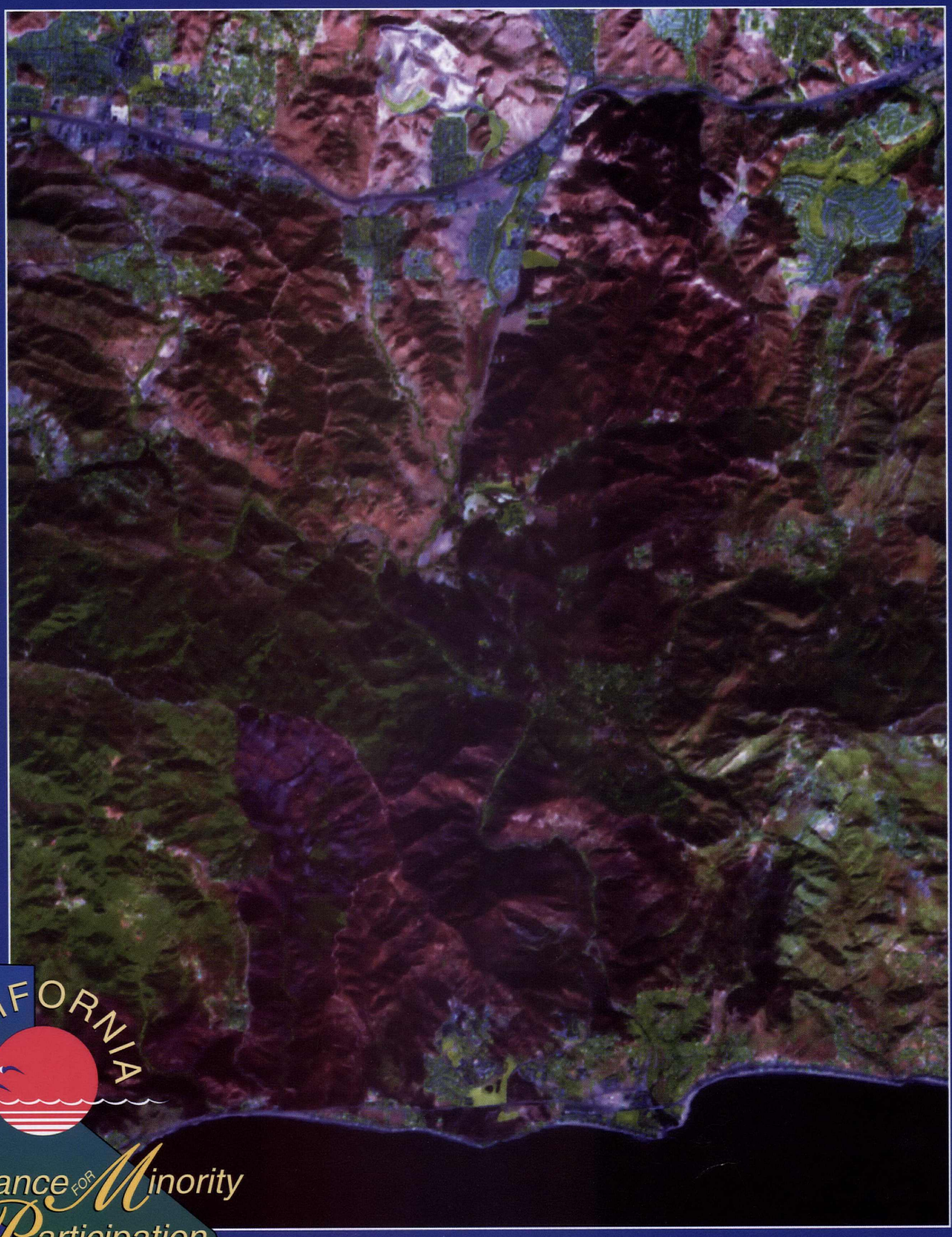
UC SANTA BARBARA RESEARCH



CALIFORNIA

Alliance FOR Minority Participation

In Science, Engineering and Mathematics

QUARTERLY

SPRING 1999

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COVER: UC Santa Barbara Professor of Geography Dar A. Roberts uses remote sensing extensively in his research with study sites ranging from the Amazon Basin to Canada. Here, mapping of the Santa Monica Mountains Calabasas area shows the striking effects of fire on vegetation. The images were collected by an airborne scanner that flies at a height of 20,000 meters. A CAMP funded student has digitized some of the historic vegetation type maps created in the 1930s. In the process he learned how to use Geographic Information Systems. See "CAMP on Fire!" (page 18), written expressly for the Quarterly.

CAMP STATEWIDE

The University of California, Irvine serves as lead campus and administrative center

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CAMP is dedicated to UC undergraduate achievement in science, mathematics, engineering, and technology.

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QUARTERLY

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SPRING 1999 • VOLUME 7 • NUMBER 3

CONTENTS

COLUMNS & DEPARTMENTS

COMING IN FALL 1999 ISSUE

COVERAGE OF THE CAMP STATEWIDE UNDERGRADUATE RESEARCH SYMPOSIUM

UC NEWS

The **Whitaker Foundation** has awarded $3 million to launch a new biomedical engineering program at UCI. The funds will support undergraduates, graduate students and postdoctoral researchers, recruit new faculty and establish core technology development laboratories. The program will capitalize on biophotonics, biomedical nanoscale systems, and biomedical computation. It is anticipated to shape the biomedical field in the 21st century. Orange County is home to more than 150 biomedical device and diagnostic companies which will help to shape UCI's impact on the area's high tech workplace.

The National Association of State Universities and Land-Grant Colleges has appointed a task force to create a greater national awareness about agricultural science and generate funding for agricultural research, education, and extension. **UC Davis Chancellor Larry Vanderhoef** will chair this effort. One goal addresses ways to achieve more effective advocacy between the university food and agriculture community and the decision-makers from the congressional appropriations and science committees.

UC Davis announces graduate school admissions for students supported by CAMP under the auspices of the Mentorships and Opportunities for Research in Engineering (MORE) program: **Javier Garay,** electrical engineering and materials science, admitted to the graduate program at Davis. Garay continues to conduct research with Dr. Zuhair Munir, chemical engineering and materials science. **Jafar Faghih,** civil engineering and materials science, admitted to civil engineering master's programs at UC Irvine, Stanford University, and UC Berkeley. Faghih conducts research with Dr. Munir. **Kofi Inkabi,** civil engineering, admitted to the graduate program at Cornell University. He has been conducting research under Dr. Melvin Ramey, civil and environmental engineering. **Jessie Johnson,** electrical engineering, admitted to the electrical engineering master's degree program at Davis. An excellent student, Johnson has also been an active player on the Cal Aggie football team. **Daniel Leigh-Martinez,** mechanical engineering and materials science, admitted to the mechanical engineering graduate program at Davis. **Sarah Chavez,** computer science, will enroll in the Ph.D. program at Davis. **Derek Newland** and **Nicole Renda,** math, are deciding among offers to several doctoral programs.

UC Riverside **CAMP Regional Director Carlton Bovell,** Professor Emeritus of microbiology, was one of two recipients of the Oliver Johnson Award for Service to the University of California's Academic Senate. The award, offered for the first time this year, was given by the UC Academic Council and is funded by a gift from Oliver Johnson, a professor emeritus of philosophy at UCR and longtime academic senate participant. Bovell was nominated for his highly visible participation on senate committees.

The 8th Annual California Forum for Diversity in Graduate Education, held at California State University, Long Beach, drew 1,150 students from 125 programs—including **CAMP.** The Princeton Review was the main sponsor, providing a $30,000 in-kind donation.

EDITOR'S NOTES

This issue gets its texture and vitality from our exuberant contributing authors. Our cover feature by Professor Dar A. Roberts illustrates the level of applied research being done with students at UC Santa Barbara. Dr. Roberts gives personal insights into what it means to really mentor undergraduates.

We are honored to have the guest editorial by Chancellor Emeritus Karl Pister, who now applies his expertise to renewed outreach endeavors by the University of California Office of the President.

We learn of internship opportunities at the Lawrence Livermore National Laboratory from Science & Technology Education Program director Don Correll, and the new collaboration initiated with Cal State LA through CEA-CREST is outlined by Carlos Robles. Thanks to Betty Isa of UCI, we learn about the dynamic outreach aligned with the American Ceramics Association traveling technology exhibit.

Nobel laureate Glenn T. Seaborg of Berkeley has passed from our lives. His contributions to science are well established, but his gentle demeanor, kindness, and sense of humanity are equally important. Our deepest condolences to his family. I sense the loss of this remarkable soul, and know it reflects the experience of many of us in UC.

On a personal note, I dedicate this issue to two extraordinary people: my parents. My mother, who spread her *joie de vivre* through music, culture and art appreciation, recently passed away. She held a degree in French literature, rather uncommon in Fairbanks, Alaska, and the ambience from that enriched all our lives. My father, a retired mechanical engineer specializing in nuclear engineering, recently suffered a stroke. His service to the U.S. Army Alaska Corps of Engineers gave me a lifetime of productivity to emulate.

Marjorie DeMartini

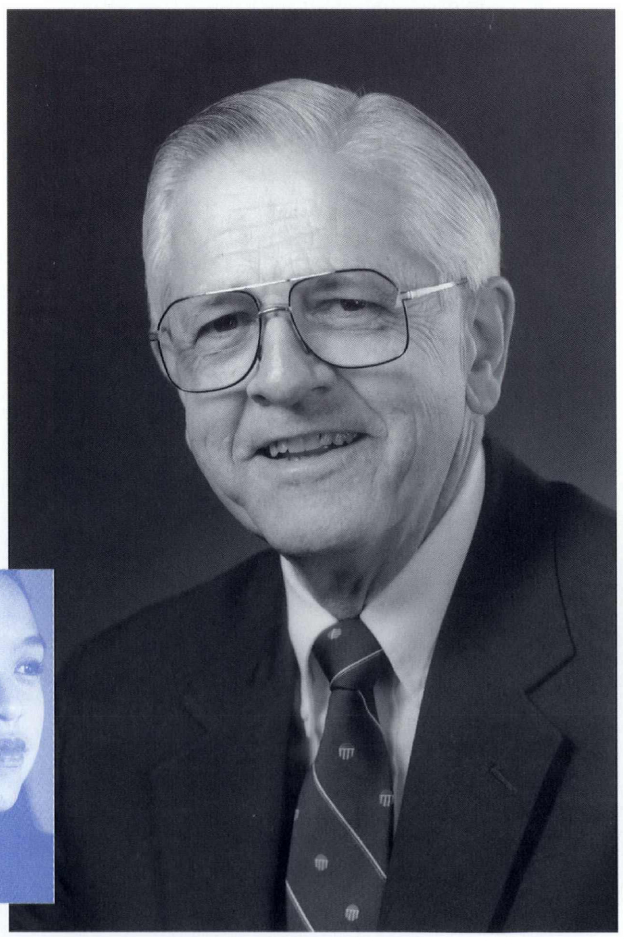
GUEST EDITORIAL
BY KARL PISTER,
CHANCELLOR EMERITUS

UC Outreach: Looking Toward the 21st Century

As we enter the 21st century, it is increasingly important that society make quality education accessible to all students; this is especially true in the areas of science and technology. In his book, *The Business of Science: Winning and Losing in the High-Tech Age,* Simon Ramo argues that the 20th century saw technological advance outpace social advance. He writes, "Even in the United States of America we are not organized—and are not yet even deliberately engaged in organizing—to meet the challenges of the technological society that has so quickly evolved." The role of higher education in addressing these challenges has never before been so critical.

The University of California has recently mounted a major initiative to expand its efforts to attract and graduate a diverse student body. In so doing, the University is also striving to ensure that no group of individuals is excluded from sharing in the benefits of our emerging technological society. It is the responsibility of institutions of higher education to ensure that in the 21st century social advance is coupled with technological advance.

The issues of access and how it is determined (who will be admitted to the University of California) have been under intense scrutiny in recent years. Since 1996, the proportion of African American, Latino, and American Indian students at each stage of the pipeline into the University (from application to admission to enrollment) has decreased every year, even though the proportion of these students among California high school graduates



increased during that period. With the passage of UC Regents Resolution SP-1 in 1995 and Proposition 209 in 1996 (measures eliminating race, ethnicity, and gender from the admissions process), the University is facing new challenges in its efforts to create a student body that reflects the State's population. In response, the UC Regents established an Outreach Task Force to identify ways to assure that the University remains accessible to students of diverse backgrounds.

In its July 1997 report, the Task Force emphasized that students in groups least represented in the University are concentrated in the state's lowest ranking schools as based on a variety of performance indicators while, at the same time, their numbers are increasing in public high school graduating classes. The University views diversity as essential for infusing the academic life of our campuses with a variety of cultural, intellectual, and social perspectives. The Board of Regents voted to support the recommendations of the Task Force to step up the efforts of the University's outreach programs to assist prospective students from low ranking schools to become aware of, and prepared for, the educational opportunities of the University.

Goals include doubling the number of UC-eligible graduates from selected educationally disadvantaged high schools, increasing by 50% the number of graduates from these schools who are competitive for admission to UC's most selective campuses, doubling the number of graduates who have participated in academic development programs like the Early Academic Outreach Program (EAOP), Puente, and the Mathematics, Engineering, Science Achievement (MESA) program. To accomplish these objectives, the Task Force recommended a number of short- and long-term strategies, such as establishing partnerships with at least 50 low-performing high schools and their feeder elementary and middle schools; focusing the work of EAOP, MESA, and Puente in these schools; and significantly expanding efforts to inform students and their parents, teachers, and school counselors about what is necessary to prepare for eligibility for UC admission. The state legislature supported the Regents' decision in 1998-99 by providing $38.5 million in new funding to the University for these efforts, including a requirement that K-12 schools match at least $31 million of the funds.

The University seeks to build upon its land-grant tradition by creating partnerships in communities to mitigate inequities in our educational system. This is not a new idea. Thirty years ago, UC President Emeritus Clark Kerr envisioned an "urban-grant university" that would "have an aggressive approach to the problems of the city" and would make improvements in public schools. Just as the land-grant movement responded to critical "agrarian demands and to problems of national economic expansion," Kerr argued, "so would this urban-grant model address the great national problems of the cities," including poverty, equality of opportunity, and quality of life.

"The University must make special efforts to ensure the success of students once they are on our campuses and to encourage more students to prepare for math- and science-based careers when they graduate. This is where programs like CAMP are making a real difference ..."

With this "urban-grant" model in mind, two key features characterize the primary goal of the University's outreach effort. One feature is the notion of working in collaboration and partnership with K-12 schools. While UC cannot provide all of the solutions, it can assist schools to build capacity to strengthen their academic programs. The second feature is that our partnership efforts focus on the whole school, not just for the few who may become eligible for UC. Our new technological society demands that all high school graduates, not just those bound for college, have strong academic preparation.

However, this effort to improve access to the University is clearly insufficient if we are to make real inroads on the social advances necessary for the technological society.

The ultimate success of our K-12 outreach programs lies in improved graduation rates of all students, since a college degree is the new benchmark for viability in a technological society. The University must make special efforts to ensure the success of students once they are on our campuses and to encourage more students to prepare for math- and science-based careers when they graduate. This is where programs like CAMP are making a real difference by supplying essential components of the University's overall outreach efforts. The CAMP program provides a critical support system to math and science majors once they enroll as UC freshmen. This step is crucial to the success of many undergraduates, particularly those who have faced extraordinary challenges just to get there.

CAMP welcomes those students who choose to enroll at UC and significantly increases the likelihood that they will be successful throughout their rigorous programs in the sciences. In addition, CAMP graduates are more likely to remain in the pipeline and further their education by obtaining an advanced degree or to enter the teaching profession in critical subjects such as math and science. Those students entering the workforce upon graduation will have their resumes strengthened by the internships provided by CAMP corporate partners. Either path will increase minority participation in the sciences and will enable groups that have traditionally been left behind during periods of technological advancement to share in the benefits that our emerging technological society provides.

Ultimately, we will need the commitment and active participation of local, state, and federal governments, community organizations, businesses, colleagues at all levels of education, and individual volunteers from every walk of life. Please consider how you, your business, or your organization can participate in this essential effort. Inform yourself about your local schools, as well as your local institutions of higher education, and the challenges they face. Familiarize yourself with their activities and offer your time and talents wherever you can. By helping our most disadvantaged students reach their full academic potential, we will brighten the future for everyone.

Karl Pister is the Chancellor Emeritus of UC Santa Cruz and former Dean of Engineering at UC Berkeley. He currently oversees UC's educational outreach activities as Senior Associate to UC President Atkinson.

KARL S. PISTER
Chancellor Emeritus, UC Santa Cruz and Roy W. Carlson Professor of Engineering, Emeritus, UC Berkeley

B.S. and M.S. civil engineering, UC Berkeley
Ph.D., theoretical and applied mechanics, University of Illinois at Ubana-Champaign.

Pister joined the Department of Civil Engineering at Berkeley as an assistant professor in 1952 and was promoted to professor in 1962. He was active in undergraduate and graduate teaching and in research in the mechanics of solids and structures. A major focus of his research included identification and characterization of the behavior of engineering materials and optimization-based, interactive computer-aided design of structures subjected to seismic loads.

At Berkeley he was appointed Dean of the College of Engineering in 1980, a position he held for 10 years. From 1985-1990 he was the first holder of the Roy W. Carlson Chair in Engineering.

