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PREFACE

On behalf of the students, faculty and staff of the University of California, we welcome you to the Seventh Annual Undergraduate Research Symposium. Undergraduate research encourages our students to go beyond studying and to actually put into practice their research, scholarship and creative endeavors. Research is a difficult but rewarding enterprise, and the projects presented here represent a significant commitment of time and energy on the part of both the students and their faculty mentors.

We commend you on your creative efforts and wish you the best as you present your results of those efforts to the larger UCR community.

Steven Brint, Vice Provost
Undergraduate Education

and

Veronique Rorive, Director of Undergraduate Research
Undergraduate Education
7\textsuperscript{TH} \textbf{ANNUAL UNDERGRADUATE RESEARCH, SCHOLARSHIP, CREATIVE ACTIVITY SYMPOSIUM}

\textbf{SCHEDULE OF EVENTS
ORAL PRESENTATION SESSIONS}

\textbf{MONDAY, APRIL 29, 2013}

8:00 – 8:45 \quad HUB Lobby 3\textsuperscript{rd} Floor
\hspace{1em} Registration & Poster Setup

8:45 – 8:55 \quad HUB 302
\hspace{1em} \textit{Welcome!}
\hspace{1em} Steven Brint, Vice Provost of Undergraduate Education

9:00-10:00 \quad HUB 355 \quad \textbf{Moderator: Amanda Huffer, Religious Studies}
\hspace{1em} \textbf{A1} \quad \textit{“Here Comes Lampito” - A Spartan Woman in an Athenian Play}
\hspace{1em} Patricia Morland, Comparative Ancient Civilizations & Classics
\hspace{1em} Faculty Mentor: Thomas Scanlon, Comparative Literature

\hspace{1em} \textbf{A2} \quad \textit{Occupy Me}
\hspace{1em} Sarah Newman, Creative Writing
\hspace{1em} Faculty Mentor: Juan Herrera, Creative Writing

\hspace{1em} \textbf{A3} \quad \textit{Operadora}
\hspace{1em} Grace Kang, Creative Writing
\hspace{1em} Faculty Mentor: Juan Herrera, Creative Writing

9:00-10:00 \quad HUB 367 \quad \textbf{Moderator: James Baird, Botany & Plant Sciences}
\hspace{1em} \textbf{A4} \quad \textit{Neurobiological Effects of Placenta Consumption on the Amygdala in Male California Mice}
\hspace{1em} Eric Kung, Neuroscience
\hspace{1em} Faculty Mentor: Wendy Saltzman, Biology

\hspace{1em} \textbf{A5} \quad \textit{Identifying Genes that Modulate Viral Replication in C. elegans}
\hspace{1em} Saige Pompura, Biological Sciences
\hspace{1em} Faculty Mentor: Morris Maduro, Biology

\hspace{1em} \textbf{A6} \quad \textit{Misinformation and Diabetes Knowledge among Hispanics and the Prevalence of Diabetes Mellitus in Riverside County}
\hspace{1em} Michelle Ramon, Biology
\hspace{1em} Faculty Mentor: Emma Simmons, School of Medicine
10:05-11:05 HUB 355  Moderator: Thomas Perring, Entomology & Undergraduate Education
B1  Antitumor Efficacy of a Potential Glioblastoma Chemotherapeutic
Elma Frias, Neuroscience & Music
Faculty Mentors: Emma Wilson, Biomedical Sciences; Jack Eichler, Chemistry
B2  Synthetic Culture Systems for Human Pluripotent Stem Cells Using Electrospun Nano-Scaffolds
Lauren Wong, Bioengineering
Faculty Mentor: Jin Nam, Bioengineering
B3  Environmental Effects of Light and Predation on Coloration in Wild Guppies
Michelle Yoakim, Biology
Faculty Mentor: David Reznick, Biology

10:05-11:05 HUB 367  Moderator: Curt Burgess, Psychology
B4  The Role of Efficacy on the Academic Performance of Foster Youth in Financial Literacy Programs
Adanna Eke, Psychology
Faculty Mentor: Robert Ream, Graduate School of Education
B5  A Quantitative Study to Understand the Effects the California Mock Trial Program has on Participants
Christopher Sanchez, Sociology - Law & Society
Faculty Mentor: Robert Parker, Sociology
B6  Black Power Education: A History of the Oakland Community School
Viet N. Trinh, History
Faculty Mentor: V.P. Franklin, History

11:10-12:10 HUB 355  Moderator: Amanda Huffer, Religious Studies
C1  Olvera Street: Building Towards the Future
Karina Muñoz, Anthropology
Faculty Mentor: Wendy Ashmore, Anthropology
C2  Elements of the Indigenous in the Image of the Virgin of Guadalupe
Judit Ramirez-Meza, Spanish
Faculty Mentor: Covadonga Lamar-Prieto, Hispanic Studies
C3  A Work in Progress: Participation and the Role of the Public as seen in the Photography of Gina Osterloh, Farrah Karapetian, and Nikki S. Lee
Pejman Shojaei, Art History & History
Faculty Mentor: Susan Laxton, Art History

11:10-12:10 HUB 367  Moderator: Steven Brint, Sociology & Undergraduate Education
C4  The Effect of the Big Five Personality Traits on Authoritarian Personality
Wun Huang, Psychology
Faculty Mentor: Curt Burgess, Psychology
C5  A Question of Prayer in Terrence Malick's The Tree of Life
Katharine Henshaw, Philosophy
Faculty Mentor: Howard Wettstein, Philosophy
C6  Jazz at UCR
Nathan Guze, Music
Faculty Mentor: Johnathan Ritter, Music

12:10 – 1:30  HUB 302  Poster Presentations 1-12 (see pgs. 10-12 for presentation titles)

1:30 – 2:30  HUB 355  Moderator: Leah Haimo, Biology & Graduate Division
D1 Design of Impedance-Driven Flow Device for Studying Magnesium Degradation in Simulated Body Fluid
Elbert Mai, Bioengineering
Faculty Mentor: Huinan Liu, Bioengineering
D2 Novel Wasp Peptides Block Store-Operated Calcium Entry in Mammalian Cells
Haroun Mohammad, Neuroscience
Faculty Mentor: Michael Adams, Cell Biology & Neuroscience
D3 Cross-Species Comparison of Bitter Detection in Drosophila
Jonathan Clark, Neuroscience
Faculty Mentor: Anupama Dahanukar, Entomology

1:30 – 2:30  HUB 367  Moderator: Tony Yang, Health Services
D4 A Computational Test of the Working Memory Hypothesis for Cerebral Hemispheric Asymmetries
Priscila Mendoza, Psychology
Faculty Mentor: Curt Burgess, Psychology
D5 Experimenter Bias and the Accuracy and Confidence of Memory
Jennifer Afana, Psychology
Faculty Mentor: Steven Clark, Psychology
D6 The Relationship between Self-Reports of Personality and Computer Mediated Communications
Israel Flores, Psychology
Faculty Mentor: Rebekah Richert, Psychology

2:35-3:35  HUB 355  Moderator: Tony Yang, Health Services
E1 Food and War in French Art: A Complex Relationship
Sara Truitt, French & Political Science
Faculty Mentor: Michelle Bloom, Comparative Literature & Foreign Languages
E2 The Culinary as an Artistic Practice in Films
Michael Turcios, French
Faculty Mentor: Michelle Bloom, Comparative Literature & Foreign Languages
E3 Comment Faire Les Madeleines
Jordan Greer, Biology
Faculty Mentor: Michelle Bloom, Comparative Literature & Foreign Languages

2:35-3:35  HUB 367  Moderator: Curt Burgess, Psychology
E4 Aptamer Based Detection and Quantification of Pb (II) Using Capillary Gel Electrophoresis and Laser Induced Fluorescence (CGE-LIF)
Michael Pham, Biochemistry
Faculty Mentor: Wenwan Zhong, Chemistry

**E5**  
*Nucleobase Dimers in the Gas Phase*  
Mark Hilado, Biochemistry
Faculty Mentor: Thomas Morton, Chemistry

**E6**  
*The Effects of Third Hand Smoke on the Liver*  
Benjamin Goodwin, Biology
Faculty Mentor: Manuela Martins-Green, Cell Biology & Neuroscience

3:40 – 4:40  
**HUB 355**  
Moderator: Tanya Nieri, Sociology

**F1**  
*Synthesis, Characterization, and Stability of Gold (III) Complex Ions Possessing Phenanthroline-based Ligands*  
Charles Ruiz, Chemistry
Faculty Mentor: Jack Eichler, Chemistry

**F2**  
*Copper/Titanium Catalysis Forms Fully Substituted Carbon Centers from the Direct Coupling of Acyclic Ketones, Amines, and Alkynes*  
Mary Nguyen, Chemistry
Faculty Mentor: Catharine Larsen, Chemistry

**F3**  
*Recombinant Anti-Dengue Immunoglobulin A as a Passive Immunization*  
Lien Trinh, Biochemistry
Faculty Mentor: David D. Lo, Biomedical Sciences

3:40 – 4:40  
**HUB 367**  
Moderator: Mike McKibben, Earth Sciences & CNAS Associate Dean

**F4**  
*The Role of PKA in IFT*  
Jae Oh, Environmental Sciences - Natural Sciences
Faculty Mentor: Leah Haimo, Biology

**F5**  
*Examination of Ras-Independent Raf Activation of ß-Arrestins through BRET-Based Biosensor*  
Nelson Poliran Jr., Cell Molecular & Developmental Biology
Faculty Mentor: Kathryn DeFea, Biomedical Sciences

**F6**  
*Computational Model of Induced Alteration of Synaptic Activity in Medial Prefrontal Cortex*  
Mundy Reimer, Neuroscience
Faculty Mentor: Edward Korzus, Psychology

5:30 – 7:30  
**HUB 367**  
Coordinator: Rebecca Spence Dobias, Undergraduate Education
Moderator: Tanya Nieri, Sociology

**COMMUNITEA**

1  
*Cultivate R'Space: Seeding a Community Garden in Riverside*  
Pavan Rami, Environmental Science

2  
*Oral Histories of Riverside’s Sister Cities*  
Kristina Brunnler, History

3  
*Best Practices for an Environmental Curriculum*  
Ismael Gabriel Castaneda, Sociology - Law & Society

4  
*900 Magnolia: A College Student’s Journey in Aiding High School Student Futures*  
Andrieu’ Aguinaldo, Biological Sciences
5  *Presentation of Rascuache Advocacy with Day Laborers*
   Jacqueline Maciel, Sociology – Law and Society
6  *An Evaluation of Art of the P.O.O.R. (People Orchestrating Optimistic Renditions) at the University of California Riverside*
   Estephania Vazquez, Sociology
TUESDAY, APRIL 30, 2013

8:00 – 8:55 HUB Lobby 3rd Floor
Registration

9:00-10:00 HUB 355 Moderator: Michael Allen, Center for Conservation Biology
G1 Stability Analysis of Predator-Prey Systems in Continuous Network Domains
Scott Manifold, Mathematics
Faculty Mentor: Kurt Anderson, Biology
G2 A Comparison of Nutritional Value of Lettuce in Vertical Hydroponics and Field Farming Systems
Italia Pacentine, Neuroscience & Biology
Faculty Mentor: Jim Baird, Botany & Plant Sciences
G3 Seasonal Variation of Leaf Traits in a Chaparral/Coastal Sage Scrub Environment,
Larissa Yates, Environmental Sciences,
Faculty Mentor: Lou Santiago, Botany & Plant Sciences

9:00-10:00 HUB 367 Moderator: Dimitri Morikis, Mechanical Engineering
G4 Designing a Conductivity Measurement Probe to Experimentally Observe Pollution Dispersion Through a Fluid
Raul-Delga Delgadillo, Mechanical Engineering
Faculty Mentor: Marko Princevac, Mechanical Engineering
G5 Nano-scale Surface Morphology of Magnesium Anodized in a 10 M KOH Electrolyte
Chris Miller, Bioengineering
Faculty Mentor: Huinan Liu, Bioengineering
G6 Determining the Fuel Savings of Dynamic Eco-Driving Technology
Nigel Williams, Mechanical Engineering
Faculty Mentor: Matthew Barth, Mechanical Engineering

9:00 – 10:00 HUB 379 Moderator: Eugene Nothnagel, Botany & Plant Sciences
G7 Production of Sap-Flow Probes to Assess the Rates of Active Ozone Uptake in Mixed Conifer Forests
Mitchell Shinn, Mechanical Engineering
Faculty Mentor: Marko Princevac, Mechanical Engineering
G8 Cultivate R’Space: Seeding a Community Garden in Riverside
Pavan Rami, Environmental Sciences; Elizabeth Tizcareno, Environmental Sciences
Faculty Mentor: Farah Godrej, Political Science
G9 Values in Higher Education
Caitlin Moore, Media & Cultural Studies
Faculty Mentor: John Levin, Graduate School of Education

10:05-11:05 HUB 355 Moderator: Eugene Nothnagel, Botany & Plant Sciences
H1 Autism and the Psychological “Self”
Nicole Johnson, Creative Writing
Faculty Mentor: Curt Burgess, Psychology

H2  
*Happiness and Self-efficacy on Neuroticism*
Sarah Maples, Neuroscience
Faculty Mentor: Curt Burgess, Psychology

H3  
*My Self, Neuroticism, and Children’s Fiction*
Alexandra Villamor, Creative Writing
Faculty Mentor: Curt Burgess, Psychology

10:05-11:05  HUB 367  Moderator: William Grover, Mechanical Engineering

H4  
*The Role of Mindfulness in Reducing Stress, Chronic Pain and Illness and Promoting the Health and Wellbeing of Nurses*
Amanda Flagtwet, Biology
Faculty Mentor: Robin DiMatteo, Psychology

H5  
*Integer-valued Polynomials and the QR-property*
Reeve Garrett, Mathematics
Faculty Mentor: David Rush, Mathematics

10:05-11:05  HUB 379  Moderator: Jim Baird, Botany & Plant Sciences

H7  
*Serum Albumin Binding Studies with Gold(III) Anticancer Compounds*
Pauline Olsen, Biochemistry
Faculty Mentor: Jack Eichler, Chemistry

H8  
*Asian American Women and Domestic Violence: An Intersectional Approach*
Jessica Tjiu, Political Science & Chinese
Faculty Mentor: Georgia Warnke, Political Science

H9  
*Foster Youths’ Self-Narratives: The Relations between Religion, Narrative Content, Arousal and Psychopathology*
Mayra Cazares, Psychology
Faculty Mentor: Tuppett Yates, Psychology

11:10-12:10  HUB 355  Moderator: Sharon Rushing, Anthropology

I1  
*Development Empire: The Neo-colonial Effects of International Aid*
Kassundra Peterson, Psychology - Women's Studies
Faculty Mentor: Marguerite Waller, Women's Studies

I2  
*Lifting the Western Veil: Study of Women’s Role in Modern Politics of Algeria*
Merima Tricic, International Relations
Faculty Mentor: Thomas Perring, University Honors

I3  
*A Literature Review on Human Trafficking in the United States: The Conflation between Sex Work and Human Trafficking*
Jessica Tjiu, Political Science & Chinese
Faculty Mentor: Amalia Cabezas, Ethnic Studies

11:10-12:10  HUB 367  Moderator: Jim Baird, Botany & Plant Sciences

I4  
*Effects of Fatherhood on Immune Cell Count and Viability in the California Mouse*
Trey Amador, Biology  
Faculty Mentor: Wendy Saltzman, Biology

I5 Adaptation to Environmental Unpredictability in Short Lived Annual Killifish  
Kevin Lee, Biochemistry  
Faculty Mentor: David Reznick, Biology

I6 Synthesis of Heterocyclic Cannabinoids  
William Leon, Biochemistry  
Faculty Mentor: Michael Marsella, Chemistry

11:10-12:10 HUB 379 Moderator: Curt Burgess, Psychology

I7 Emancipated Youth: A Collection of Short Stories  
Robyn Roberts, Psychology & Creative Writing  
Faculty Mentor: Tuppett Yates, Psychology

I8 Janitzio Island: A Study on the Impact of Tourism on a Small Indigenous Community  
Gayat Adame, Anthropology  
Faculty Mentor: T.S. Harvey, Anthropology

I9 Timebound, A Screenplay  
Janet James, Creative Writing  
Faculty Mentor: Stu Krieger, Theater

12:10 – 1:30 HUB 302 Poster Presentations 13-26 (see pgs. 10-12 for presentation titles)

1:30 – 2:55 HUB 355 Moderator: Yolanda Moses, Anthropology & AVC-DEE

J1 Art of the People Orchestrating Optimistic Renditions (Art of the P.O.O.R)  
Freddy Lopez, Ethnic Studies  
Faculty Mentor: Rickerby Hinds, Theater

J2 Archaeological Encounters of the Third Kind: An Exploration of Gender Ambiguity in the Ancient Near East  
Angel Ayala, Anthropology  
Faculty Mentor: Wendy Ashmore, Anthropology

J3 Dawn’s Rosy Fingertips: The Essence of K’inich Ahau  
Steven Fox, Anthropology  
Faculty Mentor: Karl Taube, Anthropology

J4 A Computational Test of the Semantic Relationships of Word - Emoticon Meaning  
Sarah Maples, Neuroscience  
Faculty Mentor: Curt Burgess, Psychology

1:30 – 2:55 HUB 367 Moderator: Wendy Saltzman, Biology

J5 Using Brain-Computer Interface for Assistive Limbs  
Rex Lu, Mechanical Engineering  
Faculty Mentor: Tom Stahovich, Mechanical Engineering

J6 The Design and Fabrication of a Mechanical Force Balance  
Warner Tse, Mechanical Engineering
Faculty Mentor: Marko Princevac, Mechanical Engineering

J7 Consumer Empowerment through Technology
Michael Lauchlan, Linguistics & Philosophy
Faculty Mentor: Tom Novak, Sloan Center

J8 Hydrogen Storage Using Cyclic Borane-Diamine Adduct
Erik Romero, Chemistry
Faculty Mentor: Jack Eichler, Chemistry

1:30 – 2:55 HUB 379 Moderator: Deborah Wong, Music

J9 Trends of Faith in Christian College Students
Aubrey Francis, Psychology
Faculty Mentor: Amanda Huffer, Religious Studies

J10 Are Transfers Students’ On-Time Graduation Contingent On Levels of School Engagement?
Alyssa Heckmann, Political Science/Law & Society
Faculty Mentor: Tanya Nieri, Sociology

J11 Web Scraped: An Econometric Analysis of Argentina’s Misreported Inflation Rate
Michael Perez, Economics
Faculty Mentor: Gloria Gonzalez-Rivera, Economics

J12 Out of Chaos, Craft: Purposefulness in Creating Poetry
Jacqueline Lalor, Statistics
Faculty Mentor: Goldberry Long, Creative Writing

3:00 – 3:15 HUB 302
CLOSING & Best Presentation Awards
Steven Brint, Vice Provost, Undergraduate Education
POSTER PRESENTATION SESSIONS
HUB 302

Monday, April 29, 2013

12:10 – 1:30  HUB 302  Poster Presentations

Poster 1  Discrepancies in Nicotine Concentrations on Electronic Cigarette Product Labels and in Cartomizer Fluid
Michael Dang, Biology
Faculty Mentor: Prue Talbot, Cell Biology & Neuroscience

Poster 2  Effects of Chronic Exposure to Corticosterone on Male Reproductive Function in White’s Treefrogs (Litoria caerulea)
Julia Devito, Biology
Faculty Mentor: Wendy Saltzman, Biology

