CALIFORNIA

Alliance FOR Minority Participation

In Science, Engineering and Mathematics

QUARTERLY

FALL 1998

CAMP REGIONAL DIRECTORY
UNIVERSITY OF CALIFORNIA
Richard C. Atkinson, President

BERKELEY

ROBERT M. BERDAHL, CHANCELLOR

P. BUFORD PRICE, PH.D.
REGIONAL DIRECTOR
Dean, College of Letters & Science
University of California
Berkeley, CA 94720
510-642-5872
Fax: 510-642-7578
buford_price@ls.berkeley.edu

COLETTE PATT, PH.D.
DIRECTOR
Student Diversity Programs
College of Letters & Science
510-642-0794
Fax: 510-642-7578
colette_patt@LS.berkeley.edu

DAVIS

LARRY N. VANDERHOEF, CHANCELLOR

JAMES SHACKELFORD, PH.D.
REGIONAL DIRECTOR
Associate Dean
College of Engineering
University of California
Davis, CA 95616-5294
530-752-0556
Fax: 530-752-2123
jfshackelford@ucdavis.edu

RYAN D. MITCHELL, PH.D.
COORDINATOR
College of Engineering
530-752-1650
Fax: 530-752-2123
rdmitchell@ucdavis.edu

LOS ANGELES

ALBERT CARNESALE, CHANCELLOR

ROBERTO PECCEI, PH.D.
ACTING REGIONAL DIRECTOR
Dean, College of Letters & Science
University of California
Los Angeles, CA 90095-1606
310-825-1042
Fax: 310-825-9368
robertop@lands.sscnet.ucla.edu

SCOTT HEIMLICH
COORDINATOR
CARE Center
310-206-2182
Fax: 310-267-2219
heimlich@biology.ucla.edu

SANTA CRUZ

M.R.C. GREENWOOD, CHANCELLOR

A. RUSSELL FLEGAL, PH.D.
REGIONAL DIRECTOR
Associate Dean
Division of Natural Sciences
University of California
Santa Cruz, CA 95064
408-459-2093
Fax: 408-459-2935
flegal@earthsci.ucsc.edu

MARLENE ROBINSON
COORDINATOR
Division of Natural Sciences
408-459-2931
Fax: 408-459-4161
mrobinson@natsci.ucsc.edu

IRVINE

RALPH J. CICERONE, CHANCELLOR

JUAN FRANCISCO LARA, PH.D.
REGIONAL DIRECTOR
Assistant Vice Chancellor
Enrollment Services
University of California
Irvine, CA 92697-2510
949-824-6362/5410
Fax: 949-824-1371
jflara@uci.edu

KIKA FRIEND
COORDINATOR
409 Steinhaus Hall
949-824-2363
Fax: 949-824-2634
kfriend@uci.edu

RIVERSIDE

RAYMOND L. ORBACH, CHANCELLOR

CARLTON BOVELL, PH.D.
REGIONAL DIRECTOR
Department of Biology
University of California
Riverside, CA 92521
909-787-5928
Fax: 909-787-4286
bovell@ucrac1.ucr.edu

TERESA COFIELD
COORDINATOR
The Learning Center
909-787-3721
Fax: 909-787-4543
tcofield@pop.ucr.edu

SANTA BARBARA

HENRY T. YANG, CHANCELLOR

KENNETH C. MILLETT, PH.D.
REGIONAL DIRECTOR
Department of Mathematics
University of California
Santa Barbara, CA 93106
805-893-3894
Fax: 805-893-2385
millett@math.ucsb.edu

CELIA ESTRELLA
COORDINATOR
Special Programs Office
College of Letters & Science
805-893-8801
Fax: 805-893-7654
cestrella@descartes.ucsb.edu

SAN DIEGO

ROBERT C. DYNES, CHANCELLOR

MELVIN H. GREEN, PH.D.
REGIONAL DIRECTOR
Department of Biology
University of California
La Jolla, CA 92093-0074
619-534-0485
Fax: 619-534-8895
mgreen@ucsd.edu

SARAH RICHARDS-GROSS
COORDINATOR
Academic Enrichment Programs
619-534-8839
Fax: 619-534-8895
srichard@ucsd.edu

COVER: UC Davis provides our cover, a 400x magnification of Culex quinquefaciatus, illustrating the research focus of Assistant Professor Jean VanderGheynst, Department of Biological and Agricultural Engineering. CAMP participant Mari Chinn worked with VanderGheynst. Chinn's research efforts centered on the mosquito parasitizing fungus Lagenidium giganteum. As an undergraduate, Chinn had received a Presidential Undergraduate Fellowship. Now, with a graduate fellowship from the National Science Foundation, Chinn is enrolled at the University of Kentucky, pursuing an advanced degree in bioprocess engineering. See related story on page 20. Photo by Jean VanderGheynst.

CAMP STATEWIDE

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

RALPH J. CICERONE
CHANCELLOR

NICOLAOS ALEXOPOULOS
DEAN, SCHOOL OF ENGINEERING
Principal Investigator

FREDERIC Y. M. WAN
VICE CHANCELLOR
Co-Principal Investigator

MANUEL N. GOMEZ
VICE CHANCELLOR
Executive Director

MARJORIE DEMARTINO
Associate Executive Director
Editor

NANCY MINEAR
Evaluator

SANDYA NARAYANSWAMI
Director of Development

LLYN SMITH
Administrative Analyst

NOEMI PEÑA
Administrative Assistant
Publications Assistant

The CAMP Quarterly Fall 1998, Volume 7, Number 1

The Quarterly is published three times a year in Fall, Winter and Spring by the California Alliance for Minority Participation, headquartered at UCI.

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

600 Administration
University of California, Irvine
Irvine, CA 92697-1023

e-mail: CAMP@uci.edu
http://www.camp.uci.edu/~camp/

We welcome your comments and contributions. Fax submissions to the editor at 949-824-3048 or e-mail to DMARTINO@uci.edu

Please call 949-824-6578 to change your mailing address. Or send a fax, 949-824-3048.

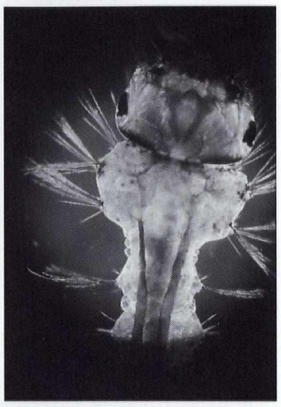
The California Alliance for Minority Participation in Science, Engineering and Mathematics is supported in part through a cooperative agreement between the University of California, Irvine, and the National Science Foundation.

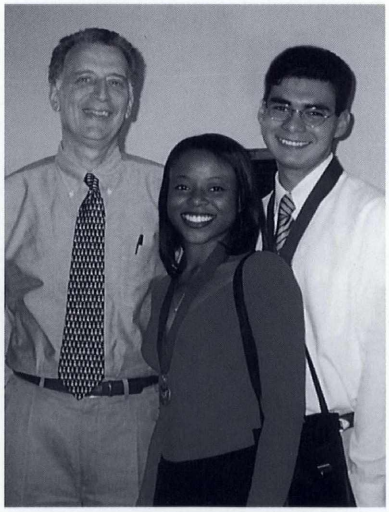
QUARTERLY

THE UNIVERSITY OF CALIFORNIA JOURNAL FOR THE CALIFORNIA ALLIANCE FOR MINORITY PARTICIPATION IN SCIENCE, ENGINEERING AND MATHEMATICS

FALL 1998 • VOLUME 7 • NUMBER 1

FEATURES





COLUMNS & DEPARTMENTS

UC NEWS

The Science Coalition, an alliance of 400 individuals, groups and institutions in support of the federal government's commitment to U.S. leadership in basic research, has included four scientific breakthroughs made at **UCLA** in its annual report: the first pictures of dust structures that may reveal planetary systems in formation (UCLA and the Joint Astronomy Centre); the use of microbes to clean explosives during nuclear weapons dismantling (with Lawrence Livermore National Laboratory); a study that showed that an HIV-infected immune system has the potential to reconstitute after antiretroviral therapy is used to kill off the existing virus; and the development of devices that are essentially wireless, networked computers on a chip.

UC Riverside continues its aggressive building campaign. The $29 million Science Library opens this fall, consolidating the science collections formerly housed in the Rivera Library, the Bio-Agricultural Library and the Physical Sciences Library. Making good use of this outstanding facility are the newly enrolled freshman for fall 1998, considered UCR's best academically prepared class ever, with an average gpa of 3.59 for the College of Natural and Agricultural Sciences and an average 1084 SAT.

Ronald J. Stern, Professor of Mathematics, was appointed Dean of the UCI School of Physical Sciences, effective July 1, 1998. Stern is an internationally recognized scholar in the fields of geometric topology and differential geometry, and will be honored as an invited speaker at the upcoming 1998 International Congress of Mathematicians.

UC Davis mechanical engineering students **Christie Vega** and **Jeremy VanderKam** recently demonstrated their "muscular" model plane—a six-pound aircraft that was able to lift nearly five times its own weight. The remote-controlled, fixed-wing aircraft lifted 27.5 pounds, enough to earn its 16-member design team second place in the national Aero Design Collegiate Competition against 40 other U.S. universities.

In other Davis news, **Intel Foundation** has made a gift of $32,500 to support undergraduate engineering students that serve as research assistants on faculty/graduate student research teams. The Intel funds, received through the Mentorships and Opportunities for Research in Engineering (MORE) program represent significant cost-sharing for CAMP-NSF at UCD.

UCI Bren Professor **Francisco J. Ayala,** Ecology and Evolutionary Biology, has been selected to receive the Distinguished Scientist Award from SACNAS (Society for Advancement of Chicanos and Native Americans in Science) presented at the 1998 national conference, "Honoring the Past, Creating our Future," in Washington, D.C. SACNAS celebrates its 25th anniversary this year. Ayala serves on the CAMP advisory board.

UC Santa Cruz CAMP Regional Director, Professor **Russell Flegal,** associate dean, Division of Natural Sciences, has won the campus Excellence in Teaching Award. Flegal was also supported as the UCSC candidate for the U.S. Professor of the Year Award.

The appointment of Professor **Barbara A. Hamkalo** to the position of UCI Associate Vice Chancellor for Research, effective September 1, 1998, was announced by Frederic Y.M. Wan, Vice Chancellor for Research and Graduate Study, and Co-P.I. for CAMP. Hamkalo has mentored CAMP participants since the program's inception.

EDITOR'S NOTES

Among our contributors to this issue are three UC faculty, representing the campuses at Davis, Los Angeles, and Riverside. As different as their disciplines are, the work supports student development in fundamental ways, advancing long term goals contingent upon graduate education.

As you read through our faculty authored features—on the physics of flight, the economic importance of biological control agent research, and mathematics outreach to junior high school girls—a unifying theme unfolds. *Making the concepts real* emerges as the formula for success.

It's equally true for the enlightened undergraduates who experienced K-12 classroom internships through our teacher preparation component. They had to demonstrate a solid grasp of mathematics concepts in order to teach. And the aspiring researchers who confidently presented their projects at the UCLA Poster Day wouldn't have reached that point without the ability to make concepts real and relevant to their majors and their goals. Throughout this issue, UC students clearly show that they are pacesetters and standard bearers for the state and the nation.

Congratulations to UCI Chancellor Ralph J. Cicerone (please see page 6), who has won the Franklin Institute 1999 Bower Award for Achievement in Science. The award goes to a distinguished scientist of any nationality for outstanding work in the physical or life sciences. It carries a prize of $250,000 and a gold medallion.

Dr. Chang-Lin Tien of Berkeley was recently appointed to the National Science Board by President Clinton. Former UCB chancellor, Tien is the NEC Distinguished Professor of Engineering.

UC has lost a Nobel laureate, Frederick Reines, who died August 26, 1998. Please turn to the inside back cover for our tribute to this great scientist.

Marjorie DeMartini

LOOKING OUTWARD, FOCUSING INWARD

A MESSAGE FROM THE P.I.

I am delighted to welcome you to the first issue of the *Quarterly* for the 1998-99 academic year. Whether you are a faculty member of many years or a new freshman or transfer student, you stand on the threshold of a year of fresh opportunity and inspiration. CAMP is growing in a number of ways, outwardly through the expansion to teacher preparation, graduate school preparation, and through several pilots in the social and behavioral sciences. We are also focusing inward, on the cohesion and integrity of the program on each of the University of California campuses, and the best practices that help students achieve their educational goals.

The first cohorts of CAMP participants are enrolling in graduate and professional school in record numbers, yet the shortfall of minority students in graduate school, in science and engineering professions, and in the university's faculty, remains our utmost concern.

Earlier this fall, I was very pleased to have met with Dr. Luther Williams, NSF division director, and Dr. Arthur Hicks, AMP program director. Our discussions centered on shared goals for the national alliances, and the need for graduate preparation.

Each UC campus offers distinct student opportunities, and the number of participants continues to grow. Last year, 1,360 students statewide received more than $700,000 of NSF funds in support, either directly through stipends or through professional development activities such as attendance at national scientific conferences. We anticipate no less for this academic year.

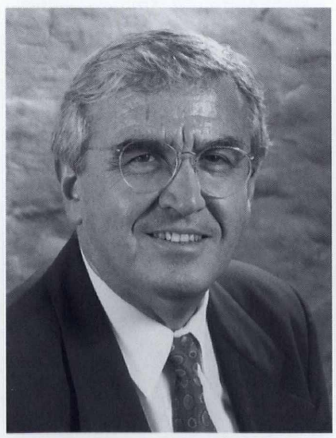
As are all federal government educational programs, the California Alliance is subject to the Government Performance and Review Act, or GPRA. It provides us with benchmarks to gage program effectiveness through quantitative measures—evaluating data from the eight general UC campuses. The GPRA questions lead us to consider measurable impact and outcomes, such as how many eligible students we serve, in what areas of emphasis, and what interventions work to ensure degree completion.

Of course, at the heart of our combined efforts lies the human dimension. Ultimately, the program's foundation is built upon people caring about people. It is that extra phone call, that letter of invitation, that lending a hand when you need it most that CAMP offers. It is also true and valid that we must concern ourselves with the practicalities of getting the most return on our dollars—both NSF funds and the requisite matching UC funds.

Each year, we address questions of quantity and quality: how many and how well do we serve eligible students? As I review the reports from each campus, I am continually impressed by the leadership, the integrity of the programs, and the impact on undergraduates. From each campus, we see growing numbers of participants engaging in activities that build a positive campus culture for students who traditionally have high attrition rates in the sciences and engineering.

In fact, preparation for graduate school has become a significant aspect of CAMP efforts statewide. We welcome the new agreement between the Princeton Review and several of the campuses to facilitate GRE preparation. This valuable corporate support is but one of several development activities led by the Statewide office. We also see contributions from Bayer, for undergraduate researchers at Berkeley, from Intel, for engineering majors at Davis, and from Southern California Edison for the teacher preparation component at Irvine. Toshiba America Companies of Southern California also continues to support students through the CAMP-Toshiba Scholarship. We thank these corporate sponsors for making undergraduate needs a priority.

CAMP is viable because of its consistent and considerable input from faculty and students alike, and from the dedicated staff who bring the program to life on each campus. I hope this year brings to each of you exciting learning experiences. Plan to attend the CAMP Statewide Symposium, April 24-26, near UC Santa Barbara. Information is available from each CAMP coordinator. See you there!



Nicolaos Alexopoulos
Dean, UCI School of Engineering
Principal Investigator, CAMP

Ralph J. Cicerone

UCI's Fourth Chancellor An Acclaimed Scientist

Atmospheric scientist and dean of physical sciences Ralph J. Cicerone became UCI's fourth chancellor July 1, 1998. He joined UCI in 1989 as the Daniel G. Aldrich Professor in the Department of Earth System Science. Earlier in his career he was a research chemist at the Scripps Institution of Oceanography at UC San Diego.

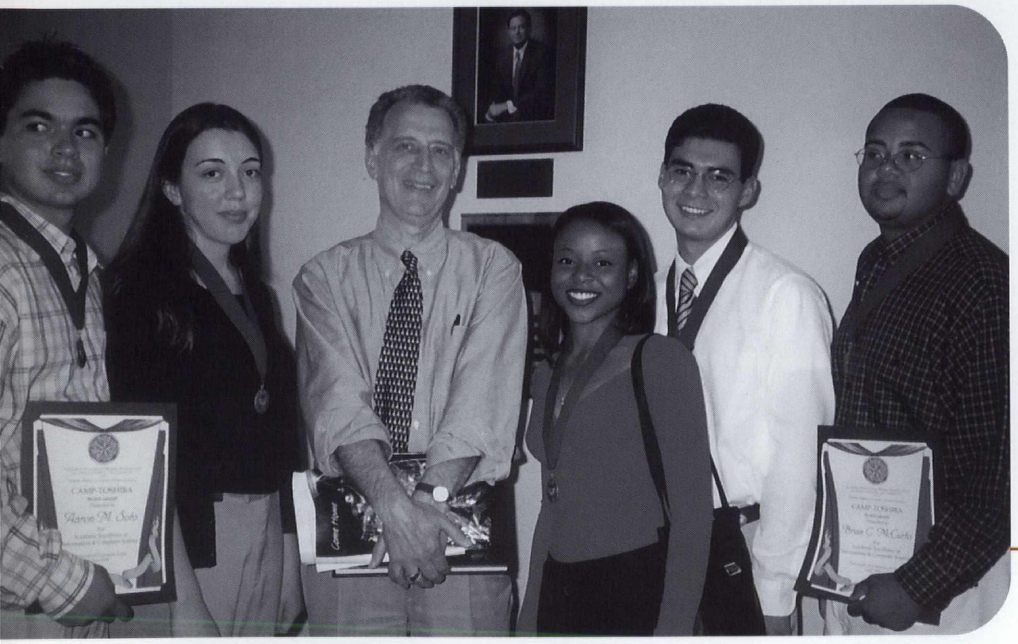
A professor of chemistry since 1990 and serving as department chair and most recently as dean, Cicerone is also known for his virtuosity as a campus leader, an effective manager, and an accomplished fund-raiser.