He was appointed Chancellor of UC Santa Cruz in 1991, and served in that capacity for five years.

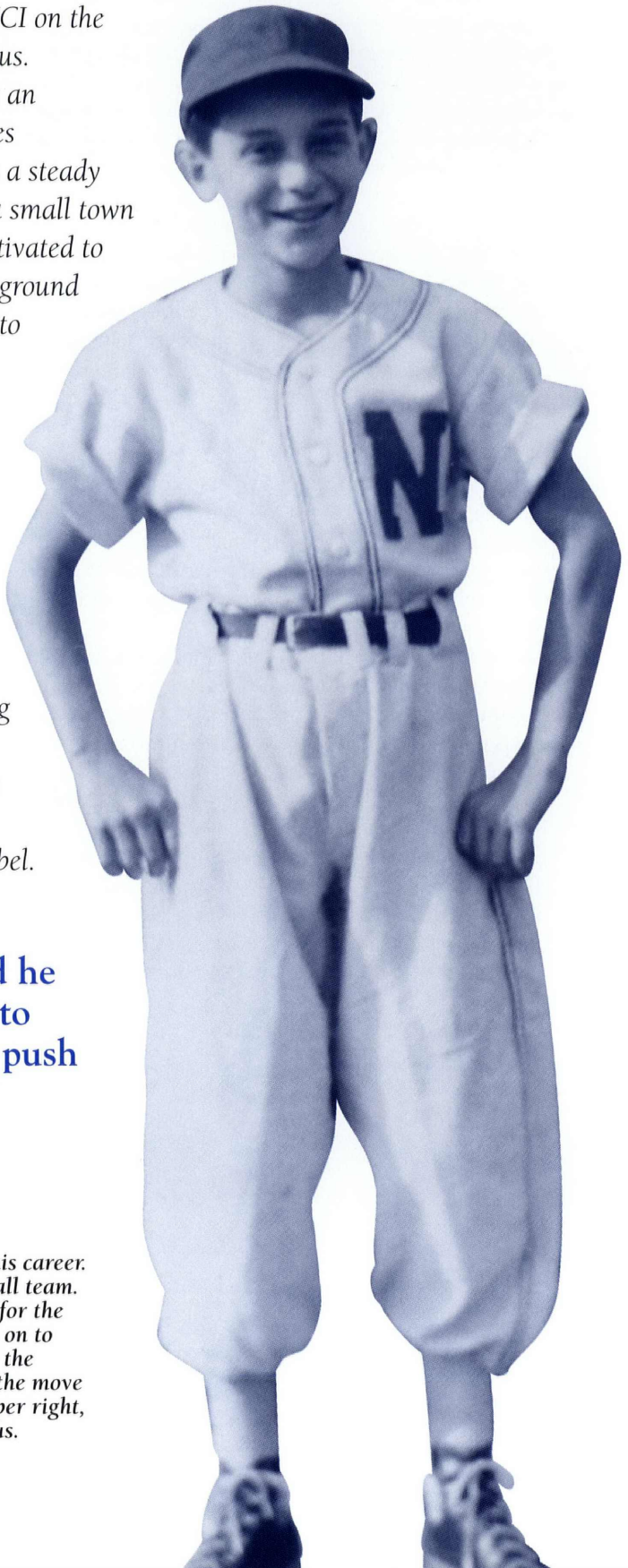
Pister was twice selected as a Fulbright Scholar: Department of Mathematical Physics, University College, Cork, Ireland and the Institute for Statics and Dynamics of Aerospace Structures, University of Stuttgart, Germany. He received the Wason Medal for Research, awarded by the American Concrete Institute. In 1988 the American Society of Engineering Education presented him with the Vincent Bendix Award for Minorities in Engineering and in 1993 the Benjamin Garver Lamme Medal, the highest honor bestowed by the Society for his contributions to engineering education. He also received the distinguished Alumni Award from the Engineering Alumni Society of the College of Engineering, UC Berkeley, as well as the Berkeley Medal. He is a member of several prominent professional societies.

Pister retired from the university on July 1, 1996, after 46 years of service. He currently serves as the senior associate to the president of the University of California, with the mandate to increase the collaboration of the University with K-12 schools in California.

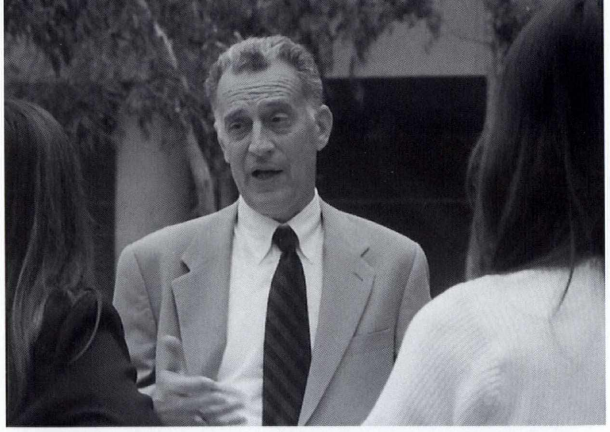
The setting for our interview is the chancellor's spacious office in 501 Administration, with views of the tranquil coastal foothills bordering the University of California, Irvine. It is filled with light and serenity, and reflects the gentle demeanor of its chief occupant, Ralph J. Cicerone, UCI's fourth chancellor, inaugurated May 14, 1999. The calm belies the fire in his belly to put UCI on the map and make it consistently a "first choice" campus.

It's soon clear that Cicerone's background plays an integral role to the energy with which he approaches important issues. To think, all he ever wanted was a steady job "not subject to layoffs all the time." Raised in a small town dependent upon mill contracts, he was initially motivated to attend college to get a good job. From his training ground at MIT to the Scripps Institution of Oceanography to the National Center for Atmospheric Research in Boulder, Colorado, where he was director of the Atmospheric Chemistry Division, to founding the Geoscience Department at UCI (now Earth System Science— #1 in the nation in geoscience research impact), and his appointment as chancellor, he is an All-American hero. The icing on the cake is his selection to receive the Franklin Institute's Bower Award and Prize in Science for his fundamental contributions to our understanding of greenhouse gases and the depletion of the ozone layer, as well as leading public policy to protect the global environment. The Bower Prize, an international competition, is second only to the Nobel.

Chancellor Cicerone loves his work, and he wants undergraduates to feel the same—to have a passion for their area of study, to push themselves, to go where knowledge ends and new questions begin.



Ralph Cicerone's love of baseball almost turned the tide of his career. In college, he was the pitcher and captain of the MIT baseball team. Later, he was a finalist for the position of sports announcer for the San Diego Padres, but decided to stay in science—and went on to become Director of the Atmospheric Chemistry Division for the National Center for Atmospheric Research, and then made the move to UCI. Here he is shown in his Little League uniform. Upper right, Cicerone talks to students about issues impacting the campus.



CAMP QUARTERLY

INTERVIEW WITH Ralph J. Cicerone

By Marjorie DeMartino

Looking back, during your childhood, had you some early experiences that turned your attention to science?

I remember when I was five or six years old, and my father bought me a magnet, a large horseshoe-shaped magnet. It was so strong I could pick up things almost at a distance. But I got worried that the more I used it, that it would run out of magnetism. And I asked my father if it could be recharged, and of course that isn't the way things work, but he thought that certain magnets could be recharged. One time, when my mother was upstairs and nobody else was home, I was down in the basement, and I climbed up on a table. There was an overhead light, with a lightbulb in it. I unscrewed the bulb and stuck this magnet in it and it blew all the fuses in the house and knocked me unconscious. But I had been watching the men work on the powerlines outside our house, and they always wore rubber gloves, so I had put on a pair of my mother's rubber gloves for doing the laundry. If I hadn't done that, I probably would have been killed. The magnet ended up with etch marks where the current had gone through it. Other than that, I didn't do a lot of science experiments. I spent all my time in sports.

Before becoming a scientist, it's well known that you were an athlete. What values or characteristics helped you to transfer your focus from sports—baseball—to academics?

Being a competitive athlete was good for me, probably not so much for academic pursuits, but more for life lessons. Self discipline and conditioning and teamwork—all of the things you hear about are true—also self confidence. Team sports obviously require a different mentality and provide different lessons. I was fortunate to play in both team and individual sports and learn from them. I don't think it was particularly relevant to academics but very relevant to daily life.

MIT transformed you. What was the biggest hurdle you faced as an undergraduate and what pulled you through the intense competition?

The pressure to succeed. The biggest force was knowing that I had to make good of the opportunity. Nobody from that [Pennsylvania] town had gone to MIT in over 30 years. I knew it was costing a lot of money—all the money my parents could possibly afford, plus all of my part time jobs, loans, and scholarships. The biggest barrier was that I never learned how to study. I went to public schools, all the way through twelfth grade. We weren't asked to do too much. There was an occasional good teacher of course, but I came to believe that I could understand everything the first time through. When I went away to college, it was another world. Studying for courses at MIT, I began to see differences in people who were doing well. Even the smartest had to go through things two or three times, test their understanding, work homework problems, and talk about solutions with other students. I realized the better students would start on an assignment in advance. They would sleep on it, make a little more progress, and after five days they'd get pretty far. That was about the time I started, thinking I was supposed to do it all like (snap!) that. Because that's what I had learned in high school. Now I tell students to gauge themselves. For

Cicerone welcomes Early Academic Outreach Program students to campus for a day at UCI.

example, when you have to write a term paper—that's when you find out if you really understand a subject, when you have to write about it. Learning when one has a shallow understanding of something is an important experience. I didn't learn that until after two years at MIT.

You have previously talked about the impact the Cold War had on you, and the motivation instilled in the American public when Sputnik was launched. How did the Cold War era influence and shape your eventual decision to major in science?

In the post-Sputnik years, there was real concern about the stability and safety of the United States. We felt that we were on the verge of a nuclear war. When the Russians launched Sputnik, it had an immediate impact, especially on those of us in school. I was in the 8th or 9th grade, and anyone who had shown any talent in science or math was given incentives, and also pressure, to go into science or engineering. This was also seen to be a way to get a job. There's this quote from George Bernard Shaw: "My father was a coal miner so I could be an engineer so my son could be a poet." I was of the generation where no one had ever gone to college in my family, a large extended family. Growing up like I did, in a part of Pennsylvania that was very dependent upon steel mills and coal mines, everyone who worked—men and women—were totally dependent upon the economic cycle and the contracts at the plant. They would be laid off from time to time, fired any time in life. The ticket out was a college education. The most elite professions at the time were to be a doctor or a lawyer or an engineer. So the motivation I had for college post-Sputnik was a way to get a steady job not subject to lay-offs all the time.

If there were a boot camp for newly appointed chancellors what would it be like?

I saw a great poster that says: "This life is a test. This life is only a test. If this life had been your real life you would have been given better instructions." There are no manuals for many jobs in life. There aren't courses we can take in college or extension courses that prepare one fully. In fact I don't like the modern system where we write a job description for everything we do. Actually, I find that demeaning. If I tried to write a job description for you, and that's all you were supposed to do, that means you are not supposed to use your intelligence to figure out what else needs to be done. So I like to think it's a better society if all of us help to define the jobs. Unless of course you're running a nuclear reactor, then I would want you to follow the manual. But that's because that particular job has been built up by trial and error.

So you would tell a new chancellor—

Follow your instincts. I think the first lesson would be on how many people feel that they own this university, and how many feel they have a stake in it. It's hard to do anything without understanding who you are going to help and who you are going to hurt. Because almost anything we do is going to hurt someone's feelings or shortchange someone else. If you look at the total cost of running this campus, including the medical school and the hospital, the state pays about 25% of the bills. Yet if you talk to the legislators, many think they own the University of California. In a sense they do. If you talk to the parents of students, they think their taxes pay for the university, and they are partly right. Then we have the students themselves, and the faculty, and the administration. The Regents, of course, have responsibilities. Universities have become very important in the way people advance themselves. The lifetime earnings of a college graduate are so much higher than people without college degrees. And because the university has become such a valuable resource, everyone thinks they own it. An indication is all the public attention given to UC admission. Now everyone wants to prescribe how to admit students and who should be admitted.

How will the governor's new "top 4%" admission policy affect UCI?

I don't think it will impact UCI very much, but I do think it's a very good idea. The formal title is something like "excellence in the local context," which means those that excel in the top 4% locally will be UC eligible. It sends a great message to every part of the state, regardless of what high school, whether it's rural or urban, and especially poor schools, that you can make it to UC. I like the message itself. You have to be motivated to finish in the top 4%. It will give us one of the kinds of diversity that we want.

What has been the greatest surprise so far in your chancellorship? Is there something you didn't anticipate?

I think how fast the campus is changing. The rate of change. How tough it's become to be admitted to UCI. How much research activity is going on, and the pace of it. It's faster than I expected—I'm really happy. The interest shown in UCI. We have a lot more people from the community learning about our programs and coming to listen to our students, coming to evening performances in the arts, and lectures, and even sporting events. And it's also happening fast. A lot of people who have lived here for many years didn't pay much attention to UCI, and they're starting to. It's what a great university should be doing—having a lot more interaction with the surrounding community. When we get a winning basketball team, it'll get even stronger.

Your responsibilities touch every aspect of university life; you are very active politically. Where do you see your most critical contribution to UCI?

This first few months, I'm trying to jump into everything, and I'm trying to sort things out. By testing the waters I'm finding out what it is that I can accomplish here and there, and which of these other important roles somebody else can do as well as or better than I can. For the most part, where I can do best for UCI is out there in the community raising money for new buildings, for scholarships, getting to know corporations who want to recruit our students. They expect the chancellor to be doing those things—defending us, advancing our interests to the legislature and the Regents, and around the country. What's interesting is that they expect me to appear every time a vending machine doesn't work. And I'm asked to greet visitors, which I try to as much as possible, because there should be an official welcome to many groups from the highest level possible.

What aspects of your vision for UCI would you like to share?

I would like the campus to be more of a first choice campus for students. This is happening now. We are having a higher fraction of the students who matriculate here saying UCI is my first choice. But it's not as high as I'd like. It actually affects the mood on campus too. What goes in to doing this at a time of growth is a lot of detail. We have to do everything we can to make the campus a more lively, interesting place. Together we are doing some of these things now. With the student-faculty ratio at 18:1, every time we grow 1,800 students, we need a hundred more faculty. So I have to put a lot of work into the details to get it right: the quality of life on campus, the interesting things that go on between classes, after classes, on weekends. An example of that is the new student recreation center that we will open in late 1999. Eventually, new student dormitories will be built surrounding that rec center, out on east campus. If we want the campus to be livelier, higher quality, more attractive, more selective, all of these things contribute: the facilities, the faculty, the enrichment programs. Then in turn these attract the employers who come to interview students. The reputation of the campus will then attract more scholarship donations. One aspect is that, to become more selective and play in the big leagues, the competition is tougher. As we move up into the ranks of the most highly qualified students, we find they have other choices. Our campus tours have to be done well. They can't be a perfunctory performance. Our web sites have to be first rate. We have to get our admissions and financial aid offers out in a quick and classy way. It's the same with recruiting faculty; we find ourselves in competition for prospective faculty members from around the country who have other offers. Suddenly, as UCI becomes more and more competitive with the other top universities, the pace of everything picks up—and I love it. But it carries with it so many details. For example, we have to expand our program offerings. One of the new programs that will help is the biomedical engineering program that's going to be headquartered in the School of Engineering, but with the medical school participating along with biological sciences. The interdisciplinary approach seems to be the way things are going.

"The biggest barrier was that I never learned how to study. . . . Studying for courses at MIT, I began to see differences. . . . Even the smartest [students] had to go through things two or three times, test their understanding, work homework problems, and talk about solutions . . . "

What do today's undergraduates need most?

Probably two things. The first is to find out what they're really interested in, what they're good at. And that's one of the traditional reasons for going to college—to suddenly be put up against those who are really good at something. Sixteen- and seventeen-year-old high school seniors have some idea of what they enjoy, what they may be good at, but the college experience can either change that or make it more real, more full. The need is to test oneself against the competition, to find out what it takes to succeed. What does it take to really understand a foreign language and be facile with it; to understand literature. Secondly, what all students need is to be pushed and understand what it means to go into something deeply. To understand something at the level where knowledge stops, and get into original questions. That is what we are supposed to do with our undergraduates: get them right up to the point where they participate in research—and many of them do, through CAMP and other avenues. The idea is to ask questions which haven't been answered yet . . . it could be an interpretation of something in literature, an engineering device, a biological experiment. To understand what it takes to get to that point requires the student to push himself and to enjoy it. While technology tells us that computer skills are needed, I'm more concerned about basic skills in reading, writing, and mathematics. Students need to work on their reading and writing skills. They have more opportunities for acquiring computer skills, and fewer opportunities to learn how to read and write and do mathematical calculations well.

How is UCI attracting more talented and highly competitive undergraduates?

Probably the biggest single reason is that there are more students in the first place. The number of high school students graduating is increasing. The statistics for the next ten years are scary. We have 150,000 students or so in UC. Ten years from now we will have 210,000, so we have to find room for 60,000 more. What's amazing is we cannot meet the demand even if we fill up Irvine to its LRDP, (Long Range Development Plan). That document's important because we need the approval of local authorities, cities and counties to increase total maximum enrollment. If Irvine goes up to its limit, which is 26,000 and some, and San Diego and Riverside go to their limits, and if Merced opens and has 5,000 students, which is unlikely to happen that fast, and if all the other UCs reach their limit, we will still be unable to meet the demand. . . . One reason we are getting so many more applicants is that there are so many more high school kids today.

