese portion sponsored by JSPS.

American researchers from any sector may apply. Japanese counterpart scientists and engineers are typically associated with universities and colleges. Cooperative research projects may be supported for one to three years. Visits made in conjunction with such projects are short term, usually several weeks to as long as three months each year. Support is also available for travel and living expenses for graduate students and postdoctoral investigators who can contribute significantly to either a research project or a joint seminar. Proposal deadlines: NSF—June 15 of each year; JSPS—May 23 of each year.

Principal investigators in the United States should submit their proposals to NSF; the Japanese counterpart principal investigator must submit a proposal to JSPS. Joint approval of such projects by NSF and JSPS is required, and the U.S. investigator's proposal to NSF must include a copy of the cover page of the proposal submitted to JSPS.

The program description and budgetary guidance can be found at http://www.twics.com/~nsftokyo/home.html.

David G. Davis
Biosciences Research Laboratory
USDA/ARS
Fargo, North Dakota
Be Sure to Visit These
Exhibitors at Plant Biology '98 in Madison

Plant Biology '98 Exhibitors
(as of 5/7/98)

Academic Press - booth #500
AEI Technologies - booth #412
Ambion, Inc. - booth #311
Blackwell Science Ltd. - booth #304
CID - booth #401
Conviron - booth #407
Dynamax (2 booths) - booths #414, #416
Elsevier - booth #504
ENCONAIR - booth #505
Environmental Growth Chambers - booth #300
Heinz Walz - booth #302
Jackson ImmunoResearch Laboratories - booth #507
Kluwer Academic Publishers - booth #304
LI-COR (3 booths) - booths #402, #404, #406
Life Technologies - booth #600
Nitrate Elimination Co. - booth #403
Opti-Sciences - booth #503
Oxford University Press - booth #317
Percival Scientific - booth #501
PP Systems - booth #306
Promega Corporation - booth #313
Qiagen - booth #602
Quantum Devices - booth #506
Qubit Systems - booth #410
Scientific Book Displays - booth #315
Sinauer Associates - booth #502

ASPP Sponsored Booths
ASPP Headquarters - ASPP Booth
ASPP Education Committee - booths #201, #203, #205, #207
DOE/NSF/USDA - booth #405
Radical Biology: Advances and Perspectives on the Function of Plant Roots
Edited by Hector E. Flores, Jonathan P. Lynch, and David Eisenstat
Proceedings 11th Annual Penn State Symposium in Plant Physiology
May 22-24, 1997
Current Topics in Plant Physiology: An American Society of Plant Physiologists Series, Volume 18

Grass Roots Science: A Fifty-Year Personal Perspective
E. Epstein

The Cellular Organization of the Root Apex and Its Dynamic Behavior during Root Growth
S. F. Baum, T. L. Rost

On the Post-Miotic Isodiametric Growth Zone in Roots
T. I. Baskin, G. T. S. Beemster

Root Cell Extension: Genetic and Molecular Approaches
L. D. Pysh, P. N. Benfey

Transposon Insertional Mutagenesis and the Study of Plant Root Development
R. Tsugeki, M. E. LeNoble, W. G. Spollen

Phosphorous Deficiency in White Lupin Alters Root Development and Metabolism
G. A. Gilbert, D. L. Allan, C. P. Vance

Regulation of Root Growth Maintenance at Low Water Potentials
R. E. Sharp, M. E. LeNoble, W. G. Spollen

Variation in Carbon Utilization in Root Respiration and Exudation as Dependent on a Species' Potential Growth Rate and Nutrient Supply
H. Lambers, I. Schuurwater, F. Millet

The Exodermis and Its Interactions with the Environment
C. A. Peterson

Physiological Basis for Zn Hyperaccumulation in Thlaspi caerulescens
M. M. Lasat, L. V. Kochian

The Use of the Model Legume Lotus japonicus to Study Nodulation and Lateral Root Formation
F. J. de Bruijn, J. Wepereis, P. Kapranov, F. B. Dezzo, K. Szafigowski

Signaling in Plants and Root-Infecting Fungi Associations
G. Bécard, T. Béguin, C. Neg.clubski

Ecophysiology of Mycorrhizal Roots
R. T. Keefe, E. P. Baswell

Nutrient Transport and Metabolism in the Life Cycle of Arbuscular Mycorrhizae as Examined by NMR Spectroscopy

Root Border Cells: Phenomenology of Signal Exchange
M. C. Haines, L. A. Brigham, F. Win, H. H. Woo, Y. Zhu

A Dirty Look: Soil Microflora and Rhizosphere Microbiology

Water Loss from Tree Roots Influences Soil Water and Nutrient Status and Plant Performance
T. E. Druege

Responses of Fine Roots to Dry Surface Soil: A Case Study in Citrus
D. Eisenstat

Inter-root Communications and the Structure of Desert Plant Communities
B. E. Mahall

Plant Roots in Agriculture and Medicine: The Uses of Radical Biology
V. M. Loyola-Vargas, S. M. T. Hernández-Sotomayor

The Biology and Culture of Cassava Roots
J. M. McMahon, R. T. Sayre

Molecular Insights into the Biology of Sweetpotato (Ipomoea batatas)
C. S. Prakash, M. Egnin, G. He, R. Gueda, D. Scott, Jr.

The Future of Radical Biology? Connecting Roots, People, and Scientists
H. E. Flores, L. A. Brigham, J. M. Vivanco

Plus 66 mini-papers
Gatherings

The ASPP NEWS publishes dates, titles, locations, and contact names and addresses for meetings, courses, seminars, and the like that are of interest to ASPP members. Submit announcements via e-mail to sbraxton@aspp.org or mail to Sylvia J. Braxton, ASPP NEWS, 15501 Monona Drive, Rockville, MD 20855-2768 USA. Faxed transmissions are not accepted.