His research focuses on atmospheric chemistry and climate change. In 1997, he was one of six American scientists to receive a United Nations award for research that seeks to protect the earth's ozone layer. In the 1970s, he found that rocket exhaust could damage the ozone layer by emitting hydrogen chloride into the stratosphere.

Cicerone is also an ardent supporter of CAMP, first having served as co-principal investigator with Dr. Eloy Rodriguez during the program's early implementation, and subsequently championing mentored research experiences as an integral part of the undergraduate years. His interest in and support of undergraduates continues to be seen by his participation in numerous CAMP events at Irvine, including the annual faculty and student recognition night honoring graduating seniors and faculty mentors who have contributed to student development. He personally spoke to many of the newly enrolled freshmen science and engineering majors who attended the special CAMP orientation as part of the Summer Science Academy.

His skill and experience will add to the successes achieved by Chancellor Laurel Wilkening and her predecessors who brought UCI to its current position—and its #7 national ranking among the top public universities. And his leadership comes at a time when UCI has achieved national recognition for its research, faculty, and high quality undergraduate programs. For example, in May 1998, UCI was awarded the prestigious Rochester Institute of Technology/USA Today Quality Cup Award.

Chancellor Cicerone did his undergraduate work in electrical engineering at MIT and completed his Ph.D. at the University of Illinois. In addition to the prestigious United Nations award, he is the recipient of many awards and honors, and is a member of the National Academy of Sciences. Most recently, Cicerone won the Franklin Institute 1999 Bower Award and Prize for Achievement in science.



Chancellor Cicerone with 1998 CAMP-Toshiba Scholars at the annual UCI faculty/student recognition night. For profiles on all the scholars, please see page 32.

UCI's geoscience research division of the Earth Science Program, which Cicerone founded in 1989, was recently ranked number one in the nation.

LETTER FROM A UC/CAMP PARENT

We are pleased to offer this brief statement in support of the CAMP Program. The opportunity to meet Vice Chancellor Manuel Gómez further strengthens our belief that UC Irvine is sincerely interested in the educational advancement of our daughter, Karen, who is a new freshmen enrolling this fall.

We look ahead to her years at UCI, and at the same time pause to reflect on April 4, 1998, the 30th anniversary of the assassination of Dr. Martin Luther King, Jr.. The occasion reminded us that King's life's work remains unfinished, yet it gave us both sadness and joy. While many of the most obvious barriers to mobility and equal opportunity have been alleviated, the struggle for racial equality continues in many areas of our society. In particular, access to higher education and employment.

The continuing low rates of participation of minority students in these areas translates into an increasing disparity between whites and underrepresented minorities in the professional ranks. This is disturbing because many of these minority students do return, upon graduation, to their communities to serve populations which remain at the lowest rungs of the economic ladder. Indeed, for many of these students, public service is as strong a motivator to complete their studies, if not more so, than economic reward and prestige.

This brings us to the joy of April 4, 1998, the annual CAMP orientation and campus tour at UCI for admitted students and their families. A sense of anticipation was evident on the faces of the students who had worked hard and overcome tremendous obstacles to arrive at this point in their lives. The presence of entire families, from parents to babies, served to validate the inclusiveness of the college experience as a shared, family experience. From the program leaders came a commitment to equality that many in the audience could never have expected in their lifetime, let alone to their children.

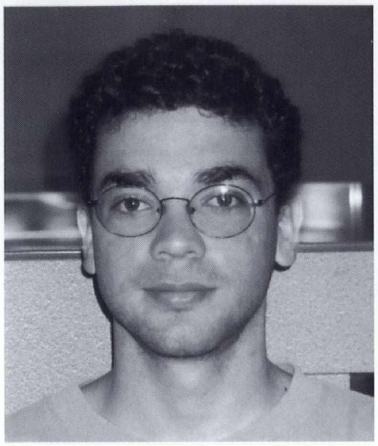
My daughter Karen is one of these students. A graduate of Bishop O'Dowd High School, she was admitted to Vassar and Cornell, but she chose UCI because of CAMP and its commitment to the success of underrepresented students. Karen, a biological sciences major, eagerly joins the ranks of participants in the CAMP Program. Her goal is to become a neurosurgeon and serve poor communities. She will thrive at UCI because of CAMP and its mission to make her dream—and the dream of Dr. Martin Luther King, Jr.—a reality.

—Chris Fleming, San Leandro, CA

UC DAVIS

ERIC ROSSETTER
Recent Graduating Senior

Eric Rossetter participated as a CAMP student during the 1997-98 academic year through the Davis Mentorships and Opportunities for Research in Engineering (MORE) program. Under the mentorship of Professor Ron Hess, Department of

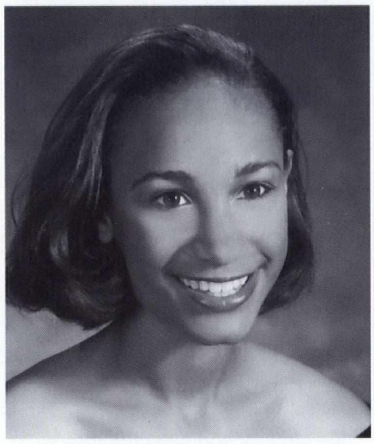


Mechanical and Aeronautical Engineering, Rossetter researched the development of intelligent, adaptive control systems as applied to aircraft flight. He had an opportunity to present his findings at the 9th Annual Undergraduate Research Conference, May 1998. In addition, Rossetter was an active member of Tau Beta Pi Engineering Honor Society, Golden Key National Honor Society, and the American Society of Mechanical Engineers. His outstanding performance at UC Davis was rewarded by his acceptance, and subsequent enrollment, in the Ph.D. program in mechanical engineering at Stanford University this fall. He received both a GEM Fellowship and Stanford University Dean's Diversity (3D) Fellowship that will fully fund his education. After completing his doctorate, Rossetter plans to seek a professorial position in academia. He had an opportunity to explore his interest in teaching as a tutor of undergraduates in chemistry, physics, and engineering. UC Davis wishes Rossetter, whose hometown is Bakersfield, every success at Stanford.

UC IRVINE

KAREN FLEMING
Newly Enrolled Freshman

"My interest in a career in science stems from my desire to enter medicine, a decision arrived at after observing my grandmother's illness following a debilitating stroke. I plan to become a neurosurgeon, and believe that I can make a difference

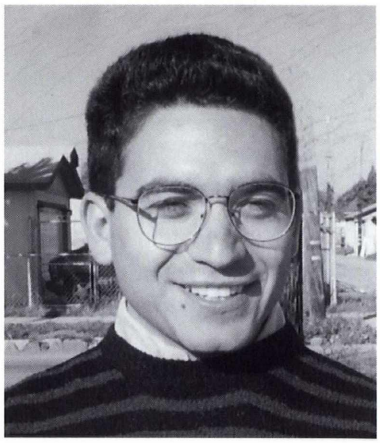


for patients and families coping with the pain of neurological illnesses. While in high school, my interest in biology came as a result of the MESA program offered through UC Berkeley, where I studied molecular biology, chemistry and physics. I also wrote a paper for my high school English class based on a career as a neurosurgeon, for which I interviewed practicing surgeons at Stanford University Medical Center. Additionally, at UC San Francisco Medical Center, I was permitted to observe the removal of a cancerous brain tumor. After this, I searched for summer programs geared toward high school students who have an interest in medical fields. The Josiah Macy Minorities in Medicine program allowed further studies in the biological sciences. The most exciting aspect of the program was the opportunity for hands-on experience in County USC Medical Center. We accompanied doctors on their rounds and interviewed patients coping with AIDS. In my senior year, my physics teacher nominated me for the National Youth Leadership Forum on Medicine, in Washington, D.C. Thus, as a CAMP participant I have a good foundation upon which to build my undergraduate experiences, and I look forward to working with other students as we begin our college journey."

SAMUEL MIRANDA
Information and Computer Science Transfer Student

Miranda was a participant in the Community College Transfer Institute, which furthered his resolve to complete his B.S. degree at a UC. In summer 1998, he was a UCI CAMP Science Scholar, conducting research under the mentorship of Professor Lubomir Bic and Michael

Faces of CAMP



Dillencourt. He presented his research, "Creation of Logical Networks for Messengers Made Easy," at the fall CAMP/Minority Science Programs Undergraduate Symposium.

"My first year at UCI was rough. CAMP was a big help, offering tutoring which gave me better grades and providing new friends. The program sent me to conferences in New Mexico and Texas that greatly expanded my experience. CAMP funded my summer research with Dr. Bic. I met several computer science graduate students who became good friends."

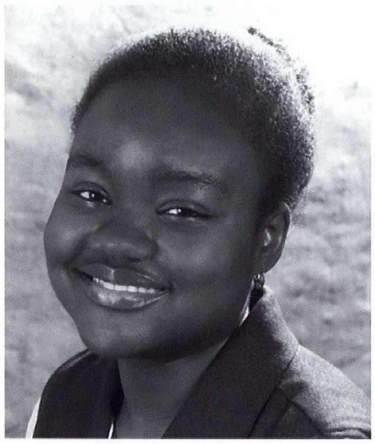
NZOLA MAGALHAES
Senior, Biological Sciences

"When I was growing up, you couldn't buy a doctor's kit, so I fashioned my own. I made a clay model of the human body and added cotton and other common things to represent the vital organs."

Magalhaes was raised in Luanda, Africa. Her mother is a native of Shreveport, Louisiana, and her father, of Angola. She speaks Portuguese, the official language of Angola. She says, "My mother didn't know Portuguese and my father didn't know English, but somehow they worked it out."

Her first two years of high school were in Luanda. For her junior and senior year, she returned to the States, living with her grandparents in Pasadena, where she attended Marshall Fundamental High School. Magalhaes had received admission to UCLA and USC as well but decided to enroll at UCI because its outreach program brought her to visit the campus. She says, "The Center For Educational Partnerships even sent me a Christmas card."

She has tutored for Math 7, statistics, and has attended two conferences, the 1997 New Mexico AMP conference and SACNAS '97.



She presented a poster at the SACNAS 1998 national conference.

"Last spring I conducted research at Beckman Laser Institute under Dr. Michael Berns. During my first few months there, Mrs. Marie Wilson (a microbiologist) trained me in tissue culture. Following that, my supervisor became Dr. Shung-Ho Sun, and I continued in tissue culture and photodynamic therapy. I've enjoyed the chance to use more advanced technology, and want to take an upper division course in lasers in medicine."

POTENTIAL OF PHOTODYNAMIC THERAPY IN CERVICAL CANCER TREATMENT
Nzola M. Magalhaes, Chung-Ho Sun, Ph.D., and Michael W. Berns, Ph.D.

Currently available light-absorbing photosensitizers used in photodynamic therapy (PDT), have shown to have many drawbacks, including prolonged skin photosensitivity, low absorption in the 630 nm therapeutic wavelength (9) and low selectivity, which have prevented advancement in the clinical application of PDT. The use of precursor 5-Aminolevulinic Acid (ALA) in clinical trials to treat precancerous cervical tissues has been advantageous. Although ALA's optimal treatment time is still not clear, its rapid localization and high degree of specificity causing a decrease of skin photosensitivity have lessened some the previous drawbacks. Currently we are exploring the possibility of using ALA to treat cervical cancer by conducting cloning assays using Hela cells, an established human cervical cancer cell line, at various treatment time points.

UC RIVERSIDE

ADRIANA RUBALCABA
Senior, Applied Mathematics

Adriana Rubalcaba is an energetic senior majoring in applied mathematics with a physics emphasis. She is a new Project ATHENA (please see page 24) intern for 1998-99 and looks forward to working with junior high school girls. For the past three years, Rubalcaba has been involved in tutoring and mentoring at junior and senior high schools, guiding students toward subject mastery. Through a student-run Science and Awareness Program sponsored by Latinos In Science (LIS), she frequently visits elementary schools in low income communities to encourage young children to begin thinking about higher education, especially opportunities in the sciences and engineering. The science experiments conducted by LIS members during the visits capture the attention of the youth. Rubalcaba contributed to writing a proposal to secure campus funding for the Science and Awareness program last year, and most recently served as a tutor for Upward Bound. She is also interested in mathematical modeling

research and its application to computer graphics. She has participated in research programs at UCLA (1997) sponsored through CAMP-UCR and at the University of Colorado, Boulder (1998).

MAGDALIA SERNA
Senior, Pure Mathematics

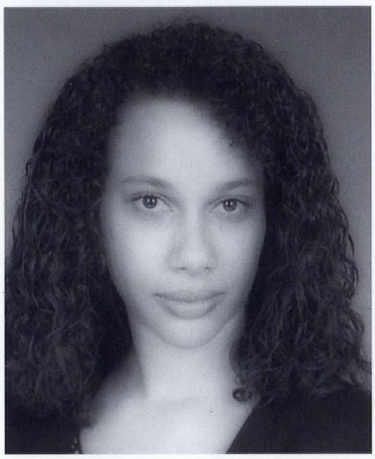
A Project Athena (see page 28) intern since last year, Magdalia Serna enjoys working with junior high school girls and finds it rewarding in many ways. She enjoys the field trips to places such as March Air Force Base and making model rockets with the girls. What does she appreciate most about her experience in Project Athena? "The one-on-one interaction with the girls and having Dr. Clute as a mentor." Serna is impressed by Dr. Clute's creativity in teaching mathematics and the frequent connections drawn

between mathematics and nature to encourage understanding and to capture students' interest in mathematics. She made the Dean's List for Spring '98, and she was a CAMP Summer Counselor for the Summer Academic Enrichment Program in Mathematics and Chemistry. This year, she is a CAMP peer mentor.

UC SAN DIEGO

CHRISTINA WESLEY-WILLIS
Senior, Biochemistry and Cell Biology

"I am a fourth year biochemistry and cell biology major with a minor in sociology. I transferred from Cuyamaca College and plan to graduate from UCSD in summer 1999. As an active CAMP participant, I was selected for the 1998 Summer Research Program. My first major project is under the supervision of Dr. Georgia Sadler, who is conducting a study called Black Cosmetologists Promoting Health



Care. A recent study of African Americans showed that only 27% knew the early warning signs of cancer. It is estimated that less than 46% of black women 40 years of age and over have annual clinical breast exams, and less than 15% of black women age 50 and over have yearly mammograms. Factors contributing to the low adherence of African American women to cancer screening guidelines include poor socioeconomic conditions which contribute to fewer doctor visits; mistrust and fear of the medical community due to governmental abuse in clinical trials (e.g., Tuskegee syphilis study); delays in treatment and diagnosis; and treatment differences.

"Prompted by these statistics, Dr. Sadler undertook the project to: 1) increase education and adherence to breast cancer screening guidelines through intervention; 2) build trust in the black community by creating a partnership to promote health care awareness; 3) improve the recruitment and retention rate of African American participation in clinical trials; and 4) most importantly, encourage black women to have an annual screening with a clinical breast exam and/or mammogram. My role is to help facilitate the administration of baseline surveys to find out the current knowledge base of breast cancer awareness from women in the community. These surveys will be evaluated to determine the effectiveness of using lay peer health educators to disseminate breast cancer information.

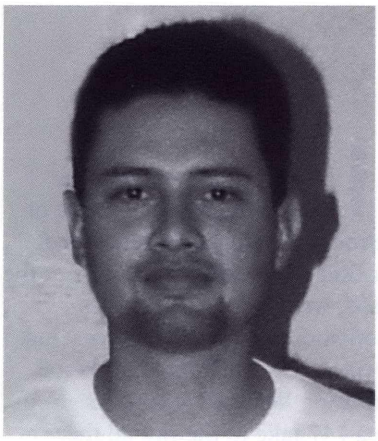
"My extra curricular activities include volunteering at St. Paul Church of God in Christ, located in a predominantly African American community. In winter 1998, I organized and implemented a homework assistance lab for K-12 children. Two days a week during the school year, students receive tutoring in areas where they experience difficulties. It gives me immense satisfaction to help these children overcome their stumbling blocks. My career goals include attending either a school of osteopathic medicine or graduate school in the field of public health."

FRANCISCO LIO
Graduating Senior, General Biology

"As the time draws near for graduation, I want to relate some of my experiences and perspectives in higher education. Simply put, I would like to reciprocate some of the positive feelings that I have gained from participating in CAMP, and from learning about the diverse spectrum of personalities (faculty, staff, and students) across the state through the distribution of this *Quarterly* publication.

"Much has contributed to my development as a scientist and a person—one who can communicate and represent himself or herself well. I've learned that in order to progress, you must be able to "market" yourself, to be assertive. Gaining experience in research is one of the best ways an undergraduate can begin to open doors. Such experience needs to be pursued, sought after, and integrated into your coursework. From my own back-

ground, I know that communication skills are indispensable. They are the way in which we transmit our ideas, our knowledge, and our very essence. We have to communicate orally in interviews when seeking admission to graduate school or the work place. It must be done with security, integrity and grace. And we have to communicate well in writing, for applying for fellowships and grants, and to convey our research. Programs like CAMP play a key role in developing these skills. I especially want to thank Drs. Larry Brunton, Palmer Taylor, and Francisco Villareal, for maximizing my undergraduate education. Their advice I will never forget—and will continue to seek."



