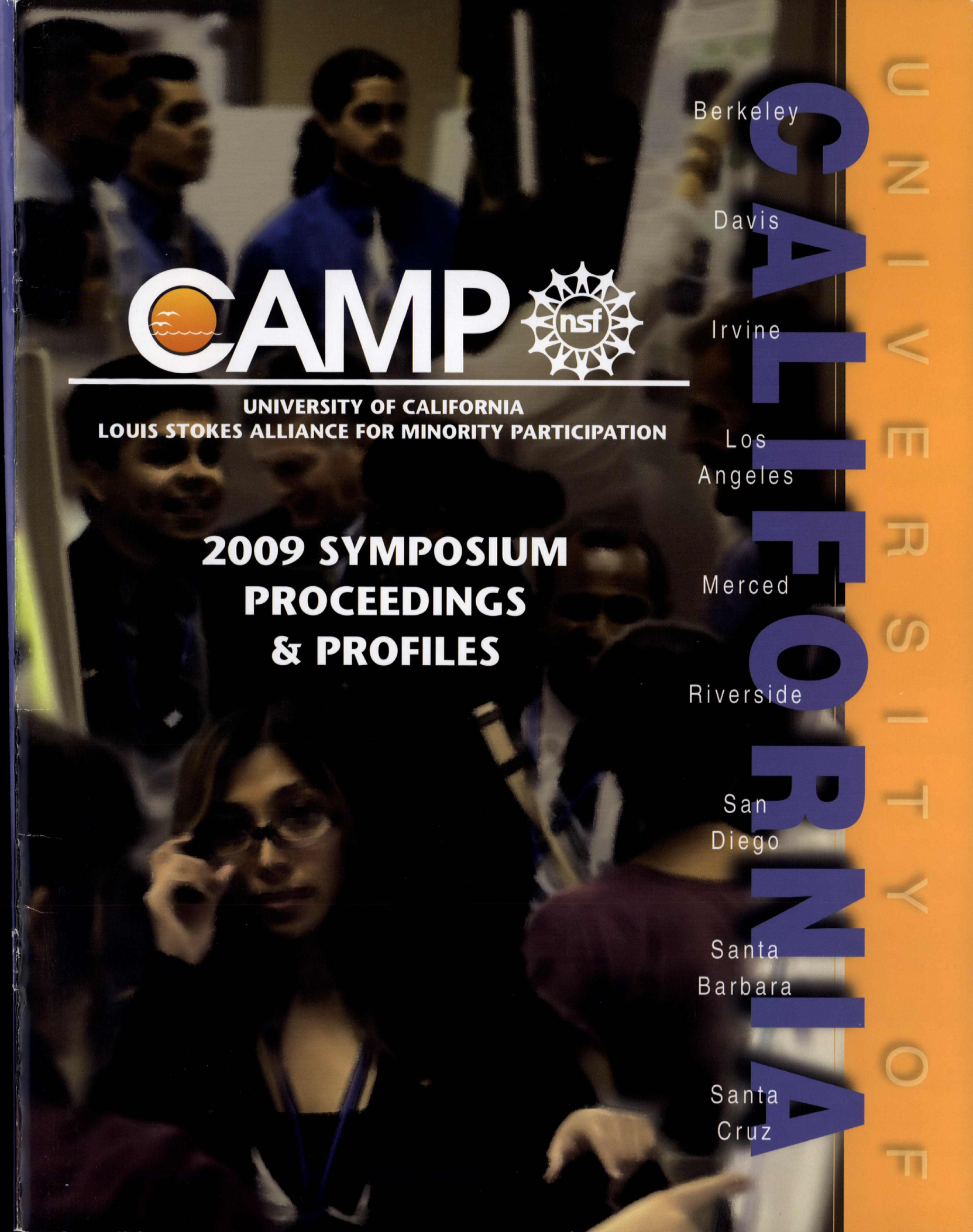

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LOUIS STOKES ALLIANCE FOR MINORITY PARTICIPATION

2009 SYMPOSIUM PROCEEDINGS & PROFILES

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Lead campus and
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California LSAMP.

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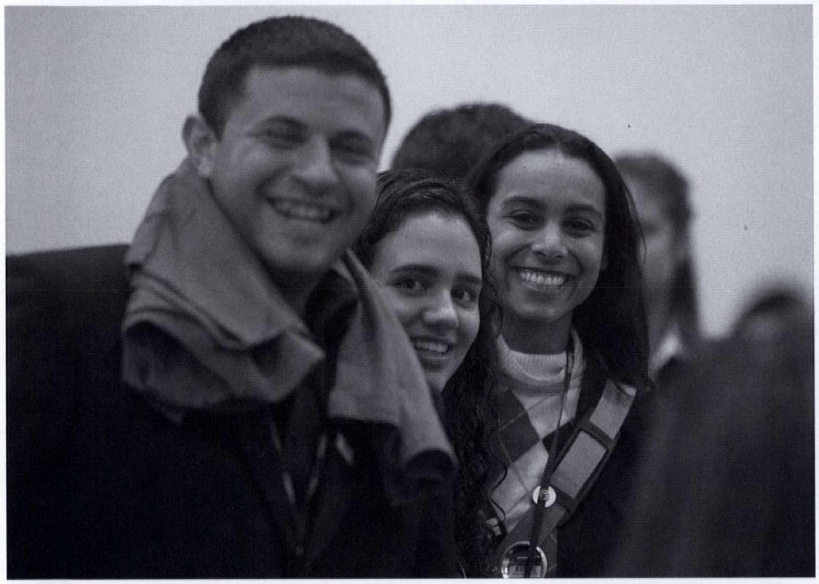
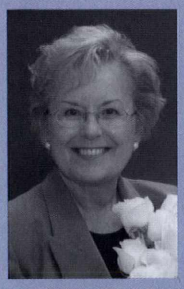
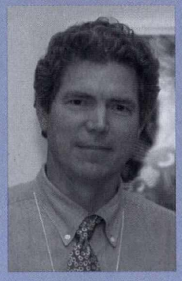
UNIVERSITY OF CALIFORNIA
LOUIS STOKES ALLIANCE FOR MINORITY PARTICIPATION

2009 STATEWIDE SYMPOSIUM PROCEEDINGS & PROFILES







GREETINGS

We are pleased to present the annual publication of highlights and profiles from our UC Statewide Symposium. By participating in this event, the premier CAMP activity, students test their understanding and move forward in subject mastery. Every great goal is achieved by taking small steps each day. We hope that our UC students' steps to experience research lead to greater appreciation for the wonders of science and engineering. The statewide symposium affords students the occasion to share their scholarly work and grow in confidence in their own abilities to communicate effectively with faculty and peers. For first time presenters, the symposium is a gateway to other venues of scientific discourse. Enjoy the profiles!

—Marjorie DeMartino, M.F.A.,
Symposium Chair,
California LSAMP Co-Project Director

—Derek Dunn-Rankin, Ph.D.,
Professor Mechanical & Aerospace Engineering,
California LSAMP Co-Project Director

Contents

General Information

Summary

The University of California Louis Stokes Alliance for Minority Participation continues in Phase IV (2006-2011), sustaining a cooperative agreement between the National Science Foundation and UC Irvine, the lead campus and administrative center since 1991. The Alliance represents a significant investment by the University and the National Science Foundation. Institutional and faculty support as well as collaborative relationships and student services distinguish the program. Minority students are offered development opportunities and hands-on experiences that increase retention, academic excellence, and degree completion. The primary goals are to significantly increase the number of baccalaureate degrees granted to underrepresented students in science, technology, engineering, mathematics (STEM) at the University of California, and support continuation to graduate studies, particularly for the Ph.D.. The Alliance facilitates a systemwide network of faculty, program staff and students contributing to a shared vision of student academic attainment and measurable outcomes, both quantitative and qualitative. Our overarching goals include preparing the future generation of scientists and engineers who will not only diversify the professional workplace but also enhance the economic health of our state and nation.

Program Impact

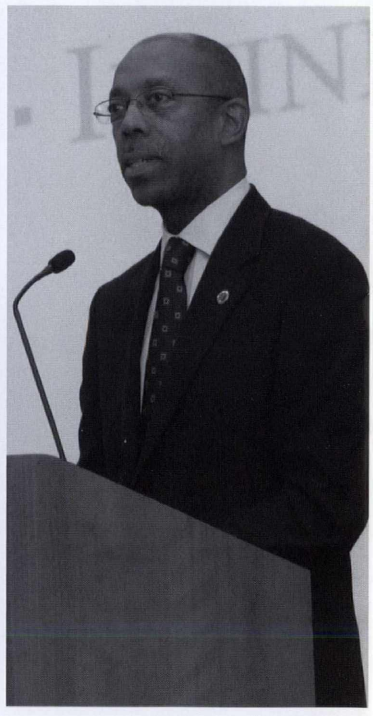
For 18 years, the Louis Stokes California Alliance for Minority Participation has pursued a comprehensive approach to support underrepresented students to complete B.S. degrees in STEM and prepare for graduate education. UC STEM baccalaureate degrees granted to underrepresented students increased by 136% since 1991, including the latest report for 2008. STEM enrollment has increased by 161% since 1990-91. The effort has been unwavering and demonstrates the effectiveness of one-on-one mentoring in retention efforts. CAMP participants are award-winning researchers and have co-authored published papers in refereed journals while still undergraduates. Student academic performance is a key indicator of retention in STEM majors, and is perhaps most visible in research presentations. University of California students consistently earn recognition at national scientific meetings. The graduate school culture has made significant increases in students completing master's and doctorate degrees, expanded through the NSF Bridge to the Doctorate activity. Approximately 40% of program participants have gone on to graduate or professional schools. They are also taking their places as faculty in UC, CSU, and four-year institutions both inside and outside California. Connecting to LSAMP institutions nationwide strengthens impact.

"Presenting at this symposium and attending the panels gave me a sense of empowerment knowing that there are others going through the same experience. It got me interested in grad school."

—Undergraduate presenter

"Students— have a passion for your work, first and foremost, and engage fully in life. Among the most important things in both your personal and professional pursuits, are to be trustworthy, to have integrity, and to care about others. Have interests outside of academia to enrich and inform a balanced life."

—Michael V. Drake, M.D., Chancellor, Principal Investigator



SYSTEMWIDE CORE PRINCIPLES & ACTIVITIES

- **Power of Mentoring:** involvement in faculty mentored research and internships
- **Power of Performance:** presenting research at campus, statewide, & national venues; developing communication skills
- **Sphere of Influence:** fostering a sense of shared purpose and identity through study groups and networking
- **"Good" Peer Pressure:** peer counseling and retention activities
- **Technology Proficiency:** exposure to current trends in technology – software and instrumentation in the lab
- **Academic Attainment:** academic counseling and tutorials; co-authorship
- **Financial Assistance:** stipends to support research and professional development
- **Collaboration:** inter-campus, inter-agency, and community
- **Student Tracking:** graduating senior questionnaire and annual data collection
- **Graduate School Preparation and Enrollment:** GRE Prep, application/ admissions workshops and student panels; writing the personal statement; Bridge to the Doctorate opportunity
- **Connectivity to LSAMP nationwide**

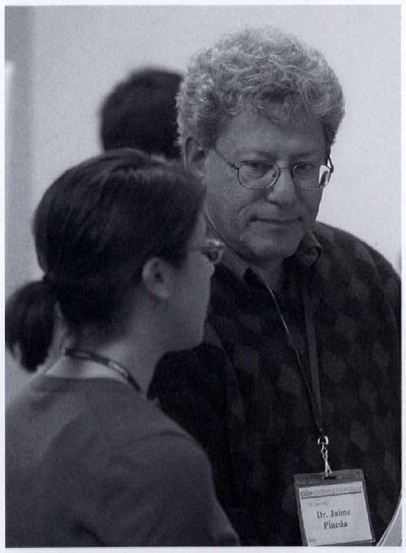
"CAMP is a great program."
—Dr. Serena Moseman-Valtierra

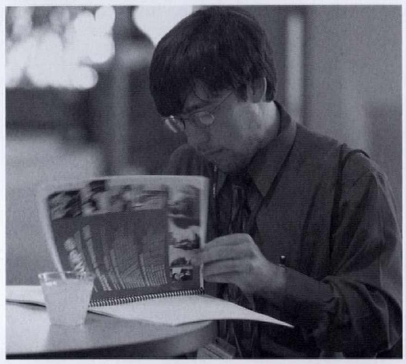
STATEWIDE SYMPOSIUM FEB. 27-28, 2009 UCI STUDENT CENTER

Welcome: Dr. Michael Drake, Chancellor, CAMP Statewide P.I.

Features:

- Undergraduate Presenters from 9 UC campuses
- Faculty Engagement
- UC-Wide Networking
- CSU LSAMP Attendees
- BD/Graduate Panel
- Graduate Prep Session
- UCI Campus Tour
- Special Merit in Research Awards
- Special Recognition/Honorable Mention





THE CAMP SYMPOSIUM AIMS TO:

- **Support** undergraduate research with a faculty member;
- **Encourage** first-time presenters;
- **Develop** student written and oral communication skills;
- **Provide** a UC systemwide forum for faculty and students;
- **Foster** preparation for and access to graduate education;
- **Set** national standards for undergraduate research.

UC IRVINE ALUMNI PANEL

- **Lamar Blackwell,** B.S. Biochemistry, Cal State Fullerton; Ph.D. candidate, Cell Biology, UC Irvine, BD Fellow*
- **Angie Hernandez,** B.S. Pursuing M.S., Neuroscience, Cal State LA, BD, with goal of continuing on in the Ph.D. path at a Ph.D. granting institution
- **Omar Moreno,** B.S. Pursuing M.S., Physics, Cal State LA, BD Fellow, with goal of continuing on in the Ph.D. path at a Ph.D. granting institution
- **Melissa Prado,** B.S. Chemistry, UC Irvine; Ph.D. candidate, UC Irvine, BD Fellow
- **Sergio Sandoval,** B.S. Chemical Engineering, UC Irvine; M.S. Bioengineering, Ph.D. program in Bioengineering, UC San Diego BD Fellow
- **Jesse Vargas,** B.S. Chemistry, B.S. Biological Sciences, UC Irvine; M.S., Molecular, Cellular, and Systemic Physiology, Southern Illinois University Carbondale, IL, BD Fellow; Ph.D. program in Molecular Biology, UC San Diego
- **Daniel Vera,** Ph.D., B.S. Mathematics, UC Irvine; Ph.D., MIT; Analyst Picoco LLC, Newport Beach, CA

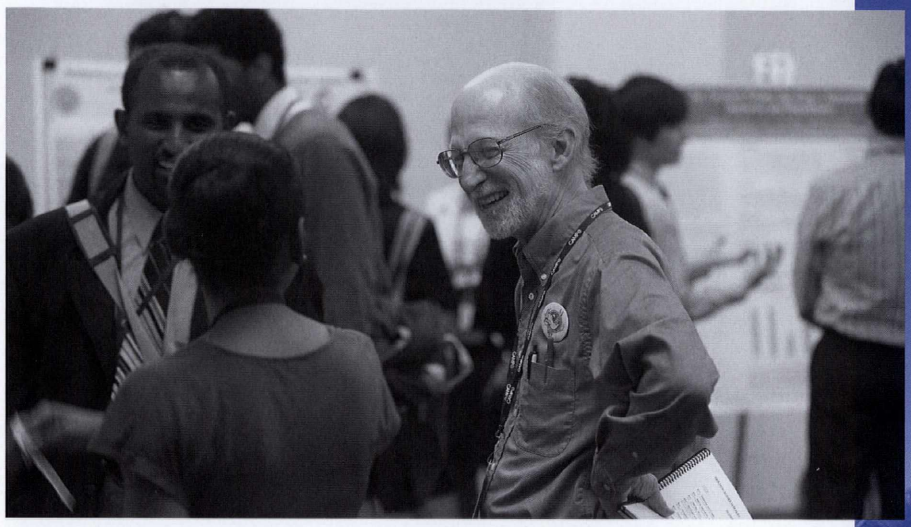
PANEL MODERATOR: Juan Francisco Lara, Ph.D., Assistant Vice Chancellor, Emeritus

Note: "BD" is Bridge to the Doctorate, a supplemental activity of NSF, supporting the first two years of graduate education. The BD is a nationwide program exclusively for LSAMP students.

