College of Natural Resources

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BREAKTHROUGHS®

A Magazine for Alumni and Friends of the College of Natural Resources, University of California, Berkeley

the art of teaching

Spring 2001

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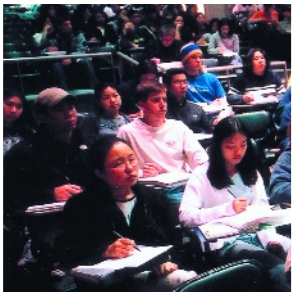

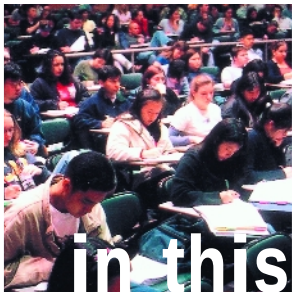

in this issue

ON THE COVER:
CNR Professor Keith Gilless and graduate student Aigar Kallas share a contemplative moment in front of Giannini Hall

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A Note from the Dean

TEACHING EXCELLENCE

Teaching is at the heart of the university. But, as we know from our own education, all teachers are not the same. "The Art of Teaching," which begins on page 11, focuses on the elements of excellent teaching here at the College of Natural Resources.

One of the truths that became evident during interviews for this feature was that good teaching requires passion, organization, relevance and genuine care for students. Those qualities—and in that precise order—were upheld as the teaching ideal by undergraduate students, graduate students and faculty members.

CNR faculty teach a broad spectrum of courses to an even broader spectrum of students. Several longtime faculty members, including myself, delight in meeting the challenge of teaching the large introductory biology course to lower-division students, mostly sophomores. Students from throughout the campus enroll in many of our courses not just for the content, but because they want to experience learning from a professor known for excellence in teaching.

In fact, 10 CNR faculty members have earned the much-coveted campus-wide Distinguished Teaching Award, given annually to outstanding Berkeley faculty since 1959. In addition, the College established its own college teaching award, which is given annually at commencement to recognize faculty members who have made strong contributions within CNR.

The opportunities for students in our College are unique, in contrast to larger colleges on campus. CNR is smaller and affords students opportunities to interact with other students and faculty on a more personal level. An important element of our overall teaching program is an extensive undergraduate research program (see page 18). And many of our programs deal with real-world problems, so that learning occurs not only in the classroom, but also out in the field. It's not simply ivory tower book learning.

Because we believe in hands-on learning, our College has held on to its laboratory and field experiences at a time when other programs on campus have cut back because of lack of resources. We've tried very hard to keep that option open so that we can cover the costs of travel, overnight lodging and other expenses associated with field trips beyond the Bay Area.

Many courses tend to take an interdisciplinary approach to the subject at hand, because that is what we do in the real world. We not only deal with the biology of a problem, we also can look at the economic and policy perspective. And sometimes we pair up with faculty from other departments. In The American Forest, students learn to appreciate our natural heritage not only through Joe McBride's virtual slide tour through the American forest, but also through Art History Professor Margaretta Lovell's slides of companion art.

The College also provides teaching training and opportunities to all graduate students, to ensure teaching excellence among future university-level faculty. The newly established Daniel I. Arnon Teaching Scholar Awards, established by the Department of Plant & Microbial Biology in memory of a former distinguished faculty member in that unit, recognize graduate students for excellence in teaching. Vanessa Handley was recognized for her creative efforts with the large introductory biology class, Biology 1B. Angela Hay was honored for her outstanding performance with the Plant Molecular Genetics Laboratory, PMB 160L. And Rachel Whitaker (see page 21) was nominated because of her ingenuity in working with students in the General Microbiology Laboratory, PMB 112L.

Yes, teaching is at the heart of the College of Natural Resources. And in teaching, we pass along our passion and enthusiasm for study and research on issues concerning our natural resources.

Richard Malkin
DEAN

Research News

UC RESEARCHERS DISCOVER LINK BETWEEN SUDDEN OAK DEATH AND RHODODENDRON AND HUCKLEBERRY FUNGUS

A tanoak bears a canker that, in only four months, grew from a spot of fungus to a massive sore—28 inches long—which completely wrapped around the trunk. Scientists intentionally infected the tree to prove that the fungus indeed caused Sudden Oak Death. They were surprised by the voracious growth of the canker.

Rapid progress in the discovery, monitoring and now, potential treatment for Sudden Oak Death, a highly contagious fungal disease that is killing California oak trees, has become front-page news. Sudden Oak Death continues to grab headlines as new research results hit the press on an almost weekly basis.

The pathogen causing the disease was identified a year ago. A breakthrough in the study of the disease came a few months later, when **Matteo Garbelotto**, plant pathologist and assistant Cooperative Extension specialist in the Department of Environmental Science, Policy & Management, and David Rizzo, assistant professor of plant pathology at UC Davis, discovered that the popular ornamental rhododendron, as well as wildland huckleberry bushes, can be infected by the same fungus that is causing Sudden Oak Death.

In a report released in January, the two researchers confirmed that the fungus affects California rhododendrons. A month later, the *San Francisco Chronicle* reported that the disease had been found in huckleberry bushes in Marin County. A year earlier, it had been reported that the fungus affected European rhododendrons. Finding this relatively new fungus in two different parts of the world—and in three species—is unusual.

On March 9, 2001, the researchers announced their discovery of a potential cure, the first big break in their efforts to curb the fast-spreading disease. Experiments on 90 potted live oak trees in Sonoma County since last August determined that at least three compounds are capable of significantly slowing down the growth of lethal cankers.

"I am totally excited," Garbelotto told a *San Francisco Chronicle* reporter. "This is an incredibly lethal disease, and we really don't have anything we can do to stop it once it gets into a tree. This gives us something we can use."

Since the discovery of the mysterious oak-killing illness in California in 1995, researchers have been scrambling to understand the disease and design strategies to stop its spread. It is not known if the fungus recently was introduced into California, or if it is a native fungus that recently became a tree killer because of environmental changes. Tens of thousands of oak trees have succumbed to the disease, and the researchers have reported up to 80 percent mortality in some infected groves.

Through molecular sleuthing, Rizzo and Garbelotto determined that the disease was caused by a never-before-seen strain of fungi from the genus *Phytophthora*. A relative belonging to this 60-member group caused the Irish potato famine, and another relative is linked to the dieback of cedar trees in Northern California and southern Oregon, as well as eucalyptus trees in Australia and oaks in Mexico, Spain and Portugal.

In California, Sudden Oak Death has been reported from Sonoma Valley in the north to Big Sur in the south, a 190-mile range, as well as east to the Napa County border, about 25 miles inland. The hardest-hit counties are Marin and Santa Cruz. The disease affects tanoak (*Lithocarpus densiflorus*), coast live oak (*Quercus agrifolia*), and California black oak (*Quercus kelloggii*) found along the coastal belt in California. Although recently reported in Shreve's oak,

the disease has not been found in other oaks such as blue oak or interior live oak.

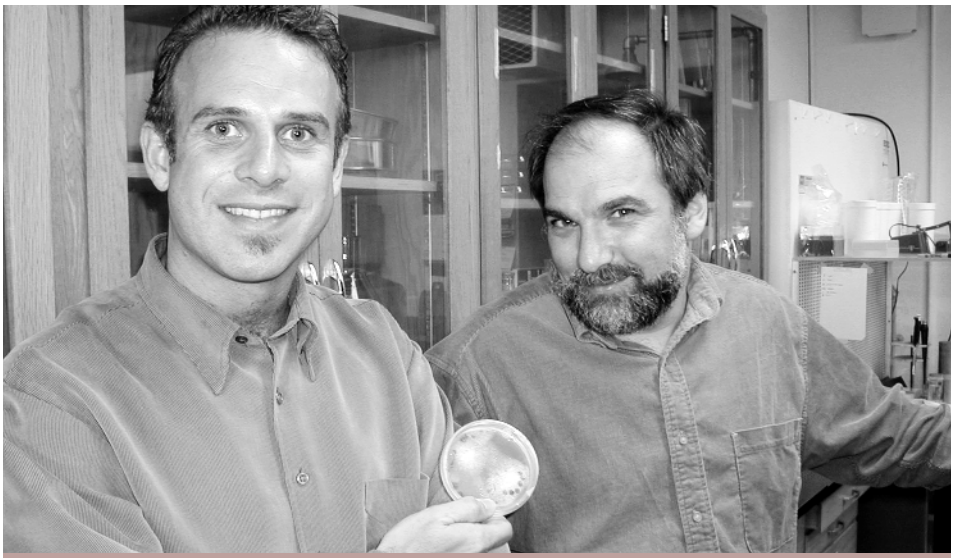
The dieback is alarming for its potential to disrupt the coast forest ecosystems. Oaks provide habitat for wildlife and a food supply for small mammals and are frequently planted as ornamentals in gardens and parks. Additionally, downed dead trees, resulting in a buildup of dry fuel, create a fire hazard.

The scientists don't know whether the disease was transmitted from California to Europe, or vice versa, or whether it traveled to both places from a third, as yet unknown, location. The fungus, first noted in European rhododendrons in 1993, has not been found in European oaks. However, European scientists are concerned that the disease will spread to European oak forests, particularly those in areas with a climate similar to that of California.

The researchers have notified agricultural and ecosystem managers of the discovery in the affected areas of rhododendron growth. Research is underway to determine if native rhododendrons—those that have not been imported—are being infected. Research is also being conducted to determine how many other susceptible species may be affected by the fungus. With the more recent finding among huckleberries—a member of the heath or *Ericaceae* family—scientists are concerned that the disease may now spread to other members of the *Ericaceae* family, including blueberries, cranberries, madrone and manzanita.

Meanwhile, researchers from both CNR and UC Davis have formed a research team to concentrate on several aspects of Sudden Oak Death. For their latest results, check out their webpage at http://camfer.cnr.berkeley.edu/oaks.

——*Catherine Zandonella*



Plant pathologists Matteo Garbelotto of UC Berkeley (left) and David Rizzo of UC Davis. Garbelotto is holding a culture dish of the fungus that causes Sudden Oak Death in California oaks and a similar disease in rhododendrons.

OakMapper Website Helps Scientists Track Spread of Sudden Oak Death

Technology plays a big role in tracking the spread of Sudden Oak Death throughout the state. Cooperative Extension Specialist Maggi Kelly, chair of the monitoring committee of the California Oak Mortality Task Force, which is coordinating research on Sudden Oak Death (SOD) in California, tracks the progression of the disease through a website that serves as both a technical and educational tool.