Poster 3  Selective Catalytic Reduction for Lawnmowers: Reducing Harmful Pollutants from Lawnmower Exhaust
Risa Guysi, Environmental Engineering
Faculty Mentor: Kawai Tam, Chemical - Environmental Engineering

Poster 4  Purification and Characterization of Aabinogalactan Proteins from Bee Honey
Jane Kim, Plant Biology
Faculty Mentor: Eugene Nothnagel, Botany & Plant Sciences

Poster 5  Seizure In a Slice
Ilona Kravtsova, Neuroscience & Biology
Faculty Mentor: Todd Fiacco, Cell Biology & Neuroscience

Poster 6  Sherman Voices
Maria Lorenzo, Native American Studies
Faculty Mentor: Clifford Trafzer, History

Poster 7  The Adaptive Evolution of Visual Genes In Tetrapods
Minh Nguyen, Biochemistry
Faculty Mentor: Mark Springer, Biology

Poster 8  Plant Water Relations in Nicotiana glauca, An Invasive Tree in Arid Southern California
Angelica Nunez, Neuroscience
Faculty Mentor: Louis Santiago, Botany & Plant Sciences

Poster 9  Radical Migration in the Gas Phase
Neil Quebbemann, Chemistry  
Faculty Mentor: Ryan Julian, Chemistry

Poster 10  *Degradation of Magnesium Alloys in Artificial Urine Solution for Potential Biodegradable Ureteral Stent Applications*  
James Tu, Bioengineering  
Faculty Mentor: Huian Liu, Bioengineering

Poster 11  *The Hypokinesic Effects of Ampulex Compressa Venom on Periplaneta Americana*  
Hoa Luu, Psychology  
Faculty Mentor: Michael Adams, Entomology & Neuroscience

Poster 12  *Fingerprinting the Sierra Snowpack: Relationship between Storm Tracks and the Isotopic Composition of Snow*  
Krystal Vasquez, Chemistry  
Faculty Mentor: James Sickman, Environmental Sciences

**Tuesday, April 30, 2013**  
12:10 – 1:30 HUB 302 Poster Presentations

Poster 13  *Exploring the Role of Zumba in Facilitating Physical Activity in Latino Americans and African Americans*  
Rachel Aguilar, Biology  
Faculty Mentor: Tanya Nieri, Sociology

Poster 14  *Pharmacological Effects of Zolpidem and Sodium Oxybate on Sleep Spindle Activity*  
Mariel Bello, Psychology  
Faculty Mentor: Sara Mednick, Psychology

Poster 15  *Capturing Storm Water Runoff Using Sustainable Technologies*  
Kyle Nelson, Environmental Engineering  
Faculty Mentor: Sharon Walker, Chemical - Environmental Engineering

Poster 16  *Can’t Sleep? Maybe You’re Blue? The Relationship between Sleep Quality, Stress, Depression and Naps*  
Eunice Oh, Psychology & Liberal Studies  
Faculty Mentor, Sara Mednick, Psychology

Poster 17  *Osmotic Pressure of Bovine Serum Albumin in the Presence of Calcium Chloride with Low Ionic Strength*  
Danielle Ornelas, Bioengineering  
Faculty Mentor: Victor Rodgers, Bioengineering
Poster 18  Aluminum-Dependent Root-Growth Inhibition in Arabadopsis
Mariano Resendiz, Plant Biology
Faculty Mentor: Paul Larsen, Biochemistry

Poster 19  Characterization of Capillary Wicking for Paper-Based Microfluidics
Cindy Rosillo, Mechanical Engineering
Faculty Mentor: Hideaki Tsutsui, Mechanical Engineering

Poster 20  Effects of Paternal Condition on Immune Response in Male California Mice
Ashwin Sharma, Biology
Faculty Mentor: Wendy Saltzman, Biology

Poster 21  Immunological Response to Chronic Elevation of Stress Hormones in White’s Treefrogs (Litoria caerulea)
Lisa Umeh, Biochemistry
Faculty Mentor: Wendy Saltzman, Biology

Poster 22  Repeated Mild Traumatic Brain Injury Results in White Matter Disruption
Faisal Rashid, Neuroscience
Faculty Mentor: Andre Obenaus, Cell Biology & Neuroscience

Poster 23  Synthesis of Plasmonic Gold Nanoparticle Structures
Monica Marks, Materials Science & Engineering
Faculty Mentor: Ming Lee Tang, Chemistry

Poster 24  Study of Flash Pyrolysis of Tert-butyl hydroperoxide Using Vacuum Ultraviolet Photoionization Mass Spectrometry
Blake Riser, Biochemistry
Faculty Mentor: Jingsong Zhang, Chemistry

Poster 25  Health Related Effects Reported by Electronic Cigarette Users in Online Forums
My Hua, English & Biology
Faculty Mentor: Prudence Talbot, Cell Biology & Neuroscience

Poster 26  Does Visibility of the Mouth in the Context of a Real Face Change Perception of Audiovisual Speech Across Different Noise Levels?
John Pangilinan, Psychology
Faculty Mentor: Lawrence D. Rosenblum, Psychology
ABSTRACTS

Gayat Adame, Anthropology
Faculty Mentor: T. S. Harvey, Anthropology
Janitzio Island: A Study on the Impact of Tourism on a Small Indigenous Community
This research focuses on the impacts of tourism on the small Purépecha indigenous community based in Janitzio Island, Mexico. It looks at the changing socioeconomic state of Mexico as early as the 1930’s, specifically the push towards expansive private enterprise and artisanal production, which was not only meant for the promotion of national identity, but also as a capitalist necessity. In Michoacán, for example, the promotion of tourism was fostered by the state and national government as a way to solve rural unemployment. Janitzio Island, which is the most populated of four islands in Pátzcuaro Lake in the state of Michoacán, became a key location for the promotion of the state’s history and culture. The isolated location of the island further engendered the belief of a static culture, exotic and alluring to the national and international visitor. Today the island, which is not even half a mile in diameter, receives on average thirty thousand visitors a month. As a consequence new ideas, technology, pollution, and forms of monetary exchange have been introduced. Through fieldwork conducted in the summer of 2012, I concluded that there were four main forms of impact as a result of tourism. This presentation will identify, describe, and discuss these cultural, economic, environmental, and social impacts and the resulting changes on the island that have been observed over time.

Jennifer Afana, Psychology
Faculty Mentor: Steven Clark, Psychology
Experimenter Bias and the Accuracy and Confidence of Memory
Abstract: This study examines experimenter expectancy effects on memory and memory confidence. It is an extension of a previous study by Stanton & Baker (1942). Each participant was shown a series of shapes, then given a filler task, and finally engaged in a one-on-one interview with a research assistant to test his or her memory of the shapes. Without the research assistant’s awareness, only half or one-third of the answers on their answer sheets were correctly keyed. The results will show the extent to which the expectations of the administrator can affect a person’s memory decisions and confidence in those memory decisions. The results
also have real-world implications for eyewitness identification lineups. In such circumstances the police typically have expectations about the guilt of the suspect, and those expectations may be inadvertently communicated to the witness.

Rachel Aguilar, Biology
Faculty Mentor: Tanya Nieri, Biology

*Exploring the Role of Zumba in Facilitating Physical Activity in Latino Americans and African Americans*

Abstract: Latino Americans and African Americans disproportionately experience several health threats, including cardiovascular disease, obesity, and diabetes, and barriers to regular physical activity. Zumba, a Latin-inspired dance fitness program, has emerged as an immensely popular form of physical activity that draws in large numbers of Latino Americans and African Americans and is now available in over 125 countries and serves 12 million people. Despite Zumba’s commercial success, little research examines the extent of its impact and reasons for its success. Using in-depth interviews with Zumba participants, this study explores the role of Zumba in initiating and sustaining physical activity. It also explores the impact of Zumba’s explicit inclusion of mainly Latin American culture, but also hip-hop and other world cultures, on the participants’ experience. This cross-sectional exploratory study aims to add to the literatures on health disparities, health promotion, cultural competence, and cultural identity. The sample includes women who live in the greater Los Angeles and Inland Empire areas, are 18 or over in age and who have participated in a Zumba class within the last year. The results reveal that Zumba attracts participants because they experience Zumba differently than other forms of physical activity and group exercise. Participants expressed that Zumba creates an atmosphere of less pressure and is less strict and more fun, compared to other forms of exercise. Participants also expressed that Zumba’s incorporation of cultural features positively influenced them and attracted them to Zumba since many participants share a common background or connection to these cultures.

Andrieu’ Aguinaldo, Biological Sciences
Faculty Mentor: Robert Ream, Graduate School of Education

*CommuniTEA: 900 Magnolia: A College Student’s Journey in Aiding High School Student Futures*

900 Magnolia is an undergraduate student research organization at UCR that is involved in both the mentoring of high school students as well as studying the behavioral difference between high school students with peer mentors and those without formal mentors. The members of 900 Magnolia act as both mentors to provide academic support to local high school
students as well as researchers to the UCR community. As mentors, we visit Ramona High School in Riverside and educate classes of juniors and seniors on applying to college (both 2 year and 4 year), applying for scholarships, and show underprivileged teens what it means to be a college student. We also look into opportunities in medical careers that are present in their community including nurses, physicians, etc. Through this, we provide events and workshops to help guide the students onto their desired career path. As undergraduate researchers, we administer a survey that investigates the extent to which students prepare during high school to realize their subsequent educational goals. Specifically, we draw from the work of Berkner and Chavez (1997) to measure the essential steps required to master the process of college enrollment. We employ indicators of whether the student is academically prepared as measured by (1) his or her cumulative high school GPA, whether the student (2) has taken a college entrance exam, (3) applied for financial aid, and (4) applied to one or more colleges or universities. In doing so, we obtain information and feedback on how effective the mentors are at encouraging prospective college-goers to take the steps necessary to secure college eligibility. This allows 900 Magnolia mentors to undertake both formative and summative assessment of the mentor program and allows us to adapt mentoring styles and projects to better the high school student’s chance of enrolling in college. Our expectations for the students are that precise mentoring and supportive mentor-mentee relationships will better prepare ambitious high school students to fulfill their career goals.

Trey Amador, Biology
Adam Marentes, Kristine Kaiser
Faculty Mentor: Wendy Saltzman, Biology

Effects of Fatherhood on Immune Cell Count and Viability in the California Mouse

Abstract: Females of several species show decreased ability to mount an immune response during reproductive efforts; however, virtually no attention has been given to the trade-off between reproduction and immunity in their male conspecifics. We tested the hypothesis that fatherhood may reduce a male’s ability to properly maintain the immune system in a biparental mammal. Male California mice (Peromyscus californicus) were placed into three different breeding conditions (n=8 per group): breeding males produced and raised offspring with a female; non-breeding males were paired with a tubally ligated female; and virgin males were housed in male pairs with no direct female contact. Eleven to fourteen days after the birth of a breeding pair’s first litter of pups, age-matched males from each condition were euthanized, and their spleens and thymuses were collected and mashed through 40 μm cell strainers.
Splenic and thymic cells were counted on a hemacytometer and stained with carboxyfluorescein succinimidyl ester and fixable viability dye and subsequently quantified and analyzed using flow cytometry to assess cell viability (i.e. the proportion of live and dead cells). Breeding males had significantly higher splenic cell counts than virgins even when controlling for the mass of the animals (p<0.05), though no significant differences in splenic cell viability were found. Across breeding conditions, no significant differences were found in thymic cell count or viability. These results provide indirect evidence that fatherhood may improve immune system function.

Angel Ayala, Anthropology  
Faculty Mentor: Wendy Ashmore, Anthropology  
Archaeological Encounters of the Third Kind: An Exploration of Gender Ambiguity in the Ancient Near East  
Abstract: This research project presents a thorough exploration into the concept of a third gender and a third sex within the "cradle of civilization"--the ancient Near East. Mesopotamia and ancient Egypt will serve as the focal point within this project. The cross cultural sampling provides for a broad understanding of how sex and gender appeared and transformed in the Near East, yet still allows for a specific understanding of how ambiguous sexes and genders were fully realized in antiquity by these cultures. Much analysis will be placed on how these beings are depicted in iconography, archaeological remains, mortuary practices, and ancient texts. These forms of evidence aid in uncovering the functions of these individuals, their roles in daily life, and how they were constructed socially. The importance of this exploration is high, considering there has yet to be a full-scale investigation into gender ambiguity in the ancient Near East.

Mariel Bello, Psychology  
Faculty Mentor: Sara Mednick, Psychology  
Pharmacological Effects of Zolpidem and Sodium Oxybate on Sleep Spindle Activity  
Abstract: Hypnotics such as Zolpidem (Ambien) (ZOL) and Sodium Oxybate (Xyrem) (SO) have been shown to modulate specific patterns of neural oscillatory activity during nighttime sleep (i.e. sleep spindles between 11-16 hz). In the present study, we examined the dose-response of ZOL and SO on sleep spindle activity during a daytime nap. Utilizing a within-subjects, placebo-controlled, cross-over design, 19 subjects completed 5 drug conditions (10mg ZOL, 5mg ZOL, 3g SO, 2.5g SO, placebo). On each experimental day, subjects were given one of the 5 drugs before taking a polysomnographically-recorded nap. Adverse events were also recorded.
We found enhanced sleep spindle densities with 10mg and 5mg ZOL as well as a significant decrease in the number of sleep spindles with 3g and 2.5g SO, compared with placebo. Significantly more adverse events were found in 10mg ZOL, 3g, and 2.5g SO, compared with 5mg ZOL. The current findings suggest that 5mg ZOL is an optimal dose for enhancing sleep spindles while also minimizing adverse events. Given the known correlation between sleep spindles and memory consolidation, these findings propose a novel method for improving memory consolidation with pharmacologically-tailored sleep.

Kristina Brunnler, History

Mentor: Rebecca Spence Dobias, Undergraduate Education

CommuniTEA: Oral Histories of Riverside’s Sister Cities

Abstract: Sister city relationships are formal diplomatic exchanges between two communities from different countries. These relationships may include the exchange of cultures, education, commerce, or development. For 50 years, the City of Riverside’s International Relations Council (IRC) has been responsible for managing such relationships. Currently, Riverside has eight sister cities in seven countries. However, the IRC has not been able to archive the history of these relationships. Therefore, the goal of this project is to collect the history of each sister city relationship in order to make this information available to the public. We are gathering information through interviews with IRC members about their experiences with the program and council.

Ismael Gabriel Castaneda, Sociology/Law & Society

Arthur Tang, Joyce Ganthavorn

Mentor: Rebecca Spence Dobias, Undergraduate Education

CommuniTEA: Best Practices for an Environmental Curriculum

Abstract: We are researching best practices for creating an environmental curriculum related to green homes, green schools, and green workplaces as part of the U.S. Green Building Council-Inland Empire Chapter’s Sustainable and Healthy Built Environment Initiative. These practices can benefit the environment greatly by educating individuals about how to change behavior to reduce carbon emissions and achieve many financial and health benefits in the process. The green practices we are researching include solar energy and renewable energy resources, energy efficiency, recycling, gardening, and water conservation. These green practices would greatly benefit low-income families, businesses, and schools throughout the Inland Empire and nationwide, and we will be presenting these green practices to each of these groups. Overall, our goal is to provide the community the opportunity to live a healthier and sustainable lifestyle,
improve our environment through reduced carbon emissions, and save hundreds of dollars on utility services.

Our long-term goal is to include the following components in each presentation:
1.) The topic
2.) Why it is important to the environment and health
3.) Case studies/examples of the topic
4.) Local city, state, and organizational resources related to the topic

Mayra Cazares, Psychology
Faculty Mentor: Tuppert Yates, Psychology

Foster Youths’ Self-Narratives: The Relations between Religion, Narrative Content, Arousal and Psychopathology

Abstract: Foster youth undergo highly variant experiences in the foster care system. In this project, I analyzed 5-minute verbal narratives of approximately 170 foster youth in which they describe their experiences in foster care. In addition to the content of what youth say (e.g., positive or negative affect), I used the program PRAAT to measure the nonverbal marker of pitch (i.e., the speaker’s fundamental frequency; F0) which is a measure of the vibration patterns produced by the vocal folds during phonation and is widely recognized as an index of arousal (Juslin & Sherer, 2005). The purpose of this study was to evaluate if and how meaning making and arousal are important mechanisms by which adverse experience is related to pathology, as well as if and how religion may protect youth by enabling more organized narrative content and arousal. Results indicate that narrative features do explain a significant part of the relationship between adversity and psychopathology. However, religion was not significantly related to psychopathology though there was a trend toward less pathology among religious foster youth. Future analyses will explore the mediating effect of narrative process on the relationship between adversity and psychopathology, as well as if and how religion may moderate these explanatory relations. Helping individuals reframe their narrative may reduce negative affect attributed to number of placements and maltreatment—religion itself may help individuals reframe their narratives.
Jonathan Clark, Neuroscience
Faculty Mentor: Anupama Dahanukar, Entomology

Cross-Species Comparison of Bitter Detection in Drosophila

Abstract: Detection and avoidance of noxious stimuli are crucial for animal survival. Animals express bitter receptors in neurons programmed to elicit aversion behavior. Previous studies have investigated bitter detection in Drosophila melanogaster and have used the GAL4/UAS system to construct a receptor-to-neuron map. However, little is known about the expression and function of bitter receptors in other Drosophila species. Here I investigate behavioral and neural differences in detection of a panel of four bitter compounds across four Drosophila species. Behavioral feeding assays used to obtain concentration-dependent feeding data among the four species reveal variations in sensitivity to the tested panel of bitter compounds. D. simulans and D. sechellia display reduced sensitivity to the tested compounds when compared to D. melanogaster. Currently, I am investigating electrophysiological responses of taste neurons to a bitter compound, caffeine, via tip recordings from labellar taste hairs. The electrophysiological data may reveal differences in cellular responses between D. melanogaster and D. simulans. Finally, I am using the binary GAL4/UAS system to compare expression driven by bitter class-specific promoters. Green fluorescent protein (GFP) is expressed under the control of individual drivers in transgenic lines of D. melanogaster. These lines will be crossed with D. simulans, and GFP expression patterns in F1 hybrids will be compared with those of D. melanogaster. If the decreased sensitivity to bitter compounds in D. simulans is due to variations in receptor expression, then we may expect to see qualitative or quantitative differences in expression patterns in species hybrids as compared to D. melanogaster.

Michael Dang, Biology
Barbara Davis, Monique Williams
Faculty Mentor: Prue Talbot, Cell Biology & Neuroscience

Discrepancies in Nicotine Concentrations on Electronic Cigarette Product Labels and in Cartomizer Fluid

Abstract: Electronic cigarettes are new tobacco-free nicotine delivery devices that aerosolize a fluid which users inhale. The purpose of this study was to quantity nicotine concentrations in the fluid from 10 electronic cigarette cartomizers, then compare measured concentrations to those printed on product labels. A method was developed to quantify nicotine in cartomizer fluid using the HPLC. The instrument used for spectral and quantitative analysis was the Hewlett Packard Series 1100 HPLC instrument with a Thermo Scientific Hypersil ODS C18,
200mm x 4.6mm, 5 μm column. The flow rate was 0.8 mL/min with an injection volume of 5 μL. An isocratic method was applied using a mobile phase of 76.9% water, 23% acetonitrile, and 0.1% triethylamine running at a pH of 7.6. Measurements were made based on one cartomizer per brand. Of the products evaluated, one labeled zero nicotine was found by HPLC analysis to contain no nicotine, one was accurately labeled 16 mg of nicotine (measured concentration = 16.324 mg./ml), and five were 13-39% below their labeled nicotine concentrations. One sample, which was labeled 16 mg of nicotine, was determined by HPLC to have 60.8% more nicotine than the label indicated. Two samples labeled “high” had nicotine concentrations of 13.54mg and 16.34mg/ml. In conclusion, nicotine concentrations on labels in 8 of 10 products were inaccurate. Of particular concern is the product that underreported nicotine concentration by 60.8%. These data indicate that the quality control used in the manufacture of electronic cigarette products needs improvement.

