California Louis Stokes
Alliance for Minority Participation
in Science, Engineering and Mathematics

CAMP

2006 STATEWIDE SYMPOSIUM PROCEEDINGS & PROFILES

University of California, Irvine
Arnold and Mabel Beckman Center of the
National Academies of Sciences and Engineering

UNIVERSITY OF CALIFORNIA

Davis

Irvine

San Diego

Santa Barbara

Riverside

Los Angeles

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CALIFORNIA ALLIANCE FOR MINORITY PARTICIPATION IN SCIENCE, ENGINEERING AND MATHEMATICS

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CAMP is one of 37 Louis Stokes Alliances for Minority Participation funded by The National Science Foundation.

California Louis Stokes
Alliance for Minority Participation
In Science, Engineering and Mathematics

CAMP

2006 STATEWIDE SYMPOSIUM

The CAMP Symposium Aims To:

- *Support undergraduate research with a faculty member;*
- *Develop student written and oral communication skills;*
- *Provide a UC systemwide forum for faculty and students;*
- *Foster interest in graduate education, particularly for the Ph.D.;*
- *Set national standards for undergraduate research.*

UNIVERSITY OF CALIFORNIA

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Los Angeles

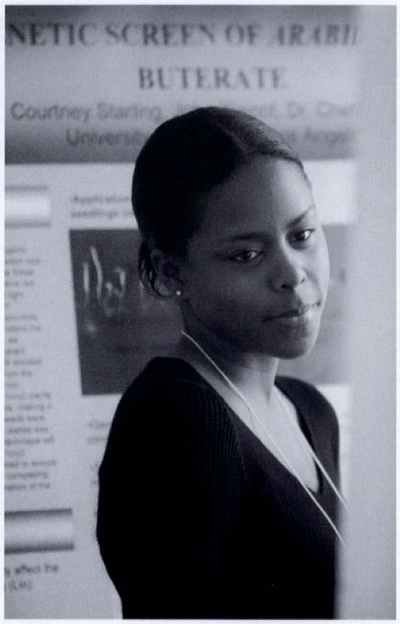
Santa Cruz

Berkeley

The CAMP Statewide Undergraduate Research Symposium is a student development opportunity supported by the National Science Foundation and the University of California.

CAMP General Information

UNIVERSITY OF CALIFORNIA
LOUIS STOKES ALLIANCE FOR MINORITY PARTICIPATION
IN SCIENCE, ENGINEERING, AND MATHEMATICS



Summary

The California Alliance, administered at UC Irvine is completing "Phase III," a third five-year funding cycle, 2001-06. The primary goal is to significantly increase the number of B.S. degrees granted to underrepresented minority students in STEM (science, technology, engineering mathematics) majors at the University of California. Offered at the eight general UC campuses, CAMP has created a systemwide network of faculty, program staff, and students working toward common goals, including completion of the B.S. degree and preparation for and transition to graduate school or the scientific workplace. This effort has contributed to a total of 13,688 B.S. degrees awarded to underrepresented minorities by UC since 1990. In addition to faculty mentored research experiences, principal activities include peer mentoring and tutoring, collaborative learning, presenting at scientific conferences, science writing and co-authorship, technology proficiency, and preparation for graduate school. CAMP is one of 37 national alliances named for former Ohio Congressman Louis Stokes. Our proposal to the National Science Foundation for continued funding in Phase IV (2006-2011) is under review.

Program Impact

For nearly 15 years, the California Alliance for Minority Participation in Science, Engineering, and Mathematics has consistently pursued a comprehensive approach to assist underrepresented students to complete the B.S. degree and prepare for graduate education. The effort has been unwavering. Our faculty mentors are convinced that undergraduates are very capable of becoming contributing members of a laboratory research team. CAMP participants are award-winning researchers and have co-authored published papers in refereed journals while still undergraduates. Student academic performance is a top indicator of achieving effectiveness. University of California students have consistently performed at outstanding levels in national scientific arenas. We expect to continue impacting degrees granted systemwide. UC STEM baccalaureate degrees granted to underrepresented students have increased by 84% since 1991 and STEM enrollment by 96%. The graduate school culture has made significant increases in students completing master's and doctorate degrees as well. At a minimum, through self report (primarily email), 35% of program participants have gone on to graduate or professional schools. Further efforts to track students are pursued through the Senior Exit Survey. For Phase IV, the University of California is fully committed to sustaining the numbers of underrepresented students earning baccalaureate degrees; involving even more of our faculty in mentored research experiences; and increasing the percentage of our students enrolling in graduate and professional schools. Our Bridge to the Doctorate supplemental activity will continue, pending renewal, with a new cohort at UC Davis.

In 2005, the University of California awarded 1,292 B.S. degrees in STEM to underrepresented minorities systemwide.

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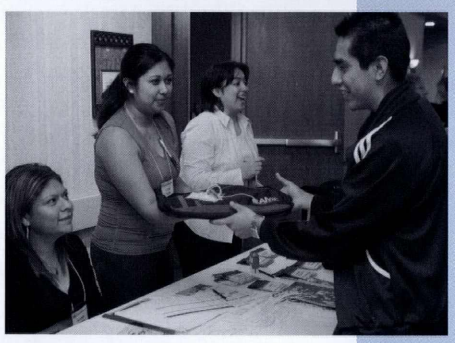


"This being my second attendance at the CAMP Symposium, I remain impressed with the quality of the presentations, the participant enthusiasm, and the positive scientific interactions that are the fruit of the UC Systemwide CAMP program. I encourage all involved to continue striving for such a high level of excellence in STEM research, and I look forward to next year's event."

—Michael Marsella, Ph.D., Department of Chemistry,
UC Riverside, CAMP Faculty Director

Message from CAMP Statewide

Congratulations to all the presenters at the annual CAMP Statewide Undergraduate Research Symposium. Ninety presenters were scheduled to present their research in an oral or poster format, and sixteen students received Special Merit in Research Awards. Additionally, special recognition was given to two posters in the areas of environmental and ecosystem science, toxicology, pathology, veterinary public health and infectious disease control. The awards, sponsored by the UC Davis School of Veterinary Medicine, were presented by Dr. Ben Norman to Nicole Klanfer (UCLA) and Geoffrey Lovely (UCD).

Something very special comes from bringing undergraduate researchers together from across the University of California. The exchange of ideas, experiences, and perspectives is rich and rewarding. There is added value in our graduate school panels and poster session, with participants from the Bridge to Doctorate supplemental activity at Irvine and San Diego.

Thanks to the faculty and professional staff, especially our UC program coordinators, who contributed much to the symposium's success. We have seen students advance from this statewide event to achieve recognition at national professional meetings, building their credentials for graduate school or the professional workplace. CAMP participants bring distinction not only to themselves but to their faculty mentors and the program staff that urge them on to growth opportunities.

The 2006 symposium afforded students the occasion to share their scholarly work and grow in confidence in their own abilities to communicate effectively to faculty and peers. For first-time presenters, the symposium is a gateway to other venues of scientific discourse. From the many conversations throughout the symposium, it is clear that students are moving forward in subject mastery and gaining a deeper understanding of their chosen majors. This is the true test of understanding something -- to explain and teach it to others. From this glimpse into student capabilities, it is clear that the University is preparing students for exciting and meaningful roles in the 21st Century. Importantly, it gives our faculty reason to continue to mentor aspiring students in the science, technology, engineering, and mathematics fields because the greatest reward is seeing students succeed.

This publication is a testament to student achievement and the ways in which peer support contributes to undergraduate education. By virtue of attending the oral and poster sessions and participating in the discussions, all students benefit. The engagement fosters inquiry and opens possibilities, leading students to consider opportunities beyond their comfort level. Finally, this symposium directly reflects our mission: Creative research is one of the best ways to prepare students for persistence and success in graduate school, and that scientists and engineers are best developed by other scientists serving as mentors who exhibit and expect scholarly excellence.

—Marjorie DeMartino,
Symposium Chair, Associate Executive Director

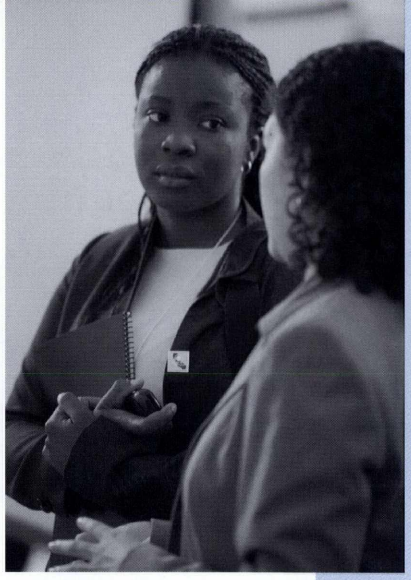
"Spending hours conducting research really pays off when you get to display what you have accomplished. I know now that I am not alone; I belong to a growing community of research scholars. WOW! That is empowering!"

—Nicole Klanfer,
UCLA, Special Merit in Research Awardee

"The Statewide Symposium offers CAMP students the possibility of sharing a common language -- research. By defending their project in a nurturing, collegial environment, students strengthen their resolve to continue the dream of higher education."

—Kika Friend,
UCI CAMP Coordinator

Symposium Schedule of Events



FRIDAY, FEBRUARY 24, 2006

5:00-8:30pm **Registration and Check in,** Irvine Marriott Hotel

6:30-7:30pm **Welcome Dinner,** Welcome & Introductions

7:30-8:30pm **Graduate Poster Session,** Bridge to the Doctorate Fellows

SATURDAY, FEBRUARY 25, 2006

8:00 - 8:30am **Shuttles** from Irvine Marriott Hotel to The Beckman Center of the National Academies of Sciences and Engineering, UCI

8:30am **Faculty Judges Orientation,** Balboa Room
Dr. Derek Dunn-Rankin, Head Judge

9:00am **Symposium Opening,** Auditorium

9:30 - 10:30am **Poster Session I** (Atrium area), **Oral Session I** (Auditorium, Huntington)

10:30 - 11:00am **Mid-Morning Break/Networking Opportunity**

11:00am - 12:15 **Poster Session II** (Atrium area), **Oral Session II** (Auditorium, Huntington)

12:15 - 1:30pm **Buffet Lunch,** Garden Patio

1:45 - 3:00pm **Poster Session III** (Corridor); **Oral Session III** (Auditorium, Huntington)

1:45 - 3:00pm **Graduate School Workshop A,** Bridge to Doctorate Fellows Panel
Newport Room - UCI and UCSD Fellows
Lisa Gauf, Facilitator

3:00 - 3:15pm **Break** - Refreshments in Courtyard Fountain Area

3:15 - 4:30pm **Poster Session IV** (Corridor and Executive Dining Room)

3:15 - 4:30pm **Graduate School Workshop B,** Bridge to Doctorate Fellows Panel
Newport Room, Lisa Gauf, Facilitator

4:30 - 5:30pm **Free Time/Walking Tour** of UCI Campus

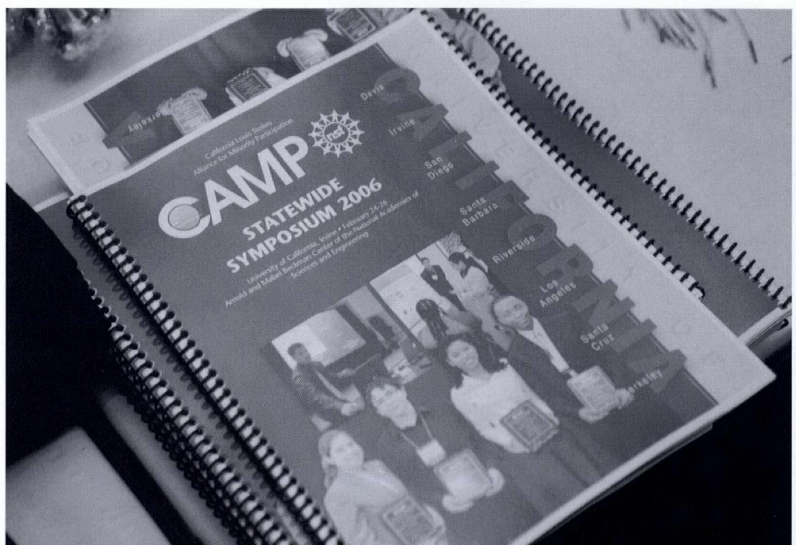
6:00 - 7:30pm **Awards Dinner,** Beckman Center Atrium Area
Keynote by Professor Art Benjamin, Harvey Mudd College, "Mathemagics"
Recognition of the Faculty Judges and Program Coordinators
Presentation of Special Merit in Research Awards

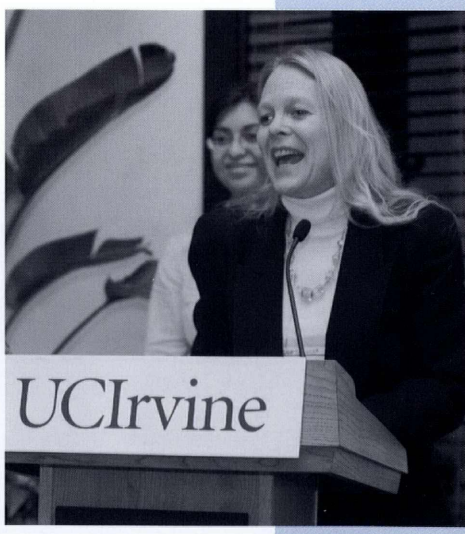
8:00pm **Shuttles** Return to Marriott; Irvine Spectrum Nightlife On Your Own

SUNDAY, FEBRUARY 26, 2006

8:00-10:00am **Informal Full Breakfast Buffet,** Marriott Hotel, Salon A-B-C

12:00 noon **Check Out** of Rooms, Return to Home Campus





CAMP Statewide Special Recognition: Faculty Leadership and Contributions to Undergraduate Education

American Eagle Award Presented to UCI and UCLA Faculty Directors

DEREK DUNN-RANKIN

Faculty Director, CAMP-UCI, Professor, Mechanical and Aerospace Engineering, The Henry Samueli School of Engineering

Dr. Dunn-Rankin studies combustion, sprays and particles using optical diagnostics and laser spectroscopy. Generally, Dr. Dunn-Rankin is interested in the fundamental information that can be obtained from simplified systems, such as linear droplet arrays, two-dimensional gas burners, and sub-scale ventilation and biomedical environments, which mimic a specific behavior in more complex systems. Using non-intrusive laser diagnostics, he probes the simplified systems in order to develop physical insight into influencing factors.