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FUTURE ASPP ANNUAL MEETING SITES

1998: Madison, Wisconsin
Saturday, June 27, through Wednesday, July 1

1999: Baltimore, Maryland
Saturday, July 24, through Wednesday, July 28

2000: San Diego, California
Saturday, July 15, through Wednesday, July 19

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1998

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MAY

May 23–28
NABC Bioethics Institute
An International Conference
North Carolina State University, Raleigh
The deadline for applications is April 1, 1998, with preference given to those received by March 1.
For more details, contact: Professor Gary Comstock, 421 Catt, rsu, Ames, IA 50011-1306, telephone 515-294-0054, e-mail comstock@iastate.edu.

May 28–30
Phosphorus in Plant Biology:
Regulatory Roles in Molecular, Cellular, Organismic, and Ecosystem Processes
Pennsylvania State University, University Park
Organizers: Jonathan Lynch and Jill Deikman.
Contact Jonathan Lynch, Department of Horticulture, Pennsylvania State University, University Park, PA 16802; telephone 814-863-2256; fax 814-863-6139, e-mail jpl4@psu.edu. For more details, visit our Web site at http://www.lsc.psu.edu/phys/annualsym.html.

May 30–June 4
The 1998 Meeting of the Society for
In Vitro Biology
Bally's Las Vegas Hotel & Casino
Las Vegas, Nevada

JUNE

June 2–6
5th International Symposium on
Preharvest Sprouting in Cereals
Detmold, Germany
Contact K. Niebuhr/D. Weipert, Assoc. of Cereal Research, Schutzenberg 10, D-32756 Detmold, Germany; telephone 49(0)5231-25530, fax 49(0)5231-20505, or M. K. Walker-Simmons, USDA-ARS, 209 Johnson Hall, Washington State University, Pullman, WA 99164-6420, e-mail ksimmons@wsu.edu.

June 2–7
5th International Conference on the Cell and Molecular Biology of Chlamydomonas
Tahoe City, California

June 3–7
Graduate Research Ethics Education
A Workshop at Indiana University
Bloomington, Indiana
For information contact Brian Schrag, Ph.D., Project Director, "Graduate Research Ethics Education," Association for Practical and Professional Ethics, 410 North Park Avenue, Bloomington, IN 47405; telephone 812-855-6450, fax 812-855-3315, e-mail app@iu.edu, Web site http://app.ucyr.edu/.

June 4–6
Phytopharmaceuticals:
From Plant to Therapeutic
John Innes Centre, Norwich, United Kingdom
Organizing committee: Paul Christou, Deborah Gierdie, and Clare Robinson. For details and an application form, please contact Clare Robinson, John Innes Centre; telephone 44-1603-452571, fax 44-1603-456844, e-mail clare.robinson@bbas.ac.uk.

June 4–7
Joint Annual Association for the Study of Food and Society (ASFS) and Agriculture, Food, and Human Values Society (AFHVS) Meeting
Gateway Holiday Inn, San Francisco, California
Contact Dr. Jacqueline M. Newman, Chairperson, FNES Department, Queens College, 65-30 Kissena Blvd., Flushing, NY 11367; telephone 718-997-4150, fax 718-997-4163, e-mail newman@qcvaaxa. acc. qc.edu.

June 4–7
1998 Conference of the Association for the Study of Food and Society and the Agriculture, Food and Human Values Society
Gateway Holiday Inn
San Francisco, California
Contact Barbara H. J. Gordon, San Jose State University, Nutrition and Food Science Department, 1 Washington Square, San Jose, CA 95192-0049; telephone 408-924-3105, fax 408-924-3114, e-mail bgordon@cruzio.com. Visit our Web site at http://www.iup.edu/~barker/.

June 14–19
IX International Congress on
Plant Tissue and Cell Culture
The ICC Jerusalem International Convention Center
Jerusalem, Israel
For further information contact The Secretariat, IX International Congress on Plant Tissue and Cell Culture, P.O. Box 50006, Tel Aviv 61500, Israel; telephone 972-3-514-0000, fax 972-3-517-5674 / 972-3-514-0077, e-mail plant@kenes.com.

June 22–July 3
Short Course:
Postharvest Technology of Horticultural Crops
University of California, Davis
Contact Ms. Sharon Munowich, University Extension, University of California, Davis, California 95616; telephone 916-757-8999, fax 916-757-8634, e-mail smunowich@unexmail.ucdavis.edu.
JULY

July 1–3
5th Spanish Conference on Nitrogen Fixation Pamplona, Spain
Contact Cesar Arrese-Igor, Department Ciencias del Medio Natural, Universidad Publica de Navarra, Campus de Arrosadia, E-31006 Pamplona, Spain; phone +34-48-169119, fax +34-48-169122, e-mail cesarai@unpa.es.

July 5–August 14
Summer Course: Exploration of Plant Science NIU at Oxford, Oriel College Oxford, United Kingdom
Northern Illinois University is offering a summer course in plant biology open to U.S. undergraduate and graduate students interested in short term study abroad. For more information, please see Oxford Program Web site: http://www.niu.edu/acadenglish/oxford.html, or contact Dr. Gabriel Holbrook, Plant Molecular Biology Center, Northern Illinois University, DeKalb, IL 60115; telephone 815-753-3199, e-mail sgphi1@wpo.cs.niu.edu.

