

Plant Biology News

Summer 2002

It's a Bug Eat Bug World...

by Joan Leonard

Insects can be a great friend of plants, carrying pollen from flower to flower. However, some insects make plants their dinner. These pests devour plants and for many

"Lacewings, aphids, and very low human toxicity pesticides are used to control greenhouse pests."

years growers have battled them with various pesticides. At the Biological Sciences Greenhouse Conservatory, we take a different approach to pest control. It's called integrated pest management or IPM. "We combine very low human toxicity pesticides, like horticultural soap, with beneficial insects," says Joan Leonard, Greenhouse Coordinator.

The "good" bugs eat, or lifecycle, inside of the "bad" bugs, controlling the pest insects. Some beneficial insects, such as *Cryptolaemus* (a.k.a. "Mealybug Destroyer") are predators. It is the larval stage of the Mealybug Destroyer that eats the plant pest Citrus Mealybug. Other predators on the prowl are predatory mites which eat the two spotted spider mite and Green Lacewings who fancy eating many different

types of insects.

Other beneficial insects are parasites. "We have a parasitic wasp that lays its eggs inside of aphids. The eggs hatch and feed on the aphid from the inside with the adult wasp

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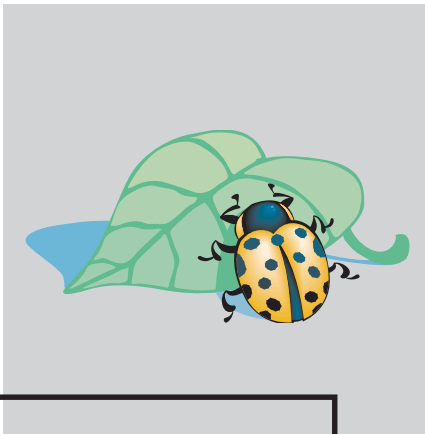
Plant Biology Receives Endowment

The Plant Biology Department is pleased to announce that it recently received its first new major endowment in over 10 years. A scholarship fund was established in the memory of Dr. Elizabeth Wagner, who was "three times a Buckeye", having earned her Bachelor of Arts here in 1943, her Master of Arts in 1944, and her PhD in 1946. Her son, William Reed, of Seattle, Washington, established the Elizabeth Wagner Scholarship Fund,

which will provide scholarships in the Department of Plant Biology, with preference given to women undergraduate students.

Dr. Wagner's specialization was plant physiology. She authored or co-authored 40 publications. These publications fell into three categories. Several were on strictly botanical topics. About half of her publications

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Dr. Gregory Armstrong

Plant Biology Welcomes Dr. Greg Armstrong

The Plant Biology Department was pleased to start the new year by hiring a new faculty member, Dr. Greg Armstrong.

Dr. Armstrong has a strong research background, having performed various research projects including the "golden rice" project, whose focus was on genetically engineering rice grains to produce beta-carotene, an important precursor to Vitamin A. This is an important dietary component that is lacking to many populations. Additionally, Dr. Armstrong has completed research on the genes which encode enzymes specifically required to make carotenoid and bacteriochlorophyll reaction center proteins of the photosynthetic membrane.

What encouraged Dr. Armstrong to enter the field of Plant Biology? Considering his lifelong interest in the natural sciences, beginning with marine biology, chemistry, and general biology, he subsequently became interested in plant biology. In large part this was due to his fascination with the interaction of plants and animals with light and pigments.

If you are interested in plant biology, Dr. Armstrong suggests

studies in basic and applied sciences, exploring their importance in everyday life. Few high schools offer specific plant biology courses, but if yours does, you could begin to explore light-pigment interactions, plant physiology, or the pros and cons of genetically engineering foods and crops.

Welcome, Dr. Armstrong!

Elizabeth Wagner Scholarship Fund

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were on genetic related topics, which is the field of biological education in which she was professionally active. Several of these are very substantial contributions. More than a dozen of her publications are in the field of genetics, mostly human genetics.

Dr. Wagner not only obtained her degrees here, she also became a research assistant in the OSU Research Foundation.

We are grateful to Mr. Reed for this endowment, and hope it gives its recipients the opportunity to achieve the kind of success that Dr. Wagner achieved -- what a legacy of scholarship, academia and research Dr. Wagner gave to our community and to others!

