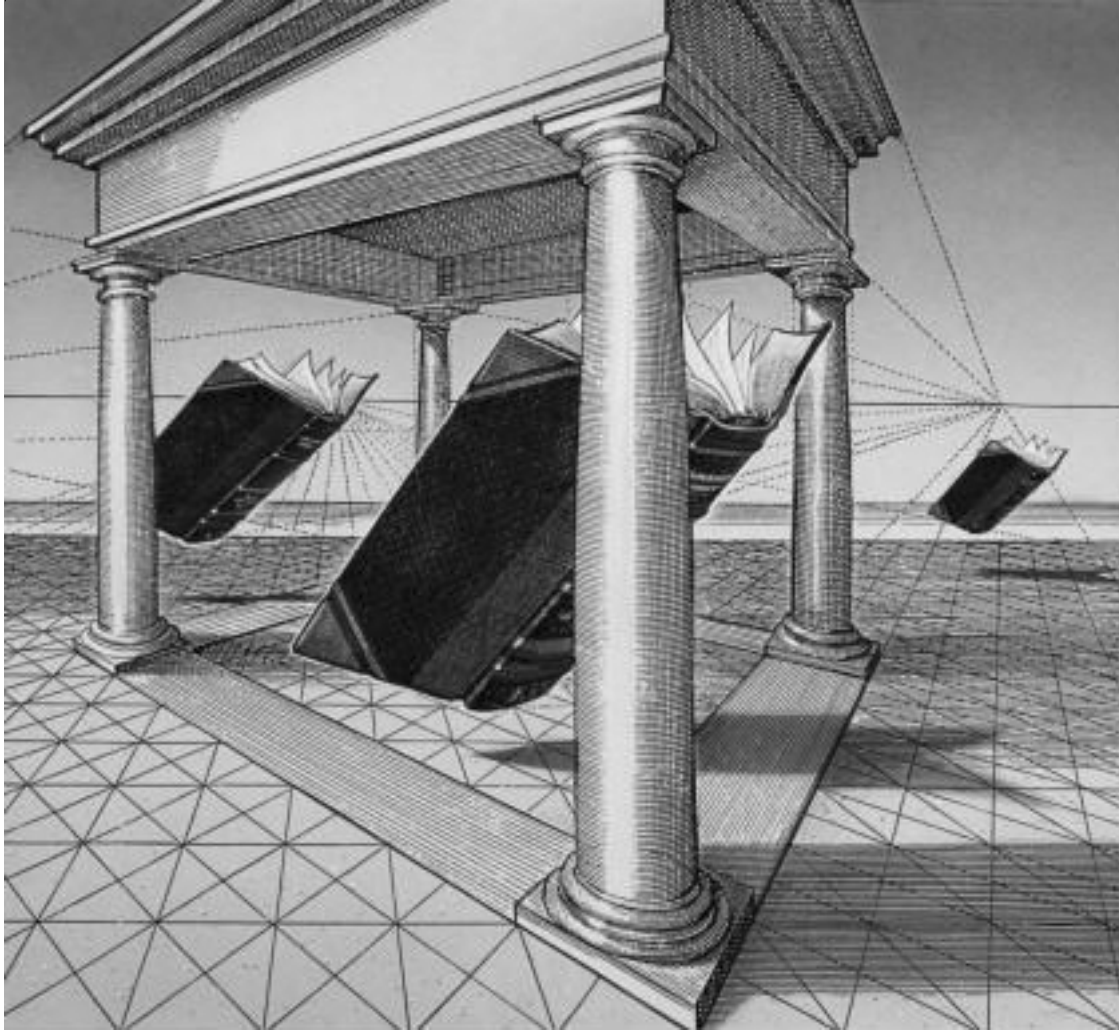


California State University, Los Angeles

12th Annual Student Symposium Research, Scholarship & Creative Activity



Friday, February 28, 2004

8 a.m. – 2 p.m.

Co-sponsored by

**The Office of Research and Sponsored Programs,
Office of Graduate Studies and Research,
and The Honor Society of Phi Kappa Phi**

February 27, 2004

Welcome to the 12th Annual CSULA Symposium for Student Research, Scholarship, and Creative Activity!

The Office of Graduate Studies and Research is pleased to organize this event each year and to have as its co-sponsor the Honor Society of Phi Kappa Phi. We both are committed to provide opportunities for Cal State L.A. students to experience the excitement that comes from presenting the results of their research and scholarship to the judges, professors and peers.