His current research activities include a study of the electrical aspects of microgravity combustion; an effort to develop techniques to measure the size of airborne droplets and particles using laser light scattering; and development of a hydrogen-enhanced IC engine. Dr. Dunn-Rankin also is studying combustion control, the formation of droplet streams at high ambient density, and acoustic interactions with burning droplets. His work can be applied in the area of combustion for size reduction, performance improvement, and emissions reduction in the area of spray processing for the novel production of biomedically relevant materials.

He earned his Ph.D. in Thermal Science at UC Berkeley, and was a postdoctoral researcher at Lawrence Berkeley Laboratory in the Applied Science Division. There his focus was ignition of premixed gases using eximer laser radiation and thermophoretic transport in a heated turbulent boundary layer. He also completed a post doctoral fellowship at Sandia National Laboratories, Combustion Research Division, where he worked on in situ optical particle counting and sizing and fundamental processes of pulverized coal and coal/water slurry combustion. Dr. Dunn-Rankin arrived at UC Irvine as an assistant professor in 1987.

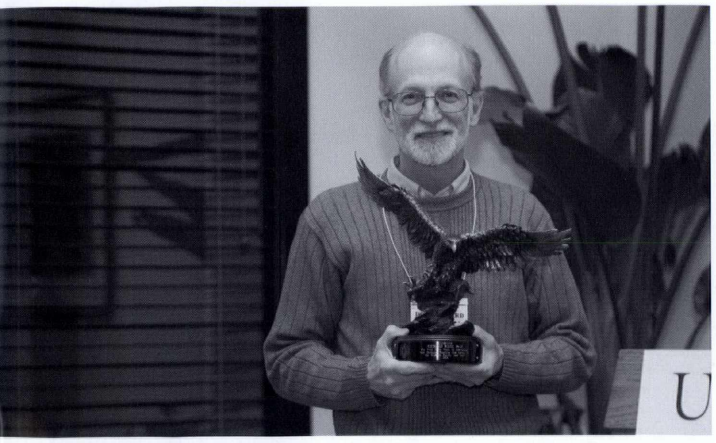
In 1997 he was a Fulbright Scholar and a visiting scientist at the Imperial College of Science Technology and Medicine, in London. Currently he is co-editor with J.H. Whitelaw, Imperial College for the Academic Press Combustion Treatise Series. Awards include the 1999 Chancellor's Award for Excellence in Undergraduate Research and 1998 Award for Excellence in Undergraduate Teaching. He was also the UCI School of Engineering Outstanding Assistant Professor in 1990-91. Among his many invited lectures are those at UCLA, the University of Heidelberg, and the Lund Institute of Technology, Lund, Sweden.

RICHARD L. WEISS

Faculty Director, CAMP-UCLA, Professor, Department of Chemistry & Biochemistry

Dr. Weiss has a distinguished career involving not only teaching and research but leading numerous initiatives supporting student development. The major focus of Dr. Weiss's laboratory is to understand the role of compartmentation of enzymes and metabolites in biological regulation. He has focused on arginine metabolism in Neurospora crassa because "it encompasses many of the compartmental features characteristic of eukaryotic cells."

In addition to sustained campus service that includes Chair of the Undergraduate Council, Dr. Weiss serves as director for no fewer than six programs, and co-director of several others. He is the faculty director for CAMP, and has judged at every-one of our the CAMP statewide symposia. Another important initiative is UC LEADS, which provides graduate school preparation and internships over a two-year commitment to students in their junior and senior years.



He directs at least three programs funded by National Institutes of Health, serving underrepresented students: Bridge Program for Community College Students (encouraging community college students to consider careers in biomedical research); Maximizing Student Diversity Program (preparing undergraduates for careers in biomedical research); and Postbaccalaureate Research Education Program (preparing B.S. degree recipients for entry into biomedical science graduate programs and for careers in biomedical research). He also directs UCLA Science, Engineering and Mathematics Summer Programs for Undergraduate Research.

Graduate students are supported by Dr. Weiss's role as Co-Director for Alliance for Graduate Education and the Professoriate (AGEP), affiliated with LSAMP, an NSF-sponsored program to increase the number of underrepresented students receiving graduate degrees in science, technology, engineering, and mathematics.

Among his newest endeavors to retain and graduate STEM majors is do-directing the Program for Excellence in Education and Research in the Sciences (PEERS), which facilitates academic success and encourages entry into research experiences of lower division science students. This exciting addition to UCLA support programs is sponsored by NIH, NSF, Howard Hughes Medical Institute, and University of California.

Dr. Weiss earned a B.S. degree in Chemistry at Stanford, where he was a National Merit Scholar. He completed a Ph.D. in Biochemistry at the University of Washington, and began his academic career at the University of Michigan, where he was a postdoctoral fellow in genetics. He joined the faculty at UCLA in 1974, and became Professor in 1985.

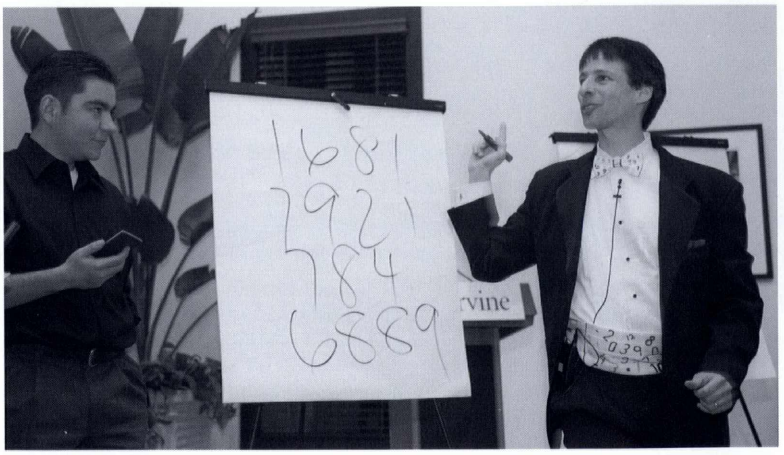
Note: Both awardees were instrumental in implementing a Bridge to the Doctorate cohort on their campuses.

Awards Dinner Keynote Speaker

ARTHUR BENJAMIN, PH.D.

Professor of Mathematics, Harvey Mudd College

Mathematics and magic—these are combined in an amazing display called mathemagics. As a professor of mathematics at Harvey Mudd College in Claremont, California, and a frequent performer at the Magic Castle in Hollywood, Dr. Arthur Benjamin has the unique ability to entertain and enlighten audiences with his Mathematical Magic Show. He demonstrates (and shares the secrets of) rapid mental calculation and fosters an enjoyment of mathematics as never before. In many instances, he can "beat" the calculators and enjoys demonstrating a mathematical magic square—similar to a sodoku puzzle. Dr. Benjamin, who received his Ph.D. in Mathematics from Johns Hopkins University, is co-author of two books on teaching mathematics and is the inventor of the Mathematics course in rapid mental calculation. He has explained his methods to students and adults all over the world, and particularly enjoys working with high school students and enncouraging them to plan and prepare for college. Dr. Benjamin teaches several undergraduate courses at Harvey Mudd College. CAMP students enjoyed his amazing feats, especially squaring numbers and multiplying large sums in a matter of seconds!



2006 Statewide Symposium Judges & Presiders

PHYSICAL SCIENCES/ENGINEERING

Dr. Derek Dunn-Rankin, head judge
Professor of Mechanical & Aerospace Engineering, CAMP-UCI Faculty Director

Dr. Peter Velazquez - lead posters judge
Postdoctoral Research Fellow, Skirball Institute of Biomolecular Medicine, New York

Dr. Glenn Beltz, Oral Sessions Presider
Associate Professor, Mechanical & Environmental Engineering, CAMP Faculty Director, UC Santa Barbara

Dr. Gerardo Aldana, Assistant Professor, UC Santa Barbara

Dr. Rodney Cole, Professor of Physics, UC Davis

Dr. Lilian Davila, Computational Materials Science and Chemistry, Lawrence Livermore National Laboratory; Diversity & Women In Engineering Programs, College of Engineering Dean's Office, UC Davis

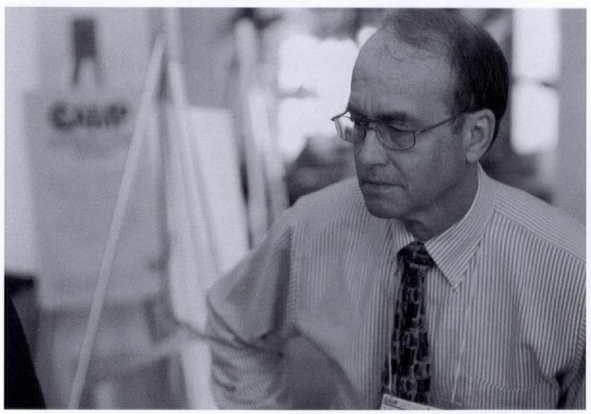
Dr. Gary Ford, Associate Dean and Professor, Electrical & Computer Engineering; CAMP Faculty Director, UC Davis

Dr. Michael Marsella, Professor of Chemistry, CAMP Faculty Director, UC Riverside

Dr. Philippe Relouzat, Math Instruction Coordinator, Learning & Academic Resources, UC Irvine

Dr. Robert Rinker, Professor Emeritus, Engineering, UC Santa Barbara

Dr. James Shackelford, Professor, Chemical Engineering and Materials Science, UC Davis



BIOLOGICAL/LIFE SCIENCES

Dr. Richard Weiss, Oral Sessions Presider
Professor of Chemistry, CAMP Faculty Director, UCLA

Dr. Lisette Acevedo, Postdoctoral Research Associate, UCSD Cancer Center, UC San Diego

Dr. Enrique Cometto-Muniz, Research Scientist, UC San Diego

Dr. Michelle Juarez, Institutional Research and Career Development Award Postdoctoral Scholar, Division of Biological Sciences, UC San Diego

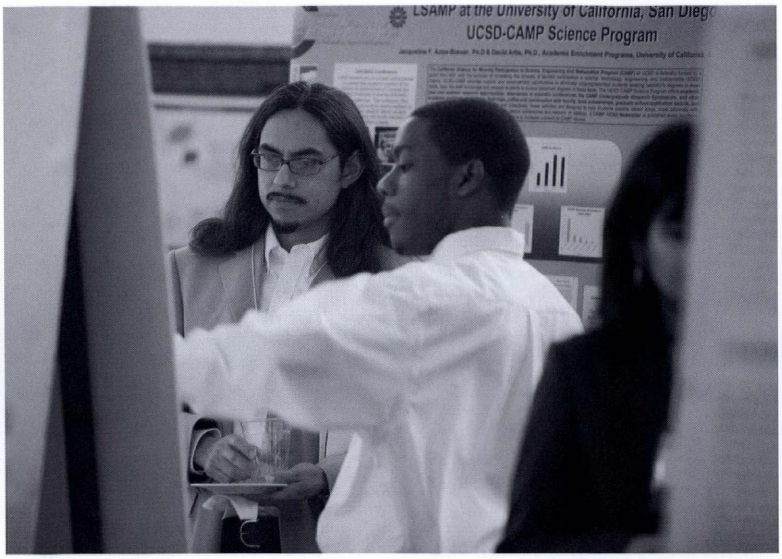
Dr. Judith Kjelstrom, Director UC Davis Biotechnology Program, Director, Advanced Degree Program, Program Director, Designated Emphasis in Biotechnology, UC Davis

Dr. Ben Norman, Professor Emeritus, School of Veterinary Medicine, UC Davis

Dr. Neal Schiller, Professor of Biomedical Sciences, UC Riverside

"Thank you for the opportunity to participate as a judge in the 2006 CAMP Symposium! The symposium was both professional and had a "personal touch."

—Lilian P. Davila, Ph.D.,
Computational Materials Science,
Diversity & Women in Engineering Program, UC Davis College of Engineering
Dean's Office; Symposium Judge

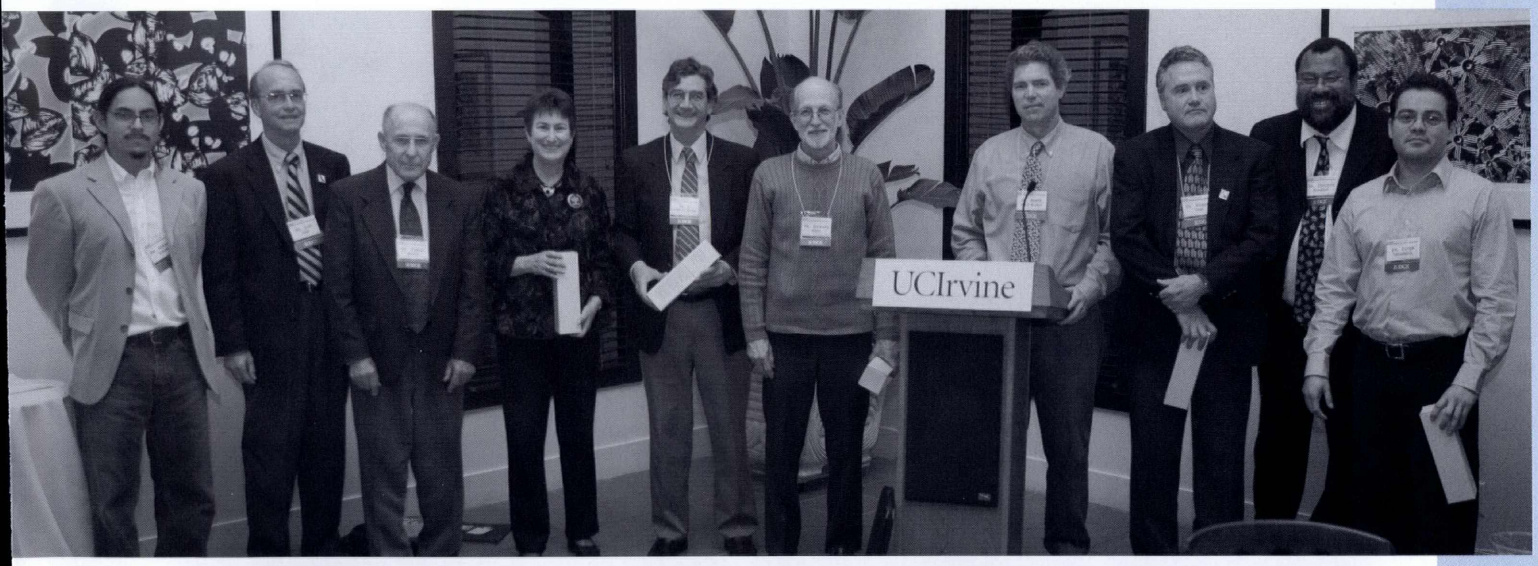


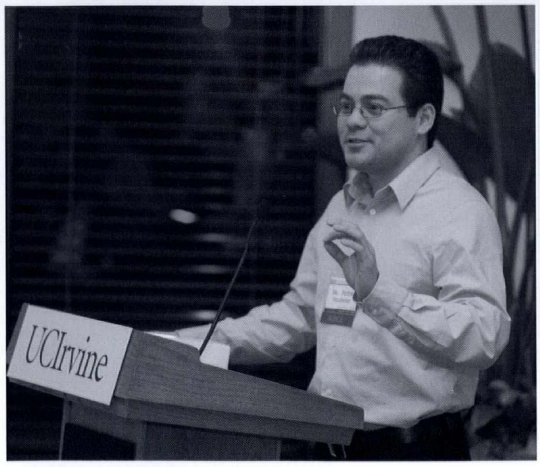
"I think an event like this is very important for undergraduates as they prepare for a career in science and graduate school. It is important to emphasize that figures and data are key points in a scientific article and grant. I look forward to attending future CAMP symposia."