Raul-Delga Delgadillo, Mechanical Engineering
Trent Nash
Faculty Mentor: Marko Princevac, Mechanical Engineering

Designing a Conductivity Measurement Probe to Experimentally Observe Pollution Dispersion through a Fluid

Abstract: An increasing problem in urban environments is the presence of toxic pollutants such as Nitrogen and Sulfur Oxides (NOx and SOx). These pollutants are able to spread through the environment with the help of wind, temperature gradients, and chemical reactions. Urban obstacles such as buildings have increased the difficulty of being able to analytically model and analyze how pollution will spread, especially if these obstacles are not isolated and resulting flow features from one interact with another. To be able to experimentally observe pollution dispersion, conductive characteristics of fluids are used to simulate pollution. The concept involves having a solvent fluid such as distilled water be considered the base fluid while a pollutant solute fluid such as salt water is injected into a flow tank to simulate a pollution source. The mixture of these fluids provides a voltage output which can be correlated to the concentration of the solute, or in other words the pollutants. A conductivity probe was developed to measure the conductance of a solution. Preliminary results indicate that the voltage read by the probes show a relationship between parameters such as temperature, concentration, and flow rate. The experiments will lead on to isolate the relationship between the voltage and the listed parameters and be optimized for a large scale production. Pending
the success of the probes, they will be arranged into arrays which will provide data for a three dimensional analysis over time of a simulation. Probe design and calibration will be discussed.

**Julia Devito, Biology**
**Regina Weickum, Caitlin Jones, Adam Marentes, Lisa Umeh**
**Faculty Mentor: Wendy Saltzman, Biology**

*Effects of Chronic Exposure to Corticosterone on Male Reproductive Function in White’s Treefrogs (Litoria caerulea)*

Abstract: Amphibian populations are declining globally. Although some of the mechanisms underlying these declines are understood, others remain unknown. One unexplored mechanism is stress: chronic stress decreases reproductive function in a variety of animals, including amphibians. We tested the hypothesis that a chronic increase in circulating corticosterone (CORT), the main amphibian stress hormone, would suppress reproductive function in White’s treefrogs (*Litoria caerulea*). We predicted that frogs with elevated CORT would show decreased sperm count and viability. To increase circulating CORT levels, we applied 40 μg CORT to frogs transdermally 3 times/day for 8 days. Blood samples were collected prior to the experiment (baseline), at the midpoint, and at the end of the experiment, and assayed for total CORT. At the end of the experiment, we collected the right testis of each frog for sperm assay. Sperm counts were taken using a hemacytometer. Sperm viability was measured by labeling cells with carboxyfluorescein succinimidyl ester and Fixable Viability Dye, and measuring with flow cytometry. Experimental animals showed an increase in circulating CORT levels in the middle and at the end of the experiment compared to baseline and to untreated control animals at all time points. CORT-treated frogs showed no difference in either sperm count or viability in comparison to the control group. The lack of effect of chronic exogenous CORT on sperm measures found here and in other recent studies suggests that chronic exposure to elevated CORT alone is not a likely mechanism for the decreases in sperm often associated with chronic stress.

**Adanna Eke, Psychology**
**Faculty Mentor: Robert Ream, Graduate School of Education**

*The Role of Efficacy on the Academic Performance of Foster Youth in Financial Literacy Programs*

Abstract: Among the 450,000 foster youth in the U.S., fewer than half (48%) graduate from high school, less than 14% of them enroll in a college, and only 2% of college-enrolled foster youth complete a bachelor’s degree. Little research is geared towards understanding the educational needs of this vulnerable population and due to high mobility rates it is often difficult to track
the long-term progress of foster youth. Using Albert Bandura’s seminal work on efficacy as the theoretical framework for this study, I set out to investigate whether efficacy is actually a teachable skill and if so, whether it is associated with the educational performance of foster youth. The study’s participants (n=54) are all current foster youth who participated in the SHADES program sponsored by United Way of the Inland Valleys. The SHADES program is a financial literacy course, aimed towards creating financially competent foster youth. Each participant was given a financial efficacy survey accompanied with pre and post quizzes at the beginning and end of the program used to track their educational performance. Also of interest, is whether the enrollees’ living statuses and learning preferences moderate associations between the efficacy of the youth and their academic outcomes. Findings will be used to both measure the effectiveness of this program and strengthen it for future students.

Alina Escalera, Physics
Parth Patel
Faculty Mentor: Allen Mills, Physics & Astronomy

Measurements of Positron Lifetimes in Ni, PTFE and SiO$_2$ by means of a Digital Storage Oscilloscope

Abstract: Positron Annihilation Lifetime Spectroscopy (PALS) is a technique by which the lifetime of positrons within a sample can provide information about porosity and or material defects. The scale of such features accessible to this technique relies on fast timing systems. Recent technological advances in the production of commercial digital storage oscilloscopes have made it possible to create fast timing systems without the use of analog electronics, making it possible to create a simpler PALS apparatus. The simplicity of these systems can lead to an improved time resolution, and makes it possible to perform multiple data selection methods for improved optimization. Herein, we describe the construction and testing of a digital positron lifetime spectrometer and present measurements of positron lifetimes in Ni, polytetrafluoroethylene (PTFE) and SiO$_2$. The apparatus consists of two BaF$_2$ scintillator crystals attached to XP2020 photomultipliers, a 500MHz, 4 GSa/s digital sampling oscilloscope, a computer, and software with on-line and off-line capabilities. The lifetime of positrons produced from the decay of a 22Na test source are determined using a 1.27 MeV nuclear gamma-ray as a start signal, and one of the two 0.511MeV gamma-rays originating from positron annihilation as a stop signal. Our simplified digital apparatus is easy to construct and operate, allows for the implementation of a broad range of digital sampling techniques and yields positron lifetimes of > 0.500 ns. The obtained positron lifetime measurements in the
Amanda Flagtwet, Biology  
**Faculty Mentor: Robin DiMatteo, Psychology**  
*The Role of Mindfulness in Reducing Stress, Chronic Pain and Illness and Promoting the Health and Wellbeing of Nurses*  
Abstract: Every person experiences stress during the course of their lives, and the failure to manage stress effectively can lead to increased tension, an overall decrease in health and well being, and the increased risk of illness. Dr. Jon Kabat-Zin created a program at the University of Massachusetts Medical Center called Mindfulness Based Stress Reduction (MBSR). This program was developed to teach patients struggling with pain and illness how to manage their stress through the techniques of mindfulness meditation. This thesis examines the eight week MBSR program, details the process used to teach participants to manage stress through mindfulness, and looks into the benefits for patients struggling with chronic pain and other illnesses including cancer and auto-immune diseases. Considerable empirical research has shown that between 35-50% of participants with chronic pain experience more than a 50% improvement in their pain by the end of an MBSR course. Along with this decrease in pain, many participants experienced a reduction of negative mood states and a growth in positive self-image; this influence on self-image and regulation of emotions has been recognized as an important element in medical care. This thesis also examines the potential benefits that MBSR has to offer in aiding nurses in their personal and professional lives. Many studies are reviewed that demonstrate that MBSR has the potential to increase nurses’ relaxation, improve life satisfaction, and decrease their risk of burn out while increasing their feelings of love and compassion towards their patients.

Israel Flores, Psychology  
**Faculty Mentor: Rebekah Richert, Psychology**  
*The Relationship between Self-Reports of Personality and Computer Mediated Communications*  
Abstract: Online communications have become an essential way for adolescents to communicate. These online interactions are not subject to the same limitations as face-to-face interactions, specifically increases in time spent interacting and the presentation of alternate selves. Social networking sites such as Facebook have become some of the most popular means of communication to date; with 37.5% of the U.S. population being active users, as well as accounting for around 17.9% of all time spent online. An individual’s involvement in such sites
may influence the manner in which they present themselves, as well as their reports of personality when interacting online. The present study examines how self-reports of personality may vary from offline to online environments. The purpose of this paper is not to explore the possibility of personality change due to the internet, but rather differences in presentation. Data was collected from 288 undergraduate participants using a 1.5 hour long questionnaire that included the Big Five Inventory (BFI) regarding offline and online self-reports of personality, as well as internet use questions. Individual differences, such as gender and the level of online interactions, were explored. Results showed that those participants considered as either high or low extraverts and high or low neurotics, provided significantly different online self-reports of personality compared to their offline self-reports. Significant differences were also present among women, but not among men.

**Steven Fox, Anthropology**

**Faculty Mentor:** Karl Taube, Anthropology

*Dawn’s Rosy Fingertips: The Essence of K’inich Ahau*

Abstract: This work attempts to delve into ancient Maya epigraphy and iconography associated with the Maya sun god, or God G, and the symbolism associated with this entity. Also known as *K’inich Ahau* in the Classic period, the Maya Sun God is associated with warfare, rulership, and sacrifice; aspects that were crucial to the worldview of the ancient Maya and other Mesoamerican communities. This symbolism associated with the Maya Sun God is trace from the Pre-Classic period all the way to modern ethnographic present of surviving Maya societies in addition the transitions, metamorphous, or abandonment of this entity as time progressed to modernity. Furthermore, the sun and its cycle through the sky and its impact on Maya cosmology in reference to site layout and the importance of themes of birth, death, and resurrection are also elaborated upon. All and all, this study is meant to show complexity in addition to the malleability of Maya religion as time and outside influences impacted them throughout the ages.

**Aubrey Francis, Psychology**

**Faculty Mentor:** Amanda Huffer, Religious Studies

*Trends of Faith in Christian College Students*

Abstract: This study examines the effects of attending college on the faith of Christian college students. College is often a significant time in a person’s life that can alter faith commitments among undergraduates. These findings will also help examine how these new experiences affect one’s faith. Existing research does not come to a comprehensive conclusion on whether college
leads to attrition from Christian denominations and self-identification with feelings of faith. This study found that there was no significant difference among students before coming to college and once attending. In fact the percentages of those who increased, decreased, or stayed the same in their faith were relatively equal. The data used in this study emerged from an online survey that divided percentage trends of increase, decrease, or sameness in faith according to their year in college, major, and living situation. As such, this study complicates current scholarship in that trends found do not coincide with various attrition models proposed by past research. The emergent data from this research will benefit a wide range of people, including students, school counselors and administrators, scholars in education, theology and/or sociology, even those working in ministry. These findings better explain what occurs in the faith of young adults once they begin in college.

Elma Frias, Neuroscience & Music

Faculty Mentors: Emma Wilson, Biomedical Sciences; Jack Eichler, Chemistry

Antitumor Efficacy of a Potential Glioblastoma Chemotherapeutic

Abstract: From a series of previously synthesized phenanthroline-based ligands possessing anti-tumor properties, 2,9-disecbutyl-1,10-phenanthroline(se-cbutylphen) was utilized as a drug treatment on glioblastoma tumor cell lines. Glioblastoma multiforme is an extremely aggressive and invasive form of central nervous system (CNS) tumor. A common chemotherapeutic drug used to treat advanced glioblastomas is Temozolomide (TMZ). In an effort to assess the anti-tumor capabilities of sec-butylphen, in-vitro and in-vivo studies were considered using proliferative GL-26 glioma cells. GL-26 glioma cells were cultured in-vitro and incubated with concentrations of sec-butylphen or Temozolomide. The drug was then removed and cell growth compared to non-treated cells was assessed using the Sulforhodamine B (SRB) colorimetric viability assay. To determine the toxicity window of the drug between tumor cells and normal cells, human foreskin fibroblasts cells treated with sec-butylphen and toxicity was assessed using SRB. Our data demonstrate improved and strong toxicity against GL-26 cells compared to TMZ in-vitro. Furthermore, in-vivo studies were done using mice in which a GL-26 cell line was established by an intracranial injection 1mm anterior and 2 mm lateral to the junction of the coronal and sagittal sutures (bregma) at a depth of 2mm using a stereotactic mouse frame. sec-butylphen injections were given intravenously through the retro-orbital route on day 1, 7 and 13 post tumor implantatio. In-vivo experiments demonstrate a significant reduction in tumor growth with administration of sec-butylphen. These experiments suggest sec-butylphen is
effective in slowing CNS glioblastoma progression and should be considered as a potential compound for future anticancer drug development.

**Reeve Garrett, Mathematics**  
**Faculty Mentor: David Rush, Mathematics**  
*Integer-valued Polynomials and the QR-property*  
Abstract: An important and often underemphasized facet of mathematics is that of structure, and in higher algebra, structure is of monumental importance. In this presentation, we’ll explore the structural properties of the ring of integer-valued polynomials in the context of commutative algebra (particularly multiplicative ideal theory), define the QR-property, and introduce the collection of tools we have to determine whether the ring of integer-valued polynomials has the QR-property or not. At the time of writing of this abstract, we do not know whether the ring of integer-valued polynomials has the QR-property, but we have several related properties to work with and some information about how these properties interrelate. I plan to define and develop these further as time permits. The aim of this talk is to be accessible to a general audience; in particular, no knowledge of abstract algebra will be assumed.

**Benjamin Goodwin, Biology**  
**Michael Frankos**  
**Faculty Mentor: Manuela Martins-Green, Cell Biology & Neuroscience**  
*The Effects of Third Hand Smoke on the Liver*  
Abstract: Cigarette smoking remains a significant health threat for smokers and nonsmokers alike. While second hand smoke (SHS) has been shown to be more toxic than first hand smoke, a newly discovered threat, third hand smoke (THS) appears even more dangerous. THS is produced by the deposition of SHS on surfaces, which then becomes more toxic with age. This presents a health threat to anyone in an environment where smoking has been present, including employees, spouses, and children. In addition, the widespread prevalence of smoking over the years, as well as the nature of smoke, has caused THS to be present to some degree nearly everywhere. Mice exposed to THS, under conditions that mimic human exposure, show levels of NNAL, a common biomarker for tobacco specific carcinogen exposure, in urine at levels comparable to children exposed to SHS and THS in their homes. Looking at the liver specifically, we found elevated triglyceride levels, elevated HDL (bad cholesterol) and decreased HDL (good cholesterol) resulting in non-alcoholic fatty liver disease. This condition can lead to cirrhosis, as well as cancer and cardiovascular disease. In addition, THS components also cause an increase in circulating glucose and show that the exposed mice cannot metabolize
glucose well. This indicates that THS causes a state similar to diabetes type 2. The oxidative stress caused by THS as well as alterations in the levels of specific enzymes also increases the threat of hepatotoxicity. This may have implication for toxicity of the liver when children are exposed to acetaminophen.

Jordan Greer, Biology

Faculty Mentor: Michelle Bloom, Comparative Literature & Foreign Languages

Comment Faire Les Madeleines

Abstract: The madeleine, a classic French pastry, has a strong symbolic root in French literature and was made famous by Marcel Proust’s overture to Remembrance of Things Past, Combray, which represents the power of food to evoke memory. The madeleine shows that when foods have a strong connection to your past, through taste they can reveal experiences and emotions that may have been long lost. This resonates with the concept that food has greater meaning in literary texts beyond serving as a source of nourishment. The central purpose of this presentation is to demonstrate how to bake madeleines and the potential effects they may have on an individual. Scripted entirely in French, the project is a video presentation. The whole video was filmed in my home and edited using iMovie ‘08 software, and a light-hearted and humorous atmosphere is maintained throughout. The cooking is filmed zoomed in using jump-cuts and attempts to poke a bit of fun at the more formal way of cooking. As displayed in the video, Julia Child’s The Way to Cook supplied the recipe for the madeleines. Also, allusions to well-known French literature that have food as a central theme are used in addition to Combray, such as Amélie Nothomb’s Biographie de la Faim. The video illustrates the step by step process of how make the madeleines while also trying to give the observer an idea of the transcendent experience one may have from the proper gustation of food.

Risa Guysi, Environmental Engineering

Jonya Blahut, Joshua Callihan, Holly Clark, Rosalva Chavez

Faculty Mentor: Kawai Tam, Chemical - Environmental Engineering

Selective Catalytic Reduction for Lawnmowers: Reducing Harmful Pollutants from Lawnmower Exhaust

Abstract: Emissions from lawnmower engines contribute a substantial amount of pollutants to the atmosphere, with studies showing that one lawnmower produces emissions equivalent to eleven cars operating over the same time period. The objective of this project was to create an after-market filter that could reduce the emission of nitrogen oxides (NOx) and carbon monoxide (CO) from lawnmowers by 50%. The design evolved into a three component selective catalytic reduction (SCR) system, which includes a quartz filter to remove large particulate
matter (PM) to increase the longevity of the catalyst, a capillary-based system that controls the mixing of urea within the exhaust stream, and a catalytic converter which consists of copper zeolite, Cu-ZSM-5. The retrofit filter attaches easily by screwing into the lawnmower where the existing muffler is located. The three components work together to remove PM, and convert NOx and CO to nitrogen gas, carbon dioxide, and water, which are much safer for the environment. Testing was conducted at CE-CERT, using a standard four-stroke lawnmower. Samples of exhaust were pumped through CO, NOx, and PM analyzers for 50 minute intervals, both with and without the SCR filter, and the data was recorded by computer software. The addition of the SCR filter showed a decrease in carbon monoxide, nitrogen oxides, and particulate matter by 87%, 67%, and 44%, respectively, exceeding the initial objective of the project. A bench-scale model of the product demonstrated the durability and efficacy of the catalyst under controlled conditions and provided proof of concept for the SCR system.

Nathan Guze, Music
Matt Zebley
Faculty Mentor: Johnathan Ritter, Music
Jazz at UCR
Abstract: My Honor’s Capstone project is entitled “Jazz at UCR”. For my project, I took the time to write out three original songs in the jazz idiom and I arranged an already existing jazz standard in an original way. The first of my original songs is called “My Baby's Baby, Baby.” For this piece, I used the basic concept of a contrafact, which is taking the harmony of an already existing song and writing a new melody over it. As I was writing my new melody, I realized that I needed to add on to the already existing harmonic structure with my own harmonic ideas and it really turned into quite the original piece. My second original song is titled “Take it Easy.” I used original compositional techniques (such as working out ideas on multiple instruments) for both the harmonic and melodic structure to make this Latin/Funk piece come to fruition. My last original song is called “Freddy's Buying.” This is a direct homage to Miles Davis' classic work “Freddy Freeloader.” It is a blues piece that functions much in the same way that Davis had his work, but with a slight variation. At the end of “Freddy Freeloader,” Davis goes to the flat 7 scale degree for his harmony. I go the opposite way in “Freddy's Buying” in that I go the the flat 2 scale degree in my harmony. My last piece is an arrangement of Charlie Parker's “Au Privave,” in which I split up the melody amongst all instruments and harmonized the melodic parts that the brass would play.
Alyssa Heckmann, Political Science/Law and Society
Faculty Mentor: Tanya Nieri, Sociology

Are Transfers Students’ On-Time Graduation Contingent on Levels of School Engagement?