Lio received a MIRT Fellowship with Dr. Rafael Rubio Garcia at the Universidad Autonoma de San Luis Potosi. He returned to UCSD this September, continuing his research on physiological changes in the heart due to weightlessness. His faculty mentor is Dr. Larry Brunton, Department of Pharmacology. Lio plans to continue in research and will be applying to graduate school for Fall 1999.

UC LOS ANGELES

GERALD SEQUIERA
Senior, Civil Engineering, Field Research, UCI

"I am going to start my fourth and last year as a civil engineering major at UCLA. Previously, I had done research my sophomore year for Professor Ming Wu in the Electrical Engineering Department at UCLA. This past summer, through some creative inter-campus collaboration, I worked with Professor Stephen G. Ritchie, UCI Department Chair of Civil and Environmental Engineering, on one of his ongoing projects in transportation engineering. Doing research on another UC campus allowed me to put my undergraduate experience in perspective and has given me understanding as to how to go about selecting a graduate school. I feel more confident about my research skills, and have gained insights into the demands, requirements and expectations of graduate school. I would like to thank Professor Ritchie as well as UCI graduate student David Kennedy, with whom I worked alongside and who helped me understand the project. I would also like to thank Mary Gonzales-Howard and Professor Richard Weiss and the staff of CARE at UCLA for giving me this opportunity."

TRANSPORTATION ENGINEERING PROJECT SUMMARY

The project investigated whether regular inductive loops that are already in use for vehicle detection could be transformed, using pattern recognition technology and the existing infrastructure of loops, into intelligent sensors. Components that make the study possible include the development of high-speed scanning detector cards that give a more defined induction profile of the loops. Intelligent sensors would be able to re-identify individual vehicles from one loop station to another. Subsequently, reidentifying vehicles could provide accurate section-related information that includes travel time, space mean speed, and density. These section-related results are key for the development of more sophisticated algorithms in areas such as incident detection, congestion monitoring and system evaluation, travel information systems, dynamic traffic assignment, and advanced ramp metering and signal control. Transforming a regular inductive loop into an intelligent sensor requires the development of vehicle signature processing algorithms to extract relevant features and correlation algorithms capable of matching separate vehicle signatures.

A site where raw traffic data and video collection could be extracted had to be selected. Once both sets of data are collected, extensive manual data reduction that includes development of ground truth database can take place. The site selected for this phase was the set of loops just upstream of the interception of Alton Parkway and Laguna Canyon heading west on Alton Parkway, in Irvine. Data was collected morning and mid-day from the inductive loops as well as video data of the vehicles as they traveled over the loops.

Video data subsequently underwent manual data reduction. The first step consisted of stamping a Global-Positioning-System (GPS) time unto the video and correlating the four sets of loop cameras to be running at the same time. The cars were given individual IDs depending on their arrival time while their individual time upstream and downstream was recorded. The cars were also classified into categories such as car, pickup, and van in order to obtain key signature features that correspond to the type of cars that transverse the loops. Car models, when recognizable, were also noted because of the possibility to train algorithms to recognize same model cars.

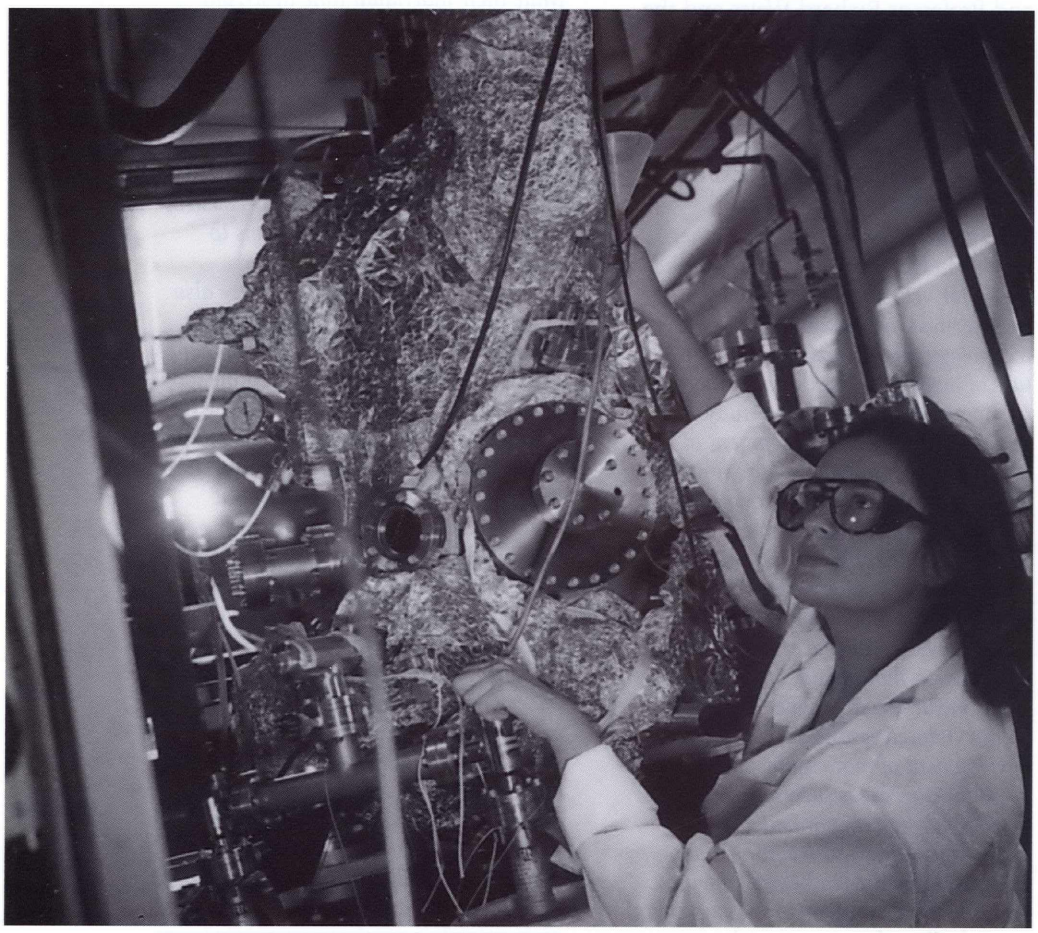
Irregularities in detection were also noted; they include cars that significantly traveled off center from the loop, and cars that completely missed the loop or that could possibly be detected by two loops. Also noted were cars that switched lanes, cars that came to a stop over the loops, and tail-gaiters that could be detected as one car, which could yield problems in detection for the algorithm.

In all, more than 1400 cars were given IDs and classified. Because of variant recording time speeds and off-pace computer time generation, large errors in the GPS stamped time developed. Different mathematical equations were used to offset the time variance and create an accurate database. Subsequent algorithm development utilizing the data reduced and classified can thus follow.

MOLECULAR Vibrations

CHEMICAL REACTION DYNAMICS

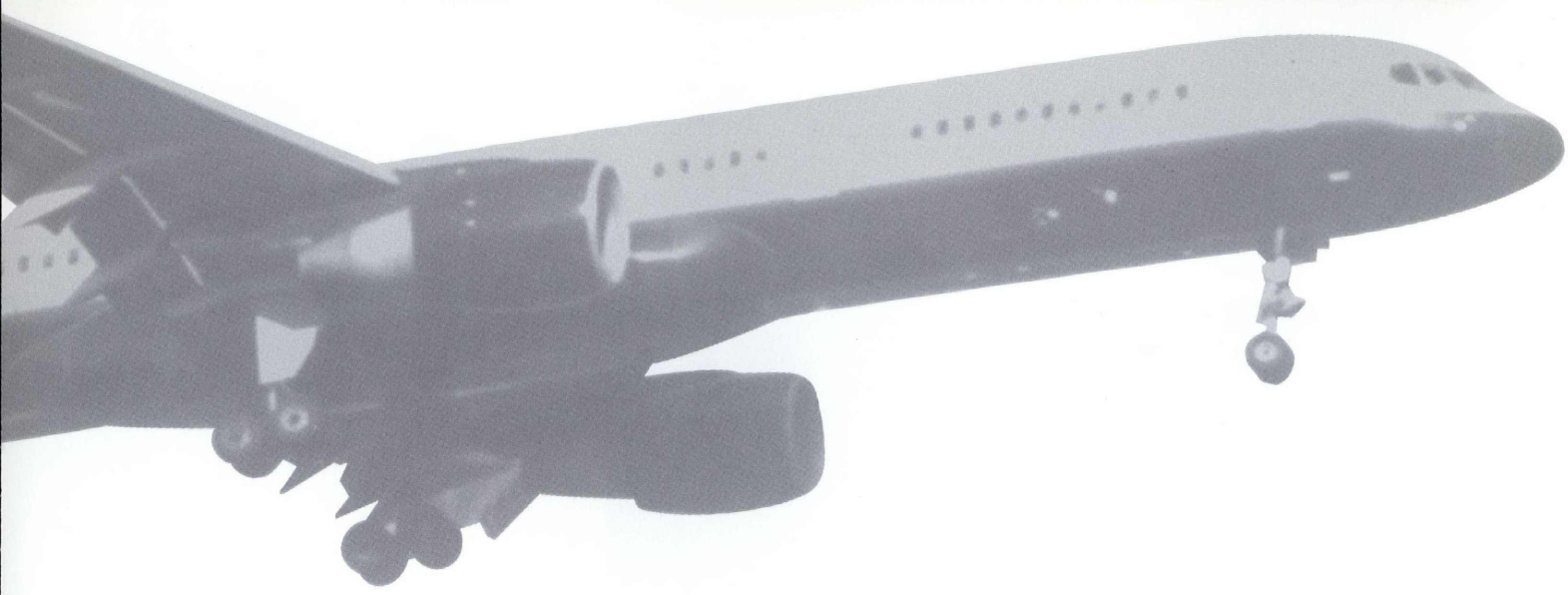
By Delroy Baugh



I love to watch airplanes fly. I believe the airplane is one of the most amazing achievements of our time. On occasion I will go to the beach, west of the Los Angeles International Airport's runways, just to watch the really big jets take-off and land. What an amazing sight to see a 747 take to the sky, all that metal floating on air—amazing, indeed. I get the same rush of excitement from watching airplanes as I did as a child in Jamaica when my mom would take me to the airport to meet someone arriving to or leaving from the island. I was born in Jamaica and lived there for 15 years. Most of that time, I am afraid, was spent daydreaming about how to build and fly jets. How did I get from there—where I did not know of atoms or molecules, to here—where I now know the subtleties of the forces that glue

UCLA graduate student Elva Torres works on the molecular beam-surface machine in my research group in the Department of Chemistry and Biochemistry.

UNDERSTANDING CHEMISTRY USING



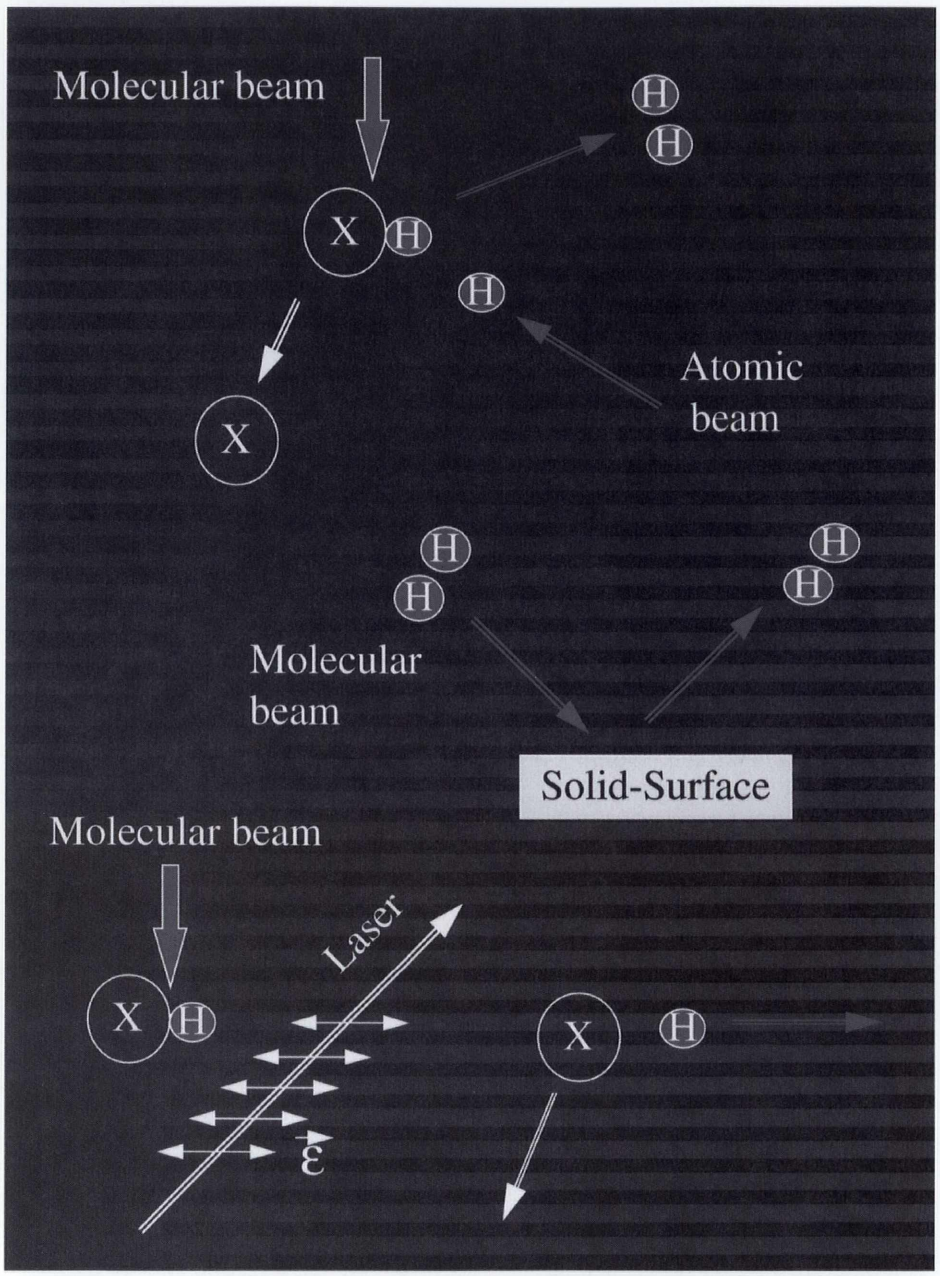
atoms together to form molecules? I flew, of course. I bought a ticket like everyone else!

In my single minded pursuit to become a builder of jets, I obtained a B.S. in Aerospace Engineering and discovered what really made jets fly: molecular collisions, the stuff of chemistry! Non-reactive collisions between the molecules in the air and the atoms in the metal skin of the wing and fuselage of the plane: these collisions provide the lift. The thrust, which propels these jets, comes from reactive collisions between the molecules in the air, *i.e.*, oxygen, and the molecules of the jet fuel. Studying the interactions between atoms and molecules, reactive and non-reactive, is the central focus of my research and constitutes the field of chemical reaction dynamics.

In this field we endeavor to explain molecular interactions using theories of fundamental physics, namely quantum mechanics. This theory was developed some time ago to explain the behavior of atomic and subatomic matter—the details of which we will leave for another time! In any event, the full application of this theory to understanding the subtle details of the forces that occur during reactive and non-reactive molecular collisions, however, had to await the development of the appropriate technologies: fast computers, lasers, and in particular molecular beams (this is exactly as it sounds, molecules of one kind or another all moving in the same direction at about the same speed). The molecules in the molecular beam are also usually very cold; they have a temperature of about 5 Kelvin. This means that the molecules move very slowly relative to each other, rotate very slowly if at all, and the atoms inside the molecules do not move relative to each other, *i.e.*, the molecules do not vibrate, or as is said in the business, molecular vibrations are frozen!