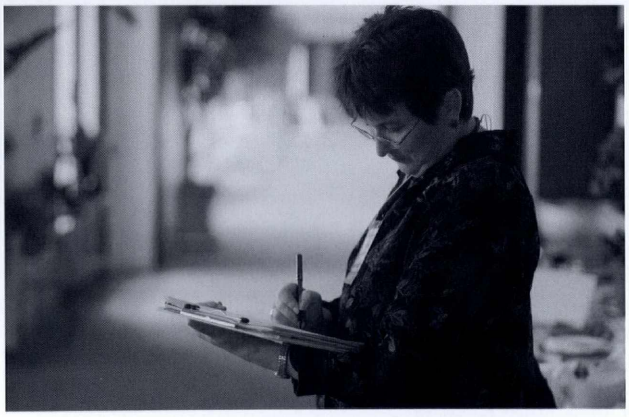
—Dr. Michelle Juárez,
UC San Diego, Judge

"I was very impressed with the quality of the posters and the detail in which the student investigators were able to explain the meanings of their images and graphs. It is good to see California LSAMP reach the goal of providing experiences in the sciences to students with such strong academic talent and diverse backgrounds."

—Dr. Ben Norman, UC Davis, School of Veterinary Medicine, Poster Judge







2006 Undergraduate Research Presenters and Awardees

Oral Presenters

PHYSICAL SCIENCE/ENGINEERING

SPECIAL MERIT IN RESEARCH AWARD

Luis Busso, UC Santa Barbara
Omar Moreno, UC Irvine
Edgar Sanchez, UC Davis
Laura Solis, UC Davis

Alfred Anguiano, UC Irvine, Session III
Alex Baca, UC Santa Barbara, Session I
Maria Garcia, UC Irvine, Session II
Felipe Godinez, UC Riverside, Session II
Luis Gonzalez-Argueta &
Anthony Oyatayo, UC Riverside, Session I
Mychal Jennings, UC Davis, Session II
Franklin Dollar, UC Berekley, Sesson III

BIOLOGICAL/LIFE SCIENCE

SPECIAL MERIT IN RESEARCH AWARD

Michael Coronado, UC Riverside
Richard Jimenez, UC Irvine
LL Isadora Trejo Martinez, UC Los Angeles
Brenda Vasquez, UC Los Angeles

Mariana Arcila, UC Irvine, Session I
Blake Brown, UC Irvine, Session III
Erik Corona, UC San Diego, Session II
Daniela Dunams, UC Irvine, Session III
Lauren Geary, UC Davis, Session I
Nelly Malangko, UC Santa Barbara, Session II
Cynthia Ortega, UC Irvine, Session II
Rene Sandoval, UC Santa Barbara, Session III
Hope Wilson, UC Santa Barbara, Session III

Poster Presenters

PHYSICAL SCIENCE/ENGINEERING

SPECIAL MERIT IN RESEARCH AWARD

Salvador Barriga, UC Berkeley
Luis Guerrero, UC San Diego
Antonio Orozco, UC Davis
Danny Ramirez, UC Santa Cruz

John Aguilar, UC Irvine, Session I
Todd Ambo, UC Los Angeles, Session IV
Kahlil Amin, UC Irvine, Session I
Monisha Brown, UC Berkeley, Session III
Alexander Buitrago, UC Los Angeles, Session II
Mateo Chamberlain, UC Davis, Session I
Brittany Gigliotti, UC Davis, Session I
Michael Golightly, UC Irvine, Session II
Mydul Islam, UC Santa Barbara, Session III
Velveth Klee, UC Los Angeles, Session II
Adam Lazaro, UC Santa Barbara, Session II
Dan'l Martinez, UC Berkeley, Session I
Gerardo Martinez, UC Davis, Session III
Fernando Mora, UC Santa Barbara, Session I
Abimbola Odusoga, UC Irvine, Session III
Nicholas Olivas, UC Irvine, Session III
Alejandra Ortiz, UC Santa Barbara, Session I
Ronald Page, UC Berkeley, Session III
Marcos Pena, UC Irvine, Session IV
Francisco Ponce, UC Berkeley, Session III
Alejandro Puga, UC Irvine, Session IV
Jose Ramirez, UC San Diego, Session III
Oscar Rebolledo-Mayoral, UC San Diego, Session II
Amber Reed, UC Irvine, Session IV
Jorge Robles, UC San Diego, Session IV
Alejandro Sanchez, UC Santa Barbara, Session IV
Rene Sanchez, UC San Diego, Session IV
Daniel Uriu, UC Irvine, Session IV
Lisa Val Verde, UC Santa Barbara, Session II
Santina Watts, UC San Diego, Session III

BIOLOGICAL/LIFE SCIENCE

SPECIAL MERIT IN RESEARCH AWARD

Manuel Campa, UC Los Angeles
Kelechi Chikere, UC Davis
Kristian Lucas, UC Riverside
Jacqueline Morales, UC Irvine

Kameelah Abdullah, UC Irvine, Session IV
Wendy Acosta, UC Riverside, Session I
Mauricio Arcila, UC Irvine, Session I
Anthony Bonilla, UC Los Angeles, Session I
Alex Castaneda, UC Irvine, Session III
Kristina Dill, UC Davis, Session II
Catalina Espinoza, UC Berkeley, Session I
Ynnez Gwye, UC Davis, Session III
Angelina Hernandez, UC Irvine, Session III
Zulema Herrera, UC Santa Barbara, Session III
Elizabeth Huerta Ortiz, UC Davis, Session II
Nicole Klanfer, UC Los Angeles, Session III
Veronica Lopez, UC San Diego, Session I
Oliver Loson, UC Riverside, Session II
Geoffrey Lovely, UC Davis, Session III
Cynthia Mendez, UC Santa Cruz, Session II
Andres Molina, UC Irvine, Session III
Vanessa Ochoa, UC Riverside, Session IV
Yelennia Palacios, UC Irvine, Session II
Chloe Rivera, UC Los Angeles, Session IV
Courtney Starling, UC Los Angeles, Session IV
Seth Stockton, UC San Diego, Session IV
Adrian Tripp, UC Irvine, Session IV

"Giving an oral research presentation at the CAMP symposium was an experience I will never forget. Standing in front of a group and teaching a novel process gave me the opportunity to see what it would be like to be in the shoes of a professor. I realized how much I loved teaching!"

—L.L. Isadora Trejo Martinez, UCLA

STRONG RESUME SUPPORTS ASPIRATIONS FOR PH.D.—LUIS APOLONIO GUERRERA, UC SAN DIEGO

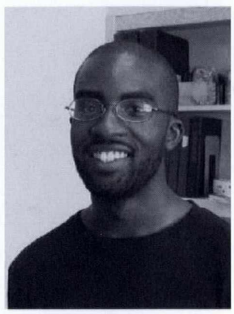
- Anticipated Graduate Date: June 2007
- Degree: B.A., Pure Mathematics
- Cumulative GPA: 3.7
- Transferred From: Southwestern College, AA Degree, Mathematics
- Educational Goal: Ph.D. in Mathematics
- Research Experience
  - Summer 2005: Collaborated in an abstract mathematical investigation on the possible solutions to a sign problem of a new theory in mathematics, and presented a poster on this topic at SACNAS, Denver, CO, October 2005
  - November 2005: Poster presentation on this research at the Southern California Conference on Undergraduate Research, UC Riverside
  - March 2006: UC LEADS poster presenter, UC Santa Cruz
  - Summer 2006: Will conduct research at UC Berkeley with faculty mentor Dr. Vaughan Jones, recipient of the Fields Medal, which has played the role of the Nobel Prize in Mathematics
- Honors & Awards
  - Sigma Xi: International Honor Research Society, Associate Member
  - UCSD: Provost's Honors, Warren College Honors Program, UC LEADS Scholar, Computer Science Engineering Scholarship, Erion Scholarship
  - Southwestern College: President's List, MESA Community College Scholarship
  - 2006 CAMP Statewide Special Merit in Research Award

Role of the Faculty Mentor

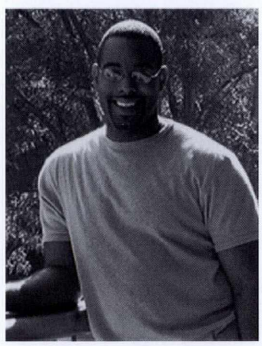
- Provide supervision and support for the CAMP undergraduate researcher by introducing him or her to the culture of the laboratory, and assisting him or her to explore and become proficient in research methodologies and in the research tools of the discipline.
- Support the student in transitioning his/her role in the research team, formulating a research question, drafting project goals, and a timeline with specific benchmarks.
- Advise the student in establishing realistic parameters and objectives for their part in a team research or individual project.
- Guide the preparation of a research proposal tailored to the student's particular field of interest and the focus of inquiry.
- Supervise or facilitate undergraduate student research projects in the laboratory and, if appropriate, provide guidance for writing an abstract or preparing a poster or oral presentation; assist in submission of the abstract for presenation at a scientific or professional symposium.
- For a long-term project, where feasible, direct the student in the technical writing process, preparing notes as a writing resource and eventually, if compelling, a polished manuscript for possible co-authorship and publication.

UCLA Graduate Mentors Complete the Ph.D.

UCLA CAMP would like to thank, congratulate, and wish the best of luck to two graduate mentors who, while earning their doctorate degrees, made major contributions as mentors, teachers, and role models for several generations of CAMP undergraduates at UCLA. Frederick Gregory and Michael Page are among the newly minted Ph.D.s who will impact future science majors through their chosen careers. Both are AGEP Fellows, and serve as an example of AGEP-LSAMP collaboration and mutual benefit. AGEP, Alliances for Graduate Education and the Professoriate, is also funded by NSF.



Frederick Gregory will complete a Ph.D. in Neurobiology June 2006, in the lab of Dr. Felix Schweizer. Gregory earned his undergraduate degree at Morehouse College in Atlanta, and is returning to Atlanta for a Postdoc at Emory University. As a Graduate Mentor for students in CAMP and affiliated programs, Gregory has led many workshops for undergraduates getting started in research, including how to write a scientific abstract and produce a research poster, how to write personal statements and make your way through grad school, and how to handle the rigors of combining research and academics at a major research university.



Michael Page will complete a Ph.D. in Organic Chemistry June 2006, in the lab of Dr. Frederick Hawthorne. Page earned a bachelor's degree at Xavier University in Cincinnati. He has accepted a Postdoc at California Institute of Technology (or CalTech) starting Fall 2006, working with Dr. Robert Grubbs, recipient of the Nobel Prize for Chemistry in 2005. Page has been a mentor for CAMP students involved in summer research programs, and also teaches in the community as part of his NSF Graduate Teaching Fellowship. These experiences have solidified his plans for becoming an educator. Page says that thanks to AGEP and its many networks and activities, he became an integral part of the UCLA community.

The 2006 symposium set a record for number of presentations, with 88, the most in the eight years since the first annual event.

Award Winning Presentations: SPECIAL MERIT IN RESEARCH

ABSTRACTS
Biological/Life Sciences – Oral Presentations

EFFECTS OF SUN-SCREEN AGENTS, ON ESTROGENIC EXPRESSION IN RAINBOW TROUT

Michael J. Coronado, *Junior, Biochemistry, Mary Ann Irwin, Dr. Daniel Schlenk, University of California, Riverside*

Vitellogenin expression has been used in laboratory studies as a measurement of estrogenic activity in fish. Recent studies in extracts of sediments surrounding municipal outfalls off the coast of New York City, NY indicated sun-screen agents (oxybenzone) as potential estrogens. To confirm these results, oxybenzone and benzophenone (structurally similar sunscreen agents) were evaluated of estrogenic activity using a juvenile rainbow trout assay. Three 14-day static-renewal exposures at concentrations of 10, 100 and 1000 ug/L were used: one with oxybenzone, one with benzophenone and the other with a commercial sunscreen containing oxybenzone as the active ingredient. At the end of the 14-day exposure, the fish were sacrificed and vitellogenin expression was measured in the plasma by ELISA. Estrogenic activity was observed only in the 1000 ug/L concentration of oxybenzone, benzophenone and commercial sunscreen.

"I would like to pursue a Ph.D. in Mathematics and have a career in academia."
—Luis Guerrero

A NEW STRATEGY FOR THE DETECTION OF LOW LEVELS OF MITOCHONDRIAL DNA MUTATIONS USING BLOOD DERIVED FROM DIABETIC PATIENTS

Richard A. Jimenez, *Junior, Biochemistry and Molecular Biology, Vincent Procaccio, Department of Molecular Biology and Biochemistry, University of California, Irvine*

Mitochondria are organelles that produce essential energy for cellular function. Each mitochondrion contains multiple copies of a small circular piece of DNA called mitochondrial DNA (mtDNA). This mtDNA is only inherited from the mother and is able to mutate, changing the genetic information. MtDNA mutations cause many known mitochondrial diseases, and a diagnosis is usually made from a muscle biopsy. For example, a common mtDNA mutation at position A3243G is present in the cell at different levels and causes diabetes at low levels of mutation and a severe neurological disease at higher levels. Conventional techniques used to detect this A3243G mutation often overlook the presence of the mutation at low levels, and we sought to develop an alternative technique that improves the detection sensitivity and throughput of mtDNA mutations. Our technique is based on the use of the Transgenomic WAVE System for the HPLC-mediated analysis of mutation-specific restriction fragments derived from PCR products. To test the sensitivity of our new method, we analyzed diabetic patients' blood samples that may possibly carry the mutation. We found that several patients carried the A3243G mutation while conventional techniques such as mitochondrial sequencing missed the presence of the mutation. Our study suggests that this sensitive technique can accurately diagnose a carrier of a mtDNA mutation without the use of a painful muscle biopsy even when the mutation is present at low levels. In addition, the use of our technique may help redefine the prevalence of the A3243G mutation in the diabetic population.