Waller Memorial Lecture

Dr. George Redei, a renowned pioneer in the field of *Arabidopsis* research, was the guest speaker for the 26th Annual Adolph Waller Memorial Lecture.

The Dorothy Davis Heart and Lung Institute was the setting for the first lecture, which was entitled "Ups and Downs in the History of Genetics".

Dr. Redei spoke the following day at the Younkin Success Center, and the topic was "The Origin of Research with *Arabidopsis*: What Lies Ahead".

Dr. Redei is one of the pioneers in the field of *Arabidopsis* research, introducing it as a genre in the USA. He has published and edited or

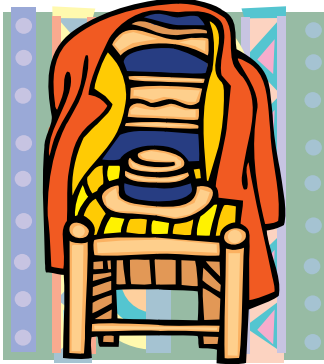


Dr. George Redei (second from left) is welcomed by (left to right) Lynn, Michael and Ed Waller

co-edited numerous papers, books and symposia. Notably, he was the editor of 14 volumes of *Stadler Genetics Symposia* and 10 volumes of the *Arabidopsis Information Service*. His textbooks, 'Basic Plant Genetics' (University of Missouri 1991, 5th edition) and 'Genetics' (Macmillan, New York - Collier Macmillan, London, UK 1982) have been used worldwide by students. Dr. Redei has just finished the manuscript of the 2nd Edition of 'Encyclopedia of Genetics', 2002. The list goes on!

Dr. Redei also met with the graduate students, providing an opportunity to share information. *(continued, page 3)*

The Chair's Corner by Richard T. Sayre



It has been four years since the Plant Biology Department was reorganized and it is appropriate to see how far we have come in the last few years. In 1998, Plant Biology underwent a major reorganization to refocus its research and teaching missions on plant cell and molecular biology (In fact the faculty recently approved renaming the Department to the Department of Plant Cell and Molecular Biology, the first of its type in the country). Over the last three years we have hired four outstanding faculty members; building strengths in molecular, developmental and cell biology. We have plans to hire one additional faculty member in the next year.

Dr. Greg Armstrong, the most recent hire, is highlighted in a separate article in this newsletter. Greg's lab is currently housed in the Biological Sciences Building but Greg will move along with several other faculty members to the new Aronoff Life Sciences Building in June 2003. The Department is slated to occupy the top floor of this new state-of-the art research laboratory building. In addition, the Arabidopsis Biological Resource Center (ABRC) will be located in the Aronoff Building. Following completion of the Aronoff Building, the Jennings Building
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Bug Eat Bug World... *(continued from page 1)*

eventually cutting an escape hatch from the shelled out aphid and flying off to reproduce. A little gruesome but actually quite fascinating," remarks Leonard.

The IPM approach is environmentally friendly as well as educational. Visitors to the conservatory have the opportunity to learn about the relationships between plants and insects. One of the most frequently asked questions is, "What are the cotton balls for?" "Insects like the Mealybug Destroyer like to lay their eggs in cottony masses so the cotton balls among the plants provide a place for that," explains Leonard. "We hope that the beneficial insects will become established, eventually lifecycling in the conservatory," she continues.

To support the IPM program, the greenhouse sold T-shirts this spring. On the front is pictured an adult Mealybug Destroyer which looks like a ladybug with black wings and an orange and the back of the t-shirt says "Do Something Bug". For more information on the program or the t-shirts, contact Joan Leonard at leonard.4@osu.edu, or (614) 292-7904.

Waller Lecture

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Several of the graduate students assisted with making this event a success. These students included Niloufer Irani and Michael Tilley. Staff that assisted with the event included Debra Gamble, Jill Williams, and Denise Blackburn-Smith. Special thanks to the Waller family for sponsoring such a wonderful event. We look forward to the 27th Annual Waller Lecture!