"Sudden Oak Death wasn't even identified as a problem until last year when it was found in China Camp and Marin County. Now we have a major collaborative effort that has confirmed the disease by laboratory isolations in six coast counties and reported it in several others," she said.

The OakMapper website, developed by CAMFER (Center for the Assessment and Monitoring of Forest and Environmental Resources), uses WebGIS (geographic information systems) technology to allow interactive map browsing and submission of the location and condition of trees. "This is a valuable tool in developing the regional picture of SOD. Areas where SOD is confirmed can be more intensely sampled, guided by new submissions of oak mortality," Kelly said.

You can take a look for yourself by logging on to http://camfer.cnr.berkeley.edu/oaks/map-intro.htm, or get more Sudden Oak Death information at the California Oak Mortality Task Force website:http://www.suddenoakdeath.org.

DELAYED GROWTH AMONG TIBETAN CHILDREN DUE TO MALNUTRITION, NOT ALTITUDE

A pilot test of a low-tech solution to rickets: kiddie watches with light sensors that assess sunlight. Children were told to keep their sleeves pushed up and to wear the watch at all times. Sunlight provides vitamin D that prevents and treats rickets.

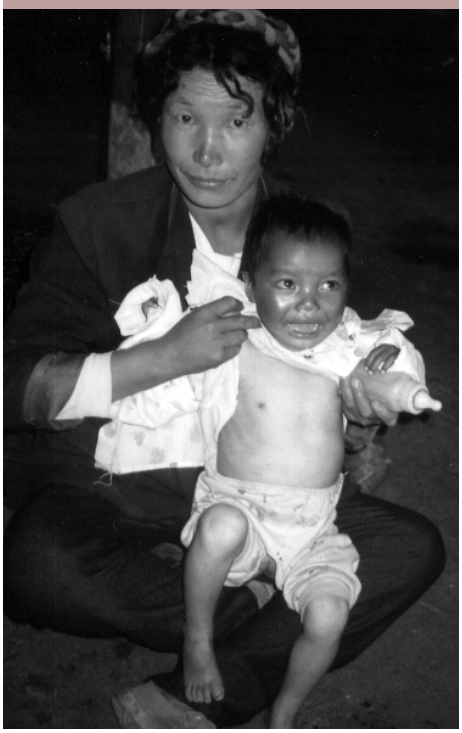
The New England Journal of Medicine (Vol. 344, No. 5, February 1, 2001) recently reported the results of a nutritional and health status study of 2078 children, aged 0 to 84 months, living in 50 diverse urban and nonurban communities in the Tibet Autonomous Region of China. The study team, which included Cooperative Extension Specialist **Patricia B. Crawford**, concluded that malnutrition has to do with stunted growth, not altitude.

Crawford, a nutritional anthropologist, examined the children in 1994 and 1995 with two Tibetan pediatricians, one Tibetan internist, one U.S. physician, local representatives of the Tibetan Maternal and Child Health Department and village health workers.

The team compared the height and weight of the children with those of U.S. children, and found that overall, 51 percent of the Tibetan children had moderately or severely stunted growth. When they considered urban and nonurban (nomadic, agricultural, and periurban) factors, they found that stunting was associated with clinical conditions such as rickets, abdominal distention, hair depigmentation and skin lesions along with a maternal history of hepatitis or goiter.

"Generalizations about the growth of children living at high altitudes may deflect attention from the urgent need for maternal and child health programs in Tibet.

A Tibetan mother and her malnourished child with abdominal distention and hair depigmentation changes.



Culturally-specific programs should be implemented to address the range of physiologic, socioeconomic, agricultural and environmental factors that affect the health of children on the Tibetan plateau," she said.

Other team members included Nancy S. Harris, M.D., Yeshe Yangzom, M.D., Lobsang Pinzo, M.D., Palden Gyaltsen, M.D., and **Mark Hudes**, senior statistician.

WORKSHOP ON INTELLECTUAL PROPERTY CLEARINGHOUSE MECHANISMS FOR AGRICULTURE

On February 16, 2001, U.C. Berkeley's Center for Sustainable Resource Development (CSRD) and the Office of Technology Transfer of the U.C. Office of the President hosted an all-day workshop, Intellectual Property Clearinghouse Mechanisms for Agriculture, at the Bancroft Hotel in Berkeley.

David Zilberman, co-director of CSRD and professor in Agricultural and Resource Economics, explained that the conference was organized because the current situation in the agricultural biotechnology industry is ripe for a discussion of mechanisms to reduce transaction costs and remove excessive barriers to using proprietary technologies. The general goal of the workshop was to discover and to share in a public forum the possibilities for cooperation, exchange of knowledge, and transfer of agricultural technologies with potential to benefit all humankind.

Over 90 participants from a variety of universities, companies, and U.S. government agencies attended, representing the United States, Europe, Australia, and Costa Rica. The meeting was supported by grants from the Giannini Foundation, the Farm Foundation, the Rockefeller Foundation and the U.C. Division of Agriculture and Natural Resources.

The workshop revealed that there is wide consensus and potential for cooperation in several directions, namely:

- Improve information exchange about existing technologies and intellectual property claims over those technologies by providing a patent "dating service."
- Reduce IPR-induced transaction costs by standardizing processes to obtain licenses or other forms of access to agricultural technologies.
- Give urgent attention to sharing intellectual property rights and improved access to biotechnologies targeted toward alleviating hunger and malnutrition in developing countries, and reducing environmental problems associated with pesticide use and groundwater contamination.
- Develop mechanisms to facilitate development and commercialization of new technologies for the improvement and production of specialty crops.
- Implement criteria for ownership of intellectual property rights based on their impact on the overall performance of agricultural and food systems, rather than on narrower impacts on individual parties or interest groups in the system—farmers, inventors, or companies.

CSRD will be working with a small group of conference participants and funders in the next few months to develop the next steps for creating an effective intellectual property clearinghouse mechanism for agricultural biotechnology innovations and product development.

—Robin Marsh

ARE TEAM TO EVALUATE IMPACT OF STATE BEVERAGE RECYCLING ACT

Department of Agricultural & Resource Economics (ARE) Professors **Peter Berck** and **Jeff LaFrance** and Cooperative Extension Specialist **George Goldman** are collaborating on a study of the California Beverage Recycling Act, which requires the beverage distributor and then the retailer to pay 2.5 cents for each under-24-oz.-container and 5 cents for each 24 oz.-or -over container, for every CRV beverage container sold in the state. The study, mandated by the state legislature last year, will evaluate alternatives to the beverage recycling system, including straight deposit and refund systems, such as Oregon's program. The team will be looking at possible changes in the current law.

"California has an unusual recycling law. In other states, you take your bottles back to the store to get your money back. Here there is a very complicated flow of funds and materials, and both processors and recyclers have to pay a fee. The Department of Conservation uses the surplus to fund recycling education, including our study," said Goldman.

"We will collect data on the purchase of beverages by container, and the recycling rates by container. Then we are going to estimate the consumer's choice of three disposal methods as a function of their income, the deposit and other factors," explained Berck.

Five graduate students and one post-doctoral student will be joining the three researchers in evaluating the benefits and cost impact of the Recycling Act on curbside recycling in the state, as well as at recycling centers and supermarket sites. The final report is due by January 1, 2002.

SPRING LECTURES IN THE DEPARTMENT OF PLANT & MICROBIAL BIOLOGY

The Department of Plant & Microbial Biology sponsored three special lectures this spring as part of its annual Departmental Seminar Series.

The department held the **Second Annual Daniel I. Arnon Lecture** on March 5, with speaker George Lorimer, distinguished professor in the Department of Chemistry and Biochemistry at the University of Maryland. Lorimer described his work with chaperonins, a group of proteins that help other proteins fold in the correct manner after they are synthesized or become disturbed by a stressful event. In addition to his recent work, Lorimer is widely recognized for his contributions to photosynthesis research.

On April 9, Peter Schürmann, professor at the University of Neuchâtel, was selected by postdoctoral scholars as the first **Bob B. Buchanan Lecturer**. His topic, From Observations to Molecular Structures: the Emergence of the Ferredoxin/Thioredoxin System, stemmed from research on the regulation of photosynthesis that he carried out with Buchanan in Berkeley in the 1960s and early 70s. Both continued to work on the problem for several decades. Schürmann described his recent work on the structures of the protein members of this system, which functions universally in the regulation of photosynthesis by plants.

On April 30, Christine Foyer, head of the Biochemistry and Physiology Department at IACR-Rothamsted, U.K., inaugurated the **Harry Tsujimoto Lecture**, which is organized by graduate students in the department. In her lecture, Peroxide Processing in Plant Cells: Antioxidant Coupling and Redox Signaling, Foyer described her research on how peroxide, derived from oxygen, is processed by plants, with special reference to its role in regulatory processes. Foyer, who leads a multidisciplinary research group, has edited several books and serves on the editorial boards of a number of scientific journals.

The Buchanan and Tsujimoto lectures are supported by a recent gift from K/T Foundation of San Francisco. The Buchanan Lecture honors Bob B. Buchanan, a long-term faculty member at Berkeley. The Tsujimoto Lecture is named for Harry Tsujimoto, a research collaborator of the late Professor Daniel I. Arnon.

UC BERKELEY RESEARCHERS TRACE ANCIENT MIGRATION OF VALLEY FEVER FROM TEXAS TO SOUTH AMERICA

When early humans migrated to South America more than 10,000 years ago, they brought with them a deadly hitchhiker—the airborne fungus responsible for causing Valley Fever, a disease that has caused illness and death in hundreds of people in central California and throughout the Southwest. This spread of Valley Fever by people migrating to southern latitudes was reported by University of California, Berkeley researchers, who tracked the disease using genetic sleuthing of fungi cultivated from victims of the disease.

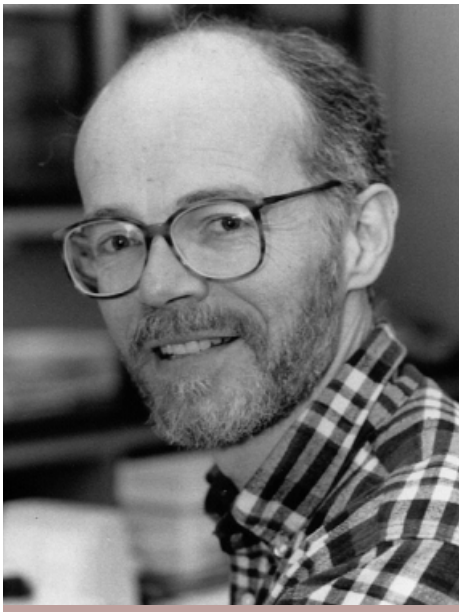
"We like to think of globalization of diseases as a modern event, but it has been taking place for tens of thousands of years," said **John Taylor**, a professor in the Department of Plant & Microbial Biology. With colleague **Matthew Fisher**, researchers at Roche Molecular Systems and four Latin American research institutions, Taylor published the research in the April 3 issue of *Proceedings of the National Academy of Sciences (PNAS)*.