STRAIN VARIATION IN MITOCHONDRIAL RNA EDITING OF *TRYPANOSOMA CRUZI*

L.L. Isadora Trejo Martinez, *Senior, Microbiology, Immunology, and Molecular Genetics, Dr. David A. Campbell and Dr. Nancy R. Sturm, Department of Microbiology Immunology, & Molecular Genetics, Scott J. Westenberger, University of California, Los Angeles*

Chagas disease is caused by the intracellular parasite *Trypanosoma cruzi*, which gives rise to digestive tract and heart malfunction; however 30% of infected individuals develop the symptoms of chronic disease several decades after exposure. Chagas disease affects 16 to 18 million people in South and Central America and there is no vaccine or therapy to treat the disease. With the completion of whole-genome sequencing of *T. cruzi* strains CL Brener and Esmeraldo, we have compiled two mitochondrial maxicircle DNA sequences, the equivalent of our mitochondrial DNA. Maxicircle mRNA transcripts undergo a unique form of RNA editing post-transcription that creates start codons, resolves frameshifts, and, in the most extreme cases, reveals entire open reading frames via directed uridine insertion and deletion. The CL Brener and Esmeraldo DNA sequences indicate that 10 edited genes are present within each isolate, similar to *Trypanosoma brucei*. Our aim is to characterize the RNA editing events in the two *T. cruzi* strains. Primers for the 10 edited genes have been designed from *T. brucei* homology and tested for hybridization with Northern blots to Cl Brener and Esmeraldo strains. Once hybridization has been confirmed, we will proceed with primer extension and cloning using a reverse-transcriptase-PCR and specialized end tailing for the second strand synthesis in order to clone the edited cDNA and send out for sequencing. This information can be compared with RNA editing event in other trypanosomes, allowing an evaluation of the origin and benefits (or disadvantages) of the process.

"My goal is to achieve a Ph.D. in Microbiology and Molecular Genetics."

—LL Isadora Trejo Martinez

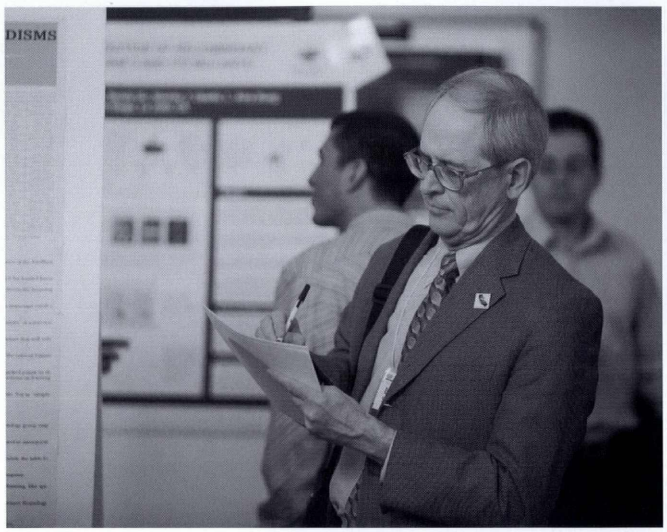
AUTOIMMUNE STEM CELLS AND THEIR ABILITY TO CAUSE AUTOIMMUNE DISEASE

Brenda Vázquez, *Junior, Molecular, Cell, and Developmental Biology, Ram Singh M.D., Department of Medicine, Rheumatology, James Wang, Ph.D., University of California, Los Angeles*

Autoimmune diseases such as systemic lupus erythematosus (SLE, lupus) arise from an overactive immune response reacting against the body's own molecules, which eventually results in tissue damage. Various components of the immune system are impaired in this disease, which led us to hypothesize that stem cells from which immune cells are derived may be impaired in SLE and that these impairments contribute to disease development. Before testing our concept in humans, we analyzed stem cell characteristics and differentiation in animal models of lupus. Our results show that bone marrow cells expressing ScaI, a mesenchymal stem cell marker, expand with age in both lupus-prone and normal mice. However, the proportion of ScaI+ cells as detected by flow cytometry and ScaI RNA levels measured by real-time PCR in fresh bone marrow are significantly higher in lupus-prone mice than in control animals at all ages. Intriguingly, bone marrow stromal cells from lupus mice preferentially differentiated into adipocytes as compared with control mice. Consistently, the fatty acid protein-4 expression increased 24-times in bone marrow cultures of lupus mice compared to 6-times in control animals. In conclusion, lupus-prone mice exhibit evidence of expansion of stem and progenitor cells of mesenchymal lineage, which differentiate preferentially into adipocytes. The above results suggest that stem cells may be impaired in lupus. How the above dysfunctions contribute to the development of disease will be investigated in our ongoing studies. These studies will improve our understanding of the role of stem cells in lupus, which should lead to development of improved methods of stem cell transplantation.

"The symposium afforded students the occasion to share their scholarly work and grow in confidence."

—Marjorie DeMartino, Symposium Chair

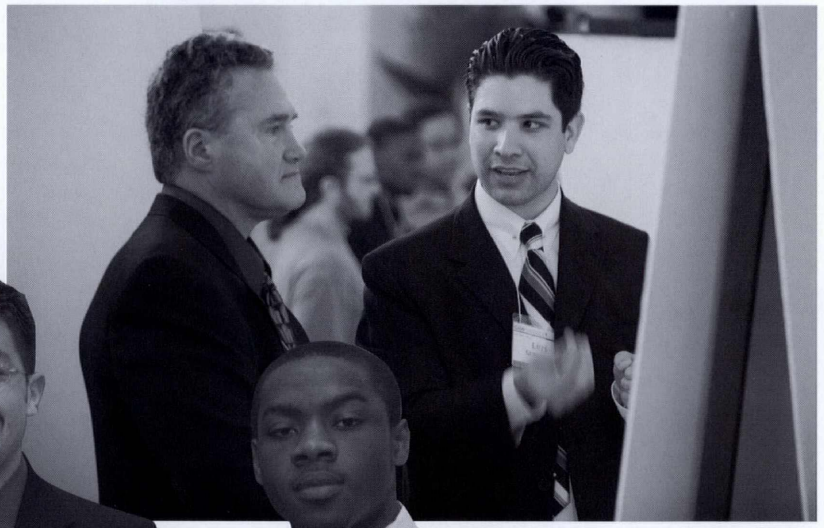


A total of 18 awards were presented—16 in two main categories, oral and poster presentations, and 2 special awards in veterinary medicine.

"I enjoyed the CAMP Symposium very much. It gave me the opportunity to present my research and to meet and exchange experiences with other students that are also involved in scientific research. Getting great feedback from different professors not only expanded my perspective of science but it also served as an incentive to continue doing research."

—Veronica Lopez, UC San Diego, Presenter

18 UC faculty and research scientists served as judges.



All presenters received a Flash Drive (memory stick) to support future oral presentations.

Physical Sciences/Engineering – Oral Presentations

ENVIRONMENTAL FLUX VARIABILITY OF NATURAL MARINE GAS SEEPS

***Luis Busso**, Senior, Geology, David Valentine, Geological Sciences, University of California, Santa Barbara*

Methane has been a great concern in the scientific community due to its effectiveness as a greenhouse gas and its increasing atmospheric concentration. Most methane in the marine environment is located in sediments along the continental margins. This methane may be dissolved in pore waters, present as free gas, or in the form methane hydrate depending on the physical variables. A small disruption to this reservoir has the potential to dwarf the natural methane cycle, this may have occurred many times in the geologic past. Methane escapes from the sediment to the water column, primarily in areas of seepage, where advective processes transport methane rapidly from depth. Significant quantities of methane clearly reach the water column through seepage at spatial scales ranging from cm-wide gas vents to meter-wide hydrate outcrops. This research project seeks to investigate the flux variability of seep environments ranging from shallow (10-30m) coastal seeps at Campus Point by mapping and measuring bubble flux measurements four times a week all summer. Results from these studies will be applicable to seeps worldwide and will assist in constraining marine contributions to the global methane cycle past, present, and future.

"I plan to attain an MD/Ph.D. and pursue research in the field of cancer biology and toxicology."
—Michael Coronado

NEURAL NETWORK APPLICATION TO PARTICLE IDENTIFICATION IN THE $\overline{\Lambda}\rightarrow p\pi$ DECAY CHANNEL

***Omar Moreno**, Senior, Physics, David Kirkby, Department of Physics and Astronomy, University of California, Irvine*

The BaBar experiment is currently studying the charge-parity (CP) violation of the unbound states of b quarks also known as B mesons. The best source of B mesons are at the Stanford Linear Accelerator Center (SLAC) in the form of high energy asymmetric collisions of electrons (e^-) and positrons (e^+) in a collider operating at the Y(4S) frequency. The electrons and positrons used in the collisions will be injected into two separate rings storage rings at asymmetric energies collectively known as the PEP-II. These two rings will intersect at the vertex (BaBar detector) where the collisions then take place. Ultimately, along with the measurement of CP asymmetries in various decay channels, BaBar will give an insight as to why anti-matter exists in such small quantities in the universe. One of the major obstacles in any analysis of data gathered from a detector such as BaBar is the discrimination between signal and background events. Studies have shown that the application of artificial neural networks (ANN) to the data increases the efficiency of signal to background discrimination. An ANN is a computer algorithm that mimics the biological processes of a neuron in the human brain. A simple neural network will take a set of inputs and produce an output that is a weighted sum of its input. A typical neural network will output one when a signal event is processes and zero otherwise. A multilayer neural network is currently being developed for the Irvine BaBar group that will identify charged (e, μ, π, K, p) particles and will be optimized for the $\overline{\Lambda}\rightarrow p\pi$ decay channel. A significant decrease in background signal is expected when using an ANN as compared to conventional statistical methods. Genetic optimization of the weight space of an ANN in combination with conventional training methods is expected to yield an even greater discriminating efficiency.

TOXICITY EFFECT OF A NOVEL CONTRAST MRI AGENT

Edgar Ivan Sanchez, *Junior, Biomedical Engineering, Angie Louie, Ph.D., Biomedical Engineering Department, Björn Gustafsson, Ph.D., University of California, Davis*

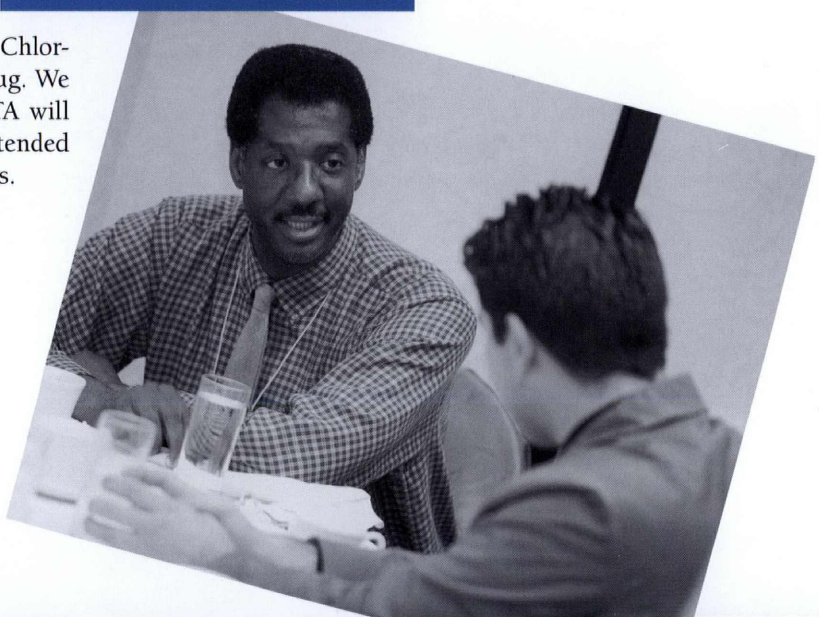
According to the United Nations Chronicle, cardiovascular diseases (CD) cause one third of all deaths worldwide. Over 70 million Americans currently suffer a cardiovascular disease resulting in over 900,000 lives lost each year in the United States alone. Additionally, cardiovascular diseases account for over $394 billion in medical expenses and loss of productivity. Recent research has demonstrated that much of the disease can be prevented through lifestyle changes, early diagnosis, and appropriate treatment. However, today there are few methods for early diagnosis of CD. Magnetic Resonance Imaging (MRI) is a possible non-invasive method for early diagnosis of atherosclerosis that uses paramagnetic ion complexes to enhance contrast. In particular, our group envisions that through the development of dual MRI and Positron Emission Topography (PET) agents we can map 3-dimensional views of atherosclerotic plaque build up in arteries and therefore optimize the use of imaging as an early diagnostic tool for cardiovascular diseases. The proposed dual mode agent is based on a maleylated bovine serum albumin (mal-BSA) with a conjugated 1,4,7,10-tetraazacyclododecane-1,4,7,10-tetraacetic acid (DOTA) chelator, that can tether both paramagnetic Gd^{3+} and a positron emitter, *e.g.* $^{64}C_4^{2+}$. Experiments in cultured cells demonstrated the receptor-mediated uptake of the probes by macrophages, and showed measurable contrast in MRI. However, its toxicity has not been quantified. Therefore, the goal of this experiment is to determine the toxicity of Mal-BSA-Gd-DOTA in albino Swiss mice 3T3 fibroblast cells so that we can then extrapolate the potential toxic risk involved in the use of our compound in imaging plaques. Results were compared to a well-studied compound Chlorpromazine, which is used as antipsychotic drug. We determined that the use of Mal-BSA-Gd-DOTA will have no significant toxicity during our intended application of imaging plaques in blood vessels.

FRUIT OF THE VINE OR PICKLE JUICE?

Laura Lucia Solis, *Junior, Biochemistry, Matthew Augustine, Ph.D., Chemistry, Daniel Sobieski, University of California, Davis*

With the emergence of a new technique, the wine industry now has a promising procedure for quantifying the amount of spoilage in unopened bottles of fine and often expensive wine. This full bottle NMR method takes advantage of the unique chemical shifts of each of the components of wine to determine the amount of acetic acid and acetaldehyde, preserving the wine by leaving the bottle unopened. The large size of a wine bottle and the <1% by volume quantities of oxidation products in bad wine necessitate a method that provides both narrow NMR lines and suppression of the background water and ethanol resonances without compromising the spectral fidelity of the contaminant peaks. Routine NMR experiments prove to be insufficient to satisfy these conditions. This problem was originally approached by a two separate methods. The first method attempted to excite only the region of the spectrum containing the oxidation product peaks. The second method used the fact that the water signal dissipates rapidly in time allowing one to detect oxidation products after the water signal has disappeared. These techniques were found to be inefficient largely due to time intensiveness and low sensitivity, two very important aspects in making the process commercially desirable. The solution that is being developed applies a series of radio frequency pulses that eliminates the signal from the water and leaves the desired signals unaltered. This method allows a bottle of wine to be tested in less than 10 minutes with high accuracy.