In a typical experiment (see figure), one molecular beam is allowed to collide with the surface of a solid, or another molecular beam or a laser beam—composed of particles of light or photons. In the first two cases the collisions, molecular beam/solid-surface or molecular beam/molecular beam, can either be reactive or non-reactive depending on the chemical character of the molecules in the beams or the atoms that compose the solid and the relative beam velocity. For example, if the molecules in one beam collide at a high enough kinetic energy with molecules of another beam then a reaction is likely to occur if the collision energy is comparable to the strength of the relevant chemical bonds. By varying the collision energy, *i.e.*, by changing the relative velocity of the molecular beams, and by observing the direction and speed of the molecules that result from the reaction, it is possible to learn about the details of this delicate encounter between two reacting molecules. For example, it is possible to tell if a reaction occurred during a short collision, with the quick exchange of atoms, or if the reaction resulted from a relatively long-lived complex

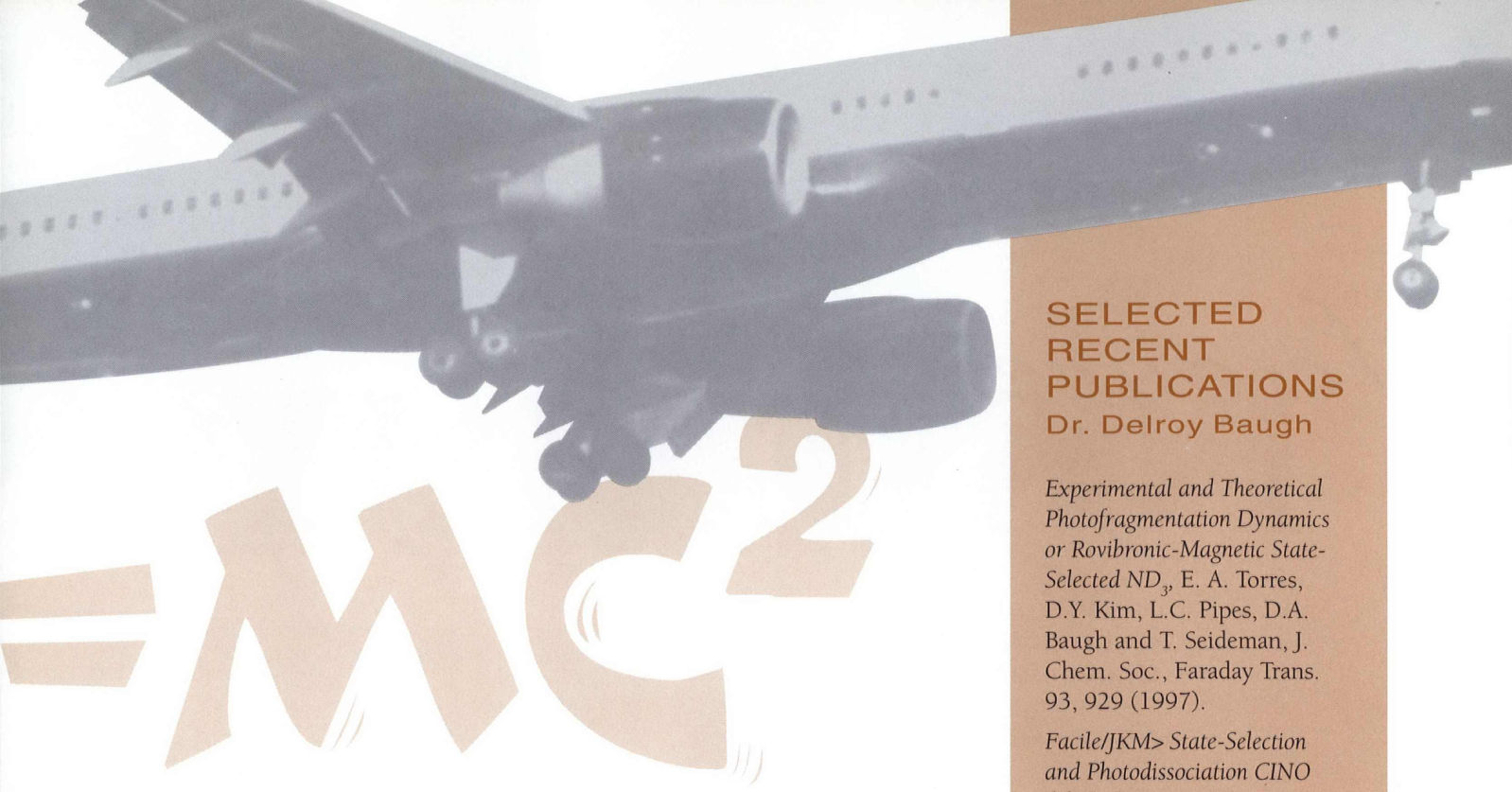
THE FUNDAMENTAL LAWS OF PHYSICS



Beam with molecules HX colliding with an atomic hydrogen (H) beam, the reaction produces molecular hydrogen (H_2) and a molecular/atomic species X (top); H_2 molecular collides with a solid-surface but does react, it could, however, transfer energy to or receive energy from the surface (middle); and finally, the dissociation of HX molecules in a molecular beam by a laser to produce a molecular/atomic species X and H—UV sunlight destroys ozone in a similar process (bottom).

(about 1000 faster than the blink of an eye) between the two reacting molecules. Many such sophisticated experiments have been and are being performed and continue to yield great insights on the physics of chemical reactions.

Indeed, over the past 20 years this field has risen to a preeminent position in chemistry and in the sub-discipline of chemical physics or physical chemistry, in particular. This achievement was recently recognized by the awarding of the Nobel Prize to several of the most skilled practitioners in the field. In 1986 the Nobel Prize in Chemistry was awarded for the development and utilization of molecular beams and in 1996 for the application of the molecular beams in the discovery C60, a 60 carbon atom molecule that looks like a soccer ball. I am sure that more prizes will be awarded in the future, since every year new and more ingenious molecular beam machines (see page 12) are being built and utilized. Another reason is that the knowledge gained from research in this field can be applied to many areas of chemistry, *e.g.*, atmospheric, environmental and combustion chemistry, the chemistry



of electronic materials, etc.

A major problem is the lack of minority scientists and graduate students in this field. The primary reason, I believe, is that undergraduate minority students are never exposed to the research in this area. This problem is particularly acute for minority students from smaller institutions where research in this area is generally not performed due to its equipment intensive nature, which makes it very expensive. This is very unfortunate since the interdisciplinary nature of the research provides students with a broad knowledge base and the skills needed to obtain very good jobs in a variety of fields from biotechnology to microelectronics, either in industry or academia. At the larger universities our challenge is to get minority students involved in physical chemistry/chemical physics research as soon as possible. This will not be easy since students are usually only aware of opportunities in the life sciences. Some students are, however, more adept at mathematics and physics and would feel more comfortable working in physical chemistry/chemical physics but due to lack of exposure do not have the opportunity to do so. In my experience working with such students, I have seen them win several of the most prestigious national awards, such as the National Science Foundation Graduate Fellowship, and attend some of the best universities in the country. In my opinion they will become top scientists but there will not be enough of them. On the latter point, I hope the next generation of students will change the situation by becoming professors and scientists in larger numbers. This is now my dream!

UCLA Professor Delroy Baugh teaches in the Department of Chemistry and Biochemistry. He mentors Elva Torres, a graduate student whose research as an undergraduate on boron rich neutron capture therapy was supported by CAMP. Her undergraduate faculty mentor was Dr. Frederick Hawthorne. She has won considerable academic recognition in her career at UCLA, including the Geissman Prize for Excellence in Organic Chemistry, the Varian Scholarship, the Ralph Bunche Scholarship, and the National Hispanic Scholarship. *(See page 19.)*

SELECTED RECENT PUBLICATIONS

Dr. Delroy Baugh

Experimental and Theoretical Photofragmentation Dynamics or Rovibronic-Magnetic State-Selected ND_3, E. A. Torres, D.Y. Kim, L.C. Pipes, D.A. Baugh and T. Seideman, J. Chem. Soc., Faraday Trans. 93, 929 (1997).

Facile/JKM> State-Selection and Photodissociation CINO (X), L.C. Pipes, E.A. Torres, D.A. Baugh. Submitted to J. Chem. Phys (1997)

Photofragmentation of M-State Polarized Molecules: Comparison of Fully Quantum and Semiclassical Treatments of Product Angular Distributions, L.C. Pipes, N. Brandstater, C.D. Fuglesang and D.A. Baugh, Accepted J. Phys. Chem. (1997)

The Production of HD from the Reaction of Photolytically Produced D-atoms with the Si(111)-H Surface, T. Garner, J. Wu and D. Baugh, submitted to J. Phys. Chem (1997)

Magic Numbers in P_n Cluster Ions formed by Laser Vaporization of Single Crystal Black Phosphorous, Xantihipe Jordanides and Delroy Baugh, submitted to J. Chem. Phys (1997)

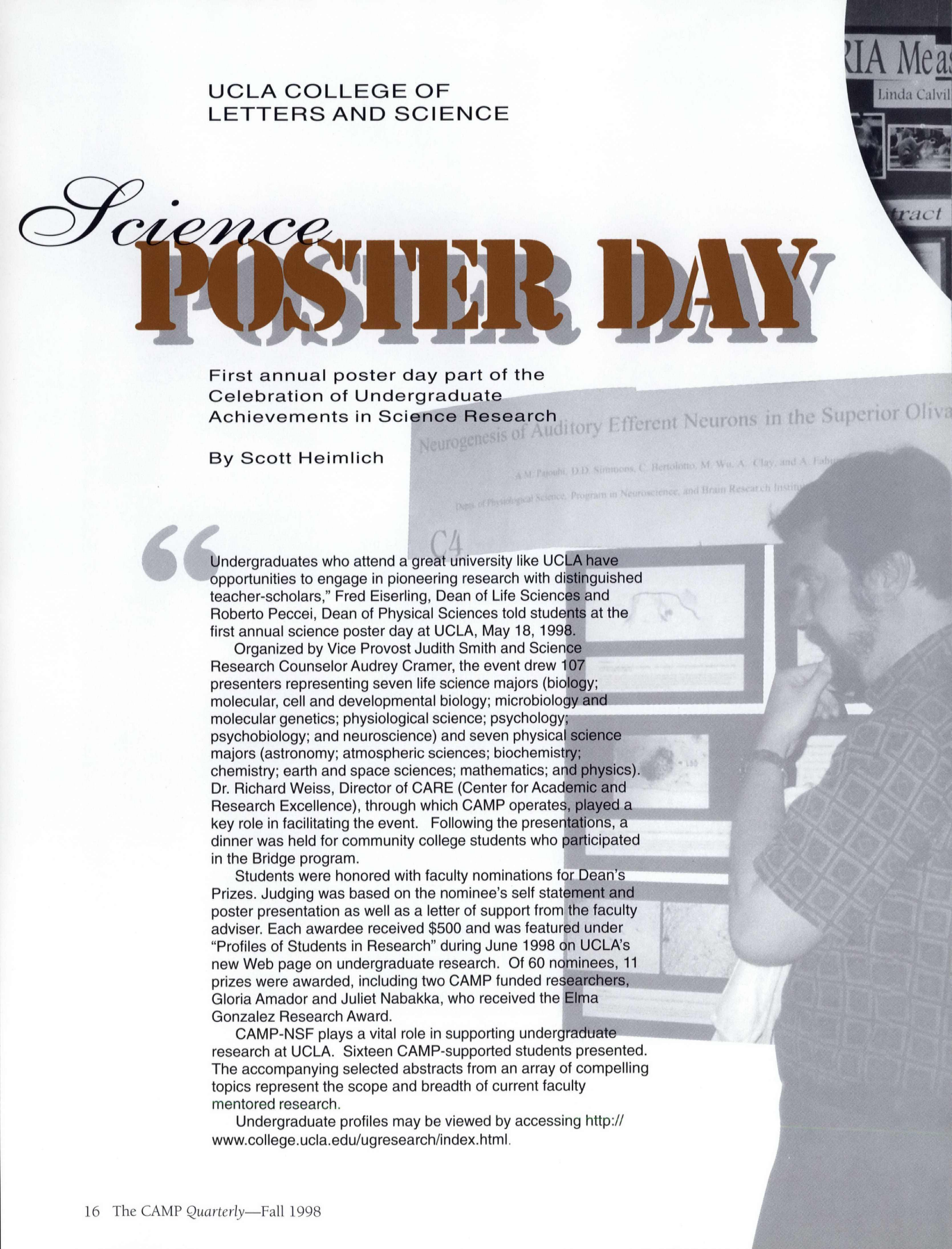
Inelastic Scattering of NH_3 ND_3 and Ne from the Si(111)-(1x1):H Surface, T. Garner, J. Wu and D. Baugh, in preparation, to be submitted to Surf. Sci.

UCLA COLLEGE OF
LETTERS AND SCIENCE

Science POSTER DAY

First annual poster day part of the Celebration of Undergraduate Achievements in Science Research

By Scott Heimlich



"Undergraduates who attend a great university like UCLA have opportunities to engage in pioneering research with distinguished teacher-scholars," Fred Eiserling, Dean of Life Sciences and Roberto Peccei, Dean of Physical Sciences told students at the first annual science poster day at UCLA, May 18, 1998.

Organized by Vice Provost Judith Smith and Science Research Counselor Audrey Cramer, the event drew 107 presenters representing seven life science majors (biology; molecular, cell and developmental biology; microbiology and molecular genetics; physiological science; psychology; psychobiology; and neuroscience) and seven physical science majors (astronomy; atmospheric sciences; biochemistry; chemistry; earth and space sciences; mathematics; and physics). Dr. Richard Weiss, Director of CARE (Center for Academic and Research Excellence), through which CAMP operates, played a key role in facilitating the event. Following the presentations, a dinner was held for community college students who participated in the Bridge program.

Students were honored with faculty nominations for Dean's Prizes. Judging was based on the nominee's self statement and poster presentation as well as a letter of support from the faculty adviser. Each awardee received $500 and was featured under "Profiles of Students in Research" during June 1998 on UCLA's new Web page on undergraduate research. Of 60 nominees, 11 prizes were awarded, including two CAMP funded researchers, Gloria Amador and Juliet Nabakka, who received the Elma Gonzalez Research Award.

CAMP-NSF plays a vital role in supporting undergraduate research at UCLA. Sixteen CAMP-supported students presented. The accompanying selected abstracts from an array of compelling topics represent the scope and breadth of current faculty mentored research.

Undergraduate profiles may be viewed by accessing http://www.college.ucla.edu/ugresearch/index.html.

Linda Calvillo, presents work co-authored with Apolinar Bordador and Ernest Filart at the Science Poster Day.

LINDA O. CALVILLO

Major: Physiological Science
Research Advisor: Michael J. Raleigh, Psychiatry and Biobehavioral Sciences

RIA Measurements of Serum Prolactin in Monkeys

Linda O. Calvillo, Apolinar Bordador and Ernest Filart

The present research assesses the reproducibility, within assays and over time, of a commercially available radioimmunoassay (RIA) for basal serum prolactin collected from vervet monkeys. In humans different concentrations of prolactin have been associated with impulsiveness, aggressiveness, and anxiety. Such studies are possible because the concentration of serum prolactin in humans can be quantified, using an RIA. However, the application of this RIA in vervet monkey serum has not been tested. If this RIA accurately measures vervet prolactin concentrations, then future studies may test hypotheses about the associations between prolactin and behavior in vervet monkeys. To evaluate the reproducibility of this RIA every sample is run in duplicate and three samples from pooled sera are included in each assay. If the duplicates differ by more than 10%, the sample is re-tested in a subsequent assay. Less than 1 out of 40 samples need to be re-tested. The values from the pool samples are used to calculate the interassay coefficient of variation (CV) and the 95% confidence intervals (CI). At present these have been determined for seven pools. Analysis of pool D (n=35 assays) shows that the mean is 17.37 ng/ml with a S.D. of 3.14. CV and CI are 18.16%, and 6.18 respectively. These results show this RIA can be used to reproducibly quantify serum prolactin in vervet monkeys. Therefore, in future studies it will be possible to test the associations between vervet monkeys and the concentration of prolactin from samples collected over long periods of time, and assayed at different times.

Special Recognition: Dean's Prize Nominee

GLORIA M. AMADOR

Major: Mathematics - Applied Science
Research Advisor: V. Reggie Edgerton, Physiological Science

Growth Hormone and Exercise Effects on Suspended Rat Soleus Muscle

Gloria M. Amador, V. R. Edgerton, and R. J. Talmadge

Six groups of hypophysectomized (pituitary gland removed) male rats were studied. In order to test possible treatments of muscle atrophy the rats were randomly assigned to one of six groups: ambulatory plus saline (Amb + Sal), Amb plus growth hormone treatment (GH), hindlimb suspension (HS) plus Sal, HS plus GH, HS and exercise, and HS plus GH and exercise. With GH therapy or exercise alone no benefits to muscle fiber size were seen, while a combined therapy treatment helped return the muscle to normal size. No observed changes in myosin heavy chain (MHC) content of the soleus muscle were seen in the hindlimb suspended study. The lack of MHC changes in response to hindlimb suspension, which occurs in hormonally normal rats, may have been due to the reduction in thyroid hormone observed in these animals as a consequence of hypophysectomy. This study demonstrates a strong interact effect of GH treatment and brief exercise bouts in countering muscle atrophy as might occur during spaceflight.

Special Recognition: Dean's Prize Nominee, Distinguished Scholar Award, UCLA Outstanding Senior Award

Left, CARE participant Annamariam Pajouhi enjoys a light moment with faculty reviewer. UCLA is a giant campus and CARE helps to make it a friendlier place.

JULIET M. NABAKKA

Major: Chemistry
Research Advisor: M.F. Hawthorne, Chemistry and Biochemistry

The Synthesis of a Precursor for Water-Soluble Mercuracarborands

Juliet M. Nabakka, George Harakas, Carolyn Knobler, and M.F. Hawthorne

The novel macrocyclic "mercuracarborands" have been shown to complex anions and other nucleophiles by lewis acid multidentate hosts. "Mercuracarbor-and" compounds are composed of ortho carborane subunits joined via their carbon vertices by electrophilic mercury atom centers. These "mercuracarborands" have been used to complex halide ions (Cl, Br, I) and other nucleophiles in hydrophobic environments. These compounds may find use in areas such as ion transport and catalysis. Reaction of dimethylamine with p-bromobenzylbromide yields N, N-dimethyl-p-bromobenzylamine. Reaction of closo-9,12-I2C2B10H10 with MgBr (C6H4CH2NMe2) affords closo-9,12-(C6H4CH2NMe2)2C2Bl0Hl0 a precursor for a mercuracarborand. This precursor could be converted to a water soluble salt via amine quartization (that is, reaction with methyl iodide). A water soluble mercuracarborand would allow us to explore the lewis acid complexation in an aqueous environment of these hosts.