Abstract: Many studies show a positive correlation between levels of school engagement and academic success. Yet, most of these studies involve freshman or traditional student populations. This study aims to explore the extent to which levels of school engagement affect the likelihood that transfer students will graduate on time—that is, within two years of transferring. It is hypothesized that transfer students who are more engaged on campus will have a higher likelihood of graduating on time, relative to transfer students who are less engaged on campus. This cross-sectional study will analyze primary data from an online survey, administered in Winter 2012 to a sample of 108 transfer students from a large, public university in Southern California. A majority of study participants (64%) reported that they will graduate at the end of Spring 2013. A majority of students planning to graduate on time (66%) reported some level of school engagement. The test of association showed that school engagement was not associated with graduating on time. The findings will be discussed in terms of their implications for the types of services and outreach needed by transfer students to ensure timely graduation.

Katharine Henshaw, Philosophy
Faculty Mentor: Howard Wettstein, Philosophy

A Question of Prayer in Terrence Malick’s The Tree of Life

Abstract: Terrence Malick’s The Tree of Life is a gorgeous and thought provoking film. Though composed of multiple narrative threads, the central story focuses on a grieving family that seeks hope and comfort through their faith in God. Writer and director, Terrence Malick, interweaves stunning imagery and poetic voiceovers in a collage of vignettes composed of family life, natural wonders, and symbolic imagery. The voiceovers that run alongside the image-montages are compositions of dialogue, thought, inner monologue, and, predominantly, prayer. In fact, prayer becomes a meta-narrative that frames the disparate images and vignettes into a single, significant whole. Prayer, as traditionally conceived, is a dialogue with God. These spiritual conversations often express wonder and gratitude, or petition God for guidance, forgiveness, or help. In The Tree of Life, Malick subtly alters the traditional expectations for prayer by employing these intimate words as a storytelling device. In addition to providing a narrative frame, the prayers used in this way, while remaining particular to the character’s situation, also expand to encompass universal expressions of human longing. This paper will examine several key
sequences of prayer in *The Tree of Life* in order to draw attention to the questions raised by their context and use. These questions are worth meditative consideration for their own sake rather than in pursuit of sure answers, much as the prayers in the film provide comfort by being heard rather than by being solved or answered.

**Mark Hilado, Biochemistry**  
**Faculty Mentor: Thomas Morton, Chemistry**  
**Nucleobase Dimers in the Gas Phase**  
Abstract: This research involves exploration of an organic cation, N, N’-dihydroxybenzamidine, and the binding properties of its conjugate acid ion to nucleobases such as cytosine are the focus of this investigation. This ion can hydrogen bond to cytosine using two points of attachment, just as common nucleobases bind to one another in vivo. The heterodimer complex between the dihydroxybenzamidinium ion and 1-methylcytosine has been created in the gas phase. The dihydroxybenzamidinium cation has been synthesized and purified, as are modified cytosines. These compounds, as well as the heterodimer complexes, are being examined using such techniques as mass spectrometry and action spectroscopy, as well as examining the formation of the heterodimer in solution by utilization of NMR spectroscopy. The findings from this research may serve for possible anti-cancer therapies. Potentially, this ion has the capability of binding to i-motifs, which are cytosine rich regions found within promoter regions of oncogenes such as c-MYC and VEGF. This cation under investigation could, in principle, bind to these promoter regions and repress or activate normal processes such as DNA transcription. Repression of this region could serve to counter the unregulated transcription of genes whose products represent a major stage in tumor growth.

**My Hua, English and Biology**  
**Faculty Mentor: Prue Talbot, Cell Biology & Neuroscience**  
**Health Related Effects Reported by Electronic Cigarette Users in Online Forums**  
Abstract: Electronic cigarettes (e-cigarettes) are battery-operated devices that deliver aerosolized nicotine to users without burning tobacco. Because little data exists on their health effects, we explored the symptoms e-cigarette use has on humans by analyzing online user posts from three e-cigarette forums with health and safety sections. Basic information (location, age, and gender) and health (symptoms and doctor diagnosed signs) information were collected. There were 405 symptoms (78 positive, 326 negative and 1 neutral) reported across three forums. Most data analysis was performed on Electronic Cigarette Forum posts. A total of 12 systems/anatomical regions were affected in e-cigarette users. Systems most often affected
include: mouth and throat, respiratory, neurological, sensory, and digestive. The majority of negative health effects occurred in the respiratory system. We further consolidated reported symptoms into categories to determine which anatomical regions/physiological processes were most affected for each system. For consolidated data, symptoms were most frequently reported for: bronchi/lungs (e.g., wheezing, shortness of breath, difficulty breathing), throat; neurological (headaches), intestine/digestion, and sight. To analyze interactions between systems, interactomes were created with Cytoscape software. Interactions were most frequently seen between circulatory/neurological; respiratory/mouth and throat; respiratory/chest, and digestive/neurological systems. Increased blood pressure was the most frequently reported sign diagnosed by physicians treating e-cigarette users. While some positive health effects were reported, a significant proportion of the data showed a correlation with e-cigarette use and onset of adverse health effects. This study is the first to compile and quantitatively assess health data associated with e-cigarette use from online forums.

Wun Huang, Psychology  
Faculty Mentor: Curt Burgess, Psychology  
The Effect of the Big Five Personality Traits on Authoritarian Personality

Abstract: The authoritarian personality is theorized as a personality type where individuals demand obedience and have a strong desire for power and order. The measurement scales for authoritarianism were mostly developed in the 1950’s and the 1960’s. As a result, the measurement scales for authoritarianism have received criticism because of terminology that would currently be considered biased or insensitive. An additional problem is that some of the items contain events that would be considered irrelevant for the current generation. Thus, the purpose of this research is to examine the reliability of different authoritarian personality scales and their relationship with five personality traits: openness, agreeableness, conscientiousness, extraversion and neuroticism. The research also addresses the impact of recent developments of authoritarianism for the present generation. Participants of this research were tested on the Big Five Personality Inventory, the Right-Wing Authoritarianism Scale, the Dogmatism Scale, the Traditional Family Ideology Scale and the Four-Item F Scale. It was hypothesized that participants who scored high on neuroticism and low on openness would be more likely to have authoritarian characteristics. The results of this research will be presented.
Janet James, Creative Writing  
**Faculty Mentor: Stu Krieger, Theater**  
*Timebound, a Screenplay*

Abstract: I started working on my screenplay almost a year ago. As a creative writing major, I have learned fundamental principles that must be applied within the art of storytelling. The first one is structure. Without a solid foundation or plotline, a story can falter. This includes: complications, rising action, crisis, climax and conclusion. These combined elements create a story filled with suspense and tension. During the vigorous process of revising my thesis, I learned that a screenplay relies heavily on dialogue and action to propel the storyline and build tension within a scene. My story is about an eighteenth-century protagonist who travels to the early nineties, falls in love and discovers the true meaning of familial loyalty. The most rewarding experience about this project was learning the art of self-discipline. It took patience, planning and focus; but overall as a career-minded writer, I want to continue to explore unique ways to express my talent through the entertainment industry.

Nicole Johnson, Creative Writing  
**Faculty Mentor: Curt Burgess, Psychology**  
*Autism and the Psychological “Self”*

Abstract: The goal of this experiment was to measure neuroticism as a function of self-efficacy and happiness. Results were taken from college students via online surveys. The college students hail from University of California, Riverside from introductory psychology courses. The findings include an effect of self-efficacy on neuroticism, happiness on neuroticism, and an interaction between happiness and neuroticism. Students who were happy and self-efficacious were less neurotic than students who were unhappy and not self-efficacious. People scored high on neuroticism if they were not self-efficacious, regardless of happiness. Based on these results, evaluating student academic behavior based as affected by neuroticsm is suggested.

Grace Kang, Creative Writing  
**Faculty Mentor: Juan Herrera, Creative Writing**  
*Operadora*

Abstract: *Operadora* is a compilation of poetry and prose pieces set in a future of two extremes in the American continent: the consumerist North and the Southern factories. The story follows two girls who are raised in opposite regions of the continent and come from drastically different socio-economic backgrounds, yet ultimately end up in the same place. Their stories are derived from the Aztec myth of the moon goddess Coyolxauhqui, as well as the German fairy tale
Rapunzel; the project explores modern day issues (e.g. human trafficking, poverty, femicide, domestic abuse, drug abuse, etc.) that are reflected in stories that have been passed down through the generations. The issues paralleled within each story are boiled down to poetic and fictionalized narratives in order to create a potential projection of the themes recognized in the original myths and folklore; the final product is intended to be a more accessible rendition for modern generations. This thesis is a prelude to the overall project with excerpts delivered in a non-linear approach.

Jane Kim, Plant Biology
Faculty Mentor: Eugene Nothnagel, Botany & Plant Sciences

Purification and Characterization of Arabinogalactan Proteins from Bee Honey

Abstract: Certain honeys applied to wounds as dressings have been found to promote healing of open wounds, burns and persistent ulcers. Leptospermum honey, for example, is commercially available in bandages for wound healing applications. Manuka, kanuka, and some other honeys have likewise been reported to promote wound healing. The active components in honey which promote wound healing have not been identified. One candidate is arabinogalactan proteins (AGPs), plant proteoglycans which are abundant in flowers. AGPs have been reported to be active components in certain plant-based folk medicines that heal wounds, bring down fevers and achieve other medicinal purposes in various cultures around the world. Other investigators have recently reported that kanuka honey contains low levels of AGPs, but it is not yet known if those AGPs are the active healing components in kanuka honey. The current project is focused on purifying, characterizing, and assaying AGPs from honeys as candidate active components in wound healing. Starting with orange blossom honey as the model, two procedures have been developed and tested for the purification of AGPs away from the massive amount of other carbohydrates in honey. One procedure involves using dialysis tubing to separate AGPs from the bulk of other carbohydrates which are predominately low molecular weight. The second procedure relies on use of cold 80% ethanol to precipitate high molecular weight polymers from honey, leaving low molecular weight components in solution. Carbohydrate analysis of the products shows that both procedures are effective in purifying AGPs. Because ethanol precipitation is faster, this method will be applied to sage, avocado and other honeys.
Ilona Kravtsova, Neuroscience
Faculty Mentor: Todd Fiacco, Cell Biology & Neuroscience

*Seizure in a Slice*

Abstract: Epilepsy, a disorder characterized by excessive neuronal excitability, affects millions worldwide. Current anti-epileptic drugs are ineffective for a third of that population and have detrimental cognitive effects. Therefore, it is imperative to identify the underlying mechanisms involved in the initiation of seizures to create more effective targeted treatments. Using an established epilepsy model to swell astrocytes in slices, I will elicit epileptiform currents known as paroxysmal depolarizing shifts (PDS). I will be studying the role of astrocytes and aquaporin-4 (AQP4) water channels in epilepsy development and severity by comparing seizure duration and threshold in litter-mate control and AQP4 knock-out (KO) mice. Because the AQP4 water channel is expressed exclusively in astrocytes, I hypothesize that the restricted water uptake in the KO would significantly hinder astrocytic swelling and thus delay the reduction of the extracellular space, which has been found to be associated with seizure initiation. This will result in a significant increase in the threshold and duration of PDSs. I will test the extent to which AQP4 knockout affects the threshold for PDS generation and the severity of PDSs already in progress by analyzing the change in duration and threshold of the PDS epileptiform activity for each experimental group. This research could provide insights for novel targets in the treatment of epilepsy.

Eric Kung, Neuroscience
Juan Pablo Perea-Rodriguez
Faculty Mentor: Wendy Saltzman, Biology

*Neurobiological Effects of Placenta Consumption on the Amygdala in Male California Mice*

Abstract: Little is known about the hormonal and neural mechanisms underlying the onset of parental care by fathers (i.e., paternal care). Interestingly, in some mammalian species, including California mice (*Peromyscus californicus*), fathers exhibit both paternal care and placenta consumption. Placenta contains hormones shown to influence the expression of parental care. Therefore, we hypothesize that placenta consumption promotes the onset of paternal care in males. We previously found that in virgin male (VM) California mice, placenta consumption increased paternal behavior and decreased neuronal activation in the bed nucleus of the stria terminalis, a brain region associated with stress and anxiety. This suggests that placenta consumption acts as a catalyst for the onset of paternal care by reducing stress and anxiety caused by novel stimuli from pups. To further test our hypothesis, neural activation in
the amygdala (a brain region strongly associated with fear responses) will be compared between VM California mice administered placenta in oil via oral gavage and VMs administered oil alone. Brains were obtained 1 hour or 8 hours after treatment, immediately following 1 hour of exposure to either an unfamiliar pup or a control object (marble). Brains were sectioned and immunostained for c-Fos, a protein indicator of neuronal activation. Micrographs of salient brain regions were obtained. Neural activation in the central and basolateral amygdala will be quantified and compared between placenta- and oil-treated mice and between pup- and marble-exposed mice. Results will provide new insight into the functions of placenta consumption and the proximate causes of paternal behavior.

Jacqueline Lalor, Statistics
Faculty Mentor: Goldberry Long, Creative Writing

*Out of Chaos, Craft: Purposefulness in Creating Poetry*

Abstract: In my creative project facilitated through the University Honors Program I focused on writing a collection of poetry that spanned work throughout my time at UC Riverside, carefully written and rewritten, focusing on the process of editing. As a result, by the end of the year, I will submit a collection of about thirty poems, some in free verse and some in form, but all meticulously crafted. The first stage of my project was the initial generation of material, followed by organizing the usable product into the desired format. Often, this would require more writing, then more editing. After repeating this process, it was necessary to edit the work in depth, often focusing on using fewer words in order to find the most powerful and concise way to convey a series of images, resulting in a vivid product for the reader. The presentation will include a short reading, and an examination of the creative process involved in poetry using a specific piece, from original brainstorm to final product, including drafts and a discussion of my methodology. Throughout this process, I have gained a better understanding of the scope and weight of decisions that need to be made throughout the later stages of writing poetry. While I still have much to learn, these lessons have been invaluable.

Michael Lauchlan, Linguistics & Philosophy
Faculty Mentor: Tom Novak, Sloan Center

*Consumer Empowerment through Technology*

Abstract: Consumer power continues to be modified and enhanced in important ways due to the development of technology. Consumer power has evolved quickly with the advent of new technology, particularly the internet and networking applications. This evolution of consumer
power is marked by several key stages such as demand-based, information-based, voice-based, social-based, and finally community-based power. In this research I focus on the evolution, culmination, and future of consumer power realized by technologies. Additionally, I explore the effects of community-based power on both social and economic activity as well as what I call the centralizing/decentralizing paradox.

**Kevin Lee, Biochemistry**  
**Faculty Mentor: David Reznick, Biology**  
*Adaptation to Environmental Unpredictability in Short Lived Annual Killifish*  
Abstract: In a changing world it is important to understand how animals adapt to environmental unpredictability, especially those that live in extreme environments. One such organism is *Nothobranchius furzeri*, it lives in ephemeral pools that desiccate each season. They can survive by producing eggs that remain dormant, buried in the soil until conditions become favorable. This adaptation makes this vertebrate well-suited to study two mechanisms by which organisms can adapt to variable environments: 1) bet-hedging (the production of a diverse array of egg phenotypes) and 2) phenotypic plasticity (the ability of eggs to respond to environmental cues). To study these reproductive strategies, eggs from one population of *N. furzeri* were exposed to different levels of light and temperature that mimic seasonal changes in their natural environment. Such cues have been shown in other organisms to signal future environmental change. It was hypothesized that if bet-hedging were occurring: 1) eggs from the same male-female pair, treated in the same manner will have heterogenous development and 2) eggs not ready to hatch remain viable for periods sufficiently long for them to hatch in two or more successive rainy seasons. If phenotypic plasticity were occurring, we would expect entry into diapause would be sensitive to environmental cues that indicate timing in the season and cause them to hatch at times most likely to enable them to mature and reproduce before their pool dries. Data generated from our experiments indicates that *N. furzeri* eggs both bet hedging and phenotypic plasticity are occurring simultaneously.

**William Leon, Biochemistry**  
**Robert Carp**  
**Faculty Mentor: Michael Marsella, Chemistry**  
*Synthesis of Heterocyclic Cannabinoids*  
Abstract: Here we present research that focuses on the synthesis of cannabinoid analogues designed to mimic the Cannabinoid (CB1) affinity of phytocannabinoids, yet alter the hydrogen-bond donating and accepting ability of the molecule relative to the putative THC-CB1
model. The reported synthesis substitutes the olivitol-based C-ring of THC with substituents that can mirror or surpass THC’s affinity for the CB1. The substitution of the olivitol-based C-ring is done by using Meldrum’s acid or methyl acetate in the Knoevenagel condensation with citral or citronellal; therefore substituting the ester and lactone formed by the condensation of these compounds respectively. Docking and computational studies of drug-ligand interactions showed that some heterocycles mirror or even surpass THC binding affinities and these compounds were selected to be further studied.

Freddy Lopez, Ethnic Studies
Faculty Mentor: Rickerby Hinds, Theater

Art of the People Orchestrating Optimistic Renditions (Art of the P.O.O.R)
Abstract: Mainstream society is often pessimistic and misunderstanding towards the arts and at-risk youth as they consistently cut arts programs from schools and use incarceration as a primary solution for dealing with these youngsters. The arts, nevertheless, can be an extremely effective tool in helping and understanding our troubled youth because the arts can serve as their language and form of expression, which can help re-design education and lead these youth into healthy ways of communication. In essence, Art of the P.O.O.R sets out to create an arts program that works with at-risk youth from East Side Riverside to create plays and films that reflect on self, social and environmental awareness to encourage passion for learning and positive social change in themselves and their communities. With the help of the CRAFT (Contact, Research, Action, Feedback, Teach) methodology from the book, Beginner’s Guide to Community-Based Arts by Mark Schwarzman and a $10,000 grant from the Donald Strauss Foundation, Art of the P.O.O.R was born. It has almost been a year since we were established and thus far in collaboration with youth from the local Youth Opportunity Center, we have created one play that depicts the consequences of drugs as well as the healing properties of art. Moreover, with youth from nearby schools and the Cesar Chavez Community Center we have created a documentary that depicts their social-awareness of their community. Within our work we’ve also witnessed some of these youth pursue college, join theatre and advocate for murals at their schools.

Maria Lorenzo, Native American Studies
Faculty Mentor: Clifford Trafzer, Native American Studies

Sherman Voices
Abstract: I proposed to work with Dr. Clifford Trafzer and Lorene Sisquoc to research the archives of Sherman Indian School Museum and copy 200 photographs representing these
topics: architecture, student life, agriculture-trade curriculum, outings, health, and sports. I researched each photograph to learn about the image from school archives and National Archives. Out of the 200 photos, I chose 20 to focus on for the interpretations. I then met with contemporary and former students, employees, and staff of Sherman school to interpret photographs. I recorded their comments and organized the photographs and comments to produce a photo exhibit, printed information, and lecture to present at Sherman and UCR. From the photos and the comments made by those I interviewed, I learned that the photos represent a richer history than those recorded in archival documents as each photo produced a different memory and story that varied from staff, student and children (staff’s children) who were raised on the property.