UC Undergraduate Presenters

BIOLOGICAL/ LIFE SCIENCES

Navid Adnani, UC Santa Cruz
Melissa Aillaud, UC San Diego
Michael Angelo, UC San Diego
Tony Baltazar, UC San Diego
Elizabeth Canales, UCLA
Paola Castro, UCLA
Nicole Coppage, UC Santa Cruz
Helio Costa, UC Davis
Darcy Dubinsky, UC Riverside
Alicia Elizondo, UC Berkeley
D'Juan Farmer, UCLA
Tinuke Fashokun, UC Davis
David Flores, UC San Diego
Eric Garcia, UC San Diego
Natalie Garcia, UC Santa Cruz
Tracy Harjo, UC Irvine
Diego Herrera, UC Santa Barbara
Jessica Jimenez, UCLA
Amber Kofman, UC Santa Cruz
Wanna Matayasuwan, UC Davis
Maria Mayorga, UCLA
Stephanie Monica, UC Santa Cruz
Magdalene Moy, UC Riverside
Daniel Noji, UCLA
Florence-Damilola Odufalu, UC Davis
Tiffany Ornelas, UC San Diego
Daniel Orosco, UC Santa Barbara
Tori Owens, UC Riverside
Rachel Perez, UC San Diego
Denise Playdle, UC Santa Cruz
Geizhar Ramirez, UCLA
Maria del Carmen Rivero, UC San Diego
Ruben Rodriguez, UC Merced
Maria Rodriguez, UC San Diego
Richard Rodriguez, UCLA
Patricia Rubalcava, UC San Diego
Ou Chong Saetern, UC Santa Cruz



Esther Salado, UC Santa Barbara
Diana Sanchez, UCLA
Sasha Shekhar, UC Santa Barbara
Desiree Tax, UC Santa Cruz
Ta'Sheema Taylor, UC Davis
Anley Tefera, UC Merced
Samiyyah Tillman, UC Irvine
Quang Tran, UC Santa Cruz
Jantammy Vargas, UC Irvine
Vanessa Williams, UC San Diego
Karen Wong, UC Davis
Alexis Zuniga, UC Santa Cruz

PHYSICAL SCIENCES/ ENGINEERING

Ricardo Alamillo, UC Santa Barbara
Josue Alfaro, UC Irvine
Andy Anguiano, UC Irvine
Esperanza Arab, UCLA
Alex Arredondo, UC Irvine
Abraham Avalos, UC San Diego
Ailed Melissa Benitez, UC Irvine
Ernesto Carrillo, UC Santa Barbara
Monica Castaneda, UC Irvine
Vanessa Corrales, UC Irvine
Cynthia Cruz, UC Berkeley
Liliana De La Paz, UC Berkeley
Audrey Desmuke, UC Irvine
Cindy Enrigue, UC Berkeley
Anthony Erlinger, UCLA
Angie Harris, UC Irvine
Frank Jimenez, UC Irvine
Ricardo Komai, UC Irvine
Steven LaFontaine, UC San Diego
Blanca Moreno-Hernandez, UCLA
Amanuel Negash, UC Santa Barbara
Vanessa Nino, UC Davis
Evelyn Ochoa, UC San Diego
Andre Paredes, UC Irvine
Brandon Reynante, UC San Diego
Joel Rivera, UC Irvine
Paulina Rodriguez, UC Santa Cruz
Hector Romo, UC Santa Cruz
Helen Sanchez, UC Irvine
Octavio Sifuentes, UC Santa Barbara
Martin Tajiboy, UC Irvine
James Tejeda, UC San Diego
Tim Thatcher, UC Irvine
Cynthia Wood, UC San Diego
Jose Cornejo, UC Davis
Jon Lo Kim Lin, UC Berkeley
Felix Rangel, UC Berkeley
Romina Rodriguez, UC Berkeley
Jesus Tapia, UC Berkeley

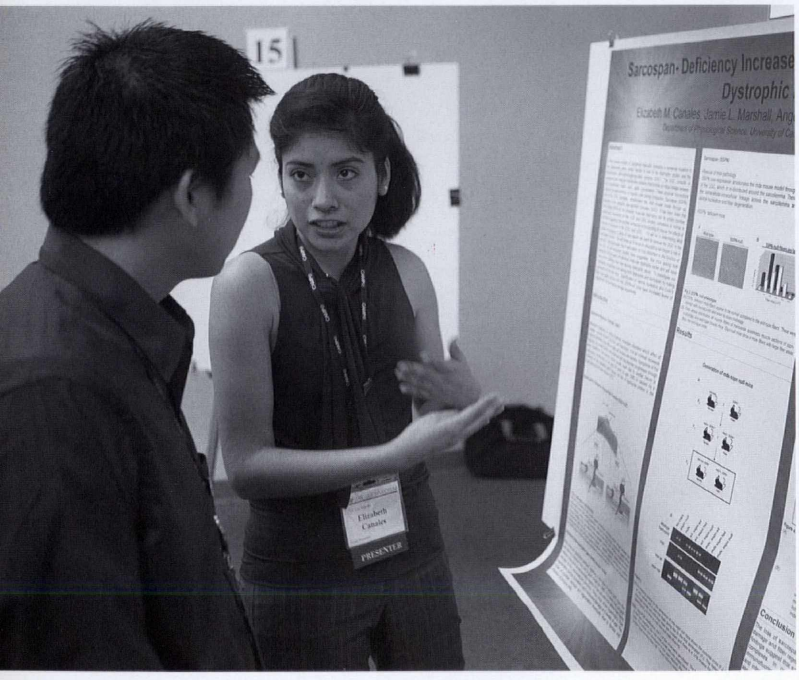
Award Winning Poster Presentations

Biological/Life Sciences

THE CELLULAR BASIS OF SEX-COMB ROTATION IN DROSOPHILA

Helio Costa, *Junior, Genetics, Professor Artyom Kopp Ph.D., Evolution and Ecology, University of California, Davis*

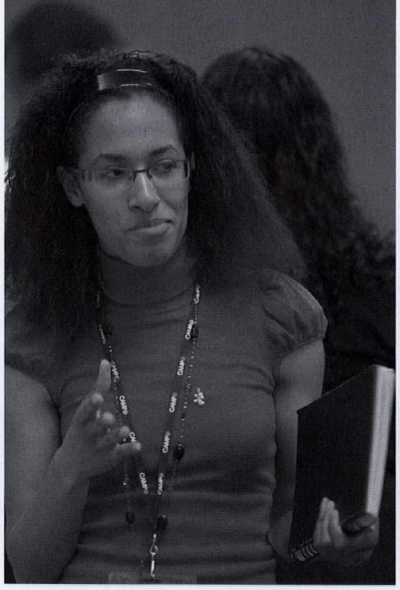
I wish to understand the roles of cytoskeletal and cell adhesion molecules in the dynamics of epithelial sheets using the *Drosophila* sex-comb as a model. The sex-comb serves as a good model system for studying this phenomenon because it demonstrates a new type of epithelial movement, where a patch of cells rotate while the surrounding cells do not. My hypothesis is that a 90 degree rotation of the sex-comb is driven by changes in the pattern of adherens junctions and cytoplasmic actin/myosin fibers in cells distal and proximal to the sex comb. I used antibody staining and confocal microscopy to examine the subcellular distribution of *zipper* (myosin), *bazooka* (epithelial cadherin) and *armadillo* (adherens junction component) in pupal legs during sex-comb rotation. I developed a procedure to properly dissect and fix the leg epithelia from the pupal cuticle to perform antibody staining. *Armadillo* staining revealed that cells distal to the sex-comb are smaller and elongated parallel to it while proximal cells are larger and elongated perpendicular to the sex-comb. This leads me to conclude that sex-comb rotation either occurs by changes in cell shape or by localized cell proliferation.



BREAST CANCER CELLS: THE BALANCE BETWEEN PROLIFERATION AND APOPTOSIS

Alicia Elizondo, *Sophomore, Molecular and Cellular Biology, Jonna Frasor Ph.D., Department of Physiology and Biophysics, University of Illinois at Chicago*

Estrogen plays a key role in breast cancer as it can stimulate proliferation and prevent the apoptosis of cancer cells. The cytokine, Tumor Necrosis Factor alpha (TNFα), is found throughout the body and can activate multiple signaling pathways but in breast cancer cells it primarily increases the rate of apoptosis. The combined effect of estrogen and TNFα on breast cancer cell proliferation and survival are not fully understood. Our hypothesis is that estrogen increases the number of viable cells in the presence of TNFα by increasing proliferation and decreasing apoptosis in breast cancer cells. Analysis of MCF-7 cells, an estrogen sensitive breast cancer cell line, through an MTS assay, which measures cell viability, shows a significant increase in the number of viable cells following estrogen treatment. In TNFα treated cells, there is a decrease in the number of viable cells. Our results indicated that the combined treatment with estrogen and TNFα treated cells shows an increase in viable cells, indicating that estrogen prevents TNFα action. This could occur by estrogen acting to reduce apoptosis, stimulate proliferation, or both. A BrdU assay, which directly measures proliferation, or a TUNEL assay, which directly measures apoptosis, would reveal which is the more prominent effect of estrogen, enhancing proliferation or reducing apoptosis. These two experiments are currently ongoing. From the BrdU and TUNEL findings, a better understanding of how estrogen influences the balance of proliferation and apoptosis within breast cancer cells could help to better target the estrogen receptor for new and better management of future therapies for breast cancer.



LUMINANCE RATHER THAN CHROMATIC CONTRAST EXPLAINS THE EFFECT OF COLOR DIFFERENCE ON VISUAL PERFORMANCE

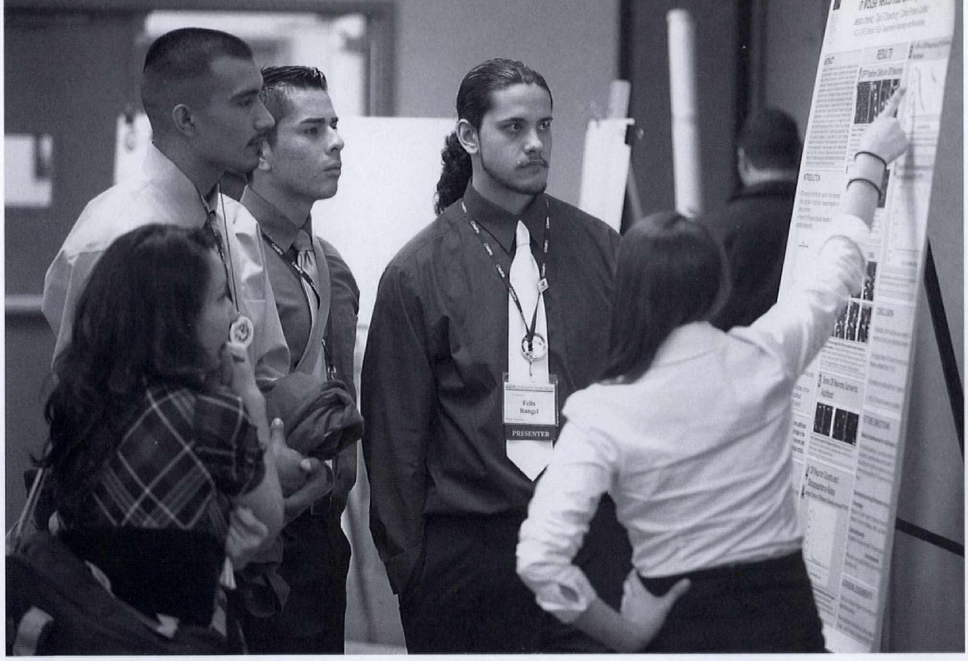
Esther Salado, *Junior, Biopsychology, Dr. Mickey Rowe, Neuroscience Research Institute, University of California, Santa Barbara*

Much time and effort is spent looking for things. Often it is critically important that we quickly and effectively find that which we seek. Here we studied how color and location affect effectiveness. Specifically we examined color heterogeneity's impact on search performance. We presented subjects with displays that contained at most one target (defined by shape) in a display containing 288 distractors. Each display contained either one or two different colors (including the targets) out of a choice of five. Accuracy (percentage of trials in which the target was found and correctly located) was measured through keypad responses. Data were analyzed according to three parameters: number of distractors matching the target color, distance of the target from the initial fixation point, and the target's color. We found that accuracy was greatly reduced when more than one distractor color shared the target's color. This effect was generally stronger when the target was father away from the subjects' initial fixation point. However, at some distances, subjects are more likely to find the target when all shapes were the same color than if only some were different. Target color also impacted the effect of heterogeneity as yellow and green targets (which had low luminance contrasts against the background) were generally harder to find than (high contrast) red and blue targets, particularly at the highest heterogeneity levels. These results suggest new avenues to explore in efforts to color code displays of critical visual information.

EARLY ESTROGEN DISRUPTION RESULTS IN ABNORMAL PLACENTAL VASCULOGENESIS

D'Juan Farmer, *Junior, Molecular, Cell, Developmental Biology, Luisa Iruela-Arispe, PhD, Molecular, Cell, Developmental Biology, University of California, Los Angeles*

Placental hypoxia and vascular abnormalities can have dire consequences on both mother and fetus during pregnancy. Preeclampsia, a disorder associated with high blood pressure, swelling, and headaches, develops from hypoxic and oxidative stress to the placenta. Tamoxifen, a selective estrogen receptor modulator which is frequently used in breast cancer, functions as an antagonist in breast tissue but acts as a partial agonist in the endometrium, and has been linked to endometrial cancer. In our research, we investigate the role of tamoxifen on placentation in order to understand estrogenic effects on placental vasculature. Thus, at day 6.5 of gestation (24hrs after implantation), mice are injected with tamoxifen, and are evaluated at mid to late gestation (days 10 to 18). To analyze the effects of tamoxifen estrogen modulation on placentation, we applied various forms of immunohistochemistry: pimonidazole for placental hypoxia, caspase-3 for cell death, and, estrogen receptor for expression analysis, and PECAM-1 for Vasculogenesis. We found consistent placental hemorrhaging at mid-gestation, suggesting a potential vascular abnormality. When comparing the wildtype and tamoxifen exposed placenta, we note abnormal placental vasculature with increased cell death and possible hypoxia in the experimental group as well abnormal estrogen receptor expression. It appears that endocrine disruption in early pregnancy (by tamoxifen administration) may result in long-term vascular disturbances in the placenta mid-late pregnancy. We will investigate hormonal disturbances as a result of tamoxifen injection by progesterone and estrogen receptor immunohistochemistry, and measure early serum levels of estrogen and progesterone following tamoxifen exposure.



STUDY OF CNTNAP2 IN ZEBRA FINCH BRAIN AS A MODEL FOR LANGUAGE DELAY IN HUMANS

Diana Sanchez, *Junior, Neuroscience, Stephanie White, Ph.D., Department of Physiological Science, University of California, Los Angeles*

Mutation of the gene Cntnap2 is associated with autism. Investigation of an Old Amish family described children with Cntnap2 mutations who suffered from epilepsy with autistic features, including language delay. Although mice have been the primary model organism for the study of Cntnap2, they do not learn their vocalizations. We theorized that a better model may be songbirds because, like humans, they possess vocal learning and have a well described neural circuit that subserves vocal learning, known as the song circuit. Therefore, songbird species such as the zebra finch could be useful organisms to investigate aspects of the language deficit present in autism. In transgenic mice lacking Cntnap2, potassium channels normally found at the juxtaparanodal regions of axons are mislocalized to the internodal regions. It was therefore hypothesized that decreases of Cntnap2 would prolong the duration of action potentials, affecting synaptic strength. In humans, this could ultimately affect language development. Toward understanding of the function of Cntnap2 using the songbird model, immunohistochemical experiments were performed to verify colocalization of Cntnap2 with potassium channels at the juxtaparanode of avian axons. Preliminary results revealed no Cntnap2 signal. Further testing using different antibody concentrations and better-preserved brain tissue will be performed to optimize our approach. The overall results of this research will lead to a better understanding of the role that Cntnap2 plays in autism.

CREATING A CO-EXPRESSION VECTOR FOR STRUCTURAL STUDIES OF THE HUMAN SF3A COMPLEX

Denise Playdle, *Senior, Molecular, Cellular and Developmental Biology, Dr. Melissa Jurica, Gabriel Roybal and Patricia Coltri Graduate Student Mentors, Department of Molecular, Cellular and Developmental Biology, University of California, Santa Cruz*

The central dogma of molecular biology states that DNA is transcribed into RNA and translated into protein. In eukaryotes, pre-mRNA transcripts are spliced into functional protein coding mRNAs by the spliceosome complex. Mistakes in this processing event can result in misexpression of genes leading to diseases such as cancer. The spliceosome complex that carries out splicing, is one of the most complex cellular machinery. It is composed of five small nuclear ribonucleoproteins(snRNPs)and many non-snRNP protein factors. Though little is known about the structural dynamics of this large complex, understanding the structure and function of the snRNPs may lead to a mechanism of the splicing process. The research focus of the Jurica lab is to combine different techniques such as electron microscopy and biochemical analysis to obtain insight into the overall shape of the spliceosome. This project involves developing a system to generate the SF3a complex, a component of the mature U2 snRNP. The U2 snRNP is a key building block of the spliceosome machinery. The goal of the project is to create a vector that co-expresses the three SF3a proteins together in bacteria. Studies have shown that individually expressed SF3a subunits misfold and we are using the Gateway Pro® Multi-site vector system to incorporate the three SF3a coding sequences into an expression vector. In order to create the expression vector via Gateway Pro®, PCR inserts of each subunit must be generated and cloned into appropriate Gateway Pro® donor vectors. I will present my progress in developing the co-expression vector using the Gateway Pro® system. Once we have created this vector, we will test the expression of the three proteins in bacteria towards our ultimate objective of purifying these proteins for structural studies.