Special Recognition: Dean's Prize Nominee, Undergraduate Research Development Stipend, National Science Foundation Undergraduate Scholarship

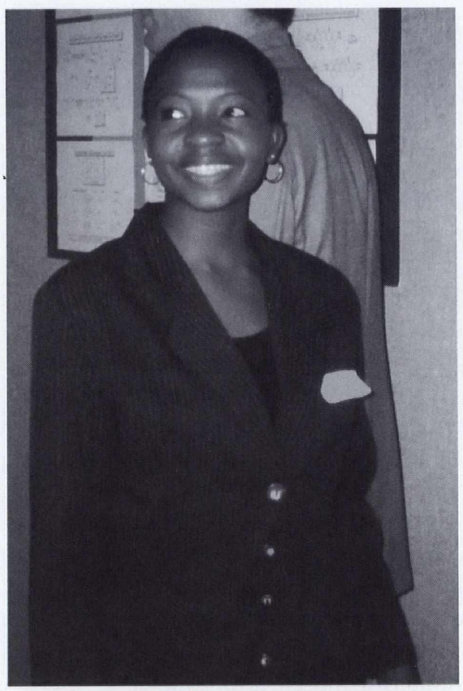
CONSEPCION SANCHEZ

Major: Astrophysics
Research Advisor: Lawrence H. Aller, Physics and Astronomy

A Comparison of Planetary Nebulae and their Chemical Abundances using Galactocentric Distances

Consepcion Sanchez

During the stellar evolution of planetary nebulae, the chemical elements fall into two categories. The first category consists of: H, He, N, C, and O. These elements have been modified by the nuclear fusion within the star. The second category contains: Ar, Cl, S, and Ne. The elements in this second group do not change and they reflect the original composition of the progenitor star. The abundance of He, C, O, and N were compared to the galactocentric distance of individual nebulae. In general, the nebulae closer to the galactic center are richer in He, C, O, and N than those farther away. Furthermore, the abundance of elements in the second category remain constant as the galactocentric distance increases.



Graduating UCLA senior, Juliet Nabakka, who won the Elma Gonzalez Research Award, flashes a smile at a fellow presenter.

Posters

NORMA E. SOSA

Major: Physiological Science
Research Advisor: Delroy A. Baugh, Chemistry and Biochemistry

Hydrogen-Termination of Silicon (111) Wafers

Norma E. Sosa

Atomically "clean" silicon surfaces are desired for the production of computer chips, among other uses. But in order for a silicon wafer to be sufficient for this use, it must be free of, and resistant to contaminants such as oxides. To obtain a "clean" surface through hydrogen-termination the silicon sample must first be atomically flat, decontaminated, made hydrophobic, and hydrogen-terminated. The purpose of these experiments was to produce a silicon surface that was satisfactorily terminated with hydrogen—having one hydrogen atom bonded to each surface silicon atom. The vibration of the silicon-hydrogen bond was studied with an infrared spectrometer, focusing on the 2083 cm-1 frequency area of the spectrum (the "signature" vibration energy of this bond). Different etches were performed on a 2cm x 1cm silicon (111) sample in the attempt to obtain this sharp vibration line. Different conditions were tested; some of these include the temperatures at which certain parts of the experiment were performed, the pH level of the etching solutions, and the lengths of the etch procedures. Preliminary results show that for the last step of the experiment, a pH level of 7 gives better results than a pH level of 9. In addition, it is speculated that the bond may be stable for only a short time—from 5 to 10 minutes. Producing these superior silicon surfaces will lead to a better understanding of hydrogen/silicon chemistry and the processing of silicon in general.

Special Recognition: Dean's Prize Nominee, College Honors

ERNESTO F. VERA

Major: Electrical Engineering
Research Advisor: Kang Wang, Electrical Engineering

Hall Mobility Experiment 1

Ernesto F. Vera and Kang Wang

In attempting to develop semiconductor materials that can be used to build more efficient electrical devices, Hall mobility measurements provide useful information. The speed at which electrical devices made of semiconductor materials process information remains an important issue. It is related to the ease or mobility of movement that charge carriers have in a semiconductor. The charge carriers may be holes or electrons, and the effects of the sample structure, composition, and growing temperature on the mobility can be analyzed using the Van der Pauw configuration of the Hall mobility experiment. Generally a wafer of silicon with a varying substance composition is put through the molecular beam epitaxy process, in which thin layers of germanium and silicon doped with boron and antimony are bonded to the substrate. The material is cut into small samples and the mobility and sheet concentration of the charge carriers is determined by calculating the resistivity and the Hall factor. The mobility and sheet concentration is found for the well and cap layer of each sample. It was found that the mobility of the charge carriers increased with decreasing temperature. Also, the growing temperature and scattering site minimization is crucial to increasing the mobility of holes and electrons.

Special Recognition: Undergraduate Research Development Stipend

---

Scott Heimlich serves as UCLA CAMP coordinator. He has a B.A. from UCLA in communication studies and an M.A. in Counseling in Student Affairs, also from UCLA, completed in June 1998. He is a part-time doctoral student in the Educational Leadership program, UCLA Graduate School of Education and Information Studies. His hometown is Northridge.

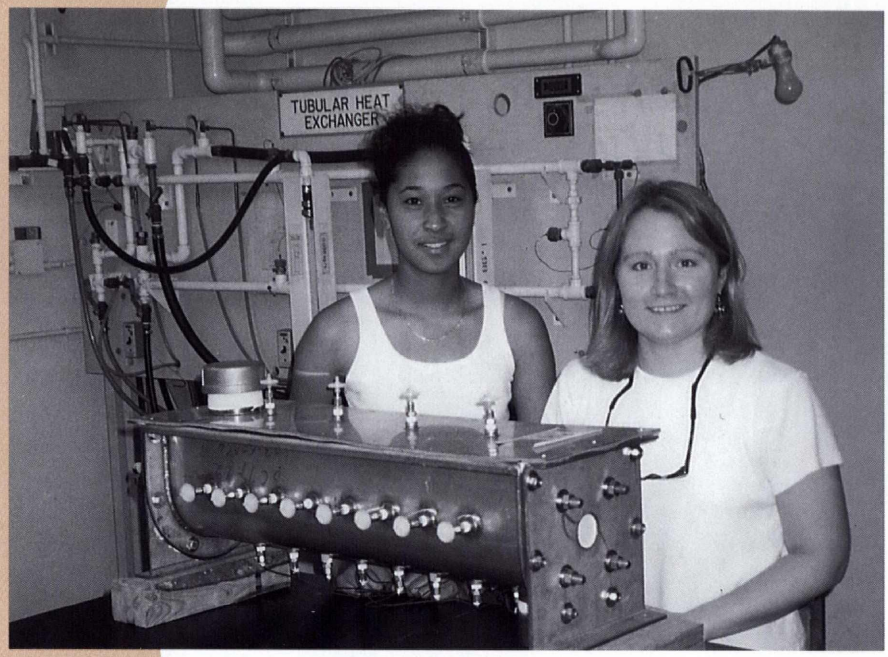
Dr. Richard Weiss, Director of the CARE Center, second from left, talks to community college students from UCLA's Bridge program. The poster day gave them plenty to look forward to when they enroll as science and engineering majors. The CARE Center houses CAMP.

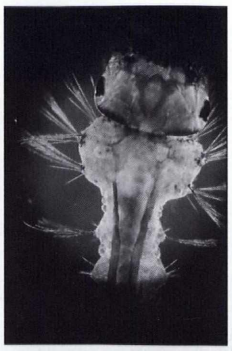
UC DAVIS RESEARCH

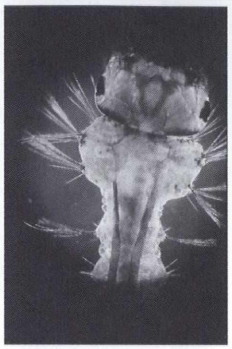
Zoosporogenesis Biological Control Agent Production

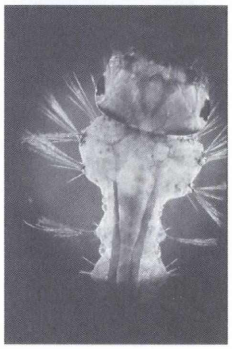
BY JEAN VANDERGHEYNST

This page: *Culex quinquefaciatus* infected with the mosquito parasite *Lagenidium giganteum*. Facing page: Mari Chin and Dr. Jean VanderGheynst. Far right: *L. giganteum* cells within the cavity of the mosquito larva.









joined the Department of Biological and Agricultural Engineering at UC Davis as an Assistant Professor in the Fall of 1996. Since arriving at Davis, I have focused my research on heat and mass transfer and biological kinetics in semi-solid biological processes, including solid-state fermentation and composting. This focus stems from an interest in transport phenomena, microbiology and their interaction in biological systems. My enjoyment in sharing these interests with students is one of the main reasons why I chose a career in academia and why I have encouraged undergraduate participation in my research program.

I was very fortunate to have Mari Chinn, a former undergraduate in Biological and Agricultural Engineering, involved with two research projects in my lab. One study was on the production of a biological control agent for the control of mosquitoes and another was the design of a semi-continuous reactor for solid-state cultivation. To help support her research and design work, Mari applied for and received funding from the Mosquito Research program and the Presidential Undergraduate Fellowship program.

In addition, Mari was rewarded for her outstanding academic performance at UC Davis. Last spring she was awarded a Departmental Citation Award from the College of Engineering at UC Davis, and a Graduate Fellowship from the National Science Foundation. It was exciting for me to observe and be included in the beginning of such a promising research and academic career.

Mari's research efforts were focused on the mosquito parasitizing fungus *Lagenidium giganteum*. This fungus is a very promising biological control agent (BCA) for mosquitoes and is now a registered BCA with the US EPA and CA EPA. It is available commercially from AgriQuest in Davis, CA. The sexual stage (zoospore) of *L. giganteum* is very resistant to desiccation and abrasion which makes this stage ideal for large-scale biological control of mosquitoes. However, current methods of cultivation result in zoospore production yields that are two orders of magnitude lower than those for cell production, so *L. giganteum* must currently be produced and supplied as cells. Although sufficient biomass can be produced in liquid culture, these cells do not remain viable upon storage and must be applied within one to three weeks of fermentation for effective mosquito control. Research is underway in my lab to study the production of *L. giganteum* in solid-state fermentation. Laboratory-scale fermentation studies are being completed to assess the effect of environmental parameters on the growth, zoosporogenesis and efficacy of *L. giganteum*. Mari played a large role in the design and testing of the reactors to be used in the study. She

CURRICULUM VITAE

Jean VanderGheynst
Department of Biological and Agricultural Engineering
University of California, Davis
jsvander@ucdavis.edu

EDUCATION

- Ph.D., 1996, Cornell University, College of Agriculture and Life Sciences and College of Engineering, agricultural and biological engineering with minors in environmental and soil and water engineering
- M.S., 1994, Cornell University, agricultural and biological engineering
- B.S., 1991, Syracuse University, chemical engineering, with distinction

PROFESSIONAL EXPERIENCE

- 1996-present, Assistant Professor of Biological and Agricultural Engineering, UC Davis
- 1991, Galson Inc., East Syracuse, NY, environmental consulting
- 1990, Dow Corning Corp., Midland, MI, manufacturing engineering

PROFESSIONAL ACTIVITIES AND SERVICE

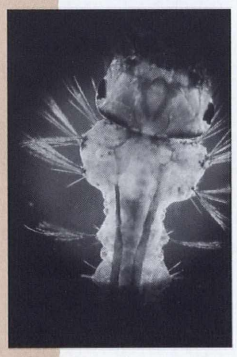
- Committee for Student Development
- California Organic Recycling Council; executive board member
- Editorial board member of Compost Science and Utilization

AWARDS

- Environmental Protection Agency STAR graduate fellowship, 1995-96
- Alice H. Cook and Constance E. Cook award for efforts on improving the status of women at Cornell, 1995
- George M. Berry award for overall outstanding senior engineer at Syracuse University and University Class Marshal for the College of Engineering, 1991

PUBLICATIONS

- VanderGheynst, J.S., VanderGheynst, G.B., Walker, L.P. 1997. *Development and analysis of oxygen sensing probes for in-situ monitoring of unsaturated solid-state biodegradation processes.* J. Air Waste Management. 47, 1041-1050.
- VanderGheynst, J.S., Gossett, J. M., Walker, L.P. 1997 *High-solids aerobic decomposition: pilot-scale reactor development and experimentation.* Process Biochem. 32 (5), 361-375.
- VanderGheynst, J.S., Walker, L.P., Parlange, J.Y. 1997 *Energy transport in a high-solids aerobic degradation process: mathematical modeling, validation and analysis.* Biotechnology Progress. 13, 238-248.
- VanderGheynst, J.S., VanderGheynst, G.B., Walker, L.P. 1997. *Measuring oxygen in compost piles.* Biocycle. 38 (10), 72-74.
- Baker, C.S., VanderGheynst, J.S., Walker, L.P. 1998. *The effect of extent of degradation and substrate on compost equilibrium moisture isotherms.* Submitted.
- VanderGheynst, J.S., Cogan, D.J., DeFelice, P.J., Gossett, J.M., Walker, L.P. 1998. *Effect of process management on the emission of organosulfur compounds and gaseous antecedents from composting processes.* In press.



also studied the effect of oil concentration and type on growth and zoosporogensis in solid-state cultivation. Funds from CAMP allowed Mari to present results from her study at the annual conference of the Institute of Biological Engineers in July 1998.

Biological control agents have been cultivated in both solid and liquid fermentation systems. Although liquid fermentation systems are the most common process for production, because of their prevalence in large-scale biotechnology facilities, solid fermentation processes have proven very effective for the production of BCAs like Trichoderma. In addition, studies have observed an improvement in the efficacy of some BCAs when cultivated in solid-state fermentation processes. Mari's senior design project in the Department of Biological and Agricultural Engineering at UC Davis involved the design, construction and characterization of a semi-continuous bioreactor for solid-state fermentation (see picture page 21). Her characterization of the reactor involved the cultivation of the biological control agent *Trichoderma harzianum*. She presented results from her design process last summer at the annual meeting of ASAE, the society for engineering in agriculture, food and biological systems.

Support from the CAMP program at UC Davis was instrumental in helping Mari build her oral and written communication skills, and increase her confidence in performing research. This support combined with Mari's academic rewards have helped develop a foundation for Mari's future growth and success in academia. She will be pursuing a graduate degree at the University of Kentucky in bioprocess engineering. Her previous academic and research experiences indicate that she is very well qualified for graduate study.

All Nations Alliance Hosts 1998 AMP Conference

"Completing the Circle through Education and Research"

The 6th Annual National Science Foundation Alliance for Minority Participation Research Conference, ARC, "Completing the Circle Through Education and Research," July 17-20, 1998, brought to western Montana participants from 27 national alliances. Hosted by All Nations AMP, the conference offered a unique blend of cultural and educational experiences set against the magnificent landscape of the Flathead Indian Reservation.

Dr. Joseph F. McDonald, President of Salish Kootenai College and All Nations AMP principal investigator, welcomed students at the opening ceremonies by encouraging cultural and spiritual as well as educational values. "Throughout all of its settings, meanings and cultures, education has empowered us to be here today," he said.

Dr. Roosevelt Calbert, Division Director, Human Resource Development, Dr. A. James Hicks, Program Director for the national AMPs, Dr. Daniel Goldin, Director of NASA, and Montana Senator Conrad Burns comprised the keynote speakers.

Hicks told students, "I encourage you to take full advantage of the opportunity here in Montana by networking with diverse individuals from the many regions of the country."

Conference organizers Judy Gobert and Eldena Bear Don't Walk saw to the many details of the conference, from the student presentations and outdoor activities to the cultural offerings, including the Standing Arrow Powwow at Elmo, on beautiful Flathead Lake.

One hundred abstracts for the oral and poster sessions provided focus for the conference, with the student presentations centered at Salish Kootenai College, Pablo, MT.

A special feature of the opening night was the signing of the conference poster, "Lakota Woman Dancer," by renowned Crow artist, Kevin Red Star.

Each alliance had the opportunity to sponsor four presenters. CAMP presenters were Ian Bacchus, physics (UC Berkeley); Christine Gonzales, biology (UC Riverside); Lisa Malone, biology (UC Irvine); and Albert Mendoza, chemistry (UC Santa Cruz). Mendoza took second place for his poster presentation, "Chemical Profile of a marine Sponge *Jaspis johnstoni.*" Their abstracts appear in this feature. The CAMP contingency was led by principal investigator, Nicolaos Alexopoulos, Dean, School of Engineering and Manuel N. Gómez, Vice Chancellor, Executive Director, CAMP Statewide.

From the opening ceremonies, announced by the Yamncut Drummers and the Medicine Wheel Ceremony, to the closing conducted by Theda New Breast, the conference was a source of inspiration and motivation.

The AMP "torch" has now been passed to Mississippi, where the 7th annual conference will be held in summer 1999.