"I plan on attending graduate school in the Geotechnical or Environmental field."
—Luis Busso



"My favorite part of the CAMP symposium is taking an undergraduate observer, who comes to see what research and presenting is about. They are overwhelmed by the experience. He or she will say 'wow, I'm going to do this and come back next year and win a Special Merit in Research Award.' And for several years now, this has happened! That is truly rewarding."

—Teresa Cofield, UC Riverside CAMP Coordinator

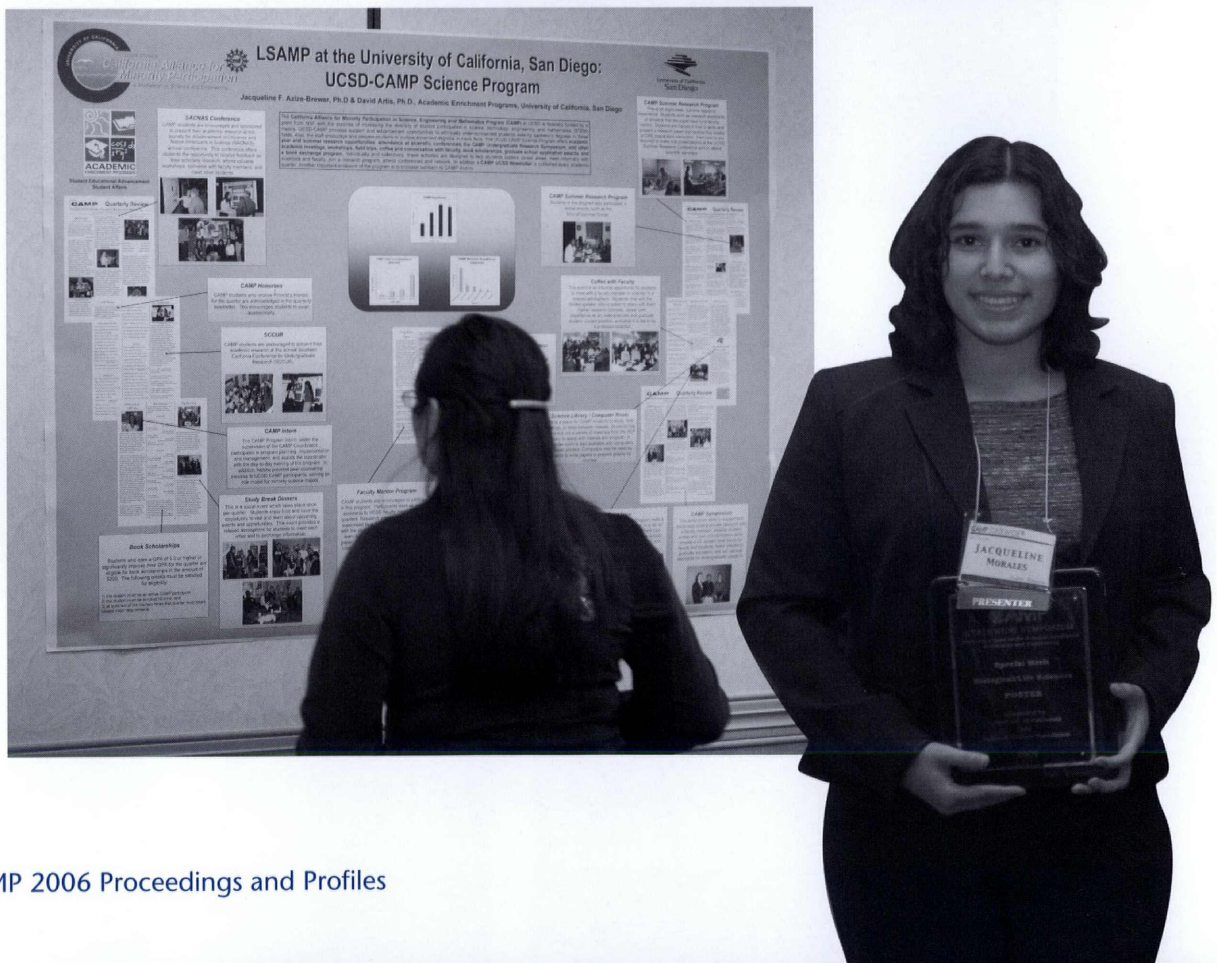
Today, more CAMP students than ever before have the Ph.D. as their goal.

"As a former CAMP student, I remember how rewarding and useful attending this event and presenting my research was for me. Now that I have the opportunity to share the CAMP experience with UC Berkeley students, I can see the same appreciation for CAMP, passion for Science, and feeling of empowerment that this academic experience yields."

—Diana Lizarraga, Director, UC LEADS, Pass The Torch, UC Berkeley

"For me it was an eye opening experience. What I enjoyed most about the symposium was meeting peers from all over California. CAMP was an experience I will never forget."

—Anthony Bonilla, UCLA, Presenter



Biological/Life Sciences – Poster Presentations

DAILY EMG ACTIVITY OF THE SOLEUS MUSCLE BEFORE AND AFTER SPINAL CORD ISOLATION

Manuel D. Campa, *Junior, Physiological Science, Dr. Reggie Edgerton, Department of Physiological Sciences, Dr. Roland R. Roy, Dr. Hui Zhong, Nicole Khalili, University of California, Los Angeles*

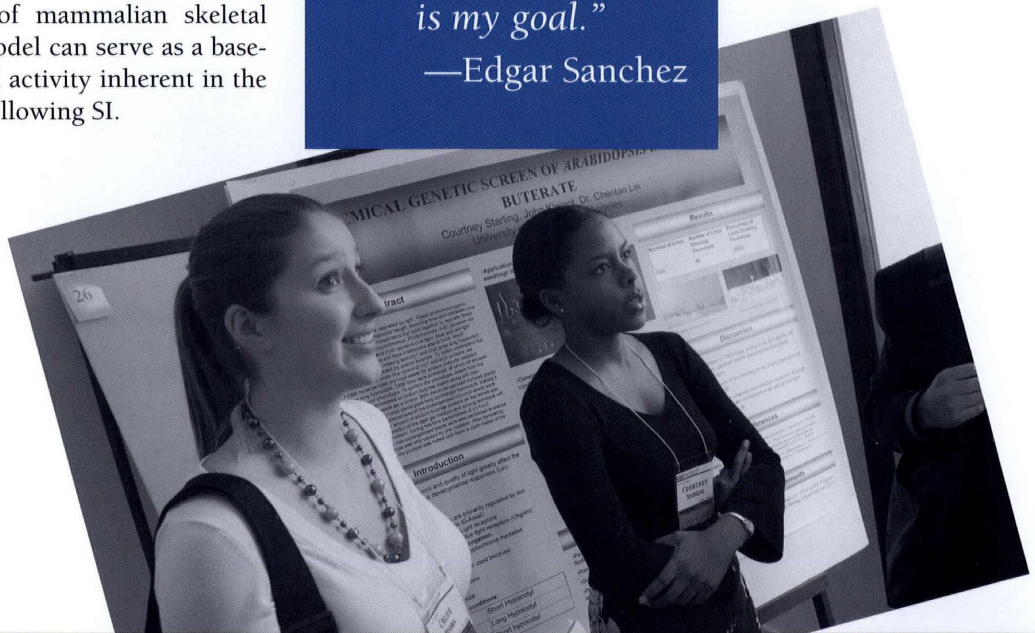
The rat soleus muscle is an ankle plantarflexor comprised predominantly of slow fibers. It has an important antigravity (postural) function, and thus has a relatively high level of electromyographic (EMG) activity. Following spinal cord isolation (SI) surgery (a complete spinal cord transection at a mid-thoracic and high sacral level and bilateral deafferentation between the two transection sites), the motoneurons in the lumbar region of the spinal cord are "silenced", and thus the muscles that they innervate , e.g., the soleus, is presumed to be inactive. The purpose of this experiment was to quantify the daily activity levels of the soleus muscle before and after SI surgery. EMG electrodes were implanted into the soleus of 5 rats and EMG data were collected before and 7 and 28 days after SI surgery. Before SI surgery, the soleus has a high level of activity, particularly during the dark hours since rats are nocturnal animals. The daily EMG duration (the amount of time active), daily mean EMG amplitude (recruitment level), and total integrated EMG (duration x amplitude) were less than 0.2% of pre-surgery values at 7 days post-SI and slightly higher (less than 1%) at 28 days post-SI. These data verify that SI preparation is a good model of soleus inactivity and verify the potential of this model to answer questions related to the role of activity level in determining the properties of mammalian skeletal muscles. The model can serve as a baseline for the total activity inherent in the soleus muscle following SI.

THE EFFECTS OF MUTANT PHYTOCHROMES ON LIGHT DEPENDENT PATHWAYS IN *ARABIDOPSIS THALIANA*

Kelechi Chikere, *Senior, Genetics, Yi-Shin Su, Amanda J Fischer, J. Clark Lagarias, Center for Biophotonics Science and Technology, Division of Biological Sciences, Section of Molecular and Cellular Biology, University of California, Davis*

Phytochromes mediate important light dependent activities such as plant growth. Modifications to the phytochrome loci that can cause changes in the pathway of phytochrome light absorption and de-excitation are expected to alter light signaling. To characterize the biological activities of mutant phytochromes in plants, we constructed transgenic *Arabidopsis thaliana* plants expressing single point mutations of a conserved GAF domain tyrosine residue in plant phytochromes. We are using single point mutations of the conserved tyrosine residue because it has been shown that this residue is key to the light activation of the phytochrome. Using *Agrobacterium*-mediated plant transformation methodology, we introduced distinctively mutated phytochromes into phytochrome B null mutant plants. Preliminary results show that a tyrosine-to-histidine mutant phytochrome profoundly alters the light responsiveness of transgenic phytochrome mutant plants. In light of this result, we expect to see significant changes in the growth pattern of the Arabidopsis plants with other mutations of this conserved tyrosine residue.

"A Ph.D. in Biomedical Engineering is my goal."
—Edgar Sanchez



SEARCH FOR A POLYAMINE-RESPONSIVE TRANSCRIPTION ELEMENT UPSTREAM OF THE FOS GENE IN LNCAP HUMAN PROSTATE CELLS

***Kristian Lucas**, Junior, Biochemistry, Dr. Craig Byus, Dr. Leo Hawel, Allan Ancheta, Division of Biomedical Sciences, University of California, Riverside*

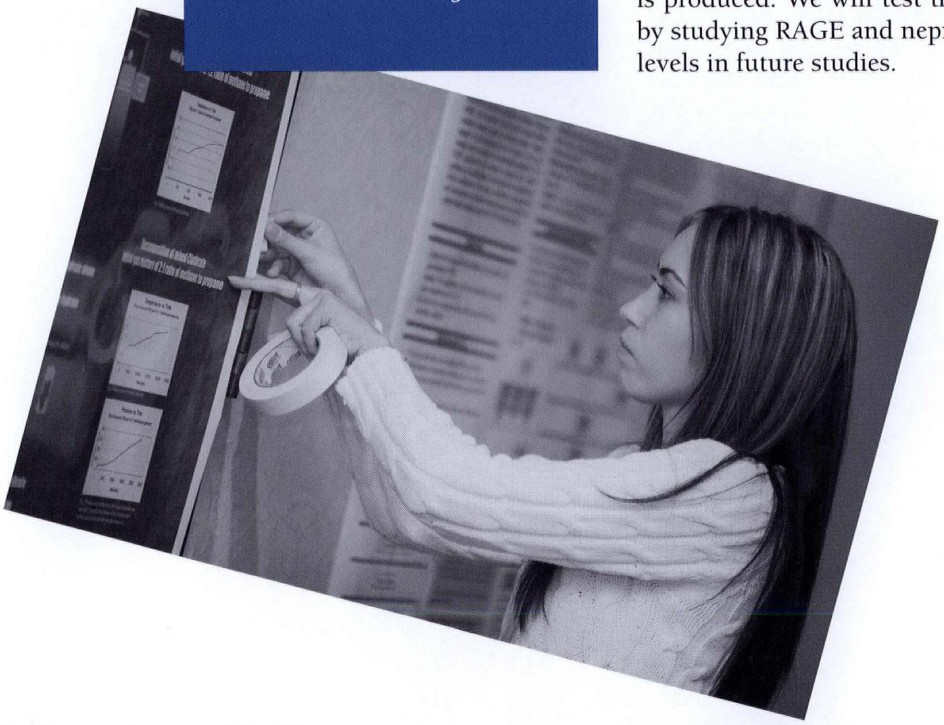
Ornithine decarboxylase (ODC) is the first and rate-limiting step in the polyamine biosynthetic pathway, producing putrescine. The further additions of aminopropyl groups lead to the production of spermidine and spermine. In previous experiments we have observed that increases in intracellular polyamine concentrations lead to the induction of the Fos gene. We have postulated that there are polyamine-responsive control elements upstream of the Fos gene, which are responsible for these observed increases in Fos transcription levels. Having previously extracted genomic DNA from the LNCaP human prostate cell line and designed primers that are specific for the upstream element of the Fos gene, we have amplified our target (hopefully regulatory) sequence and inserted it in a luciferase reporter vector. We are currently in the process of optimizing the transfection conditions for our vector. Our objective for this study is to identify the exact polyamine-responsive element(s) that mediate the induction of Fos by increased intracellular polyamine levels.

LRP AND THE CLEARANCE OF THE A_ PEPTIDE IN DOWN'S SYNDROME AND ALZHEIMER'S

***Jacqueline Morales**, Sophomore, Biology, Elizabeth Head, Institute for Brain Aging and Dementia, University of California, Irvine*

Individuals with Down's syndrome (DS) develop Alzheimer's disease (AD) pathology, namely beta-amyloid (Aβ) plaques, at an early age and accelerated rate. The low-density lipoprotein receptor-related protein (LRP) plays a key role in exporting the Aβ peptide from the brain. We hypothesized that the progressive increase of Aβ in the brain of older individuals with DS was due to a decrease in LRP protein levels. Immunohistostaining was performed on 19 DS cases and 18 age-matched controls. Surprisingly, the DS and the control cases showed an increase in LRP with age. Further, the age at which LRP rises in DS was younger than that of the controls. There was a significant correlation between the extent of Aβ protein labeling and LRP protein labeling in DS brains ($r=0.66$ $p<.05$). The increase in both Aβ and LRP with age and in DS suggests a compensatory response, which is in contrast to our original hypothesis. This may be due to an increased influx of Aβ into the brain with age, mediated by another receptor – the receptor for advanced glycation end products (RAGE), or the inability to degrade existing cerebral Aβ by the enzyme, neprilysin. These results show that despite the increase in LRP and possibly clearance of Aβ, Aβ still reaches high levels in the DS brain suggesting that LRP cannot clear Aβ as rapidly as it is produced. We will test this hypothesis by studying RAGE and neprilysin protein levels in future studies.