**Rex Lu, Mechanical Engineering**  
**E.T. Esfahani, S. Venkatadriagaran**  
**Faculty Mentor: Tom Stahovich, Mechanical Engineering**

*Using Brain-Computer Interface for Assistive Limbs*

Abstract: Recent trends in rehabilitation have emphasized the direct control of prosthetics and assistive devices by using brain activity. Such control is possible if the connection between the intents involved in walking as measured by electro-encephalography (EEG) signals and the actual walking process could be determined. One of the important steps in discovering this connection is to relate the user’s desire for controlling the speed of motion with the actual speed of motion. This research explores this relation by having subjects control the speed of 2D objects while playing a racing game where users attempt to match the speed of an object with a reference object on a computer screen. The brain signals are analyzed using Time-Frequency Analysis and Principal Component Analysis for the different EEG frequency bands of the signals from the sensors on the frontal lobe. The results show an average classification rate of 80%, indicating that it is possible to classify user’s intentions for speeding up or slowing down objects. The results of this research can be used as a basis to design algorithms to control the speed of prosthetic devices.

**Hoa Luu, Psychology**  
**Jean Paul Urenda, Ryan Arvidson**  
**Faculty Mentor: Michael E. Adams, Entomology**

*The Hypokinesic Effects of Ampulex Compressa Venom on Periplaneta Americana*

Abstract: *Ampulex compressa* is a parasitoid wasp that uses *Periplaneta americana*, the American cockroach, as the host for its larva. After a sting to the head by the wasp, the cockroach is placed
in a state of hypokinesia. In this study, we look to measure the hypokinesic effects of *A. compressa* venom on *P. americana*. After the head sting, a timer is started and the cockroach is brought over to the escape response arena where their escape response is measured. For the onset time to hypokinesia, a tactile stimulus is applied to the cockroach’s cerci every minute for the first 20 minutes (followed by every 5 minutes till 45 minutes). For the recovery time from hypokinesia, the same tactile stimulus is applied consequent days following the sting. As predicted, stung cockroaches escape response starts low, increases to almost normal, and ultimately decreases to a hypokinesic state of low movement [compared to normal high-movement escape response in the controlled un-stung condition]. Not as predicted, recovery times from hypokinesia did not sigmoidally increase on the 10th day to normal movement; instead there was a slight increase on the 8th day followed by a decrease in movement.

**Jacqueline Maciel, Sociology - Law & Society**
**Adryzashenka Roldan**
**Mentor: Rebecca Spence-Dobias, Undergraduate Education**
**CommuniTEA Presentation of Rascuache Advocacy with Day Laborers**

Abstract: *Rascuache* is a Spanish colloquialism used to describe impoverished and marginalized people who must accomplish what they can with the few resources they have access to. Alfredo Mirande uses this term in *Rascuache Lawyering* to emphasize resourcefulness when challenging hierarchical mentalities that are commonly found in advocacy work. In the pursuit of eradicating oppression that stems from hierarchy as well as empowering subordinated communities, the rascuache lawyering paradigm is premised on collaborations consisting of mutual respect and reciprocity that allow working with, and on behalf of, subordinated communities that are often disenfranchised.

**Elbert Mai, Bioengineering**
**Nidhanjali Bansal, Frank Le, Michael Reyes, Jack Tang**
**Faculty Mentor: Huinan Liu, Bioengineering**
**Design of Impedance-Driven Flow Device for Studying Magnesium Degradation in Simulated Body Fluid**

Abstract: A flow apparatus using an impedance pump was devised to investigate the effect of liquid flow on magnesium degradation. Magnesium has the potential to be an effective biomaterial for use inside the human body due to its biocompatibility and biodegradability. Magnesium undergoes electrochemical reactions with the surrounding fluid causing a loss of magnesium from the bulk and increasing the pH of the surrounding fluid. To quantify this
degradation process, a flow apparatus consisting of a small flow chamber and an impedance pump was constructed. The setup is low-cost and flexible enough such that magnesium degradation can be observed in both flow and static conditions, as well as to take measurements. The pump design has not been used for this kind of investigation before. The average flow rate in the flow apparatus was about 2.8 milliliters per second. In flow conditions, magnesium samples lost their mass at more than three times the rate of the mass loss of the magnesium samples under static conditions. Starting with a pH of 7.4, the magnesium degradation increased the pH to greater than 8.0 after several days of degradation in the flow chamber, although the samples subjected to flow conditions had a higher rate of pH increase compared to the static condition. This information helps in designing magnesium-based implants that may be subject to fluid flow in the human body.

Scott Manifold, Mathematics
Faculty Mentor: Kurt Anderson, Biology

Stability Analysis of Predator-Prey Systems in Continuous Network Domains

Abstract: Population ecologists use a variety of analytical and computational models to study interactions among species. Combined with field data, these models are important in making predictions about how population stability and persistence respond to perturbations of environmental conditions over different spatial scales. However, there is a lack of analytical models which focus on the effect of spatial heterogeneity in complicated continuous spatial domains. Existing partial differential equations (PDE) models which consider a continuous domain are usually restricted to simple geometries such as the interval or disk. Other models which consider complicated geometries usually do so by parsing space into discrete sections. Using Quantum Graphs, a modeling structure that has been largely restricted to physics, it is possible to use the machinery of PDEs on a continuous network to more accurately reflect how barriers to movement and intricate geometries can affect population dynamics. I construct a nonlinear reaction-diffusion system on a continuous network and present methods for analyzing stability properties of predator-prey systems. In particular, I examine ways in which graph structure influences the onset of Turing Instability. Current results are focused on star and tree graphs, though trends and areas of further inquiry are noted.
Sarah Maples, Neuroscience  
Faculty Mentor: Curt Burgess, Psychology  

**Happiness and Self-efficacy on Neuroticism**  

Abstract: The goal of this experiment was to measure neuroticism as a function of self-efficacy and happiness. Results were taken from college students via online surveys. The college students hail from University of California, Riverside from introductory psychology courses. The findings include an effect of self-efficacy on neuroticism, happiness on neuroticism, and an interaction between happiness and neuroticism. Students who were happy and self-efficacious were less neurotic than students who were unhappy and not self-efficacious. People scored high on neuroticism if they were not self-efficacious, regardless of happiness. Based on these results, evaluating student academic behavior based as affected by neuroticsm is suggested.

Sarah Maples, Neuroscience  
Joanna Wong, Jason Viray  
Faculty Mentor: Curt Burgess, Psychology  

**A Computational Test of the Semantic Relationships of Word - Emoticon Meaning**  

Abstract: A semantic priming study is presented that uses a computational model of meaning in order to test the semantic word - emoticon relationships. In traditional semantic priming study one finds that decision times for words preceded by related words are faster than when preceded by unrelated words. Rather than word-word trials, this study used word-emoticon trials. This priming study makes use of an earlier normative study where we asked people to rate their agreement to the possible meanings of emoticons. Semantic priming exists when memory retrieval is facilitated by a prior event. In the first experiment, it was predicted that semantic judgment reaction times would be faster for emoticons that were preceded by words judged to be related in the norming study. In experiment two, the Hyperspace Analogue to Language (HAL) model of semantic memory was used to calculate the distance for each emoticon-word pair. HAL is a computer model that calculates semantic similarity based on the contextual history of the word in language use. The more items are related, the closer they should be in the model. The results from HAL are expected to be correlated with the emoticon-word ratings. Furthermore, the HAL distances should predict user reaction times. These results will be discussed in the context of how emoticon meaning is encoded the same way as words.
Monica Marks, Materials Science & Engineering  
Alex Dagg, Zhiyuan Huang  
Faculty Mentor: Ming Lee Tang, Chemistry  

*Synthesis of Plasmonic Gold Nanoparticle Structures*

Abstract: Gold nanoparticles have unique plasmonic properties. A nanosized gold structure of specific size and inter-particle spacing has the potential to be exploited in sensors, optical devices, and metamaterials. We are fabricating well-defined organic assemblies in order to synthesize a monovalent gold nanoparticle structure with one active binding site. In order to achieve this we make use of a solid support bonded to a dendron which is bound to the gold nanoparticle via a series of thiol bonds. The solid support consists of self-assembled silane monolayers on a silicon substrate. Each silane acts as a scaffold by bonding to a dendron at its focal point. Gold nanoparticles are then dispersed atop the solid support-dendron assembly and bound to each dendron. These structures are then cleaved at the dendron’s focal point creating a monovalent gold nanoparticle structure with a single binding site. To fully harness the potential of plasmonic gold nanoparticles, the size and morphology of gold nanoparticles must be precisely controlled as well. This is done through various synthetic methods, for example, the seeded growth method.

Priscila Mendoza, Psychology  
Faculty Mentor: Curt Burgess, Psychology  

*A Computational Test of the Working Memory Hypothesis for Cerebral Hemispheric Asymmetries*

Abstract: Based on clinical evidence, Zaidel (1978) suggested that a source of hemispheric cerebral asymmetries might be a difference in short-term memory capability. The purpose of this study is to investigate whether a computational model that varies its working memory capacity can produce an effect consistent with Zaidel’s hypothesis. Three different types of related words: similar only (Deer-Pony), associated only (Bee-Honey), and similar+associated (Doctor-Nurse), were used for this study. These words provided the test stimuli for the Hyperspace Analogue to Language (HAL) model of semantic meaning. The model was used to learn word meanings and during the word learning used either a small or large encoding window that would presumably correspond to different sized capacities of working memory. Following Zaidel, it is hypothesized that the RH results can be accounted for by a smaller encoding window when it comes to memory retrieval. The results of this research will be presented.
Christopher Miller, Bioengineering
Aaron Cipriano
Faculty Mentor: Huinan Liu, Bioengineering

Nano-scale Surface Morphology of Magnesium Anodized in a 10 M KOH Electrolyte

Abstract: Magnesium (Mg) is a promising implant material for orthopedic applications due to its biodegradability and desirable mechanical properties. However, in order for Mg to be used in a wide range of clinical applications, engineering solutions that address the rapid degradation in physiological environments and promote bone-forming activity are necessary. The objective of this study was to develop an anodization process using a toxicant-free electrolyte to modulate nano-scale surface features and surface chemistry on Mg. Anodic polarization and potentiostatic anodization tests were used to evaluate the effect of applied potential on surface morphology of Mg in a 10 M KOH electrolyte. The alkaline electrolyte used for anodization of Mg in this study offers an alternative to commercial processes that use hazardous chemicals. The anodized samples were annealed to investigate the effect of thermal treatments on surface morphology and chemical composition. The nanostructure and chemical composition of the anodized and annealed Mg substrates were characterized using a scanning electron microscope and energy dispersive X-Ray spectroscopy. Our results showed that the nanostructures and chemical composition of anodically-generated oxide layers on Mg are specific to each oxidation process in a 10 M KOH electrolyte. Our results begin to suggest the possibility to rationally design the surface features at the nano-scale and improve the corrosion resistance of Mg-based medical implants.

Haroun Mohammad, Neuroscience
Faculty Mentor: Michael Adams, Entomology

Novel Wasp Peptides Block Store-operated Calcium Entry in Mammalian Cells

Abstract: Venom components DG2807 and DG2847 isolated from venom of the endoparasitoid jewel wasp, Ampulex compressa, suppress store-operated calcium entry (SOCE) in cultured cells. Store-operated calcium channels, referred to as the ORAI1/TRPC complex, are largely responsible for calcium entry into cells following its depletion from intracellular stores. SOCE refers to the mechanism by which calcium is admitted through SOC. Inserted into the membrane of the endoplasmic reticulum (ER) as well as the plasma membrane are the stromal interaction molecule 1 (STIM 1) proteins. STIM1 is a type I transmembrane protein that functions as a calcium sensor and gates store-operated calcium channels. After depletion of intracellular calcium stores, STIM1 oligomerizes in the ER membrane and gates SOC in the
plasma membrane. Through use of the genetically encoded calcium reporter Aequorin, we observe the effect of Ampulex venom components on relative calcium fluxes in mammalian HEK-293T, NG-108, and CHO cells. In addition to its suppression of SOCE, DG2807 augments calcium efflux from internal stores in response to ER depleting agonists. This augmentation along with the suppression of SOCE have become of particular interest and the mechanisms underlying these effects are the focus of the current study.

Caitlin Moore, Media & Cultural Studies
Faculty Mentor: John Levin, Graduate School of Education

Values in Higher Education
Abstract: The focus on values in university communities is a constantly evolving and fairly recent trend in the field. Over the past decade, public universities have taken notice of the ethical codes of historic, private universities. Following suit, institutions such as the University of California, Riverside and the University of California, Los Angeles have developed their own values campaign, each respectively named to reflect campus culture. The purpose of my study is to explore the history of values in higher education, as well as deduce potential triggers for the recent movement towards values in higher education institutions generally. The notable works of student development theorists will be utilized in reference to the effects that values campaigns may have upon the collegiate population. Following the conclusion of my work, I will make a formal hypothesis as to why values are an increasing trend in higher education and how they can be implemented to effect students, staff, and faculty.

Patricia Morland, Comparative Ancient Civilizations & Classics
Faculty Mentor: Thomas Scanlon, Comparative Literature

“Here Comes Lampito” - A Spartan Woman in an Athenian Play
Abstract: Sparta is arguably, next to Athens, the most famous ancient Greek city-state, and even people who are not well-steeped in history have preconceived notions about it. However, few outsiders know that the vast majority of written evidence on Sparta was composed by non-Spartans, to be specific, mostly Athenians. My aim was to investigate the portrayal of the Spartan woman Lampito in the play Lysistrata, composed by the Athenian comedic playwright Aristophanes, as to conjecture what this play can tell us about commonly perceived stereotypes of Greek women in general, and about Spartan women in particular. In order to do so, I touch on the differences between ancient and modern plays, as well as analyze the historical times during which the play was written, before looking into detail at the stereotypes concerning women and Lampito. Furthermore, I briefly analyze the role men play in this story, and try to
discern the differences and commonalities of Sparta and Athens, as well as taking a short glance at Eros, the driving power behind the actions. For this purpose, I have analyzed the play itself, as well as having read a plethora of ancient and modern sources. In addition, I included an Appendix on Plutarch, to investigate how the perceived characteristics of Spartan women changed in the Hellenistic Age, some five hundred years after the *Lysistrata*. Since this is a vast topic, my presentation will focus on the stereotypes of Greek women in the play, as well as the characterization of the Spartan Lampito.

**Karina Munoz, Anthropology**

**Faculty Mentor: Wendy Ashmore, Anthropology**

*Olvera Street: Building Towards the Future*

Olvera Street, a major cultural center in Los Angeles, is a historically contested site. While this historical contention has been documented, there is little information about how it has affected present day Olvera Street. Most of the information available is largely about the past and revolves around one particular figure, Christine Sterling. By uniting ethnographic methods and urban studies tools, the documented past is connected to the present. Intensive fieldwork - archival research, participant observation, and numerous interviews – provides the data necessary for the analysis. The present state of Olvera Street is explored through the Urban Studies tools: the social production of space – the intention behind the material created - and social construction of space – the transformation as the material takes symbolic meaning. These concepts show the dynamics between different groups of people as they shape and/or experience Olvera Street. The current interplay between social production and social construction in Olvera Street also reveals various forces at work: political, ethnic, economic, historical, cultural, personal, and symbolic. What is then presented is a space that is far from neutral, but a continued conflict between the produces and users of the space due to differing priorities.

**Kyle Nelson, Environmental Engineering**

**Richard Lu, Shrey Prajapati, Linh Tong, Chhay Sun**

**Faculty Mentor: Sharon Walker, Chemical/Environmental Engineering**

*Capturing Storm Water Runoff Using Sustainable Technologies*

Abstract: Most urban areas present many challenging problems including storm water run-off pollution, clean water shortage, heat island effect, and erosion. The problems these locations encounter depend on a number of factors including: amount of rainfall, landscaping, and
accessibility to clean water. Best Management Practices (BMPs) introduce an excellent way to develop and design a green infrastructure to eliminate these problems. Using BMPs, the Riverside Infrastructure Sustainable Campus (RISC) Management team assessed three locations at UCR: the Botanic Gardens, Fleet Services, and the new student dormitory Glen Mor 2. RISC Management designed and engineered green infrastructure that captures storm water run-off, and reduces erosion and the heat island effect using a permeable paving system called TrueGrid. Where storm water run-off cannot be avoided, RISC Management installed a novel sustainable filter meant to capture oil sheen and other sediment at two storm drains. The filter insert contains a calibrated oil indicator that will activate when the filter is close to saturation. The results show a more conservative use of water and an economic solution to the heat island effect and erosion.

Sarah Newman, Creative Writing
Faculty Mentor: Juan Herrera, Creative Writing

*Occupy Me*

Abstract: In September 2011, a number of Occupy campsites (also called occupations by the occupiers) sprang up over the United States, and, by October, worldwide. These sites iconically housed tents, sleeping bags, and protesters exercising their right to assemble on public property. Reminiscent of Hoovervilles, the campsites often included facilities (larger tents) such as libraries of donated books, clinics with donated supplies, and kitchens serving donated food. These camps attracted not only activists but also the homeless, since food and sleeping-space in a tent or sleeping bag were free; the homeless and the occupiers merged here as a commentary on the national economic crisis. The poetry-play, *Occupy Me*, is set in a fictional Occupy campsite. The play enters a growing body of literature — essays and journalistic accounts, as well as poetry — about the Occupy movement. The play takes on the form of reporting through poetry, with different characters (identified by their role during this fictionalized account) allowing for a variety of viewpoints; they interact with one another, each voicing some important ideal or concern about the movement; and all telling the story of the occupation in the weeks leading up to, including, and after Thanksgiving.
Mary Nguyen, Chemistry
Conor Pierce
Faculty Mentor: Catharine Larsen, Chemistry

*Copper/Titanium Catalysis Forms Fully Substituted Carbon Centers from the Direct Coupling of Acyclic Ketones, Amines, and Alkynes*

Current pharmaceuticals and bioactive compounds need to be optimized in potency, selectivity, and bioavailability for maximum efficacy. Specifically, propargylamine structures have been widely studied as a result of their intrinsic biological activity and utility as important chemical building blocks. These nitrogen-containing structures are present in pharmaceuticals that treat ailments from cancer to HIV. Rare counts of access to tetrasubstituted propargylamines using ketone reactants mainly require an extra step that costs time, energy, and chemicals to produce. However, we successfully discovered an unprecedented dual catalyst system that operates solvent- and waste-free to yield fully-substituted propargylamines in one step from simple, commercial starting material. This novel method employs both Copper and Titanium to catalyze the coupling of unactivated ketones with a broad range of amines and terminal alkynes. The dual catalyst system overcomes the barrier to *in situ* ketimine formation and subsequent alkynylation to provide direct access to fully substituted propargylamine as a potential therapeutic. Current investigations are directed towards incorporating other nucleophiles to form highly-substituted amine structures to test for anticancer activity.