> "The success with which our hosts forced us to build community—beginning with the thumbs-up-tongues-way-out on Friday night and ending with a sage smudge and prayer ribbons on Sunday—is a model for the work that the Alliances all strive for. We were challenged to create balance, to exhibit bravery, and to make permeable the boundaries in which we live both our scientific and spiritual lives."
>
> *— Sarah Richards-Gross*
> *CAMP Coordinator*
> *UC San Diego*

Four CAMP Students Present at ARC 1998

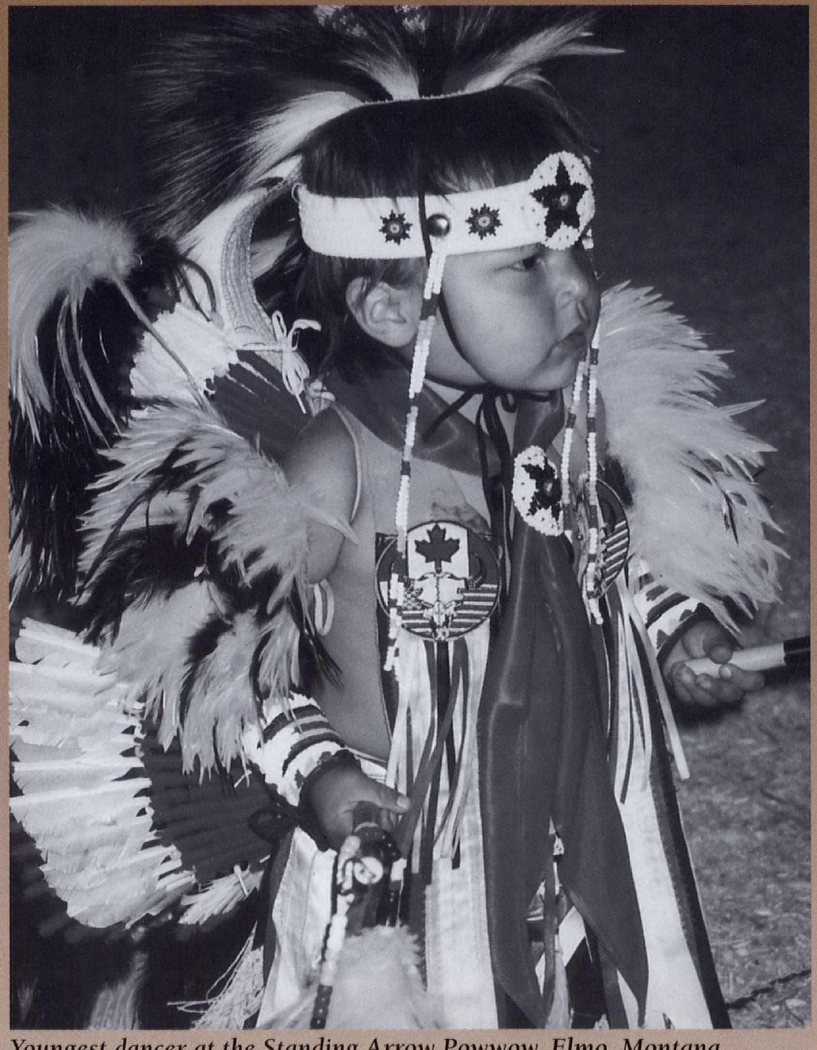
Story and photos by Marjorie DeMartino

Ian Bacchus

Major: Physics
Faculty Sponsor: Dr. Yusuf Hascicek, UC Berkeley

Resistive Joints in High Temperature Superconducting Systems

Making a 5T insert coil for a 25T NMR magnet requires approximately 10km of conductor. It is impossible to make a single piece of conductor this long, so it is produced in sections. These sections consist of double pancakes: coils of heat treated, insulted, high temperature superconducting (HTS) tape. A stack of these coils when connected would be the equivalent of a single long piece of HTS tape. A problem arises, however, in connecting them: how to link these double pancakes while minimizing resistance? One cannot bend or press double pancakes lest their performance be compromised; using excessive heat would have the same effect. Therefore, the task was to join heat treated HTS tape in a manner that would avoid damage to the tape as well as introduce the lowest possible resistance in the ensuing joint. Described are the materials, methods, and results from this endeavor.



Youngest dancer at the Standing Arrow Powwow, Elmo, Montana.

Alma De La Garza of the Chicago AMP discusses posters; below, Nancy Minear, CAMP evaluator, and Nicolaos Alexopoulos, CAMP principal investigator.

Eldena Bear Don't Walk, All Nations conference coordinator stays in touch.

2

ALBERT MENDOZA

Major: Chemistry
Faculty Sponsor: Dr. Philip Crewes, UC Santa Cruz

Chemical Profile of a Marine Sponge *Jaspis johnstoni*

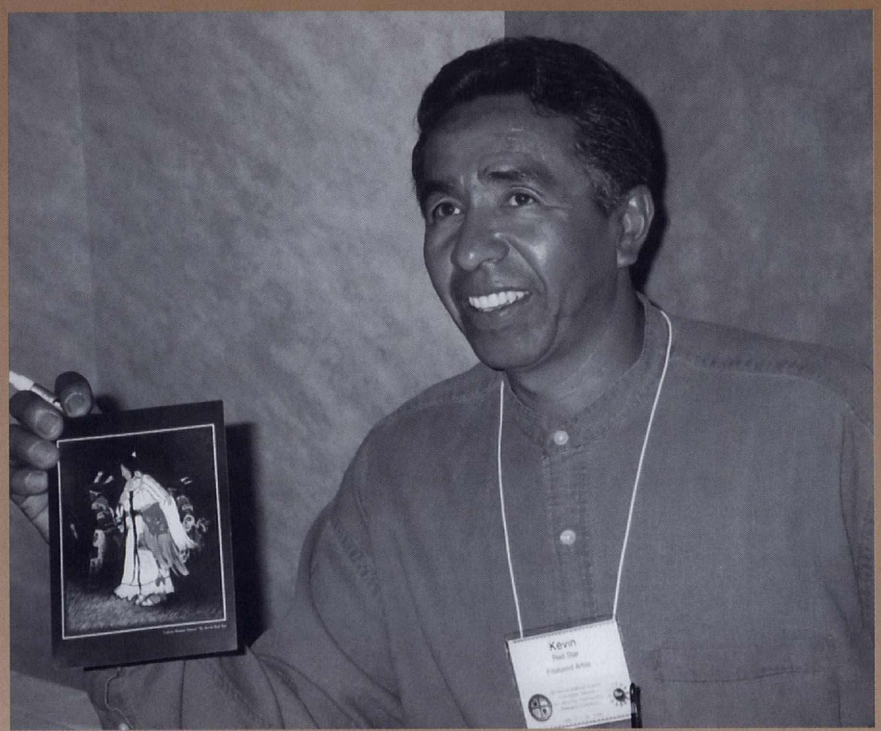
The Indo-Pacific marine sponge *Jaspis johnstoni* has been a source of diverse marine metabolites including jasplakinolide, a cyclodepsipeptide comprised of three amino acids. Jasplakinolide has been isolated as the major component from collections of the *Jaspis* sponge from the Indo-Pacific region including Fiji, Solomon Islands, Papua New Guinea, Indonesia and Vanuatu. Jasplakinolide has received much attention due to its anti-prostate cancer activity and unusual mechanism of action as an actin inhibitor that has been reported by the National Cancer Institute. Because jasplakinolide is not selective for cancer cells, further development for its use as an anti-prostate cancer drug has ceased. Biologists have found jasplakinolide useful as a research tool due to is mechanism of action as an actin inhibitor.

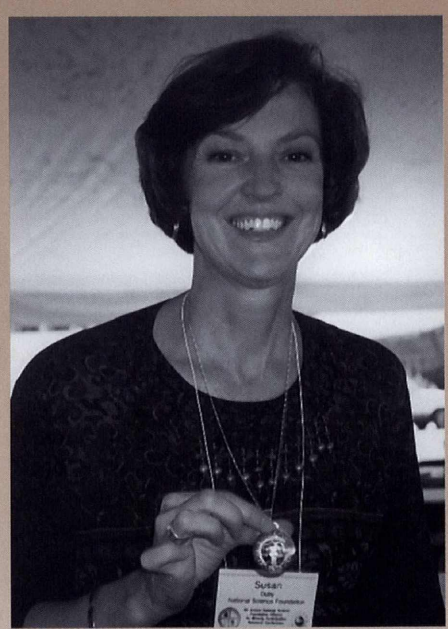
Magnificent

Christine Gonzales
Major: Biology
Faculty Sponsor: Dr. Leonard Nunney, UC Riverside

The Evolution of Hemoglobin

Hemoglobin is a multi-gene family consisting of an alpha and beta family, located on chromosome 16 and 11, respectively. It has been observed that there is a reduction in the frequency of the base sequence CpG (C followed by G) in the beta family but not in the alpha family. A proposed cause for this reduction in CpG is DNA methylation, however methylation is absent in regions of DNA called CG islands. Thus, the observed pattern could result if the alpha family is within a CG island. We will examine the CpG frequency in detail taking care to avoid the complication of mutations that cause an amino acid change, and compare only dinucleotide frequencies that differ by a synonymous change in the third position. The procedure includes a computer analysis of the exons and introns of various DNA sequences from organisms including plants, insects, fish, birds, and mammals. Comparisons are made between the expected CpG frequency and the observed CpG ratio in each sequence. In our analysis of CpG ratios among the class Mammalia, rodents appear to show a decrease in the alpha CpG ratio and an increase in the beta CpG ratio, compared to the other mammal groups. We will examine the possibility that the methylation pattern has changed in the rodents.

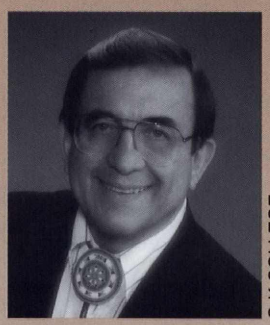




Well known Native American artist Kevin Red Star signed posters and postcards of his work, Lakota Woman, the conference poster. Right, Susan Duby, NSF representative and director of the Graduate Fellowship Program, shows off her purchase of a silver bear fetish, under the ARC Bigtop, Salish Kootenai College.

Montana

Left, Judy Gobert, All Nations project director and conference manager



S-K COLLEGE

Clockwise from above: jingle dress dancer, Standing Arrow Powwow; poster presenter Lisa Malone; and All Nations AMP P.I., Dr. Joseph McDonald

4

Lisa Malone

Major: Biological Sciences
Faculty Sponsors: Dr. Allen Gibbs and Dr. Valerie Pierce, UC Irvine

The Effect of Time Exposure on Urea in *Drosophila melanogaster*

Drosophila melanogaster is an ideal organism for studying evolution and development under various environmental conditions. We studied the development and survival of five populations of *D. melanogaster* under normal food and urea food. Urea is known to be detrimental *to D. melanogaster*. This experiment determines the relative time of exposure to urea needed to alter the normal development and survival of *D. melanogaster*. Two experiments were conducted. First, 40 larvae were started on normal food for 2, 3, or 3.75 days and later switched to urea food for 48, 24 or 6 hours respectively. Second, 40 larvae were started on urea food for 5 days and later switched to normal food for a period of 24 hours. Urea food contained 300 mM of urea. In the first experiment we observed that survival was inversely related to exposure time on urea. In the second experiment, flies were able to emerge into healthy viable flies when switched to normal food on the last day, however flies that were not switched suffered high mortality, suggesting that the last day of development is critical. Flies exposed to urea for even a short period of time do experience a decrease in their percent emergence. However, the detriment caused by urea is not permanent because a portion of the larvae started on urea are able to emerge into adult flies after being exposed to normal food for only one day.

PROJECT ATHENA

UCR-CAMP TUTORS ENHANCE PERFORMANCE IN MATHEMATICS

By Pamela Clute

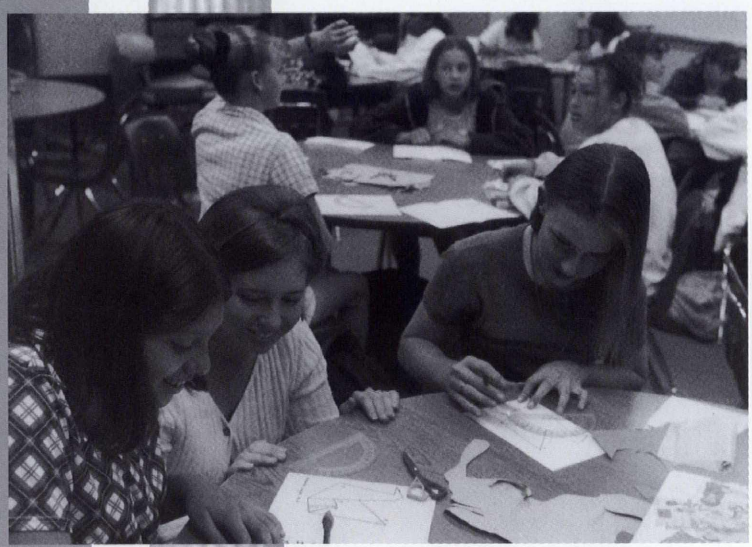


PHOTO BY THE SAN BERNARDINO SUN

Athena addresses several key needs in the science and mathematics community. First, the Athena project will make a significant contribution by increasing the number of women and girls interested in mathematics and science. Second, the project will increase the number of women and girls that pursue mathematics and science majors with the intent of entering a profession related to these disciplines. Third, the project will increase mathematics and science academic achievement of women and girls from all backgrounds thus opening career opportunities for this population.

The Greek goddess of wisdom, Athena, symbolizes the ideals and goals of an exciting initiative in the Riverside and San Bernadino counties for young women. Project Athena, supported by a grant from the National Science Foundation, aims to guide seventh and eighth grade girls toward greater participation in mathematics and the sciences. The project is highly collaborative, joining schools, parents, university faculty and junior high school girls in a concerted effort to improve academic performance and raise aspirations.

UC Riverside Professor Frank Romero, Department of Education, and I serve as co-principal investigators for Project Athena, which was prompted by the 1992 landmark report by the American Association of University Women that showed girls are less likely to pursue math and science. To encourage and support interest we brought in university role models, and looked to the CAMP program to provide motivated undergraduates majoring in science, engineering, and mathematics. UCR-CAMP participants serve as tutors and mentors, helping

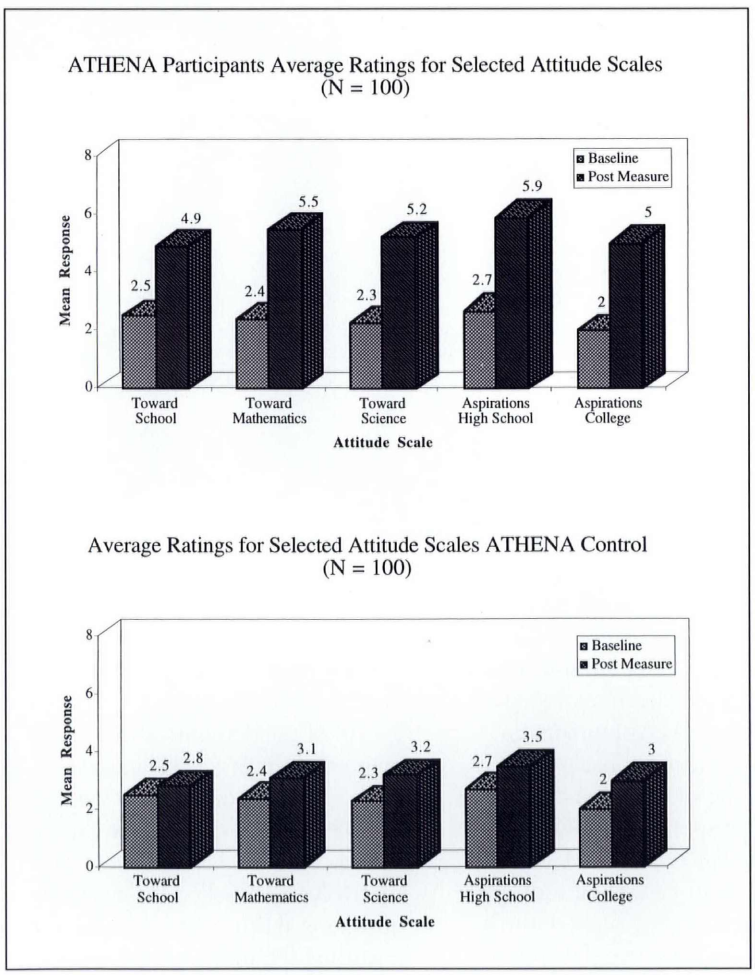
bring mathematics proficiency and science achievement to cohorts of 100 young women annually. Entering the second year of a three-year grant, Athena participants are provided opportunities to improve their mathematics and science academic performance, including SAT preparation. Other objectives include fostering parental support and creating awarnesss of teaching as a career.

CAMP tutors are exposed to the field of teaching, given experience in delivering instruction, and encouraged to pursue teaching as a career. They take courses in the School of Education on effective strategies for teaching and learning mathematics and science. CAMP tutors, in turn, are matched with UCR faculty mentors, and supported in preparing research papers to present at professional conferences. Thus, Project Athena enhances the academic aspirations and performance of everyone involved. The project also builds a supportive network for women helping women, and makes connections to professional women in such organizations as the American Association of University Women.

What have we learned after one year of implementation? First year findings show that Athena participants had significantly fewer school absences and occasions of tardiness than the matched control group, and they had greater increases from baseline to end of year measurement in their attitudes toward school, toward the study of mathematics, and toward the study of science. Participants also showed greater increases in their aspirations to complete high school and pursue and complete a college education.

One of my dreams is opening up the horizons of what constitutes mathematics. Project Athena shows young women that mathematics is involved in every aspect of our lives.

ATHENA: HIGH PERFORMANCE IN MATHEMATICS.
Women helping women is what Athena is all about. The project is highly collaborative, encouraging the pursuit of careers and educational opportunities in mathematics and science related fields. Fundamental goals are to provide and advance: opportunities and encouragement for 7th-8th grade female students to improve their mathematics and science academic performance and pursue mathematics and science careers; academic and financial support structure for college; female mathematics and science majors considering teaching as a career; parental awareness and support; and encouragement, opportunity and guidance from the public schools.