The population dynamics and demographics in California constantly make the news. How will UCI and its sister campuses be able to serve this burgeoning population?

Irvine, San Diego and Riverside are going to have to grow the fastest. In a sense we are getting more selective, and it's hard to turn down those students who come in with higher and higher gpas, SAT scores, and you name it. At Irvine this year we have a record number of applicants. We rejected 9,000 applications; 6,000 were UC qualified; that is, they finished in the top 12-1/2% and their grade point average was above the minimum. On the one hand, the UC campus has generally more motivated and maybe even brighter students than in some previous years, but on the other hand we are not providing places for a lot of qualified students. Those numbers assume that the community colleges and CSU will still take far more students than UC. We are only talking about the fraction that usually go to UC. Here at UCI, for

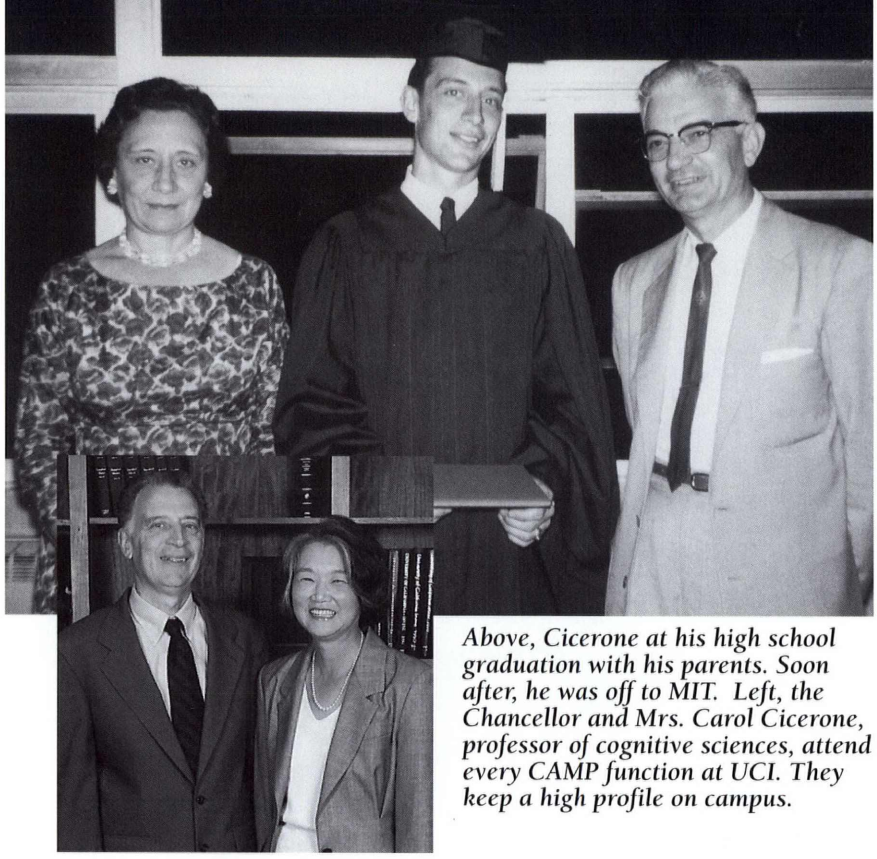
One of the richest and most prestigious American awards in science, the Bower recognizes Cicerone's public policy leadership in protecting the global environment.

The Bower Awards of the Franklin Institute

The long, distinguished history of The Franklin Institute Awards Program dates back to 1824, when the Institute was founded by a group of leading Philadelphians to train artisans and mechanics in the fundamentals of science.

The list of Franklin Institute laureates reads like a "Who's Who" in the history of science, including Alexander Graham Bell, Pierre and Marie Curie, and Rudolf Diesel, who received Cresson Medals at the beginning of this century; as well as Thomas Edison, Niels Bohr, Max Planck, Albert Einstein and Stephen Hawking, who received the equally prestigious Franklin Medal.

Through the years other medals have been established. Two of the newest awards were made possible in 1988 by a $7.5 million bequest by Philadelphia chemical manufacturer Henry Bower. Both awards carry gold medallions, and the Science Award carries a cash prize of at least $250,000, making it one of the richest American prizes in science.



Above, Cicerone at his high school graduation with his parents. Soon after, he was off to MIT. Left, the Chancellor and Mrs. Carol Cicerone, professor of cognitive sciences, attend every CAMP function at UCI. They keep a high profile on campus.

example, we have about 4,500 applications for 92 spots in the medical school. Two years ago, the major that gave an undergraduate the best edge was physics. When I was a student, it was English.

Are there other ways we can accommodate more students?

We may have to have more intensive summer sessions, and by intensive, I mean more students. This is what the state is telling us, so that we won't have to build as many buildings—to use the summer more. Well, what about the students who work in summer? That's almost everybody. What about the outreach programs we have on campus in summer? I've been telling the legislators as politely as I can, but as strongly as I can, do you really want us to kick out our outreach programs? We can increase our enrollments, but what happens to a student who goes to school full time in summer? Chances are they're going to have to work during the fall, winter or spring quarters, because they need the income. Our students generally are working many hours per week. We are getting pressure to have a fully enrolled summer session. But I don't see anyone graduating in three years by going four quarters a year.

What will the new research park ultimately mean to the campus?

It will help more on quality than on numbers. When we talked to students and their families several weeks ago, they were excited about the research park, because they see that as a way students can get part time jobs and connect to companies that might employ them after graduation. And that's already started to happen. Given that many of our students have to work while they're in college, getting nearby part-time jobs related to their majors will be helpful.

You have been selected, out of all the national and international candidates, to receive the Bower Award and Prize for Achievement in Science. How important is this award to you?

I haven't quite gotten used to it yet. Because this is a really big prize. If you look at the list of previous winners from the Franklin Institute, it's pretty inspiring: Einstein, Edison, Marie Curie. There will be a big ceremony at the end of April. My family will be there. It's good for the campus. Several people have said if I were going to win the prize, it's more advantageous having won it after my appointment as chancellor. It gives the campus more visibility. The prize was awarded to the Astronomer Royal of England last year, so it's an international prize. What's interesting is that a lot of people back in Philadelphia putting together the ceremony never heard of Irvine, California. Sherry Rowland is going too. We are giving a symposium together, so that will add more recognition for Irvine.

Are you managing to stay connected to your research?

It's taken forbearance from my students. They have to deal with me when I'm there, and e-mail in between because I'm not there as much as I used to be. But it's working. I have some great students.

You have so much to do and you burn the candle at both ends. How do you keep your life in balance?

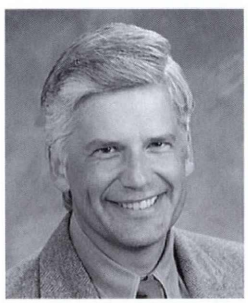
Well, I like to burn the candle at both ends. It's exactly what I like doing. You have to plunge into it, and your priorities do change. But I'm very committed.

If you could project yourself ten years into the future, what will you be doing?

There's no way I'll be doing *this* job in ten years. It takes too much energy. . . It depends on what my daughter is doing, and my wife Carol, of course. We have a new puppy, who will be ten years older, and maybe slowed down by then. I'd like to run a private philanthropic foundation. That will also be hard work. I'd like to travel and learn a new language. Right now, I don't have enough time to travel. I'd like to play golf. Some day when I have more time I'll realize what I've missed, but I have a lot of energy. I'm blessed with good health. I love what I'm doing.

NEW SYNERGY WITH CAMP AND NSF
Center of Research Excellence in Science and Technology

CEA-CREST: CATCHING THE WAVE OF GRADUATE PREPARATION



By Carlos Robles

Multidisciplinary investigations into society's environmental problems are among the most exciting scientific endeavors of our time. CEA-CREST (pronounced "sea-crest"), the Center for Environmental Analysis, employs graduate and undergraduate students in integrated research teams tackling key environmental questions. Participants praise it as a superb educational experience. The Center offers a pathway to careers that are financially secure, intellectually stimulating, and socially constructive.

My close association with the UC system began as an undergrad at UC Santa Barbara and developed as a doctoral student at UC Berkeley. Later, as a young faculty member at Cal State L.A., I took up my equity education collaboration with Elma Gonzalez, UCLA professor of biology. From this came the natural extension to UC Irvine and CAMP. Proximity of the campuses to each other is, of course, of vital importance in any genuine cooperative venture, and CEA-CREST is no exception.

Teams of senior scientists from biology, chemistry, and geography advise student collaborators in five areas of emphasis: natural and altered dynamics of intertidal marine communities (my particular specialization); ecophysiology and fire ecology of evergreen-dominated ecosystems; chemistry of air pollu-

tion and its impact on neighborhoods; the application of molecular techniques to population studies; and environmental equity. Because these areas are interdisciplinary, each addresses a wide range of interests and student backgrounds. For example, my component, which seems to deal only with benthic ecology, in fact treats aspects of behavioral ecology, biophysics, statistics, Geographic Information Systems, and computer modeling.

The major goal of the NSF-CREST initiative is to develop outstanding research centers which will produce new knowledge and increase the number of underrepresented minorities with Ph.Ds.

At our April, 1999 Advisory Board meeting, Cal State L.A. President James Rosser spoke for all of us when he said, "We aim to make CEA-CREST a national model." He elaborated on how the program will create "vertical mobility opportunities" for our students. Dr. Ted Crovello, Dean of Graduate Studies and Research, who serves with Dr. Rosser on the Executive Committee, added, "The excitement of CEA is the energy that our faculty bring to it."

New collaboration at UCI and at UC Santa Barbara will expand our ability to recruit from talented undergraduates who would be eligible for the Bridges to the Ph.D. Program. While working toward a master's at Cal State L.A., selected students receive guidance from both their on-campus advisors and faculty from the University of California. Upon successful completion of the master's thesis and with the recommendation of their advisors, students may continue in a Ph.D. program at a regional UC campus with full financial support.

On campus facilities at Cal State L.A. include a molecular genetics complex, marine aquatics laboratory, atomic absorption spectrometer, computer workstation laboratories, greenhouses, machine shops, and the laboratories of the Center for Spatial Analysis and Remote Sensing. The computer facilities are linked with the laboratories of the individual CEA-CREST research teams by the campus-wide system of fiber optics and high speed servers.

Field studies take place at diverse locations, including those of the Southern California Ocean Studies Institute, the Santa Monica Mountains, the California Desert Studies Consortium, and the field stations of other universities.

Ongoing collaborations with UCI faculty members, Barbara Finlayson-Pitts, chemistry, and Sue Trumbore, earth system sciences, support this effort. Co-mentoring of students by CSU, UCSB and UCI faculty ensures continuity of advisement. To learn more, e-mail ceacrest@calstatela.edu

Interdisciplinary Areas of Emphasis:

1 ***Simulating marine population dynamics:*** *testing with field data spatially explicit simulation models of the recruitment, growth, and survival of species of the rocky shore community. Faculty mentors: Dr. Robert Desharnais, professor of biology and microbiology; Dr. Hong-lie Qiu, assistant professor of geography and urban analysis; Dr. Carlos Robles, professor of biology and microbiology (director, CEA-CREST).*

2 ***Monitoring changing ecosystems with remote sensing:*** *interplay of community composition and ecosystem productivity under varying fire disturbance regimes in evergreen California shrub lands. Faculty mentors: Dr. John Gamon, associate professor biology and microbiology; Dr. Hong-lie Qiu. (Gamon's work utilizes data sets generated by Dar Roberts, whose feature on the Calabasas fire appears on page 18.)*

3 ***Fine-scale analysis of airborne pollutants and population exposure:*** *spatial and temporal variations of important air pollutants at the neighborhood scale and the pollutant exposures of minority/disadvantaged populations within the Los Angeles Basin. Faculty mentors: Dr. Scott Nickolaisen, assistant professor of chemistry and biochemistry; Dr. Feimeng Zhou, assistant professor of chemistry and biochemistry; Dr. Steve LaDochy, associate professor of geography and urban analysis; Dr. Ali Modarres, professor of geography and urban analysis.*

4 ***Molecular applications thrust area:*** *use of DNA sequencing and other molecular techniques to understand the evolutionary relationships and population processes of marine organisms. Faculty mentor: Dr. Elizabeth Torres, assistant professor of biology and microbiology.*

5 ***Environmental equity:*** *issues of water relations, water pollution and air pollution, social and political costs of environmental degradation. Faculty mentor: Dr. Barry Hibbs, assistant professor of geology.*

UCLA Student Honored by Congress

Ernesto Vera pursues research excellence

Electrical engineering major Ernesto Vera created a sensation when he was awarded a certificate from the U.S. House of Representatives for "Exceptional Commitment to Research Excellence" presented by Congressman James Rogan. As part of his recognition ceremony, he received a United States flag. The award recognizes Vera's work on semiconductors.

"Ernesto is one of our top CAMP students here at UCLA," said Dr. Richard L. Weiss, professor of chemistry and biochemistry. Weiss emphasized, "Through his enthusiasm, commitment, and talent for research, Ernesto clearly is deserving of any award that comes his way."

Professor A.V. Balakrishnan serves as his mentor. Vera thanks the CARE Center (Center for Academic and Research Excellence) at UCLA, directed by Weiss, for "allowing me the opportunity to work towards the award in the first place."

Vera is currently pursuing a new experiment. He says, "Computer simulations are becoming used more and more in solid state electronics. I have learned about the devices tested, and hopefully soon I will run my own simulations."

Vera has participated in the Cal Tech Minority Undergraduate Research Fellowship Summer Program and CARE Scholars Research Program. Membership in the Institute of Electrical and Electronic Engineers and Society of Latino Engineers and Scientists has expanded his professional development opportunities. He also participates in the CARE Mentor Program.

Future plans include a Ph.D. in electrical engineering, with a specialization in controls. Vera attended the Don Bosco Technical Institute in Rosemead, CA before enrolling at UCLA, and resides in South Pasadena.

Ernesto Vera is a 1999 CAMP Statewide Research Symposium award winner

"Through his enthusiasm, commitment, and talent for research, Ernesto clearly is deserving of any award that comes his way."
—Professor Richard L. Weiss

RESEARCH SUMMARY:

Real-Time Digital Signal Processing Using Modular Control Patch

In the field of flight control systems, signal processing and turbulence estimation are key. With the use of a micro-controller developed by TRW, the development of new techniques for acquiring flight data are on the horizon. Ideally, we plan to use the micro-controller to process input signals from a flight environment, with the ultimate goal of developing a new control system. We would also like to acquire data in real time. In order to do this, algorithms written in a C-based program will be used to program the controller so that it can process the input signals. We hope to use the results of this experiment in applications to aeroelastic control as well.

UC RIVERSIDE'S

LaKrecia Sanders

MATHEMATICS IS STRENGTH AND INSPIRATION

I was born in Los Angeles, but have lived most of my life in Moreno Valley. I have a sister, Brandi, who will be attending UCR in Fall 1999. Both of my parents work on campus. My father is a computing resource manager, and my mother is an administrative assistant at the University Extension Center. In my senior year of high school, I participated in the high school university program which was a tremendous help. I was able to attend UCR for a year, taking one class each quarter.

My major is pure mathematics. Initially, I majored in computer science, but I decided to pursue my interest in mathematics, which has always been my strength and remains my passion. I volunteer as a tutor at the Riverside Public Library, and for the Early Academic Outreach Program, which motivates disadvantaged high school students to attend a four-year college or university. I tutor in algebra, geometry, trigonometry, and calculus, which makes me feel capable of sharing everything I have learned with others. I am also a peer counselor for freshman math and engineering majors.

For the past three years, my summers have centered around involvement in CAMP. I participated in the summer transition program in 1995, when I resided in the dormitories at UCR and took a math class. This five-week program helped me develop friendships as well as adjust to college life. Within two years I became the study group leader for pre-calculus. For summer 1998, I completed a research program at the University of Colorado, Boulder, in the Applied Mathematics Department on wavelets in computer graphics.

My long-term career goal is to become a math education counselor. I've come to find that students at all levels have encountered obstacles in mathematics. I would like to be the one to help relieve this anxiety by finding out what makes mathematics so challenging.

LaKrecia Sanders is a 1999 CAMP Statewide Research Symposium award winner

All my goals are being accomplished one by one. I always wanted to go to college, motivated by the fact that I was the only one of thirteen grandchildren who graduated from high school. My parents continue to push me to excel, and I intend to be the first in my family to receive a college degree.

ABSTRACT

Wavelets provide a useful mathematical tool for hierarchically decomposing functions and data in a way that is efficient (Stollnitz, DeRose and Salesin 1996). Wavelets are utilized in different fields such as medicine, where wavelets can improve the detection of cancerous tumors from the images of the body. Wavelets have recently been applied to computer graphics problems. Computer graphics entails image editing, compression, decomposition and reconstruction. However, before wavelet transformations were used, there were Fourier transformations. The Fourier transformation consists of cosine and sine integrals that can give an accurate image, but at great cost. The disadvantage of this transformation is the sudden breaks between line segments (Strang 1994). The segments should be continuous, not scattered (Strang 1994). Wavelets help us with this disadvantage by having continuous starting and ending points. The goal of our research this summer is to investigate an efficient and fast way to restore, decompose and edit images. We have studied Haar and Daubechies wavelets to obtain a greater understanding of wavelets and their applications to data and image analysis.