LASER ABLATION OF MITOTIC MICROTUBULES AND THE RESULTING KINETICS OF MITOSIS, IN MALE RAT KANGAROO (PTK2) CELLS

David Flores, *Senior, Physics (Biophysics), Professor Michael Berns, Norman Baker, and Linda Shi, Department of Bioengineering, University of California, San Diego, Department of Biomedical Engineering, University of California, Irvine, Beckman Laser Institute, University of California, Irvine*

During cell mitosis, the spindle fiber microtubules play a key role in the kinetics of pole and chromosome movement. The microtubules have been attributed to both the initial positioning of sister chromatids along the metaphase plate, and also with the opposing forces which separate the duplicated chromosomes during anaphase. The microtubules have further been deemed a key factor in determining when the final pre-anaphase checkpoint (tension/attachment) is released. The purpose of this study was to selectively destroy various types and areas of microtubules during metaphase, in a live cell, with a goal to help clarify their role in positioning, force generation, and kinetics during mitosis. Using the automated RoboLase II laser microscope*, microtubules of single ECFP-tubulin transfected male rat kangaroo (PTK2) cells were ablated during the metaphase stage of mitosis. The irradiation of 0.2447 nJ/micropulse, corresponding to an irradiance of 1.4496*10^7 watts/cm2, produced well-defined micro-destruction of mitotic microtubules. The ensuing response of the poles and mitotic spindle were followed using fluorescent microscopy and the RoboLase II system. The results include several different patterns of kinetics in both the pole whose microtubules were ablated, as well as the pole which received no biophotonic alteration. Both the pattern of ablation and the type of microtubules targeted (astral vs. kinetochore) effected the resulting kinetics. These findings may help elucidate the sensory and structural mechanisms of spindle collapse and force generation during mitosis. *(Botvinick and Berns, 2005, Micros. Res. Tech. 68:65-74)

EVALUATION OF THE VIABILITY OF NEONATAL CARDIOMYOCYTE CELLS ON DIFFERENT EXTRACELLULAR MATRIX COMPONENTS

Michael A. Angelo, *Junior, Human Biology, Karen L. Christman, Ph.D. and Jessica DeQuach, Department of Bioengineering, University of California, San Diego*

A heart attack results in a restriction of blood supply and shortage of oxygen to part of the heart. If left untreated, this restriction in blood supply can lead to an infarction in the myocardium. Myocardial infarctions impair the ability of the heart to fill with or pump sufficient amounts of blood, which can result in a decrease in both arterial pressure as well as venous return, thus myocardial infarctions may increase the probability of heart failure. A potential therapeutic option to treat myocardial infarctions is the transplantation of myocardial cells directly into the infarction to augment the function of the remaining cardiomyocytes. However, ideal culture conditions for cardiomyocytes have not yet been completely determined. Thus, we will culture cardiomyocytes from neonatal rats on different extracellular matrix (ECM) components in order to evaluate the viability of cardiomyocytes. The aim of the study is to determine which extracellular matrix: collagen type I, laminin, fibronectin, commercially available Sure-Coat, or native cardiac ECM will demonstrate the best attachment and growth of cardiomyoctes. This can be determined through staining for actin and a live/dead assay. Different ECM may have various effects on the cardiomyocytes, and determining which ECM is the best for cell viability and function may be useful for the culture of stem cell derived cardiomyocytes for therapeutic applications.

Physical Sciences and Engineering

CATALYTIC CONVERSION OF BIOMASS DERIVED OXYGENATES

Liliana De La Paz, *Junior, Chemical Engineering, Juan Bravo Ph.D. and Enrique Iglesia, Ph.D., Department of Chemical Engineering, University of California, Berkeley*

With less petroleum availability, there are new incentives to develop biofuels based on biomass. An economical and environmental approach has been to exploit glycerol, a prevalent byproduct of biodiesel production, to obtain higher value products. Prior to exploring the catalytic conversion of glycerol, the behavior of 1,3 propanediol was studied under conversion with the zeolite H-ZSM-5 and polyoxymetalates $H_3PW_{12}O_{40}$ (40 wt%)/SiO_2 (HPW) and $H_4SiW_{12}O_{40}$ (5 wt%)/SiO_2 (HSiW). Conversion was tested under various temperatures, specifically a 75-275° C range for the polyoxymetalates and a 100-400° C range for H-ZSM-5. After establishing the best temperature for conversion and selectivity, stability tests were run at varying space velocities with each catalyst. At 220°C, H-ZSM-5 achieved a 13% conversion with selectivity to acrolein of 24%, whereas HPW converted 36% with acrolein selectivity of 4.7% at 120°C, and HSiW at 120°C converted 24% with selectivity to acrolein of 4.5%. With the results of conversion and selectivity of 1,3-propanediol under different catalysts, additional insight is provided in regards to the expected products of glycerol conversion and its promise for creating valuable chemical intermediates.

MORPHING SURFACES FOR THE CONTROL OF BOUNDARY LAYER TRANSITION

Brandon M. Reynante, *5th Year Senior, Mechanical Engineering, Professor Beverley McKeon, Professor Kaushik Bhattacharya, Jeff LeHew, Professor Michael Ortiz, Graduate Aerospace Laboratories, Mechanical Engineering, California Institute of Technology, University of California, San Diego*

Micro Air Vehicles (MAVs) are miniature unmanned aerial vehicles that operate in the range of chord Reynolds numbers from 104-105. Rough airfoils are capable of higher lift-to-drag ratios than smooth airfoils for Reynolds numbers below 105, while smooth airfoils provide increased performance at higher Reynolds number values, which can be attributed to flow separation effects. This project investigated the use of morphing surfaces for the control of boundary layer transition as a means to improve the flight performance of MAVs. By utilizing the inherent elastic buckling instability of a stiff thin film bonded to a soft substrate subject to a strain mismatch, the surface can be morphed from smooth to rough for the stimulation of transition. Furthermore, the material properties can be tailored to satisfy the requirements needed to avoid the separation condition. Morphing surfaces were fabricated by depositing a gold film on a polydimethylsiloxane (PDMS) elastomer substrate that was pre-strained by thermal expansion; relieving this pre-strain caused the film to wrinkle. Characterization of the wrinkles was done using a custom built scanning laser displacement system, and the effects of film thickness on the amplitude and wavelength of the wrinkles were experimentally determined and compared to existing theory. Values of ~15-70 μm for wavelengths and ~8-40 μm for amplitudes were found, which were similar to theoretical predictions. Temperature was investigated as a control mechanism for the activation of the morphing surfaces, and the reversibility of the morphing characteristics was demonstrated.

CUSHIONED LIPID MEMBRANES FOR STUDYING INTEGRAL MEMBRANE PROTEINS

Tasheema Taylor, *Junior, Biological Systems Engineering, Professor Tonya Kuhl, Ph.D., Chemical Engineering and Materials Science, University of California, Davis*

Integral membrane proteins (IMPs) are extremely important in cellular function, playing vital roles in signaling and transport. More than 50% of commercial drugs target IMPs; thus, understanding the structure and function of IMPs is crucial for drug discovery. These efforts are stymied by challenges associated with maintaining proper folding and function of IMPs once they are removed from the membrane environment. To overcome this problem, we are creating solid supported bilayers that mimic cell membranes and can maintain proper structure and function of IMPs of interest. The bilayers are prepared by incubating liposomes on polymer coated glass substrates. Fluorescence recovery after photobleaching will be used to determine bilayer fluidity a key property for incorporation of functional IMPs. Once bilayer fluidity is determined, IMPs will be incorporated using vesicle fusion techniques. Subsequent work will investigate the use of electrophoretic gradients to displace IMPs and collect them against barriers for crystallization studies.

CALIFORNIA BIODIESEL MULTI-MEDIA EVALUATION: EXPERIMENT PLANNING AND PROTOCOLS

Vanessa Nino, *Senior, Civil Engineering, Professor Timothy Ginn Ph.D., Civil and Environmental Engineering, University of California, Davis*

The California Air Resources Board (CARB) is required by the state legislature to present a multimedia risk assessment for any new fuel. The University of California Davis and University of California Berkeley are currently investigating the environmental hazards and health risks involved in the transport, storage, use, and fate of biodiesel that will guide the state's decision making concerning specifications for biodiesel blends. Three tiers have been constructed to guide our research goals. "Tier 1: Technical consultation and peer review to establish the risk assessment elements and issues. Tier II: Development and review of the risk assessment protocol for future actions and reports. Tier III: Implementation of a Final Multimedia Risk Assessment and submission of Final Report..." We are now in the beginning stages of Tier II and are planning experiments to determine relative increases in risk with biodiesel vs. conventional diesel with respect to the following: the infiltration time from the ground surface to the water table; capacity as a solvent; potential for degradation by microorganisms; and aquatic toxicity impacts. Infiltration times will be studied via "ant farm" (two-dimensional porous media) tests to understand biodiesel's potential transport to groundwater. Batch leaching experiments using diesel contaminated soils will be done to discover biodiesel's capability as a solvent for hydrocarbons. Microcosm experiments using microbial cultures are planned to observe rates of decomposition in soils. Finally, a wide range of aquatic toxicity experiments are being performed to evaluate impacts of dissolved components of biodiesel on freshwater and saltwater organisms.

EFFECTS OF HEAT TREATMENT CONDITIONS ON CREEP IN ELECTRODEPOSITED NANOCRYSTALLINE NICKEL

Frank A. Jimenez, *Senior, Material Science & Mechanical Engineering, Dr. Farghalli A. Mohamed, Department of Chemical Engineering and Materials Science, Heather Yang (Graduate Student), University of California, Irvine*

Nanocrystalline (nc) materials are characterized as polycrystalline materials with grain sizes in the range 1 -100 nm. Nc-materials exhibit highly attractive mechanical properties that give them high potential in engineering applications. Primary among the mechanical properties is creep resistance. In the present investigation, the creep behavior of nc-Nickel with an average grain size of 20 nm has been studied. Nc-Ni has served as a model material in studies involving deformation and correlation between properties and microstructure. Nc-Nickel was produced via an electrodeposition (ED) procedure since the procedure has proven to be an advantageous in terms of producing dense and highly pure (ED) nc-Ni. The double shear creep testing technique was adopted in order to avoid any geometric instability with the onset of necking commonly seen in tensile tests. Furthermore, the microstructure of nc-Ni was examined via Transmission Electron Microscopy (TEM) to gain insight into: (a) the effect of heat treatment on the grain size and microstructure, and (b) the details of the deformation process.

INVESTIGATION OF GRAIN BOUNDARY SLIDING DURING DEFORMATION OF NANOCRYSTALLINE METALS

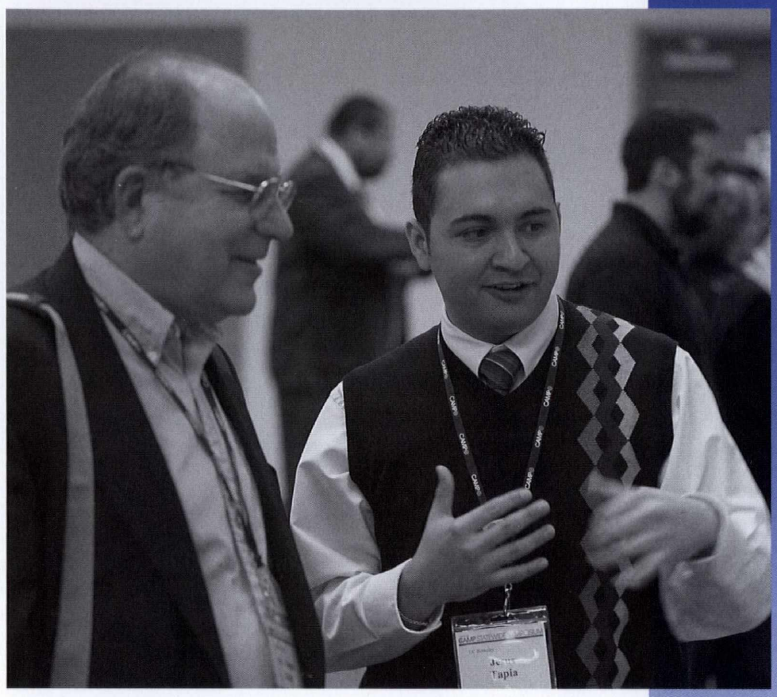
Ricardo Komai, *Senior, Material Science & Mechanical Engineering, Professor Farghalli A. Mohamed, Khin Lay Maung, Department of Chemical Engineering and Materials Science, University of California, Irvine*

Nanocrystalline metals are composed of metal grain sizes in the range of 1-100 nanometers. These metals have unique features different from their conventional grain-sized counterparts due to the relative increase in grain boundaries. Nanocrystalline materials are regarded as a new class of material because they have new properties that can prove to be useful in engineering. The investigation of these properties and behavior is an important area in materials research. While chemical and electromagnetic properties have been explored, many mechanical properties have not been fully investigated. Before these materials can be used for structural application, it is important to understand all of their properties and behavior to prevent future problems that may occur during service. Computer simulations can predict occurrences of "boundary sliding," that signify the movement of grain boundaries in nanocrystalline metals. However, this phenomenon has not been experimentally observed. In order to observe how boundary sliding affects nanocrystalline properties of nanocrystalline materials, we intend to use an Atomic Force Microscope to visually observe the formation of steps and voids in nanocrystalline nickel. Boundary sliding often has a negative effect in metals. The boundary sliding that occurs in nanocrystalline metals causes voids and cavities in the structure of a metal, which can cause premature failure. Research dealing with boundary sliding is at present in progress. Preliminary results that are obtained in this research will be presented and discussed.

WIRELESS HEALTH ANALYSIS THROUGH ON-CHIP CYTOMETRY

Anthony Erlinger, *Senior, Electrical Engineering, Aydogan Ozcan, Ph.D., Department of Electrical Engineering, University of California, Los Angles*

Conventional medical diagnostic tests rely on rapid recognition and analysis of various cells in a biological sample. However, in clinical settings, this can be a challenging endeavor and current microscope and imaging technologies are cumbersome and expensive, requiring entire laboratories of equipment and dedicated personnel to achieve a simple task. To address these shortcomings we have produced a lens-free platform using high resolution sensor arrays capable of imaging a very wide field-of-view, up to 100 times greater than an objective lens microscope, within a space no larger than a cell phone. In our system, a sample is placed above the sensor array and illuminated from above with partially coherent light. A cell within the sample will scatter the light onto the sensor in a unique manner giving each type of cell a particular diffraction pattern or signature. Additionally, through application of image processing algorithms, such as pattern recognition or feature detection, we can characterize and differentiate between cells in a sample, without ambiguity, to identify the presence and state of a disease. The removal of bulky equipment used in conventional technology such as flow-cytometry allows us to dramatically reduce size and cost while maintaining high-throughput. Ultimately, our aim is to implement this technology to monitor such diseases as HIV and malaria in resource limited settings such as Africa and other third world countries. Experimentally, we have demonstrated accurate characterization for a myriad of applications including analysis of HIV infected blood, red blood cell populations, and the detection of bacteria. Based upon the presence and quantity of such cells or micro-organisms, a clinical diagnosis by a trained technician or doctor can be made to assess the health of a patient.



MASS FLUX OF PLASTICS AT PILOTED IGNITION

Romina Rodriguez, *Junior, Civil Engineering, Sara McAllister, M.S., A. Carlos Fernandez-Pello, Ph.D., Department of Mechanical Engineering, University of California, Berkeley*

By 2010, NASA plans to retire their shuttles and will implement new spacecrafts for space exploration. A major problem that must be avoided is the possibility of a fire. To prevent this from happening, a study must be conducted on how flammable the materials used in the spacecraft are. To better understand material flammability, one aspect that can be studied is the mass flux of the material right before ignition and this is the approach followed in this study. An experiment is conducted on the effects of heat flux and flow velocity on the mass flux at ignition and through it the flammability of a plastic, PMMA. The experiment apparatus consists of a small-scale wind tunnel and heaters that thermally radiate a small sample of PMMA. The samples then undergo piloted ignition sparked by an igniter. From here, mass loss and mass flux data is gathered to determine the flammability of PMMA. The results of the experiment indicate that the mass flux of the sample at ignition increases with an increase in heat flux and shows no relevant change with an increase in flow velocity up to 1 m/s. Future research will be done on mass flux of PMMA in a FIST (Forced Ignition and Flame Spread Test) chamber that has exploration ambient conditions, i.e. high oxygen concentration and low pressure.