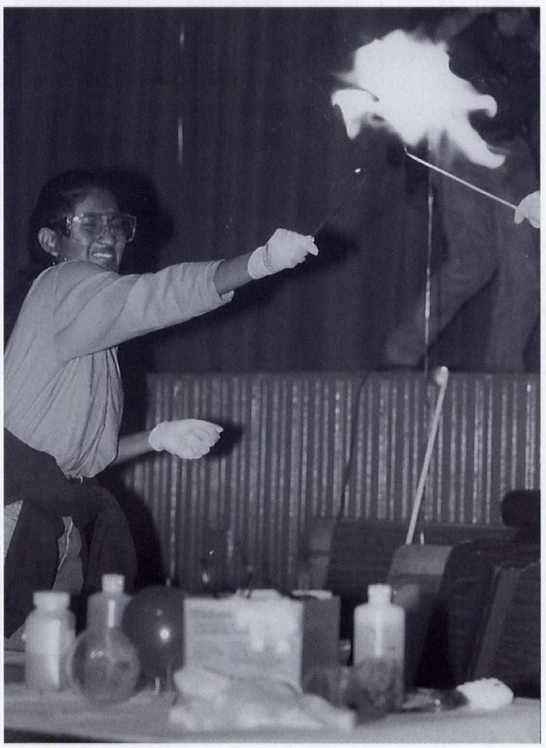


Pamela Clute, Ph.D., is a lecturer in the Department of Mathematics at UC Riverside and serves as the UCR CAMP-Teacher Preparation liaison.

UCI Chemistry Outreach Program

"Sweet, cool, awesome"... not exactly words that come to mind when thinking of high school chemistry. But that was the enthusiastic response of Los Amigos High School chemistry students as they watched a captivating presentation by volunteers from the UCI Chemistry Outreach Program. Providing lively demonstrations followed by well-scripted explanations, the program shows students that chemistry is relevant, dynamic, and exiting.

By Jenny Espinoza



UCI COMMUNICATIONS

Chemical explosions ignite interest

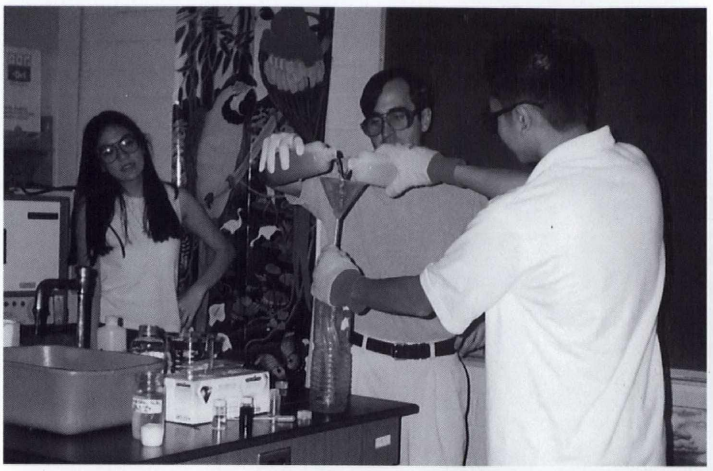
The UCI Chemistry Outreach Program was established to address limitations imposed on high school chemistry education by high costs and safety concerns, which have impeded the ability of teachers to offer more exciting and relevant lessons to students. Teams of graduate and undergraduate student volunteers have reached thousands of high school students in over 35 Southern California schools. During their visits, the volunteers deliver one of four scripted shows: the polymer show, the organic chemistry show, and variation shows I and II.

The variation show performed at Los Amigos High School started by intriguing students with a dense fog of dry ice and water, which then proceeded to extinguish a candle flame. The volunteers explained the chemical reaction involved in the sublimation of dry ice that was responsible for extinguishing the flame. This was followed by an acid-base color indicator demonstration, an egg sucked into a cooled jar, a liquid nitrogen demonstration with flowers and balloons, and the apparent melting of polystyrene foam "peanuts" by acetone. The dramatic finale took place in the dark and culminated with a piece of guncotton, held on a stick by a Los Amigos High School student, bursting into flames.

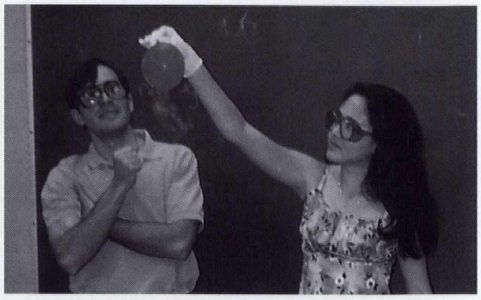
All of the demonstrations were marked with class participation. High school students participated in the execution of each of the experiments. After each experiment, the UCI volunteers asked the students questions and invoked a dialogue regarding the underlying chemistry principles behind the experiments. The show ended with a discussion about college, graduate school, and the study of chemistry as a career.

Feedback from the class underscored the unique and valuable experience that the UCI Chemistry Outreach Program provides. "Not only was this entertaining, but I actually learned something," exclaimed one student. "I wish our teacher would let us do this kind of stuff in class. Usually there is so much writing and chemistry seems so complicated, but this show amazed me," said another. Mrs. Anna Richards, Los Amigos High School chemistry teacher, also attested to the value of having trained graduate students share their knowledge. "They did a great job and were very informative. I think this helps to enhance students' enthusiasm and desire to go into science majors, and not just think it's hard, icky or boring; instead, they think 'this is exciting and look what we can do.'" Richards added, "they serve as mentors because a lot of our students go to UCI."

The UCI Chemistry Outreach Program is beneficial for everyone involved, and supports the university's public service mission. The students are educated and motivated, the teachers' lessons are complemented and reinforced and the UCI volunteers attain teaching experience while becoming more in touch with their community.



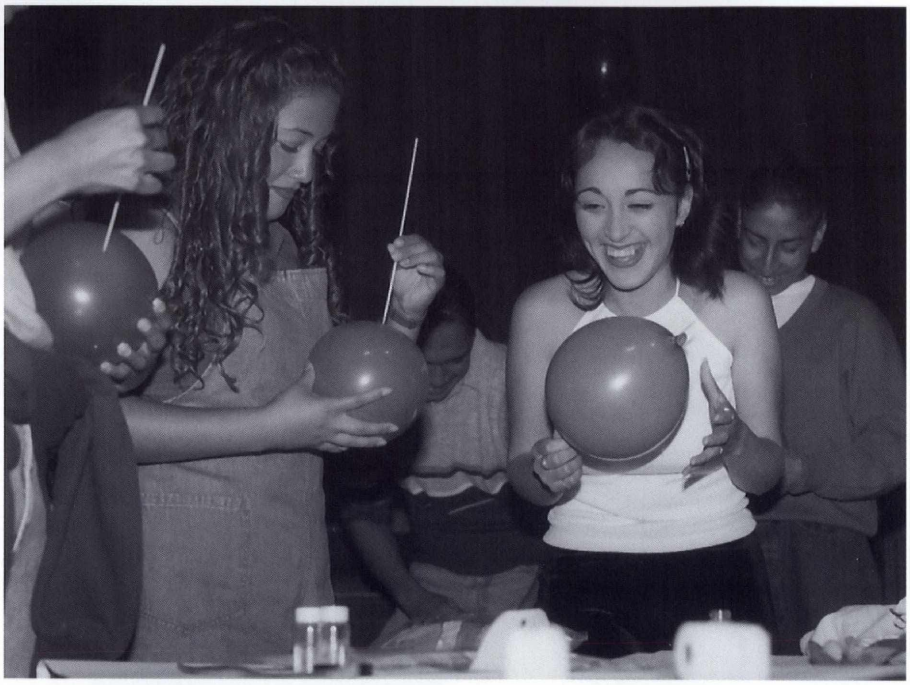
UCI Chemistry Outreach is designed to enlighten high school students about the "wonders of chemistry" and to inspire them to pursue a college education.



J. ESPINOZA

LOS AMIGOS HIGH SCHOOL PROFILE

- Motto: Siempre Con Dignidad (Always with Dignity)
- Principal: George Willson, Ed.D.
- School District: Garden Grove Unified
- 81% of the Class of 1997 registered in colleges and universities
- 627 students made honor roll
- 170 students participated in the California Scholarship Federation
- 115 students maintained a 3.5 gpa for three semesters and earned academic letters
- 21 teachers tutored students four days each week
- 9th and 10th grade OCAD Team placed 6th among 48 Orange County teams
- Advanced Placement (AP) courses are offered in art appreciation/history, biology, calculus, chemistry, economics, English, French, Spanish, physics, and U.S. history.
- Golden State Exam results included 36 high honors, 70 honors, 171 school recognitions
- Los Amigos won the Darrell Stillwagon Memorial Trophy for Best Leadership Team in Orange County
- UCI Chemistry Outreach site



UCI COMMUNICATIONS

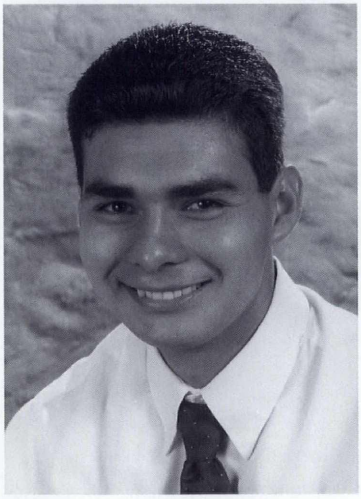
Abracadabra! The magic of chemistry.

Although chemistry is so important that it is often called the "central science," opportunities to learn chemistry have declined. Issues of safety, disposal, and cost limit teachers' abilities to incorporate demonstrations and laboratory experiments, rendering the subject less exciting and less relevant to the students' daily lives. The UCI Chemistry Outreach Program, a three-year grant supported by the National Science Foundation, was developed by Dr. James Nowick to address these issues. In the program, teams of graduate and undergraduate student volunteers visit local high schools to perform demonstrations and talk about chemistry. The program has been a resounding success, having sent over 100 volunteers to over 35 Southern California schools—reaching over 10,000 students since 1992.

Jenny Espinoza graduated in June 1998 from UCI and is enrolled at UC San Francisco Medical School. She was a CAMP participant for four years. She has conducted research at the Beckman Laser Institute.

1998 UCI CAMP-

The third annual scholarship offering supported by Toshiba America Companies of Southern California continues to support students at UCI. Darrell Lynn of the Toshiba America Electronic Components division and his colleagues on the community relations board have joined to make the 3rd annual CAMP-Toshiba Scholarship possible with a $10,000 gift. Candidates are highly competitive science, engineering and mathematics majors with plans for graduate school. Most have research experience. Part of the application requirements includes a personal essay, in which students express their goals, inspiration, and commitment to education. The scholarship supports educational expenses at UCI, and represents a viable, ongoing corporate partnership. Each of these undergraduates exemplifies UC talent.



JUAN L. BRAVO

SENIOR, BIOLOGY AND CHEMISTRY

Bravo participates in CAMP in numerous ways, having joined the program as a new freshman, serving as a tutor and conducting research. He has presented at several national conferences and completed a summer internship at Stanford University. For summer 1998, he participated in AIDS-related research at New York University. Additionally, Bravo was a 1997-98 Ronald E. McNair Program scholar. Bravo plans to enroll in graduate school in biochemistry and hopes to become a university professor.

BRIAN C. MCCURTIS

JUNIOR, INFORMATION & COMPUTER SCIENCE

McCurtis is involved in several programs and organizations to, as he says, "maximize" his educational success. He contributed to a group research project demonstrating the importance of creating efficient and reliable software. McCurtis is treasurer of the UCI Chapter, National Society of Black Engineers; he attended the NSBE Leadership Conference in August. He took third place for his research presentation at the 1998 National McNair Conference in Tennessee.

He relaxes by playing jazz on his tenor saxophone.

LISA M. MALONE

JUNIOR, BIOLOGICAL SCIENCES

Malone considers herself a dedicated young woman striving to succeed in a complex and challenging arena. Her faculty advisors couldn't

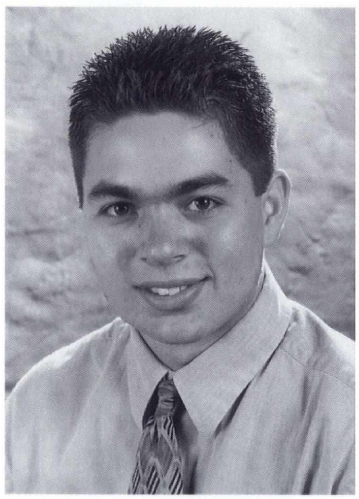
Toshiba Scholars

agree more. She has maintained her status on the dean's list with a 3.5 gpa, and hopes to become a medical doctor. As a new freshman, Malone participated in the CAMP Summer Science Academy, then went on to become a tutor and mentor herself. She also became involved in research, which she is currently conducting in the lab of Dr. Allen Gibbs. Three members of her family will be enrolled in college next fall, so this scholarship provides financial support that is especially timely.

LYNHER RAMIREZ

JUNIOR, CHEMICAL ENGINEERING

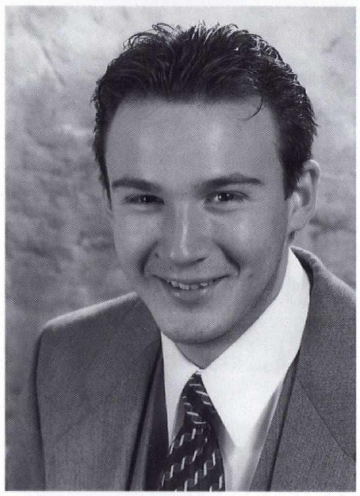
Ramirez completed a summer internship program in Texas for Union Carbide Company. Her career goal is to work at a chemical company, and she intends to pursue a master's while working, and eventually participate in managerial aspects of a chemical company. She enjoys motivating youngsters through an engineering outreach program, and encourages third and fourth graders to begin thinking about college. Ramirez also speaks to high school students and feels that it is her obligation to be a positive example in her community.



AARON M. SOTO

JUNIOR, INFORMATION & COMPUTER SCIENCE

Soto feels that his experience in the CAMP Summer Science Program helped him gain the confidence needed to achieve in a fiercely competitive environment. His area of specialization is software systems, and he is seeking a summer internship with a large software development firm to gain industry experience. Soto hopes to move into project management and eventually earn an MBA to support that goal. He also hopes to run his own business some day.



HERMAN A. VILLALBA

JUNIOR, BIOLOGICAL SCIENCES

An M.D./Ph.D is Villalba's long-term goal. He completed a project in physiology at Harvard University, and received honorable mention for his work at the 1998 AAAS conference. He is currently conducting research in psychobiology under Professor Ricardo Miledi. For the past three years, Villalba has tutored his peers in general and organic chemistry, and he enjoys teaching math to middle school students in the UCI Saturday Math Academy. The impact of Villalba's tutoring and that of his peers has significantly enhanced the mathematics abilities of disadvantaged 7th graders at three local schools.

CAMP Teacher Preparation FIRST PERSON POV

By Noemi Barragan, Paula Carbajal, Charles Dominguez, and Rocio Jimenez

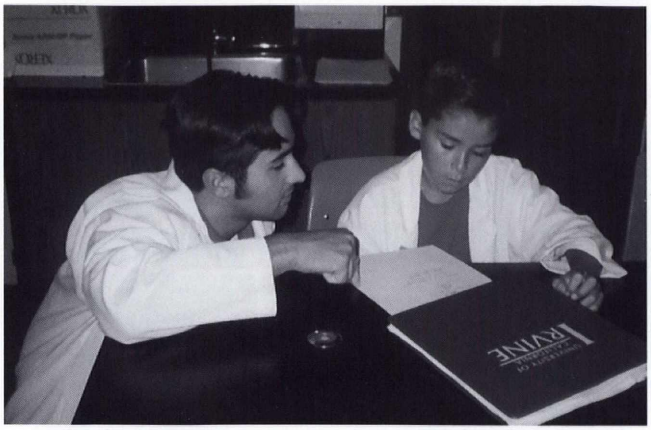
NOEMI BARRAGAN

"Education is a powerful tool in one's life, which can not be taken away nor substituted. Ever since I was young, I have always had a strong love for the teaching profession. As the eldest in my family, I have had the responsibility of taking care of my brothers in many ways. One was to teach them what I knew. I would gather all the kids in our neighborhood and we would play school—and I always played the teacher. Mathematics is an important and fascinating subject that forms a foundation for other sciences. Thus, I decided to continue my mathematics education at UCI, where I received my B. S. degree in math summer '98. As an undergraduate, I was often the only woman in my classes. But that only challenged me to build up my own determination to succeed. Achieving my math degree has given me great assurance and confidence that I can continue striving for my goals, which include graduate studies toward a credential in mathematics for middle and high school. I am especially excited about the prospect of teaching math and physics to young women. In view of the shortfall of female role models in science, I feel that this is an area of great promise for me."

Noemi Barragan, right, reacts to lesson in pedagogy.

PAULA CARBAJAL

"One of the biggest influences that inspired me to go into academia is my own background. My siblings and I comprise the first generation in our immediate family to earn college degrees. My family migrated to the United States in 1973 from Mexico, settling in the low income community of East L.A.. There, one must overcome extreme obstacles such as poverty, gangs, drugs, and crime. However, I have learned that obtaining an education is imperative. My family is a prime example. Among us, we now count a civil engineer, a high school teacher, a business administrator, a registered nurse, and an entrepreneur. Moreover, my brother is currently pursuing a B.S. in civil engineering. To attain these goals we became our own support group. With the increase in the Latino community and the need for equal representation in the sciences for Chicanos/Latinos, more Latinos with graduate degrees will be in demand. I am completing my B.S. in computer science with a minor in mathematics, from UCI. As a teacher, however, I would be limited as to what I can do for the overall student body. Therefore, my goal is to become a school principal, and some day a superintendent, where my objective will be to prepare all students intellectually and technologically to excel. As a tutor in the Saturday Academy our objective is to accelerate sixth through eighth grade students in mathematics. Moreover, expose young potential students to college and encourage achievement. My experience as a tutor, mentor, and a friend to the students has been very



Charles Dominguez tutors young student.

motivating. Helping eager and enthusiastic children has made my experience extremely satisfying."