"All my goals are being accomplished one by one."

Science Education in the National Interest

BY DONALD L. CORRELL, JR.
Director, Science & Technology Education Program
Lawrence Livermore National Laboratory

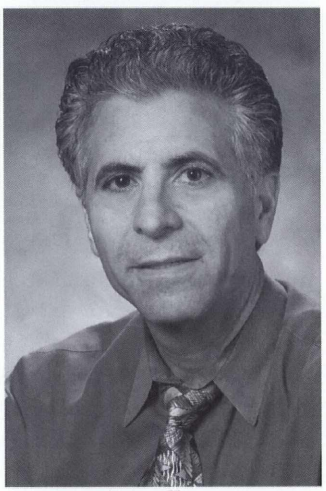
Lawrence Livermore National Laboratory's commitment to science education finds its roots in the close relationship between Livermore Laboratory and the University of California, and in the realization that the leading edge research conducted at the Lab requires the development of skills that are not always readily available from academia. One of my goals when I became Director of the Science & Technology Education Program in May 1998 was to expand our education activities to help ensure a highly skilled, diverse laboratory workforce. This goal is being accomplished in part by engaging students as research interns in the Lab's mission-based, science programs with access to our state-of-the-art facilities.

It has also become apparent that the decline in students enrolling in undergraduate majors of interest to Livermore Lab, such as physics, requires additional components be added to our education activities. As reported by American Institute of Physics (AIP Enrollments and Degrees Report, January 1998), with respect to U.S. students, the number B.S. degrees in physics has declined for the past seven years, leading to a 17% reduction. The negative slope in the number of degrees is not anticipated to change over the next few years.

Thus a decision was made to increase career counseling by researchers in our existing internships. A new education-research-counseling theme (see figure 1) was developed for our science education projects involving pre-college, undergraduate, and graduate students, with an emphasis on undergraduates attending four-year colleges and universities. The 'road-map' of figure 1 attempts to help students answer the question "what is the path that must be chosen to enter a challenging and rewarding career within science, mathematics, engineering, and technology disciplines?" Certainly the skills and training a research intern acquires are common factors to success in undergraduate curricula, graduate school, and technical careers.

Our experience at Livermore Lab mirrors that of our education and research colleagues at other institutions—career counseling combined with internships effectively increases the number of students entering scientific careers. Being involved in world-class research provides interns with a set of experiences that support their education and career goals. At the same time, it is a proven method for attracting students to the lab's mission-based science and technology. We offer numerous internships to undergraduate and graduate students that provide opportunities to become part of a professional team.

The Undergraduate Research Semester (URS) is one of our programs with all of the above education-research-counseling components. The URS is available at each of the three Department of Energy, Defense Programs National Laboratories: Lawrence Livermore, Los Alamos, and Sandia. Interns work with mentors or scientific teams engaged in long-range, multi-discipline investigations. Appointments are usually for one semester or 17 weeks during the academic year. Students participate in seminars, workshops, and coursework designed to supplement the research experience and to help them address their questions about technical careers. Selection is based on academic references and merit, career goals, and availability. Research opportunities are available in such mission-based topics as electro-optics, large-scale computing and environmental protection. Figure 2 shows three former Livermore Lab URS interns, from top to bottom: Thomas Hall, Edgar Harding, and Anabel Miranda.



Dr. Don Correll

Hall worked in the operations engineering group of the National Ignition Facility laser construction project at Livermore Lab. He presently is working as an employee in the optics assembly areas of that facility. He will attend graduate school in fall 1999 working on a M.S. in robotics/controls.

Harding did research on earthquakes and the San Francisco Bay Bridge. He recently earned a B.S. in civil engineering at Mississippi State University. His internship at Livermore Lab connected him with a UC Berkeley professor who offered an opportunity for graduate research.

Miranda worked on the effects of bacteria to the overall corrosion rates of waste packages that could potentially be deposited for long-term storage at Yucca Mountain, Nevada.

She has accepted another internship at the Lab while waiting to start graduate school in fall 1999 for doctoral studies in immunology and genetics.

These students are a recent representative sample of the 132 URS interns that spent a semester of their undergraduate education at Livermore Lab, 1995 through 1998. Of these interns, 30% pursued graduate school, 50% returned as summer employees, and more than 5% became career lab employees.

The banner for Livermore Lab's web home page (www.llnl.gov) reads "Science in the National Interest," which succinctly describes how the Lab's research is focused on issues of national importance. The Science & Technology Education Program's activities are described on our home page (education.llnl.gov) under a parallel banner "Science Education in the National Interest." If students can be part of the Lab's scientific inquiry, then they will have direct experience in "science in the national interest."

I invite CAMP participants to visit our web sites and consider whether a research internship might support your ultimate educational and career goals.

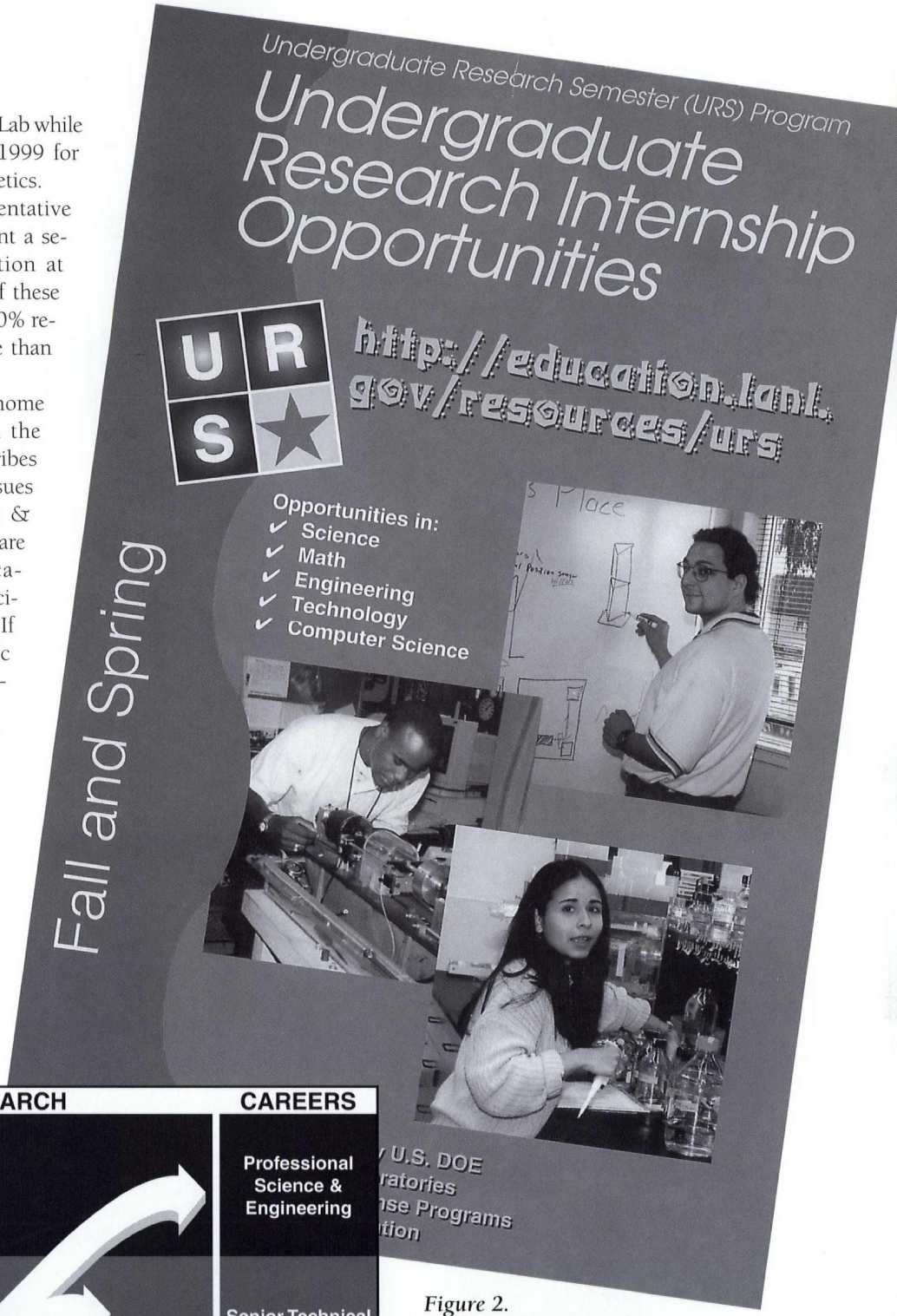


Figure 1. A common theme of Livermore Lab's science education projects is the integration of education, research, and career counseling for students, especially undergraduates attending all types of two- and four-year colleges and universities.

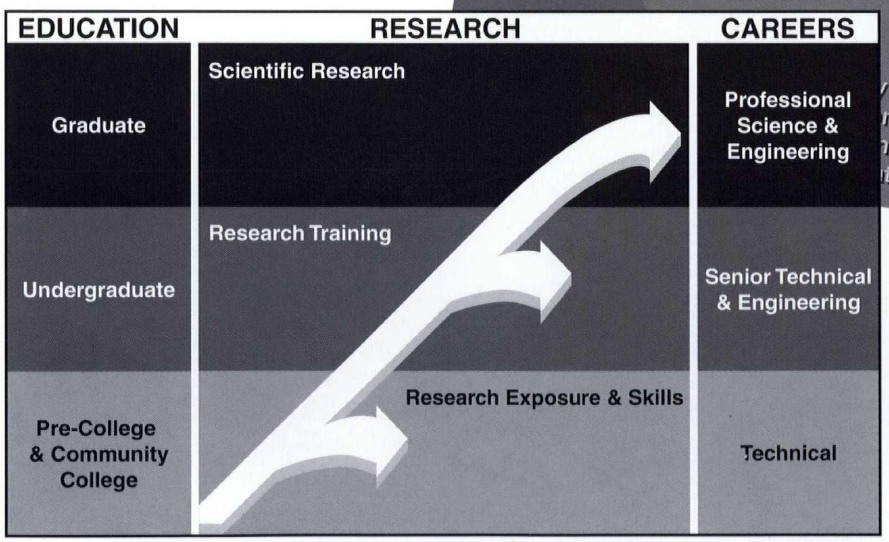


Figure 2. Undergraduate Research Semester interns, above, have the opportunity to become involved in Department of Energy research, working with mentors or scientific teams engaged in long-range investigations and using advanced facilities and equipment. CAMP participants are encourage to visit the URS website.

This work was performed under the auspices of the U.S. Department of Energy by Lawrence Livermore National Laboratory under Contract W-7405-Eng-48.

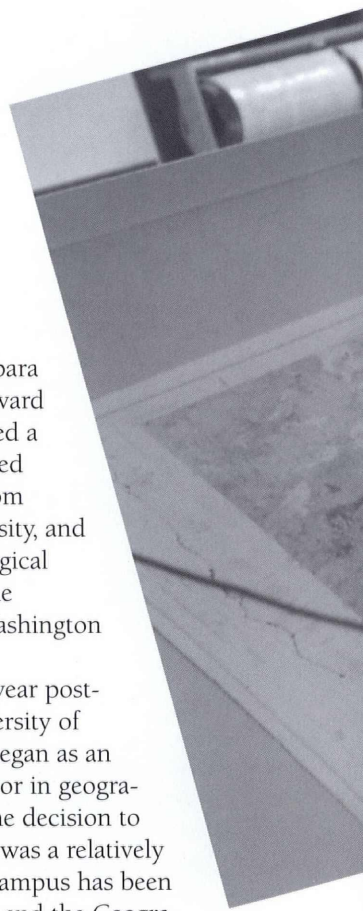
Don Correll earned a B.S. in physics at Cal State Long Beach and a Ph.D. in plasma physics at UCI. He joined LLNL in 1976, and has taught plasma physics at UC Davis. His career has evolved from research scientist to science management to science education.

ER-2 PLANE, *remote sensing* USED FOR MAPPING SANTA MONICA MOUNTAINS FIRE

CAMP on

BY DAR A. ROBERTS

One of the greatest thrills I experience in my job is when a student evolves from absorbing facts to asking questions. There comes a time in every course I teach when a few students stop coming to my office to ask about homeworks or tests and come to ask about something they have observed that relates to the class. Or, perhaps they come to see if they might participate in research. Those are the moments that make teaching most worthwhile.



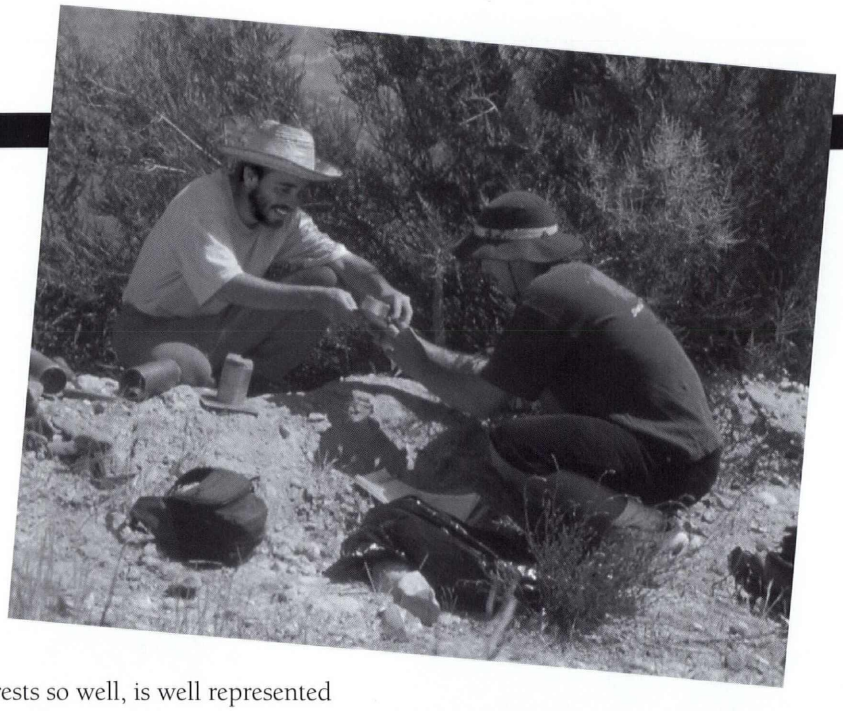
I have always been interested in how things work and I have always loved maps. From the time I was six years old and catching insects and lizards, I have cultivated an interest in the natural environment and the organisms that inhabit it. This interest, which started in biology then expanded to include geology, naturally lead me into a research field where scientists ask questions about the factors that control the distribution of vegetation on the landscape—biogeography. New tools for studying the land surface such as remote sensing and Geographic Information Systems (GIS) have made it possible for us to study spatial processes over large areas and relatively long time scales. Over the past 15 years, I have used remote sensing extensively in my research with study sites ranging from the rainforests of the Amazon Basin to the Boreal forest of Canada.

My diverse research interests lead me to geography. The traditional view of geography as a discipline of memorizing the names of cities, counties and countries is a poor description of contemporary geography. Geographers today study an incredible diversity of human and environmental processes. The one common thread that links all geographic disciplines is an interest in the spatial dimension—where things are, why they are there and how they got there. My own research interests fall in the area of biogeography and physical geography.

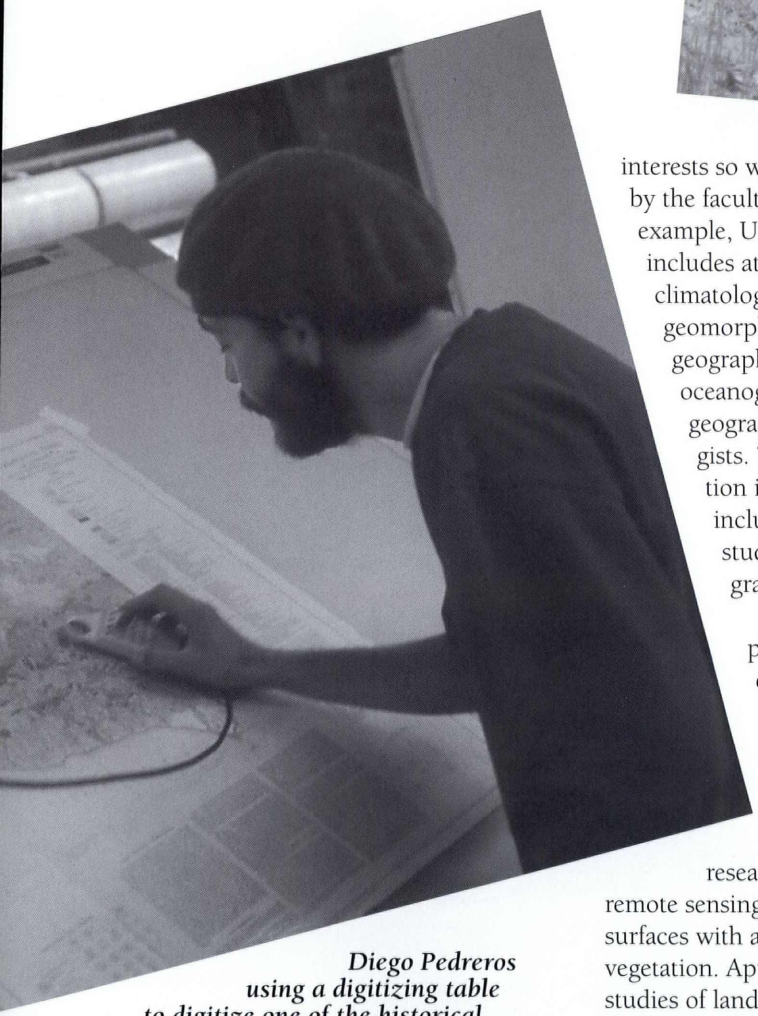
In coming back to UCSB in January 1994, I came full circle in my academic career. I received a bachelors degree in environmental biology and geology from UCSB in 1982. From Santa Barbara I began a northward trek that included a masters in applied earth science from Stanford University, and a Ph.D. in geological sciences from the University of Washington in 1991.