Special Recognition, Honorable Mention

TRANSCRIPTIONAL ANALYSIS PROFILE OF TWO ANDROGEN – INDEPENDENT PROSTATE CANCER CELL LINES

Tinuke Fashokun, *Senior, Biochemistry and Molecular Biology, Professor Maria Mudryj, Ph.D., Medical Microbiology & Immunology, University of California, Davis*

HYPERTENSION AND THE CORRELATION BETWEEN HUMANS AND RATS

Samiyyah Tillman, *Senior, Public Health Sciences, Professor Pam Flodman, Pediatrics, University of California, Irvine*

PREVALENCE OF OBESITY IN BOTH MINORITY AND WHITE ADOLESCENTS IN A RURAL U.S. POPULATION

Ruben Rodriguez, *Senior, Psychology, Dr. Rudy M. Ortiz PhD, Jana Mowrer, Jessica Romo, Amanda Camelo, and *April Aleman RN, School of Natural Sciences, Health Services, Merced Union High School District, University of California, Merced*

FATE OF CAJAL-RETZIUS NEURONS IN MOUSE POSTNATAL DEVELOPMENT

Jessica Jimenez, *Sophomore, Neuroscience, Carlos Portera-Cailliau, MD/Ph.D., Department of Neurobiology, University of California Los Angeles*

MICROFLUIDIC APTAMER ARRAY FOR MULTIPLEXED PROTEIN ANALYSIS

Anley E. Tefera, *Senior, Bioengineering, Dr. Luke P. Lee, Research Mentor Megan Dueck Lab partner/undergraduate researcher: Dominique Hall, Bioengineering Department, University of California, Merced*

TRANSLATING SOUNDS INTO ACTIONS

Vanessa Williams, *Senior, Cognitive Science, Professor Jaime Pineda and Yoon Chung, Department of Cognitive Science, University of California, San Diego*

TEC TYROSINE KINASE SIGNALING IN MYOCARDIAL ISCHEMIA AND REPERFUSION

Daniel Noji, *Senior, Biology, Thomas M. Vondriska, Ph.D., Department of Anesthesiology, University of California, Los Angeles*

IDENTIFYING INTERACTING PARTNERS OF THE HUMAN SMALL TIMM PROTEINS IN MITOCHONDRIA

Geizhar Shoun Ramirez Enriquez, *Junior, Biochemistry, Carla Koehler, Ph.D., Department of Chemistry and Biochemistry, University of California, Los Angeles*

SLITS ACT AS TUMOR SUPPRESSORS IN MOUSE MODELS OF BREAST CANCER

Stefanie Monica, *Senior, Biochemisty and Molecular Biology, Dr. Lindsay Hinck, Rebecca Marlow, Ph.D., Department of Molecular, Cellular and Developmental Biology, University of California, Santa Cruz*

HAR1 POINT MUTATION

Desire Tax, *Junior, Chemistry, Dr. William Scott, Monica Rae Jung Lares Graduate Student Mentor, Department of Chemistry and Biochemistry, University of California, Santa Cruz*

LANDEN TRANSFORMATIONS WITH COT(3THETA)

Cindy Enrigue, *Senior, Mathematics, University of California, Berkeley; Gerard D. Koffi, Loraine Torres Castro, Candice Price, Professor Victor Hugo Moll - University of Massachusetts, Boston, MA, Universidad de Puerto Rico, Rio Piedras, University of Iowa, IA, Tulane University, LA*

CARBON CYCLING IN CALIFORNIA TURFGRASS ECOSYSTEMS

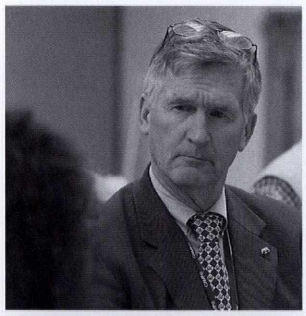
Ailed Melissa Benitez, *Junior, Earth System Science & Public Health Science, Dr. Susan E. Trumbore, Earth System Science, University of California, Irvine*

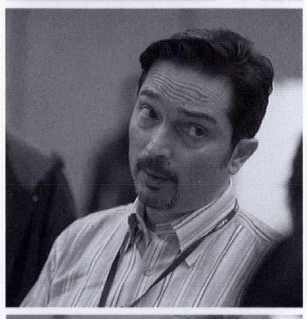
HAMILTONIAN SYSTEMS AND THEIR APPLICATION TO DYNAMICAL WAVES AND FLUIDS

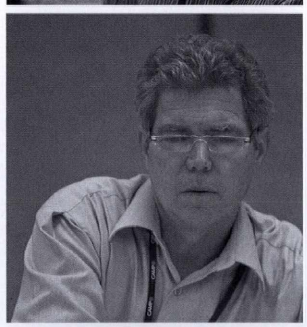
Paulina Rodriguez, *Junior, Mathematics, Dr. Debra Lewis, Maria Schonbek, Ph.D, Department of Mathematics, University of California, Santa Cruz*

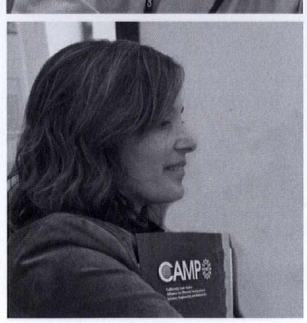
RADIOACTIVE MATERIAL DETECTION IN CARGO CONTAINERS

Felix Rangel, *Senior, Nuclear Engineering, Edward Morse, PhD, Darren Johnson, and Christian Shopcke, Department of Nuclear Engineering, University of California, Berkeley*









Judges

CAMP Statewide - Lead Judge

Derek Dunn-Rankin, Ph.D., Professor and Chair, Mechanical and Aerospace Engineering; California LSAMP Co-Project Director; Faculty Director, CAMP-UCI

PHYSICAL SCIENCES/ ENGINEERING

Glen Beltz, Ph.D., Engineering, UCSB

Russell Flegal, Ph.D., Toxicology, UCSC

Arnold Guerra, Ph.D., Physics, UCI & Orange Coast College

George Johnson, Ph.D., Mechanical Engineering, UCB

Kenneth Millett, Ph.D., Mathematics, UCSB

Philippe Relouzat, Ph.D., Mathematics, LARC, UCI

Todd Squires, Ph.D., Chemical Engineering, UCSB

BIOLOGICAL/ LIFE SCIENCES

Caroline Kane, Ph.D., Molecular & Cell Biology, UCB

Carla Koehler, Ph.D., Chemistry and Biochemistry, UCLA

Jennifer Martiny, Ph.D., Ecology & Evolutionary Biology, UCI

Jaime Pineda, Ph.D., Cognitive Science, UCSD

Stuart Sandin, Ph.D., Marine Ecology, Scripps Institution of Oceanography, UCSD

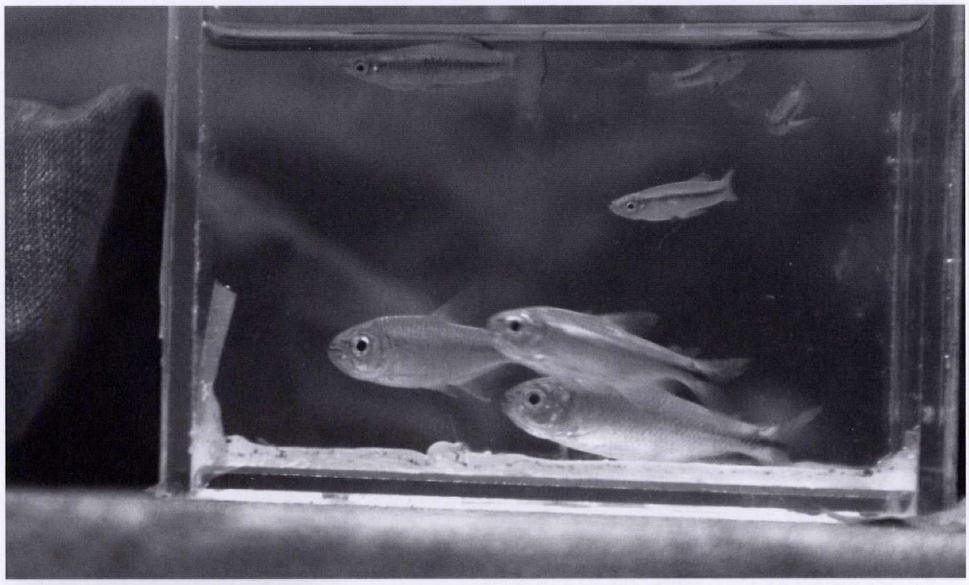
Andres Sciolla, M.D., Clinical Professor, Psychiatry, UCSD

Richard Weiss, Ph.D., Chemistry/Biochemistry, UCLA

UC Irvine's Gilberto Cardenas Acquires Life Lessons on Path to B.S. Degree

Applied Mathematics Major Studies Blind Cave Fish in Mexico through Interdisciplinary Research

By Marjorie DeMartino



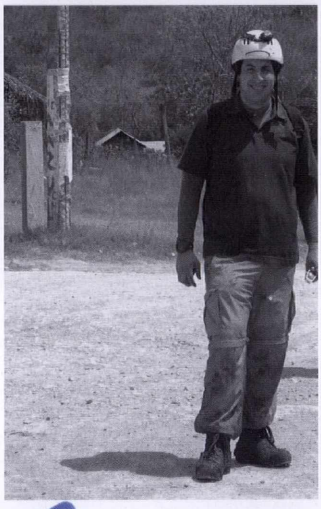
One of the first things you notice in a conversation with **Gilberto Cardenas** is his skill at describing his long and winding road to UC Irvine. His path to becoming an applied mathematics major has many twists and turns. His persistence and focus on the prize, a bachelor's degree from the University of California, Irvine, encompass not only his personal goals but also his desire to make a difference. Along the way, he acquired useful life lessons.

"Life is the best educational tool you can have," Cardenas states. "You learn so much from real-life experiences."

Experiences like being an Army attack helicopter mechanic.

Experiences like trying to take college courses at night during a war.

Experiences like producing artistic photographs, a hobby that began as a young teenager with a disposable camera and has become a passion and a vital research tool documenting people, places, and things.



"I joined the military right after high school," he explains, because (cupping his hands) "my world was so small. During my service on bases in Germany, I earned my AA degree."

Cardenas was an attack helicopter crew chief, performing inspections and troubleshooting. He also worked long days on aircraft, yet plugged away taking evening courses, one course at a time.

He says, "As strange as it seems today, I use those mechanic skills in my research and in my photographic pursuits."

Taking all the right courses, however didn't automatically lead to admission to a four-year institution. Returning home to California he met with some disappointment.

"Many of the units didn't transfer, so I started over at Orange Coast College and, after another four years, finally transferred to UCI."

He was never without a productive activity to advance his professional development. For two years, he managed a small logistics company transporting shipments across the U.S., building people and business skills.

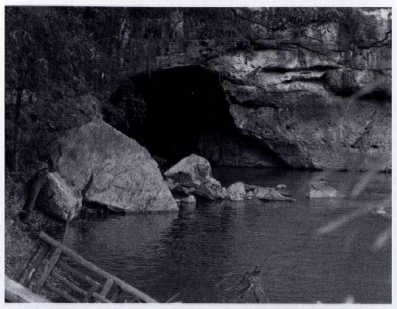
For the final push to the bachelor's, he enrolled at UCI — but he hadn't always had UCI in mind — he had been admitted to UCLA and UC Berkeley, and Berkeley was looking pretty attractive because his sister had graduated from Cal. (She is now pursuing a master's in Barcelona, Spain.) But the deciding factor was the opportunity to conduct summer research before transferring through Bridges to the Baccalaureate program. Interestingly, he was offered a chance to participate in a laboratory in Ecology and Evolutionary Biology, under the mentorship of Dr. Matthew McHenry, P.I. The project focused on blind cave fish. Before long, it was not only the exposure to a new way to use math, it was also the people and the financial support that cemented his decision to choose UCI.

Cardenas received a UC-Edison Scholarship, a transfer

student scholarship made available through an established partnership between UCI, Edison International and CAMP Statewide. He found the campus itself very beautiful and the academics excellent. "And," he admits, "the people are not what I had expected. They're friendly and approachable! Not the bookworms I had imagined."

Getting started in the research laboratory also exceeded his expectations. His mentor showed him the tool room, with everything needed to build a laboratory setup. "There were chisels, saws, and everything else you'd find in a workshop." His background as a mechanic came into good use. He started by designing a plan and showing it to Dr. McHenry. Cardenas says, "Dr. McHenry motivated me to improve on my design and continue with my experiments. He didn't hold my hand, he was a resource."

Cardenas dove into the experiments and discovered that observing the predator-prey interactions "was not just about data analysis." He saw it was turning real life situations into equations that mathematicians work on. He also employed his love of fine art photography throughout the process. His photographs have appeared in *Scribendi Magazine*, Albuquerque, NM, and at the Frank M. Doyle Arts



Pavilion, Costa Mesa, CA. He is currently awaiting word on a cover photograph in a journal.

The effort culminated in an exciting project to present at the Astyanax International Meeting in San Luis Potosi, Mexico, a meeting unusual in that it focused solely on one type of fish, the blind cave fish. Biologists from all over the world discussed their findings, and Cardenas met scientists from France, England, and Croatia, among others.

He was also able to make a unique contribution to the dialogue. A lot of the cave fish were going extinct. There were thousands of caves in the area. He asked the locals, and learned that a mining company had been using dynamite, and that the vibrations were causing cracks in the caves making the water seep out. "I gave that information to the international scientists."

Inspiration and support has also come from Kika

Friend, CAMP Program Coordinator for UCI (and recipient of the SACNAS Professional Mentor Award in 2005).

"I was very fortunate to get into the CAMP program," he says, "Kika has constantly pushed me to broaden my networks."

Cardenas was on a roll. He attended the Sackler Colloquium In The Light of Evolution III: Two Centuries of Darwin. He then presented at the West Coast Biological Sciences Undergraduate Research Conference, Point Loma College, San Diego. Additionally, in March 2009 he was an invited speaker at the Western Regional Honors Council Conference in Spokane, WA.

Summer 2009 presented the opportunity to participate in the CAMP Summer Science Academy, ten weeks of academics, professional development workshops, and laboratory research, as well as action plans to prepare for graduate school.

Cardenas expects to complete a B.S. degree in Applied Mathematics in June 2010, and continue on in a master's and eventually a Ph.D. For now, he has set his sights on the interdisciplinary master's in art, computer science and engineering. In addition to the blind cave fish project, he has been working on another mathematical modeling project with zebra fish, which he presented at SACNAS 2009. It's taken ten years to arrive at this point, where Cardenas sees his future in science and math beckoning clearly on the path ahead. But it is a road well traveled with life lessons well taken.

Like he says, "If you have an idea, there's a good possibility you can make it true."

GILBERTO CARDENAS

- High School: Newport Harbor HS, Newport Beach, CA
- Community College: Orange Coast College, Costa Mesa, CA, and U.S. Army Base college courses
- Major: Mathematics; Areas of Concentration: Applied and Computational Math
- Level: Senior
- Anticipated B.S. Degree: June 2010
- Mentor: Dr. Matthew McHenry
- Research Presentations: Astyanax International Meeting, San Luis Potosi, Mexico; Point Loma College, San Diego; UC Irvine, CAMP Summer Science Scholars Undergraduate Research Symposium
- Awards/Honors: UC-Edison Scholar; CAMP Summer Science Research Scholar; HENAAC Scholarship and National Hispanic Caucus Scholarship at Orange Coast College; National Defense Service Medal, Overseas Service Ribbon, U.S. Army
- Academic Service: Tutoring in math and physics
- Educational Goals: Master's degree and ultimately a Ph.D.
- Career Goal: Research
- Memberships: CAMP, SACNAS, Bridges to the Baccalaureate Program, Puente Project, Think Together

Q&A WITH GILBERTO CARDENAS

When did you first realize you were good in math?

I was in the fourth grade, but I never considered it a skill, just an ability. Then I found I could use my strengths to enhance everything else. Lately I've discovered that I really like mathematical modeling—how to turn life into math equations. I see math as fundamental to everything.

How is your relationship with your mentor?