Minh Nguyen, Biochemistry
Hieru Huynh, Christopher Emerling
Faculty Mentor: Mark Springer, Biology

*The Adaptive Evolution of Visual Genes in Tetrapods*

Abstract: From a Darwinian perspective, natural selection is the driving force for adaptation. Upon exposure to new environments, adaptive changes may be required for survival and reproduction. A trait frequently modified in vertebrates is the visual system, which aids species in foraging, avoiding predators, and searching for mates. Opsin proteins, a major component of photoreceptive visual pigments in the vertebrate eye, can be a useful tool to link changes in visual systems with environmental transitions. Previous research has demonstrated numerous cases of species losing their opsins due to changes in environmental light conditions. What has not been examined is whether opsin genes undergo adaptive selection during these changes in light conditions. We sought to determine if this has occurred, and whether they adapted to compensate for the loss of the other opsins or solely due to the changes in photic environment.
To accomplish this, we surveyed the literature to determine in what lineages opsins have been lost. Next we used dN/dS ratio analyses to test for adaptive selection in the remaining opsin genes in lineages corresponding to visual environment transitions. We found evidence for the adaptation of opsins on many important transitional branches, including the origin of terrestrial vertebrates, the inception of flight in birds, plus two land to water transitions (turtles and crocodiles) and shifts to nocturnal habits (geckos and mammals), respectively. Several cases of adaptive selection occurred that did not coincide with the loss of opsins. We concluded that opsins have evolved adaptively due to transitions in visual environments.

Angelica Nunez, Neuroscience
Alexandria Pivovaroff
Faculty Mentor: Louis Santiago, Botany & Plant Sciences

Plant Water Relations in Nicotiana Glauca, an Invasive Tree in Arid Southern California

Abstract: Invasive plants, like Nicotiana glauca, disrupt many natural habitats. In the worst cases, these plants can choke out native plants, therefore negatively affecting native ecosystems. Nicotiana glauca, known by the common name of tree tobacco, is invasive in southern California and often found in water-limited sites. Our study focuses on understanding how this plant uses water to survive in these sites; we measured leaf water potential and stomatal conductance of N. glauca during different times of the day to determine the water potential at which stomatal conductance goes to zero. Preliminary results show that leaf water potential decreases from -0.2 to -1.6 MPa over the course of the day. We are still collecting stomatal conductance data to clarify these relationships. With this information we aim to learn more and understand how N. glauca invades water limited sites and how it affects native species.

Eunice Oh, Psychology & Liberal Studies
Katherine Duggan, Elizabeth McDevitt
Faculty Mentor: Sara Mednick, Psychology

Can’t Sleep? Maybe You’re Blue? The Relationship between Sleep Quality, Stress, Depression and Naps

Napping has been shown to improve performance across a range of memory tasks, and is an effective tool for managing the negative physical and psychological symptoms of disrupted sleep. Despite the benefits of napping experienced by many people, others report negative outcomes following a daytime nap, such as disrupted nighttime sleep. We investigated factors that might contribute to poor nighttime sleep by examining napping habits, depression and stress. Four hundred twenty six (426) participants (214 F; M age=19.89, SD=1.51) completed a series of self-report questionnaires that assessed frequency of napping, nighttime sleep quality,
perceived stress, and depression. Participants with worse nighttime sleep quality tended to nap more frequently ($r = 0.20, p < 0.001$), be more stressed ($r = 0.46, p < 0.001$), and be more depressed ($r = 0.48, p < 0.001$). However, a median split on stress and depression showed that poor nighttime sleep was more associated with nap frequency in the high stress ($r = 0.23, p = 0.004$) and high depression groups ($r = 0.21, p = 0.012$) when compared with the low stress ($r = 0.13, p = 0.07$) and low depression ($r = 0.13, p = 0.08$) groups. Stress and depression are important factors contributing to poor nighttime sleep that moderated correlations between poor sleep and napping habits. These results may inform conflicting findings in the literature on the effects of napping on nighttime sleep, as well as individual differences in cognitive performance following a daytime nap. Future research should consider levels of stress and depression when examining associations between nap behavior and nighttime sleep quality.

Jae Oh, Environmental Sciences - Natural Science

Faculty Mentor: Leah Haimo, Biology and Graduate Division

The Role of PKA in IFT

Abstract: Intraflagellar transport (IFT) is a cellular process that involves the delivery and removal of subunits required for the biogenesis and maintenance of cilia and flagella. Certain proteins in the cell must be activated prior to the initiation of IFT. A recent study showed that an increase in cyclic AMP (cAMP) levels can induce flagellar lengthening through an increase in the rate of IFT. cAMP serves as a regulator that activates inactive forms of Protein Kinase A (PKA). PKA is known to regulate cellular processes by activating or deactivating proteins through phosphorylation. Because an increase in PKA activity leads to an enhanced rate of IFT, we seek to identify the target protein phosphorylated by PKA. We are using wild type and a mutant strain of the biflagellated green algae model, *Chlamydomonas reinhardtii*. In the mutant, flagella cannot be maintained at the restrictive temperature of 33°C, suggesting that the rate of IFT decreases. We predict that the phosphorylation patterns of proteins induced by activated PKA will differ between the wildtype and mutant strain at the restrictive temperature as well as other conditions that lead to flagella lengthening. We are currently analyzing different patterns of phosphorylation observed in these preparations to identify a protein associated with IFT that becomes phosphorylated upon flagella elongation.
Pauline Olsen, Biochemistry  
Faculty Mentor: Jack Eichler, Chemistry  
*Serum Albumin Binding Studies with Gold(III) Anticancer Compounds*

Abstract: Gold(III) complexes bearing polypyridyl ligands based on the 1,10-phenanthroline (phen) and 2,2’-bipyridine (bipy) structural architectures have shown promising anticancerinogenic effects in a variety of tumor cell lines. In particular, our laboratory has found that a five-coordinate gold(III) complex possessing 2,9-di-sec-butyl-1,10-phenanthroline, [(sec-butylphen)AuCl3], was found to exhibit promising anticancer activity against in vitro tumor cell lines, but limited activity against in vivo tumors in mice. The current working hypothesis proposes that the limited in vivo activity of [(sec-butylphen)AuCl3] is due to the fact this neutral complex may be binding to the blood protein serum albumin, which subsequently impedes its delivery to the tumor. The research reported here describes initial experiments designed to determine if the [(sec-butylphen)AuCl3] complex has significant interaction with serum albumin, and if structural analogues of this gold(III) complex possessing decreased hydrophobic character might have decreased serum albumin binding. In order to test if decreasing hydrophobic character could possibly change the serum albumin binding, a gold(III) complex possessing 2-mono-sec-butyl-1,10-phenanthroline [(mono-sec-butylphen)AuCl3] was synthesized and fully characterized. Serum albumin binding studies with [(sec-butylphen)AuCl3] and [(mono-sec-butylphen)AuCl3] have been completed. Initial data indicate that the [(sec-butylphen)AuCl3] complex has significant binding with a bovine serum albumin (BSA) model, whereas the [(mono-sec-butylphen)AuCl3] has weaker binding with BSA. The synthesis and characterization of the [(mono-sec-butylphen)AuCl3] complex, the BSA binding studies, and the potential impact of BSA binding on the antitumor efficacy of these gold complexes will be discussed.

Danielle Ornelas, Bioengineering  
Noriko Ozaki  
Faculty Mentor: Victor Rodgers, Bioengineering  
*Effect of Low Ionic Strength on Salt Ion Binding to BSA*

Abstract: Osmotic pressure of protein solution deviates from ideal, linear behavior at high concentrations. Previously, our lab developed a free-solvent model to describe this non-ideal behavior. In this study, we measured the osmotic pressure of BSA in 3 mM CaCl2 at pH 7.4, which was regressed to the free-solvent model in order to obtain two biologically significant parameters; salt ion binding and hydration. The regression of observed osmotic pressure provides an adequate fit to the free-solvent model, but with a negative ion binding parameter.
While the free-solvent model can sufficiently predict the osmotic pressure of high BSA concentrations, this work shows that the free-solvent model needs to be revised to account for the effects of low ionic strength on the hydrated macromolecule and divalent ion binding.

Itallia Pacentine, Neuroscience - Biology  
Faculty Mentor: Jim Baird, Botany & Plant Sciences  
*Abstract: V*ertical *Hydroponics (VH)* is a farming method that conserves space and water through the use of 3-D shelving and a soilless medium. Such facilities can be built in urban areas, bringing the produce closer to consumers and reducing turnover rates to one day. This study compared the relative nutritional content of lettuce (*Lettuca sativa l.*) cvs. LE2005, S8963, and Frill Ice grown in VH in Kyoto, Japan and in the field in Salinas, CA (USA). Leaves were sampled at harvest and at 1 and 6 d post-harvest under refrigerated conditions. Fructose and glucose concentrations were not affected by sampling date and overall were significantly higher in field-grown than VH lettuce. Sucrose concentrations were higher from the field at 0 and 1 d, but not different than VH at 6 d. Vitamin C content was highest in VH lettuce at 6 d. Overall, it appeared that carbohydrate production in field grown lettuce was favored by natural sunlight. However, shorter times from harvest to the table may favor VH for nutrients and vitamins that are prone to degradation.

Michael Perez, Economics  
Faculty Mentor: Gloria Gonzalez-Rivera, Economics  
*Web Scraped: An Econometric Analysis of Argentina’s Misreported Inflation Rate*  
Abstract: Since being elected in 2007, Argentinean president Cristina Kirchner and her administration have subjected their country to pervasive criticism and scrutiny for reporting unreliable inflation statistics. Prominent international institutions like the International Monetary Fund (IMF) and World Bank (WB) have censured the country’s government for manipulating the data collection processes of the National Institute of Statistics and Census of Argentina (INDEC). Additionally, they have threatened it with sanctions if it refuses to adopt accurate price level estimators in accordance with those published by independent agencies. The purpose of this research is to determine econometrically the degree to which Argentina is misreporting its inflation rate. Using online (web scraped) price indices modeled after the official Consumer Price Index (CPI) by economists at the Massachusetts Institute of Technology (MIT) and time-series data from both INDEC and financial firm State Street, I show that Argentina’s official inflation rate repeatedly falls well-below the estimated online figure. To
provide statistical support for this discrepancy, I calculate several regression variables pertaining to the significance of MIT’s model and the data. For further evidence, I conduct the same analyses across other countries in South America to show that of them, Argentina is the only one in which the online price index does not accurately gauge official rate. Lastly, I explain several of actions taken by the country’s government that suggest it is manipulating inflation data, including fining INDEC economists and regularly changing the methodology for deriving the rate without disclosing what those changes are.

Kassundra Peterson, Psychology - Women’s Studies
Faculty Mentor: Marguerite Waller, Women’s Studies

Development Empire: The Neo-colonial Effects of International Aid

Abstract: My research analyzes the effects of the lending practices of first world financial institutions in Ghana with particular reference to the construction of the Akosombo Dam and its impact on the livelihoods of women living in lakeside communities. It deconstructs the illusion of international aid and foregrounds the actual effects of the dam’s development. I examine the historical role of the World Bank in development, and the economic motives for granting international loans to third world nations. This allows me to problematize the development model that has been prescribed for nations regardless of their unique needs and infrastructure. I use primary sources gathered during my study abroad program, which include interviews I conducted with the people of Dzemeni. I draw upon the ethnographic research of Peter Agbodza, a Ghanaian anthropologist who guided my research abroad, who specifically addresses the impact that development is having on the livelihoods of rural Ghanaian women. I discuss the impact that both environmental hazards and long-term livelihood changes are having on traditional ways of living. Due to the overwhelmingly negative outcomes of development projects, like this one, I argue that the current model of development needs to be dismantled and that development needs to be re-imagined. Notions of prosperity need to include those that exist outside of or are critical of the western notion of progress. My findings clearly demonstrate the ways in which neocolonial financial interests have devastated vulnerable populations through exploitative development projects.
Michael Pham, Biochemistry
Kenneth Flack
Faculty Mentor: Wenwan Zhong, Chemistry
Aptamer Based Detection and Quantification of Pb (II) Using Capillary Gel Electrophoresis and Laser Induced Fluorescence (CGE-LIF)

Abstract: Lead poisoning has been linked to developmental defects and neurobehavioral disorders such as dyslexia, attention deficit hyperactivity disorder (ADHD), autism and mental retardation. The most common methods of lead detection and quantification are Inductively Coupled Plasma Mass Spectrometry (ICP-MS) and metal-responsive dyes on microplate fluorescence detection. The former has a multiplex advantage for analyzing concentrations of different metals at once, but is a large and expensive to maintain machine. The latter analysis technique can detect, but cannot differentiate different metals in a case such as multiple metals being in sink water. This project uses capillary gel electrophoresis with laser induced fluorescence which separates different molecules by molecular weight. Capillary Gel Electrophoresis and Laser Induced Fluorescence (CGE-LIF) is cheaper to maintain and uses very small sample sizes, thus it can be implemented in third world countries. CGE-LIF uses a sieving gel in the capillary to separate migrating aptamers. Aptamers are single stranded DNA/RNA (ssDNA/RNA, oligonucleotides) that binds specific target molecules. In this case, the aptamer is an enzyme (17E, 33 bases) that cleaves a complementary strand of DNA substrate (17S, 20 bases) when lead is present to bind as a cofactor in the enzymatic reaction. An intercalating dye in the sieving gel binds fragments of ssDNA, whole ssDNA substrate and enzyme, producing the recorded fluorescence signals when hit with a laser beam. CGE-LIF separates the cleaved strands from the whole strands, each letting off a different signal, which determine presence of lead. The results of this work will provide a novel, inexpensive and efficient platform to detect lead.

Nelson Poliran Jr., Cell Molecular & Developmental Biology
Faculty Mentor: Kathryn DeFea, Biomedical Sciences
Examination of Ras-Independent Raf activation of β-Arrestins through BRET-Based Biosensor

Abstract: The Raf/MEK/ERK mitogen-activated protein kinase (MAPK) module is a cytosolic signaling pathway consisting of proteins that convey an extracellular response for mitogenesis, differentiation and cell migration. Protease-activated receptor-2 (PAR2) is G-protein-coupled receptor (GPCRs), that is activated by serine proteases to promote activation of heterotrimeric G-proteins, which can promote Ras activation. Ras can directly activate the serine kinase, Raf,
leading to subsequent activation of MEK and finally the ser/thr kinases ERKs 1 and 2 (ERK1/2). PAR2 also promotes activation of this pathway through a Ras-independent mechanism that involves β-arrestins, proteins that scaffold the Raf/Mek/ERK module at the membrane, leading to activation of the cascade by an unknown mechanism. Raf is normally auto-inhibited through interactions between an N-terminal regulatory domain and the C-terminal kinase domain. We hypothesized that β-arrestins activate Raf by disrupting these intramolecular interactions. We have identified a region of β-arrestin-1, within the first 100 amino acids, that interacts with the Raf regulatory domain and created a triple-point mutant in which critical FVD residues were mutated to AAA, that lacks the ability to bind Raf. Human Embryonic Kidney 293 cells (HEK293), which express fairly low amounts of endogenous β-arrestin, were transfected with mutant β-arrestin, deficient in Raf binding. These cells, when transfected with wild-type β-arrestin and treated with PAR2 agonist, show increased activation of the MAPK module, compared to untransfected cells or cells transfected with the FVD mutant β–arrestin, as demonstrated by phosphorylated ERK1/2 (PERK) levels in cell lysates. This demonstrates that interaction of β-arrestin with the Raf regulatory domain is critical for activation of the MAPK module.

Saige Pompura, Biological Sciences

Faculty Mentor: Morris Maduro, Biology

Identifying Genes that Modulate Viral Replication in C. elegans

Abstract: Defense against viruses is an important human health problem. We are using the nematode Caenorhabditis elegans as a model to study host-virus interactions. We have previously shown that the Flock House Virus (FHV), a (+)-strand RNA virus, can replicate in C. elegans, although this is not its natural host. Normal FHV carries two RNAs: RNA1 encodes and RNA-dependent RNA polymerase (RdRP), which copies the RNA, and the B2 protein, which suppresses host RNA interference (RNAi). RNA2 encodes the viral capsid. We are working with a C. elegans strain that we have engineered to express FHV RNA1 in which the B2 coding region is replaced with that of GFP. When this transgene is induced by heat-shock, GFP expression indicates viral replication. Using chemical mutagenesis and RNA interference, we have identified genes that, when mutated or silenced by RNAi, enhance or suppress replication of FHV in C. elegans. Many of the genes found by RNAi-mediated knockdown play roles in lipid storage and autophagy. While previous studies have shown a relationship between these pathways and longevity in C. elegans, we now have good evidence that autophagy and lipid storage also play roles in regulating a defense response against viral replication.
Neil Quebbemann, Chemistry  
**Faculty Mentor: Ryan Julian, Chemistry**  
*Radical Migration in the Gas Phase*  
Abstract: Many methods have been developed to aid in the study of proteins. One such method is the use of radical chemistry with mass spectrometry. Radicals allow for new fragmentation patterns not seen in other mass spectrometry dissociation methods which assist in the sequencing of proteins. Also, radical methods that do not involve heating of the molecule allow for easy identification of posttranslational modifications, which are of great interest when determining the functions of proteins. Here radical migration in peptides among various functional groups was studied. Results were obtained by calculating hydrogen abstraction transition state energies with Gaussian 09W using the M06-2X/aug-cc-pvdz level of theory. These results were compared with experimentally determined fragmentation patterns obtained from photodissociation experiments ran on a modified LTQ linear ion trap mass spectrometer, when available. Overall, this study explored which residues are most susceptible to radical attack in peptides.

Pavan Rami, Environmental Sciences  
Elizabeth Tizcareno  
**Faculty Mentor: Farah Godrej, Political Science**  
*CommuniTEA: Cultivate R’Space: Seeding a Community Garden in Riverside*  
Abstract: According to the USDA, Riverside County has multiple areas that are designated food deserts, with some areas having up to 88.5% of their residents with limited access to healthy and fresh produce (USDA Food Desert Locator). Ironically, there is little opportunity within undergraduate classrooms at the University of California, Riverside to learn and engage in local food issues. For these reasons, we wanted to research (1) how to create a student-led seminar that focuses on food justice, (2) how effective student-led seminars are in producing community-based social action, and (3) how to develop and sustain an intersectional environmental education program in Riverside. Cultivate R'Space is a research collective that incorporates values of ecological regeneration, community empowerment, and socio-political awareness to create quarterly programs and events. We will explore the three Urban Garden Seminars from 2011-2013 and compare the quantitative and qualitative results of each. The results of such programs show the potential for creating local social change through this model, and a higher degree of program development by students who have the opportunity to create these seminars. Since the development of the garden that resulted from organizing in the 2012
seminar, student evaluations show there are a continual demand for more experiential learning, more employment opportunities, and increased collaboration between community organizations and the UC Riverside Community Garden.

Judit Ramirez-Meza, Spanish  
**Faculty Mentor: Covadonga Lamar Prieto, Hispanic Studies**  
*Elements of the Indigenous in the Image of the Virgin of Guadalupe*  
Abstract: Many can recognize the image of the Virgin of Guadalupe but few know the meaning the images hold. The clothing, the moon and the angel are only a few of the defining characteristics that hold meaning to the image. The peasants of 1531 were not allowed to use color or images in their clothing, their clothing were bland and earthy colors. Color and images were only for the rich or images of Gods. The indigenes recognized these attributes in the image of the Virgin of Guadalupe; a mantle like the Aztec Gods and colorful dress with images, although the indigenes did not know who she was they respect her because her clothing was attributed to that of a Goddess or a rich person. The moon in this time was also a form of God it was believed that if the sun did not rise on the next day it had lost the fight against the moon and the cycle of life would end. The Virgin image was made to be in-between the moon and sun as a defining powerful factor. Finally the angle that holds her up is a child and at the same time elderly man that has the knowledge and wisdom to hold her up. These are only of a few amazing thing that the image has. When her image was made a lot of thought was done so that her image could be powerful and recognizable.