After a two year post-doc at the University of Washington, I began as an assistant professor in geography in 1994. The decision to return to UCSB was a relatively easy one—the campus has been rising in esteem and the Geography Department was ranked fourth in graduate education in the most recent survey of the National Research Council. The multidisciplinary aspect of geography, which fits my own research

Fire!



Diego Pedreros (left) and Jason Leroy (right) collecting soil samples in the Santa Monica Mountains. The soil samples were collected to measure soil moisture, needed for interpreting Synthetic Aperture Radar data acquired the same week on April 28, 1998. Leroy was an undergraduate in geography.



Diego Pedreros using a digitizing table to digitize one of the historical VTM maps for the Santa Monica Mountains. Paper maps, such as VTM maps, need to be digitized so they can be entered into the GIS and projected into the same geographic projection as the other data layers. Older maps, such as the 1930s VTMs are particularly hard to work with.

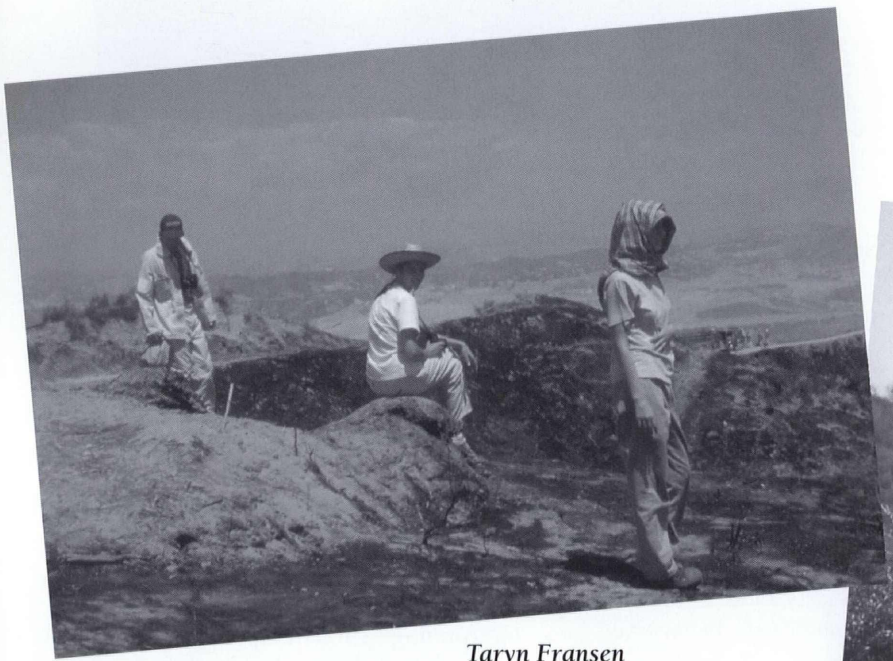
interests so well, is well represented by the faculty at UCSB. For example, UCSB geography includes atmospheric scientists, climatologists, biogeographers, geomorphologists, behavioral geographers, cartographers, oceanographers, economic geographers and hydrologists. The student population is even more diverse, including over 90 graduate students and 250 undergraduate majors.

My research philosophy includes a strong emphasis on applied science through measurement and modeling of physical processes. My specific area of research involves the use of remote sensing to study terrestrial surfaces with an emphasis on vegetation. Applications include studies of land-cover change and biogeochemistry in the Brazilian Amazon, habitat loss and fire hazard in southern California, forest regeneration in northern California, carbon exchange in Washington State and land-cover mapping the Boreal forest of Canada. In all of these studies, remote sensing and computers play a major role.

My teaching philosophy is based on the idea of empowerment. One of my favorite statements has always been "you can give a man a fish and he eats for a day, or you can teach a man how to fish, and he eats for a lifetime." When we work with students, it is our responsibility to help them learn how to learn, providing them tools that they can use for a lifetime. For this reason, most of my classes include laboratory exercises that give students hands on experience working with data. I try to involve students in as many facets of the research as I can.

It is at the interface between teaching and research where programs such as CAMP excel. In my own case, I have been fortunate to have had the opportunity to work with minority students through CAMP funding. I first encountered

It is the interface between teaching and research where programs such as CAMP excel.



Taryn Fransen (foreground) and Meg Gardner (center) watching a prescribed fire in Newhall, California in July, 1997. Prescribed fires are a management tool used by the U.S. Forest Service and county and state fire management agencies to reduce fuel loads and lower fire hazard. Fransen was a visiting undergraduate from Stanford. Gardner was a masters student at UCSB.

Dar Roberts collecting reflectance spectra from chaparral. The spectra are collected using a field spectrometer that samples from 350 to 2500 nm at 2 nm intervals. The spectra are used to help interpret airborne and spaceborne data. A three meter tall ladder, with leg extenders for steep slopes, is used to enable us to measure spectra above tall shrubs.

CAMP through a gifted minority student named Diego Pedreros. Diego, I believe, is an excellent example of what a student can do when given the opportunity to excel.

Diego was born in Colombia, in a popular area in Cali where he grew up as the fourth of five children. After finishing service in the army at the age of 18, he studied mathematics at a university in Cali and biology at another. By this time his older brother was living in Los Angeles, which inspired Diego to come to the U.S. He learned English in an adult school then went on to study computers at Los Angeles Community College and finish his general education at Santa Monica College where he met his wife. In 1993 he started at UCSB in the environmental studies program.

I first met Diego in the spring of 1995 in a course I teach called Introductory Physical Geography. Physical geography is a joy to teach, but because it is a large general education course, typically results in my knowing only a handful of students by name in any one year. At the end of the quarter, Diego approached me to say he would like to work with me and asked whether I had any projects. I told him yes,

many, but I could not support him financially. At that time, he was conducting overhead projector maintenance for the university and tutoring math for the Math Achievement Program, where he met Christine Iriart and Dr. Ken Millett and learned of CAMP. Diego quickly wrote a proposal to CAMP which was funded.

We discussed a wide array of potential projects and settled on one of personal interest to the both of us—namely the potential effects of fire on vegetation in the Santa Monica Mountains. The Santa Monica Mountains project is a NASA funded program exploring the use of an advanced remotely sensed system for mapping vegetation for use in assessing wild-fire hazard. The instrument, called the Airborne Visible/Infrared Imaging Spectrometer (AVIRIS) samples the electromagnetic spectrum in 224 discrete wavelengths between 350 and 2500 nm. The spectral information allows us to identify chemical and physical properties of land, water and the atmosphere at high accuracies while creating an image that allows us to see how these materials are distributed. AVIRIS is typically flown by NASA on a converted U2 spy plane called an ER-2 at an elevation of 20 km. For this particular project, we were interested in mapping vegetation species and biophysical properties associated with fire hazard, including plant moisture content, green leaf biomass, and ratios of green plant material to stems and branches.

The cover shows an example of one of the many maps we have produced of the Calabasas area after the fire of October 1996. The top inset map (see back cover) shows the same area before the fire. Both images show a "false-color-composite" in which three of the 224 bands are displayed as red, green and blue. In this rendition, riparian vegetation and oak woodlands are bright green, hard chaparral dark green, soft chaparral brown and senesced grasslands tan. The lower inset frames show a "mixture model" in which the abundance of non-photosynthetic vegetation (NPV: stems, branches, senesced grass and wood), green vegetation and soil are displayed as red, green and blue. Drought deciduous shrubs and senesced grasslands model primarily as NPV. The loss of NPV and green vegetation and exposure of bare soil is the most striking effect of the fire, as shown by blue in the bottom frame.

Diego started by digitizing some of the Vegetation Type Maps (VTM) for the area. The VTM maps are high quality maps that were created in the 1930s for most of California and represent an excellent source for monitoring change. In the process of learning how to work with these maps, Diego learned how to use GIS. In addition, as part of his on-going funding from CAMP, he was able to participate in collecting field data with my graduate student, Meg Gardner and several other students from different universities, including Alicia Orueta-Palacios, George Scheer and Claudia Casteñada from UC Davis, Lydia Serrano from Cal State Los Angeles, Taryn Fransen from Stanford University and Jason Leroy and Greg McGarragh from UC Santa Barbara. Faculty collaborators included Drs. Susan Ustin of UC Davis, Stefan Jaquemoud of the University of Paris and John Gamon of Cal State Los Angeles. Participating agencies included the National Park Service, Los Angeles County Fire Department, Los Alamos National Laboratory, NASA, the Jet Propulsion Laboratory and U.S. Forest Service.

As Diego's work with me advanced he started working with Dr. Hugo Loaiciga, another professor in geography who studies hydrology. This work was also sponsored by CAMP. Based on some of the data from the Santa Monica project, Dr. Loaiciga and Diego started developing a hydrology related project, studying the effects of fires on water flow in Malibu Creek. This project, along with a comparison of the vegetation of 1930 to a 1992 map, became the topic for Diego's senior thesis. A part of this research was submitted and is in review for publication in the Annals of the Association of American Geographers, one of the most prestigious journals in geography—with Diego as first author. His contribution to my own research has led to co-authorship on several of my own publications.

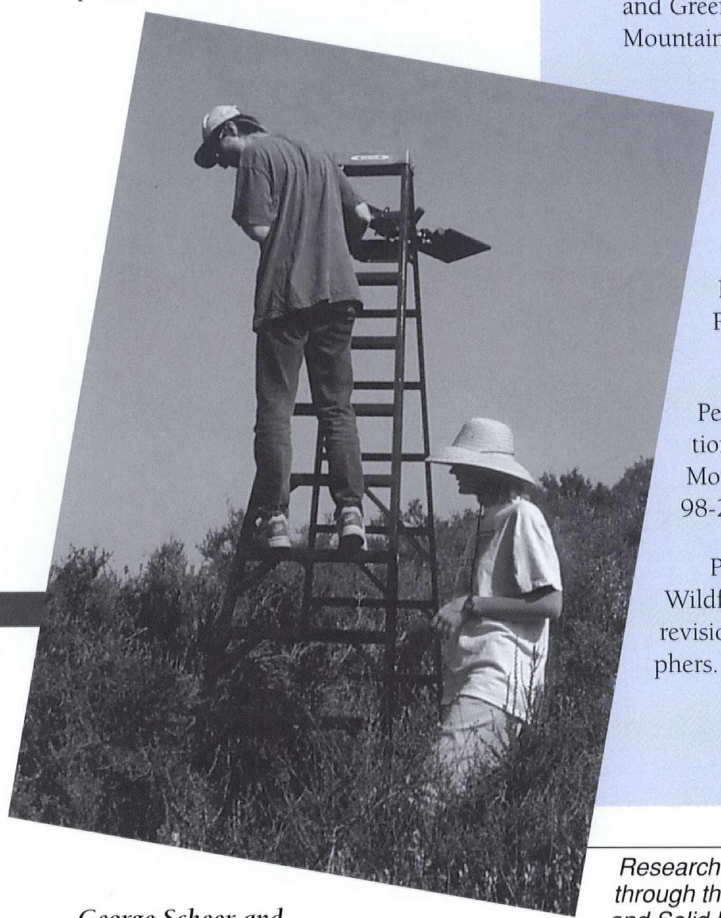
Through CAMP, Diego has also been given the opportunity to present his work at CAMP workshops and professional meetings.

In the best of possible worlds, teaching and research are complementary. Students enhance their classroom education with hands-on experience performing meaningful research. It has been my experience that, when given the opportunity to collect and analyze real data,

"THIS KIND OF RESEARCH *allows us to apply* OUR SCIENTIFIC TOOLS TO A PRACTICAL PROBLEM— MAPPING WILDFIRE HAZARD..."

students learn more and can excel. Their enthusiasm is infectious, reminding us why we chose research and teaching for our own careers.

The Santa Monica Mountains Project is an excellent example. The research is practical and highly applied. Wildfire is one of the most destructive and expensive natural hazards in our area. This kind of research allows us to apply our scientific tools to a very practical problem—mapping wildfire hazard so that management agencies and homeowners can understand the hazards they face and do something about them. Over a period of four years, more than twenty students from at least three countries have participated. Their contribution has enriched the project and in the process, enriched themselves as well.



George Scheer and Meg Gardner collecting reflectance spectra from chamise. Scheer was an undergraduate from UC Davis.

PUBLICATIONS

Dr. Roberts is an associate professor in the Department of Geography at UC Santa Barbara. He has 17 publications in peer-reviewed scientific journals and over 60 proceedings and book chapters. Selected publications include:

Roberts, D.A., Adams, J.B., and Smith, M.O., 1993, Discriminating Green Vegetation, Non-Photosynthetic Vegetation and Soils in AVIRIS Data, *Remote Sens. Environ.*, 44:2/3 255-270.

Roberts, D.A., Green, R.O., and Adams, J.B., 1997, Temporal and Spatial Patterns in Vegetation and Atmospheric Properties from AVIRIS, *Remote Sens. Environ.* 62:223-240.

Roberts, D.A., Nelson, B.N., Adams, J.B., and Palmer, F. 1998, Spectral Changes with Leaf Aging in Amazon Caatinga, *Trees* 12:315-325.

Roberts, D.A., Gardner, M., Church, R., Ustin, S., Scheer, G., and Green, R.O., 1998, Mapping Chaparral in the Santa Monica Mountains using Multiple Endmember Spectral Mixture Models, *Remote Sens. Environ.* 65:267-279.

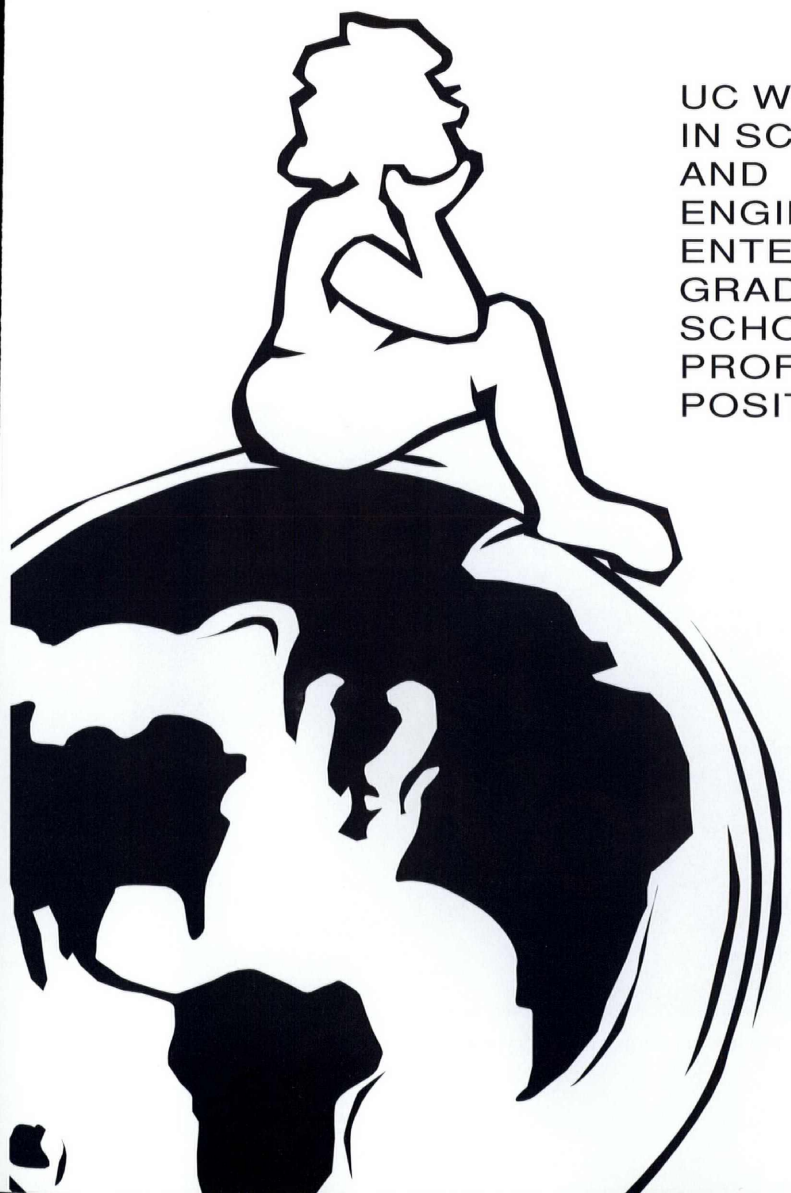
Roberts, D.A., Batista, G., Pereira, J., Waller, E., and Nelson, B. 1998, Change Identification using Multitemporal Spectral Mixture Analysis: Applications in Eastern Amazonia, in Remote Sensing Change Detection: Environmental Monitoring Applications and Methods, (Elvidge, C. and Lunetta R., Eds.), Ann Arbor Press, Ann Arbor, MI, in press.