July 7–9
For registration forms and information, contact Royal Microscopical Society, 37/38 St. Clements, Oxford OX4 1AJ, United Kingdom; telephone 1-865-248786, fax 1-865-791237, e-mail info@rms.org.uk, Web site http://www.rms.org.uk.

July 7–10
25th Annual Meeting: Plant Growth Regulation Society of America Chicago, Illinois
For information contact Dr. Warren Shafer, Abbott Laboratories, Agricultural Research Center, 6133 RFD (Oakwood Road), Long Grove, IL 60047; telephone 847-367-2654, fax 547-367-2913, e-mail pgsa98@aol.com, Web address http://members.aol.com/pgs98.

July 11–14
Annual Meeting of the Canadian Society of Plant Physiologists Université de Montréal, Quebec, Canada
Contact Dr. Dwight Beebe, IRBV, Université de Montréal, 4101 rue Sherbrooke est, Montréal (Québec) H2X 2B2, Canada; telephone 514-872-4563, fax 514-872-8406, e-mail beebede@umontreal.ca, meeting Web site http://alize.e蕾.unmontreal.ca/~beebed/index.html.

July 11–15
26th Annual Meeting of the American Society for Photobiology Snowbird Resort, Snowbird, Utah
For more information contact Dr. Sherwood Reichard, Secretariat, 1021 15th Street, Suite 9, Augusta, GA 30901; telephone 706-722-7511, fax 706-722-7515, e-mail maps@csranet.com.

July 12–17
Ilth International Symposium on Cytochrome P450 Biodiversity and Biotechnology Strasbourg, France
Information concerning this meeting and second circular can be obtained by e-mail at P450-98@ibmp-ulp.u-strasbg.fr. Information is also available from the Web P450 page: http://www.igeb.trieste.it/p450/

July 12–17
Gordon Conference on the Chemistry and Biology of Tetrapyrroles Salve Regina University, Newport, Rhode Island For information, please contact Gordon Research Conferences, University of Rhode Island, P.O. Box 984, West Kingston, RI 02892, telephone 401-783-4011, fax 401-783-7644; e-mail ggc@grcmail.grc.uri.edu. The complete program of this meeting is posted on the Web at http://www.grc.uri.edu.

July 12–17
Deadline for abstracts: June 1, 1998 (submit abstracts to Ruth Anne Eaton, The Bobby R. Alford Department of Otorhinolaryngology and Communicative Sciences, Baylor College of Medicine, One Baylor Plaza, Houston TX 77030). For more information, visit the Gordon Conferences general Web site at http://www.grc.uri.edu or the specific Web site for this Gordon Conference at http://jvc undesirable/98grc/ or contact Mike Evans, Department of Plant Biology, Ohio State University, Columbus, OH 43210; telephone 614-292-9162, fax 614-292-6345, e-mail evans.206@osu.edu.

July 13–17
6th International Symposium on Inorganic Nitrogen Assimilation Luso, Portugal

July 13–25
Workshop Course on Molecular Techniques Oregon State University, Corvallis Contact Cail Millimaki, Molecular and Cellular Biology Program, 3202 ALS, Oregon State University, Corvallis, OR 97331; telephone 541-737-3799, e-mail mcdb@bc.cr.orst.edu.

July 19–24
Conference chair: Pam Green; vice chair: Rob Last. The conference program may be viewed though the Gordon Conference Web site at http://www.grc.uri.edu. This site also provides online registration and other meeting information.

July 20–24
The Supporting Roots: Structure and Function A Conference Sponsored by the University of Bordeaux, Bordeaux, France
Contact Alexia Stokes, Laboratoire de Rhéologie du Bois de Bordeaux, Domaine de l’Hermitage, B.P. 10, 33610 Cestas Gazinet, France; telephone +33-5-57-97-91-04; fax +33-5-56-68-07-13, e-mail stokes@libb.pierron.inra.fr.

July 22–24
Carbohydrate Metabolism in Plants, the Pathways and Their Control A meeting IN MEMORIAM to honour Professor T. ap Rees Queens College, Cambridge, United Kingdom
Organizers: Dr. M. M. Burrell, Professor J. A. Bryant, Dr. N. J. Kruger. For further information, contact Dr. M. M. Burrell, Advanced Technologies, Northern Illinois University, DeKalb, IL 60115; telephone 815-753-3199, fax 847-367-2913, e-mail mcb@bcc.orst.edu.

July 23–24
Strategic Partnerships to Successfully Commercialize Agricultural Biotech: Maximizing the Profit Potential of New Output & Input Traits The Sutton Place Hotel, Chicago, Illinois
JULY 26–31
1998 Phytochemical Society of North America Conference
“Phytochemicals in Human Health Protection, Nutrition and Plant Defense”
Pullman, Washington
Contact Norman C. Lewis, Institute of Biological Chemistry, 467 Clark Hall, P.O. Box 646340, Pullman, WA 99164-6340; telephone 509-335-3412 (ask for Hiroko); fax 509-335-7643, e-mail lewisn@wsu.edu.

AUGUST
August 7–8
Tobacco Mosaic Virus: Pioneering Research for a Century
Edinburgh, Scotland
The meeting organizers are Professors T.M.A. Wilson and B. D. Harrison. For further information and registration materials, please send an e-mail inquiry to TM@scri.ac.ru. You can also view the program and obtain registration information at http://www.bspp.org.uk/icpp98/meetings/tmv100.htm.

August 9–14
Annual Meeting and Exhibits
Society for Industrial Microbiology
Adams Mark Hotel, Denver, Colorado
For more information, please contact the SIM office at 703-691-3357. Visit the SIM Web site at http://www.simmq.org or e-mail info@simhq.org.

