

spring 2002



Integrative biology NEWS



To *Bt* or Not to *Bt*

Field studies of the effects of *Bt* corn on nontarget butterflies



The widespread planting of corn that has been genetically modified to produce *Bacillus thuringiensis* (*Bt*) endotoxin has been the source of much controversy. With the exception of herbicide-tolerant soybeans, *Bt* corn is the most widely grown transgenic crop plant in the United States. The principal target species for *Bt* corn is the European corn borer, *Ostrinia nubilalis*, one of the most damaging pests of corn in North America.

Bacillus thuringiensis is a naturally occurring soil bacterium, and the gene of interest produces a protein that specifically kills caterpillars (larvae of butterflies and moths). The protein is very selective, generally not harming insects of other orders. To kill a susceptible

insect, a part of the plant that contains the *Bt* protein must be ingested. To insert the gene into the plant, a promoter sequence is used, which determines how the new trait is expressed.

Although *Bt* corn has been touted as an environmentally friendly alternative to synthetic organic insecticides traditionally used to control the European corn borer, concerns have been raised that *Bt* corn may have adverse effects on nontarget butterflies and moths.

In a laboratory feeding study, Cornell University researchers in 1999 found that exposure to *Bt* corn pollen can cause mortality in neonate monarch caterpillars (*Danaus plexippus*). This study created a widespread perception of risk, particularly among nonscientists, and generated a tremendous amount of coverage in the national media because of the potential clash between biotechnology and wildlife.

The monarch caterpillar feeds on milkweed plants. These plants are often found at the edges of cornfields. Therefore, *Bt* corn pollen that drifts onto the milkweed leaves could affect monarchs, and other nontarget butterflies and moths.

(continued on page 3)



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Change is an inevitable part of life, a fact that we as biologists perhaps appreciate more than most. Change comes to publications, as well. As a consequence of our administrative reorganization, we have ceased to publish the familiar School of Life Sciences Alumni Newsletter. You are receiving our inaugural issue of Integrative Biology News because you graduated with an option in one of our departments, in Biology General, in Biology Honors, or in a curriculum that preceded one of these. We will continue to bring you news of curricular changes, research activity, faculty, and other events related to Integrative Biology at the University of Illinois.



These are exciting times. Following the administrative approval of the new School of Integrative Biology and the School of Molecular and Cellular Biology in July 2000, we welcomed the first freshman class into the new biological sciences track in fall 2001. In this track, students take two new introductory courses, IB 150 and MCB 150, one offered by each School. Based on their experiences in these courses, students then elect to major in either Integrative Biology (IB) or Molecular and Cellular Biology (MCB). Both IB and MCB will offer a new slate of core 200-level courses for their majors starting in fall 2002. We believe that our new curriculum will offer an opportunity for undergraduates interested in broad, integrative aspects of biology to obtain a modern, dynamic, and focused grounding in the field.

Of course the foundation on which any curriculum is built is the faculty that develop and teach the courses in it. Since 1997, we have recruited an outstanding array of new faculty into our departments. New faculty this year, their departmental affiliations, and their main areas of research can be found on page 9. We are also fortunate that, even in the current bleak economic climate, we have successfully recruited two additional faculty members: Dr. Ross Fitzhugh, an ecosystem ecologist who works on nutrient cycling in forests, will join the Department of Plant Biology in August 2002. Dr. Andy Suarez, an ecologist working on invasive species and currently at UC-Berkeley, will join the Departments of Animal Biology and Entomology in August 2003. Both of these ecologists have strong credentials and will add significant strength to our teaching expertise and our research program.

There is no question that the key to our long-term success is being able to attract and keep the very best faculty. This quest is aided by extraordinarily generous benefactors who see our potential and wish to help us achieve it. In particular I want to acknowledge two recent gifts. As described on page 11, Dr. Roy J. and Mary Lou Criss Barker have made a gift to establish the "C.E. Kearns, C.L. Metcalf, and W.P. Flint Endowed Chair in Insect Toxicology." Further, G. William and Clair Mae Arends have established the "G. William and Clair Mae Arends Professorship in the School of Integrative Biology." This gift will be used to recognize a current faculty member for his or her outstanding research achievements by providing unrestricted support for research. We are grateful for the confidence that these donors have expressed in us by virtue of making these gifts. These and other donations from our graduates and friends allow us not only to attract the very best professors but also to add that extra level of support to our programs that will make biology at Illinois worthy of the top 25 ranking that it just recently achieved.

Fred Delcomyn, Director

To Bt or Not to Bt (from page 1)



A monarch caterpillar. Photo courtesy of May Berenbaum.

In 1999, May Berenbaum, Swanlund Professor of Entomology, and Arthur Zangerl, Senior Research Scientist in Entomology, conducted a field study of the effects of *Bt* corn (Pioneer variety 34R07, which contains Monsanto event 810 and expresses the *CryIAb* gene in its pollen) on the eastern black swallowtail (*Papilio polyxenes*). They placed early instars on host plants arrayed along the edge of the cornfield to determine effects of corn pollen ingestion under field conditions.

In a paper published in the *Proceedings of the National Academy of Sciences (PNAS)* in July 2000, they reported that there was no relationship between mortality of the caterpillars and their proximity to the field or to the pollen deposition on the host plant (wild parsnip). Moreover, they found that the pollen from these same corn plants failed to cause mortality in the laboratory at the highest pollen dose tested (10,000 grains per square centimeter), a level that far exceeded the highest pollen density observed in the field (200 grains per square centimeter).

In the same laboratory study, however, pollen from another *Bt* corn, Max 454, was found to be toxic to swallowtails at levels comparable to those observed in the field. The Max 454 pollen was found to contain more than 40 times more endotoxin than the pollen from the Pioneer 34R07 variety.