"I want to attend Veterinary School and become a Veterinary Scientist."
—Richard Jimenez



"The UCI symposium had such an impact on my future goals. There were many students that I could relate to. The poster presenters were very friendly and not afraid to strike up a stimulating conversation. It was so cool to see all the UCSD representatives in the graduate school forums and to hear their very helpful information. Thank You.

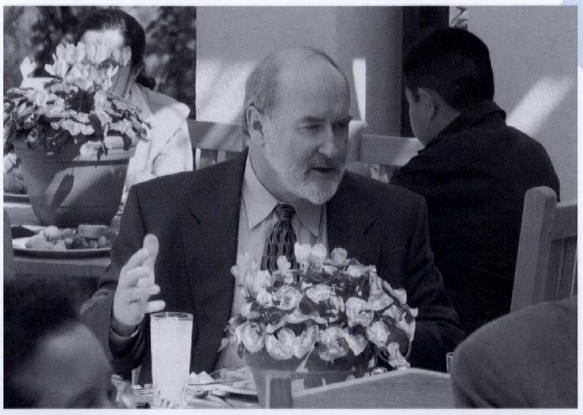
—Angela Rebolledo, UC San Diego

All students received a copy of "Plan 4 Success" by Terica Kindred, UCI alumna, B.S. Computer Science. Terica is a former CAMP participant.

Each UC partner campus took home at least one award for Special Merit in Research.

"I had a wonderful time at the CAMP symposium. The students were very impressive.Congratulations on running a very professional event. I would love to participate in future symposia."

—Judith Kjelstrom, Ph.D., Director, UC Davis Biomolecular Technology Program, Symposium Judge



CAMP-Bridge to the Doctorate supplemental funds have supported 34 minority graduate students at UCLA, UCI, UCSD. A fourth cohort of 12 is expected at UC Davis.

Physical Sciences/Engineering – Poster Presentations

PERFORMING LOW FIELD MRI USING T1 WEIGHTED CONTRAST TO DISTINGUISH BETWEEN HEALTHY AND CANCEROS TISSUES

Salvador A. Barriga, *Senior, Physics, John Clarke, PhD, Physics, University of California, Berkeley*

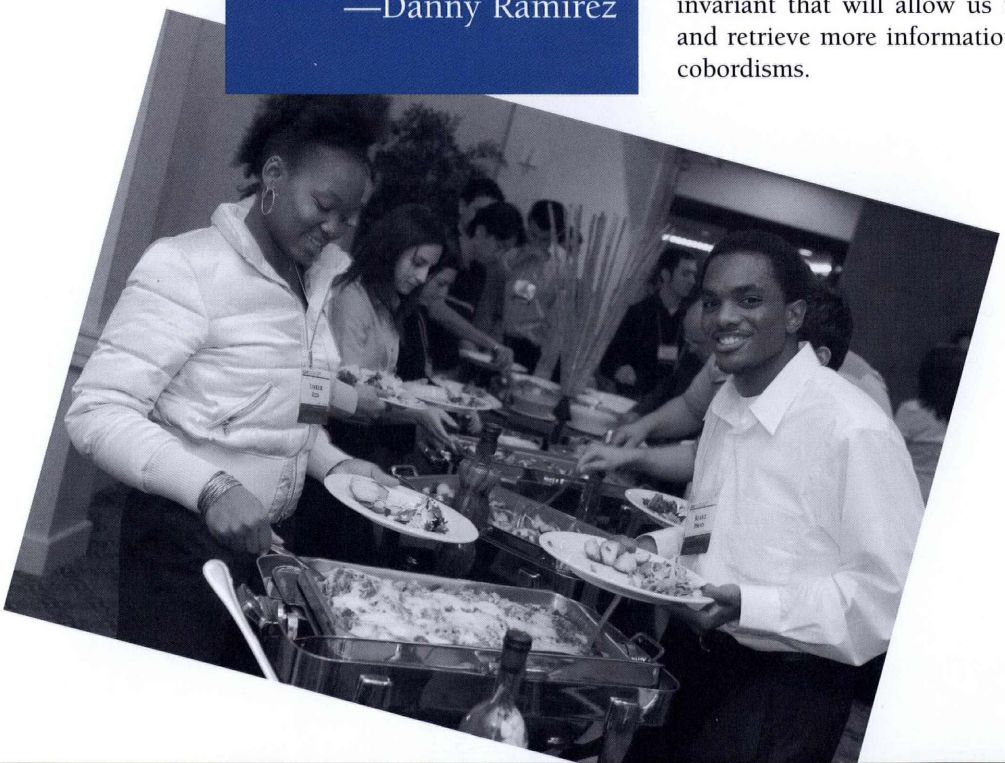
The Clarke group at the University of California, Berkeley is involved in performing magnetic resonance imaging (MRI) in the microtesla range, to enable non-invasive images of the inside of the human body. This is achieved by detecting the Nuclear Magnetic Resonance (NMR) signal generated by the prepolarized sample using a second order gradiometer that is coupled to a Super Conducting Quantum Interference Device (SQUID). A new system is being built to take into account the current noise problems. The system will be utilized to measure different T1 relaxation times between normal and cancerous tissue. Field cycling was utilized to achieve T1 contrast at any arbitrary field between the polarizing and the measurement field. This data helps determine the field range to achieve maximum contrast, which gives us flexibility unmatched by high field systems. The final goal is to acquire T1 weighted contrast MR images to determine the contrast and resolution achievable with microtesla MRI.

EXPLORATION OF KHOVANOV HOMOLOGY AND LINK COBORDISMS

Luis A. Guerrero, *Senior, Mathematics, Dr. Justin Roberts, David Clark, M.A, Department of Mathematics, University of California, San Diego*

Since the introduction of the Jones polynomials in knot theory, there has been a flurry of generalizations and other polynomials that are invariants of knots. Invariants help us classify and distinguish different knots. This research explores Khovanov's seminal work of a stronger invariant than the Jones polynomial. In his paper, Khovanov introduces what is typically referred to as Khovanov homology, and he showed how this is an invariant of links. Khovanov conjectured how an induced map on the homology groups of the target and source link of a link cobordism (4dimensional knotted surfaces), was invariant under isotopy UP TO A SIGN. Jacobsson proved Khovanov's conjecture and provided a "sign table" on Movie Moves (Reimdermeister type moves for four dimensional knotted surfaces). The research I am involved with deals with the exploration of Khovanov homology and link cobordisms to find a solution to this "Sign table" problem. Possible solutions we are still testing are: 1) To uncover a structure, that when added to the Movies Moves, will make the signs go away and, 2) Find a new definition of Khovanov's invariant for Framed link cobordisms that will make the signs consistent. Having taken care of the "Sign table," then we would have a trouble-free invariant that will allow us to calculate and retrieve more information from link cobordisms.

"My educational goal is a Master's Degree in Electrical Engineering."
—Danny Ramirez



DOSE RADIATION EFFECTS IN FINFETS

Antonio Orozco, *5th Year Senior, Electrical Engineering, Professor J.P. Colinge, Electrical and Computer Engineering, University of California, Davis*

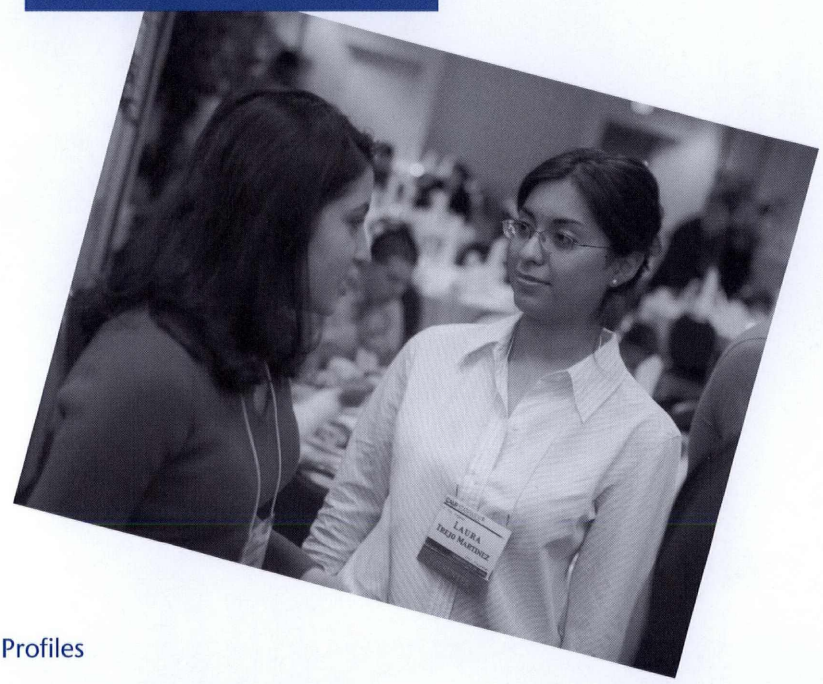
FinFET devices have created quite a stir within the last couple years because of their incredible scaling potential beyond that of conventional MOS technology. They also possess the unique ability to be hardened to withstand a significant amount of radiation from a variety of sources. These characteristics give a FinFET device great potential in the space and military industry. The main uncertainty among researchers in this field is whether these devices hold up against radiation as much as simulations have shown. The prediction using simulations is that irradiation with gamma or x-rays will produce positive charges in the dielectric layers and create traps for electrons in the silicon at the interfaces with the dielectric. Despite these effects FinFET devices should illustrate substantially promising current-voltage characteristics. The experiments done were carried out using N-channel FinFETs using cobalt-60 as the radiation source with a constant dose rate of 100 rad(SiO2)/sec. All devices were grounded and measurements were performed within an hour of irradiation. Measurements were also done before irradiation and then compared to post radiation results. Devices were shown to have little threshold voltage shift and neither the sub threshold swing nor the leakage current seemed to degrade. Results also showed formation of inversion layers at the different Si/SiO2 interfaces in the device. The results were conclusive enough to show that FinFET devices are very promising when being used in highly radioactive environments.

CAMERA STAGE CALIBRATION FOR AN ELECTRON MICROSCOPE

Danny Ramirez, *5th Year Senior, Electrical Engineering, 5th Yr. Senior, Dr. James Bouwer, National Center for Microscopy and Imaging Research at UCSD, University of California, Santa Cruz*

At the National Center for Microscopy and Imaging Research (NCMIR) the project to build an 8k x 8k (pixels) electron microscope imaging detector is well under way. The underlying goal of this project is to design and develop the largest format detection system available for electron microscopy. The specific aim of this project was to successfully calibrate the stages that the charged coupled device (CCD) cameras would be mounted on by using interferometry. This was done in order to ensure that the cameras moved to a desired position and remained stable at that point. The goal was to detect tiny movements in the camera stage system by using a Michelson interferometer with the translating mirror attached to a camera stage. By counting the number of light fringes that passed by the observer's point of view of the system, the movement of the camera stage could be calculated in micrometers. These results could then be compared to the values that the adjusting knobs in the camera stages were reading. From these comparisons we could get the offsets for the adjusting knobs. This project taught a valuable lesson of vibration and optical systems. Interferometers are highly sensitive to vibrations, especially high frequency vibrations, which make it difficult to record significant data. This is one method of calibrating camera stages that would benefit from refined optical instruments.

"My goal is the Ph.D. in Biochemistry and Molecular Biology."
—Kristian Lucas



Special Poster Awards by UC Davis School of Veterinary Medicine

Two posters were selected to receive a special monetary award, certificate, and letter from the Dean, UC Davis School of Veterinary Medicine, which includes public health and environmental science. The recipients were Geoffrey Lovely, UC Davis, and Nicole Klanfer, UCLA. The awards were made by Dr. Benjamin Norman.

A NUCLEAR PHYLOGENETIC ANALYSIS OF *EMYDID* TURTLES (FAMILY: *EMYDIDAE*)

***Geoffrey Lovely**, Sophomore, Genetics, Brad Shaffer Professor of Evoluton and Ecology, Dr. Philip Spinks, University of California, Davis*

My research is a phylogenetic analysis of the turtle family *Emydidae*. Emydids are a group of predominantly North American species, but one species- the European pong turtle (*Emys orbicularis*) is widely distributed throughout Europe (Fig 1). *Emydids* are quite diverse, exhibiting a broad range of dietary and habitat diversity. Most are omnivores, but a few species are either herbivores or carnivores, and run the gamut from highly aquatic terrestrial species. Previous phylogenetic analyses of the *Emydidae* have been based exclusively on mitochondrial DNA, thereby providing nly a single perspective on the evolutionary history of this group. To better understand the phylogenetic diversity of the family, we compiled a 39-taxon nuclear DNA data set, and used it to construct the first nuclear gene phylogeny of the *Emydidae*. We generated a 3,899 bp data set, from 4 nuclear loci including, 1153 bp of intron 61 of the Reelin gene (RELN), 1011 bp of intron 1 of the fingerprint protein (R35), 852 bp of intron 2 of the Hepatocyte nuclear factor 1± (HNFL), and 864bp from the recombination activating factor (RAG1). Maximum parsimony (MP), maximum likelihood (ML), and Bayesian analysis produced similar well-resolved trees. The subfamilies *Deirochelyinae* and *Emydinae* were recovered as weakly supported and well supported respectively, and most genera were recovered as monophyletic. We foresee future research further resolving *emydid* relationships as more nuclear markers become available, and we hope that our nuclear genes will become important tools in the future work in turtle phylogenetics.