Do-It-Yourself DNA Extraction from Wheat Germ: An Experiment

by Kevin Sadeski

Equipment and Materials Needed:

The following are needed for each DNA extraction:

- Raw (not toasted) wheat germ - 1.5 grams or 1/2 tsp (can be found at health food stores)
- Liquid dishwashing detergent - 5 ml or 1 tsp
- Clear test tube, beaker, or spice jar (wider than a standard test tube)
- Cup for mixing (we used a styrofoam coffee cup)
- Graduated cylinder, measuring spoons, or other measuring devices
- Glass stirring rod or wooden applicator stick for stirring the mixture
- Wooden coffee stirrer (a glass rod, paper clip hook or shish kabob skewer for spooling DNA)

Protocol:

1. Place 1.5 grams or 1/2 tsp of the raw wheat germ in a styrofoam cup.
2. Add 100 ml or 1/2 cup of distilled water and stir gently and constantly for 2 minutes.

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"Using common household materials, you can experiment with DNA isolation"



DNA Extraction

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3. Add 5 ml or 1 tsp of dishwashing detergent and stir gently for 10 minutes. (If stirred too violently, the DNA strands might be broken up and it will not spool as well).
4. Pour 10 ml or 2 tsp of the wheat germ solution into a wide test tube.
5. Slant the test tube and gently pour 15 ml or 3 tsp of ice cold 70-95% ethyl alcohol down the side of the test tube. The alcohol needs to be added gently so that it will form a separate layer above the wheat germ solution.
6. The DNA will begin to precipitate where the alcohol and the wheat germ solution meet. Let it sit for a few minutes.
7. After a few minutes, use the wooden coffee stirrer to collect the DNA by spinning it around the stick so that the alcohol and wheat germ interface. The DNA is delicate, but it should come out in fluffy strands.

Quick Explanation: To extract the DNA from the cell, the cell walls and the membranes need to be broken. The stirring separates the cells and breaks the cell walls. The detergent disrupts the cell and nuclear membranes allowing the DNA to come out into the wheat germ solution. The DNA precipitates at the wheat germ solution/ethanol interface because the DNA is not soluble in the ethanol. The creamy white strands are a combination of DNA with the proteins that normally associate with it. This experiment does not yield pure DNA. **Special thanks to Debra Gamble for her assistance.**

The Chair's Corner

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(formerly the Botany and Zoology Building) will be renovated primarily for classroom use and teaching labs.

Over the last four years we have seen tremendous growth in student credit hours taught. During the last two years we have averaged a 20% increase in credit hours taught each year. Plant Biology faculty currently teach the highest number of credit hours/faculty member in the College of Biological Sciences. We have added several new courses to the curriculum and expect to offer our most popular courses on a more frequent basis in the future.

The Departmental research programs also continue to expand. Each of the faculty members hired through 2001 has successfully established an independently funded research program. Last year total Departmental research expenditures exceeded \$1.9 million dollars. In addition, the ABRC was refunded by the National Science Foundation for another five years. This summer each of our more recent hires received either a newly funded research grant award or had their current grants renewed. In the next year we expect to have one of the most well-funded research and graduate student training programs in the country. Our research, teaching and service programs continue to be strong. Additional highlights of the last year include:

Teaching:

- Total credit hours taught reached a new record high of 9,118 or an 18% increase over last year. The credit hours taught per faculty member remains the highest in the

College of Biological Sciences.

- Three new courses were offered for the first time; Microtechniques (Dr. Biao Ding); Plant Transgenic Systems (Dr. Iris Meier), and Circadian Biology (Dr. David Somers).



Research:

- Sixteen peer-reviewed papers were published by the faculty in such high impact journals as the Proceedings of the National Academy of Sciences, the Journal of Biological Chemistry, Virology (cover article by Dr. Biao Ding) and Plant Physiology. This continues the trend of approximately 2 peer-reviewed papers/regular faculty member/year.
- Several faculty including, Drs. Erich Grotewold, Iris Meier, Val Raghavan, Fred Sack, and Randy Scholl published invited review articles or book chapters.
- Five new major competitive grants were awarded to faculty in 2001, including new grants to Drs. Erich Grotewold (NSF), Iris Meier (NSF and USDA), Richard Sayre (NIH, Co-PI), and David Somers (NSF).
- A \$2.8 million dollar renewal of the NSF grant in support of the Arabidopsis Biological Resource Center (ABRC) was awarded to Dr. Randy Scholl.
- Total grant expenditures (adjusted for distribution to the Plant Biotechnology Center) for the Plant Biology Faculty were greater than \$1.9 million dollars. This is a decline from last year's record expenditures and reflects the loss of grant expenditures from former faculty and

reduced major equipment expenditures from the ABRC grant.