Consequently, they repeated field experiments in the summer of 2000 using the Max 454 *Bt* corn variety, which contains Novartis event 176. They tested both monarch larvae (on milkweed) and eastern black swallowtail larvae (on wild parsnip).

Mortality of monarch larvae was pronounced. After 6 days in the field, fewer than 7% of the larvae survived. Mortality was greatest during the first 24 hours. Neither proximity to the cornfield or pollen deposition on hosts explained this mortality. Predaceous arthropods, especially the multicolored Asian lady beetle, were numerous on milkweed plants, and may have accounted for much of the caterpillar mortality.

Survivorship of black swallowtails was much higher than that of the monarchs, but there was a significant reduction in growth rates that was likely caused by corn pollen exposure. At the end of the experiment, larvae seven meters away from the corn were three times as large as the larvae one-half meter away from the corn.

Whether the observed reduction in larval mass was due to direct toxicity of ingested corn pollen or to antifeedant effects of pollen exposure is unclear. Also unresolved are the long-term consequences of larval mass reduction over the life of the caterpillar.

These results were published in *PNAS* in October 2001 as part of a six-paper package discussing *Bt* corn. Berenbaum served as editor of these papers.

The *Bt* 176 corn variety has not been reregistered, and much of the *Bt* corn planted this year is the 810

event hybrid, which does not express high levels of endotoxin in its pollen.

“That there may be nontarget impacts of *Bt* corn is not in itself surprising—there are nontarget impacts of any pest management approach,” says Berenbaum. Risks and benefits of *Bt* corn must be evaluated relative to alternative methods of management.

Berenbaum and Zangerl may conduct follow-up studies on the impact of predation by multicolored Asian lady beetles on monarch caterpillars. This beetle was imported as a biological control agent into the United States to help control aphids on pecan and apple trees. However, the beetle’s diet includes a wide variety of insects, including many non-economic species of aphids, scale, and caterpillars. In a preliminary laboratory test, the lady beetle readily ate monarch caterpillars.

Also working with Berenbaum and Zangerl on these studies were graduate students Duane McKenna and Mark Carroll and undergraduates C. Lydia Wraight, Peter Ficarello, and Rita Warner.

The photo of the adult monarch butterfly on the front cover is by James Sternburg.



Berenbaum



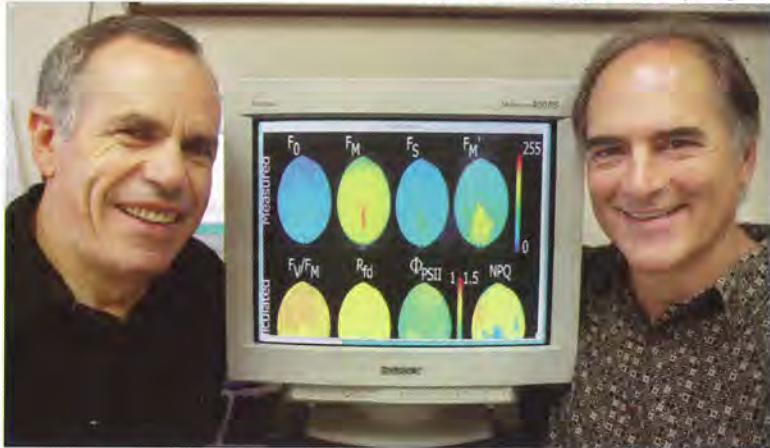
Zangerl

U.S. News & World Report's graduate school rankings recently listed the **University of Illinois** tied for 24th in biology with Baylor College of Medicine and the University of California-Davis. Illinois ranked 6th in public campuses overall, and 3rd among public research campuses without a major medical school.

Stewart H. Berlocher was promoted to Professor of Entomology in August 2001.

John K. Bouseman, Associate Professional Scientist at the Illinois Natural History Survey, and **James G. Sternburg**, Professor Emeritus of Entomology, coauthored *Field Guide to Butterflies of Illinois*. The guide contains more than 90 butterflies found in the state. Many of the 300 color photographs were taken by Sternburg.

Feng Sheng Hu, Assistant Professor of Plant Biology, was named a fellow of the Center for Advanced Study for the 2002-2003 academic year. The appointment grants one semester of release time for creative work on self-initiated programs of scholarly research or professional activity. Hu will be studying "Climatic variability in the mid-continent of North America: lessons from the past."



Stephen Long and John Whitmarsh pose with computer image of leaves. Photo by Robin Scholz, used by permission from *The News Gazette*.

Shedding Light on Photosynthesis

Developing a dynamic model using the supercomputer

Stephen Long, Robert Emerson Professor of Plant Biology and Crop Sciences, and John Whitmarsh, Professor of Biochemistry and Plant Biology and Director of the Center for Biophysics & Computational Biology, are working on a dynamic computer model of photosynthesis that will help assess how crops will react to climatic changes brought on by global warming, and also assess the impacts of biotechnological manipulations on plant species.

The model offers a new way of studying photosynthesis. "We know about all the parts and how each part works," said Whitmarsh. "But we don't have a good understanding of how

all the parts work together." Biotechnology now provides the means to manipulate the capacities of almost every step within the photosynthetic process, but what changes will optimize the system?

Photosynthesis is a complex process that is difficult to recreate, control, and manipulate in an experimental setting. Altering one step or a combination of steps is very expensive and time consuming in field experiments. But with the help of the supercomputer, they will be able to change sunlight and carbon dioxide concentrations at will to rapidly study how photosynthesis responds.

Essentially, they must represent the machinery of photosynthesis in differential mathematical equations, which will turn into software that powers the computer model. The challenge is to make the equations an accurate representation of real-life photosynthesis.