This year's symposium features 38 oral presentations and 43 poster exhibits in seven discipline areas. The research and scholarly activities that will be shared today provide additional evidence of the high standards and academic quality of our university and its students. Each year winners of the Cal State L.A. Symposium represent our campus in competition with representatives from all of the Cal State campuses. Your success in the state competition and that of students from previous years further underscore the quality of the educational experience at Cal State L.A..

I wish each participant all the best both academically and personally. To the faculty sponsors, judges and others attending this Symposium, please accept my sincere appreciation for being part of the process of ushering in our next generation of researchers, scholars and creative individuals.

Theodore J. Crovello,
Dean Graduate Studies and Research

February 27, 2004

Welcome to all the student participants, faculty sponsors, judges, and other guests who are attending the 12th Annual CSULA Symposium of Research, Scholarship and Creative Activity. We are pleased that you have chosen to be part of this exciting day, and we hope that you enjoy the stimulating examples of intellectual activity that you will be experiencing.

This annual event is open to both undergraduate and graduate students in all disciplines. Once again, our student presenters represent all areas of the university, a testament to the hard work of the many individuals involved in ground-breaking and innovative research, scholarship, and creative activity on our campus.

We invite you, first, to choose from among the five groups of oral presenters, representing seven discipline areas. Then, you can explore the poster exhibit in the Edward R. Roybal Institute for Applied Gerontology, Rooms C98 and C99, where you can interact with the many student researchers who are exhibiting their work.

Today's Symposium promises to be another exciting installment in this ongoing series. Again, please accept our sincere appreciation for helping to make this event a success.

Susan E. Kane,
Associate Dean, Graduate Studies and Research-
Research Administration

Carl M. Selkin,
President, The Honor Society of Phi Kappa Phi
Symposium Co-Organizers

Symposium Schedule

8:00 a.m. - 9:00 a.m.

Symposium Registration and Presenter Check-In

Salazar Hall Patio

9:00 a.m. - 12:00 p.m.

Oral Presentations

Behavioral and Social Sciences – Salazar Hall 162

9:00 a.m. – 12:20 p.m. (Break - 10:20 a.m. - 10:40 a.m.)

9:00 Lara Elizabeth McCormick

9:20 Victoria Stosel

9:40 Steven Pan

10:00 Oscar Ureno, Dalia Cuevas & Lisa Howell

10:20 Break

10:40 Isabela Carrillo

11:00 Cesar Espinosa

11:20 Clarus Backes, Jr

11:40 Hitomi Uchishiba

12:00 Wilson Segura

Biological Sciences – Salazar Hall 165

9:00 a.m. – 12:00 noon (Break - 10:40 a.m. - 11:00 a.m.)

9:00 Haedy Shafeek

9:20 Dani Haack

9:40 Julie King

10:00 Ana Valdes

10:20 Break

10:40 Antonio D. Heras

11:00 Amerigo Rossi

11:20 Helen C. Claudio

11:40 Diana Dupuis

12:00 Christopher Martinez

Education and Humanities – Salazar Hall 237

10:00 a.m. – 11:40 a.m.

10:00 Cheryl T. Wilkinson

10:20 Mario Cuéllar

10:40 Maria Isabel Ramos

11:00 Elena Rodriguez

11:20 Michael Sharrett

Oral Presentations (Cont.)

Physical and Mathematical Sciences – Salazar Hall 255

Session I - 9:20 a.m. – 10:00 a.m.

- 9:20 Maya Popova
- 9:40 Nancy Carrillo
- 10:00 Andres Garcia, Jr.
- 10:20 Jaime Anguiano and Gina E. Ramirez

Physical and Mathematical Sciences – Salazar Hall 244

Session II - 9:00 a.m. – 12:00 noon

- 9:00 Steven Han
- 9:20 Karara Muhoro
- 9:40 Melanie Xie
- 10:00 Danny Chagolla
- 10:20 Break**
- 10:40 Jesse Chapman
- 11:00 Monica McDowell
- 11:20 Amir Massoudi
- 11:40 Uche Ofoma

10:00 a.m. - 11:00 a.m.

Set-Up for Poster Session

Roybal Institute for Applied Gerontology

11:00 a.m. - 2:00 p.m.