The discovery will help scientists learn more about the spread and evolution of the Valley Fever fungus, *Coccidioides immitis*, which grows in soils in hot, dry climates. Wind, farming and even landslides caused by earthquakes can stir up soil, causing fungal spores to become airborne and occasionally lodge in a susceptible person's lung. Within three weeks, the spores expand and burst to release more spores, causing symptoms such as fatigue, cough and chest pain. If untreated, death can result.

Recognized as a pathogen for just over a century, the C. immitis fungus kills about 50 people a year in North America. The disease affects approximately 100,000 people per year, although most never know they've been infected. Periodic epidemics, like one that occurred in the early 1990s in Bakersfield, may be triggered by climatic events like drought. "Climate change and human disease are intricately related," said Taylor. "It is a phenomenon we will see more of as we continue to experience global warming."

To study the historical migration of the fungus, the researchers assembled 161 fungal isolates from patients who had visited health clinics throughout the affected region—Central and Southern California, Arizona, Texas, Central and Southern Mexico and South America. In addition, they studied two samples collected from environmental sources, one from the soil and another from an armadillo.

From each fungus, the researchers isolated DNA and then selected certain regions of the genome called microsatellites, which are short repeating bits of DNA. Using similarities in the DNA code of each microsatellite, the researchers grouped the fungi into eight distinct groups, each from a different geographical region. These eight groups all originated from a common ancestor, but became genetically distinct populations through genetic isolation and natural mutations.



John Taylor

The researchers noticed something curious. Two of the populations, one collected in Texas and the other in South America, were very similar. Previous work indicated that the ancestral fungus had occupied California and Arizona, so the researchers knew the fungus must have migrated south rather than north. "This led us to conclude that the fungus moved into South America recently and has not had time to display genetic changes," said Taylor.

Further analysis of how the DNA sequence diverged over time led the researchers to determine that the fungus reached South America between 9,000 and 140,000 years ago, which coincides with archeological evidence of the arrival of Homo sapiens to the region.

The fungal spores were probably carried as tiny spheres lodged in the lungs of domesticated animals or infected humans, who can carry latent C. immitis spores for up to 12 years. The fungus has been found in Native American middens in North America, showing that the disease was prevalent amongst these people.

Although the migration southward occurred thousands of years ago, Taylor said the disease is still capable of being carried around the globe. "Humans can contract the disease in California or Arizona and carry it to unexposed parts of the world," said Taylor. "However, even if those areas were dry enough to support the fungus, it would be unlikely to spread."

The fungus cannot spread directly from human to human. To complete its life cycle, C. immitis must make spores in the soil, where it migrates by seeping into soil from an infected animal's corpse. "Modern human burial practices prevent this from happening with people, but not so 12,000 years ago," said Taylor.

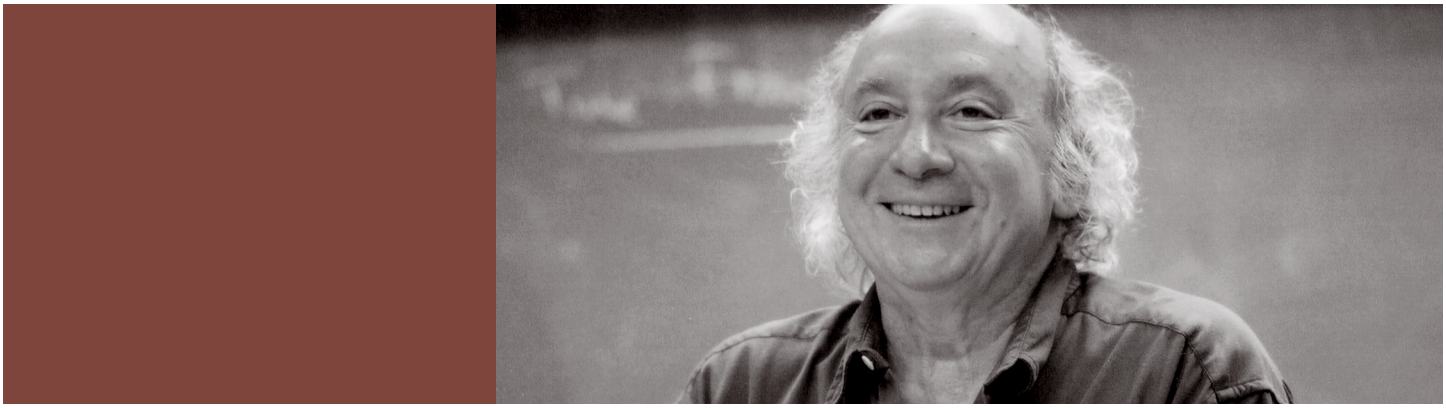
When in the "soil spore stage," C. immitis is quite infective and as a result it is the only fungus on the list of terrorist organisms under the U.S. Effective Death Penalty and Anti-Terrorism Act, said Taylor.

This work was supported by grants from the National Institutes of Health and UC Berkeley's Miller Institute for Basic Research in Science.

—Catherine Zandonella

Class and Field

SCIENCE AND MORAL OBLIGATIONS: PUTTING ETHICS ON THE LINE



Visiting Professor Charles Weiner engages his students much the way a folksinger engages an audience. He weaves history, drama, politics, personal conscience and humor into his Bioethics and Biotechnology and Society classes in such a way that his students leave each session thoughtful, challenged, personally involved and clamoring for more.

"I want students to feel that they are not spectators but a part of history with choices to make and a responsibility to society. They're going to have the advantage of learning from history and others' experience when they enter their careers, because they will understand a little more about some of the ethical pitfalls that they will face in the wider context of work and life," he said.

Weiner comes to Berkeley from the Massachusetts Institute of Technology (MIT) where he is professor emeritus of history of science and technology in the Science, Technology and Society Program. He brings a wealth of experience to the classroom. After receiving his Ph.D. in 1965, he was director of the Center for History of Physics at the American Institute of Physics until 1974, when he joined the MIT faculty.

Since the mid-1970s he has been documenting the development and responses to genetic engineering and biotechnology. He directed the project to create MIT's Recombinant DNA History Collection of oral history interviews, videotapes and archival documents. His writings have dealt with the history of the continuing controversy over academic patenting of biomedical research results; the environmental, safety and ethical aspects of genetic engineering and biotechnology; and the development of nuclear physics. His courses at MIT have included Biotechnology and Society, Engineers, Scientists and Public Controversies, and American Science: Ethical Conflicts and Political Choices. In 1998 he introduced a new graduate course at MIT, Down and Dirty: Technical Experts, Citizens and Environmental Cleanup Controversies. He has been a Guggenheim Fellow and is a Fellow of the American Association for the Advancement of Science.

Folksinging is not just an analogy: Prior to going to college on the GI Bill at age 26, Weiner traversed the country as a collector of folksongs. He melds all of these experiences into his teaching with resounding success. Both this spring's undergraduate Bioethics class and the graduate Biotechnology and Society seminar drew large waiting lists, and other faculty on campus are frequent visitors to his classes, actively participating in the lively discussions. The interest in the undergraduate course was so great that he had to limit it primarily to seniors, and there was a long waiting list for the graduate seminar.

This is the first time that Weiner has taught at Cal. "Over several decades, I've done other classes at MIT that have elements of what I'm now doing. What makes it interesting to me is that I'm defining bioethics so that it goes beyond the traditional, narrow definition of physician-patient relationship, informed consent and the autonomy of patients making decisions. In this class, we're looking at the ethical and social implications of biological research and its applications, which make it relevant to the research and teaching pursued here."

The course explores ethical problems in biotechnology, genetic engineering, human experimentation and environmental controversies. Students examine issues of science and social responsibility with guest speakers from plant biology, biotechnology and medicine, as well as from public

interest groups. They immerse themselves in real cases with detail (the two readers for the class measure 3 inches thick, with four or five other books on the reading list, as well). Weiner mixes in videotapes of hearings and news coverage of events, which may have occurred decades before the students in his class were even born, to provide a taste of the political and social environment of the day. Then students discuss the contemporary implications of what they have just seen—from coverage of the Nuremberg code of medical ethics stemming from the Nazi human experiments to Rachel Carson's 1962 bestseller *Silent Spring* and the more recent breakthroughs in the Human Genome Project. In addition to the heavy reading load, students must produce three short papers.

"By exploring the moral and social contexts of science, I hope to assist students in developing their own ethical positions in these emerging fields of biology," he explained.

Weiner's graduate seminar, Biotechnology and Society, draws about 25 graduate students from throughout CNR and other colleges on campus, including several faculty members, and even someone from a biotech company. His teaching style is different at the graduate level. "I expect much more of graduate students; they have to do a major research project that they present to the rest of the class at the end of the semester. And we focus on fewer topics in greater depth," Weiner explained.

The seminar explores the history of the intellectual and institutional development of molecular biology and genetic engineering, including the recombinant DNA safety controversy, and the development of the biotechnology industry. Students also analyze controversies on the environmental and health effects of agricultural use of genetically engineered organisms, as well as ethical and social problems in genetic testing, gene therapy, human reproductive cloning and the Human Genome Project. Other topics include effects of patents on industrial and academic research, conflicts of interest and regulatory policies. As in his undergraduate class, Weiner encourages and stimulates discussion.

"I love this. The students are so alive and it's not unusual to have 20 or 30 people waiting to speak. They're enthusiastic and open and are aware of issues that go beyond their particular course work. I'm having a great time. It's very energizing and I'm learning as well," he said.

Perhaps that's the point of his lessons—that science is changing so rapidly that we all must constantly test our values, as scientists and members of our community.

At one point in his Bioethics class, after a lively class discussion following the replay of an almost 40-year old "CBS Reports" review of the issues raised by Rachel Carson in *Silent Spring*, Weiner discussed the continuity of these issues into the present. He asked students what they would do if they were a member of a group studying a set of issues and obtained results that might be unpleasant to sponsors of the study. "Do you take the money, run and remain silent, or does scientific responsibility extend beyond that—to provide information to those who have the most reason to know about it—those at risk?