Currently they are working on a model of a leaf, that will eventually be scaled to the canopy level. Long and Whitmarsh received a fellowship from the National Center for Supercomputing Applications for this modeling project.

Insect Bites on Plants Reduce Photosynthesis

New imaging device reveals additional damage

When insects feed on plants, they get nourishment and the plant gets damaged. The amount of damage has taken on new light, thanks to a new photosynthesis-measuring device that illuminates and photographs never-before-seen injury extending far beyond an insect's bite.

The results of the first experiments with the tool—done in a University of Illinois laboratory using leaves of wild parsnip (*Pastinaca sativa*) and hungry cabbage loopers (*Trichoplusia ni*)—were published in the January 22, 2002, issue of *Proceedings of the National Academy of Sciences (USA)*.

Researchers found that damage to a leaf isn't relegated to a hole where tissue once was. In this case, it affects three to six times more of the leaf's surface. The images gathered clearly recorded blue halos, representing damage to patches of cells surrounding the insect-caused holes, and varying levels of red fluorescence, denoting precise reductions in photosynthesis activity. They also found an almost 80-fold increase in the synthesis of furanocoumarins, a defensive chemical, suggesting that a plant may purposely turn down its photosynthetic machinery to boost its defensive capacity.

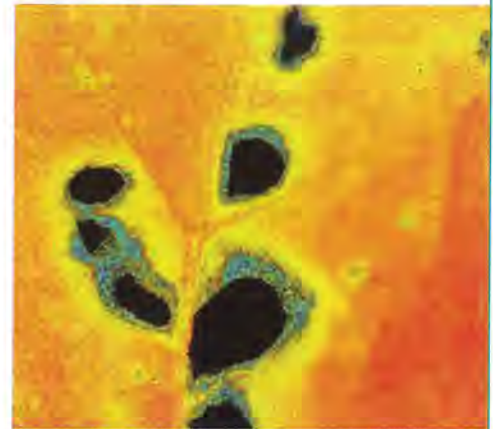
"We don't know how our results will hold up in a real ecosystem, as we've only tested this instrument in a one plant-insect system under laboratory conditions," said Evan H. DeLucia, Professor of Plant Biology. "But this study does suggest that we are greatly underestimating the impact of herbivores on plants. In the past, we knew tissue was removed. Now we know that the impact in terms of lost carbon gain

can be much greater than just the tissue loss."

In a normal year, losses in agricultural and forest systems to dining insects range from 2% to 24%. The loss in plant photosynthesis, however, could be much greater and have potential management implications if carbon dioxide levels increase as projected under global warming scenarios. The device is now being tested on U-grown soybean plants and on trees in a North Carolina forest.

DeLucia pondered the periphery damage when he saw leaves riddled with holes as he walked in a forest. Without a means to measure photosynthesis-related changes, he consulted with Antony Crofts and Timothy J. Miller in the Department of Biochemistry and Kevin Oxborough, a plant physiologist and computer programmer at the University of Essex, UK.

With funding from the Illinois Critical Research Initiatives program, DeLucia and colleagues built the device and teamed with May R. Berenbaum and



A damaged wild parsnip leaf. Dark holes are where caterpillars have fed. The bluish discolored areas show how damage has extended out from the bite areas. Photo by Jason Hamilton.

Arthur R. Zangerl, Department of Entomology, and Jason G. Hamilton, a biologist at Ithaca College in New York, to study caterpillar-caused damage to parsnip plants.

The prototype consists of a high-speed camera linked to specially designed parallel processing computers. The camera sits in a colander-shaped light source containing more than a thousand high-intensity light-emitting diodes. A momentary flash of bright light hits a leaf's surface, and the computers instantaneously collect data, providing high-resolution images.

Story by Jim Barlow, Life Sciences Editor, News Bureau, University of Illinois at Urbana-Champaign.

Susan Fahrbach, Professor of Entomology and Director of the Howard Hughes Medical Institute's Undergraduate Biological Sciences Education Program, and Shirley Splittstoesser, Prairie Flowers Program Manager, received an award from the Illinois Board of Higher Education's Dwight D. Eisenhower Professional Development Program for "Mathematics, Science and Technology Entwined." Their project will bring together the Hughes Program and numerous campus units including the College of Education, the Department of Mathematics, the Illinois State Geological Survey, the School of Integrative Biology, and the School of Molecular & Cellular Biology to provide training for middle school mathematics and science teachers in information technologies.

Illinois was home again to aliens—with six legs. **May Berenbaum**, Swanlund Professor of Entomology, hosted the 19th Annual Insect Fear Film Festival. This year all the films and animated shorts featured larger-than-life alien insects. Craig Reid, an entomology alum, was an extra in the feature film "Spiders." This year the film festival was held in conjunction with Insect Expo, which featured interactive displays, an arthropod zoo, and the annual arthropod art contest.



Gene Robinson in his office at Morrill Hall. Below are honeybees in an observational hive.

Senior Bees Up All Night Caring for Larvae

Social trigger changes biological clock

Foraging worker bees are the first insects known to have a social trigger radically change their biological rhythm—that trigger comes from a crisis in the nursery. This social trigger was reported by Guy Bloch, Postdoctoral Research Associate, and Gene Robinson, Professor of Entomology, in a recent article in *Nature*.

Newly hatched honeybee larvae need round-the-clock care, which is typically provided by the hive's youngest adults. Each nursemaid takes care of the brood at all hours.

As the nursemaids age, they start venturing out

of the hive. Eventually they switch to full-time foraging and adopt a regular circadian rhythm of activity spanning 22 to 25 hours.