August 9–18
11th International Workshop on Plant Membrane Biology
Cambridge, United Kingdom
Contact Dr. Mark Tester, Department of Plant Sciences, University of Cambridge, Downing St., Cambridge, CB2 3EA, UK; telephone +44-1223-333918, fax +44-1223-333953, e-mail plantnut@lists.cam.ac.uk.

August 13–17
16th International Conference on Plant Growth Substances
Makuhari Messe, Chiba, Japan
Organizer: Nobutaka Takahashi. For information contact http://frpp.afriken.go.jp/IPGSA/ IPGSA98.html, or Dr. Yuji Kamiya, Plant Hormone Function, FRP RIKEN, Hirosewa 2-1, Wako-shi, Saitama 351-01, Japan; fax +81-48-462-4716, e-mail ykamiya@postman.riken.go.jp.

August 16–21
Gordon Research Conference
Cellular Basis of Adaptation to Salt and Water Stress in Plants
Queen's College, Oxford, United Kingdom
Chair: Andrew Smith; vice chair: Beth Bray. For more information, visit the GRC at http:// www.grc.uri.edu/ or contact J.A.C. Smith, Department of Plant Sciences, University of Oxford, South Parks Road, Oxford, OX1 3RB, UK; telephone 44-1865-275098, fax 44-1865-275074, e-mail andrew.smith@plants.ox.ac.uk.

AUGUST 26–31
1998 Phytochemical Society of North America Conference
“Phytochemicals in Human Health Protection, Nutrition and Plant Defense”
Pullman, Washington
Contact Norman C. Lewis, Institute of Biological Chemistry, 467 Clark Hall, P.O. Box 646340, Pullman, WA 99164-6340; telephone 509-335-3412 (ask for Hiroko); fax 509-335-7643, e-mail lewis@wsu.edu.

SEPTEMBER
September 1–5
Cell Walls '98
6th International Cell Walls Meeting
John Innes Centre, Norwich, United Kingdom
Scientific organizers: Keith Roberts, Maureen McCann, and Keith Waldron. For a copy of the first circular, please contact the symposium organizer, Mrs. Gay Adams, at telephone +44-1603-452571, fax +44-1603-501771, e-mail gay.adams@bbsrc.ac.uk.

September 5–8
European Union TMR-Euconference on Biology and Biotechnology of the Plant Hormone Ethylene II
Island of Santorini, Cyclades, Greece
Organizer and contact: Dr. Angelos K. Kanellis, National Agricultural Research Foundation, Institute of Viticulture and Vegetable Crops, PO Box 1841, GR-711 10 Heraklion, Crete, Greece; telephone/fax +30-81-245851, 245873, 242870, e-mail kanellis@metelli.imb.forth.gr. Web site www.imbb.forth.gr/ethylene.

September 7–19
16th International Conference on Phytochemistry
Island of Santorini, Cyclades, Greece
Organizer: Dr. Angelos K. Kanellis, National Agricultural Research Foundation, Institute of Viticulture and Vegetable Crops, PO Box 1841, GR-711 10 Heraklion, Crete, Greece; telephone/fax +30-81-245851, 245873, 242870, e-mail kanellis@metelli.imb.forth.gr. Web site www.imbb.forth.gr/ethylene.

September 13–16
The Phytochemical Society of Europe Biologically Active Polysaccharides
Oslo, Norway
Paper deadline: May 1998. Contact Professor B. S. Paulsen, Farmasoytisk Avd, c, Postbox 1068 - Blindern, 0316 Oslo, Norway; telephone 47-2285-6572, fax 47-2285-4402, e-mail b.s.paulsen@farmasi.uio.no.

1999

JANUARY
January 21–February 5, 1999
Temperature Stress in Plants
Gordon Research Conference, Ventura, California
Contact Charles Guy, University of Florida, Department of Environmental Horticulture, PO Box 110670, Gainesville, FL 32611-0670; telephone 352-392-7934, fax 352-392-3870, e-mail c1g@fnv.ifas.ufl.edu. See the Web site http://www.grc.uri.edu/programs/1999/tempstrs.htm.

MAY
May 16–20, 1999
6th Symposium on Stand Establishment and the Seed Working Group of the International Society for Horticultural Science
Roanoke, Virginia
Contact Greg Welbaum, Department of Horticulture, Roanoke, Virginia; telephone 703-691-3357. Visit the SIM Web site at http://www.simhq.org or e-mail info@simhq.org.

Dear Members,

It is my pleasure to invite ASPP members to attend the 25th annual meeting of the Plant Growth Regulation Society of America (PGRSA), which will take place July 7–10, 1998, at the Hotel Inter-Continental in downtown Chicago. Because the meeting comes on the heels of the annual ASPP meeting just one week earlier and 100 miles away, why not consider “hanging around” Madison, Wisconsin, or the greater Chicago area for a few extra days (see a baseball game, visit the Art Institute, challenge your appetite at the famous “Taste of Chicago” street festival) and attend our meeting? We have an exciting scientific program planned, including symposia on Systemic Acquired Resistance and the Use of PGRs in Tree Fruit Production, as well as workshops on Gibberellins, Non-Chemical Ways to Control Plant Growth, and new Industry Developments. To learn more about the meeting and how to register, visit our new Web site at http://members.aol.com/PGRSA98. Thanks for your time and attention. We look forward to seeing you in Chicago!