When I first started in Dr. McHenry's lab, I didn't know anything about science. He's been a very good mentor, and he gives me freedom, which has given me more than I could learn in a classroom. Since day one he has given me the liberty to design my own apparatus and procedures. If there are some techniques I want to try he'll encourage me.

What makes a successful undergraduate researcher?

Curiosity! Curiosity is the big key. You have to be curious about your subject area and successful undergrads have to take initiative. You can't sit around and wait for someone to do it for you.

What is your advice to a new transfer student?

Be open minded. Don't shy away, take every opportunity that comes your way. You never know where it will lead. Get involved in student clubs, outreach programs or research.

What are you involved in?

I tutor a lot of students at the CAMP office in math and physics. I also reach out to youth in my community, and bring them to campus and give a tour of my lab to show them the possibilities. I think if you have an idea, there's a good possibility you can make it true.

What is the biggest barrier for transfers?

Being able to adjust to the environment is a huge obstacle, and not knowing a lot of their peers.

You want to make a difference for others. How are you planning to do this?

Recently I met with Vice Chancellor Gomez to discuss an after school program in my neighborhood in Costa Mesa. It's grown into a program called Think Together. I wanted to see if UCI and Think Together could collaborate, if we could be more powerful as a group than working individually. I believe that you have to reach students at a very early age to keep them focused on school.

Do you have a favorite read?

I have a lot of favorites, like *Catch 22*. I can relate. And *100 Years of Solitude*, which shows the importance of strong family bonds.

How do you relax?

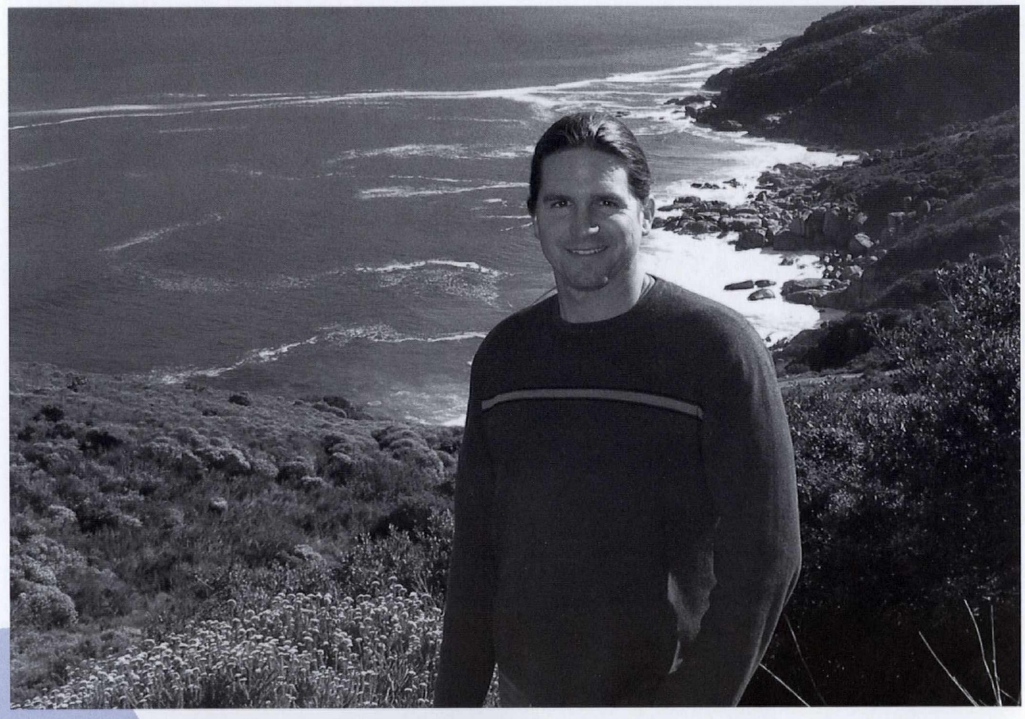
Photography!

Parting Words?

I've learned what it takes to succeed in anything you want — all you have to do is work for it.

PHOTOS BY GILBERTO CARDENAS

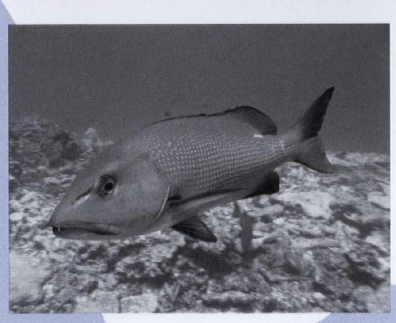
Marine Ecologist Dr. Stuart Sandin Seeks Solutions to Ocean Health



Dr. Stuart Sandin is an Assistant Researcher in Marine Ecology at the Center for Marine Biodiversity & Conservation (CMBC) at the Scripps Institution of Oceanography in La Jolla, CA. He is interested in community ecology, particularly coral reef communities, and in marine conservation and human impact.

"The study of marine ecology today cannot ignore the role that humans play in changing our ocean environment," Sandin says, "From climate change to intensive fishing, we are altering the basic structure and working of marine ecosystems."

Sandin believes that the responsibility has fallen on our generation of scientists and citizens to "find solutions that couple the needs of a growing human population with the persistence of ocean health."



With toxic chemicals in the oceans and bacterial populations threatening swimmers as well as depleted marine life, it's a tough time to be an oceanographer. In fact, in an article Sandin wrote for the San Diego Union-Tribune, he notes that the job of oceanographer was rated by a popular science magazine as the second worst job in science. But there is hope.

In July 2009, Sandin was among 1,000 marine scientists and managers who met in Washington, D.C. at the inaugural International Marine Conservation Congress to discuss the future of the world's oceans. The goal was to explore ways of ensuring that the oceans will continue to serve mankind's needs for generations to come.

Sandin is currently engaged in projects in Palmyra and the Line Islands, the Central Pacific Atolls — remote and uninhabited atolls nearly 1,000 miles south of the Hawaiian islands. The area provides the opportunity to study coral reef ecosystems in the relative absence of local human activities. He reports that, based on information stored within Palmyra's corals, the history of El Niño climate fluctuations during the past centuries have been described as never before. Scientists are using remote audio recorders to learn the behaviors and habits of the dolphin populations. Additionally, they are uncovering the importance of sharks and other predators to the ecology of coral reefs.

In addition to mentoring undergraduate and graduate students, Sandin is engaged in public information activities — his personal information campaign. He says, "Scientific education and engagement of the full spectrum of our population is essential to meet these challenges."

He enjoyed interactions with STEM majors at the 2009 CAMP Statewide Undergraduate Research Symposium and says of the judging experience, "I was truly overwhelmed by the breadth and the depth of the research presentations at the CAMP Symposium. Walking through the halls and listening to the presenters offered a clear view into the

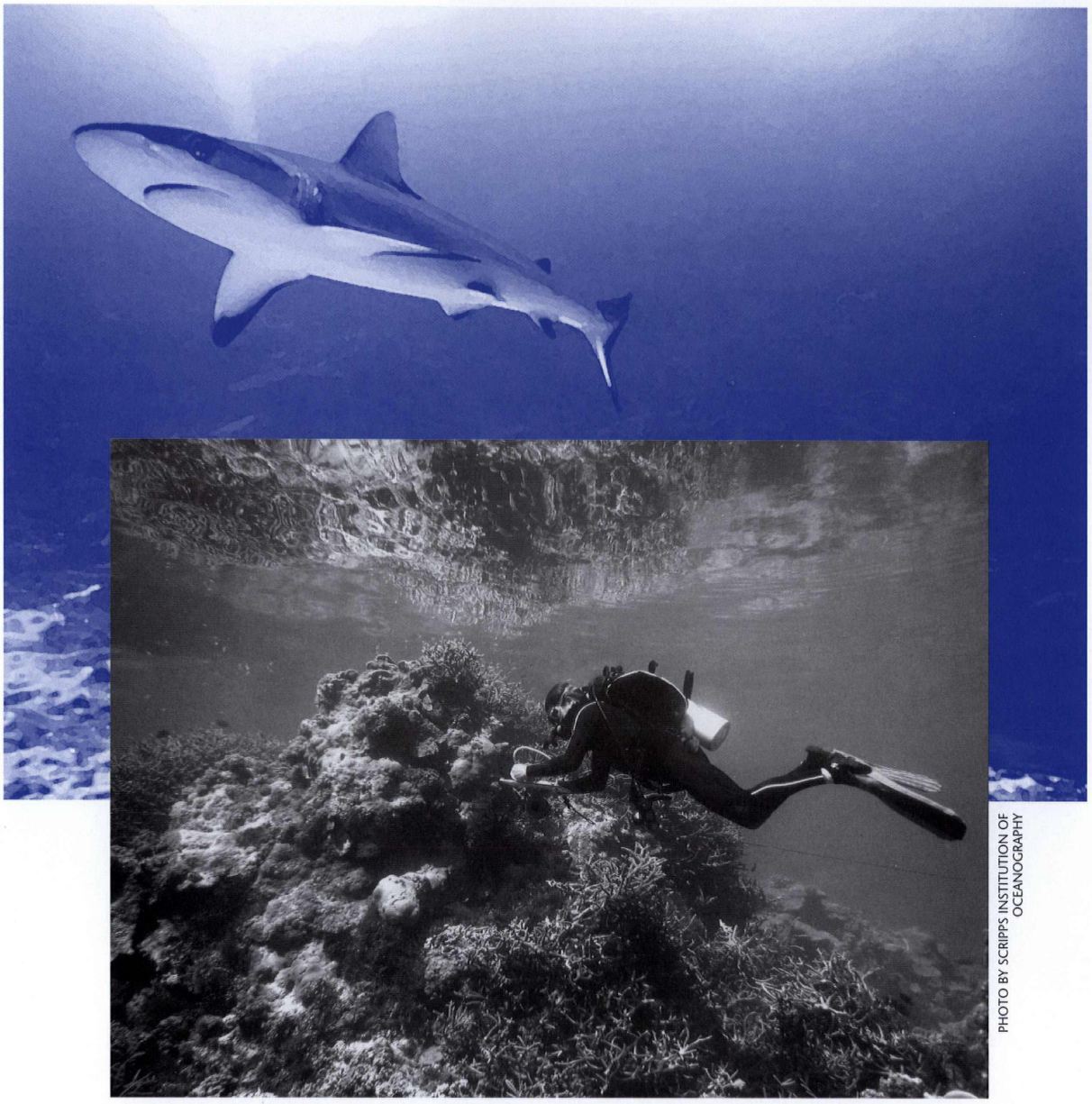


PHOTO BY SCRIPPS INSTITUTION OF OCEANOGRAPHY

"From climate change to intensive fishing, we are altering the basic structure and working of marine ecosystems."

changing face of tomorrow's scientific leaders."

Sandin has numerous publications in journals such as *Global Ecology and Biogeography*, *Oecologia*, and *Evolutionary Ecology*. In addition, he has published science for the general public in the popular press and media, including an NPR interview and a History Channel video. He is an advocate of communicating science to non-scientists as well as nurturing the future generation of scientists. Sandin mentored Eric Garcia, 2008 CAMP Summer Scholar, Ecology, Behavior and Evolution major, who will graduate in June 2010. Garcia conducted research on pipefish at the University of Zurich, Switzerland, and plans to pursue a Ph.D.

Sandin looks forward to judging for the CAMP Symposium again, and says of his previous experience, "The enthusiasm of the CAMP presenters is infectious." He noted the variety of STEM topics the students pursued. "Addressing topics ranging from embryonic development in flies to hybridization in fishes, the research quality and academic drive in this group of students was mind-blowing."

Sandin earned a B.S. in Ecology, Behavior & Evolution at UC San Diego and a Ph.D. in Ecology and Evolutionary Biology from Princeton University. He was a lecturer and research associate at Princeton and a postgraduate researcher at Scripps Institution of Oceanography.

NSF-LSAMP Hosts Community College Workshop

Two UCSD Students Serve as Panelists October 4-6, 2009

The University of Alabama at Birmingham (UAB) hosted the National Science Foundation 2009 Workshop on Best Practices for the Recruitment and Transition of Engineering and Science Students from Community Colleges to Four-Year Institutions. Conference director Dr. Louis Dale, P.I. UAB LSAMP, welcomed participants from 41 alliances to discuss strategies to ensure community college success for STEM transfers.

From the greeting by UAB President Carol Garrison to the breakout sessions to remarks by LSAMP director A. James Hicks, the conference offered strategies and perspectives to advance student attainment.

The University of California was represented by two student panelists from UC San Diego: Cynthia Wood and Eva Gabriel "Gaby" Baylon, both Mechanical Engineering majors who expect to graduate in June 2010. Their presentations, together with two UAB students, were a highlight of the event and crowned the closing banquet. Wood and Baylon had attended San Diego City College, participated in the MESA program, transferred to UCSD, and joined the CAMP program.

Baylon states, "I was very honored to be selected to participate in the workshop as a student panelist. Sharing my experiences as a transfer student is very rewarding to me because my comments can be used to make somebody's transition to the University a lot smoother." She added, "I felt very empowered to continue with my journey through higher education when I saw the very large network of support of people that wants us to succeed and that make sure we have every opportunity possible to become successful university students."

Both students attributed their strong sense of belonging to the STEM community to actively engaging in CAMP activities including faculty mentored research and travel to professional conferences as well as tutoring and mentoring. The students received a stipend for their participation — and a key leadership activity to add to their resumes.

MESA advisor at SDCC, Dr. Alyson Ponomarenko, Professor of Geology, applauded their ability to focus and overcome challenges. "I am so proud," Ponomarenko said. She served as the community college representative for CAMP.

Kika Friend, UCI CAMP program, gave a workshop on "Financing the Transition," from the community college to a four year institution, citing the UC-Edison Scholars Program. Friend discussed the financial burden faced by community college students and the support provided by corporate partnership. The UC-Southern California Edison collaboration has developed over the past ten years, providing more than 150 transfer students with scholarships of up to $15,000. The fact that more underrepresented students are starting higher education at the community colleges underscored the importance of forging relationships with business to support upper division students.

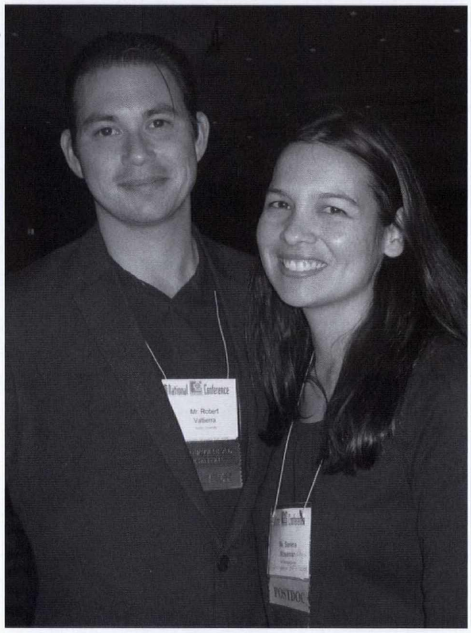
The workshop drew participation from 45 universities and 32 community colleges, with representation from 30 states, according to a summary by Dr. Louis Dale. The proceedings will be published and disseminated nationwide.

Also attending the workshop were UCI Professor Derek Dunn-Rankin and Marjorie DeMartino, CAMP UC System-wide Co-Project Directors.

Dr. Omnia El-Hakim, NSF Program Director for Engineering Diversity & Outreach, second from left, and Dr. A. James Hicks, NSF-LSAMP Director, far right, congratulated the student panelists. Two students from the University of Alabama, Birmingham, Lorra Hyland and Anthony Crutch, University of Alabama, Huntsville, joined Ms. Baylon and Wood (center) on the panel. *See also page 33.*

UC San Diego Alums Pursue Academic Career Tracks

Oceanographer and Engineer Positioned for Contributions to Research



Robert Valtierra, B.S. Structural Engineering 2008, is in his second year of the Ph.D. program in Mechanical Engineering at Boston University. Valtierra won numerous awards for his research as an undergraduate, including first place in "sustainability research" in UCSD's Earth Week Environment and Sustainability Initiative, in 2007. His project, "Development of Electronic Fuel Injection and Flex Fuel Retrofit System," came with a cash prize. Valtierra was a 2006 CAMP Summer Research Scholar and presented at the CAMP Statewide Symposium in 2007 and 2008. He also won a best poster award at SACNAS in 2007. He presented at NCUR 2008 at Salisbury University in Maryland. At SACNAS 2009 in Dallas, Texas, Valtierra presented "Acoustic Measurement of Water Saturated Materials Using an Impedance Tube Technique."