Poster Session Presentation

1. Lizette Ivy Chuateco (Behavioral & Social Sciences)
2. Maria Corona (Behavioral & Social Sciences)
3. Dalia Cuevas (Behavioral & Social Sciences)
4. Laura Juarez (Behavioral & Social Sciences)
5. Haydee Lopez (Behavioral & Social Sciences)
6. Teresa K. Monreal (Behavioral & Social Sciences)
7. Martha Rea (Behavioral & Social Sciences)
8. Edgar Sarabia (Behavioral & Social Sciences)
9. Anny Ku (Interdisciplinary)
10. Marianela Arias (Biological Sciences)
11. Andre Hernandez (Biological Sciences)
12. Jose Martinez (Biological Sciences)
13. Marquis Patrick (Biological Sciences)
14. Suzanne Brunelle (Biological Sciences)
15. Mircea Voda (Biological Sciences)
16. Rochelle Songco (Biological Sciences)
17. Anahid Mirzaton (Biological Sciences)
18. Gloria Preza (Biological Sciences)
19. Haedy Shafeek (Biological Sciences)
20. Dennis Yang (Biological Sciences)
21. Susan Sanchez (Biological Sciences)
22. Raymond Quon (Biological Sciences)
23. Rosie Alvarez (Biological Sciences)
24. Jacqueline Levy (Biological Sciences)
25. Carolina Reyes (Biological Sciences)
26. Erika Reynoso (Biological Sciences)
27. Jose Alfonso Silva (Biological Sciences)
28. Michael Soto (Engineering & Computer Science)
29. Loren MacKinney (Interdisciplinary)
30. Komal Patel (Biological Sciences)
31. Juan Apodaca (Health & Nutrition)
32. Preciliano Duran (Health & Nutrition)
33. Maria Flores (Health & Nutrition)
34. Jingjing Zhang (Biological Sciences)
35. Maira Soto (Health & Nutrition)
36. Raffie Avakian (Physics & Mathematics)
37. Jeremiah Fields (Physics & Mathematics)
38. Elizabeth Abeja (Physics & Mathematics)
39. Ruth Avila (Physics & Mathematics)
40. Abby Brown (Physics & Mathematics)
41. Cindy Chau (Physics & Mathematics)
42. Marco Orozco (Physics & Mathematics)
43. Rayshonda Williams (Physics & Mathematics)

Judges for Oral Presentations

12th Annual CSULA Student Research Symposium

Theodore Bell	Communication Disorders
Marty Brodwin	Administration and Counseling
Costello Brown	Chemistry and Biochemistry
Desdemona Cardoza	College of Natural and Social Sciences
Dillis Chow	L.A. County Sheriff's Crime Laboratory
Jose Galvan	Graduate Studies and Research
Susan Kane	Biological Sciences
Philip LaPolt	Biological Sciences
James McKeever	Sociology, University of Southern California
Wayne Plumtree	L.A. County Sheriff's Crime Laboratory
Edith Porter	Biological Sciences
Tony Ross	Student Affairs
Bernard Sanchez	LAPD Crime Laboratory
Frieda Stahl	Physics and Astronomy
Wayne Tikkanen	Chemistry and Biochemistry
Linda Tunstad	Chemistry and Biochemistry
William West	Jet Propulsion Laboratory

Judges for Poster Presentations

12th Annual CSULA Student Research Symposium

Jafargholi Amirmoazzami	Chemistry and Biochemistry
Peter Castro	Chemistry and Biochemistry
Aaron Coleman	
Ray de Leon	Kinesiology and Nutritional Science
Elaine Draper	Sociology
Joel Ellwanger	Psychology
Jolly Emrey	Political Science
Jennifer Faust	Philosophy
Gaithri Fernando	Psychology
Krishna Foster	Chemistry and Biochemistry
Daniel Frankl	Kinesiology and Nutritional Science
Scott Grover	Chemistry and Biochemistry
Darrell Guillaume	Mechanical Engineering
Grady Hanrahan	Chemistry and Biochemistry
Steve Hawkins	Kinesiology and Nutritional Science
Michelle Ivey	Chemistry and Biochemistry
Margaret Jefferson	Biological Sciences
Nazareth Khodiguan	Kinesiology and Nutritional Science
Vickie Kubo-Anderson	Chemistry and Biochemistry
Patrick Krug	Biological Sciences
Sam Landsberger	Mechanical Engineering/Kinesiology and Nutritional Science
Diane Lewis	
Alison McCurdy	Chemistry and Biochemistry
James Rudd	Chemistry and Biochemistry
Amelia Russo-Neustadt	Biological Sciences
William Taylor	Physics and Astronomy
Greg Santillan	

CSULA 12th Annual Student Symposium Reception

The Golden Eagle, Ballroom, 3rd Floor
March 4, 2004 3 p.m. - 5 p.m.