However, these bees can lose this rhythm under special conditions. If the hive falls short of nursemaids, some of the older bees return to the nursery. Under these conditions, secretory glands that provide the larvae "milk" reactivate. Bloch and Robinson moved members of three bee colonies into observation hives. For each hive, they gathered a queen, some 2,000 foragers, and a very young brood, but left out young nursemaids.

Several hundred older bees stopped foraging, lost their circadian rhythms, and assumed arrhythmic infant care. Such a developmental turnabout "suggests that the biological clock of the honey bee has unusually strong plasticity," says Bloch. The Robinson lab is interested in the genes that provide the basis for this plasticity.



Kim Hughes at one of the study sites in Trinidad. Below is a male guppy exhibiting an orange tail.



Male Guppies Imitate Food in Competition for Females

Males woo females by looking like their favorite food

Kim Hughes, Assistant Professor of Animal Biology, and colleague Helen Rodd, zoologist at the University of Toronto, in a recent study found that female guppies apparently are attracted to males with big orange spots simply because the markings resemble the bright orange fruits they like to eat. This research challenges the standard theory of sexual selection, which maintains that preference originated because it enabled females to obtain high-quality mates.

They found females in some guppy populations were very responsive to orange spots on males—the same color as fruit that falls into the water from trees onshore. Did this species first evolve a sensitivity to orange to help find food, and then males exploited this sensitivity to catch the eye of females?

To test this hypothesis, they placed colored disks in guppy-rich streams in Trinidad and noted the sex and age of each fish that approached and pecked at each disk. To confirm the field results, they conducted similar experiments in

the laboratory. In all experiments, both sexes pecked at the orange (and sometimes red) disks most often. The orange bias, therefore, extends beyond selection of potential mates. They also found that the sex appeal of males with orange spots was greater in populations in which both sexes showed a strong attraction to the color orange.

Although color is only one factor in mate selection, this study is one of the first to show how sexual preferences get started in the first place. Results of this study appear in *Proceedings of the Royal Society of London, Series B*, March 7, 2002 issue.

Hugh Robertson,

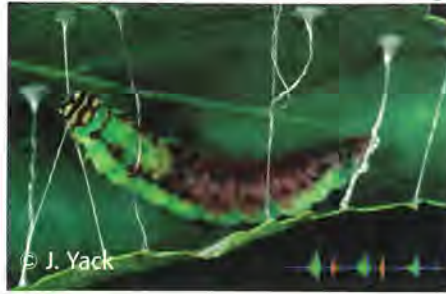
Professor of Entomology, along with colleagues at Vanderbilt University and Yale University, have identified some of the genes that enable a mosquito to smell and seek out its human victim. The genes they identified are believed to be responsible for coding proteins, called odorant receptors, which in turn produce the sense of smell. The genes, which are strikingly similar to those that give humans a sense of smell, were identified in a particularly deadly mosquito, *Anopheles gambiae*, an African species that spreads malaria. Understanding how its olfactory system works may suggest some new and novel ways to keep it from spreading catastrophic diseases.

Jeffrey Brawn, Associate Professor of Natural Resources & Environmental Sciences and an affiliate of Animal Biology, was named Director of the Program in Ecology & Evolutionary Biology. Brawn had served as chair of admissions for the program for the last several years. He also has an appointment in the Center for Wildlife Ecology, Illinois Natural History Survey. His research areas include avian population and community ecology.

Craig Williamson, a junior majoring in Biology Honors, was one of 77 students selected nationally to receive a Harry S Truman Scholarship.

Carol Augspurger, Professor of Plant Biology, received the Dean's Award for Excellence in Undergraduate Teaching and also the Campus Award for Excellence in Undergraduate Teaching for 2002. Since 1990, she has been on the "Incomplete List of Teachers Ranked Excellent by Their Students" 17 times. John Cheeseman, Head of the Department of Plant Biology, in his nomination letter, commended Augspurger as "a world-class ecologist and a world-class educator. Her focus is always unequivocally on the students before her." One of her former students said, "Dr. Augspurger doesn't teach her students about ecology, she teaches them to be ecologists."

Steven Buck, Research Technologist III, received the Chancellor's Distinguished Staff Award for 2002. Buck works under the auspices of the Committee on Natural Areas, which is chaired by May Berenbaum. Buck manages the University's natural areas, which have grown from six sites with 370 acres to 11 sites with 932 acres. He is responsible for daily management and physical maintenance of the sites, staffing the office, working with the university community and nearby landowners, and conducting research at the sites. He has worked for the Committee on Natural Areas since 1994.



A hook-tip moth caterpillar in its protective tent, with record of acoustic activity at bottom right. Photo courtesy of Jayne Yack, Carleton University.

Caterpillar Talk: Acoustically Mediated Territoriality

Sound used to defend nests

Patrick Weatherhead, Professor of Animal Biology and Natural Resources & Environmental Sciences, working with colleagues Jayne Yack and M.L. Smith at Carleton University (Ottawa, Canada), found that caterpillars used sound to communicate with each other. This finding reveals new depth to the social life of caterpillars.

In the specific case they studied, sound was used to defend nests. The female common hook-tip moth (*Drepana arcuata*) lays dense groups of eggs on birch and alder trees in North America. Each caterpillar builds a small, silky tent on a separate leaf to protect itself from predators and the elements while it feeds.

The time and effort that goes into making these tents make them worth defending—and

stealing. Confrontation is common and nests do not stay empty long. These larvae seem to settle turf battles by drumming out a warning.

In laboratory tests, these scientists staged bouts between a territory holder and an intruder. As the intruder moved onto the leaf, the resident caterpillar began scraping its hindmost legs over the leaf. If the intruder came closer, the resident added staccato mouthpart drumming. Although the caterpillars do not respond to airborne sound, they probably sense each other's display through the leaf.