Serena Moseman-Valtierra, Ph.D. Oceanography 2008, is an adjunct faculty member at Boston College. She held a postdoctoral fellowship at Woods Hole, and also presented at SACNAS 2009, "Nitrogen Loading Affects the Climatic Role of Coastal Marine Wetlands," in the Postdoctoral session. Moseman-Valtierra conducted the research with colleagues from the U.S. Geological Survey. By the time she completed her doctorate, Moseman-Valtierra was first author on five publications and was awarded UCSD Outstanding Graduate Student. She completed a B.S. in Ecology, Behavior and Evolution, *Summa Cum Laude*, and a M.S. in Oceanography from Scripps Institution of Oceanography. She also has had several international collaborations, including at the Netherlands Institute of Ecology and at the Hong Kong University of Science and Technology. Her many awards include the UC President's Dissertation Year Fellowship and the U.S.G.S. Mendenhall Postdoctoral Fellowship (2008-2010). Valtierra and Moseman-Valtierra were married in Summer 2009 in the Boston area. Dr. Moseman has served as a CAMP mentor and role model on the San Diego campus. The couple met through their participation in CAMP-UCSD.

Power couple: Robert Valtierra and Serena Moseman-Valtierra take their places among the new generation of science and engineering leaders. Above, they are pictured at SACNAS 2009, following their respective presentations. At left, Serena presenting her research conducted at Woods Hole to Dr. Jacqueline Azize-Brewer, UCSD Program Coordinator.

Student Spotlight: UC Berkeley

NSF CAMP 2009 Summer Research Scholars Pursue a Pathway to Excellence

KLIULAI CHOW-YEE, Mechanical Engineering

Mentor: Carlos Fernandez-Pello

Research title: A Continuous and Scalable Microwave Assisted Fast Pyrolysis Reactor for Conversion of Biomass to Bio-crude

Career goal: Attain a PhD and use my knowledge to help solve the world's energy crisis.

Dream job: Working in a national research lab where I would work on improving the situation (of the energy crisis).

XIORANNY LINNARES, Mechanical Engineering

Mentor: J. William Morris

Research title: The Influence of an Imposed Current on the Creep of SnAgCu Solder Interconnects

Career goal: I would like to become an expert in metallurgy and mechanical properties of materials. I would like to make a significant contribution through my research and help others understand how the science of materials works.

Dream job: I would like to be a professor at a university where teaching and research have equal priority. This position would allow me to help and encourage diversity students to be engineers or part of the sciences.

DIANA OLVERA, Mechanical Engineering

Mentor: Oliver M. O'Reilly

Research title: Dynamics of the Human Spine

Career goals: If I decide to focus in Material Science and Engineering, I'd like to become a researcher for a company and develop new ideas and get a patent approved. If I focus in Mechanical Engineering, I would love to work for NASA. I might like to become a patent lawyer ... and I would love to start a scholarship fund for underrepresented students.

Dream job: Work for NASA and hopefully one day travel to space.

MIGUEL RODRIGUEZ, Civil Engineering

Mentor: Carlos Fernandez-Pello

Research title: A Continuous and Scalable Microwave and Solar Assisted Fast Pyrolysis Reactor for Conversion of Biomass to Bio-crude

Career goal: My career goal is to work for Northrop Grumman or a space influenced career such as NASA.

Dream job: My dream job is to work independently on studying the behavior of time and if possible time travel (just a dream). To do this, I need many years of research and schooling which has led me to decide on going to graduate school.

JOSÉ SANCHEZ, Mathematics

Mentor: Alan Schoenfeld

Research title: Practices that Lead to Student Mathematical Proficiency

Career goal: To obtain a Ph.D in the field of Mathematics Education

Dream job: Work with a school district to promote teacher development through research and practice.

ELIANA TRUJILLO, Civil Engineering

Mentor: Claudia Ostertag

Research title: Analyzing the Corrosion Products of Rebar in Concrete Using X-ray Difractions

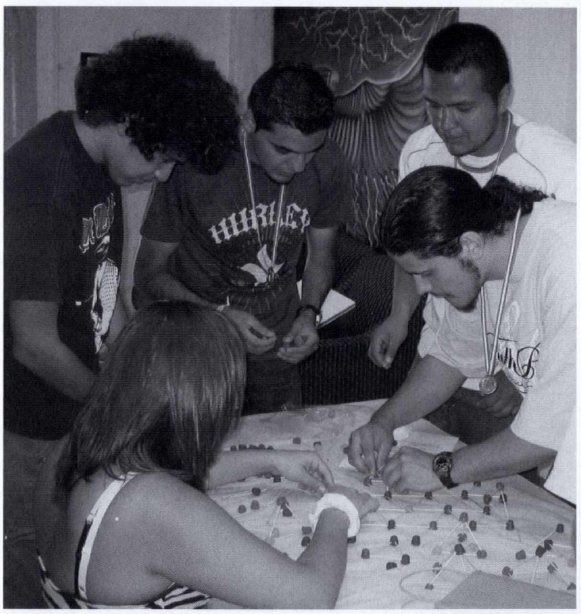
Career goal: Attending graduate school at USC and getting my masters in construction management followed by pursuing a career in my specialized field and working in industry. My goal also includes getting my masters in education administration and running a STEM program at a high school in my home town.

Dream job: My dream job consists of being a Project Manager at a construction management firm. I want to see a building take its first breath of life under my supervision.

NERDS = New Experiences for Research and Diversity in Science

NERD OLYMPICS!

2009 UC Berkeley NERD Olympic participants. Event winners received gold, silver, bronze medals. UCB college researchers = NSF CAMPers + UC LEADS plus high school participants of the LEEDS Google program.



Team Columbia working diligently in the NERD Olympics structure challenge event. Each team had one half hour to create the strongest structure using dot candies and toothpicks. Ultimately, Team Brazil's dot toothpick structure held eight large calculus books and earned the gold medal. Each team had three NERDS and three high school students.

From left, NERDs Miguel Rodriguez, Xio Linnares, visiting UCLA summer NERD scholar Marcel Nations, and Kliulai Chow-Yee with their NERD Olympic bling. Xio was on Team Brazil.

Participants from Team Spain

UC Berkeley Hosts 2009 Graduate Horizons

Pre-Graduate School Program for Native American, Native Hawaiian, and Alaska Native Students

The Graduate Horizons Program, a four day intensive experience, was hosted at UC Berkeley in July 2009. It marked the first time the event came to California. The overarching goal is to prepare Native American students for success in graduate education. The event featured an array of workshops, from selecting a program and career pathway to writing an effective personal statement.

Diana Lizarraga, Berkeley's CAMP coordinator, co-chaired the event with Carmen Foghorn, American Indian Graduate Program. Participation from more than 20 universities and 10 organizations nationwide enabled students to sample broadly from available resources throughout the country. The event engaged 90 students — the available number of slots for student participation.

Graduate Horizons is a collaborative effort of the American Indian Graduate Center, Winds of Change magazine, the Princeton Review Foundation, UC Berkeley American Indian Graduate Program, and many of the nation's finest graduate and professional programs.

Franklin Dollar, CAMP Scholar and University of Michigan Ph.D. graduate student, participated as one of the advisors for the STEM group. Mr. Dollar is the recipient of an NSF Fellowship. He presented several times at the CAMP Statewide Undergraduate Research Symposium, receiving recognition from the faculty for his research achievements.

UC Berkeley hosted the Native American Graduate Horizons program convening 90 students from throughout the country — New York to Alaska, Hawaii to Arizona — and 45 faculty members for an intensive focus on the graduate school application and admissions process.

UC BERKELEY ~ FACULTY PROFILE

Carlos Fernandez-Pello, Ph.D.

Professor of Mechanical Engineering, Associate Dean of the Graduate Division, Faculty Director of UC Berkeley's CAMP Program

Carlos Fernandez-Pello received the degrees of Doctor Aeronautical Engineer from the University of Madrid, Spain, and a Ph.D. in Engineering Sciences from the University of California, San Diego. He was a Postdoctoral Fellow at Harvard University and a Research Fellow at Princeton University. Fernandez-Pello joined the University of California, Berkeley, in 1980. He teaches courses in thermosciences with emphasis on combustion. His recent research, with funding from several federal agencies, focuses on combustion in reduced gravity with emphasis on fire safety in spacecraft, micro-scale portable power generation using combustion, and wild-land fire propagation. He has received teaching and research awards and has published more than 160 papers in archival journals. He is a member of the Royal National Academy of Engineering of Spain and a Fellow of ASME International. He has been awarded Fellowships from the Fulbright and Juan March Foundations, the Japan Society for the Promotion of Science, and the French National Center for Research. He assumed the role of CAMP faculty director July 1, 2009.

Since 2003, Professor Fernandez-Pello has also served as Associate Dean of the Graduate Division, where he oversees graduate student fellowships and appointments/employment, and the Division's work in support of graduate student diversity, equity and inclusion.

CAMP students mentored by Fernandez-Pello include Miguel Rodriguez and Kliulai Chow-Yee (see profiles page 24) as well as David Alcocer, Jesus Tapia, and Romina Rodriguez.

UCLA Summer Scholars Experience Research Away

Exploring other campuses and labs expands horizons

BLANCA MORENO-HERNANDEZ

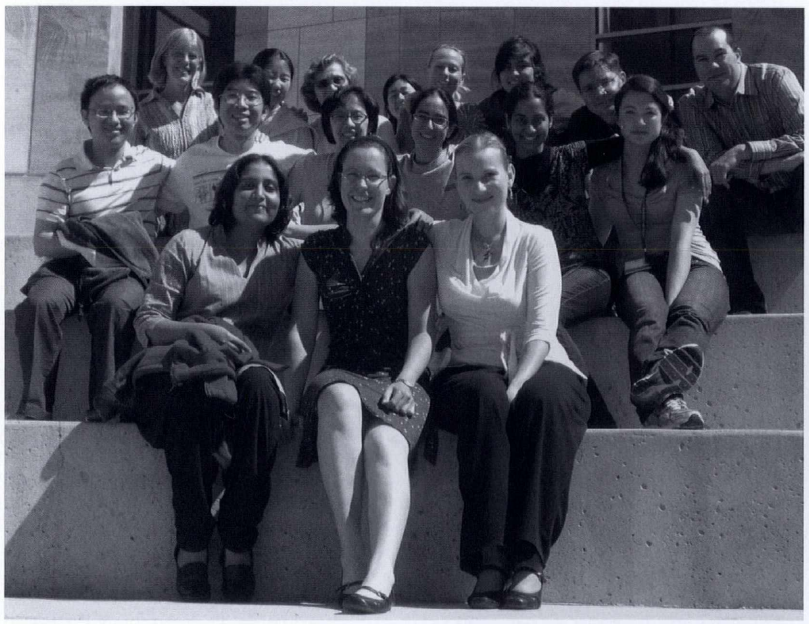
Blanca Moreno-Hernandez, UCLA chemistry major, spent summer 2009 at UC Santa Barbara as a participant in their RISE program which included talks, seminars and poster presentations. She conducted research with Dr. Craig Hawker consisting in making polyelectrolytes hydrogels using triblocks copolymes with anionic ends (middle block is neutral) and homopolymers with cationic chains. Polyelectrolytes copolymers are soluble in water, responsive to the environment, thermodynamically stable, and have important applications in drug delivery and underwater adhesives.

RICHARD RODRIGUEZ

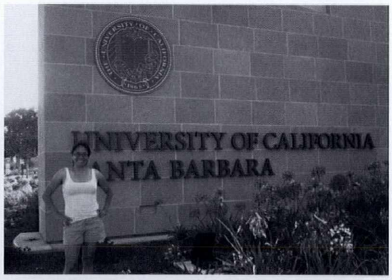
Richard Rodriguez, majoring in Microbiology, Immunology, and Molecular Genetics, participated at Brigham and Women's Hospital, in Boston, Massachusetts, under the STARS summer program. Rodriguez worked in Vijay Kuchroo's lab, working under Nicole Joller Ph.D. His project involved characterizing the regulatory abilities of two proteins in T cell activation. Although the proteins themselves are not novel, the preliminary research indicates that one may be an inhibitor (Vsig9) and the other, a stimulator (CD226). Rodriguez performed FACS analysis for the first time and harvested organs from EAE Multiple Sclerosis model mice.

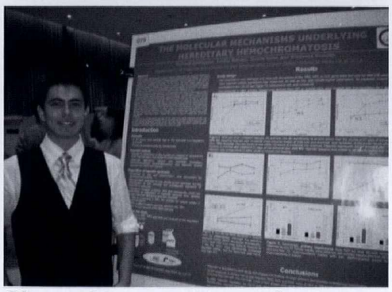
PAOLO CASTRO

Paola Castro, biochemistry, took part in the SRTP (Summer Research Training Program) at UC San Francisco. She worked in the laboratory of Dr. Cynthia Kenyon who is part of the biophysics and biochemisty department at UCSF. Castro worked on two projects using the fabulous *Caenorhabditis elegans* model. One project consisted in studying the interaction between proteins with a propensity to aggregate with age and proteins that aggregate because of the presence of a polyglutamine expansion. In the second project, she studied the role of the proteasome in protein aggregation.



Paola Castro at UC San Francisco with peers in the Summer Research Training Program.





Blanca Moreno-Hernandez, top, at UCSB; Richard Rodriguez, above, went to Boston for an exciting lab experience.

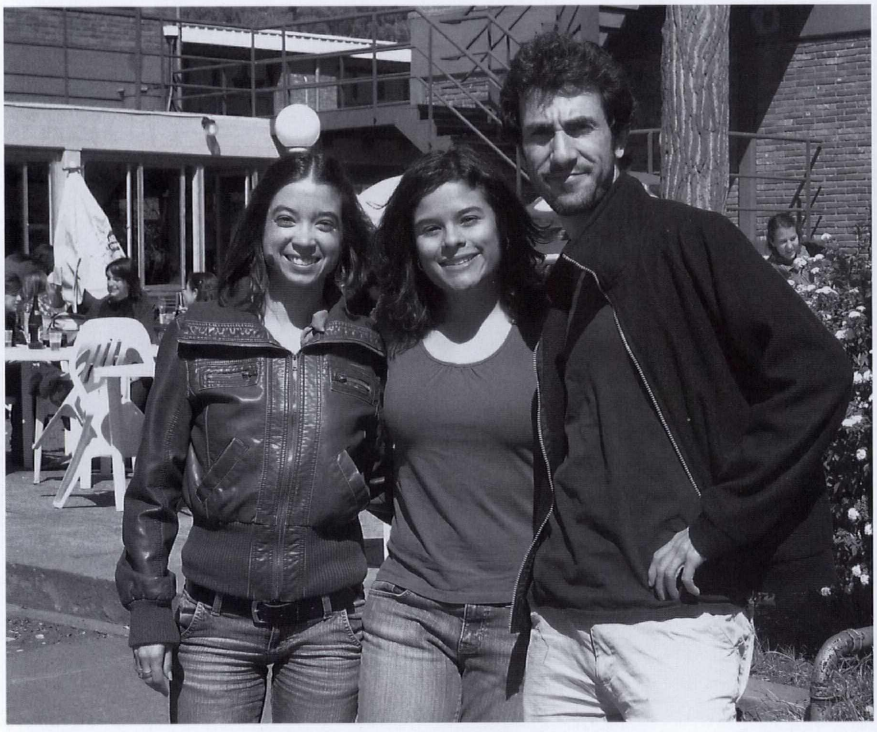
I always wanted to travel. It opened my mind, and I want to return one day.

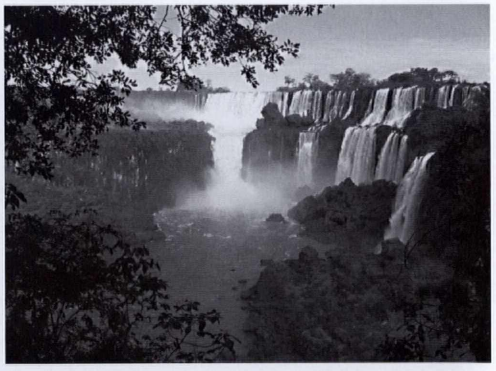
Julie Cojulun Savors Research in Argentina

Three months' sojourn led to glaciers, lush tropical forests and waterfalls

UCI's Julie Cojulun, Class of 2010, will complete a B.S. in Aerospace Engineering having achieved a remarkable record of activities, honors and awards along the way. Surely one of the major highlights will be her experience at the University of Buenos Aires in Summer 2009.