Co-sponsored by
Office of Graduate Studies and Research,
Office of Research and Sponsored Programs, and
The Honor Society of Phi Kappa Phi, Chapter 093

Program

Welcome

Theodore J. Crovello, Dean, Graduate Studies and Research

Introduction of Symposium Planning Committees

Carl M. Selkin, President, Chapter 093, The Honor Society of Phi Kappa Phi

Opening Remarks

James M. Rosser, President, California State University, Los Angeles

Overview of the Research Competition

Theodore J. Crovello, Dean, Graduate Studies and Research

Recognition of 2003 CSULA State Delegates

Kylie Hsu, Associate Chair, Modern Languages and Literatures

Daniel Frankl, Associate Professor, Kinesiology and Nutritional Science

Presentation of Campus Symposium Winners

Poster Competition

Raymond Garcia, Scholarship and Awards Coordinator, Chapter 093, The Honor Society of Phi Kappa Phi

Oral Presentation Competition

Susan E. Kane, Associate Dean, Graduate Studies and Research—Research Administration

Presentation of Campus Representatives to the Statewide Research Competition

Jose L. Galvan, Associate Dean, Graduate Studies and Research and President-Elect, Chapter 093, The Honor Society of Phi Kappa Phi

Presentation of Travel Award

Carl M. Selkin, President, Chapter 093, The Honor Society of Phi Kappa Phi

Reception Planning Committee:

Kylie Hsu, Daniel Frankl, Ellen Stein, Evelyn Winchester

Oral Presentations

Group 1: Behavioral and Social Sciences – Salazar Hall 162

9:00 - 9:15

Lara Elizabeth McCormick

Department: Anthropology

A Preliminary Analysis of the Trotter and Gleser Stature Estimation Formulae

Faculty Mentor: Dr. Elizabeth Miller

9:20 - 9:35

Victoria Stosel

Department: Anthropology

Observations on the diet of the Niceleno

Faculty Mentor: Dr. Patricia Martz

9:40 - 9:55

Steven Pan

Department: Psychology

Sleep, Steroids, and Memory: Effects of Sleep Deprivation and Hormonal Treatment on an Olfactory Task

Faculty Mentor: Dr. Sonsoles de Lacalle

10:00 - 10:15

Oscar Ureno, Dalia Cuevas & Lisa Howell

Department: Psychology

Ethnicity and Cancer Screening in Female University Students

Faculty Mentor: Dr. Ramani Durvasula

Break – 10:20 - 10:40

10:40 - 10:55

Isabela Carrillo

Department: Sociology

Affective Responses to Social Exchange within Positively Connected Networks

Faculty Mentor: Dr. Gretchen Peterson

11:00 - 11:15

Cesar Espinosa

Department: Anthropology

The Survival of Religious Beliefs and Practices in Ulama

Faculty Mentor: Dr. James E. Brady

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Clarus J. Backes, Jr.

Department: Anthropology

More Than Meets the Eye: Fluorescence Photography for Enhanced Analysis of Pictographs

Faculty Mentor: Dr. James Brady

11:40 - 11:55

Hitomi Uchishiba

Department: Psychology

Testing the sequential superiority effect: Is the sequential method still superior when photo arrays are clearly biased?

Faculty Mentor: Dr. Mitchell L. Eisen

12:00 - 12:15

Wilson Segura

Department: Psychology

Coping Strategies Applied by Minority College Students

Faculty Mentor: Dr. Jean Phinney

Group 2: Biological Sciences – Salazar Hall 165

9:00 - 9:15

Haedy Shafeek

Department: Biological Sciences

The interaction between tubulin and M proteins from both wild - type Sendai virus and its variant, F1-R

Faculty Mentor: Dr. Nancy McQueen

9:20 - 9:35

Dani Haack

Department: Biological Sciences

The Effect of Exercise and Stress on Brain-Derived Neurotrophic Factor in the Hippocampus

Faculty Mentor: Dr. Amelia Russo-Neustadt

9:40 - 9:55

Julie King

Department: Biological Sciences

The Current Distribution Of The Fox Squirrel (Sciurus niger) In The Los Angeles Metropolitan Area And Its Behavioral Interaction With The Native Western Gray Squirrel (Sciurus griseus)

Faculty Mentor: Dr. Alan Muchlinski

10:00 - 10:15

Ana Valdes

Department: Biological Science

The Impact of Physical Activity on Learning Impairments Induced by Stress Anxiety and Depression affect the daily lives of a great number of people worldwide

Faculty Mentor: Dr. Amelia Russo-Neustadt

Break – 10:20-10:40

10:40 - 10:55

Antonio D. Heras

Department: Kinesiology and Nutritional Science

The effects of robotic locomotor training combined with drug therapy on the recovery of stepping in spinal transected rodents

Faculty Mentor: Dr. Ray de Leon

11:00 - 11:15

Amerigo Rossi

Department: Kinesiology and Nutritional Science

VO₂ max and lactate threshold as predictors of endurance running performance in master athletes