"It starts at the job interview," he noted. "You're making a good impression and you can see that the recruiter is gleaming. And then he or she asks 'Do you have any questions?' And you say, 'Yes, I do. May I bring my conscience to work?'"

the art of teaching

UC Berkeley has long been noted for its excellent research capabilities while teaching, some may say, has tended to play second fiddle. In the College of Natural Resources, however, teaching is a priority, according to CNR professors who have been recognized by their students as outstanding teachers. Of the seven faculty members interviewed for this article, five have received Cal's Distinguished Teaching Award, the campus's highest honor for teaching excellence.

Excellent teaching takes constant preparation to keep material up-to-date and engaging, and an ongoing commitment to student learning. Here's what seven CNR faculty and three students say about the art of teaching.

continued on next page

"We are a university first. We have a responsibility to generate and disseminate information, and teaching is one of the primary ways we disseminate that information," said Assistant Professor Whendee Silver, who joined the Division of Ecosystem Sciences faculty four years ago from Boston University. She was the recipient of a Dean's Stellar Course Award with Keith Gilless in 1998.

"I feel a personal commitment and responsibility to further the next round of academic leaders through teaching. If I didn't feel that way, I'd be working at a strictly research institution or for the government rather than at an academic institution," she said.

"I don't see any boundary between teaching and research," added Don Kaplan, professor in the Department of Plant and Microbial Biology and 36-year veteran of the UC system. "They are mutually and reciprocally stimulating. I am a better teacher because I do research and because I can give personal insights into the subject matter, which simply would not be the same if I had depended on only secondary sources for this information.

"Similarly, being a teacher gives my research a better perspective and helps me to place the more detailed aspects of what I do in the broad context of knowledge in my field. Moreover, when I am writing scientific papers, I am teaching the same way I teach in the classroom. It is just that professional biologists are most of my audience," continued Kaplan.

A 1976 recipient of a campus-wide Distinguished Teaching Award, Kaplan usually teaches principles of plant morphology to upper division undergraduate and graduate students. This spring he is teaching a freshman seminar for the first time.

"More than anything else, I am teaching students that how we work cannot be separated from our culture. I want students to develop their critical thinking skills, to question. It really comes down to affecting students' lives so that they become independent, thinking beings. That's the long-term goal," he said.

CNR Honor Roll of UC Berkeley Distinguished Teaching Award Recipients

Howell Daly	Environmental Science, Policy & Management	1982
Lewis Feldman	Plant Biology	1996
J. Keith Gilless	Environmental Science, Policy & Management	1988
Donald Kaplan	Plant Biology	1976
W. M. Laetsch	Plant Biology	1974
Joe McBride	Environmental Science, Policy & Management	1991
Vincent H. Resh	Environmental Science, Policy & Management	1995
Arnold Schultz	Environmental Science, Policy & Management	1992
Ronald Stark	Environmental Science, Policy & Management	1961
Paul Zinke	Environmental Science, Policy & Management	1959

Teaching Biology 1B, with an enrollment of 500 lower-division students, can be challenging.

Teaching the Love of Learning at the Undergraduate Level

Even with his responsibilities as dean, Richard Malkin finds time to co-teach the lower division course, Biology 1A, in the fall semester.

"I like the introductory level," Malkin said. "You can deal in broad strokes. Besides teaching facts, what you are really trying to do is to show students the excitement of the subject. We have 500 students in this year's course. Some I will never reach, but if I'm able to convey that excitement to a number of students, then I feel that I am doing well."

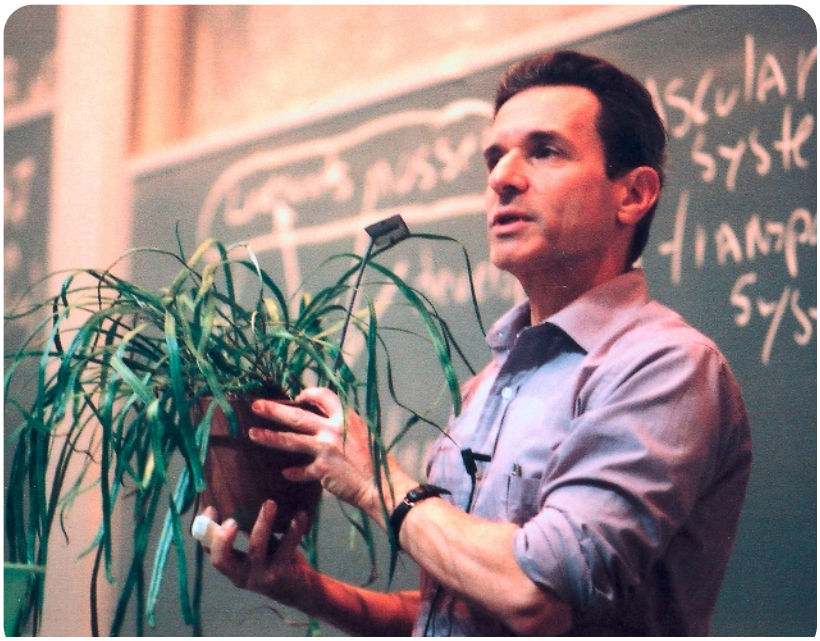
Division of Insect Biology Professor Vincent Resh, who received a Distinguished Teaching Award in 1995, teaches 5 weeks of the 15-week introductory biology course. "Almost all Biology 1 students have aspirations to go on to medical school. Exposing them to ecology, evolution and botany may be the only experience with these subjects they will ever have. It will make them better informed citizens, and it's extremely important that they be aware of these things," he said.

Teaching is so important to Resh that in 1987, as chair of the Campus Committee on Teaching, he steered through the Academic Senate a campus-wide policy for the evaluation of teaching for advancement and promotion; it is now an integral part of faculty performance evaluations. "The perception, incorrect I might add, is that good teaching and good research are not compatible. But there was a feeling then that teaching was not considered in tenure and promotion cases; only research was considered. Establishing this policy put aside that notion for good," he explained.

Professor and chair of the Division of Plant Biology, Lewis Feldman has been teaching at Cal for 25 years and received a Distinguished Teaching Award in 1996. For the past 12 years, he and Resh have co-taught Biology 1B.

"I think undergraduate students are the best part about being at Cal. They are so original, creative, stimulating and a lot of fun. I get a terrific, wonderful kick when I interact with them," he said.

To assure that interaction, Feldman visits all 25 lab sections during the course of his five-week botany section. "I go partly because I can help the teaching assistants, but also because it is the right thing to do. It gives me a chance to interact with these students on a one-to-one basis, which you can't do in a big lecture hall."



Professor Lewis Feldman uses humor and plants that students are familiar with to make his point in the Botany unit of Biology 1B.

Teaching should be fun, according to professors Lewis Feldman (left), Vincent Resh and Richard Malkin, who teach introductory biology each year

Standing before a roomful of 500—and sometimes as many as 1000—students can be daunting. "When you are teaching 500 students, you have to engage as many of the senses as possible, and make the material relevant to their lives. Sadly, very few high school teachers provide material on plants in their biology courses, so the students have had very little exposure and contact with plants. But many have gardened. I use the fruits, vegetables and flowers they are familiar with so that there is some association and connection," Feldman explained.

Silver uses the same technique to demystify quantitative science. "I do a lot of chemistry in my classes. When students are intimidated by chemistry, I use the analogy that chemistry is just like cooking. I really enjoy watching the accomplishment they experience when they see that they can master it," she said.

Mentoring Students at the Graduate Level

Teaching upper-division and graduate courses takes a slightly different approach, according to professor and chair of the Division of Forest Science Joe McBride, a 1991 Distinguished Teaching Award recipient. "My primary interest is in teaching, and I am especially interested in preparing graduate students for teaching careers at the university level," he said.

"At the graduate level, there's an expectation that students will do more of their learning through reading. We discuss the information to a greater extent than at the undergraduate level," he continued.

Professors Vincent Resh (second from left) and Brent Mishler (far right) pause with two undergraduate students during a class field trip to the rain forest in Moorea. The class was a 13-credit course titled Biology and Geonorphology of Tropical Islands, taught primarily at the Richard B. Gump Research Station, Moorea, French Polynesia.

"I encourage graduate students to delve into the primary literature, to think critically about journal papers and how they might approach problems differently," added Silver, who teaches an upper-division/graduate course in tropical ecology as well as graduate seminars in ecosystem ecology.

"My role is more of a mentor than teacher at the graduate level," noted Kaplan. "You inherently assume that graduate students have certain basics of subject matter that you don't have to cover again, and that they can get up to speed faster. On the other hand, sometimes graduate students are more resistant to new information—they come thinking that they know a lot of things. I don't do anything to put them down, but they'll hang on to ideas as a security blanket."

Resh also sees himself as a mentor to graduate and post-graduate students. "I have had 25 Ph.D's in my lab. If we are successful, we turn them into professionals by teaching them how to excel in writing papers, how to present talks at meetings, and how to think through an experiment."

Graduate Student Learns the Ropes

Yi Lam, of the Department of Nutritional Sciences & Toxicology, has already had more than a taste of teaching. The Ph.D. candidate has taught as a graduate student instructor (GSI) each semester during her five-year program, although only one semester is required.

"All graduate students in the department take a course in the theory of teaching during their first year. 10 graduate students get their feet wet serving as GSIs in Introduction to Human Nutrition, which attracts more than 700 undergraduates a year," she said.

GSIs lead discussion groups of 25 students. They must sit in on the professor's lecture, develop one or more week's worth of material, lead discussions, prepare and grade exams and provide one-on-one counseling to students. With so many students to manage, most GSIs in this introductory course are responsible for three discussion groups at a time.

"It's easy to make teaching relevant in nutrition, because you can always find everyday life examples—it's not like molecular and cell biology," she continued.

"We tend to pick topics that interest students, such as fad diets, supplements for athletes, sugar substitutes and other current and sometimes controversial issues."

Although Lam enjoys teaching, she plans to focus on research in an academic institution or in industry after she graduates this spring. She is currently exploring the anticancer effects of soybean proteins.

Senior Terry Sutherland observes her former GSI Yi Lam in the lab as she checks foci formation in cell culture. Cells form foci when normal cells become cancerous. Crystal violet dye is used to stain the cells.

Professor Joe McBride frequently takes his students into the field for hands-on learning experiences, most recently with students in his Vegetation Assessment and Management course.

Training Teachers of the Future

Malkin and Feldman lead a teaching course in plant biology for about a dozen graduate students, most of whom are already teaching as graduate student instructors (GSIs). Similar courses are taught by all the departments in the College. Students learn how to run a discussion session, how to write a quiz and an exam, how to budget their time, and how to handle conflicts with students and peer pressure. "We talk about pedagogical skills, bring in other faculty to talk about their teaching experience, and give students a chance to give a 30-minute lecture, which is videotaped and later critiqued," Malkin explained.