Roberts, D.A., Gardner, M., Regelbrugge, J., Pedreros, D. and Ustin, S., 1998, Mapping the distribution of wildfire fuels using AVIRIS in the Santa Monica Mountains, Proc. 7th AVIRIS Earth Science Workshop JPL 98-21, Pasadena, CA 91109, 345-352.

Pedreros, D., Loaiciga, H. and Roberts, D., 1999, Wildfire-streamflow interactions in a chaparral watershed, in revision for Annals of the Association of American Geographers.

Research in the Santa Monica Mountains has been supported by NASA through the Terrestrial Ecosystems and Biogeochemical Dynamics branch and Solid Earth and Natural Hazards program.

TAKING THEIR PLACE IN THE WORLD



UC WOMEN IN SCIENCE AND ENGINEERING ENTER GRADUATE SCHOOL, PROFESSIONAL POSITIONS

XOCHITL CASTANEDA

B.S. Aquatic Biology
UC SANTA BARBARA

Fisheries biology technician, National Oceanic and Atmospheric Administration, Seattle

Entering graduate school in Fall 1999

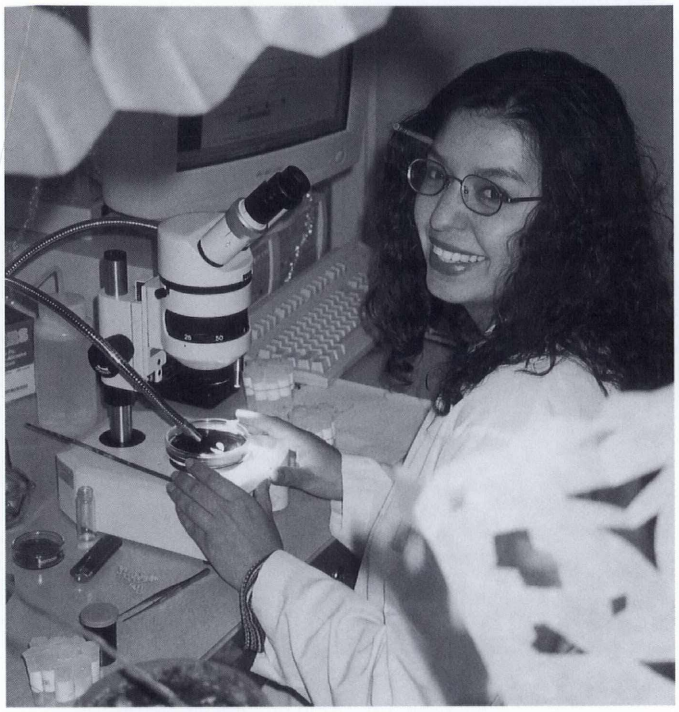
"My field is an expanding area of research. Ocean resources are strained and as a result research must be done in order to better manage them. The decisions we make today are vital to the health of world ecosystems of tomorrow. Lifestyles need to change, especially wasteful lifestyles. People see so many thing as disposable or temporary, which reduces their perceptions of accountability. As Newton would say, all of our actions have reactions.

I was raised in the Mojave Desert but I loved the ocean. I was in the Coast Guard for three years, serving as quartermaster, a navigator on a ship. We sailed around Alaska, the Aleutians, Kodiak, Unalaksa. Then I started community college and transferred.

As an undergraduate at UCSB, CAMP was very important to me. It was instrumental in my professional development and gave me a feel for research, which is a connection to real science that most undergrads don't get. CAMP gave me the funding and the freedom to choose my own mentor.

I worked with Dr. Alice Alldredge, a world renowned UCSB faculty member. She's the ultimate mentor and role model. She is a highly accomplished scientist and an amazing human being, with a smile and kind word for everyone.

Having conducted research gives me an edge, and getting admitted to graduate school will be more feasible. To me, it seems



Xochitl Castaneda plans to start graduate studies

unreasonable to commit to graduate school without exploring whether you enjoy independent research. It requires a great deal of motivation and creativity—coupled with scientific scrutiny.

CAMP sponsored La Sociedad de Tlaloc which was the medium through which I and many of my classmates secured research internships and positions as tutors. Through this program, I was a independent researcher for nine months, doing original work on the effect of zooplankton swimming in marine snow. This research will be included in a major scientific study conducted by Professor Alldredge in conjunction with other scientists from the East Coast. I cannot say enough about the impact of seeing successful minority scientists and having access to them. It has made a huge impact in my career choices and supports my desire for graduate school.

Students must continually look ahead. We must take opportunities that will enhance our careers—and practical experience is absolutely vital to a scientific education."

JULIET NABAKKA

B.S. Biological Sciences UC LOS ANGELES

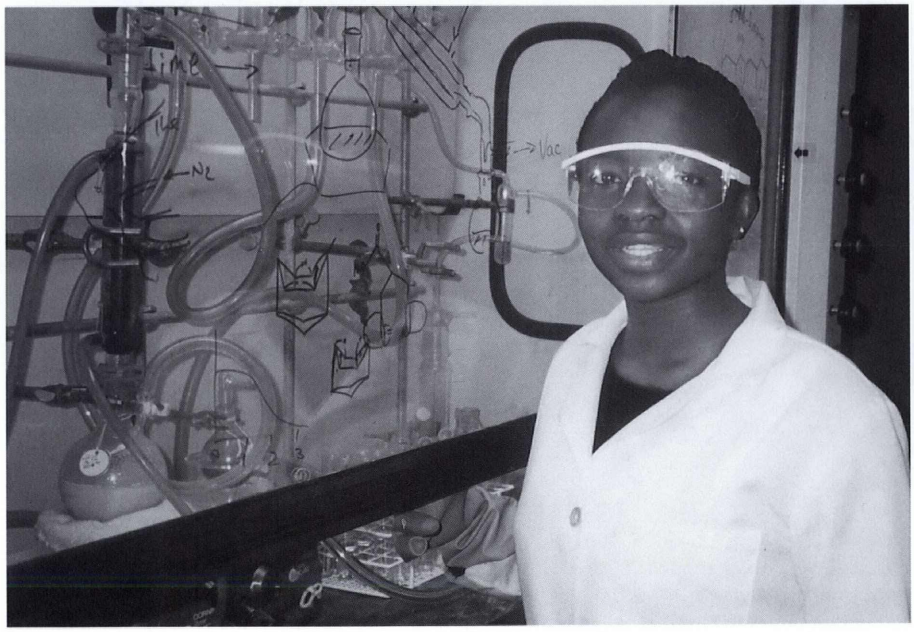
Enrolled in graduate school at University of North Carolina

Named Student of the Year by the UCLA Student Research Program

"I have definitely enjoyed my first year at the University of North Carolina. It took a little adjustment, settling in at Chapel Hill, having lived in Los Angeles for so long. There is definitely a lot more to do in Los Angeles. However, when classes began, I felt very well prepared, given the coursework that I had taken at UCLA and the discipline that I have.

The interaction with the faculty here is awesome. They all take great initiative to get to know each student. I am very impressed with the faculty. Likewise, the interaction with the students is great. For us first year graduate students, there was a lot of collaboration and far less competition. My overall first impressions about the graduate program are that, with a great deal of dedication and fortitude, you will be successful. Good time management allows for a less stressful week. I can definitely see my long-term goals begin to take shape. I have not yet made a decision on my career goals. I am considering either becoming a faculty member or going into industry. But this is a decision that I do not have to make anytime soon, and I know that I'm on the right track.

I was very active in my undergraduate career, and having presented my research numerous times gave me the confidence that is great to have in graduate school—especially the first year. Unfortunately, I did not prepare much for the GRE, and therefore did not score very well on the



Juliet Nabakka is considering becoming a faculty member.

general test. And the subject test in chemistry did not carry that much weight in the admission process for me. Nevertheless, I encourage everyone to prepare for both of those exams. I had a good gpa, and a lot of research experience, both of which worked in my favor.

The advice I have for today's senior who is beginning the application process is to watch out for the deadlines and spend enough time on each application. There is nothing more rewarding than having several schools to visit during the spring, and using that experience to make the best decision for yourself.

My mentor at UCLA was Professor M. Frederick Hawthorne. He helped me tremendously throughout my undergraduate program, and in deciding what graduate school to apply to. He pretty much guaranteed that I would like UNC. I am very happy with my decision to enroll here. I encourage every student when making this decision to choose a school with an environment in which they can live and succeed. The program takes a couple of years and you want to be happy for those years."

SALLY DAGANZO

B.S. Chemistry
UC BERKELEY
Enrolled in Ph.D. program in physics, UCB

Long-term goal: university professor, astronaut or researcher in industry

"As an undergrad, I did a lot of work with the Physics Scholars Program—tutoring, homework help sessions and helping TAs in the discussion sections. I spent two and a half years working in Professor Stacy's chemistry lab on low temperature synthesis and the magnetic properties of lanthanum nickleates. I presented this research at the national AMP conference hosted by New Mexico where I took first place for my oral presentation in the physical sciences category. I spent a year and a half researching nanoparticles in Professor Paul McEuen's group (physics) and in Professor Alivisatos' group.

Sally Daganzo is one of five women in first year class of 45.

"For my bachelor's program I pursued a strong interest in physics, and after a lot of thinking, decided that was what I wanted for my Ph.D. So now I'm a first year physics graduate student at Berkeley, and one of only five women in a first year class of 45. I plan to start research this summer in a condensed matter experiment group. Before enrolling at Berkeley, I visited MIT and decided it was not for me, and initially I was going to go to Stanford, but at the last minute decided to stay right here. I feel challenged, since I came from a chemistry background and I was missing a few classes."

At Bekeley, her role model is graduate student Newell Washburn, who is "really motivating." She strives to keep some variety in her life, and although she really likes physics, "leaves work at work." She lifts weights at the gym and, although not as often as she would like, plays the flute. She is a member of the Society of Women in the Physical Sciences, and works with a group of mentees in physics, geology, astronomy, and other areas of physical sciences.

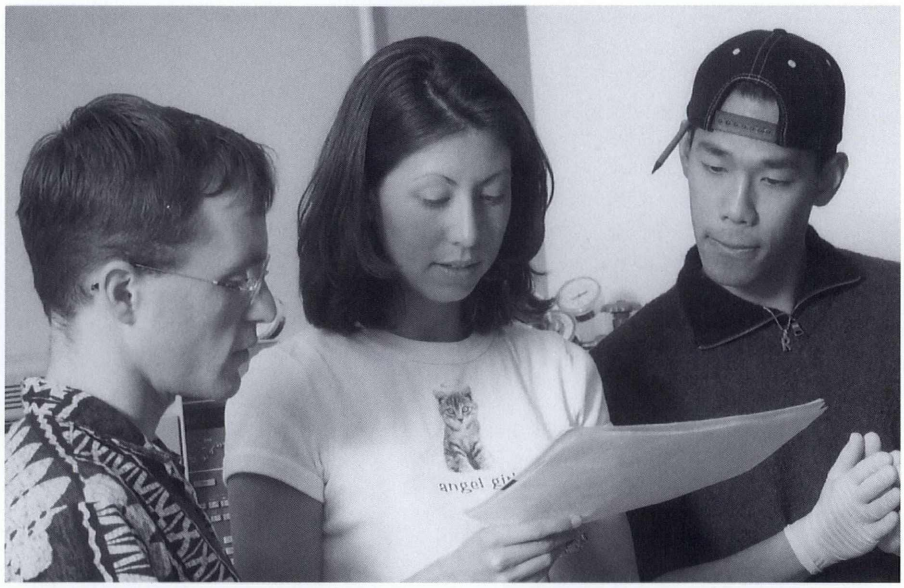
Daganzo has an older sister who has completed her master's in audiology and is pursuing her career as an audiologist. Another reason that Berkeley remains so appealing – her father is a professor of civil engineering there.

JESSICA ADKINS

B.S. Civil Engineering, emphasis in environmental and water resources
M.S. Environmental Engineering
UC IRVINE
Postion: United Water Conservation District, Assistant Engineer

Adkins had "always wanted to be a police officer." But her father had other ideas, and he encouraged her to major in engineering because of the job market. He had a degree in environmental science from UC Santa Barbara, and that showed him how far an engineer in that field could go. She said, "I had no idea of what engineering entailed. My high school didn't have calculus or computers. When I was admitted to UCI, I got a letter in the mail from CAMP to attend the Summer Science Academy. That got me going. The program was really valuable to me."

The year she co-chaired MAES



Jessica Adkins checks lab reports of her students.

was particularly good — organizing events with friends who shared the same goals and backgrounds.

"When I came to UCI I was just 17. I had received a letter from CAMP inviting me to the Summer Science Academy. The program was really valuable—and I was really homesick. The CAMP coordinator at the time, Gina Paiz, encouraged me to stick it out, especially the math. At my high school (Newbury Park) we didn't have calculus or computers." So she was a bit underprepared.

"Later, I became interested in microbial processes, taught by my advisor, Dr. Stanley Grant. He's been my greatest influence. I studied water quality, coagulation and sedimentation. Under Dr. Grant, I worked on a project characterizing unknown bacteriophage found in treated wastewater being recharged back into the groundwater of Los Angeles County. The aim was to determine if phage found in the wastewater effluent were the same as those being found underground at the recharge point, and if so, to ascertain the implications that this would have on our recharged water policies. We could in fact be polluting the very water that we drink from. This experience helped me to identify my primary interests in water quality, treatment, chemistry, and environmental microbiology. I knew that I wanted to get an advanced degree, either a master's or a doctorate, so I called Dr. Grant and was admitted at the UCI program in the School of Engineering. He's always had an open door for me."

Adkins, who won a Regents Scholarship, finished her master's in just four quarters.

"It went very fast," she says, "because my research counted toward some of the requirements." After completing her bachelor's degree, she learned about the opening for the CAMP coordinator position at UC Santa Barbara. "I felt that CAMP had given me so much that I wanted to give something back," she said. She began the environmental science management program there, but it was more ecology oriented, and she wanted to keep an engineering focus.

Jessica Adkins has begun her new position as an assistant engineer at the Ventura County United Water Conservation District, working on the Oxnard Basin and Plain, agricultural district. Her next priority is achieving her P.E. (Professional Engineer) license and ultimately moving to a management position.

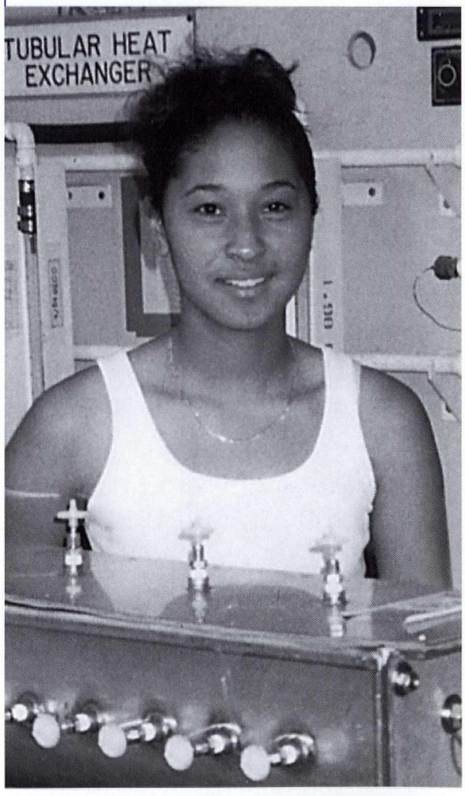
MARI CHINN

B.S. Biological Systems Engineering UC DAVIS

Graduate School, University of Kentucky

Graduate Fellowship, National Science Foundation

"I was well prepared for graduate school because, as a senior at UC Davis, I already felt like a grad student. My participation in the MORE/CAMP program got me started in full-fledged



Mari Chinn feels well prepared for graduate work because of her excellent education at UC Davis and her "full-fledged" research experience.

research, and also having a good advisor, Professor Jean VanderGheynst, because she has a strong drive, made me accomplish a lot. I had written a proposal for a mosquito grant and another for the Presidential Undergraduate Fellowship, which supported my research. I also presented at three conferences, including the American Society for Agricultural Engineers.

My education is supported by a National Science Foundation Fellowship, a $15,000 stipend per year for books and fees. If you have to worry about money, it's hard to focus on school. I'm so happy that I don't have that concern.

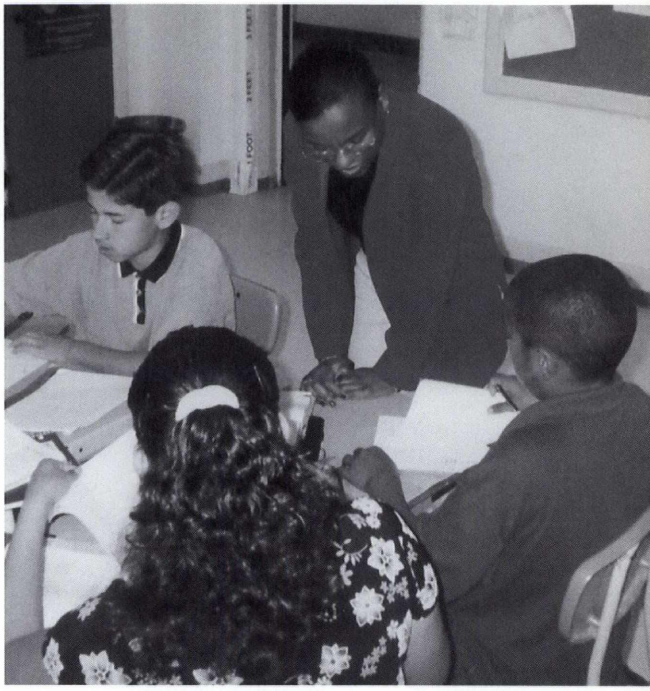
The biggest change for me at Kentucky is the culture shock. Kentucky is not the most diverse place, especially when compared to California—I'm from Oakland. Being of African American and Asian American heritage is different. Besides the lack of diversity, the grading takes some adjusting; grades are based strictly on percentages (90-100% is A, etc). Changing from the quarter system to the semester system is also a big adjustment.