CHARLES DOMINGUEZ

"If anything can be said about my college years, my formal and informal education has been well-rounded. I have been able to explore a multitude of careers and make informed decisions backed by a confident and content state of mind. As a biology teacher in junior high school, I will not only be afforded the opportunity to teach a subject that I enjoy but also given the chance to work with children who are at a delicate and influential age in life in which they are transcending from children to teenagers. Biology is an all-encompassing subject that relates to almost every aspect of our lives. The opportunity to spark this interest while helping to develop the minds, goals, and dreams of young people is a challenge I am anticipating. My personality is one which enjoys and cannot function without the interaction of people. This realization became apparent to me when I returned from an internship in Madrid, Spain last summer—a country where there is a distinct balance between one's social life and one's career. It became apparent to me that I perform best and get the most satisfaction from an interactive environment that allows for the exchange of ideas and experiences. I plan on applying the experience of Spain to achieve a balanced life in respect to family and career. I am involved in the UCI Early Outreach Program where I tutor mathematics at Willard Intermediate school in Santa Ana. This experience has been instrumental in my decision to pursue a teaching career. There is a certain energy that I see in students at this level, which attracts me to the career of teaching and has also contributed to my current decision. I anticipate helping to nurture dreams, while realizing of course that dreams do not carry much weight unless they have direction. I want to be the kind of teacher that is remembered for sparking interests in students, while at the same time giving them the tools and guidance needed to reach their dreams."

Rocio Jimenez, June 1998!

ROCIO JIMENEZ

"In addition to my family, my educational goals were also influenced by reading fascinating biographies in the Society of Mexican American Engineers and Scientist National Magazine, about Latino scientists and engineers in this country. Their academic experiences in college and their life experience guided my decision of what to study at the university—and I started to think about obtaining a bachelor degree in mathematics. Then, I thought that I could combine a mathematics degree with a teaching career. I am concerned with the limited number of Latino teachers in our schools, especially where more than half of the students are Latinos. The fact that there are even fewer Latino women teaching, especially in the field of mathematics and science, further motivates me to become a mathematics teacher. Since enrolling at UCI, I have focused on achieving my goal of becoming a teacher. I have worked at the Santa Ana Unified School District to gain experience in the classroom. I am currently working at Lathrop Intermediate. Many of the teachers let me teach one of their classes or they let me work with a group of students. When I work with the group of students I am responsible for teaching the same material the teacher is teaching in the classroom. I realize that to be a well prepared teacher it is not enough to take mathematics courses at the university or volunteer at school, but to further my experience and knowledge by taking part in internship programs. For two summers I participated in the Young Educators Program, which has a strong curriculum development component. Together with another student, we were responsible for teaching high school students a statistics and probability class like a college course. This was very challenging because we had to be very well prepared with our lectures, homework assignments and exams."

This feature was facilitated by Sonia Mucarsel, program director, Project SMART, UCI.
Southern California Edison supported the professional development of these teacher credential candidates.

A TRUE CAMP *Wedding*

By Ryan D. Mitchell

ARC 1995 was by far the most productive AMP conference I have ever participated in, and who better to host it than UC Irvine? I attended as the graduate student assistant to the CAMP program at UC Davis. Kara-Lisa, my then future wife, was the undergraduate liaison for ARC 1995 while working for CAMP under direct supervision of Dr. Juan Francisco Lara, Regional Director of CAMP at UCI. Kara-Lisa was also an Irvine CAMP student and mentor. Who would have known that after meeting her at the conference that we would be married three years later. CAMP has clearly had an impact on our personal and professional lives.

Kara-Lisa's first encounter with the program came in the summer prior to her freshmen year when she participated in the CAMP Summer Science Academy. Her experiences included mentoring and research, and travel to national conferences. The golden opportunity for Kara-Lisa, however, was the opportunity to teach science to first and second graders in Santa Ana. Since that time, she has completed one year as an assistant teacher in a private elementary school in Pasadena where she had the opportunity to teach the science and math components to first and second graders. The kids loved Kara-Lisa. With the motivation of a locomotive, she also began teaching her own craft classes at a local cappuccino bar to help kids explore their creative side. Kara-Lisa will return to classes at UC Davis in fall 1999 after taking a year to teach at a Montessori school in Sacramento.

My own experience with CAMP began as I was completing my last year of graduate studies at UC Davis where I served as the graduate student assistant to the program. As the current CAMP coordinator, director of the Mentorships and Opportunities for Research in Engineering (MORE) program, and occasional biochemistry lecturer at UC Davis, the opportunity to engage in student outreach and education has been very motivating. Above all, however, the network of individuals connected with the statewide CAMP program is not unlike that of a large family out of which can develop numerous possibilities.

Although Juan Lara might have predicted something would become of the meeting of Kara-Lisa and I at ARC 1995, little did I expect that Juan and I would have our next meeting at the small engagement party for Kara-Lisa and I, and later at our wedding reception. To add a little more trivia to our "CAMP wedding," my wife's childhood best friend and maid of honor was Adia Millett. Not only was she a witness to the beginning of our new family, she is also indirectly a part of the CAMP family as she is the niece of Kenneth Millett, Regional Director at UC Santa Barbara. CAMP seemed to have quite a presence in my wedding to Kara-Lisa. A true CAMP wedding indeed!

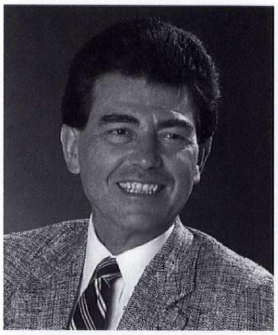
The kids love Kara-Lisa's innovative and enthusiastic teaching style.

Kara-Lisa Jones and I were married in July 1998.

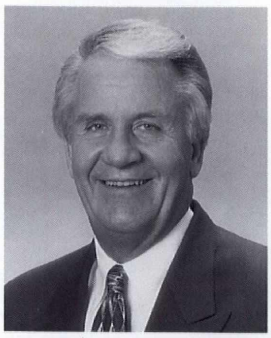
Dr. Ryan D. Mitchell earned a Ph.D. in biochemistry and molecular biology at UC Davis. He teaches a course, Metabolism and Bioenergetics, and serves as CAMP coordinator.

CAMP ADVISORY BOARD

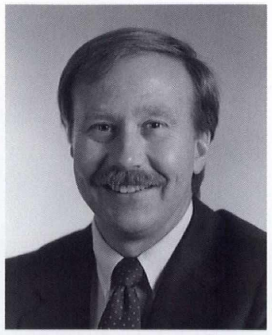
The CAMP statewide advisory board represents public and private sectors in a variety of business and industry endeavors, as well as representatives of California higher education. Members are called to 1) work actively with the P.I. on behalf of program expansion and development; 2) act as a liaison between CAMP, the community and corporate sectors, create appropriate links and offer expertise; 3) cultivate a general awareness of the trends in technology-based industries in California, in order to advise CAMP more effectively to meet industry's requirements; 4) become familiar with science educational issues, and committed to improving minority undergraduate science education and access to science careers; and 5) provide or facilitate internship opportunities. The board is co-chaired by Vice Chancellor Manuel N. Gómez, Executive Director, CAMP Statewide, and Nicolaos Alexopoulos, UCI Dean of Engineering, and CAMP P.I.



DR. FRANCISCO AYALA
Bren Professor
Ecology & Evolutionary Biology
UCI

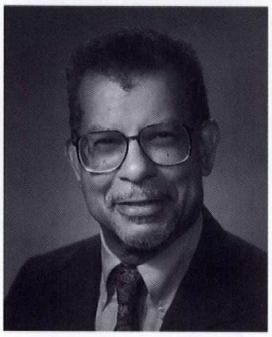


MR. RICHARD COLLIVER
Executive Vice President
Honda Automobile Sales



DR. DENNIS GALLIGANI
Associate Vice President
UC Office of the President

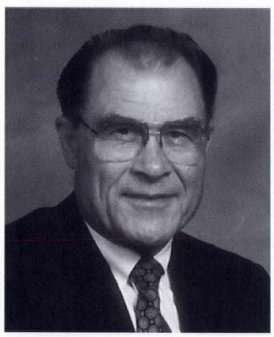
DR. ELMA GONZALEZ
Professor of Biology
UCLA



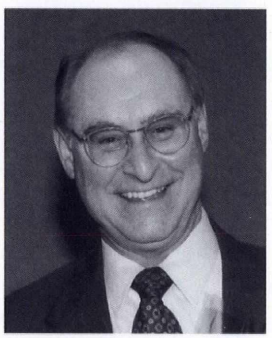
MR. GUS GUICHARD
Director of Special Projects
Chancellor's Office
California Community Colleges

DR. SUSAN HACKWOOD
Executive Director, California Council on Science & Technology
Professor, UC Riverside

DR. THOMAS HUNTER
Vice President
California Laboratory
Sandia National Laboratories

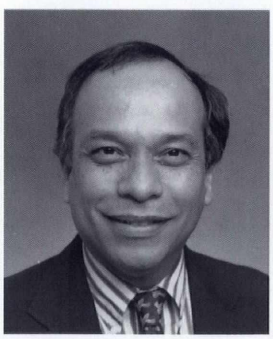


MR. ROBERT KLEIST
President
Printronix, Inc.

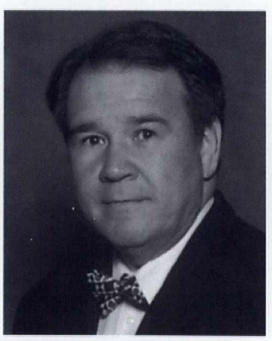


MR. DARRELL LYNN
Community Relations
Toshiba America Electronics Components, Inc.

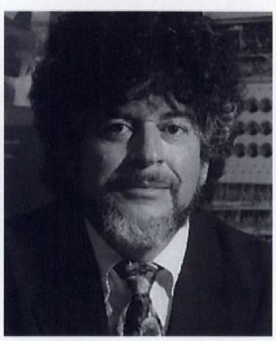
DR. MARTHA MECARTNEY
Associate Dean, Graduate Studies; Professor, Engineering
UCI



MR. ALFRED PAIZ
Manager, Air Force Laboratory Programs
NASA Jet Propulsion Laboratory



MR. FRANK ROBLES, J.D.
Compliance, Affirmative Action & Diversity Program, Lawrence Livermore National Laboratory

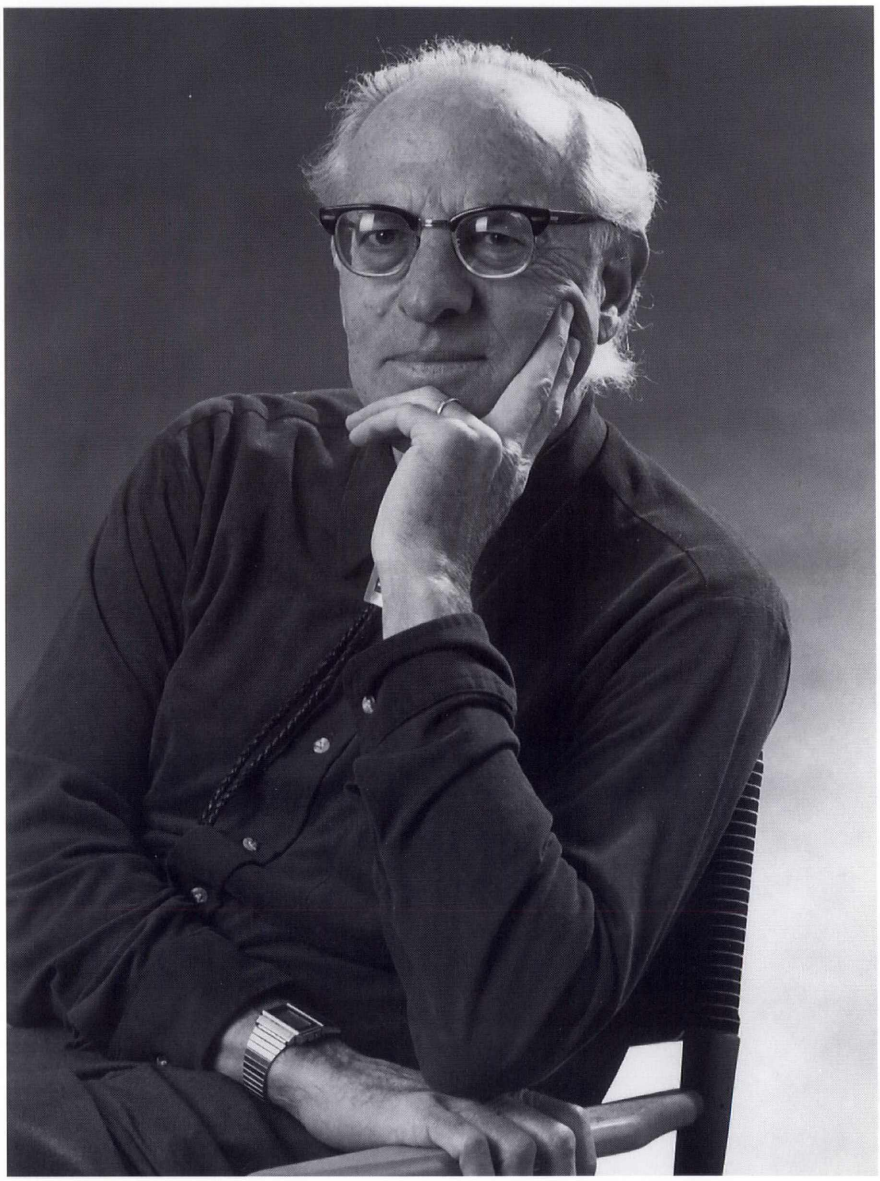


MR. ABAD SANDOVAL
University Programs
Los Alamos National Laboratory
Los Alamos, New Mexico

IN MEMORIAM

Frederick Reines

1918 -1998



Nobel laureate Frederick Reines, recognized among scientists as the "father of neutrino physics," died August 26, 1998, of Parkinson's disease. He was 80. Reines lived on the UCI campus, where he was distinguished professor emeritus in physics. He won the Nobel Prize in 1995 nearly 40 years after his discovery of the subatomic particle called the neutrino changed the world of physics. Until his discovery, scientists had only theorized the existence of the neutrino. It was only last year that other scientists, using detectors in Japan, finally determined that the neutrino does have some mass and thus could contribute to the so-called dark matter that pervades and shapes the universe.

Born in 1918 in Paterson, New Jersey to Russian immigrants, Reines grew up in his parents' general store. He joined the Boy Scouts and built crystal radios from scratch on his way to attaining the rank of Eagle Scout. He had decided by the time he was a senior in high school to be "a physicist extraordinaire." Upon receiving his Ph.D. from New York University in 1944, he was immediately recruited to work on the Manhattan Project at the Los Alamos National Laboratory in New Mexico. His first job was on the theoretical staff headed by Dr. Richard Feynman, another future Nobel laureate.

Reines joined the University of California, Irvine in 1966 as founding dean of the School of Physical Sciences. He later returned to full-time teaching and research, heading a team of neutrino scientists. The team's subsequent research on neutrinos from supernova 1987A won the Bruno Rossi prize in high-energy physics from the American Astronomical Society. He also received many important awards, including the National Medal of Science, the Franklin Medal from the Benjamin Franklin Institute Committee on Science and the Arts, the J. Robert Oppenheimer Memorial Prize, and was named to the National Academy of Sciences.

His sense of humor, his humility and his generosity were well known. He loved music and could be heard singing opera in his office for hours. As an undergraduate, he took lessons from a voice coach at the Metropolitan Opera, where his fine baritone earned him solo roles in Handel's "Messiah."

In 1997, UCI named its physical sciences instructional building Frederick Reines Hall. Plans are under way to establish the UCI Foundation-Frederick Reines Memorial Fund. Chancellor Ralph J. Cicerone said, "Fred Reines leaves behind a rare legacy of fundamental scientific discoveries and many, many dear friendships. He will be greatly missed."

UC: Where Science Is Invented Every Day

Cutting Edge Research, Cutting Edge Attitude

Revolutionizing the undergraduate experience, CAMP promotes mentored research as a key student development tool and a platform for graduate school. Directed by distinguished faculty, CAMP promotes the vision of shaping California's future university faculty and its scientific and technological workforce.

Participants select opportunities in the science, engineering and math-based disciplines as well as in teacher preparation leading to the K-12 single subject credential. Our faculty believe that creative research is one of the highest academic goals undergraduates can attain and one of the best ways to prepare them for persistence and success in graduate work. Our efforts affirm that scientists are best developed by other scientists serving as mentors who exhibit and expect scholarly excellence.

CALIFORNIA Alliance FOR Minority Participation

In Science, Engineering and Mathematics

Berkeley • Davis • Irvine
Los Angeles • Riverside
San Diego • Santa Barbara
Santa Cruz

University of California, Irvine
CAMP Statewide: 600 Administration
Irvine, CA 92697-1023
949/824-6578 • Fax 949/824-3048

BULK RATE
U.S. POSTAGE
PAID
SANTA ANA, CA
PERMIT NO. 1106