Residents usually won, although sometimes large caterpillars usurped the nest. The ferocity of a caterpillar's drumming may advertise its size and strength. Also the drumming may attract the attention of predatory birds, causing the unprotected intruder to retreat.

"Given the ecological and economic importance of caterpillars, this discovery seems likely to stimulate new research in both basic and applied aspects of this phenomenon," said Weatherhead. Jamming such an exchange might even lead to chemical-free pest control.

This study was published in *Proceedings of the National Academy of Sciences (USA)* in 2001.

new faculty



Bohnert



Cáceres



Cameron



Weatherhead



Whitfield

Hans J. Bohnert, Professor of Plant Biology and Crop Sciences, earned his PhD from the Universität Heidelberg, Germany. Before coming to Illinois in August 2001, he was a professor at the University of Arizona. Bohnert's research interests include plant gene expression with an emphasis on environmentally induced genes, plant engineering for increased stress tolerance, biochemistry and molecular biology of Rubisco and PEPcase, the evolution and expression of genes for pathways in plant carbon allocation, and multi-gene transfer vectors for engineering plant metabolic pathways. He will be teaching classes in plant biochemistry and plant genetic engineering.

Carla E. Cáceres, Assistant Professor of Animal Biology, earned her PhD in 1997 from Cornell University. She was an Assistant Professional Scientist at the Illinois Natural History Survey, and had been an affiliate of Animal Biology for several years. Her research interests are centered on exploring population and community dynamics in aquatic systems. Currently she is

studying diapausing eggs and the dynamics of plankton communities and the effects of invasive invertebrate predators on the food webs of the Great Lakes. Cáceres teaches limnology and concepts in ecology.

Sydney A. Cameron, Assistant Professor of Entomology, earned her PhD in 1985 from the University of Kansas. She comes to Illinois from the University of Arkansas. Her research involves the application of phylogenetic theory and techniques to questions concerning social insect evolution and ecology. One application is to reconstruct phylogenies using DNA sequence and morphology to examine the historical pattern of social evolution in bees. A second application is the use of phylogenetics to study inter- and intraspecific geographic variation in social traits. Much of her field research takes place in the Amazon Basin of South America. Cameron will be co-teaching one of the new integrative biology core courses, Genetics and Evolution.

Patrick J. Weatherhead, Professor of Animal

Biology and Natural Resources & Environmental Sciences, received his PhD from Queen's University in 1978. Before coming to Illinois he was Director of the Ottawa-Carleton Institute of Biology. His research addresses a variety of questions about the behavior, ecology, and conservation biology of animals, primarily snakes and birds. He has taught a variety of behavioral ecology courses.

James B. Whitfield, Associate Professor of Entomology, earned his PhD in 1985 from the University of California, Berkeley. He comes to Illinois from the University of Arkansas, where he was an associate professor and curator of the Entomology Museum. Whitfield focuses on the systematics, evolutionary biology, and ecology of parasitoid wasps. A major focus has been on phylogenetic aspects of the evolution of interactions between parasitoid wasps and the symbiotic viruses they carry to suppress host immune systems. He is currently teaching classification and evolutionary history of insects.

The Tropical Forest Canopy

A graduate student gets a bird's eye view

Tropical forests cover only 7-12% of the earth's landmass, yet are home to more than half of its known species. Approximately 70-90% of the tropical forest's species, most of which are insects, live in the canopy—the crowns or branching tops of tall trees. Each tree may be home to hundreds of insect species.

Yet less is known about the ecology of these canopies than even the ocean bottom, largely because getting up into the canopy was difficult and dangerous. In 1990, the United Nations Environment Programme and the Smithsonian Tropical Research Institute started the Tropical Forest Canopy Programme, which employs construction cranes to lift scientists into the canopy.

The crane has a 50-meter tower and a boom with an effective reach of 40 meters, covering approximately 0.5 hectares of forest. A gondola attached to the boom transports researchers and equipment through 150,000 cubic meters of canopy.

Panama has two cranes: one in a dry forest just outside Panama City,

and one near Fort Sherman, about 45 miles away, in a wet forest. The wet forest receives twice as much rainfall as the dry forest, and has more than twice the number of tree species.

I am using the cranes to study canopy insects that damage the leaves of trees. Specifically, I would like to know how insect population growth is limited in the canopy. My dissertation research is shaped by the question: do insectivorous birds and bats limit the populations of foliage-eating insects? If so, this means that birds and bats are indirectly helping trees by ridding them of these insects.

In temperate forests, we know that severe outbreaks of insects may degrade entire forests and that insect populations are sometimes controlled by bird predation. In a Missouri forest when birds were experimentally kept away from young trees, these trees experienced high levels of insect damage. The damage was severe enough to slow tree growth.

But does this also happen in tropical forests? This question is particularly interesting

because of the high diversity of birds and insects in these forests. Also, overwintering migratory birds add dramatically to the number of birds foraging in the tropical forests.

Using the cranes to gain access to the canopy in both the wet and dry forests, I built exclosures—structures designed to keep birds away from certain branches. Since birds cannot forage on these branches, the insects are free to “chew away.” I am comparing the damage to leaves and the numbers of insects on branches in the exclosure versus control branches that are open to bird foraging.

I am also observing avian foraging in the canopy using the cranes. Virtually nothing is known about how birds forage in the canopy. Specific bird species may be contributing disproportionately to insect predation, so I hope to identify bird species that may be useful indicators of the health of forest canopies.

Contributed by Sunshine Van Bael. Van Bael received a BA with honors in Biological Sciences from the University of Chicago in 1996. She was one of eight U.S. young scientists chosen by the Organization for Tropical Studies to participate in a course spanning two years and six tropical field sites. She is completing her doctoral degree in Biology.