Cojulun was among 20 students who had been selected by Dr. Randy Duran, P.I. for the new LSAMP International REU (Research Experiences for Undergraduates) program at the University of Florida, which offered research opportunities in exciting locations around the world, including South America. In Buenos Aires, Professor Damian Scherlis mentored Cojulun in her work on energy calculations and molecular dynamics simulations. During her stay, she took several treks around the country to see the natural wonders like the glaciers near the southern tip of Argentina. Upon completion of her project, she presented at the International Workshop on Nanomaterials and Functional Materials held at the University of Campinas, Brazil, in August 2009. Subsequently, she presented at SACNAS 2009 in Dallas, winning Best Poster,



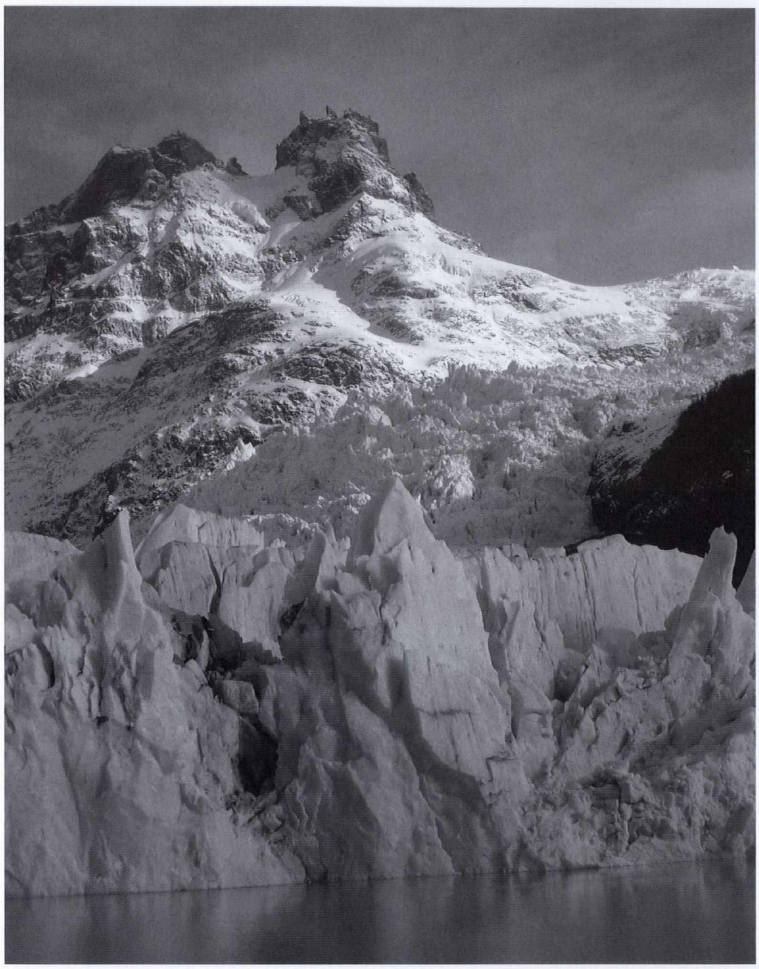


Aspiring astronaut Julie Cojulun, center, flanked by Veronica Sanchez, graduate student, and Dr. Damian Scherlis, Director, Laboratory for Quantum and Classical Simulation in Condensed Matter at Molecular Scale.

Bariloche, in the Andes. Top, Iguazu Falls.

"The research team was very friendly. Dr. Scherlis even sent his lab team to the airport to pick me up! They have a wonderful tradition of passing around mate, a tea drink shared communally."

"My ultimate dream is to be an astronaut. I plan to get a master's in aerospace engineering and find my way into NASA.... I like to picture myself doing a spacewalk to fix a satellite. I would like to be among the first astronauts to return to the moon."



and she has plans for the AAAS 2010 Annual Meeting in San Diego.

A CAMP Summer Scholar in 2008, Cojulun worked with Dr. Derek Dunn-Rankin and a team of graduate students in the Department of Mechanical and Aerospace Engineering on an air preheater for a turbine burner. She had several opportunities to present the project at national conferences, building her strengths and skills which supported her successful application for the International REU.

Other professional development activities combine to enhance her resume. Cojulun is a member of the Engineering Student Council, SHPE, SACNAS, and MAES. Her awards include the Hispanic Scholarship Fund/Mazda Foundation Scholarship, the Raytheon Engineering Scholarship, and the George Smith Jr. Scholarship. Cojulun says, "CAMP opened up all these doors— to scholarships and research and travel to conferences." She is applying to no less than 10 graduate programs, and expresses gratitude to her major advisor Dr. Derek Dunn-Rankin and to Kika Friend.

MOLECULAR MODELING OF TITANIUM DIOXIDE AND METHANOL

Julie Ann Cojulun,
University of California, Irvine, Irvine, CA, University of Buenos Aires, Buenos Aires, AR.

Molecular and computer modeling are tools used in computational chemistry for studying the behavior of molecules and solid state systems. The data obtained from carrying out multiple dynamics simulations is informative of molecular reactivity within a particular system. Scientists are then allowed to make further observations and to predict how a molecule will behave under a certain set of conditions. In this study, energy calculations and molecular dynamics simulations were used to analyze methanol (CH3OH) dissociation upon a titanium dioxide (TiO2) anatase (110) surface. In particular, the statistical technique of umbrella sampling was utilized to obtain the energy profile through a specific reaction coordinate which in turn is used to analyze the proton transference between CH3OH and one oxygen bridge present on the surface. The information obtained from the simulations has many applications in practice. For example, the simulations provide insights on the thermodynamics and the catalytic mechanisms of the deactivation of organic compounds on oxide surfaces. The computational data collected, the process and methods that were used for obtaining this data, and its applications are presented.

UCSB Laboratory Research

EFFECTS OF ARUNDO DONAX ON FLOODPLAIN PROCESSES OF BRAIDED RIVERS
Maria Arenas, Hydrology, Dr. Ed Keller

SYNTHESIS AND CHARACTERIZATION OF POLY(ETHYLENE)-GRAFT-POLY(TERT-BUTYL ACRYLATE) MATERIALS
Brian McVerry, Biochemistry, Dr. Guillermo Bazan

COATING PROCESSES FOR ORGANIC PHOTOVOLTAIC DEVICES
Andres Munoz, Mechanical Engineering, Dr. Michael Chabinyc

ALTERING MOBILITY OF AG:DNA HAIRPINS THROUGH HYBRIDIZATION
Joshua Murillo, Physics, Dr. Elizabeth Gwinn

EXPERIMENTAL AND THEORETICAL STUDY OF INSTABILITIES OF LIQUID RIMS
Amanuel Negash, Mechanical Engineering, Dr. Rouslan Krechetnikov

ENERGY CALIBRATION OF NEUTRON MULTIPLICITY METER DETECTOR
Manuel Olmeda, Physics, Dr. Harry Nelson

CHROMOSOME BREAKAGE SEQUENCE MAPPING IN TETRAHYMENA THERMOPHILA
Rosie Quiroz, Biological Sciences, Dr. Eduardo Orias

MATING SYSTEMS EVOLUTION: CORRELATING PHYSIOLOGY WITH FITNESS
Sandra Roman, Environmental Studies, Dr. Susan Mazer

MAPPING A GENE IN THE REGULATED EXOCYTOSIS MUTANT STRAIN SB281 TO THE MICRONUCLEUS AND MACRONUCLEUS
Jesse Vasquez, Biological Sciences, Dr. Eduardo Orias

COUNTERFACTUAL REASONING IN MEDICINE
Jessica Zaragoza, Biopsychology, Dr. Russell Revlin

10 CAMPers Conduct Exciting Projects

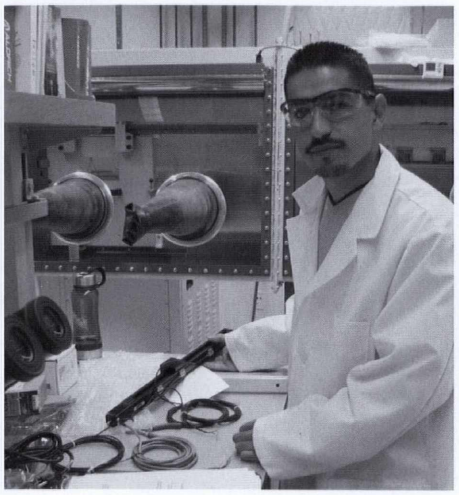
The Materials Research Laboratory (MRL), which is home to CAMP at UCSB, was established in 1992 with funding from the National Science Foundation, and became an NSF Materials Research Science & Engineering Center in 1996. It has a strong tradition on educational outreach and facilitating undergraduate research. The scientists and education staff at MRL (note the logo on the student t-shirts!) are dedicated to improving access to diversity students to help build the future scientific and engineering workforce.

The MRL implements an exciting array of educational programs, including CAMP. Affiliated programs, such as Research Interns in Science and Engineering (RISE); Cooperative International Science and Engineering Internships (CISEI); and Partnership for Research and Education in Materials (PREM) leverage resources and provide various pathways for undergraduate research. Thus, CAMP is well situated to take advantage of available resources. Students have access to technology, travel fellowships, and international programs.

The CAMP Summer Research Program provides a 10-week intensive research experience for STEM majors. Mentors provide one-on-one training and support for the research project. Students participate in weekly group meetings to develop oral presentation skills and attend special seminars. They present their results at an end-of-summer poster session. They also present at the CAMP Statewide Undergraduate Research Symposium and other professional conferences, such as SACNAS. Activities are organized by Dr. Julie Standish, CAMP Coordinator.

Congratulations to the CAMP-NSF Summer 2009 researchers!

Success Stories to Inspire!



Andres Munoz: Rising Mechanical Engineer

UCSB CAMP participant, Andres Munoz, is an engineer in the making who plans to earn a graduate degree and make his mark in the private sector. Munoz is a senior in Mechanical Engineering, having transferred from Evergreen Valley College (EVC) in San Jose, CA after completing an associate degree in Engineering with honors.

In 2009, Munoz participated in the UCSB CAMP Summer Internship program under the mentorship of Professor Michael Chabinyc in the Materials Department on the project entitled *Coating Processes for Organic Photovoltaic Devices*. He presented the research at the Society for Hispanic Engineers and Professionals conference in October 2009.

In addition to his commitment to his studies and research, Munoz is an active member and leader in engineering professional societies, including SACNAS, SHPE, MESA, and Los Ingenieros.

While attending community college, Munoz served as the Vice President and President of the SACNAS chapter and helped the chapter win the national Award for Outstanding Student Chapter (for 20 or less members) of the Year.

Lourdes Velazquez: Research Opens Doors to Success

UC Santa Barbara student Lourdes Velazquez has already participated in several research internships that have inspired

an interest in the sciences and opened doors to future success.

Currently a junior in Biology, Velazquez first became interested in science in high school when she took a biology class from an excellent teacher. While in high school she was accepted to the Apprentice Researcher Program through the California NanoSystems Institute (CNSI) at UCSB and worked with mentors in the Department of Chemistry and Biochemistry. After graduating high school, she attended the two-week internship Summer Institute in Mathematics and Science (SIMS) program at UCSB.

Velazquez began her undergraduate career by participating in the SIMS Early Research Experience program and the CAMP 2008 Summer Internship program working with Dr. Deborah Fygensen, Physics Department, on the study of fluorescence of silver treated DNA. The experiences resulted in a coauthored publication with her mentors in the Journal of Physical Chemistry (February 2009) entitled, "Hairpins with Poly-C Loops Stabilize Four Types of Fluorescent Agn:DNA".

In addition, she presented her summer internship work at the SACNAS 2008 national conference, where she received a special merit award for her poster presentation.

Velazquez has served as Vice-President of the UCSB SACNAS student chapter. In addition, she has participated as a SIMS Peer Advisor tutoring students in the sciences. She plans to pursue a master's degree and then perhaps teach at the community college level before deciding whether to pursue a Ph.D. and possibly a research career.

Sasha Shekhar: UCSB CAMP Graduate Pursues Ph.D. in Biophysics

Sasha Shekhar is a Winter 2008 graduate at UC Santa Barbara who earned a B.S. degree in Biochemistry. Shekhar was awarded High Honors and received Distinction in the Biochemistry major. Her impressive portfolio has opened doors to a successful future career as a research scientist. She began actively pursuing

research as a sophomore in the lab of Professor Ian Ross in the Molecular, Cellular and Developmental Biology Department. With the mentorship of Professor Ross, Shekhar used filamentous fungi to determine if mitochondrial presence affects nuclear gene expression.

Wanting more research experi-

Shekhar continues on page 37

UC Santa Barbara Hosts Bridge to the Doctorate, Cohort V

The newest cohort of Bridge to the Doctorate students for the California Alliance are well into their first year of graduate work at UC Santa Barbara, host UC campus for Cohort V. In conjunction with CAMP leadership, the BD academic and professional development activities are being coordinated by the California NanoSystems Institute (CNSI), a research institute that pursues interdisciplinary research in nanoscience and engineering. The BD program incorporates best practices and innovative ideas for academic development and retention of graduate researchers and builds upon lessons learned from programs at other University of California campuses as well as sister LSAMPs.

Faculty leadership includes Co-PIs Glenn Beltz, Mechanical Engineering (CAMP faculty director); Craig Hawker, Materials; Susan Mazer, Ecology, Evolution and Marine Biology; Kenneth Millett, Mathematics; and Alec Wodtke, Chemistry & Biochemistry. Additionally, the BD Steering Committee comprised of 12 faculty mentors represents a range of STEM departments.

Associate Director for the BD is Ofelia Aguirre, who organizes and oversees the professional development activities and events, and ensures timely communications between the graduate division and the Fellows. Ms. Aguirre facilitated the fall orientation and retreat for the Fellows and provides support for the intensive mentoring activities and workshops.

MENTORING ACTIVITIES AND WORKSHOPS INCLUDE:

- Regular meetings to discuss academic and research progress
- Productive research efforts (setting goals, managing time in the lab)
- The process and expectations of graduate education
- The ethics of scientific research and responsible conduct
- Modern telecommunications technology supporting research
- Opportunities for BD Scholars to mentor undergraduates
- Structured networking and social activities (including at the Statewide Symposium)
- Training in communication skills, including making presentations at professional conferences
- Science writing workshops, supporting authorship
- Submission of quarterly research reports

Additionally, the BD Fellows will have mandatory workshops in the following professional development areas:

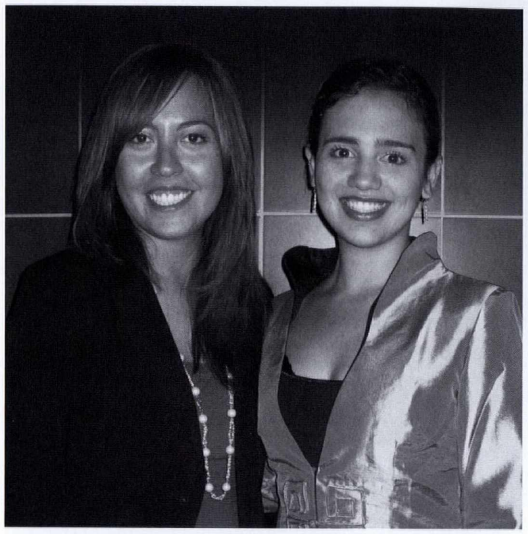
YEAR 1: COMPLETING THE PH.D. SUCCESSFULLY

- September - How to survive your 1st year in graduate school
- October - How to choose your PhD adviser
- November - Department specific milestones (qualifying exams, candidacy exams)
- December – Journals (what to read and where to publish)
- January - Conferences (which conferences and why? when in graduate career? networking skills)
- February - Funding opportunities (fellowship awards – general and discipline specific)
- March – Research Group Meetings (how to prepare, how to contribute)
- April - Summer Research/Internship Opportunities (career preparation)

YEAR 2: BEYOND THE PH.D., PROFESSIONAL APPOINTMENT

- September - Career Options for PhD, Academic
- October – Career Options for PhD, Industry
- November – Career Options for PhD, Government/Non-Profit
- December – Career Options for PhD, non-traditional
- January - Creating a Portfolio (research/awards/teaching/mentoring, etc)
- February - Applying for Post-Doctoral positions and fellowships
- March - Applying for Faculty positions
- April – Applying for Industry positions

Student Spotlight: UC San Diego



UCSD LSAMP students Cynthia Wood and Eva Gabriel Baylon

UC San Diego Students Selected to Serve on NSF LSAMP Best Practices Panel

UCSD LSAMP students Cynthia Wood and Eva Gabriel Baylon were selected to serve on the student panel at the NSF LSAMP 2009 Workshop on Best Practices for the Recruitment and Transition of Engineering and Science Students from Community Colleges to Four-Year Institutions. Woods and Baylon transferred from San Diego City College to UC San Diego and are preparing to graduate in June 2010. Both plan to pursue graduate degrees.