"The students feel terrible after they see the video, but it is a very good teaching device," added Feldman.

"I actually look forward to that class. I am always learning from it. We ask those that are teaching to share how their week went, what problems they had and how they dealt with them. Then we give them feedback and insight on other ways they might have approached the situation.

"It's an important opportunity because, as GSIs, they will be seeing the students they teach in an undergraduate section over the next two or three years. GSIs want those students to think they did a good job every time they see them," said Feldman, adding that he approaches his own teaching from the same perspective.

"These are great students and they deserve the best, as far as teaching is concerned. Even with responsibilities as department chair, teaching is my number one priority until it is of a quality with which I feel comfortable. My teaching load is not very heavy, so I can always justify putting my research on hold or second priority."

Professor Whendee Silver interacts with students in her graduate seminar.

Balancing Teaching with Research

Finding a balance between teaching and research and between work and family, is a continuing struggle no matter how much experience you have had as a faculty member. "To me, it's the balancing act between my professional life and family life that is the struggle," explained Keith Gilless, an economist in the Department of Agricultural & Resource Economics and the Division of Resource Institutions, Policy & Management; he also has two young daughters. Gilless received a Distinguished Teaching Award in 1988.

"It's definitely something that evolves," noted Silver, who is relatively new to the CNR faculty and has a young son.

"My first semester at Berkeley was rough even though I had taught before. The hardest thing for me is time management. The biggest shock was how much time it takes to prepare for lectures. It can take me up to 10 hours to write a new lecture. And while it's immensely frustrating that I spend so much of my time writing new lectures, I don't want to be disorganized or give a bad lecture," she said.

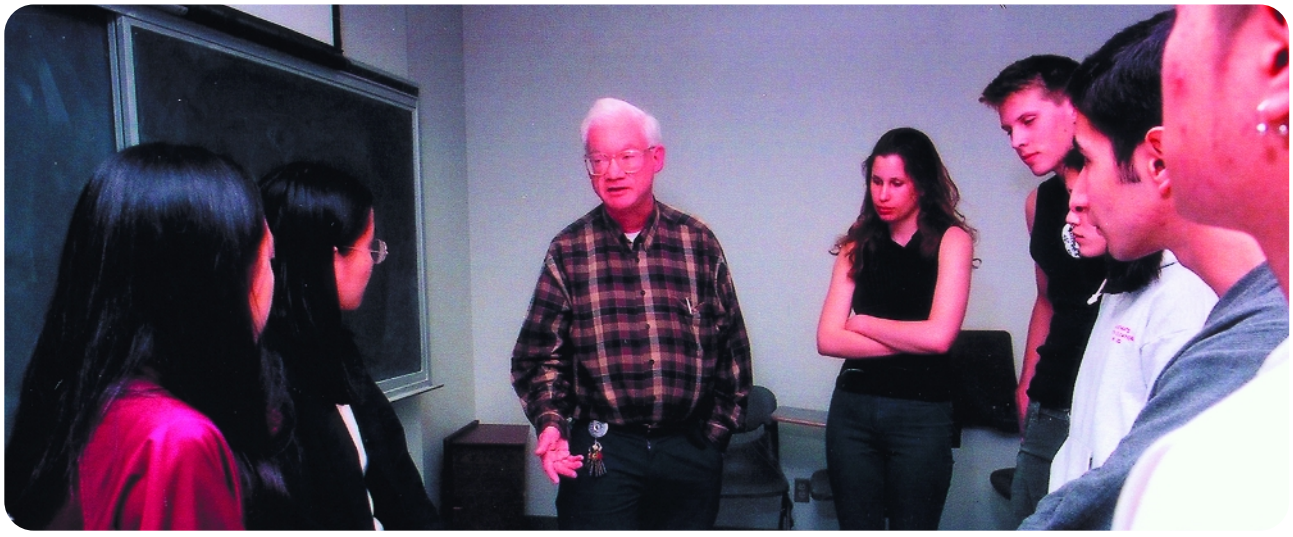
"Even when I teach a class the second time around, I have to rewrite the lecture, otherwise it would come out stale."

Keeping Teaching Fresh

Keeping teaching from becoming stale is a common goal among these professors. "Most important is being enthusiastic about the material, because if you are not, it is going to be a painful exercise for everybody. You also have to really understand the material in a way that allows you to answer questions flexibly. If you are doing a good job, you may have to explain the exact same material three different ways to ensure that your students really get it," noted Gilless.

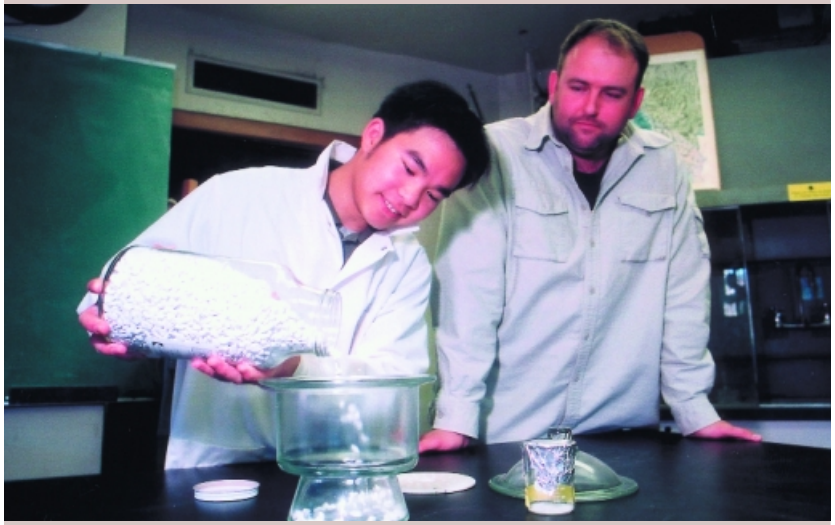
Organization is also important. "The lecture should not be scripted, but it is important to be well organized when you walk into the lecture, to know all the key concepts that you want to explain so that the class discussion gets to that material. That's why I use chalk. I find that a lot of the technology so in vogue these days results in a less flexible presentation," said Gilless.

Joe McBride gleaned his philosophy of teaching from his own professors. "I learned that it was important that teaching was relevant, and that you must be organized in presenting lectures and teaching laboratories. I learned the power of really knowing what it is you teach and of being enthusiastic about your subject," he said.



Professor Don Kaplan and students in his freshman seminar discuss the latest results of the Human Genome Project.

Senior Theo Leung (left), a recipient of a grant from CNR's Undergraduate Research Opportunity Program, works under the watchful eye of Ph.D. candidate Randy Jackson (right) in the laboratory of professor Barbara Allen-Diaz.



Students' Teaching Standards on Par with Teachers' Priorities

Students, it seems, look for the same qualities in good teaching that good teachers try to achieve. Impromptu interviews with undergraduates—from freshmen to seniors—revealed that students respond best to teachers who are enthusiastic, organized and connected with their students.

"It's mostly in the attitude," explained senior Theo Leung, who will be graduating this spring with a degree in Natural Resource Management. "You can always tell if your teacher really wants the students to learn. If you have a good teacher, one who conveys his or her passion for the subject, the size of the class doesn't really matter. I've had less effective teachers in small classes and really great teachers in big classes."

Leung gravitates to teachers who make an effort to involve students in the subject. And the learning experience doesn't always happen in the lecture hall. For the past year and a half, Leung has taken advantage of the Undergraduate Research Program and worked with Randy Jackson, a doctoral student in professor Barbara Allen-Diaz's lab.

"Talking to Randy has helped me learn a lot about what you have to do as a grad student as well as giving me a better sense of what is involved in the research process.

"He always takes the time to answer my questions and has given me some good advice," said Leung.

Thanks to donors to the Berkeley Fund for Natural Resources, Leung and 25 other undergraduate students work side by side with CNR faculty and graduate students on their own research projects.

McBride also drew on the experience of Kenneth Ware, professor of biometrics at Iowa State University, where he taught after completing his graduate work at Berkeley. "As a neophyte assistant professor, I asked him for teaching suggestions. He looked me straight in the eye and said, 'You've got to love them a little.' Experience continues to remind me of that insight. Teachers cannot expect to have the respect, esteem and love of students unless they are willing to offer those qualities to the students. Once the students know that you really care about them, teaching is easy."

"A good teacher has to be a bit of a showman," added Feldman. "You have to have an awareness of whether your students are following you. Unless you are able to know that they are with you—all the rest of your presentation is lost.

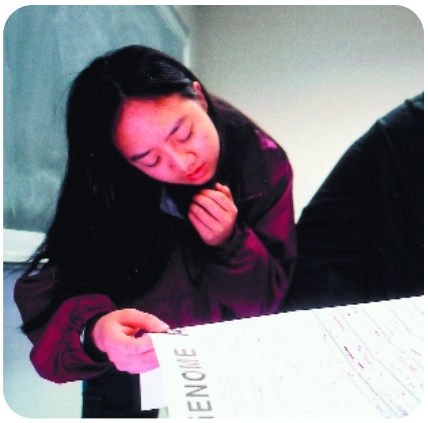
"And you have to be willing to be vulnerable," he continued. Feldman referred to a former colleague, now retired, who used to stop in the middle of a lecture and pass around 3-by-5 cards to her students, asking them to write down exactly what they were thinking at that moment. "It was a concrete way for her—and her students—to see if she was connecting with them.

"That is why I prefer live lectures. You have no way of knowing if the students are following you in a taped lecture or in distance learning," said Feldman.

"I approach teaching like it's an adventure," added Resh, who estimated that in the last 10 years, he has taught 10,000 students.

"And it is an adventure, because I don't know what will happen from one day to the next. I am amazed that after teaching the same course for years, I'll get a new question I've never heard before," he said.

(below) A student in Don Kaplan's freshman seminar takes a closer look at a print-out from the Human Genome Project.



Students gravitate to teachers who are enthusiastic, know their subjects, relevant and truly connected to their students.

Resh admits to having butterflies in his stomach at the start of a new academic year. "Every year as I start my first lecture, I ask myself why am I doing this when I don't have to. It's absolutely terrifying with television cameras videotaping me, and knowing that what I say will be on the Web. I wonder if my bald spot and gray hair are showing. But the payoff is so great, that I just let myself go."