Van Bael collecting data in the gondola of a crane in Panama.



Dr. Roy J. Barker recently visited the Department of Entomology. Top: Barker with May Berenbaum, Swanlund Professor and Head of Entomology. Bottom: Sampling a french-style gourmet honey-tasting.

For information on gift opportunities to benefit integrative biology at the University, please contact Dr. Kathy Carter, Director of Development, School of Integrative Biology and School of Molecular & Cellular Biology, University of Illinois at Urbana-Champaign, at 877/ 265-4910 (toll free) or by email at kacarter@uiuc.edu.

Barkers Endow Insect Toxicology Chair

Enhancing the excellent record of entomology at Illinois

Dr. Roy J. and Mary Lou Criss Barker, of Tucson, Arizona, established in September 2001 the “C.W. Kearns, C.L. Metcalf, and W.P. Flint Endowed Chair in Insect Toxicology.” This gift will support an endowed faculty position in the Department of Entomology. A search committee has been established to seek excellent candidates for this chair.

Roy J. Barker (PhD Entomology 1953) grew up on a Missouri farm plagued with fleas, flies, armyworms, and grasshoppers. An entomology 4-H Club introduced him to the book *Destructive and Useful Insects* by C.L. Metcalf and W.P. Flint, professors of Entomology at the University of Illinois. Barker attended the University of Missouri on a Sears-Roebuck Scholarship (\$15 a month) and, after serving in World War II as an army cannoneer, graduated in agricultural chemistry. He applied to the graduate program in chemistry at Illinois. Denied admission to that program, he was encouraged by C.W. Kearns, a pioneer in the field of insect toxicology at Illinois, to take graduate chemistry courses and major in entomology. A grant to study metabolism of DDT in houseflies funded Barker’s PhD thesis. He explored biological magnification of DDT by earthworms and says it “established my reputation in the booming insecticide industry as a trouble maker.” He enjoyed a career in industry as well as in basic research. In retirement, Barker has been a civil air patrol pilot, a Silver Beaver Scoutmaster, and a volunteer naturalist with the U.S. Forest Service.

Mary Lou Criss Barker earned a BS in home economics from Madison College (VA) in 1953 and an MS in deaf education from Gallaudet College (Washington, DC) in 1964. She taught deaf students in Virginia, Arizona, and California. She also taught first and second graders in Tucson public schools and began playing the organ during her teaching career. She is still playing for church services in her retirement. Several projects, including working with school children, make retirement as busy as “working.”

The Barkers believe that the Department of Entomology is well situated to take advantage of expertise in chemistry, natural history, and biology to give the world safer and more effective insect pest management. The Department and the University are truly fortunate to have such loyal alumni and friends.

2001 Awards Reception



From left to right: John Cheeseman, Head of Plant Biology, Teerapong Buaboocha, Harold and Sonja Labinsky, and Yoon Shin Cho at the Annual Awards Reception.

honors

The School of Integrative Biology held its annual awards reception on May 3, 2001, in the Illini Union to recognize undergraduate student, graduate student, and staff award recipients.

In attendance were Dr. Harold C. and Sonja L. Labinsky from Elk Grove, IL, to meet the first recipients of the Harold C. and Sonja L. Labinsky Award—Teerapong Buaboocha and Yoon Shin Cho. The endowment, established in 1999 in memory of Carl H. Labinsky, Dr. Labinsky's father, and in honor of Katherine M. Labinsky, his mother, provides an annual financial award to one or more students in the Department of Plant Biology who are involved in plant genetics research.

Undergraduate Student Awards

Harriett Long Award—Stephanie K. Tankou, Biology

Mildred Parizek Zukor Outstanding Achievement Award—Amy C. Cash, Biology

Procter & Gamble Company Undergraduate Student Research Award—Tai Tang Tran, Bioengineering

Graduate Student Awards

Robert Emerson Memorial Grant—David J. Schulz, Entomology

Procter & Gamble Company Doctoral Student Research Award—Barry L. Williams, Animal Biology

Francis M. & Harlie M. Clark Summer Grant—Rakan A. Zahawi, Plant Biology

Francis M. & Harlie M. Clark Research Support Grant—Lynn A. Anderson, Ecology & Evolutionary

Biology; Sean A. Collins, Entomology; Jeffrey S. Heilveil, Entomology; Yiching Lin, Plant Biology; Sheila A. Lyons-Sobaski, Plant Biology; Sabrina E. Russo, Animal Biology; David J. Schulz, Entomology; Anita Stone, Ecology & Evolutionary Biology; Fengjie Sun, Plant Biology; Yung-Ho Wang, Ecology & Evolutionary Biology; Mosheh H. Wolf, Animal Biology

Edwin M. Banks Memorial Award—Robert H. Diehl, Animal Biology

Herbert Holdsworth Ross Memorial Fund Award—Sean A. Collins, Entomology; Andrew R. Deans, Entomology; Adam A. Wallner, Biology

Philip W. Smith Memorial Fund Award—Robert H. Diehl, Animal Biology; Yiching Lin, Plant Biology

John G. & Evelyn Hartman Heiligenstein Outstanding Teaching Assistant in Biology 120—Kate E. Diel, Biology
Ellis MacLeod/DuPont Award for Outstanding

Teaching by a Graduate Student in the Department of Entomology—Mark J. Carroll

Award for Outstanding Teaching in Plant Biology—

Jeff F. Zimpfer
Harold C. & Sonja L. Labinsky Award—

Terrapong Buaboocha, Plant Biology; Yoon Shin Cho, Plant Biology

John R. Laughman Award—Jennifer S. Hartz-Rubin, Plant Biology; Yiching Lin, Plant Biology