Michelle Ramon, Biology  
**Faculty Mentor: Emma Simmons, School of Medicine**  
*Misinformation and Diabetes Knowledge among Hispanics and the Prevalence of Diabetes Mellitus in Riverside County*  
Abstract: Diabetes mellitus is a metabolic disease where the body is unable to produce enough insulin or is unable to respond to the insulin produced, thus resulting in high blood sugar levels. This disease affects many people in the United States with more than 25.8 million people, or 8.3 percent, of the population now diagnosed with diabetes. Racial minorities are more vulnerable. As of 2010, 3.2 million Hispanic adults, 18 years or older, have diabetes. On average, Hispanics are 1.7 times as likely to have diabetes as Whites. In this study, knowledge, both accurate and inaccurate, about diabetes among the Hispanic population residing in Riverside County is studied to determine its relationship to diabetes prevalence. One hundred participants from a community clinic will be given a short questionnaire in English or Spanish.
In addition, the participants may answer an optional free response question of why they believe Hispanics have high rates of diabetes. A Chi-square test of independence will be performed on the data to determine if the two variables, rates of diabetes and knowledge, are independent or dependent. We expect to see a dependent relationship between the two variables. Confirming that they are dependent encourages the continuation of diabetes education programs. If an independent relationship exists, other factors must be closely examined to determine their relationship with the rates of diabetes.

Faisal Rashid, Neuroscience  
Faculty Mentor: Andre Obenaus, Cell Biology & Neuroscience  
Repeated Mild Traumatic Brain Injury Results in White Matter Disruption  

Abstract: Recent focus has been placed on mild traumatic brain injuries (mTBI), as a growing number of investigations have shown that subsequent injuries can augment existing neuropathology and result in increased neurological deficits. Studies have shown that white matter is particularly sensitive to mTBI. Our investigation focused on the subacute effects (<14d) of mTBI on corpus callosum (CC) pathology using a novel model of repeated mTBI (rmTBI). Adult male rats were randomized into–Sham control, Single mTBI and rmTBI-7d groups. All mTBI animals received an initial mild injury on the right cortex, using controlled cortical impact, and rmTBI-7d animals received a second mTBI on the left cortex 7 days later. Animals were sacrificed at 14 days post injury and brains underwent ex vivo diffusion tensor imaging (DTI), where axial (axonal) and radial (myelin) diffusivity measurements were extracted from the anterior CC. Quantification of axial diffusion (AD) demonstrated significant (p<0.001) increases within left (second injury) CC regions of rmTBI D14 animals, compared to the single and Sham groups, while no differences were observed between the groups within the right (first injury) CC. In contrast, no differences in radial diffusivity (RD) were observed at the site of the second injury between groups, with only a few regions at the site of the initial injury demonstrating significantly increased RD compared to Shams. Using this new model of rmTBI, we show that there are ongoing axonal changes at this subacute time, particularly at the site of the second injury within rmTBI animals, with little myelin disruption within the CC. This study provides insight into the developing CC pathology following rmTBI. This study was supported by funding from Department of Defense (DCMRP #DR080470).
Mundy Reimer, Neuroscience
Faculty Mentor: Edward Korzus, Psychology

*Computational Model of Induced Alteration of Synaptic Activity in Medial Prefrontal Cortex*

Cannabis abuse during key brain developmental stages such as adolescence has been previously shown to be associated with increased likelihood of schizophrenic symptoms and psychosis related diseases. Experimental results also suggest that various forms of plasticity and spiking patterns in the medial pre-frontal cortex (mPFC) regulated by transmission of GABA mediated inhibitory pathways coupled with excitatory glutamate pathways will also be subject to disruption due to dependence upon the endocannabinoid signaling pathway. This project investigates the role of cannabinoid signaling on plasticity and neuronal spiking dynamics in the mPFC of a glutamate receptor (NMDAR) hypofunction and cannabinoid receptor (CB1R) hyperfunction mouse models. Korzus laboratory investigates the biochemical mechanisms of CB1R-mediated plasticity while recording neuronal activity in acute brain slices. A simplified proposed model was then built and simulated through MATLAB programming as a network consisting of 1,000 randomly connected spiking cortical neurons in real time. Results demonstrate that although the model was able to reproduce a wide variety of biological neuronal behavior such as spiking, bursting, and ultimately alpha and gamma band rhythms, it did not illustrate the full range of expected disruptions in spiking dynamics, indicating a further need to create greater biophysically plausible networks. These competing mechanistic models will be of help in testing the theoretical road-maps of prefrontal cortex dependent cognitive functions.

Mariano Resendiz, Plant Biology
Caroline Sjogren
Faculty Mentor: Paul Larsen, Biochemistry

*Aluminum-Dependent Root-Growth Inhibition in Arabadopsis*

Abstract: Internalized aluminum (Al) toxicity is an agricultural issue in acid soils impacting an estimated 50% of the world’s arable land. Suppressor isolation for Al-tolerant mutants in *Arabidopsis thaliana* was performed using an Al-hypersensitive mutant als3-1. This screen resulted in identification of an Al-tolerant mutant, suv2-3, also known to be a mutated *Ataxia telangiectasia* and RAD3-related interacting protein (ATRIP) that functions in coordination with ATR to monitor and respond to DNA damage and acts as a cell cycle checkpoint factor. It is not the DNA damage from internalized Al that is harmful to root growth. Without a functioning ATRIP in tandem with the response from ATR, a significant increase in aluminum tolerance is
found. It is not ATR alone that reacts to Al toxicity. In fact, it is the detection of DNA damage from Al of ATRIP that continues the G2 phase arrest. Although the immediate loss of the quiescent center, the G2 phase arrest, and the removal of compromised cells from the mitotic stem cell pool is sudden and subject to an unfavorable evolutionary characteristic, it is likely that this characteristic arose to cease further inheritance of damaged DNA to further progeny. Specifically near the hypocotyl and root structures (where ATRIP is most apparent), the removal of ATRIP’s function will produce engineered Al tolerant plants able to survive Al-toxic environments.

**Blake Riser, Biochemistry**  
**Faculty Mentor: Jingsong Zhang, Chemistry**  
*Study of Flash Pyrolysis of Tert-butyl Hydroperoxide using Vacuum Ultraviolet Photoionization Mass Spectrometry*  
Abstract: The thermal decomposition of tert-butyl hydroperoxide (tBuOOH) was performed by flash pyrolysis with a 20-100 ms time scale at 600 K-1500 K temperatures. The pyrolysis was followed by supersonic expansion to isolate the reactive intermediates and initial products, and detection was accomplished by vacuum ultraviolet single photon ionization time-of-flight mass spectrometry (VUV-SPI-TOFMS). At temperatures above 600 K, the initial decomposition steps produced t-butoxy radical, acetone, acetyl radical, and ketene in their respective order. The initial dissociation of tBuO–OH took place to give the t-butoxy radical due to its low bond dissociation energy of ~146 kJ/mole. Further loss of methyl from the t-butoxy radical produced acetone. Subsequent loss of methyl from acetone produced the acetyl radical followed by immediate loss of hydrogen atom to give ketene. An alternate reaction pathway in the tert-butyl hydroperoxide decomposition may include epoxide (dimethyloxirane) formation by loss of water.

**Robyn Roberts, Psychology & Creative Writing**  
**Faculty Mentor: Tuppett Yates, Psychology**  
*Emancipated Youth: A Collection of Short Stories*  
Abstract: There are over half a million children in foster care each year, yet people are unaware of their experiences. One reason their lives are a mystery to many is because foster youth are rarely represented in media. However, their experiences should not be overlooked. The circumstances that force youth into care are often traumatic and many face further abuse in the system. When they emancipate, they are at an increased risk for poor emotional, relational, and educational outcomes. Through fictional representation, foster youth can benefit from having
their lived experiences reflected in fiction, which also provides an accessible opportunity for others to learn about their lives. But how do foster youth understand their experiences? How are their attitudes about themselves, others, and life affected by foster care? What do they share when given a chance to express their truth? To answer these questions, a subset of 12 interviews from the Adapting to Aging Out Study of Risk and Resilience was transcribed. A grounded theory approach was used to analyze the data for convergent themes. Four themes were identified that capture 1) youths’ commitment to beating the odds against them, 2) the importance of significant others who offer helping hands to support them, 3) the push and pull conflicts within their relationships, and 4) the maturity gap youth must transcend between their precocious maturity on one hand, and their thwarted development on the other. This thesis integrates these themes into relatable portrayals of emancipated youths’ experiences through a small collection of short stories.

**Erik Romero, Chemistry**
**Jay-Ar Bendo**
**Faculty Mentor: Thomas Morton, Chemistry**

*Hydrogen Storage using Cyclic Borane-Diamine Adducts*

Abstract: The world is currently on a search for alternative fuels to meet a growing consumer demand. New methods are being explored which can transfer energy from a stationary source (such as a power plant) to a mobile consumer (such as a car). This project explores compounds that may be easily regenerated. The proposed molecules contain a borane-diamine ring structure. The main objective is synthesis, purification, and characterization of these borane-diamine compounds. Thermodynamic calculations using Gaussian 09 predict the overall release of molecular hydrogen to be near thermoneutral, which is essential to reversibility. The calculations also suggest the locations at which dehydrogenation is most likely to occur. Since the reaction is essentially thermoneutral, effective use of this approach to chemical hydrogen storage needs only to overcome kinetic barriers, which can potentially be done with a combination of high pressures and a homogeneous catalyst. Goals include the production of the spent fuel so that approaches to regenerate the starting material can be investigated.
Cindy Rosillo, Mechanical Engineering  
Carlos Castro  
Faculty Mentor: Hideaki Tsutsui, Mechanical Engineering  
Characterization of Capillary Wicking for Paper-Based Microfluidics

Abstract: Paper-based microfluidics is an emerging field that strives for simple-to-use devices capable of accurate and quick fluid specimen analysis at a low cost. By utilizing blood, urine or saliva these paper-based devices are capable of detecting foodborne pathogens such as Salmonella to detect hormone concentrations such as Human Chorionic Gonadotropin. By advancing towards a more complex detection mechanism, it requires a greater understanding of fluid transport in paper. Therefore, it is necessary to characterize fluid transport in paper-based microfluidics. Three different paper pore sizes of 2.5μm, 11μm, and 22-25μm were used to see how the pores impact the wicking of fluid. As expected, the larger porosity of the paper has a greater wicking rate. In order to control the flow rate of the channel, three approaches took place; expanding/contracting the channel, adding dotted arrays, and modulating the wax density print. Through changing the geometry of the channel and/or the wettability properties of the paper, we were able to get a greater understanding of the wicking characteristics in complex channels.

Charles Ruiz, Chemistry  
Faculty Mentor: Jack Eichler, Chemistry


Abstract: A five coordinate neutral gold (III) complex possessing a 2,9-di-secbutyl-phenanthroline ligand {[secbutylphen]AuCl3} has been previously reported in our laboratory. This complex has been shown to have enhanced reduced glutathione (GSH) stability compared to four coordinate square planar complex ions, and has also demonstrated in vitro anti-tumor activity. However, the [secbutylphen]AuCl3 complex has limited in vivo activity. We hypothesize that serum albumin limits in vivo activity, and recent results indicate that [secbutylphen]AuCl3 exhibits binding to a bovine serum albumin (BSA) model. Our goal is to make analogous complexes that have varying hydrophobic character and test if this impacts GSH stability and/or serum albumin binding. We have successfully synthesized and characterized two new ligands{[2-secbutyl-phenanthroline (mono-secbutylphen), and 2,9-di-secbutyl-1-4-methyl-phenanthroline (methyl-secbutylphen)] and subsequently made new gold (III) complexes with the ligands{[mono-secbutylphen]AuCl3, and [methyl-secbutylphen]AuCl3]. 1H NMR and single crystal x-ray
Diffraction experiments confirm that we have made the analogous five-coordinate neutral gold (III) complexes. Initial GSH stability experiments indicate that both gold complexes possess similar GSH stability to the previously reported \([\text{tectophen} \text{AuCl}_3]\) complex. These two new gold complexes will soon be tested for their ability to inhibit in vivo tumor cells, with and without the presence of BSA to determine if they have different properties than the original complex.

**Christopher Sanchez, Sociology/Law and Society**  
**Faculty Mentor: Robert Parker, Sociology**  
*A Quantitative Study to Understand the Effects the California Mock Trial Program has on Participants*  
Abstract: The purpose of this research is to identify if participation in an after-school program offered in high school, called Mock Trial, increases critical thinking skills. To determine the effects Mock Trial has on participants, an identical experiment will be conducted in three separate high school campuses. In each high school, the students who participated in Mock Trial in the year 2012-2013 and an equal amount of randomly selected students that did not participate in Mock Trial will take a proctored version of the LSAT (Law School Admissions Test) twice after school in the month of April 2013. The results from the two groups of students in each school will be compared to determine if there are any statistically significant differences between the LSAT scores of the two groups. The expected result is that Mock Trial participants would score higher on the LSAT than students who did not participate in Mock Trial. The reason for this expectation is that Mock Trial claims to be a program that increases participant's critical thinking skills and uses multiple techniques to try to accomplish that goal. The goal of the research is to determine if the goal of Mock Trial can be reached in a quantitative way, and if so, then expand the research to determine the most effective techniques that increase critical thinking skills. This research can help create a more stimulating educational environment by identifying techniques that increase critical thinking skills and then provide support for the application of those techniques to the classroom.

**Ashwin Sharma, Biology**  
**Eric Kung, Juan Perea-Rodriguez**  
**Faculty Mentor: Wendy Saltzman, Biology**  
*Effects of Paternal Condition on Immune Response in Male California Mice*  
Abstract: Trade-offs between physiological processes are an important component of life-history theory. Trade-offs refer to situations in which a positive change in one system has an unfavorable effect in a different one. Many studies have demonstrated trade-offs in females
with regard to the energetic costs of reproduction. Males may also make a large investment in caring for their young. Though only 5-10% of mammalian species are biparental, studies of those species in which males do invest heavily in parental care suggest that large costs may be present. In this experiment, we tested the hypothesis that fathers have a suppressed immune response, as compared to non-fathers, in the biparental California mouse (*Peromyscus californicus*). Three groups of male mice (fathers, housed with a female and their first litter of pups, N=7; nonbreeding males, housed with a tubally ligated female, N=8; and virgin males, housed with another male, N=7) underwent an inflammatory response caused by lipopolysaccharide (LPS) injection; saline-injected males within each housing condition served as controls (N=7-10). Behaviors during the first four hours after injection and body temperature at four hours after injection were compared among groups. LPS-treated males in all three housing conditions showed significant decreases in consumption of sweetened water, consumption of food, and body temperature, as compared to controls (p’s<0.05). In addition, LPS-treated fathers showed significantly lower food consumption (p=0.007) and body temperature (p=0.027) when compared to LPS-treated virgin males. Contrary to our hypothesis, these results suggest that fathers have an enhanced immune response as compared to non-fathers.

**Mitchell Shinn, Mechanical Engineering**  
**Jose Freire, Warner Tse, Campbell Dinsmore**  
**Faculty Mentor: Marko Princevac, Mechanical Engineering**

*The Design and Fabrication of a Mechanical Force Balance*

Abstract: Drag forces acting on a body regularly produce inefficiencies in a design and are constantly trying to be minimized. Drag can contribute to a decrease in efficiency or increased power consumption in a machine. By measuring the drag acting on an object, it can be redesigned for better efficiency. Commercial devices to measure drag acting on models exist, but these are usually very costly. Due to this, the production of a force balance for research purposes, as well as for use among faculty and students, has been undertaken by undergraduate students.
Mitchell Shinn, Mechanical Engineering  
Jahangir Ashraf, Malay Jitmohan, Daisy Patino, Karrin Alstad  
Faculty Mentor: Marko Princevac, Mechanical Engineering  
*Production of Sap-Flow Probes to Assess the Rates of Active Ozone Uptake in Mixed Conifer Forests*

Abstract: Extreme ozone (O₃) deposition into forested ecosystems can cause lasting effects to tree and whole forest function. This is because a substantial fraction of ozone deposited into an ecosystem is taken up actively through open leaf pores, stomata, during necessary gas exchanges, and can cause disruption in normal stomata responsiveness. Thus, quantifying the amount of O₃ taken up through stomata is the primary factor in assessing potential toxicity incurred by polluted forests. Transpiration, the movement of water through the plant from the roots through the vascular system to the atmosphere, primary exits the plant through stomata opening.

Pejman Shojaei, Art History & History  
Faculty Mentor: Susan Laxton, Art History  
*A Work in Progress: Participation and the Role of the Public as Seen in the Photography of Gina Osterloh, Farrah Karapetian, and Nikki S. Lee*  
Abstract: Participation within contemporary art is a movement that has made itself very prevalent in the past two decades. Artists create situations and events that require the participation of the viewers to activate the work of art. Taking on aspects of performance and social engagement, participation allows for the viewers and audience of the artwork to become integral players in its conception. Photography as a medium is no exception to this new model, with participation, social engagement, performance, and new modes of installation indicating photography’s expansion into a more cross-medium discipline. Through their photography, Gina Osterloh, Farrah Karapetian, and Nikki S. Lee use different dimensions of participation in the production of their work to investigate identity roles and group formation within a larger context. Through the erasure of the self and the body or through the taking on of a specific role and identity, these three artists’ work grapple with different scopes of identity and body politics. Public participation is used to examine these issues of identity, politics and the concept of post-identity within a contemporary setting. Through photography, the production process, which is in essence the art itself within these artists’ bodies of work, can be reproduced and displayed in such a fashion that it allows for some permanence to the very temporal production process.
Jessica Tjiu, Political Science - Chinese  
Faculty Mentor: Georgia Warnke, Political Science  
Asian American Women and Domestic Violence: An Intersectional Approach  
Abstract: My research analyzes the political and social causes and effects of Asian American women’s invisibility in American society and politics. According to Model Minority Myth, Asian Americans are economically and socially successful and do not have social problems, such as domestic violence. The myth overlooks differences among Asian Americans of different national origins and creates a homogeneous identity for all Asian Americans. I analyze domestic violence in the Asian American population, using Kimberle Crenshaw’s intersectional approach. I explore the similarities and differences among racial/ethnic groups: Chinese Americans, Korean Americans, Vietnamese Americans, and South Asian Americans. I also include the effects and consequences of social class in instances of domestic violence.

Jessica Tjiu, Political Science/Chinese  
Faculty Mentor: Amalia Cabezas, Ethnic Studies  
A Literature Review on Human Trafficking in the United States: The Conflation between Sex Work and Human Trafficking  
Abstract: I researched the history of human trafficking discourse in the United States dating back to late the 1980s to present time. I read books, academic articles, news articles, and governmental documents to discover the conflation of human trafficking with sex trafficking. In other words, sex trafficking is the main focus to prevent human trafficking in the United States. I discover that the discourse in sex trafficking is led by faith based groups and radical feminists who believe prostitution and sex work are harming particularly women and girls. Yet, this fixation narrows the definition of human trafficking, harming other ways to prevent different forms of human trafficking. It is imperative to broaden the definition of human trafficking and to distinguish between sex trafficking and sex work.