Learning from Experience

Most of the teachers admit that they had little training before they taught their first class. They not only relied on their own experiences with good and not-so-good teachers, but they continue to take advantage of opportunities to improve their teaching. Silver co-taught her first class with a more experienced teacher. Resh visits other professors' lectures to observe them in action. "We are great copiers. If we see something that works, we tend to bring it in to our own repertoire," he said.

The University's Center for Faculty Educational Development and Technology provides ongoing courses, publications, and more recently, a website, to help professors enhance their teaching skills for greater effectiveness.

Teaching Is More Than Lecturing

Silver, like most CNR professors, uses a mix of lectures and hands-on experiences in her teaching. She uses a diversity of visual aides and tries to use examples that she personally finds exciting. "Tropical Ecology is easy to teach because everything is exciting. I can't help but show my enthusiasm for the topic," she said. "I include discussions of my research and my colleagues' research so that it makes my lectures less of a textbook experience and more of a you-too-can-do-this experience."

Joe McBride uses photos, charts and graphs on slides for his Senior Seminar in Professional Forestry as well as for Vegetation Assessment and Management, a course in the College of Environmental Design. This spring he is also co-teaching the American Forest with Margaretta Lovell, a professor in the Art History Department. "I try to incorporate a lot of visual variation during the lecture to keep it interesting."

He uses 60 to 80 slides per lecture. After the lecture, he boils down his remarks to a one-page outline, and selects the 10 most important slides to appear on a web page for the course. He also uses field experiences. "Charles Bessey, a 19th century professor at the

The chalkboard still reigns in Whendee Silver's classes, where a student demonstrates her problem solving abilities.

University of Nebraska, who is considered the father of American botany, once said that botany is the study of plants, not books. Students should not spend as much time in the library as in the lab and the field. I've taken that to heart and all my courses have field labs on a weekly basis, so that students can think about what they are seeing," he explained.

When out in the field, McBride tends to let the students lead the discussion. "I'm there mostly to answer questions about what they are finding," he said.

High Tech vs. Chalkboards

Some faculty members are strong advocates of technology in the classroom and post their class notes on the Web as a matter of course. But many prefer the personal approach to high tech. "There's a kind of chemistry that happens in the classroom that does not happen over a TV or computer monitor," said Malkin, who admits to being somewhat old-fashioned in his teaching approach—"I'd rather use chalk than PowerPoint™. If it isn't going to improve my effectiveness as a teacher, why do it?"

"You can use all types of devices to convey information—books, websites, videotapes, but the basic reason to have a live human being leading the class is that a student can say, 'I didn't understand a thing you said', and you can find another way to express it so that it will sink in," added Kaplan.

Silver has tried using computer-generated overheads but found it "pretty stiff." "I like to be able to write on things. I'm a little too short to write on the board, so I use overheads and write all over them. This way I have the material documented."

On the other hand, she is developing a web page with links to other useful sites as a supplemental resource. Attending class, however, is a requirement for Silver's students. "I specifically give material in class that students won't get otherwise. Showing up and asking questions that other students didn't think to ask, or were afraid to ask, contributes to the learning experience for everyone."

The Ever-Present Challenge: Connecting with Your Audience

Getting students to participate is part of the challenge, especially in large introductory classes. "In my first large class, it was devastating to find someone in the back of the room reading a newspaper. I try to throw questions out to the audience and get them to respond," said Silver. "The first couple of times, students look at me blankly and it's discouraging. But over time, as they get to know me better, students begin to participate in the process."

"Faculty who are successful in Biology 1 have to work very hard to break down the bigness. It's difficult. A lot of students are detached. You make yourself accessible by going to the labs and being around when students are there. Every now and then, students will come in and talk to you about something that's off the wall, but that's okay because they are thinking," said Malkin.

"I feel real pleasure when I see somebody gets something that they didn't understand, not just assimilating another fact, but when I see the lights go on in their head—that's really enjoyable," noted Gilless.

Sometimes, a teacher can really make a difference in a student's life. Silver says that when she receives letters from former students 5 or 10 years later, thanking her for introducing them to something that changed their lives, it makes teaching really worthwhile.

Last year, senior Amy Maxmen knocked on Silver's door and told her that she had been a freshman in Silver's introductory biology course at Boston University. "I was one of those determined pre-med students. But when Whendee showed me that other branches of biology were exciting, I decided to switch majors." Maxmen wound up transferring to Cal, and graduated last year with a degree in integrative biology.

"What I hope my students learn is a way of looking at plants that will last for much of their lives," concluded Kaplan. "In most other classes, students acquire a body of information that they forget once they have taken the final exam. My long-term goal is to change the way they look at plants, to trust their own instincts and to affect students' lives so they become independent, thinking beings, because that's what it really comes down to.

"Scientists ask questions for a living. Some aspire to try to answer those questions. If students can get a sense of that's what it's all about, then I have done my job," he said.

And thinking is what teaching at CNR is all about.

Ph.D. candidate Rachel Whitaker brought her previous teaching experience as a Vista volunteer to her work as a graduate student instructor. She's put teaching on hold while she completes her doctoral research on the process of evolution in the thermophilic species of microbes.

Teaching Occurs in Many Settings

Third-year graduate microbiology student Rachel Whitaker experienced teaching and learning in many settings. During her first year as a graduate student, she was one of many graduate student instructors (GSIs) for Biology 1A , a large class with more than 500 students and 22 lab and discussion sections. On the other extreme, she was a GSI for the upper-division General Microbiology Lab, where there were eight students; for this work, she received a Daniel I. Arnon Teaching Scholar Award.

"Teaching Micro lab was completely different from Biology 1A. Since it was the first time that class had been taught, we had to be flexible and creative, and because the class was small, we could be," said Whitaker.

She has found that teaching occurs in a variety of locations, including in the lab. Currently, she is working in Professor John Taylor's lab, studying the process of evolution in thermophilic species of microbes.

"John is very open to answering questions or discussing results. I talk to him mostly about the larger concepts and analyses of data. The post-docs in the lab do most of the day-to-day teaching on how to design experiments and make them work.

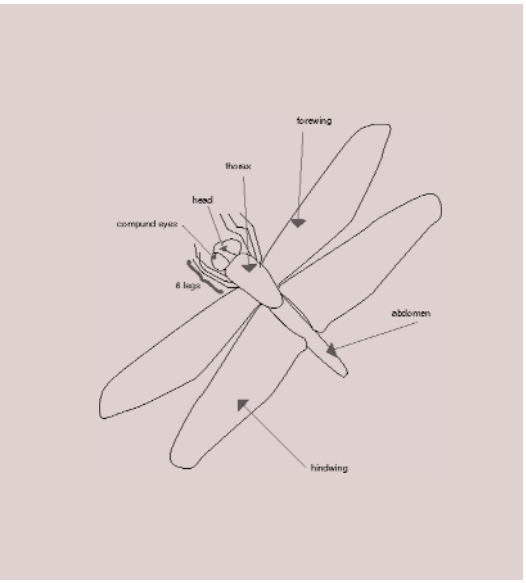
"Graduate school is a different, much more personalized kind of teaching, because it is all driven by my own curiosity and needs," she said.

CNR Honors

Barbara Allen-Diaz

Barbara Allen-Diaz, associate dean for research and extension and professor of Ecosystem Sciences, received the Outstanding Achievement Award from the Society for Range Management at their 54th annual meeting in Hawaii in February. She was honored for "her outstanding research record, productivity as a college instructor, participation in outreach and professional development programs and service on scientific review committees." Her expertise and reputation among researchers, ranchers, land managers, wildlife enthusiasts, and conservationists has led to numerous prestigious appointments. She was team leader for a report evaluating the effects of livestock grazing on Sierra Nevada ecosystems and is a member of the National Research Council's review committee on large ungulate grazing in Yellowstone National Park.

CNR's website CityBugs has won the San Francisco Exploratorium's Ten Cool Sites Award for Educational Excellence. CityBugs, a collaboration between UC Berkeley, the Interactive University and the Oakland Public Schools, provides teachers with ideas for developing their K-12 science curriculum. Using hands-on classroom activities and Internet-based projects, the program recruits insects as a tool for teaching children about the principles of life science, science literacy and biodiversity. Students and faculty from the Division of Insect Biology and Essig Museum of Entomology answer e-mail questions about insects that are sent by curious web surfers, and they help to develop a database that assists students with local insect identification. CityBugs earned the Chancellor's Award in September, as well. **Debbie Lenz** is the project coordinator for CityBugs. Visit the website at www.cnr.berkeley.edu/citybugs.

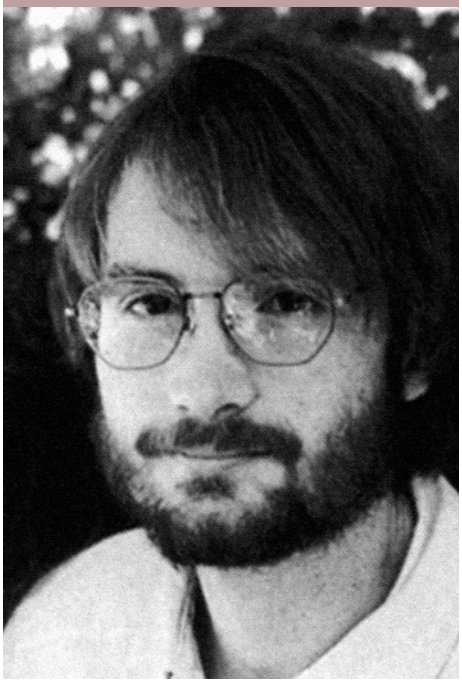


IMAGES COURTESY OF WWW.CNR.BERKELEY.EDU/CITYBUGS

Christopher Vulpe, assistant professor of Nutritional Sciences, received a Hellman Family Faculty Fund 2000 Award to further his research in copper and iron metabolism.

Established by E. Warren Hellman in 1995, the fund provides support for assistant professors in the physical and life sciences, engineering, arts humanities and social sciences who show the promise of great distinction in their research. Thirteen Cal assistant professors were awarded a total of $300,000 in research support.

Christopher Vulpe



Celina Yong, a molecular environmental biology major in the Department of Environmental Science, Policy and Management, has been awarded the prestigious Marshall scholarship from the British government. She is among 6 Californians (including another UC Berkeley student) and 40 students nationwide to receive the honor, considered one of the highest accolades for college students.

The Marshall scholarships were established in 1953 by Great Britain in gratitude to the United States for the assistance it provided after World War II under the Marshall Plan. The $50,000 scholarship covers tuition and living expenses while Yong pursues a doctorate in public health at Oxford University starting this fall.