I'm getting a master's in biosystems engineering, with a specialization in bioprocessing. I like the area of research and development, and I'm still debating on whether or not to complete my master's and work in industry or continue and earn my Ph.D. If I get my doctorate, I'll become a university professor.

The hospitality here is great, particularly in my discipline. There are a lot of female engineering graduate students, and they're very supportive. The faculty are equally supportive, and do all they can to make sure students succeed.

Currently, I'm working on a data acquisition and control system for a deep bed bio reactor for solid state fermentation. It's for a company named Alltech. I am going to model the system and optimize the growth of one of Alltech's organisms. I'm doing enzyme production, which is more applicable to the biotech industry. The lab equipment is great. I work with Dr. Sue Nokes, whose expertise is in solid state fermentation application. She is working on ethanol production and on pesticide/fungicide applications for tomato plants.

The Kentucky basketball spirit is wild here. People have flags hanging from their homes and their cars, and have huge tailgate parties for the games. It's a lot of fun. I'll probably remain in Kentucky. The area around Lexington is very nice—it could never replace California, but Kentucky is just beautiful. You get all four seasons. But mainly the research, what I want to do, is here."



Jacqueline Hodge always wanted to teach, and loves teaching junior high.

JACQUELINE HODGE

B.A. Mathematics
Masters of Education
UC SANTA BARBARA
Teaching credential

Hodge teaches seventh grade math at Santa Barbara Junior High School. She completed a master's in education from UCSB and her single subject clear credential in mathematics at the same time, Summer 1998. She says, "I always knew I wanted to teach. I had wanted to be an English teacher, but then I discovered math. I love teaching junior high.

"I loved CAMP. I participated four years, and also in the Math Achievement Program."

Hodge is the co-director of MESA at the school. She enjoys incorporating math into the experiments. "We talk about ratios, proportions, equations. For the 'naked egg drop' experiment, students had to construct a package and drop the egg in increments of 30 centimeters, and keep it from breaking. We're making a video, thanks to the video class. I was the student teacher last year in this teacher's classroom. Now, his students will edit and run the video in the school's video-bulletin.

"What gets you through college is your work ethic. No one is going to remind you; the only way to get your degree is to work hard. I was never very good at math, but it gave me a work ethic. I decided to stick with it. The steps you take to solve problems, the thinking you do to decide how you are going to get there logically and clearly...it permeates your life."

Hodge grew up in a single parent home in Sacramento, CA, the youngest of four children. She is the first to graduate with a

four-year college degree.

"I always knew that I wanted to be a teacher. When other kids would be playing hide-and-go seek, I would be playing school and teaching my friends to read, write and multiply. I knew that teaching was something I had to do. My passion and drive for this profession was affected greatly over the years by some excellent teachers like Mrs. Tofoya, first grade, Mr. Wong, 11th grade Algebra 2, and Mrs. Watson, 12th grade English. These teachers all exhibited a love, not only for their subject matter but for their students as well. This love showed in every aspect of their teaching, and their passion inspired me. How many times have you ever been in a classroom with someone you knew did not want to be there? Wasn't that experience less enjoyable than the classes with great teachers?

"My inspiration now comes from my students. It is a really great feeling to watch a student who has been struggling finally grasp a concept, and then to hear the gratitude in their voice when they say, 'I get it, Ms. Hodge,' or 'Ms. Hodge, you're the best!' I am reminded everyday why I wanted to teach. And I want to pass this love for learning on to my students."

When she is not in the classroom, she enjoys doing improvisational comedy. "I think that having a hobby completely unrelated to school is a must for first year teachers."

Jo Ann Del Rio wants to combine teaching and research.

JO ANN DEL RIO

B.A. psychology, California State University, Northridge, cum laude

Ph.D. candidate, Department of Pharmacology

UC IRVINE

Golden Key National Honor Society

Elected to Psi Chi, National Honor Society in Psychology

Vigil Poster Presentation Award, SACNAS

Doctoral candidate in pharmacology Jo Anne Del Rio was a "little scientist" as a child, owning a microscope and a chemistry set. Then a few of life's detours interrupted her education, including life in a religious commune. Before commencing her undergraduate work at Cal State Northridge and her subsequent enrollment in graduate school at UCI, she was a professional truck driver, and before that, lived in San Francisco's Haight-Ashbury district. "Funny how things work out," Del Rio says. Indeed. A back injury put an end to her long distance truck driving, and rekindled her interest in science. She recalls the project she had once entered in the San Francisco Bay Science Fair: "I wanted to know if and how plants responded to music, so I grew plants to both rock and classical music. The ones exposed to rock grew away from the radio; the ones nurtured on classical grew toward it."

As an undergrad at CSU Northridge, she became involved in the MARC program, being the sixth of a group of just six students, all of whom were expected to apply for graduate school. She served as president of Psi Chi, which put her in close contact with faculty mentors. Initially, she was interested in psychobiology, until she received a letter from UCI's pharmacology department and support for the first year. "UCI wasn't even on my list. I was interested in UCLA and UC San Diego; I didn't know anything about Orange County. But somehow UCI got my name and sent me a fee waiver for the graduate application. I thought it won't cost me anything to apply."

That fee waiver was the catalyst that began her on a career in pharmacology. Dr. Larry Stein is her faculty advisor.

She plans to complete her Ph.D. in February 2000, and to take a post doc position. She wants to pursue an interest in the interaction between drug abuse and the immune system. Ultimately she wants to combine teaching and research. "I wouldn't mind doing that here at UCI." Currently she is preparing to present her dissertation proposal.

Since 1993, Del Rio has conducted research in behavioral pharmacology through the Department of Pharmacology and Toxicology. The lab is concerned with brain mechanisms of reinforcement and memory as they pertain to drug abuse. Investigation of these mechanisms is performed through the use of behavioral and neurophysiological methods to determine the neural

systems which modulate these processes.

Del Rio has been working on a project which utilizes an animal self-administration paradigm to study dopaminergic substrate involvement in the reinforcing effects of cocaine. The two main objectives are classifying reinforcement-relevant dopamine receptors, and assessing relative involvement and possible specialization of dopamine receptor subtypes in mediation of reinforcement.

In 1998, she presented a poster, "Acquisition of Cocaine and Dopamine Agonist Self-Administration in Naïve Rats," at the Society for Neuroscience, Los Angeles.

MONTSERRAT C. ANGUERA

B.S. Environmental Chemistry
UC SAN DIEGO

Graduate Student, Cornell University

"As an undergrad, I did research with Dr. William Fenical at Scripps Institute of Oceanography on marine natural products chemistry, and with Professor Barbara Sawrey through the Faculty Mentor Program on environmental health and safety. I presented a poster at the National AMP conference in New Mexico, and attended the ACS conference in Anaheim. The lab setting definitely solidified my decision to pursue graduate work.

Graduate school at Cornell has been like a roller coaster ride: fast paced, with ups and downs. From day one, I was busy with an intensive laboratory course, classes, and seminars. I absorbed so much in such a short amount of time! By the end of fall semester, routines had become established, and I was much more familiar with the department, the campus, and the area (Ithaca).

Montserrat C. Anguera attests that the lab setting solidified her decision to pursue the Ph.D.

The biochemistry Ph.D. program requires first-year students to do three lab rotations during the first year, as a way to find out more about the people in the group, the PI, and the research being done. This is a great experience for many reasons. Even though the rotation only lasts 10 weeks, I have been able to get a lot done, including getting exciting positive results on some of the projects. It also gives you the opportunity to determine if the lab is the right place for you.

First year students also take the same courses, giving us a chance to get to know each other. We often study for exams together, discuss lab research problems and ways to fix experiments, and also partake in non-school activities (like Friday night dinners and movies). Living in a small college town almost forces you to hang out with your peers, and as a result, the grad students are very close.

The transition to the East Coast has been tough, but I kind of expected it. One thing that I didn't think about until I was already in my classes was the transition from chemistry to biology. My undergraduate degree was in environmental chemistry, so I taken classes in areas such as organic, inorganic, atmospheric, physical chemistry, etc., whereas my classmates with biology or biochemistry degrees have taken classes in areas of molecular biology, genetics, signal transduction. So I have been playing catch-up.

I am originally from San Diego, CA, and Ithaca, NY has definitely been a huge change! I wanted to experience living somewhere completely new and different. Ithaca is completely different—the scenery, the size of the city, the weather, and the way of life. The change is exciting, difficult, and also rewarding. The hardest part has been moving away from my family in San Diego, but the distance keeps me focused on my studies.

I'm still not sure if I want to go into academia, and perhaps industry will be the goal. As a result of my lab rotations, I have learned which areas of biochemistry/biology I don't want to go into (like genetics, for example), and also areas that could be a possibility (such as nutritional biochemistry or natural products chemistry)."

MIRACLE MATERIAL:
JUST ADD KIDS

The Magic of Ceramics

BY BETTY ISA

"We learned that ceramic is heat resistant. We also froze marshmallows. They

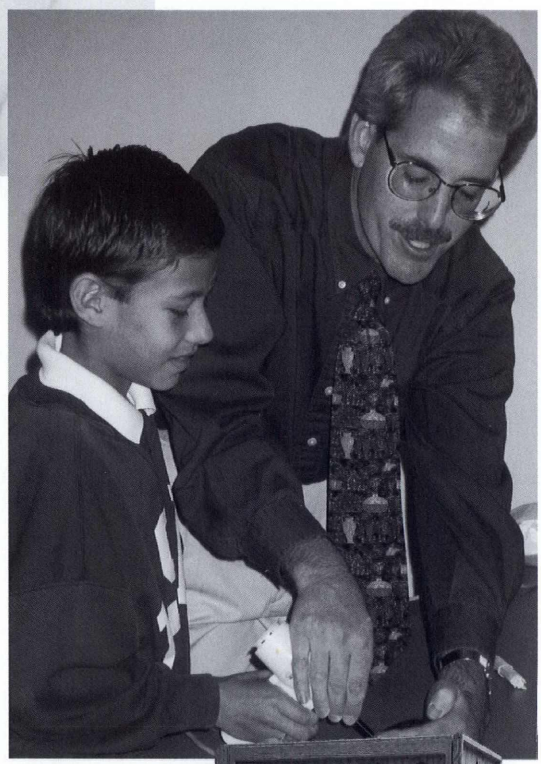
Can you imagine busloads of students—elementary through high school—visiting a university almost every day for four weeks? In October and November 1998, over 800 elementary and secondary school students from 14 schools in Orange and Los Angeles counties visited the University of California, Irvine for a unique campuswide outreach initiative fondly known as the "Magic of Ceramics."

Last fall, Professor Martha Mecartney in the Department of Chemical and Biochemical Engineering and Materials Science (and CAMP Statewide Advisory Board Member) organized a major research conference in Irvine on the materials science and engineering of ceramic materials, sponsored by the American Ceramic Society. The Society offered to provide the Centennial Traveling Ceramics Technology Exhibit celebrating the 100th year of the establishment of the American Ceramic Society if Mecartney could find a suitable location in Orange County that would accommodate outreach programs.

The new Science Library at UCI seemed a natural site, especially when science librarian Julia Gelfand enthusiastically offered assistance. The combined efforts of the UCI Library, School of Engineering, Center For Educational Partnerships, and the American Ceramic Society came together to provide a fantastic opportunity for hundreds of young students to introduce them to ceramics through displays and demonstrations celebrating the art, science, and technology of ceramics, as well as exposure to the fields of engineering.

The primary focus was to spark the students' interest in going to college and considering possible future careers in science and engineering. The students were divided

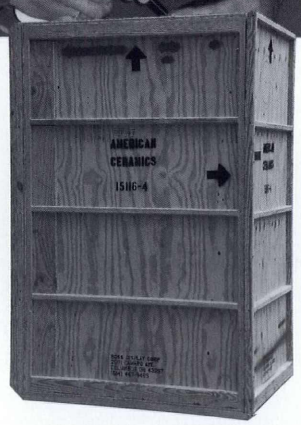
Left: Hot and Cold! Martha Mecartney demonstrates what effect liquid nitrogen has on various every day items such as marshmallows, by making "ceramic marshmallows."



Right: Mark Glasper, director of communications, American Ceramics Society, lends a hand to Efraim Campo of Wilson Elementary. They are using a high-intensity light to cure the ceramic composite for dental fillings.

into three small groups led by UCI undergraduates, including CAMP students, and each group rotated through three different stations: the Magic of Ceramics hands-on demonstration, the engineering laboratory tours, and the interaction with UCI staff and students—with expectations that all of these experiences combined would create that *spark*! Here's a taste of what the students learned:

Station #1 The Science Library Lobby: The demonstration began with an explanation of the various applications of ceramics as displayed in various showcases, from ceramic uses in our body (artificial teeth and bones) to technological uses (better skis, baseball bats, and engine components) to commonly known applications (jewelry, ceramic plates and sculptures). Students were then able to participate in demonstrations of the properties of ceramics. They watched a space shuttle tile heated red hot by a blow torch to simulate re-entry into the earth's atmosphere, then felt how cool the tile was on the other side—demonstrating the heat-resistant characteristics of ceramics. Participants learned that approximately 33,000 individually com-



The Centennial Traveling Ceramics Technology Exhibit arrived at UCI in huge plywood crates.

PARTICIPATING HIGH SCHOOLS

325 HIGH SCHOOL STUDENTS

Long Beach Unified School District:
- Cabrillo High School
- Poly High School

Los Angeles Unified School District:
- Gardena High School
- Carson High School
- Morningside High School
- Banning High School
- Jefferson High School

"and more." "I also liked when you let us ask questions to the (UCI) students. Now I know

puter-designed tiles cover the shuttle.

The students were fascinated by the fact that ceramics can be used to efficiently conduct electricity with no resistance and that these "superconductors" strongly repel magnetic fields—demonstrated by watching a ceramic become superconducting and levitate a magnet in the air after liquid nitrogen was poured over the ceramic.

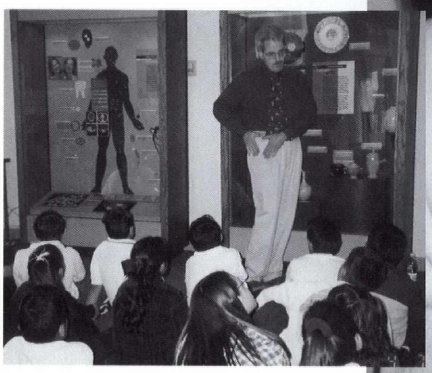
A designated "future dentist" was able to fill a tooth cavity with ceramic dental composite and cure it with the curing light. The students learned that ceramics are strong and durable when used as fillings, and also closely resemble the natural appearance of teeth.

The final treat was the chance to eat "ceramic" marshmallows—to demonstrate that all ceramics are processed—as evidenced by the soft marshmallows changing in texture to "ceramic-like" brittle marshmallows after liquid nitrogen was poured over them.

Station #2 Engineering Laboratories: UCI CAMP students and other undergraduates volunteered to lead tours of some of UCI's most intriguing engineering laboratories, hosted by our UCI faculty and their graduate research assistants. Tour guides introduced each of the labs and its relations to the science and engineering areas from well scripted informational sheets. Some of the exciting stops included Professor Michael McCarthy's robotics lab where the students witnessed "Puma" the robot learn how to lift heavy weights. The virtual reality chair in Professor McCarthy's lab was another hit, as well as the mini-robot races. The students also saw how Professor Will Recker and his colleagues at the Institute of Transportation Studies work on projects to find solutions to the traffic and transportation problems in Southern California. Other tours included: Dr. Jack Brouwer and the National Fuel Cell Research Center, Dr. Rick Nelson and the Microelectronics Semiconductor Fabrication Lab, Professor John La Rue's wind tunnel lab, Dr. Robert Kazanjy and Professor Gerry Pardoen's structures lab, and Professor Mecartney's electron microscopy facility.

Elisa Valenzuela, civil engineering major and CAMP student, expressed how much she enjoyed leading one of the groups. "It was a great experience speaking with these young students, especially the young ladies who seemed to make a special connection with me. I shared with them my personal experience as to how I got to a university and why I chose engineering as my major." Professor Mecartney commented, "That was an amazing experience, to see these elementary school girls

"What it is like to be in college." "When I go to college, I am going to UCI and be a scientist."



Left, Mark Glasper explains how ceramic materials are used in medicine, such as in hip replacement sockets, bones, and in dental applications, such as in fillings. Right, first it's hot, then it's not: Professor Mecartney heats up space shuttle tile that students found cool to the touch.