Merima Tricic, International Relations  
Faculty Mentor: Thomas Perring, University Honors  
Lifting the Western Veil: Study of Women’s Role in Modern Politics of Algeria  
Abstract: The purpose of this study is to demonstrate the involvement of Muslim women in the modern political systems, specifically in Algeria (but will later allud to other countries such as Qatar, Turkey, United Arab Emirates, Morocco, and Tunisia) and demonstrate the impact of Muslim women in the governments of modern-day times in the work-force, education, constitutions, National Assembly, and presidential candidacy. This research will show that the
largely accepted perception of all Muslim women as oppressed and uninvolved in the political systems of Middle Eastern countries as incorrect and largely changing. To show this, I will conduct research by examining texts, speeches, and photographs while also collecting statistical data of women in the Middle East participating in politics and using the Western so-called anthropological French sources that I myself have translated and that have been widely accepted as the image of the Middle Eastern Woman. I will be questioning the impact of biased anthropological works that have diminished and changed the view of the Middle East.

Lien Trinh, Biochemistry

Faculty Mentor: David D. Long, Biomedical Sciences

Recombinant Anti-dengue Secretory Immunoglobulin A

Abstract: Dengue is a mosquito borne viral disease and a global health issue especially in tropical regions. No vaccines are currently available to prevent dengue virus infection. There are four known dengue serotypes. Previous research indicates that when an individual is infected the second time, particularly by a different serotype, the anti-dengue antibody immunoglobulin G (IgG) produced from the first infection will bind to the new dengue virus but will not neutralize it. As a result, a white blood cell, also known as a macrophage, contains a Fc receptor (FcR) that binds to the Fc portion of IgG, the macrophage will engulf the virus, infecting the macrophage and promoting a faster virus replication and dengue hemorrhage fever (DHF). Our lab predicted that immunoglobulin A (IgA) may cross react to all dengue viruses but will not bind to macrophage’s FcR. IgA, also termed secretory IgA (sIgA) when in its dimeric form, has a different Fc portion in contrast to IgG. sIgA is interlocked by a J-chain at the Fc portion. Hence, in the presence of dengue specific IgA may prevent DHF, a deadly symptom. IgA used as a passive immunization in a mouse model of dengue infection was produced by sub-cloning IgA specific to Den2 and expressing it in Chinese hamster ovary (CHO) cells. We have optimized purification methods for the best IgA yield. sIgA will be engineered by adding a J-chain to two monomeric IgA. sIgA protein will be purified and injected into a mouse model of dengue infection. Our studies on the effects of IgA in the serum and the mucosal immune system may lead to a dengue vaccine or other therapies to prevent dengue symptoms.
Viet Trinh, History
Faculty Mentor: V.P. Franklin, History

Black Power Education: A History of the Oakland Community School

Abstract: The Oakland Community School (OCS) was an alternative public school founded and run by the Black Panther Party (BPP) between the early 1970s and 1980s. The BPP viewed the Oakland schooling system as a racist, out-of-touch institution which failed to educate inner-city youth, and sought to remedy this problem through the OCS. Eventually, corruption and dissent within the BPP leadership forced the school to close in 1982. Although the project was short-lived, there were several promising indicators of success. Unfortunately, much of the existing scholarship on Panthers glosses over the OCS, its contributions to the local community, and its implications for the BPP legacy, instead choosing to emphasize the Party’s polarizing image, its militant rhetoric, and its enigmatic leadership. My project will seek to address this deficiency by adding to the growing body of research on the BPP’s community-service efforts, referred-to as the survival programs. In particular, it will examine the evolution of the school’s curriculum and pedagogy, attempting to understand how the BPP’s social, political, cultural, and intellectual perspectives informed their practical approaches to education, thereby situating the OCS within broader BPP histories and narratives.

Sara Truitt, French - Political Science
Faculty Mentor: Michelle Bloom, Comparative Literature & Foreign Languages

Food and War in French Art: A Complex Relationship

Abstract: The complex relationship between food and war and its effects on identity, socio-economic status, and culture are presented in Simone de Beauvoir’s autobiographical novel La force de l’âge (1960), Emile Zola’s novel Germinal (1885), and Gabriel Axel’s film Le festin de Babette (1987). A staunch feminist battling the idea that a woman’s place is in the home, Simone de Beauvoir understands for a brief moment the joy of being a housewife while forced to cook during the wartime closure of the restaurants she frequents in Paris. While Beauvoir’s new sentiment relies on a lack of food caused by war, Emile Zola focuses on the opposite scenario – war caused by a lack of food. Zola highlights the malnourishment of a family of coal miners in late nineteenth century France, and contrasts it with the extravagant meals of the aristocracy to illustrate a source of the tensions between the two groups that lead to calls for revolution. Revolution also plays heavily into Le festin de Babette, as Babette is forced to flee her position as head chef in an esteemed Parisian restaurant, bringing haute cuisine with her to a rural town in Denmark. I argue that these three significant French works develop the ideas of self-identity,
socio-economic and political structure, and cultural identity through conflict caused by the relationship between war and food.

**James Tu, Bioengineering**  
Jaclyn Lock  
**Faculty Mentor: Huinan Liu, Bioengineering**  
_Degradation of Magnesium Alloys in Artificial Urine Solution for Potential Biodegradable Ureteral Stent Applications_  
Abstract: Ureteral stents are utilized to allow for proper urine flow and alleviate blockages in the ureter, which may be caused by various obstructions (i.e., kidney stones or tumors). Clinical complications with currently used polyurethane-based ureteral stents result from bacteria biofilm formation, encrustation, and secondary removal procedure. As a result, a need for biodegradable and antibacterial materials is critical to improve ureteral stent function. Our group has shown that magnesium-based alloys inhibited _Escherichia coli_ cell growth and proliferation. Magnesium is innate in the human body and degrades in aqueous solutions, which can eliminate the need for a secondary removal procedure. In this study, we demonstrated that magnesium-based alloys (e.g. magnesium-yttrium alloys, magnesium-aluminum-zinc alloy, and pure magnesium) degrade when incubated in an artificial urine solution over time. Moreover, we observed that alloy composition and surface condition (oxide versus metallic surface) affect the rate of degradation. Further investigation is essential to determine the effectiveness and safety of magnesium-based biodegradable stents for urological applications.

**Michael Turcios, French**  
**Faculty Mentor: Michelle Bloom, Comparative Literature & Foreign Languages**  
_The Culinary as an Artistic Practice in Films_  
Abstract: The representation of food as an artistic practice is sustained through two culinary films that provide an insight to the arduous process in preparing a meal. Gabriel Axel’s _Le Festin de Babette_ (1987) and Chris Hegedus and D.A. Pennebaker’s _Kings of Pastry_ (2010) both utilize cinematographic techniques that aid in supporting my argument that cooking is an art form. Through close analysis of both films, the meticulous work ethic cooks from both films possess, demonstrates their dedication and knowledge of their culinary craft. In _Le Festin de Babette_, the protagonist—Babette—volunteers to produce a culinary œuvre that feeds twelve guests. In _Kings of Pastry_, the many contestants in the running to become le Meilleur Ouvrier de France (MOF) put into practice their expertise of pastries to produce a sugar sculpture. Cooks from
both films possess the diligence, creativity, and perseverance essentially required to produce an artwork of large proportions. Considering the fact that the competitors for the title of MOF were provided with assistance and resources, they managed well. However, Babette on the other hand, is not provided with assistance; nonetheless she manages to produce a magnificent creation while working alone. I argue that Babette produces the best oeuvre due to her independent work ethic and based on the limited timeframe she is given to complete her project.

Lisa Umeh, Biochemistry
Adam Marentes, Rachel Perez, Julia Devito, Caitlin Jones
Faculty Mentor: Wendy Saltzman, Biology

**Immunological Response to Chronic Elevation of Stress Hormones in White’s Treefrogs (Litoria caerulea)**

Abstract: Amphibian populations are declining significantly worldwide. Although many declines are well understood, the underpinnings of many others remain unknown. One possibility is that these declines result in part from chronic exposure to environmental stressors, leading to persistent elevations in frogs’ circulating levels of the stress-responsive hormone corticosterone (CORT). Chronic CORT increases are known to have a suite of detrimental effects on amphibians and other vertebrates, including decreased immune and reproductive function. We tested the hypothesis that chronic elevation of CORT leads to immunological suppression in male White’s treefrogs (*Litoria caerulea*). We predicted that CORT-treated frogs would show a decrease in white blood cells compared to control frogs. To increase CORT levels, we applied 40 μg of exogenous CORT to 10 frogs transdermally every 8 hours for 8 days. Control frogs (N=10) received no treatment. We collected blood for CORT analysis on days -5 (baseline), 4, and 8 from the beginning of the CORT treatment. Blood collected at the end of the experiment was used to create blood smears to test for variation in white blood cell count. CORT-treated animals had elevated levels of circulating CORT on both day 4 and day 8 relative to baseline and relative to control animals at all time points. Preliminary results suggest that CORT-treated frogs had significant decreases in eosinophils, neutrophils, and lymphocytes compared to controls, indicative of immunosuppression. Ultimately, these results may provide us with new insight into the mechanisms responsible for amphibian population declines.
Krystal Vasquez, Chemistry  
Faculty Mentor: James Sickman, Environmental Sciences

_Fingerprinting the Sierra Snowpack: Relationship between Storm Tracks and the Isotopic Composition of Snow_

Abstract: The Sierra Nevada snowpack is important to our state of California. Unfortunately, due to the rising temperatures, climate models predict that the Sierra snowpack could be reduced significantly, drastically affecting California’s fresh water supply. However, the main obstacle is predicting the changes in the snowpack due to the many involved complex, interacting systems. One solution to predicting changes in the snowpack is the use of paleo proxies, natural records of past climate patterns that can aid in the reconstruction of centuries’ worth of past climates in order tell us how our current condition came to be, and what the future may hold. My lab group is currently investigating diatoms, preserved in lake sediments in the Sierra Nevada. We propose that these diatoms can be used as paleo proxies for the snowpack due to the silica, SiO₂, of which they are composed. We hypothesize that the oxygens of SiO₂ are derived from lakewater, and in turn, the lakewater is mainly derived from snowfall. However, this correlation must first be proven. My objective is to see if the δ¹⁸O of individual snow storms in the Sierra Nevada is truly related to the storm track that produced the snow through the use of isotopic analysis. By proving the correlation between the SiO₂ and the snowfall, we can say that δ¹⁸O recorded in diatom preserves long-term records of storm tracks which could be useful for climate change research.

Estephania Vazquez, Sociology  
Mentor: Rebecca Spence Dobias, Undergraduate Education

_COMMUNITEA: An Evaluation of Art of the P.O.O.R. (People Orchestrating Optimistic Renditions) at the University of California Riverside_

Abstract: In an attempt to understand how art-based programs can enhance the learning experience and positively impact youth in low-income communities, this study aims to evaluate how youth’s interaction with local artists, peers, and supportive project leaders contributes to improving their artistic and social engagement. Art of the P.O.O.R. (People Orchestrating Optimistic Renditions) is a UCR student organization that was established to serve the youth of the Eastside neighborhood of Riverside. This art-based program, also known as AOTP, provides a space where at-risk youth can expand their artistic skills. My research explores the following question: To what extent does AOTP benefit at-risk youth’s learning experience and what are the limitations that are keeping AOTP from growing a personal relationship with at-risk youth?
Hence, the primary purpose of this evaluation was to develop a management model that describes the factors that appear to enhance or detract from the completion of Art of the P.O.O.R.’s stated goals and objectives designated for at-risk youth. To fulfill the objectives, the study benefits from SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis to present an overall picture of the program. This assessment method was used in a collaborative approach between the department leaders of the organization and the researcher. In my presentation, I will lay out some of the issues that need to be addressed when thinking about and studying how Art of the P.O.O.R.’s programs impact the youth population in Riverside.

**Alexandra Villamor, Creative Writing**  
**Faculty Mentor: Curt Burgess, Psychology**  
**My Self, Neuroticism, and Children’s Fiction**  
Abstract: This research is an empirically-driven self-reflection on the validity of my own perception of neuroticism and its effects on my front-stage behaviors and on my desire to edit children’s fiction as a career. The Big 5 personality test and a personal worldview scale, when combined with personal reflection and secondary opinion, provided measurements of my neuroticism and insights concerning my perception of neuroticism. Using an information processing approach, a personal model of the Self enabled me to further contemplate the most important constructs that are part of my self-schemas. The rationale motivating how the constructs in the model were weighted is described. The findings of this project were used to fuel personal development and enhance self-cognizance in the context of understanding motivations behind career goals.

**Nigel Williams, Mechanical Engineering**  
**Faculty Mentor: Matthew Barth, CE-CERT**  
**Determining the Fuel Savings of Dynamic Eco-Driving Technology**  
Abstract: In recent years, gas prices have risen considerably, providing motivation for drivers to find new ways to increase their fuel economy. One possible solution is to purchase a vehicle with higher fuel economy, but another relatively inexpensive option is to use a technique called eco-driving. Eco-driving is defined as the fuel-efficient operation of a vehicle: avoiding idling, accelerating gently, and properly maintaining the vehicle. It can be learned statically: drivers can take lessons on these fuel-efficient techniques before they start driving. In addition, drivers can obtain these lessons dynamically during driving from certain types of technology that provide visual, auditory, or haptic real-time feedback. While such eco-driving technology has the potential for substantial fuel savings, these savings are typically not observable using the...
federal procedure for determining a vehicle’s fuel economy. This is a problem for automakers, which are required to meet federal fuel economy standards of 54.5 mpg by model year 2025. In order for the fuel savings of eco-driving technology to count towards the final fuel economy number, an alternate methodology is required to quantify the fuel savings. One such methodology that has been proposed includes on-road testing and modeling. Driving data was collected with and without an example eco-driving technology, and the data was analyzed for differences. Based on the data collected, it was found that the technology could produce fuel savings of up to 6.9%.

Lauren Wong, Bioengineering
Maricela Maldonado
Faculty Mentor: Jin Nam, Bioengineering

Synthetic Culture Systems for Human Pluripotent Stem Cells Using Electrospun Nano-Scaffolds

Abstract: In our research, we utilized the technique of electrospinning to create nanofibrous scaffolds that resemble the morphology of extracellular matrix, in order to control the functions of pluripotent stem cells. The polymers used to produce the scaffolds were polycaprolactone, polycarbonateurethane, polyethersulfone, polyetherketoneketone, and polyethylene therephthalate. These scaffolds were used due to the different mechanical properties, yet having similar nanofibrous morphology. This enabled investigating the contribution of mechanical environments on stem cell behaviors. In this project, a long-term cell culture experiment was carried out by culturing a human induced pluripotent cell line (Riv9) on these scaffolds for five weeks. For the first four weeks, the Riv9 cells were cultured on separate scaffolds with passaging every seven days. During the culture period, the morphology of the cells was optically monitored. For the fifth week, the cells were transplanted on Geltrex®, a typical animal-derived matrix for cell culture, to observe whether they still maintained their pluripotency with the possibility of having been spontaneously differentiated. Analytical techniques used are SEM to observe scaffold morphology, rt-PCR and fluorescent microscopy to determine gene and protein expression profiles of the stem cells. We showed that these scaffolds could potentially be used to culture pluripotent stem cells. However, the choice of scaffold materials, thus the mechanical properties are important to determine stem cell functions by controlling its morphology.
Larissa Yates, Environmental Sciences  
Faculty Mentor: Lou Santiago, Botany & Plant Sciences  

**Seasonal Variation of Leaf Traits in a Chaparral/Coastal Sage Scrub Environment**  

Abstract: Understanding how plants react to shifting climate patterns, especially drought, is critical for predicting vegetation transitions and managing agriculture. Within the same climate, different plant species can vary dramatically in their drought tolerance. We characterized seasonal leaf trait variation for species in a Mediterranean climate region to determine whether leaf morphological traits are related to drought tolerance. Coastal sage scrub species are drought-deciduous. During the summer, when there is little to no rainfall, they drop their leaves to avoid water stress. Chaparral species are evergreen. Evergreens keep their leaves throughout the entire year and tolerate the drought. Specific leaf area (SLA), leaf dry matter content (LDMC), and relative water content (RWC) were measured on ten native Californian chaparral species and four coastal sage shrub species from the Santa Margarita Ecological Reserve, Fallbrook, California. The data indicate that chaparral species have a greater RWC in winter than summer and no difference in SLA and LDMC throughout the year. Coastal sage species have a greater SLA, lower LDMC, and no difference RWC relative to chaparral species. These differences between chaparral and coastal sage scrub species suggest significant seasonal adjustments to maximize physiological leaf capacity in at least some chaparral species according to the leaf economics spectrum. Certain chaparral species, including *Xylococcus bicolor* and *Ceanothus tomentosus*, strongly exhibit seasonal variations that may favor physiological capacity during that season. Further work is required to understand linkages between water use strategies, morphology, and the leaf economics spectrum.

Michelle Yoakim, Biology  
Leila Magistrado, Francis Phan  
Faculty Mentor: David Reznick, Biology  

**Environmental Effects of Light and Predation on Coloration in Wild Guppies**  

Abstract: A key goal in evolutionary biology is to understand the maintenance of trait variation in nature. This paper explores the ecology, trait variation, and possible adaptation of Trinidad guppies introduced to novel environments. Here we study two important environmental factors leading to changes in color polymorphisms of wild populations, which enable the guppy to survive and thrive under abrupt environmental change. Guppies were initially taken from one high-predation environment and introduced into two geographically isolated low-predation environments, one of which had its canopy trimmed to increase more light. In low
predation environments, the expected lifespan increases dramatically, but so does population density, causing a reduction in food availability. The introduced guppies were photographed and measured bimonthly for twelve months for any changes in coloration from their ancestral measurements. Results show that little changes in coloration have occurred since the introduction, but fine scale measurements indicate that cyclical changes in coloration may occur as guppies initially adapt to abrupt changes in their environment. More time may be needed until we can see significant phenotypic and genetic changes in these wild streams and our future work will examine this. The merits of this study so far include a better understanding of both how trait polymorphisms can shift or be maintained in nature under environmental change, a topic quite important in the conservation of rare and endangered species.
ACKNOWLEDGEMENTS

Session Moderators

Michael Allen, Center for Conservation Biology • Jim Baird, Botany & Plant Sciences • Steven Brint, Sociology & Undergraduate Education • Curt Burgess, Psychology • William Grover, Bioengineering • Leah Haimo, Biology & Graduate Division • Amanda Huffer, Religious Studies • Mike McKibben, Earth Sciences & CNAS Associate Dean • Dimitrios Morikis, Bioengineering • Yolanda Moses, Anthropology & AVC DEE • Tanya Nieri, Sociology • Eugene Nothnagel, Botany & Plant Sciences • Thomas Perring, Entomology & Undergraduate Education • Sharon Rushing, Anthropology • Wendy Saltzman, Biology • Deborah Wong, Music • Tony Yang, Health Services

Oral Presentation and Poster Presentation Evaluators

Geoff Ball, Economics • Allison Cantwell, Undergraduate Education • Michaela Curran, Sociology • Noam Hart, Chemical and Environmental Engineering • Lauren Hale, Environmental Sciences • Sanval Nasim, Environmental Sciences • Veronique Rorive, Undergraduate Education • Ashley Swanson, Environmental Toxicology

Nuts and Bolts Assistants

Jason Dunk, Theatre • Teresa Cross, Undergraduate Education • Tom Lee, Undergraduate Education • Kevin Mitton, Undergraduate Education • Shanshan Liao, Undergraduate Education • Rebecca Spence Dobias, Undergraduate Education • Lisa Walke, HUB Scheduling • Alejandra Herrera, Undergraduate Education • Rodrigo Peña, Photographer University Honors Undergraduate Volunteers • TAPS • Dining Services