Sincerely,
Warren E. Shafer, Program Chair
PGRSA98
This form may be used only by members of the American Society of Plant Physiologists. Please print or type your placement information on this form (curriculum vitae will not be accepted) and send it to Estella Coley, ASPP Headquarters, 15501 Monona Drive, Rockville, MD 20855-2768

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<th>LAST NAME</th>
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I am seeking the following position (check all that apply):
- [ ] Permanent
- [ ] Temporary
- [ ] Academic
- [ ] Government
- [ ] Postdoctoral
- [ ] USA only
- [ ] Industrial
- [ ] Outside USA

US citizen? [ ] Yes [ ] No Date available: ________________

Fields of interest, specialties, and publications titles:

Thesis, dissertation topics, professor:

Professional societies and honors:

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

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References (names, addresses, telephone numbers):

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

ASPP headquarters in Rockville, Maryland, operates a placement service in which are kept active two files of resumes of individuals who are seeking employment. Employers are urged to survey the resume files for those seeking permanent positions and those seeking postdoctoral or similar positions. The files cost $25 each and may be ordered from Estella Coley, ASPP Placement Service, 15501 Monona Drive, Rockville, MD 20855-2768 USA. Those seeking employment should complete the Placement Service Form on the facing page to be included in the service.

II. Placing a Position Ad in ASPP NEWS and on the ASPP World Wide Web Homepage

Submit all ads by e-mail to Sylvia J. Braxton at sbraxton@aspp.org (or by mail to Sylvia J. Braxton, 15501 Monona Drive, Rockville, MD 20855-2768; FAXED ADS ARE NOT ACCEPTED). A fee of $150 for print, Web, or both is charged for all academic/government/industry permanent positions and for all positions, regardless of rank, posted by private companies (private nonprofit companies are not charged a fee). If a fee is charged for your ad, please include billing information at the time the ad is submitted.

- Academic/Government/Industry Permanent Positions (Ph.D.): Limited to 200 words; ad will run 12 weeks on the Web and appear in one issue of ASPP NEWS. (If the ad runs only on the Web, the word limit is waived.)
- Postdoctoral Positions and Research/Technical Positions (non-Ph.D.): At universities and government installations, limited to 100 words; at private companies, limited to 200 words. Ad will run 12 weeks on the Web and appear in one issue of ASPP NEWS. (If the ad runs only on the Web, the word limits are waived.)
- Assistantships, Fellowships, Internships, etc.: Announcements of programs and fellowships or internships for students seeking advanced degrees run at no charge and without a word limit. They will run two times in ASPP NEWS: the first time, they will run at full length; the second time, they will include location, contact name, and address, with a reference to the original posting. These announcements will run on the ASPP World Wide Web homepage for 12 weeks from the date of posting.

ACADEMIC/GOVERNMENT/INDUSTRY PERMANENT POSITIONS (Ph.D.)

Phytochemists and Plant Biotechnologists
Institute of Botany, Academia Sinica
Taipei, Taiwan
(Received 03/31)

Tenure-track positions are available for experienced phytochemists and plant biotechnologists with Ph.D. degrees to strengthen and develop our interdisciplinary programs on biotechnology of medicinal plants. The desired applicants are (1) Chemists with considerable experience in natural products, preferably with backgrounds in biochemical/analytical chemistry. Demonstrated creativity and leadership skills with a strong ability to pursue aggressive natural product research a must. (2) Biochemists with experience in metabolic pathways and key enzymes on plant secondary metabolites. Backgrounds in plant physiology/tissue culture desirable. (3) Plant tissue culture/molecular biologists with ability to develop programs on gene manipulation and transgenic plants related to secondary metabolites. Submit curriculum vitae with three references, official transcripts, and one proposal to Wei-chin Chang, Searching Committee, Institute of Botany, Academia Sinica, Taipei, Taiwan 115, Republic of China; fax 886-2-2782-7954, e-mail wcchang@wc.sinica.edu.tw.

Assistant Professor
University of Missouri, Columbia
(Received 04/02)

The College of Agriculture, Food and Natural Resources at the University of Missouri seeks applicants for a research assistant professor of biochemistry and agronomy to study soybean functional genomics employing combinations of SAGE, macro and microarray technology, and bioinformatics. Innovative approaches are encouraged. The candidate will contribute to and benefit from the strong intellectual support in the plant sciences at Missouri, including plant biotech, production, and protection under the Interdisciplinary Plant Program. Funding, including start-up and postdoctoral support, is provided by the Missouri Soybean Merchandising Council. Qualifications include at least two years postdoctoral training in genomics and/or plant molecular biology and physiology. A curriculum vitae and three letters of reference should be sent by June 15, 1998, to Dr. Joe Pelacco, Biochemistry Department, 117 Schweitzer, University of Missouri, Columbia, MO 65211. The University of Missouri is an equal opportunity/affirmative action employer.

Research Assistant Professor
Rutgers University, New Brunswick, New Jersey
(Received 04/03)

A research assistant professor position is available to develop novel systems for heterologous protein expression in plants. Experience in plant transformation, general molecular biology, and plant virology is required. Please send curriculum vitae and the names of three referees to Ilya Raskin, Biotech Center, Rutgers University, Foran Hall, 59 Dudley Road, New Brunswick, NJ 08903. Rutgers University is an equal opportunity/affirmative action employer.