- The faculty presented over 25 invited presentations at such prestigious institutions as Cornell, Harvard, University of Illinois, University of Virginia, and the University of Kiel.
- In addition, the faculty presented invited talks at many national and international symposia including the American Society of Cell Biology Meeting, the American Society of Plant Biologists, the American Phytopathology Conference, the International Cassava Biotechnology Conference, and the 17th International Conference on Plant Growth Substances, among others.
- The quality of the incoming graduate student body class continued to improve with an increase of 300 points in cumulative GRE scores (2050 average score).



Service:

- Half of the faculty serve on editorial boards including Drs. Morris Cline (Tree Physiology), Biao Ding (Acta Botanica Sinica), William Jensen (Journal of Sexual Reproduction of Plants, Nordic Journal of Botany), Fred Sack (American Journal of Botany), and Richard Sayre (Photosynthesis Research).
- Dr. Richard Sayre served on the US-Israel Bi-national Agricultural Research and Development Grant Panel.



Personnel:

Faculty:

- In recognition of his outstanding research and teaching accomplishments, Dr. Erich Grotewold received early promotion to Associate Professor with tenure.
- Dr. Greg Armstrong was hired at the Assistant Professor level and joined the faculty on January 1, 2002. Dr Armstrong came to the Plant Biology Department from The Institute of Plant Biology in Zurich, Switzerland and is an expert on plastid development and pigment biosynthesis.
- Dr. Michael Evans (Professor, emeritus) received the "Founders Award" for a distinguished career in space biology from the American Society for Gravitational and Space Biology.

STAFF

Staff:

- Ms. Bette Hellinger retired after more than ten years service to the Department as Administrative/Fiscal Officer
- Ms. Jill Williams was promoted to Administrative/Fiscal Officer in recognition of her outstanding service to the Department
- Ms. Denise Blackburn-Smith was hired as Office Associate and received a Mortar Board Alumni Association Scholarship for academic excellence.

· Ms. Debra Gamble was nominated for the College Distinguished Staff Award and was awarded a 2001 Technology in Instruction Grant in the amount of \$5,900.

- Ms. Joan Leonard was promoted to Greenhouse Coordinator in recognition of her outstanding contributions to the greenhouse.
- Ms. Kim Hiser resigned as business manager for the Botanical Society of America to pursue other career interests.



Students:

- Chris Wolverton presented an invited lecture at the Gravitropism Gordon Conference, won the Ohio State University Graduate Leadership Award, and the Department of Plant Biology Distinguished Graduate Student Award.
- Mr. Dimuth Siritunga received a Travel Award to 10th Int. Plant Tissue Culture and Biotechnology Conference, Orlando, FA
- Two undergraduate honors students, Dave Swedler and Mike Buschur, were hired as teaching assistants.
- A Plant Biology Undergraduate Major study lounge was set-up in the B&Z building as a place for undergraduate majors to meet with faculty members, hold meetings and use as a study refuge.

Other Notable Events:

- Construction began on the Aronoff Laboratory of Biological Sciences, the new home to half of the Plant Biology Faculty. This state of the art research facility will open in June 2003.



Plant Biology was privileged to have Dr. George Redei, a pioneer in the Arabidopsis field, be the guest speaker at the Waller Lecture. Pictured above, Dr. Redei is joined by faculty, graduate students, and Interim Dean Rich Hall. See related story, inside, page 2.



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The Plant Biology Department:

- Offers undergraduate, graduate and Ph.D. programs for Plant Biology majors
- Explores the cell and molecular biology of plants
- Sponsors the Waller Lecture
- Currently has 18 Faculty or Adjunct Faculty Members, and 18 Graduate Students

Undergraduate and Graduate Study in Plant Biology at OSU

If you are interested in pursuing either undergraduate or graduate plant biology studies at Ohio State University, you might want to review our website at www.biosci.ohio-state.edu/~plantbio/plantbio.html, to gain more information about the program here. If you have already completed your undergraduate degree, and want to

pursue graduate studies here, you can even apply online! If you can't apply online, or would prefer printed materials instead, please fill out the form to the right and send it to the Plant Biology Department (see address listed above the mailing label). We look forward to hearing from you!

Please send me information about Plant Biology at OSU!

Name: _____

Address: _____

Current college: _____

e-mail: _____