The 21-year old was raised in Rohnert Park, California. She said she is deeply committed to public service and plans to become a primary-care physician, policy-maker and public health specialist. She has helped provide medical assistance to communities in Ecuador and to the homeless in San Francisco, and she is co-editor of *Issues Berkeley Medical Journal*.

Yong is currently finishing a research project in which she studied the gastrointestinal tract system of small snails in the coral reefs off French Polynesia, exploring the relationship between the gastrointestinal tract and diet.

She previously won the Sproul Award and a Harry S. Truman Scholarship.

Celina Yong

College Support

LARA KUEPPERS WINS SCHUBERT PRIZE:

2001 Outstanding Ecosystem Sciences Graduate Student

KATHRYN MORIARTY

Ruth Schubert (left) and Lara M. Kueppers, recipient of the 2001 Walter and Ruth Schubert Prize awarded to an outstanding graduate student studying in the Division of Ecosystem Sciences.

Lara M. Kueppers, Ph.D. candidate, received the Walter and Ruth Schubert Prize for 2001. The annual award is given to an outstanding graduate student studying in the Division of Ecosystem Sciences.

"Walter always felt that young people—and education—are the future. Education was always a priority in our lives and that of our children. I continue to provide the prize each year because I know Walter would have wanted it that way," explained Ruth Schubert.

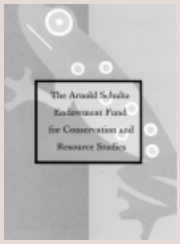
The Schubert family has strong ties to the University. The late Walter Schubert graduated from Cal in 1937 with a bachelor's degree in economics. One son, Richard, was a student in the 1960s, and a daughter, Joanne, received her bachelor's degree in 1972.

"Aside from the monetary value, the prize is wonderful simply because of the recognition," said Kueppers. "The prize will help me prepare for scientific conferences where I'll be presenting my research with my peers. Having the opportunity to talk about my work with other scientists is really important to me."

Kueppers is investigating how climate change may affect carbon cycling in Rocky Mountain forest soils, and how any responses may feed back to alter the future rate of climate change.

"Overall, the direct and indirect effects of climate change on forest metabolism could have important repercussions for climate change itself. The balance between forest growth and decomposition of dead organic matter determines how much carbon is stored in forest soils. A shift in this balance would result in either an additional source of atmospheric carbon dioxide or a new sink—forests themselves. By studying all of the important components of forest carbon metabolism in Rocky Mountain forests with respect to both climate differences and species composition differences, I hope to be able to predict whether the response of these forests to climate change will worsen an already serious problem," she explained.

Thanks to the generosity of the Schuberts, young investigators such as Kueppers are making a difference. —*Kathryn Moriarty*



ALUMNI LAUNCH CAMPAIGN TO HONOR ARNOLD SCHULTZ

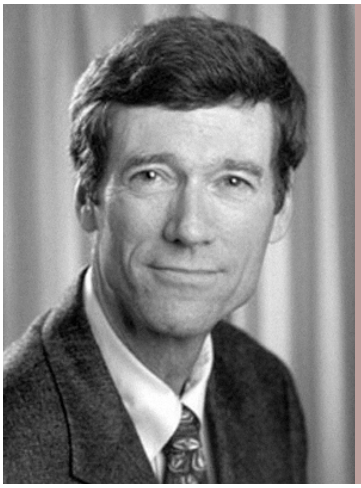
The fund-raising campaign for the Arnold Schultz Endowment Fund for Conservation and Resource Studies is well underway, and all CRS alumni are encouraged to participate. Gifts will honor professor emeritus Arnold Schultz and will benefit CRS students by supporting scholarships, field trips and outside lecturers.

The success of this campaign will depend on the commitment and participation of CRS alumni and friends. The alumni volunteer committee includes Terry Byrnes '82, S. Loren Cole '70, Kreg Eacret '77, Tom Javits '74, Sharon Miller '82, Lisa Petrides '83 and Alexandra Saunders '79.

For more information, please contact Kathryn Moriarty (510 643-6641; email moriarty@nature.berkeley.edu.) You may also send a gift today. Please make out your check to the Arnold Schultz Endowment Fund and mail to the Arnold Schultz Endowment Fund for Conservation and Resource Studies, 101 Giannini Hall, MC 3100, Berkeley, CA 94720.

Alumni News

TWO CNR ADVISORY BOARD MEMBERS NAMED TO HIGH-PROFILE NATIONAL POSITIONS



Steve McCormick

Ann M. Veneman

Two CNR Advisory Board members have been named to top national posts. Ann M. Veneman was picked by President George W. Bush and took office on January 20 as the first woman and 27th secretary of the U.S. Department of Agriculture. In February, Steve McCormick, B.S. '73, Agricultural Economics, took office as president of the Nature Conservancy (TNC), the world's largest nonprofit conservation organization, based in Arlington, Virginia.

Veneman served seven years in the U.S. Department of Agriculture, including two years as the No. 2 official in the first Bush administration. She was the first woman to run the state agriculture agency in California, from 1995 until 1999, under Governor Pete Wilson.

As national agricultural secretary, Veneman has pledged to work to foster an atmosphere of teamwork, innovation, mutual respect and common sense within the department and to focus on improving delivery systems and service. She is respected as a pragmatic and seasoned professional with a deep knowledge of farm issues. Raised on a peach farm in the San Joaquin Valley, she helped negotiate the farm portions of the GATT free-trade agreements and focused heavily on exports while running California's farm agency.

"Our farmers feed and clothe not only the people in this county, but people around the world, and it's important that we work together to expand markets for our food and fiber, both at home and abroad," she was quoted as saying in the December 22, 2000, edition of the *Washington Post*.

Veneman received a bachelor's degree in political science from UC Davis in 1970, a master's in public policy from UC Berkeley in 1971, and a J.D. from Hastings College of the Law in 1976.

Another Californian heading to the East Coast is Steve McCormick, who served as the executive director of the Nature Conservancy of California, the conservancy's largest state chapter, from 1984 until 2000. During his tenure as director, the California program grew from 15 to 150 staff members and raised over $300 million in contributions. The chapter led efforts in the campaign that resulted in the March 2000 passage of two state bond measures yielding $4 billion for conservation projects.

McCormick is no newcomer to the national office. He chaired a national conservancy committee in 1994 that produced Conservation By Design, a strategic mission statement emphasizing a bioregional approach to conservation. The revised mission, McCormick explained, "is a portfolio approach to conservation." It identifies an array of places that would assure the biodiversity of the region if it were protected.

This unique approach is the same one that McCormick used leading TNC's California chapter. "One thing you learn with this approach is that it compels you to use strategies other than just land acquisition. You have to model ways that people can live and work near and, even, in these areas," he said in a *San Francisco Chronicle* interview.

It is these collaborative efforts that have earned McCormick rare high esteem by groups often found opposite each other—government agencies, ranchers and environmental groups.

"The collaborative projects he developed were real models for protecting landscapes in the West," said Dan Macon, the executive director of the California Rangeland Trust, an open-space preservation group founded by ranchers. "He embraced agriculture while simultaneously preserving prime wild areas."

"I can't find enough glowing words to describe him," said Robert Hight, the director of the California Department of Fish and Game. "He's a visionary. He brings people together. Under Steve, what was good for the conservancy was good for California."

Following his graduation from Cal with honors in 1973, McCormick earned a J.D. from Hastings College of the Law in 1976. He has received numerous prestigious awards including the Department of Interior Silver Award (1986), the Chevron Conservation Award (1989) and the Edmund G. "Pat" Brown Award (1999) for exemplifying the principles of environmental and economic balance.

CLASS NOTES

'40

Stanley M. Mather, B.S., Plant Pathology, is retired and living in Sacramento.

Raymond Talcott, B.S., Agricultural Economics, is retired and living in Bakersfield.

'42

William Dresser, B.S., Forestry, lost his wife, Dorothy, in August, after a long illness.

'43


Shirley Burbank

Shirley Fuller Burbank, B.S., Home Economics, recently retired after teaching full time for 30 years and 14 years as a substitute teacher, primarily in public schools in Sacramento.

'48

Myron McFarland, B.S., Forestry, writes that, though his days of forestry are far behind him, he has been amazed at how much of his course work was useful in his career with the family agricultural business: growing, processing and marketing a wide variety of crops in the San Joaquin Valley. For the last 30 years the family focused on growing premium grapes and making outstanding wine in Monterey County. In 1980, he began to export premium wine to Japan; he also opened a consulting business in Japan.

'58

Prasert Bhodthipuks, B.S., Forestry; M.S. '60, Forestry, formerly an oil-palm plantation consultant, serves as a national researcher and consultant to teak plantation and mineral companies, and is an importer-exporter of timber and minerals in Bangkok, Thailand.

'65

Stephen Holland, B.S., Forestry, teaches science, physics, logging and forestry career training as well as computers at a high school in Sooke, British Columbia.

Winifred Jebian, B.S., Food Science, and her husband participate in ultrarunning (trails) events. Her husband has finished the Western States 100-miler five times and Angeles Crest once. She is interested in the nutritional aspects of ultrarunning.

'69

Terry Laydon, B.S., Forestry, works in Silver Spring, Maryland as the director of the National Aeronautical Charting Office of the Federal Aviation Administration.

'71

Patricia T. Kelly, Ph.D., Genetics, a medical geneticist with Cancer Risk Assessment in Berkeley, authored the book, *Assess Your True Risk of Breast Cancer*, which was recently reviewed in the *Los Angeles Times*. The book is based on her experience providing to individuals cancer risk assessment based on hereditary and nonhereditary risk factors.

Kristi Wrigley, B.S., Food Science, currently works with the California Department of Transportation in Eureka. A local resident, she is an advocate for cleaner water and has been lobbying Maxxam Corporation to help improve the quality of the Elk River.

'73

Fred Bunnell, Ph.D., Forestry, was named the 2000 winner of the British Columbia Science and Technology Award for "Solutions Through Research". He currently teaches at the University of British Columbia in Vancouver. He was named director of the Centre for Applied Conservation Biology in 1991 and Forest Renewal BC chair in Applied Conservation and Biology in 1996.

Richard S. Colman, M.S., Ph.D. '76, Food and Nutrition Science, is president and founder of the Biomed Corporation, a multi-national scientific organization that conducts research, publishes scientific books and articles, and operates an Internet science-information service. He lives in Orinda.

'75

Jeanne McCreary Hollingsworth, B.S., Forestry, reports that after 15 years in Latin and Central America, 10 of which were spent as a realtor and single mom, she has returned to California and is building a horse ranch and vineyard on 500 acres in the Santa Ynez Valley.