Manager of Technology
Acquisition and Licensing
Seminis Vegetable Seeds
Woodland, California
(Received 04/17)

Seminis Vegetable Seeds, the world's largest vegetable seed company, seeks applicants for the position of Worldwide Manager of Technology Acquisition and Licensing at its Woodland, California, Research and Development Headquarters. The incumbent will be responsible for identifying and evaluating new technologies, particularly biotechnology and on a worldwide basis. The applicant will also be responsible for all licensing and research agreements for the Seminis Department. The position requires a Ph.D. in plant molecular biology or related field; significant experience in contracts and licensing; and strong organizational, interpersonal, and management skills. Compensation will be commensurate with experience. Please send letter, resume, and references to Seminis Vegetable Seeds, Attn: Human Resources, 37437 State Highway 16, Woodland, CA 95695; fax 530-666-3198, e-mail donald.greenbaum@svseeds.com. Applications must be marked “EG-498.”

MAXIMIZE YOUR JOB PROSPECTS!

Check ASPP's World Wide Web site (http://aspp.org/JOBS/) every Friday for new job listings.

Jobs with early application deadlines are listed on the Web site, but might not appear in ASPP NEWS.
The research project is focused on targeting and glycosylation of proteins in the study of auxin-regulated transcription in Arabidopsis. A postdoctoral position is immediately available to study the early steps of formation of aliphatic glucosinolates in Arabidopsis thaliana and related species or (2) the biosynthesis of volatile terpenes induced by herbivore attack in cotton and corn. Previous experience in protein biochemistry, analytical chemistry, and/or plant molecular biology is desirable. The Institute of Chemical Ecology is international in character with English as the official language. Applications are invited from scientists of all nationalities. Please send curriculum vitae and names of three references to Jonathan Gershenson, Max-Planck-Institut fuer Chemische Oekologie, Tatzentpromenade 1a, D-07745 Jena, Germany; fax +49-3641-643653, e-mail gershenson@ice.mp.de.

Postdoctoral Positions
University of Kentucky, Lexington (Received 03/24)
A postdoctoral position is available immediately to study regulation and manipulation of fatty acid metabolism in transgenic plants, especially soybeans. Experience in biochemistry and/or chemistry, molecular biology, and plant transformation/regeneration advantageous. Send letter describing experience, curriculum vitae, and references (e-mail address, phone, or fax) to David Hildebrand, N-106 AGM, Department of Agronomy, University of Kentucky, Lexington, KY 40546-0091; e-mail dhasil@pop.uky.edu, Web site http://www.uky.edu/Agriculture/Agronomy/PLBC. The University of Kentucky is an equal opportunity employer.

Postdoctoral Research Fellowship
Rutgers—The State University of New Jersey New Brunswick (Received 03/24)
An opening for a postdoctoral researcher in plant or algal molecular biology will be available beginning September 1998 to work on the redox regulation of nuclear gene expression. Candidates must have a strong background in molecular biology; experience in protein purification, plasmid construction, and transformation and screening is highly desired. Salary is $32,000 per year plus benefits. Applicants should send a curriculum vitae, three letters of recommendation, and names of three references, and two reprints/preprints of their research papers to Paul Falkowski, Rutgers—The State University of New Jersey, Institute of Marine and Coastal Sciences, 71 Dudley Road, New Brunswick, NJ 08901-3821. The closing date is May 15, 1998. Rutgers is an equal opportunity/affirmative action employer.

Postdoctoral Position
University of California, Los Angeles (Received 03/26)
A position is available in physical and theoretical chemistry. Research is on solvent dynamics and their influence on charge transfer reactions using both fs spectroscopies and MD simulations. Experience with either fs lasers or computer simulations and a Ph.D. in chemistry or related field are required. Send curriculum vitae, summary of research experience and two letters of recommendation to Prof. B. I. Schwartz, Department of Chemistry and Biochemistry, UCLA, Box 951569, Los Angeles, CA 90095-1569; fax 310-206-4038, e-mail schwartz@chem.ucla.edu. EOE.

Postdoctoral Position
Max Planck Institute of Chemical Ecology Jena, Germany (Received 03/21)
Two postdoctoral positions are available to study the biochemistry and molecular regulation of plant defense metabolism. Research will focus on (1) the early steps of formation of aliphatic glucosinolates in Arabidopsis thaliana and related species or (2) the biosynthesis of volatile terpenes induced by herbivore attack in cotton and corn. Previous experience in protein biochemistry, analytical chemistry, and/or plant molecular biology is desirable. The Institute of Chemical Ecology is international in character with English as the official language. Applications are invited from scientists of all nationalities. Please send curriculum vitae and names of three references to Jonathan Gershenson, Max-Planck-Institut fuer Chemische Oekologie, Tatzentpromenade 1a, D-07745 Jena, Germany; fax +49-3641-643653, e-mail gershenson@ice.mp.de.

Four Postdoctoral Positions
University of Kentucky, Lexington (Received 03/31)
Four research position openings are available to work on novel approaches for control of plant pathogenic fungi using the downy mildew fungus of Nicotiana spp. as a model system. The first position is expression of fungal and mycovirus-encoded antifungal polyphenols in transgenic plants. Contact Dr. David A. Gubler, e-mail sagbl000@pop.uky.edu. The second position is regulatory genes involved in systemic acquired resistance. Contact Dr. Chris Schardl, e-mail schardl@pop.uky.edu. The third position is development of molecular markers for epidemiological and population studies of Peronospora tabacina. Contact Dr. Mark L. Farman, e-mail farman@pop.uky.edu. The fourth position is cloning and functional characterization of disease resistance genes. Contact Dr. Qingshun (Quinn) Li, Tobacco and Health Research Institute, e-mail agr022@pop.uky.edu, or Dr. Mark L. Farman, e-mail farman@pop.uky.edu. Send curriculum vitae with brief statement of research background and interest with names of three references directed to the appropriate PI at Department of Plant Pathology, University of Kentucky, Lexington, KY 40546; fax 606-323-1961.