PARTICIPATING SCHOOLS

430 ELEMENTARY SCHOOL STUDENTS

Garden Grove Unified School District:
- Riverdale Elementary

Newport-Mesa Unified School District:
- Wilson Elementary

Santa Ana Unified School District:
- Martin Luther King, Jr. Elementary
- Heninger Elementary
- Madison Elementary

Capistrano Unified School District:
- San Juan Accelerated

70 MIDDLE SCHOOL STUDENTS

Los Angeles Unified School District:
- Wilmington Middle School

clustering around Elisa, questioning her in Spanish and looking up at her with awe, and I realized they were seeing who they could become."

Station #3 College Life and Future Careers: For many of the young, first time visitors to a major university, the enormity of the campus and the independence that college life entails was exhilarating and inspiring. The enthusiasm in which the students asked questions about college life demonstrated how eager these young students are to learning more about this place called the "university." Some of the tidbits of information exchanged with the fifth graders included the fact that college students can: ride bikes, skateboards and roller blades to class; talk to friends between classes; sit under a tree and read a book or study; go to work or the library to study between classes; and go to sleep at any hour they wished. To complement the interaction with UCI outreach staff and undergraduates on preparing for the university and thinking about possible career paths in science and engineering, each student received a folder with college preparation information and flyers highlighting the School of Engineering for them to share and review with their parents at home.

The pleasure of an outreach initiative such as the "Magic of Ceramics" is that it impacts so many people. In addition to the 800 public school students, approximately 10,000 UCI students and the surrounding community members visiting the Science Library enjoyed the exhibit as well. The campus will be using the "Magic of Ceramics" campuswide outreach initiative as a model to further impact the lives of many more young students.

UCI UNDERGRADUATE OUTREACH VOLUNTEERS

Simone Abraham, Alfredo Andrade, Veronica Aguilera, Maronel Barajas, Raul Buenrostro, Charles Dominguez, Melissa Elvir, Esmeralda Flores, Zerrick Fountain, Cecilia Gonzalez, Marquis Griffith, Lauren Hoo, Faith Idemundia, Kimberly Jackson, Sabrina Johnson, Enedina Mejia, Karen Mijangos, Melissa Reyes, Richard Silva, Tuan Tran, Elisa Valenzuela, Josh Warren

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Betty Isa is an outreach program coordinator for the UCI Center For Educational Partnerships. She also leads the campus's America Reads initiative in local schools. Recently, Isa was invited to be Principal for a Day at Martin R. Heninger Elementary School, Santa Ana, CA.

AMERICAN ASSOCIATION
FOR THE ADVANCEMENT OF SCIENCE
"CHALLENGES FOR A NEW CENTURY"

AAAS '99 a Magnet for CAMP-ers

More than 80 CAMP and Minority Science Program participants converged upon Anaheim for the annual meeting of the American Association for the Advancement of Science (AAAS), January 21-25, 1999. The poster session provided challenging competition for two dozen CAMP students who competed in the same categories with graduate students from across the nation to earn honorable mention awards.

UCI computer science majors Aaron Soto, Andres Nava, and Brian McCurtis earned recognition at AAAS "Challenges for a New Century" and also presented at the 21st International Conference on Software Engineering, May 1999, Los Angeles. Above right, Detiger Dunams presents her poster.

Awardees Brian McCurtis, Aaron Soto, and Andres Nava, UCI computer science majors, had previously presented their team project to the CAMP Statewide Advisory Board and Regional Directors January 20, 1999 (McCurtis and Soto have won corporate scholarships, pages 35, 36). UCI's Nelsson Becerra, Detiger Dunams and Olumide Akingbemi, biological sciences, also earned honorable mention as well as UCSD's Vladimir Cortez, whose work on "Penetration of the Blood-Brain Barrier by Group B Streptocci" was supported by CAMP and McNair.

Pre-conference activities included a student roundtable hosted by SCIENCE's *Next Wave* magazine and the AAAS Education and Human Resources Directorate. Eighteen students from UCLA, UCI, UCR, Cal State Fullerton, Williams College, and Swarthmore College discussed the challenges minority undergraduates face and suggested online resources that might be developed. Karen Fleming, a vocal UCI CAMP participant, energized the session. Her noteworthy contributions were being talked about a week later, at a seminar on graduate education.

"Fleming is a natural—gifted, passionate, and mature beyond her years," said Professor Richard Cardullo of UC Riverside, who mentors students and supports the CAMP program in several ways. (Cardullo provided the cover feature for the Winter 1999 *Quarterly*.)

The students addressed the need to combat isolation and find a supportive environment. They drew up three main recommendations: 1) a database of research opportunities, including undergraduate-friendly labs for summer and year-round research, and information on financial support and housing; 2) online mentors and online forums to share insights on questions such as: how do you approach a lab chief? how do you find a lab that matches your interests and career plans? and 3) resources for faculty mentors who also can learn from their peers. They also wanted to see "best practices" in mentoring for undergraduates, as well as a Who's Who in Mentoring.

Mazda Foundation Awards $35,000 in Scholarships to UCI Students

Mazda's commitment to diversity a business imperative

Seven competitive UCI undergraduates won $5,000 scholarships funded by Mazda North American Operations in cooperation with the National Hispanic Scholarship Fund.

UCI undergraduates receiving scholarships at ceremonies in Irvine March 15, 1999: Engineering majors Lily Becaria, Lizbeth Cordova, Fernando Haro II, Sergio Sandoval, and Lynher Ramirez and computer science majors Aaron Soto and Maritza Rios were awarded $5,000 scholarships, for a total of $35,000 in undergraduate support. All participate in various ways in CAMP and in the engineering counterpart, CODE (Center for Opportunities and Diversity in Engineering).

"It is a privilege away from the rigors of our usual work, and very important to a company like ours, to present these scholarships," said Richard N. Beattie, President and CEO of Mazda North American Operations, headquartered in Irvine, CA. The corporation has a tradition of supporting philanthropic activities through the Mazda Foundation (USA), Inc.

Beattie said that Mazda wanted to support Hispanic education by channeling its funds through the National Hispanic Scholarship Fund, and targeting its closest educational partners, University of California, Irvine and California State University, Fullerton. Beattie added that "It's very important to us that Mazda mirror the community it does business with." To the UCI students and six recipients from Cal State, he gave wholehearted support.

Sara Martinez-Tucker, president, National Hispanic Scholarship Fund, told students, "It's an enviable time in your life, with all the options you have, all the choices you make. Mazda wants to put you on a strong path to your future." Martinez-Tucker stated that the two top reasons students complete their degrees is sufficient financial aid and family support and encouragement. She added that student achievement is a "work in progress."

Professor and Associate Dean of Mechanical and Aerospace Engineering John LaRue represented Nicolaos Alexopoulos, Dean, UCI School of Engineering, and P.I., CAMP. Also attending was David Blake, Dean, Graduate School of Management.

At Mazda corporate headquarters, Irvine, left to right: scholarship recipients Aaron Soto, Lizbeth Cordova, Lynher Ramirez, Lily Becaria, Maritza Rios, Sergio Sandoval. Right back row: Kika Friend, UCI-CAMP coordinator, Robin Jeffers, Director, Center for Opportunities and Diversity in Engineering. Not shown is recipient Fernando Haro II, who was taking a mid-term exam.

"It's an enviable time in your life, with all the options you have, all the choices you make. Mazda wants to put you on a strong path to your future."

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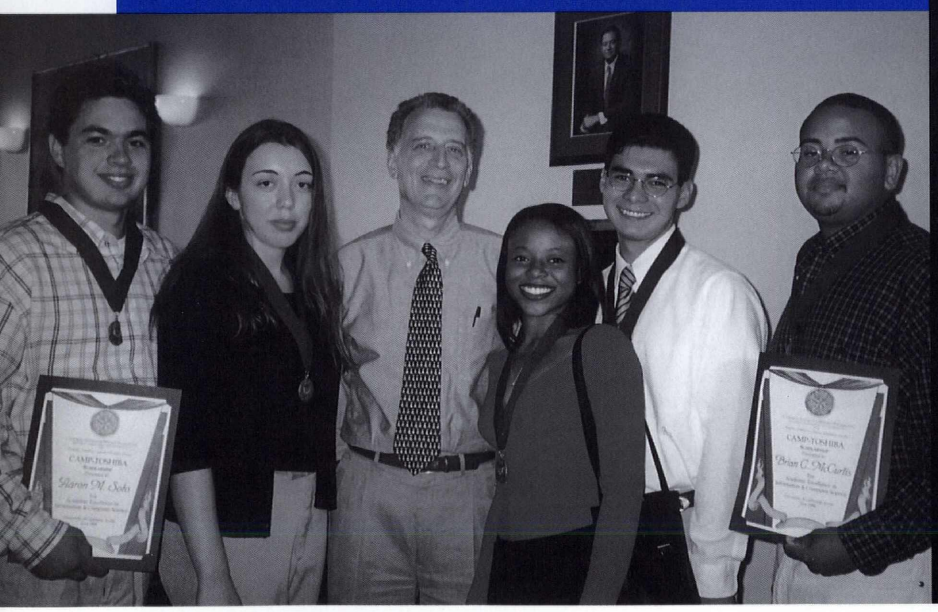
UCI CAMP-TOSHIBA SCHOLARSHIP

The Toshiba America Companies of Southern California continue to support the CAMP program with funding through Toshiba America Electronic Components, Inc.

Congratulations to these outstanding UCI undergraduates and recent alumni. Best wishes in all your future plans.

Below, UCI Chancellor Ralph J. Cicerone congratulates the 1998-99 Toshiba Scholars.



TOSHIBA AND CAMP: Partners Preparing Students For Tomorrow

1996-97

Ruben Alarcon
B.S. 1998, Ecology and Evolutionary Biology (enrolled at UC Riverside Ph.D. program)

Jenny Espinoza
B.S. 1998, Biological Sciences (enrolled at UC San Francisco Medical School)

Fernando Haro III
B.S. 1999, Electrical Engineering/Applied Mathematics

Mariella Kabar
B.S. 1997, Biological Sciences (enrolled at UC Los Angeles Medical School)

Dion Manly
B.S. 1997, Civil Engineering

Ramiro Perez
B.S. 1997, Biology

1997-98

Nzola Magalhaes
Biological Sciences

Erik Espinoza
Civil Engineering and Mathematics

Bettina Thornton
Biology and Psychology

Marisa Magana
B.S. 1998, Biological Sciences

Maria Lopez
B.S. 1999, Information and Computer Science

1998-99

Juan Bravo
Biology and Chemistry
Recipient of the Francisco Ayala Science Prize

Brian McCurtis
Information and Computer Science
AAAS '99 Award Winner

Lisa Malone
Biological Sciences

Lynher Ramirez
Chemical Engineering
Mazda/National Hispanic Scholarship Recipient

Aaron Soto
Information and Computer Science
AAAS '99 Award Winner

Herman Villalba
Biological Science

IN MEMORIAM

GLENN T. SEABORG

1913 – 1999

A life extraordinary, a legacy unparalleled. Glenn T. Seaborg has died. He was 86. The discoverer of plutonium and nine other transuranium elements, including Seaborgium, Sg 106, had suffered a stroke last fall. For the scientific community and the nation, he provided leadership endowed with vision, integrity, passion, and humor. Born in Ishpeming, Mich., Seaborg moved with his family to California in 1922. He earned his bachelor's degree at UCLA, then went to Berkeley for his Ph.D.—and became part of the fabric of the campus. His career was seasoned with uncommon diversity, from the Manhattan Project and subsequent arms negotiations to his chancellorship at Berkeley to his work with K-12 science curriculum reform.

As recently as August 1998, he advocated for K-12 science content standards, hoping to establish world class expectations for all California students.

Acknowledged father of the nuclear age and first chairman of the Atomic Energy Commission, Seaborg saw his achievements as just his work. He had commented that following the discovery of plutonium, "It was our research and it was successful. We were pleased."

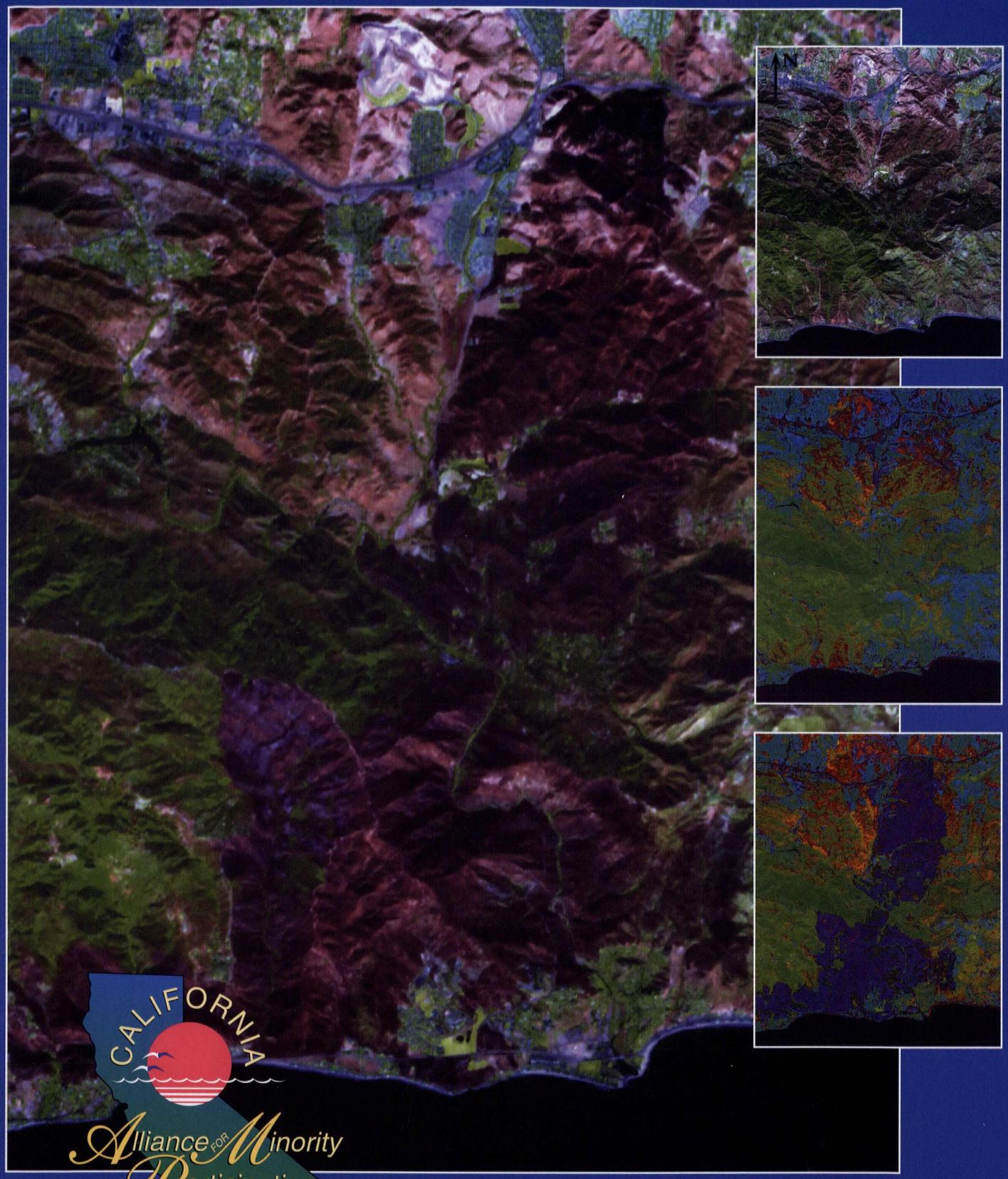
Seaborg was there when Khrushchev and Kennedy signed the Limited Test Ban Treaty. In his memoir, he had written, "I stood just behind Krushchev and he and I tipped our champagne glasses together for toasts at least five times."

An important player in world politics and policy-making, Seaborg wrote candidly about his service to U.S. presidents in his book, "National Service with Ten Presidents of the United States," released around his 80th birthday. He prided himself in being straightforward and without a hidden agenda in his dealings with the presidents. On Lyndon B. Johnson, he said: "Johnson had perhaps the strongest and most overwhelming personality of any person that I have ever known." Seaborg recorded Johnson's important role in the Nonproliferation Treaty in his book, "Stemming the Tide—Arms Control in the Johnson Years." He had hoped for a ban on nuclear testing, and promoted peaceful uses of atomic energy.

He recalled the moment when it occurred to him that the periodic table be revamped as "pure inspiration." For the first time since 1869, when the table was devised by a Russian chemist, he reconfigured it, placing the heavy elements below, as an Actinide series. It had occurred to him one day in July 1944, when he was dictating a report for a presentation at a meeting.

Seaborg saw as his greatest achievement—greater than the Nobel prize—the naming of the element seaborgium in his honor, something that had never before been given to a living person. He was proud of his work in the discovery of the radioactive isotopes, the workhorses of nuclear medicine—iodine-131, technetium-99m, cobalt-60, etc., used in 10 million applications per year in hospitals. These discoveries were noted in a 1995 CAMP *Quarterly* interview.

A memorial was held March 27, 1999 at UC Berkeley, where friends and colleagues gathered for a circle of sharing. He is survived by his wife of 56 years and five of their six children. The Seaborg family requests that donations be sent to the Glenn T. Seaborg Endowment at the Lawrence Hall of Science or to the College of Chemistry at UC Berkeley.



CALIFORNIA

Alliance FOR Minority Participation

In Science, Engineering and Mathematics

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