Program in Ecology & Evolutionary Biology Summer Research Grant—Jon D. Hoekstra, Animal Biology; Yiching Lin, Plant Biology; Rose M. Reynolds, Ecology & Evolutionary Biology; Sabrina E. Russo, Animal Biology; Kevin C. Rowe, Animal Biology;

Fengjie Sun, Plant Biology; Wendy M. Schelsky, Animal Biology; Jeffrey A. Steinmetz, Animal Biology; John F. Tooker, Entomology
Program in Ecology & Evolutionary Biology Travel Grant—Derek Aday,

Animal Biology; Elizabeth A. Ainsworth, Crop Sciences; Carl J. Bernacchi, Plant Biology; David R. Chalcraft, Animal Biology; Steven J. Cooke, Natural Resources & Environmental Sciences; Michael J. Dreslik, Natural Resources & Environmental Sciences; Jeffrey T. Foster, Ecology & Evolutionary Biology; Yiching Lin, Plant Biology; Jeffrey A. Steinmetz, Animal Biology; Jeff F. Zimpfer, Natural Resources & Environmental Sciences

Program in Ecology & Evolutionary Biology Symposium Awards—David R. Chalcraft, Animal Biology; Kevin M. Robertson, Plant Biology; Gretchen A. Gerrish, Natural Resources & Environmental Sciences

Staff Awards

Service Awards—Cecil W. King, 5 years; Lisa J. Smith, 10 years; Carol A. Hall, 20 years; Lisa G. Boise, 20 years; Martha E. Plummer, 20 years
LAS Academic Professional Award—Beth A. Morgan, Plant Biology
LAS Academic Advising Award—Ruth E. Wene, Biological Sciences Advising & Career Center

David Schulz Receives 2001 Eickwort Student Research Award

The North American Section of the International Union for the Study of Social Insects announced that David J. Schulz received the 2001 Eickwort Student Research Award.

David received his BS with highest distinction in biology in 1995 from the University of Illinois. Working on an independent undergraduate research project in the laboratory of Gene Robinson, he discovered his interest in the neurochemical regulation of honeybee behavior. Schulz

remained with Robinson for his graduate work, receiving a MS in 1997 and defending his PhD dissertation in November 2001. His doctoral research integrated behavioral, neuroethological, and neurochemical studies of division of labor in honeybees. Specifically, he investigated the effects of the biogenic amines dopamine, serotonin, and octopamine in different brain regions on age-related division of labor. This research has led to an impressive series of papers published in the *Journal of Comparative Physiology*, *Journal of Insect Physiology*, and *Insectes Sociaux*.

For his postdoctoral research, Schulz joins the lab of Ron Harris-Warrick at Cornell University to work on neuromodulatory mechanisms of the lobster stomatogastric ganglion.



Schulz



Heilveil

Jeffrey Heilveil Selected to LAS Council Hall of Fame

Jeffrey Heilveil, PhD student in Entomology, was recognized by the LAS Undergraduate Student Council for exemplary efforts in the classroom. This award, recently created by the Council, is based on student nominations. Heilveil was one of only six from the entire LAS teaching staff recognized by the Council.

1940s

Ward W. Moore (BA Zoology 1948, MS 1951, PhD Physiology 1952) is Associate Dean Emeritus of the Indiana University School of Medicine and Professor Emeritus of Physiology & Biophysics. He served in the Armed Forces from 1943 to 1946. After graduating, Moore served as a postdoctoral associate under A.V. Nalbandov for 2 years, and then as an Assistant Professor at Oklahoma A&M.

After 50+ years in Nebraska, **William F. Rapp** (MS Entomology 1945) moved to Pittsford, NY. Although retired, he is still active in entomology, with primary interests in terrestrial isopods and soil invertebrates.

1960s

James J. Zohrer (BS Zoology 1968) is Head of the Wildlife Diversity Program for the Iowa Department of Natural Resources, Des Moines.

1970s

Leslie (Rosencranz) Herzog (BS Zoology 1976) was recently promoted to manager, Clinical Data Management, Division of Global Pharmaceutical Development, Abbott Laboratories in North Chicago. Daughters Jennifer and Andrea are currently enrolled at the University of Illinois.

Janis Bacon Petzel, MD (BS Biology Honors 1979, MS Physiology & Biophysics 1981) reports that going to medical school was a mid-life career change. She had been a stay-at-home mom, a freelance writer, and a lab technician prior to going to the University of Nebraska Medical Center, Omaha. She received her MD in 1996. In August 2001, Petzel became a staff psychiatrist at Maine General Medical Center in Augusta. She is also doing clinical teaching and precepting in the Maine-Dartmouth Family Practice Residency. Husband **Dave Petzel** (PhD 1982) spends time in the Antarctica and at a marine lab in Maine for his research.

J. Craig Rylands, MD (BS Biology 1970) is in private practice in family medicine in Knoxville, TN. He is associated with Summit Medical Group, a 110 physician primary care group based in Knoxville. Craig and wife Suzanne (Wheeler) (BS

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ACES 1972) have two children: Christopher (22) and Chelsea (18).

1980s

Dwight D. Garrels (MS Biology 1981) received an MS in Engineering in 1996. He is currently a brewing process engineer for Anheuser-Busch, Inc. "My dual position as staff brewmaster and process engineer combines my science and engineering background to make for a very rewarding career." He lives in a country home with wife Nikki and their children Jessica, Garth, and Hannah.

Andrea Morden-Moore (BS Ecology, Ethology & Evolution 1980) received her DVM degree from the University of Illinois in May 2001. At the spring awards ceremony, she received a Banfield Family-Pet Bond Award, a Scamps Top Herder Memorial Scholarship, and a Smack Dab's Agility Club Scholarship. She is practicing veterinary medicine at Capitol Illini Veterinary Services in Springfield, IL.