Postdoctoral Position
Iowa State University, Ames (Received 04/06)
A postdoctoral position is available to characterize Arabidopsis genes differentially regulated during cyst nematode parasitism. Applicant must have strong background in molecular biology and should have experience/interest in situ hybridization techniques. General lab info can be obtained at [http://www.public.iastate.edu/~tmaier/baumlab/baumcnt.html]. Send (hard copies, not e-mail) letter of research interests, curriculum vitae, relevant reprints, and names of three references to Dr. Thomas J. Baum, Iowa State University, Department of Plant Pathology, 351 Bessey Hall, Ames, IA 50011.

Postdoctoral Position
University of Rouen, Rouen, France (Received 04/15)
Three postdoctoral positions are available to study targeting and glycosylation of proteins in the plant secretory pathway and to produce (position 1 or 2) or to characterize (position 3) the active therapeutic glycoproteins expressed in transgenic plants or in suspension-cultured cells. Candidates for positions 1 or 2 should have experience in cDNA cloning/construction, analysis of gene expression, and protein purification/characterization. Candidates for position 3 should have an active interest in the identification of N-linked glycans and practical experience with advanced methods to study the structure of oligosaccharides (HPAEC-PAD, NMR, mass spectrometry, etc.). Annual salary: 132000-168000FF/year for one to three years. Send a letter of application, a curriculum vitae, and the names of three references to Dr. L. Faye, UMR CNRS ESA 6037, European Institute for Peptide Research, UFR des Sciences, University of Rouen, F-76821 Mont. St. Aignan, Cedex, France; e-mail lfoye@crihac.fr.

Postdoctoral Position
Purdue University, West Lafayette, Indiana (Received 04/17)
A postdoctoral position is available to study the genetic and environmental basis for dormancy in cereal grain seeds. We have developed recombinant inbred (RI) lines and other population segregating for dormancy. The overall objectives are to determine the germination phenotype and genotype of RI lines under various environmental conditions and to identify molecular markers for dormancy QTL. These objectives are consistent with the goal of cloning dormancy QTL. Candidates should have a background in molecular genetics. Previous experience in genetics, statistics, and seed biology is desirable. Send a curriculum vitae and the names, telephone numbers, and e-mail addresses of three references to Dr. Michael Foley, Department of Botany and Plant Pathology, Purdue University, West Lafayette, IN 47907-1155; fax 765-494-0363, e-mail foley@btmp.purdue.edu.

Postdoctoral Position
University of Toronto, Ontario, Canada (Received 04/20)
A postdoctoral position is available for one year and perhaps a second (contingent on obtaining outside funding) to study the molecular genetic mechanisms involved in the induction and establishment of systemic acquired resistance (SAR) in the Arabidopsis/Pseudomonas syringae pv tomato model system. Previous experience in molecular biology and genetics is required; experience with Arabidopsis or plant-pathogen interactions would be useful. Please send curriculum vitae, research interests, and the names, telephone numbers, and e-mail addresses of three references to Dr. Robin K. Cameron, Department of Botany, University of Toronto, 25 Willcocks Street, Toronto, Ontario, Canada, M5S 3B2; telephone 416-978-3545, e-mail rcameron@botany.utoronto.ca.

Postdoctoral Position
University of Missouri, Columbia (Received 04/20)
A postdoctoral position is immediately available to study auxin regulated gene transcription in Arabidopsis. The research project is focused on...
Auxin Response Factors (ARFs) and the proteins with which they interact. Applicants must have a strong background in molecular biology. Please send a curriculum vitae, a statement of research experience, and three letters of reference to Tom Guilfoyle, Biochemistry Department, 117 Schweizer Hall, University of Missouri, Columbia, MO 65211; telephone 573-882-7658, fax 573-884-5635, e-mail bctgulf@muccmail.missouri.edu. The University of Missouri is an affirmative action/equal opportunity employer.

Postdoctoral Position
Arizona State University, Tempe
(Received 04/22)
A postdoctoral position is available to study the significance of UV-induced blue-green autofluorescence in leaves and its possible role in photosynthesis. Investigations include characterizing this autofluorescence using spectrofluorometry and fiber optic microprobes, assessing the contribution of this autofluorescence to photosynthesis, and identifying autofluorescing phenolics. Optical expertise in spectrofluorometry and spectroscopy is preferred, and MS-level applicants with these skills will be considered. Applicants should send a curriculum vitae and names, telephone numbers, and e-mail addresses of three references to Dr. Thomas Day, Department of Plant Biology, Arizona State University, Tempe, AZ 85287-1601; fax 602-965-6899, e-mail ttday@asu.edu. AA/EOE.

RESEARCH/TECHNICAL POSITIONS
(Non-Ph.D.)
Senior Research Assistant
The Noble Foundation, Ardmore, Oklahoma
(Received 04/02)
The Forage Biotechnology Group in the Samuel Roberts Noble Foundation has an opening for a senior research assistant position. The successful candidate will provide technical support in plant tissue culture, molecular cloning, and generation of transgenic plants. Master’s degree in molecular biology, genetics, or plant sciences, or related areas is required. Salary is in the range of $24,890–$37,330 depending on qualifications and experience. Please send a letter of application, and detailed curriculum vitae and arrange for three letters of reference to be sent to Human Resources Department, Attn: Research Assistant—Forage Biotechnology Group, Samuel Roberts Noble Foundation, P.O. Box 2180, Ardmore, OK 73402.