SEX CHROMOSOME EFFECTS ON BASAL AND STRESSED INDUCED HYPOTHALIMIC-PITUITARY-ADRENAL AXIS ACTIVITY

***Nicole Klanfer**, 5th Year Senior, Anthropology, Dr. Arthur P. Arnold, Department of Physiological Science, Maya A. Lebow, University of California, Los Angeles*

A major part of the neuroendocrine system that controls reactions to stress is known as the hypothalamic-pituitary-adrenal axis (HPA). Under stress, the HPA undergoes a cascade of events resulting in an increase in the hormone corticosterone. This and other hormones mediate most of the changes that form the stress response. Our goal is to determine if there are sex chromosome effects on basal and stressed induced HPA activity. To determine this, we will use a four-core genotype model involving mice which differ in genetic sex: XX & XY with ovaries and XX & XY with testes. To measure any significant difference in basal and stressed-induced HPA activity, we must identify the genotype of the 4-core mice, eliminate activational effects of hormones on these mice and measure their corticosterone levels under basal and stressed conditions. The genotype of each 4-core mouse is identified by polymerase-chain-reaction (PCR), using primers to both an X gene, a Y gene, and the Sry gene carried on an autosome. The Sry gene is responsible for testes production and without it ovaries develop. We will then measure the levels of plasma corticosterone from four-core genotype gonadectomized and sham mice under basal and stressed induced conditions. These results will allow us to determine if sex chromosomal effects cause the sexually dimorphic secretions of HPA axis hormones.

"I plan to attend graduate school and earn a Ph.D. in Neuroscience."
—Nicole Klanfer

Bridge to the Doctorate, UCI and UCSD Graduate Fellows Poster Session

Bridge to the Doctorate Poster Titles

Jesse Pompa
Effects of Cooling on the Combustion in a Centimeter-Scale Four-Stroke Engine

Mamadou Diallo
Architectural Support for Trust Models in Decentralized Applications

Melissa Prado
Formation and Composition of Type II Hydrates Made with Varying Mixtures of Propane and Methane Gas

Jose Romero-Mariona
Emphasizing Security throughout the Developmental Cycle: Why Requirements are Key

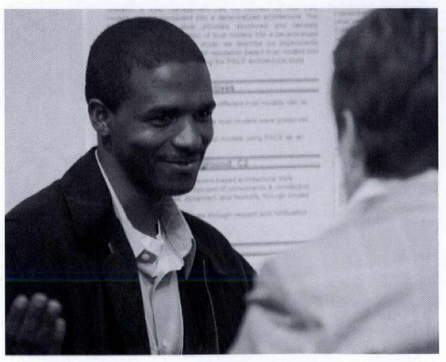
Kimberly Romero
The Role of PKCΔ on Growth Factor Induced Apoptosis and Nutrient Transporter Expression

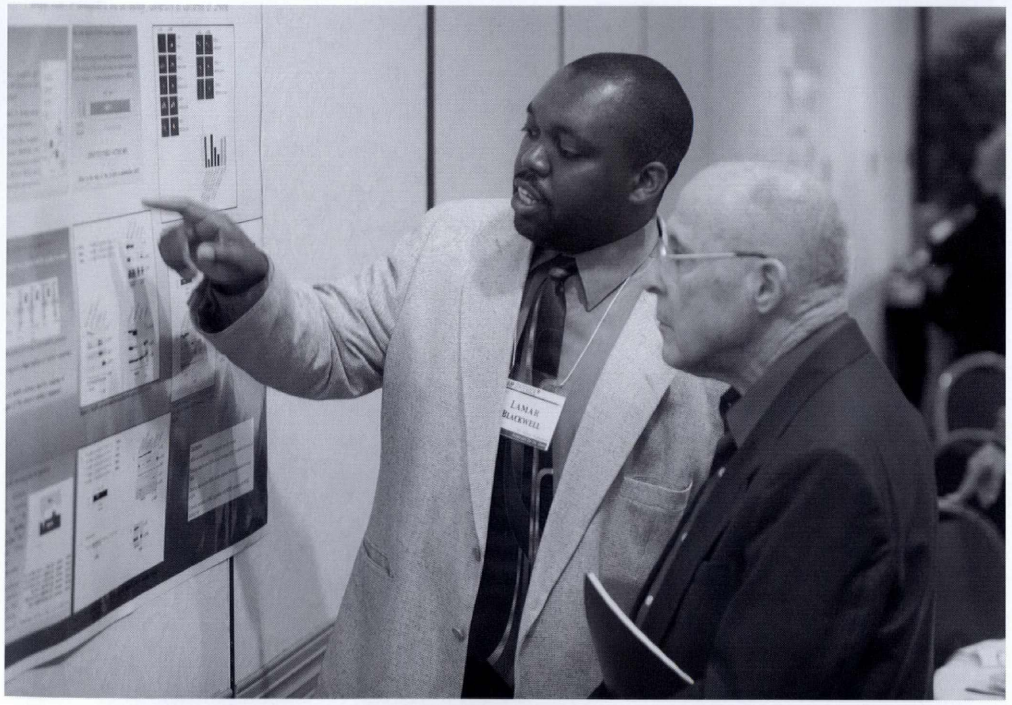
Melanie Zauscher (two posters):
Prospective Study: Comparison of Biodiesel and Petrodiesel Combustion. Melanie Zauscher, Kal Seshadri, Steven G. Buckley

Improving the Validation of Measured Oxygen Isotopes Ratios of Carbon Dioxide. Melanie Zauscher, Valerie Claymore, Bruce H. Vaughn, James W.C. White

James Marshel
Attention, not objects reflected in posterior gamma-band activity. Marshel, JH, Brooks, JL, Hillyard, SA, & Robertson, LC

UCI-BD Fellows Mamadou Diallo and Jose Romero-Mariona presented their respective research in Computer Science in Shanghai, China, May 2006, at the International Conference on Software Engineering.





"I never in my life had the experience of presenting my research prior to CAMP. Displaying my work made me feel so accomplished."

—Nicole Klanfer,
UCLA Senior,
Awardee

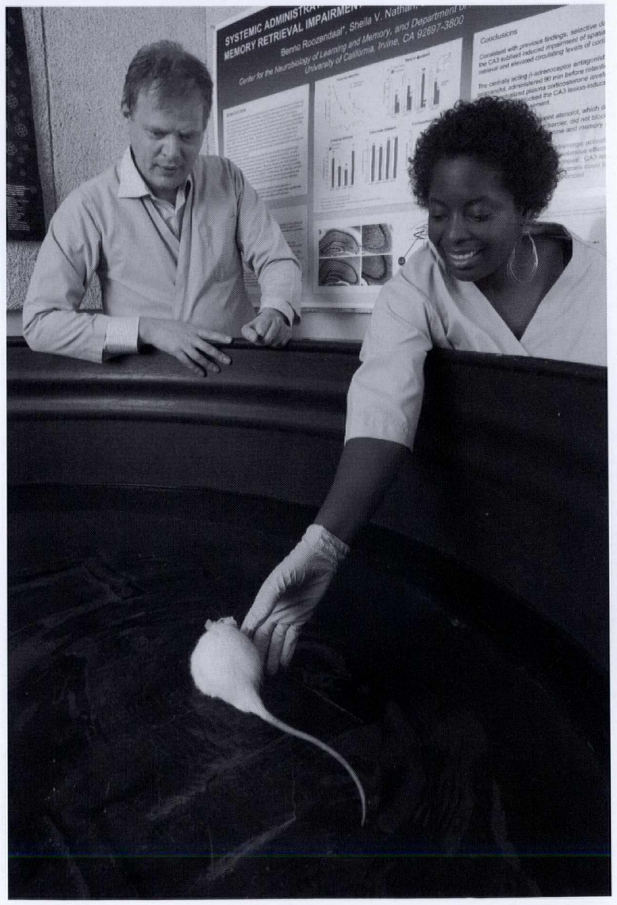
Discipline and Diligence Guide Qyana Griffith

UC Irvine Alumna to Begin Graduate and Professional School at Boston University this Fall

September 2006 is a magic date for **Qyana Griffith**, when she will head to Boston University for the MD/Ph.D. program. It is a personal triumph, and one for which she has prepared for with determination and patience--including completing a Postbaccalaureate Program at UC San Francisco. "Everything I've gone through is for a reason," she says philosophically. She had previously applied to medical schools in 2003, but when she wasn't admitted to her top choices, she thought hard and pursued the Postbaccalaureate Program, and from that further research opportunities that served her well.

A UC Irvine graduate, Griffith has bold plans to some day work in underserved communities and make a difference in terms of human suffering. When she heads to the East Coast from California, luckily, the transition will be eased by the comfort of knowing that a friend currently enrolled at Boston will be her roommate. But before settling in on the campus, she will visit family in Georgia, and her 100-year-old great aunt who keeps asking, "Are you a doctor yet? I'm hanging on."

In 2005 Qyana was inducted into Sigma Xi Scientific Research Society. This benchmark highlights her commitment and dedication to professional development that has included participation in numerous opportunities to explore research areas and sharpen her skills.



Above right: Qyana Griffith in the lab of Dr. James McGaugh, Center for the Neurobiology of Learning and Memory. Lower: Qyana with mentor, Dr. Benno Roozendaal, and a rat who has found the platform in the Morris Water-maze, a task to test spatial memory.

"My project with Benno investigated the effects of stress hormones on memory retrieval of spatial memory. We found that stress hormones administred in a particular brain region impair memory, while lesioning another area reverses this memory impairment."
—Qyana Griffith

Griffith has experienced the inherent value of research. Summer NIH internships in Spain and Tanzania, as well as a Postbac at UC San Francisco, have broadened her experience and led to her special interest in tropical parasitic diseases.

She developed an impressive resume which allowed her to obtain research associate positions at UCSF and UCI. Her research experience in Tanzania helped her to focus on her current goal of treating individuals suffering from tropical infectious (parasitic) diseases. After taking parasitology and immunology as a Postbac, she became interested in how the immune system combats parasitic infections.

Classroom learning was translated into practical health care management in Tanzania by exploring indigenous natural products to control malaria. While there, Griffith had witnessed her mentor suffer from three bouts of the disease. It was then that she recognized the need for physicians to treat traditionally neglected communities. She was deeply affected by the people. "They don't know they're poor," she says, "they make the best out of what they have, which is very admirable." She says the people smile and joke, but there is no health care and they rely on traditional medicines. Some of the preventive measures, she observed, were so simple, such as merely covering the drinking water.

Griffith says that she admires people with a positive attitude, a strong and principled work ethic, enthusiasm for their work, and humility. By any standards, that's a tall order, but optimism definitely attracts her. Griffith was raised in Chino Hills, CA, but some day she would like to go back to Guyana, South America, where her parents were born.

As an undergraduate, she was in the CAMP office "all the time," and tutored in organic chemistry through the McNair Program and MSP (Math Science Program). Now the favor has come full circle: at Boston U she will receive scholarships for the medical portion of her studies, including the prestigious Martin Luther King, Jr. Fellowship, and full tuition and stipend for the graduate degree.

The Question & Answer part of this profile provides other insights into this successful student's non-stop quest to develop academically and with a sense of social responsibility.

Q&A WITH QYANA GRIFFITH

When did you first discover your aptitude for science, and when did you decide on your undergraduate major?

My mother is a registered nurse and I have been exposed to medicine a majority of my life. I thus knew from a very young age that I wanted to pursue a career in medicine.

I do not think that I ever recognized my aptitude for science, but I knew that I needed a background in science in order to become a successful physician.

In what ways did being involved in research as an undergraduate shape your education and future goals?

Conducting research as an undergraduate at UCI provided me with discipline and patience to let me know that experiments (and life) may not necessarily go according to plan, but with persistence and patience, experiments (and goal) can be accomplished. I also participated in campus-wide and national scientific conferences (CNLM, MSP, UROP, McNair, AAAS, SACNAS, and UTMB) which cultivated my communication and critical thinking skills, and which have prepared me for job and medical school interviews.

What do you see as the biggest opportunity today in your particular field of Bio Sci?

Though I am currently investigating the effects of methamphetamine on different memory phases, I am interested in tropical infectious diseases. These have absolutely nothing to do with each other, however, there is the potential to find cures for individuals suffering from both of these conditions. This is the beauty of science: you can work in almost any field and improve some aspect of human health.

You are published as a co-author - how did it feel when you first saw your contributions to the research in print?

I had seen several copies and the final manuscript of my paper and found out that it was accepted to the Proceedings of the National Academy of Sciences (PNAS), but I do not think that it actually hit me that my work had been published until I went to a conference in Denver and saw that the PNAS booth had the copies of the journal in which my paper was featured. I ended up taking 10 copies of the journal home!

Q&A With Qyana Griffith continues on page 36

Student Spotlight

Graduate:
LORENA MORENO, UC DAVIS CAMP ALUMNA

Lorena Moreno graduated from UC Davis in June 2005 with a major in mechanical and aeronautical engineering (cumulative GPA of 3.94).

She is now pursuing a doctorate in Aeronautics and Astronautics at Stanford University. Her extraordinary record of achievement is an inspiration to all, especially to women in engineering.

Lorena received many academic awards during her undergraduate career, including the Northrop Grumman Foundation Scholarship, the Astronaut Alumni Scholarship, the Ben L. Hagglund Scholarship and the Department of Mechanical and Aeronautical Engineering Citation Award, given to the outstanding graduating senior.

She participated in the University of California's Leadership Excellence through Advanced Degrees (UC LEADS) research science program and was on the Dean's Honor List and the National Dean's List. She was active in student organizations and campus events including the Aggie Micro Aeronautical Team, the Chicano and Latino Engineers & Scientist Society, the Sigma Xi Research Society, Tau Beta Pi Honor Society, and the American Society of Mechanical Engineers.

From June 2003 through June 2004, Lorena conducted research at Davis in the Department of Mechanical and Aeronautical Engineering under the mentorship of Professor C.P. Van Dam. From June through August 2004, she conducted research at UC Berkeley in the Department of Mechanical Engineering under the guidance of Professor Omer Sava. These activities contributed to an impressive resume, and richly enhanced Lorena's graduate application.

After an internship last summer at Sandia National Labs in Livermore, CA, Lorena began her graduate program at Stanford University. She is well on her way to achieving her dream of the Ph.D.

Undergraduate:
OSCAR REBOLLEDO-MAYORAL, UC SAN DIEGO

"By entering academia, I feel that I would not only be contributing to expand the frontiers of science, but most importantly, I would be assisting the next generating of students to become great scientists."