At the SACNAS 2009 National conference, held recently in Dallas, Wood took second place in the mathematics competition, "Who Wants to be a Mathematician?" and Baylon won a Poster Award for her research 'Self Healing Polymer.'

"It was an honor to be nominated and selected as a student panelist in a national workshop. It allowed me to represent my school, the California alliance, and the whole transfer community. Moreover, the recognition the panel had among the workshop attendees left me a feeling of satisfaction, and made me proud of my educational accomplishments as a transfer student."

—Cynthia Wood, Class of 2010

Student Spotlight: UC Riverside

Alumna Update: Biology Major is a BD Fellow at Delaware State University

Tori Alexandra Owens was an active CAMPer as a UC Riverside undergraduate who received a CAMP summer research stipend in 2008 and 2009. She was selected to present at the 2009 CAMP Statewide Undergraduate Research Symposium, where she presented, "Use of Fluorescent Probe BCECF to Discover the PH of Sea Urchin Egg Jelly." Owens was a STEM student leader and an inspiration to her peers. She was co-president for CAMP as well as a key member in founding the STEM Club at UC Riverside. Dr. Richard Cardullo and Dr. Isgouhi Kaloshian served as her mentors. On campus, Owens was a motivator and role model, particularly for women in science. Her honors and activities prepared her for admission to graduate school at Delaware State University for Fall 2009, where she is a Bridge to the Doctorate Fellow.

Tori Alexandra Owens, BD Fellow

UC Davis BD Fellow Envisions Interdisciplinary Research

Raquel Orozco: Aspiring Chemical Engineer

Raquel Orozco is on the path to the Ph.D., pursuing her passion in chemical engineering. She is among the successful graduate students at UC Davis who were selected for the Bridge to the Doctorate (BD).

"If it was not for the BD, I would not be here," Raquel Orozco says of her NSF Bridge to the Doctorate Fellowship and the sense of community afforded by participation in the BD cohort at UC Davis.

"If it was not for the BD, I would not be here."

Orozco's special interest is in biomembranes and biotechnology, which she pursues under faculty advisor Dr. Tonya Kuhl. She says, "The primary goal of my work is to characterize and directly measure the extension (thickness) and mechanical properties of the glycocalyx on live endothelial cells and to interface the glycocalyx work to the design of more efficacious drug targeting modalities."

Orozco adds a detailed explanation: "Elucidation of glycocalyx properties is useful for several applications including improvement of targeting and liposome uptake for drug delivery, and areas of cardiovascular disease such as white cell rolling on the endothelium, atherosclerosis studies, and mechanotransduction.

Her goal is to develop a career in interdisciplinary research that advances biomedical breakthroughs to clinical applications.

She has presented at the International Conference on Colloid Chemistry and Physiocochemical Mechanics, where she obtained constructive feedback, and met other scientists working in similar areas. Orozco has also participated in departmental symposia and the Designated Emphasis in Biotechnology Retreats.

Orozco is also motivated by the responsibility she has as a scientist "to answer a few of the myriad of questions humans have."

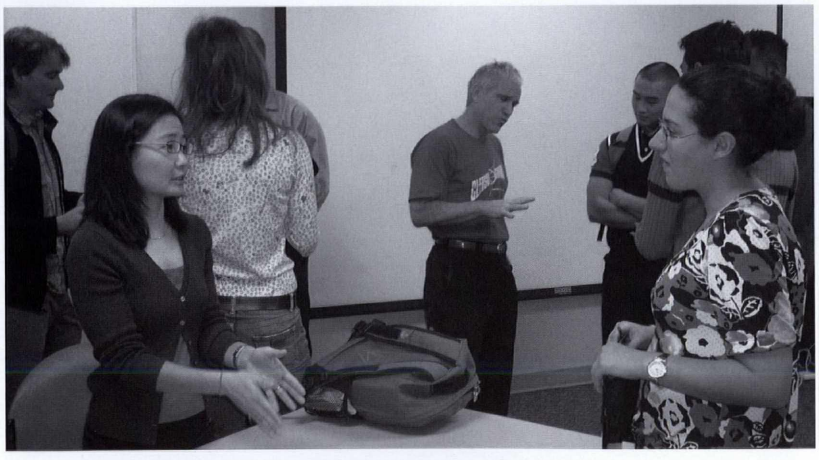
"My family and loved ones inspire me and help me balance my life," she adds.

Orozco's dissertation title is "Direct characterization of the endothelial glycocalyx."

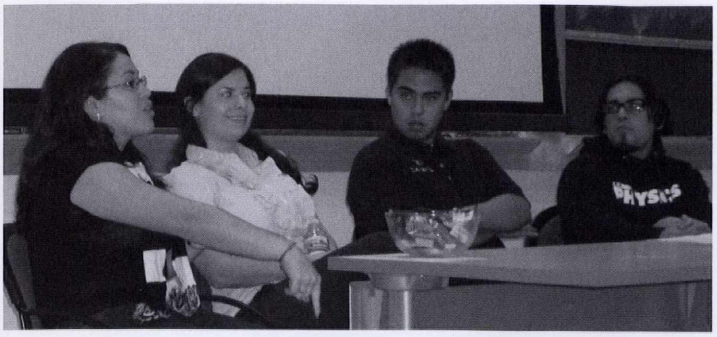
STEM Transfer Day! Collaboration Yields Dynamic Results

CAMP is very proud to have the opportunity to co-sponsor the UC Davis STEM Transfer Day. The collaborative efforts of past CAMP Regional Coordinator, Renee Maldonado, and Professor Yayoi Takamura successfully incorporated a STEM outreach component to Dr. Takamura's NSF Career grant that resulted in bringing back this annual event, previously funded by MESA. This year's Transfer Day held Friday, November 6, 2009 resulted in the participation of 12 Northern California community colleges and respective MESA directors accompanying 70 of their students.

The purpose of this event is to raise the visibility of UC Davis as a transfer option for



Front left, Professor Yayoi Takamura, Chemical Engineering & Material Science, and center, Professor Richard Scalettar, Physics, interacting with community college guests. Takamura wrote an outreach component into her NSF Career grant that resulted in funding this event for 5 years (this is year 2). Scalettar is the PI on the Mentorship for Undergraduate Researchers in Mathematics and Physical Science program.

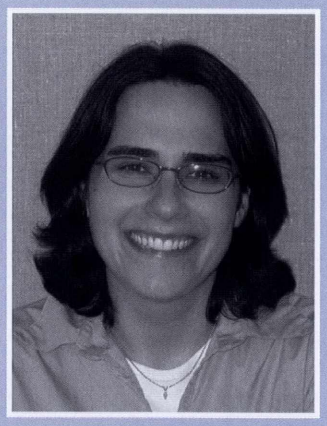


UC Davis transfer student panelists, from left to right: Karla Lanzas, Mathematics (UC LEADS participant); Angela Echeverri, Neuro, Physio, Biology; and Ryan Doctor, Bio Med Engineering (CAMP summer participants in the NSF-Center for Biophotonics, Science and Techonology); Patricio Piedra - Physics (CAMP Scholar)

MESA students and to provide a full day of programs and workshops oriented toward understanding what it means to transfer to UC Davis as a STEM student.

Activities included various workshops and panels that involved research faculty, CAMP student researchers, student research posters, and learning experiences. The Career Discovery Workshop featured faculty panelists emphasizing the multiple pathways open to students who complete a degree in one of the STEM fields. Dr. Takamura and Dr. Scalettar were faculty panelists in the Engineering/Physical Sciences Session. Another CAMP partner, the NSF-Funded initiative, Center for Biophotonics, Science and Technology (CBST) hosted an interactive learning session featuring Dr. Marco Molinaro and Dr. Ana Corbacho. The occurrences of Biophotonics in our everyday lives were highlighted and hands-on experience with various research apparatus was offered. Always popular with prospective transfer students was the opportunity to hear about student experiences from currently enrolled UC Davis transfer students. This year's panel featured students who were not only successful at managing their transition to UC Davis, but had also recently conducted summer research supported by CAMP. Four CAMPers displayed research posters: Patricio Piedra, Physics; Amanda Gonzales, Chemistry; Robert Mazzola, Physics; and Carmen Vallardares, Bio Systems Engineering.

UC DAVIS ~ FACULTY PROFILE



Professor Lori M. Lubin

Professor of Physics, New Faculty Director for CAMP at UC Davis

Current research program focuses on studying galaxy associations—from groups, to clusters, to superclusters—in their very early stages of development in order to understand the evolutionary history of galaxies and the formation of structure. With colleagues at UC Davis and other institutions, Lubin is undertaking the Observations of Redshift Evolution in Large Scale Environments (ORELSE) Survey, a multi-wavelength study of galaxy properties in the large scale structure around 20 distant clusters. Other projects include near-infrared spectral studies of high-redshift, active galaxies, X-ray and optical properties of moderate-redshift groups, and gravitational lenses and their environments. Dr. Lubin is a member of the UC Davis Cosmology Group, which has grown from one member to ten over the past eight years. The Cosmology group is comprised of observational and theoretical faculty. Lubin and colleagues probe dark matter and dark energy through galaxy clusters, gravitational lensing, and high-redshift quasars, among other techniques. Dr. Lubin earned a B.S. in Physics at MIT and a Ph.D. in Astrophysical Sciences at Princeton. She was a Carnegie Fellow at Carnegie Observatories in Pasadena, CA, and a Hubble Fellow at Caltech. Before coming to UC Davis, she was an Associate Research Scientist at Johns Hopkins University and Assistant Astronomer at STSci in Baltimore. She joined the faculty at Davis in 2002.

"As a college student, it was my direct experience with cutting-edge research that really motivated me and prepared me for graduate school. I would like to see our STEM majors, particularly students from underrepresented groups, have this same opportunity."

Spring Poster Session and Commencement Cap the 2009 Academic Year

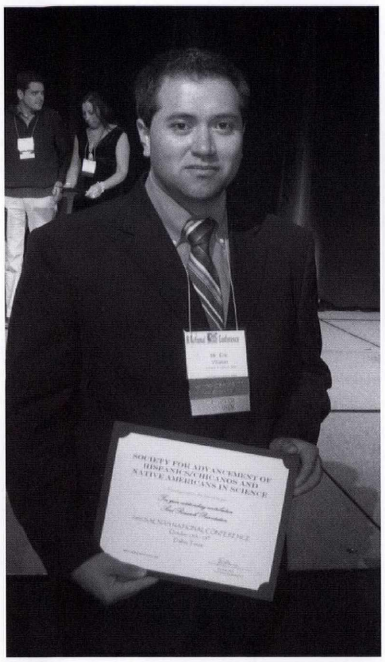
The UCSC special diversity graduation celebration was made festive by specially decorated mortar boards and hand-stitched quilted stoles. The graduation amenities were hand made by Malika Bell, UCSC CAMP Program Coordinator, and Yulianna Ortega, CAMP Program Assistant. Commencement 2009 was a day to remember! The spring undergraduate research symposium was also a special day for CAMP students to share their work with faculty and peers. The outdoor event was a well timed sunny day, enabling presenters and viewers to enjoy the exchange of ideas and experiences in a welcoming campus setting. The CAMP leadership collaborates with affiliated programs for optimum utilization of resources and student engagement.

UC SANTA CRUZ CAMP CLASS OF 2009

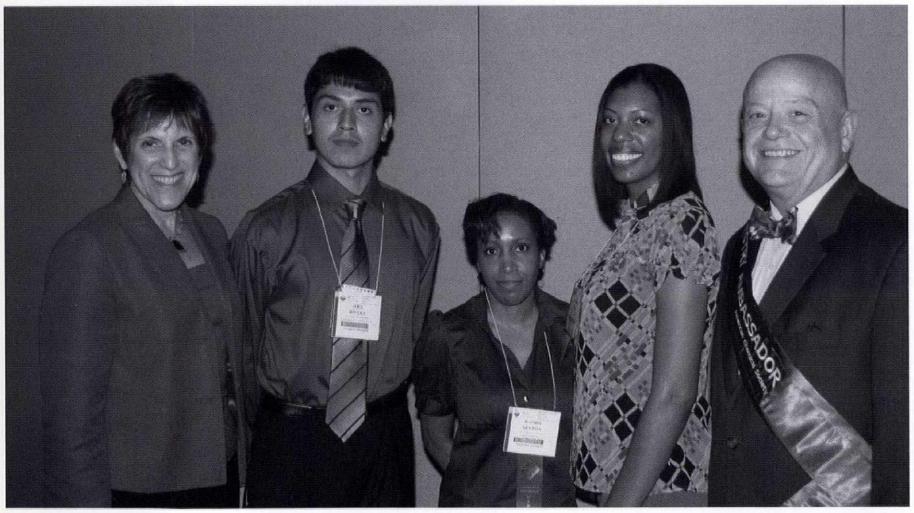
- **Beatriz Alavarado,** Biology
- **Martha Aarciniega,** Marine Biology
- **Aram Avila-Herrera,** Bioinformatics
- **Natalie Garcia,** Molecular, Cellular, Developmental Biology
- **Christopher Gomez,** Cellular, Developmental Biology
- **Jason Gonzalez,** Cellular, Developmental Biology
- **Marcos Grabiel,** Marine Biology
- **Carlos Hernandez,** Astrophysics
- **Paul Levine,** Chemistry
- **Lilia Magana,** Neuro Science and Behavior
- **Yannick Maiki,** Electrical Engineering
- **Marisela Marinez,** Health Science
- **Pedro Medina,** Cellular, Developmental Biology
- **Michelle Montemayoe,** Neuro Science
- **Crystal Nyitray,** Biochemistry and Molecular Biology
- **Milana PeBenito,** Cellular, Developmental Biology
- **Marissa Perez,** Cellular, Developmental Biology
- **Michelle Reiner,** Chemistry
- **Melanie Reyes,** Cellular, Developmental Biology
- **Christina Sanchez,** Biology
- **Janelle Yong,** Electrical Engineering

Left, UCSC graduates celebrate their B.S. degree completion in a special ceremony. They are future scientists and engineers on the path to excellence. The spirited Class of 2009 is the picture of dedication and commitment.

News Bits



UC Davis CAMP Scholar Eric Villalon, left, at SACNAS 2009 awards ceremony. Villalon won a special merit award, the Martin Farias III Memorial Award for Health/Medicine Research. Villalon is a Neuro Physio Biology major. Above, also enjoying the SACNAS experience were UC Davis undergraduate researchers Carmen Villadares (Biosystems Engineering), Ryan Doctor (Biomedical Engineering/Biotechnology), and Leopoldine Matialeu (Biochemistry and Molecular Biology). Davis BD Fellow Gerardo Rocha (not pictured), fourth year doctoral student in engineering, also presented. All are part of a generation of new information.



Left, UCI-CAMP Student Joel Rivera attended the American Chemical Society meeting in Washington, D.C. and was featured in the C & En Magazine. He conducts research with Professor Kenneth Janda (and is also under the tutelage of our CAMP Bridge to the Doctorate Ph.D. Candidate, Melissa Prado). From left, ACS Executive Director and CEO Madeleine Jacobs, Joel Rivera, UCI undergraduate, Baxter Bio Science's Wanda Seyton; Georgia College & State University Chemistry Professor Chavonda J. Mills; and Dr. Thomas Lane, President, ACS.

Sasha Shekhar *continued from page 31*

rience in bioengineering, Shekhar independently sought out a research project with Professor Herbert Waite whose work spans between the Materials Department and the Molecular, Cellular and Developmental Biology Department. As a senior, she participated in the UCSB CAMP Summer Internship program under the supervision of her faculty mentor, Professor Waite, characterizing the chemical and mechanical properties of the structural proteins in a small marine worm, *Phragmatopoma california.* Shekhar presented her research at the 2008 SACNAS conference and the 2009 CAMP Statewide Research Symposium.

In Fall 2009, Shekhar began her graduate career at UC Berkeley pursuing a Ph.D. in Biophysics. While fulfilling her rotations, Shekhar has been very active in her community as a volunteer chemistry teacher for fifth graders with the Community Resources for Science program.

Alabama
Alaska
All Nations
Arkansas
California State
Colorado
Florida
Georgia
Houston
Illinois
Indiana
Islands of Opportunity - Hawaii
Kentucky - West Virginia
Louisiana
Michigan
Mississippi
Missouri
New Mexico
New York City
North Carolina
North Star - Minnesota
Northeast
Ohio
Oklahoma
Pacific Alliance
Peach State
Philadelphia
Puerto Rico
South Carolina
State University of New York (SUNY)
Tennessee
Texas
University of Texas System
University System of Maryland
Washington - Baltimore - Hampton Roads
Western Alliance to Expand Student Opportunities (WAESO)
Wisconsin

California

UNIVERSITY OF CALIFORNIA

CAMP

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A Grant Through the National Science Foundation

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