Postdoctoral Student
Federal Institute of Technology (ETH) Zurich
Lindau, Switzerland
(Received 04/06)
A three-year Ph.D. student position is available. The present project is supported by the Swiss National Science Foundation and aims at characterizing the cell types responsible for phosphate uptake from the soil and the molecular mechanisms involved in phosphate transport. The work will include the subcellular localization of a phosphate transporter in root cells and investigations on structure/function relationships within the transporter. Basic knowledge of molecular biological, biochemical, and physiological methods is advantageous. Interested persons please contact Dr. Marcel Bucher, ETH Zurich, Institute of Plant Sciences, Plant Biochemistry and Physiology (Prof. Dr. M. Amrhein), CH-8093 Zurich, telephone/fax +41-52-345-20-64, e-mail marcel.bucher@ipw.biol.ethz.ch.

Research Technician
Texas Tech University, Lubbock
(Received 04/22)
A full-time research technician is available to conduct crop genome mapping research. Individuals with a B.S. or an M.S. degree in plant science, biology, or biochemistry are suitable for this position. Experience in molecular biology techniques is an advantage but not required. Applicants should provide a letter of interest, a complete resume, and college transcripts and arrange for three references to be sent to Dr. Henry T. Nguyen, Plant Molecular Genetics Laboratory, Department of Plant and Soil Science, Texas Tech University, Lubbock, TX 79409.

ASSISTANTSHIPS, FELLOWSHIPS, INTERNSHIPS, ETC.
Graduate Research Assistantship
Kansas State University, Manhattan
(Received 03/19)
Student may pursue an M.S. or a Ph.D. degree. Research will be in the areas of drought and heat stress physiology in cool-season turfgrasses. Excellent laboratory and field research facilities are available. Student will pay in-state tuition. Qualifications: B.S. or M.S. in plant physiology, horticulture, agronomy, or related fields. Applications should provide a letter of interest, a complete resume, and three letters of recommendation to Dr. Bingru Huang, Division of Horticulture, 2021 Throckmorton Plant Science Center, Kansas State University, Manhattan, KS 66506-5506; telephone 785-532-1429, fax 785-532-6949, e-mail bhuang@oz.ornet.ksu.edu.

Graduate Research Assistantship
New Mexico State University, Las Cruces
(Received 03/26)
Three assistantships devoted to two different projects will be available July 1, 1998. Project 1: AFLP linkage mapping in tetraploid alfalfa. An M.S.- or a Ph.D.-level student will be responsible for developing a linkage map in tetraploid alfalfa and anchoring this map to diploid maps that have been previously developed. The tetraploid map will be used to identify amplified fragment length polymorphism (AFLP) DNA markers that are linked to quantitative trait loci (QTL) that influence yield, water-use efficiency, and forage quality in alfalfa. Other research opportunities include developing suitable populations for QTL analysis and evaluating these populations in the field. Project 2: Genetic engineering for osmotic stress tolerance in alfalfa. An M.S.- or a Ph.D.-level student will be responsible for determining whether genetic alterations in carbohydrate metabolic pathways is a useful approach to improve osmotic stress tolerance in alfalfa. Research responsibilities will include transforming alfalfa with single and multigene constructs that produce osmoregulatory compounds or radical oxygen species (ROS)-scavenging enzymes. Transgenic materials will be characterized for changes in carbohydrate and metal ion metabolism when subjected to osmotic stresses and the extent to which each construct confers protection to water-stress and salt-stress. Qualified candidates will possess a B.S. or an M.S. in genetics, molecular biology, plant physiology, agronomy, or a related field. To apply send resume, transcripts, and the names of three references to Dr. Ian Ray, Department of Agronomy and Horticulture, MSC 3Q, New Mexico State University, Las Cruces, NM 88003-8003; telephone 505-646-3819, fax 505-646-6041, e-mail iaray@nmsu.edu.

USDA National Needs Graduate Fellowships
Iowa State University, Ames
(Repeat)
Contact Dr. Michael P. Anderson, Department of Plant and Soil Sciences, Okahoma State University, Stillwater, OK 74078; telephone 405-774-6939. (Details March/April 1998 ASPP NEWS)
A Look Beyond Transcription: Mechanisms Determining mRNA Stability and Translation in Plants

Edited by
Julia Bailey-Serres and Daniel R. Gallie

Plant pre-mRNA Splicing
M. A. Schuler

Intron Recognition in Plants
V. Brendel, J. C. Carle-Uriozte, V. Walbot

mRNA Polyadenylation in Plants
A. G. Hunt, J. Messing

Determinants of mRNA Stability in Plants
M. A. Johnson, E. J. Baker, J. T. Colbert, P. J. Green

The Role of Stress in Regulating mRNA Stability
M. C. Mehdy, M. R. Brodl

Developmental Regulation of Translation and mRNA Stability
W. R. Marcotte, Jr.

The Translational Machinery of Plants
K. S. Browning, D. J. Goss, D. A. Roth, D. R. Gallie

Ribosome Shunting in Eukaryotes: What the Viruses Tell Me

Dependence of Fed-1 Light Regulation on Translation

Translational Regulation during Periods of Environmental Stress
M. E. Vayda, C. Webster

The Role of the Cytoskeleton in Plant Protein Synthesis
E. Davies, S. Abe, B. A. Larkins, A. M. Clore, R. S. Quatrano, S. Weidner

Cytoplasmic Ribosomes of Higher Plants
J. Bailey-Serres

Ribosome-Inactivating Proteins
A. D. Mehta, R. S. Boston

RNA Editing in Mitochondria and Plastids
R. M. Mulligan, P. Maliga

Chloroplast mRNA Processing: Intron Splicing and 3'-End Metabolism
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A Look Beyond Transcription:
Mechanisms Determining mRNA Stability and Translation in Plants

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