1990s

Christine A. Armer (MS Entomology 1996) received the 2001 John Henry Comstock Graduate Student Award from the Entomological Society of America. She is finishing her PhD at Oregon State University, where she is studying the biological control of the Colorado potato beetle, a serious potato pest.

Chris (Hurt) Clements (BS Biology 1997) graduated with a DVM degree from the University of Illinois in May 2001. She is an intern in ambulatory/production medicine at Illinois.

Rachel Davis (BS Biology Honors & Psychology 1993) received her DVM from North Carolina State University in 2001. She is working as an associate veterinarian at Hill Creek Veterinary Hospital, Cary, NC. She and Clarke Pope (BS 1992, MS Electrical Engineering 1993) are planning their wedding for April 2002.

Frank W. DeLaurentis, MD (BS Biology 1991) completed his residency in psychiatry at Northwestern University in June 2001 and began a fellowship in geriatric psychiatry, also at Northwestern. He was awarded the 2000 Dr. Virginia Tarlow Award in

Psychiatry for outstanding performance in patient care and performance on the national Psychiatry Resident in Training Examination. He and wife **Martina** (BS Biology 1990) welcomed their first child Marisa Sharon in August 2000. Martina, who received her DDS from Illinois in 1994, practices dentistry on the northwest side of Chicago.

Vasilisa A. Fasoula (MS Plant Biology 1994) is a PhD student in Crop & Soil Sciences at the University of Georgia, Athens.

Angelo Fico (BS Plant Biology 1991) opened his own glass blowing shop in 1999 and is displaying his work at art shows and galleries around the country. He and wife Shelly (BFA 1994) welcomed their second daughter Adrianna Rosalie in December 2000.

Armgard E. Haken (BS 1989, MS Biology 1993) is a research scientist for Archer Daniels Midland Company. She formerly was a research specialist/laboratory manager of a corn processing lab in the Department of Agricultural Engineering, University of Illinois.

Peter Hatch (BS Ecology, Ethology & Evolution 1994) is a senior software engineer for Cincom Systems. "After pursuing a masters in Computer Science at Illinois and becoming a programmer, I realize how valuable my life science background really is. Not many in my field have that kind of well rounded education. He is married to **Susanne (Wilhelm) Hatch** (BS Biology 1995).

Alan Schroeder (PhD Entomology 1990) is President and CEO of Noetecs. He is a consultant to US embassies and USAID missions in Africa, providing advice on the management of insect outbreaks and locust plagues. He received the 1999 Presidential Citation for Outstanding Achievement from the University of Delaware. Schroeder was featured in Fox Television's 1997 release "World's Deadliest Swarms."

2000s

Scott E. Converse (BS Biology Honors 2000), a recipient of a National Science Foundation graduate research fellowship, is a PhD student in Biochemistry & Biophysics at the University of California, San Francisco.

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Mark M. Reznick (BS Biology Honors 2000) is a product specialist for Abbott Laboratories. He works in a testing laboratory on materials that are eventually packaged into kits which are sold to blood banks, hospitals, and doctor's offices to test for the hepatitis B virus surface antigen in blood.

Deaths

Arthur W. Ghent, 73, died on April 23, 2001. He retired as a Professor of Ecology, Ethology & Evolution at the University of Illinois in 1997, and was awarded Professor Emeritus status.

Ghent was a member of the UI Faculty Advisory Committee and the Senate Advisory Committee. He was active in the faculty union and was a member of the American Civil Liberties Union.

Ghent earned a bachelor's degree in forestry in 1950 and a master's degree in zoology in 1954 from the University of Toronto. He earned his doctoral degree in zoology from the University of Chicago in 1960.

He is survived by his wife Joy, a son, two daughters, five grandchildren, and a great grandchild.



Ghent

C. Ladd Prosser, 94, died February 3, 2002. He was Assistant and Associate Professor of Zoology at the University of Illinois from 1939 to 1949, Professor of Physiology from 1949 to 1975, and was Head of the Department of Physiology & Biophysics from 1960 to 1969. He was named Professor Emeritus in 1975.

He was a Guggenheim Fellow, a Fellow of the American Academy of Arts & Sciences, and earned many awards, including the 50th anniversary award from the Society of General Physiologists.

Prosser spent almost every summer of his adult life working in the Marine Biological Laboratory, Woods Hole, and was a trustee there.

He published seven books, including the textbook *Comparative Animal Physiology*, was involved with 50 review chapters, and authored more than 140 research publications.

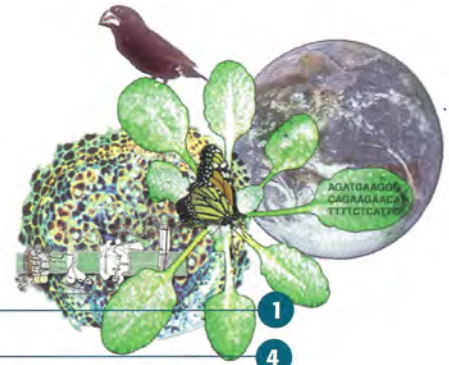
Prosser earned his AB from the University of Rochester in 1929 and graduated with a doctorate in zoology in 1932 from Johns Hopkins University. He conducted postdoctoral research at Harvard Medical School and at Oxford and Cambridge, UK.

Prosser is survived by a son, two daughters, six grandchildren, and a great grandchild.



Prosser

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Keep in touch. Please let us know about your news, achievements, honors, career, etc. Also, include your degree, department/program, and year. Mail the information to the address above; fax it to 217/ 244-1224; or email it to j-waite@life.uiuc.edu. We look forward to hearing from you.