- Anticipated Graduation Date: August 2006
- Degree: B.S. Chemical Physics
- Admitted to Graduate School Fall 2006: Notre Dame and University of Southern California
- Educational & Career Goal: Ph.D. in Physical and Biophysical Chemistry, with special focus on macromolecules; eventually entering Academia to teach and conduct research
- Experience:
  - Research Assistant, UCSD Department of Chemistry and Biochemistry; Summer Research Assistant, Southwestern College, Department of Chemistry; Tutoring Services and Teaching Assistant (2002 - present)
- Poster Presentations Include:
  - SACNAS 2005, Honorable Mention; ACS, 2005 and 2006; CAMP-UCSD Summer Research Conference, 2005; UCSD Undergraduate Research Conference, 2005
- Honors and Awards:
  - Provost Honors, UCSD; McNair Scholar; Faculty Mentor Program; Phi Theta Kappa National Honors Society, Southwestern College
- Professional Society Memberships:
  - American Chemical Society, American Physical Society; Society of Physics Students; SACNAS

Faculty Perspective

Undergraduate Research and Faculty Mentoring

By Derek Dunn-Rankin
Professor of Mechanical and Aerospace Engineering
CAMP Regional Director, UC Irvine

An important component of many undergraduate programs (especially CAMP) designed to encourage students to stay in the sciences, technology, engineering, and mathematics(STEM) arena is the opportunity for "research." There are two principal areas where involving undergraduates in research has an impact. First, their involvement allows a framework for informal interactions with faculty, graduate students, and post-doctoral researchers, making the academic enterprise more accessible and familiar. This familiarity correlates positively with persistence and retention in the university. Second, being involved in research illuminates the environment and the opportunities available in graduate school. One helps students attain the bachelor's degree and the other encourages students to achieve advanced degrees. In addition to these retention and recruitment outcomes, there is an expectation that learning motivated and intertwined with research is inquiry-based. Learning based fundamentally on inquiry is thought to produce the creative and independent leaders that the University of California intends to educate in order to ensure a robust future for the state, the country and the world.

The relationship between undergraduate research participants and those continuing in graduate study is overwhelming. For example, in a review of the Summer Grant Programs of AIURP/CURSOR/SURE, 68% had pursued advanced degrees after graduating from college. Certainly the students who choose to participate in these research programs are more likely to be considering graduate school in the first place, so the causality of undergraduate research and graduate enrollment is not quite clear. The value of undergraduate research as preparation for graduate research is very clear, however. Nearly all graduate research institutions weigh positively an undergraduate research experience when evaluating candidates for admission and support. Perhaps even more important than the research itself is the opportunity for the faculty advisor to obtain in-depth information about the student's potential for an expressive and effective letter of reference. The statistics mentioned above refer to a research program in an undergraduate teaching institution, and it is likely that even higher percentages of those participating at research universities will continue on to graduate school. This is a pipeline issue, and there are direct positive implications for involving undergraduates in research for the simple purpose of maintaining a well-trained population of graduate school applicants.

The concept of providing research opportunities for graduate-school bound undergraduates is not particularly lofty or subtle. A student with early training in research will make a better-prepared graduate student, one that is ready right away to contribute to the research enterprise. It is more interesting to examine the value of an undergraduate research experience for students who are not considering graduate study.

"there are direct positive implications for involving undergraduates in research for the simple purpose of maintaining a well-trained population of graduate research applicants."

There is evidence that undergraduate research can help with student retention. The model of student retention in college due to Tinto (1987) postulates that the four key elements of university survival comprise: (a) adjustment, both socially and intellectually to the new world of college; (b) difficulty, as related to the meeting of academic standards; (c) incongruence between the interests of the individuals and of the institution; and (d) isolation produced by insufficient contact between the individual and other members of the social and academic communities. Academic and social integration is essential to student persistence, and one powerful feature of undergraduate research is that it can aid in this integration. In particular, being involved in a research effort helps students understand the academic environment and it advances their academic skills. Several other studies demonstrate a high correlation between informal student/faculty interaction and persistence (Pascarella, 1980; Ferguson, 1990; Pascarella and Terenzini, 1980).

In an interview-based study, Nordquist (1993) confirmed the principal features of the Tinto model and pointed out a further interesting finding. Persisting in college for all students can be strongly influenced (either positively or negatively) by "a single informal faculty-student interaction." The suggestion is that there is not a simple relationship between the amount of interaction and the persistence, but that it is more like a switch being thrown. One positive interaction has a magnified positive effect on student persistence. This finding is not far different from the influence that the one memorable elementary, middle, or high school teacher has had on so many successful students. The finding also suggests that with a little mentoring effort (e.g., a single undergraduate research experience), retention could be improved substantially.

Persisting in college for all students can be strongly influenced (either positively or negatively) by "a single informal faculty-student interaction."

The Carnegie Foundation for the Advancement of Teaching sponsored Boyer Commission report on educating undergraduates in the research university is titled "Reinventing Undergraduate Education: A Bluebrint for America's Research Universities." This report includes an Academic Bill of Rights. The Bill says that at research universities, students have a right to expect and be given the opportunity to work with talented researchers to help and guide their efforts. It further states that the number one (of 10) methods for changing the way undergraduates are educated is to move toward inquiry-based learning, "...education by inquiry demands collaborative effort; traditional lecturing should not be the dominant mode of instruction in a research university." The basic idea of learning as inquiry is the same as the idea of research, and involving undergraduates in research is an effective mechanism for discovery-based learning. The Boyer Commission suggests that involving undergraduates in research should not be a special situation, but rather part of the regular fabric of learning in a research university.

Three justifications for investing effort in the involvement of undergraduates in research are: (1) for students graduate school bound, the research experience will ease the transition to graduate school and will make the students more effective researchers sooner; (2) involvement of students in a mentored research experience is a powerful and effective retention mechanism that will boost the rates of graduation and lead not only to a more educated population, but one that is sympathetic to the importance of education; and (3) research is fundamentally inquiry-based learning and is the kind of teaching that should be offered at research universities in order to ensure the kind of creative graduate necessary for the health and vitality of human society.

Unfortunately, simply recognizing the benefits of undergraduate involvement in research is the easy part. It is the implementation that is the real challenge. Although all faculty would agree that an important mission of the University of California is undergraduate education, there is an alluring (and at times overwhelming) demand for creating new knowledge in research. Hence, even if all agree that involving undergraduates in research is an important inquiry-based educational experience for the student, what can we say about their impact on the creation of new knowledge? That is, what if the faculty take the point of view that they will participate in activities only if those activities increase their research productivity? Is there then an advantage to taking on an undergraduate in research? In the idealized view of the Boyer Commission report the answer is yes since, "Inherent in inquiry-based learning is an element of reciprocity: faculty can learn from students as students are learning from faculty."

But such reciprocity requires that undergraduates change their attitude toward learning. They must recognize themselves as part of the team of inquirers that includes graduate students, post-doctoral researchers, and faculty. In some fields of endeavor (particularly biological sciences), this

team viewpoint has worked very well. The undergraduate student works with graduate students, other researchers, and faculty to develop the skills necessary to carry out some part of the investigation (e.g., dissection, cell staining, DNA separation and replication, electron microscope imaging, chemical analysis, etc.). Working side-by-side with other researchers, the undergraduates learn naturally how the process of knowledge creation occurs while contributing to the gathering of data. The examples of this kind of team effort research project are demonstrable successes (see, for example, the awards received by CAMP students). Often, however, faculty are engaged in research that is highly theoretical, and it is not likely that any undergraduate will have sufficient training to understand, let alone contribute to this research. These same faculty members have been known to lament the lack of training of even graduate students, and they instead rely on post-doctoral researchers for reciprocal and shared relationships in discovery. The trouble with this attitude is that there is an implied hierarchy of research that discounts faculty endeavor involving undergraduate efforts. That is, how does one respond to the question, "how can your research be truly cutting-edge if an undergraduate can be involved in it?" While this attitude is clearly nonsense, since even the most sophisticated of experimental research has somewhere some hardware that undergraduates can master, it has a detrimental effect on faculty commitment to undergraduate research.

How then can an undergraduate student be mentored in theoretical research? If the research involves the running of a computer program that has already been developed, this is something that might be accessible to undergraduates. Library research can also be a useful consideration. For example, one undergraduate student was asked to research the history of a mathematical construction. An undergraduate student might even be asked to translate for the lay public the goals and values of theoretical research, helping to bridge the esoteric language used by those in the field to terms understandable by an educated audience. With a bit of creative effort, virtually all faculty members could develop a research project scoped appropriately for undergraduates. Undergraduate research might be considered less in terms of research product and more in terms of research enterprise or research process. Through their research experience, undergraduates should recognize how difficult research is and how much effort is required to generate publishable material. They should understand that it is important to put all research in perspective, both with regards to what has been done in the past, and where the research might lead in the future. An undergraduate researcher should: (a) know whether they are repeating work done by others or breaking new ground; (b) know what the piece of the research they were responsible for was meant to accomplish; (c) know the details of any procedure they followed in data collection or reduction; and (d) categorize and evaluate the results of their investigation.

"I prefer to think of undergraduate research less in terms of research product and more in terms of research enterprise or research process."

In order for an undergraduate in research to achieve the understanding mentioned above, two elements in the mind of the research mentor are critical. First, the research mentor must have a genuine interest in and commitment to the research problem posed to the student. Without this interest, the research experience is compromised because it is the enthusiastic search for answers that marks an active research effort. A "make-work" research problem is second-rate and can not properly represent the true research enterprise. Second, the research mentor must believe that the student can accomplish the research tasks assigned. There is a challenge in posing tasks that are realistic given the undergraduate student's skill set, but once posed, there should be an absolute expectation of performance. In general, undergraduate research process and graduate research process should not be different. It is likely, however, that undergraduates will benefit from closer mentoring as they learn the culture and methods of the research. It is important, therefore, that undergraduates have access to several individuals who can provide research guidance. The key point here is to provide access to advice in a timely manner. A busy faculty member can easily derail an undergraduate's research if there is no alternative source for answers and suggestions. Not only does access to more than one mentor (including graduate students, post-docs, and other research staff) help provide technical feedback, it also enhances socialization into the research culture. A team of researchers, including undergraduates, can lead to spectacular results.

The costs of providing undergraduate research opportunities are high; there is no denying that proper guidance of undergraduates takes time and laboratory resources. In addition, the payoffs for research are variable and often longer term. Nevertheless, the educational benefits to the students are compelling. Furthermore, the unique educational potential of the research university for creating and supporting inquiry among undergraduates through research is undeniable.

References are available upon request.

Email dmartino@uci.edu

Congratulations to Former CAMP Participant
Shondelle Marie Wilson, Ph.D.

- Doctor of Philosophy in Bacteriology
- Conferred May 2006
- University of Wisconsin, Madison
  College of Agricultural & Life Sciences

In 1994, Shondelle Wilson attended the CAMP-UCI Community College Summer Institute, where she was selected student speaker for the closing event. She had not yet been admitted to UC Davis, but was looking forward to completing her transfer requirements at Solano Community College. She was convinced of one goal: that her destination was the University of California. She completed her B.S. degree in Microbiology at Davis and was admitted to the University of Wisconsin. In 2001, Shondelle gave the awards dinner keynote address at the CAMP symposium, held at UC Davis that year. She has pursued her dream of the doctorate degree by weathering the ups and downs with a motto that guides her life: Believe, Trust & Obey! Our best wishes to Dr. Wilson as she continues on her chosen career path.

Q&A With Qyana Griffith *continued from page 31*

What is your best advice to a newly enrolled freshman in your discipline?

My first suggestion is to identify what type of learning style one is comfortable with: if one is a visual learner, seek professors who use power point presentations; if one is an audible person, tape lectures and listen to them later on. Don't be shy to seek help from professors. By taking an active approach to your education, you won't feel as though you are just another number on a scantron, and most importantly, you will also be able to request a more personal letter of reference for graduate or professional school.

What can be done to interest more young women in considering science for a professional career?

I think the best way to get young women interested in science is to ask female scientists to invite interested young women to their laboratory for a day for a tour of the facilities and a question and answer period. This would be similar to a "take your daughter to work day." This approach is more active than hosting a conference where the scientists would speak to the students. The students would be able to see, rather than hear, of the scientist's accomplishments.

Discuss your involvement in Lambda Theta Nu Sorority, and what membership means to you.

Together with eight others, I am a co-founder of Lambda Theta Nu Sorority, Inc. at UCI. I was the fundraising coordinator and when I graduated from UCI and went to UCSF for the Post Baccalaureate Program, I helped establish another chapter at Stanford, and helped women join UC Berkeley's chapter. The main thing that my sorority has provided me with is stability. I have developed long-lasting friendships with several of my sisters.

What is your favorite past time? book? music?

I enjoy traveling, scrap-booking, photography, coin collecting and stamp collecting. My favorite book is "The Four Agreements" by Don Miguel Ruiz and I enjoy a variety of music genres. Samuel L. Jackson is my favorite actor.

CONGRATULATIONS & BEST WISHES TO

Kika Friend, recipient of the SACNAS Professional Mentor Award

Presented at the annual SACNAS Conference in Denver, the Mentor award recognizes Kika Friend, UCI CAMP program coordinator, for her many contributions to undergraduate student success. Kika has supported hundreds of students through completion of the bachelor's degree, and urged them on in the pursuit of graduate degrees. In her acceptance speech, Kika emphasized the importance of passion for one's career and meaningful work throughout one's life, quoting poet Miguel De Unamuno, "...to live is to work, and the only thing which lasts is the work; start there, turn to the work." She was applauded by more than 2,500 students and educators from across the country.

Jacqueline Azize-Brewer, Ph.D., recipient of the UC San Diego Champion of Diversity Award

Presented by Chancellor Marye Anne Fox, the Diversity award recognizes Dr. Azize-Brewer's efforts to expand and enhance student academic and professional development. Jacqueline has introduced a number of student-centered activities to the campus and has influenced many students to enroll in graduate education. In her acceptance remarks, Jacqueline noted that she had the best of both worlds, that of scholarship and of service, which come together in her leadership on the campus. Her doctorate is in neuroscience, which informs not only her ability to advise and counsel students, but to guide students into graduate programs which best meet their goals and expectations. She is particularly interested in the advancement of women in science. Mentoring science majors is a key component of her role as CAMP coordinator.

Acknowledgements

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Keynote Speaker

Dr. Arthur Benjamin, Professor of Mathematics, Harvey Mudd College, Claremont, CA, and Co-Editor, Math Horizons Magazine

Special Guests

Dr. Loren Thompson, Assistant Vice Chancellor Student Educational Advancement, UC San Diego
Dr. Karen McDonald, Professor and Associate Dean, Chemical Engineering, UC Davis

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Bridge to the Doctorate Fellows, UCI and UCSD cohorts, for participating in the Graduate School poster session and panels

CAMP Statewide Support Team:

David Tong, Vilma Palma, Melina Duarte

Faculty Judges

(Please refer to page 8.)

SAVE THE DATE

Next Symposium: February 23 - 24, 2007 • Student Presentations: Saturday, February 23, 2007
Arnold & Mabel Beckman Center of the National Academies of Sciences and Engineering

THANK YOU - THANK YOU SO MUCH


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