Gregg Manston, B.S., Conservation of Natural Resources, beekeeper, bee remover and insect handler, was recently honored by the Department of Fish and Game and the Lost Hills Utility District of Kern County with the dedication of the "Gregg Manston Conservation Area." The approximately 240-acre site is designed to protect the San Joaquin Valley habitat of several endangered species, including the rare wooly threads, a plant found only in the Kimberlina Sands in Kern County.

'76

Nancy Litterman Howe, B.S., Conservation of Natural Resources, gave up her technical writing position with a Silicon Valley software firm to pursue her hobby of weight training. She became a personal trainer and a professional natural body builder. In April 2000 she won the Western America's Natural ProQualifier in Tucson, Arizona.

Dr. Charles Ian McNeill, B.S., Conservation of Natural Resources, is a senior environmental policy advisor to the Sustainable Energy & Environment Division of the United Nations Development Program in New York.

'77

Daina Apple, B.S., Political Economy of Natural Resources, was inadvertently omitted from the Hilgard Society Honor Roll in the Fall 2000 issue of *Breakthroughs*. Our apologies. She continues to be a consistent supporter of the College and of the Hilgard Society.

Jim Perich-Anderson, B.S., Political Economy of Natural Resources, lives in Seattle where he consults on design and implementation of natural resource conservation programs. Recently he worked on industrial efficiency programs for the federal government and on industrial recycling programs.

'78

David Rector, B.S., Political Economy of Natural Resources, is the director of Interline Services Management at Union Pacific Railroad, where he focuses on improving the reliability of freight interchanges between Union Pacific and other railroads. Union Pacific interchanges almost half of its freight traffic with other railroads.

'79

Fran McPoland, B.S., Conservation of Natural Resources, recently left her position as federal environmental executive and chair of the White House Task Force on Recycling to join GreenOrder.Com as senior vice-president and chief environmental strategist. GreenOrder is a new online resource for institutional suppliers and buyers of environmentally sound products.

'80

Kevin Hackett, Ph.D., Entomology, is currently national program leader for Biological Control and Bees at the U.S. Department of Agriculture, Agricultural Research Services, in Beltsville, Maryland.

'82

Richard H. Allan, B.S., Political Economy of Natural Resources, has been raising a family and practicing environmental and land use law in Portland, Oregon for the past 11 years.

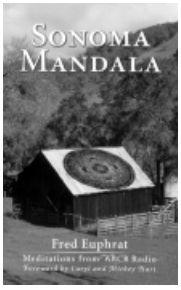
Murray D. Feldman, B.S., Conservation of Natural Resources, was recently selected to head the environmental practice group at Holland & Hart, LLP, in Boise, Idaho. He is vice-president of the University of Idaho College of Natural Resources Alumni Board of Trustees (he received a master's from that university) and recently co-authored *Redefining Critical Habitat for Anadromous Fish in Central Idaho* in the proceedings of the 2000 High Altitude Revegetation Conference at Colorado State University.

Sharon Miller, B.S., Conservation and Resource Studies, returned to the Bay Area from an 18-year hiatus in New York City. She is the CEO of the San Francisco-based Renaissance Entrepreneurship Center, a nonprofit organization that helps entrepreneurs start and grow their own businesses.

'84

Donald Friend, B.S., Conservation of Natural Resources, an assistant professor of geography and director of Earth Science Programs at Minnesota State University, was appointed the United States representative to the International Geographical Union Study Group on Diversity in Mountain Systems. He is also co-founder and chair of the Mountain Geography Specialty Group of the Association of American Geographers. He, his wife Lisa, and two-year-old son Scanlon recently welcomed new daughter and sister, Riley.

'87



Fred Euphrat, M.S., Ph.D. '92, Wildland Resource Science, recently published *Sonoma Mandala*, a collection of his popular "Native Sonoma" radio essays heard each week on KRCB, the National Public Radio affiliate in Santa Rosa. He practices forestry and hydrology in Sonoma County.

Karen Goldsmith, B.S., Conservation of Natural Resources, and her husband, Pete McManus, opened their first chiropractic center in Fayetteville, North Carolina, last fall.

'91

Heidi Melander, B.S., Conservation and Resource Studies, is working at Brown, Vence and Associates of San Francisco, focusing on waste management and environmental education.

Melisa McKim Positeri, B.S., Conservation of Natural Resources, recently moved to northeast Illinois with her husband and three vizslas.

'92

Minli Zhang, Ph.D., Entomology, moved from DuPont Corporation to Merial, a joint venture between Merck and Aventis, in December 1999. A year later, he joined AstraZeneca Pharmacy Corporation.

'93


Hunter O'Reilly

Hunter O'Reilly (formerly known as Gayle D. Hunter), B.S., Plant Genetics, received her Ph.D. in genetics from the University of Wisconsin, Madison, in December 2000. Last year, she received a grant from the Puffin Foundation to reinterpret science as art in her exhibit entitled "Radioactive Biohazzard," which premiered at the Walker's Point Center for the Arts in Milwaukee, Wisconsin, in April of this year. The exhibit will also be shown at the University of Michigan. Her artwork has appeared on seven scientific journal covers. You can read about her science and artwork at www.ArtbyHunter.com.

'95

Sarah Beamish, B.S., Political Economy of Natural Resources, recently received her master's in Environmental Management from Duke University's School of the Environment. She has returned to the Bay Area as a wetland restoration associate at Save the Bay in Oakland.

'96

Deqiao Chen, Ph.D., Entomology, is a database developer for Oracle in Illinois.

'97

Rosalia Mendoza, B.S., Entomology, took a break between her third and fourth year at the University of Washington Medical School to attend the Harvard University School of Public Health where she is an M.P.H. candidate.

'98

Rachel Balsley, B.S., Bioresource Science, provides free technical assistance on waste reduction and recycling to large businesses in her job as a program services specialist with the Alameda County Waste Management Authority and Source Reduction and Recycling Board.

Paul Grogan, Ph.D., Ecosystem Ecology, moved to Copenhagen, Denmark, for a post-doctoral position. In October of 2000, he was appointed as a lecturer in Plant and Ecosystem Ecology at Cranfield University in Bedfordshire, England. There he teaches graduate students as well as continues his research into plant-soil-microbial relationships that control carbon and nutrient cycling belowground.

In Memoriam

Richard Olof Been, Ph.D., Agricultural Economics, 1965, died February 16.

Roy D. Berridge, B.S., Forestry, 1952, died January 6. He retired in 1989 after 35 years as timber and lands manager with Diamond International. A past president of the California Alumni Foresters, he was the only member to serve two terms. A Fellow of the Society of American Foresters, he was chair of the Northern District Technical Advisory Committee to the California State Board of Forestry and a member of the California State Board of Forestry for eight years.

Eugene L. Ely, Jr., B.S., Agricultural Science, 1939, died November 24, 2000. He served as the executive secretary to the president of Northwestern Pacific Railroad.

Adrian W. Ford, B.S., Forestry, 1941, died September 16, 2000.

George P. Georghiou, Ph.D., Entomology, 1960, died November 6, 2000. He was an entomologist at UC Riverside for 35 years, retiring in 1995. The head of the Division of Toxicology and Physiology from 1975 to 1983, he was a consultant for the World Health Organization and received numerous awards for his research on mosquitoes and insect control.

Stephen A. Klein, B.S., Agricultural Science, 1952, died December 17, 2000. He worked for 25 years in UC Berkeley's Sanitary Engineering Department.

Harry Marin Pancoast, B.S., Food & Nutrition Science, 1932, died February 20.

Diana R. Silla, B.S., Nutrition & Food Science, 1984, died October 30, 2000. She was an assistant director of dietetics at Napa State Hospital and also served as a nutritional consultant and clinical dietitian.

Lloyd Wesley Swift, B.S., Agricultural Science, 1927; Ph.D. Forestry, 1930, died February 17. After he retired as director of Wildlife Management of the USDA Forest Service, he served as a consulting biologist for the United Nations. He was awarded the Alumni Citation for Excellence from UC Davis in 2000.

SEPTEMBER 28-30, 2001

Homecoming & Parents Weekend

Calling all alumni, parents, and students:
There's something for everyone, so don't miss out on the fun!

- Cal vs. Washington Football Game
- Faculty Seminars
- Class Reunions
- Bear Affair
- Spirit Rally
- Cal Parents Events
- Campus Tours and Open Houses
- School, College, Alumni, and Student Group Events

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Celebrated Classes:
The War Classes ('45,'46, wartime '47 and '47)
and the classes of '48, '49, '51, '56, '61, '76, '81, '86, '91 and '96

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Or visit our website at www.urel.berkeley.edu/homecoming

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CNR Alumni: Where are you and what are you doing?

The College wants to hear from you.

Many of our alumni and friends have expressed their pleasure in reading the Class Notes column. Please share your news with us by filling out this coupon and sending it to the address below or send us news via electronic mail at: breakthroughs@nature.berkeley.edu. **Photos are welcome!**

NAME

ADDRESS | NEW ADDRESS?

PHONE | EMAIL

YEAR OF GRADUATION | DEGREE | MAJOR

EMPLOYER

OCCUPATION

BUSINESS ADDRESS | BUSINESS PHONE

NEWS

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MAY 17

Water Policy and Resource Management Presentation. Steinbeck Center, Salinas. For more information, call (510) 643-8860.

MAY 20

CNR Commencement. Keynote Speaker: Jack Ward Thomas, Boone and Crockett Professor of Wildlife Conservation, University of Montana. Thomas is former chief of the U.S. Forest Service. 10 a.m. - 12 noon, Chancellor's Esplanade.

JUNE 3–5

Biennial meeting of the International Water Resource Economics Consortium, Girona, Spain. Jointly sponsored by the Center for Sustainable Resource Development (CSRD) and other groups. For more information, call (510) 642-4612.

JULY 4–27

Beahrs ELP summer certificate course in Sustainable Environmental Management. UC Berkeley. For more information, call (510) 642-4612 or visit http://cnr.berkeley.edu/BeahrsELP

JULY 15

Cal Alumni Foresters Annual Picnic. Forestry Summer Camp, Meadow Valley. For more information, call (510) 642-4424.

SEPTEMBER 28

Cal Alumni Foresters Banquet and Annual Meeting. For more information, call (510) 642-4424.

SEPTEMBER 28–30

Homecoming Reunion and Family Weekend. See previous page for more information.

OCTOBER 22–25

The Integrated Hardwood Range Management Program sponsors "Oaks in California's Changing Landscape, the Fifth Symposium on California's Oak Woodlands," at the Bahia Resort Hotel in San Diego. For more information, visit http://danr.ucop.edu/ihrmp/symposium.html