Faculty Mentor: Dr. Steven Hawkins

11:20 - 11:35

Helen C. Claudio

Department: Biological Sciences

Watching the Ecosystem Breathe: Using Remote Sensing to Measure Carbon and Water Fluxes in a Chaparral Ecosystem

Faculty Mentor: Dr. John Gamon

11:40 - 11:55

Diana Dupuis

Department: Anthropology

Decomposition in the Santa Monica Mountains: A Seasonal Taphonomical Analysis of Buried and Exposed Remains

Faculty Mentor: Dr. Elizabeth Miller

12:00-12:15

Christopher Martinez

Department: Chemistry and Biochemistry

The Generation of Reactive Oxygen Species (ROS) in Heart Mitochondria of Bulls and Mice

Faculty Mentor: Dr. Raymond E. Garcia (CSULA) and Dr. Martin Brand (University of Cambridge)

Group 3: Education and Humanities – Salazar Hall 237

10:00 - 10:15

Cheryl T. Wilkinson

Department: Special Education

Educareconnect.org: A website development to educate educators and other professionals regarding physical and health impairments

Faculty Mentor: Dr. Sherwood Best

10:20 - 10:35

Mario Cuéllar

Department: Modern Languages and Literatures

An Unofficial but Useful Pronoun: Salvadoran vos in L.A.

Faculty Mentor: Dr. Domnita Dumitrescu

10:40 - 10:55

Maria Isabel Ramos

Department: Art

An Ethnographic Study of the Roles of Women in Ulama: Implications for Understanding the Ancient Ballgame

Faculty Mentor: Dr. James Brady

11:00 - 11:15

Elena Rodriguez

Department: Chicano Studies

Social History of Chicana Muralists in Los Angeles, the 1960's and 1970's

Faculty Mentor: Dr. Richard T. Rodriguez

11:20 - 11:40

Michael Sharrett

Department: History

Commercial and Financial Considerations for the Development of Washington, D.C.

Faculty Mentor: Dr. Daniel Crecelius

Group 4: Physical and Mathematical Sciences – Salazar Hall 255

9:20 - 9:35

Maya Popova

Department: Chemistry and Biochemistry

Synthesis of Bifunctional Enterobactin Analogs

Faculty Mentor: Dr. Carlos G. Gutierrez

9:40-9:55

Nancy Carrillo

Department: Chemistry and Biochemistry

Derivatives of Enterobactin

Faculty Mentor: Dr. Carlos G. Gutierrez

10:00-10:15

Andres Garcia, Jr.

Department: Chemistry and Biochemistry

Solution Studies of Enterobactin Conformation.

Faculty Mentor: Dr. Carlos G. Gutierrez

10:20 - 10:35

Jaime Anguiano and Gina E. Ramirez

Department: Chemistry and Biochemistry

Synthesis of Galloyl Dendrimers

Faculty Mentor: Dr. Carlos G. Gutierrez

Group 5: Physical and Mathematical Sciences – Salazar Hall 244 – Session II

9:00 - 9:15

Steven Han

Department: Chemistry and Biochemistry

Further Analysis of Group IIIB Metal-Ligand Complexes By Dynamic NMR

Faculty Mentor: Dr. Yong Ba

9:20 - 9:35

Karara Muhoro

Department: Chemistry and Biochemistry

Relaxation Studies of the Dynamics and Interaction of ^{13}C -Labeled Side-Chain of Type I Anti-Freeze Protein

Faculty Mentor: Dr. Yong Ba

9:40 - 9:55

Melanie Xie

Department: Mathematics

The Radio Numbers for Square Paths and Square Cycles

Faculty Mentor: Daphne Liu

10:00 - 10:15

Danny Chagolla

Department: Chemistry and Biochemistry

Variable Temperature-Dependent ^{129}Xe NMR used to Study the Interaction of Chromatographic Column Material and Solvent Molecules

Faculty Mentor: Dr. Yong Ba

Break – 10:20 - 10:40

10:40 - 10:55

Jesse Chapman

Department: Chemistry and Biochemistry

Exploration of the Photochemical Dissociation of Nitrate in Aqueous and Frozen Samples

Faculty Mentor: Dr. Krishna Foster

11:00 - 11:15

Monica McDowell

Department: Chemistry and Biochemistry

Detection of Hypophosphite, Phosphite and Orthophosphate in Natural Geothermal Waters

Faculty Mentor: Dr. Krishna Foster

11:20 - 11:35

Amir Massoudi

Department: Mechanical Engineering

Mixture Air-Fuel in Combustion Chamber

Faculty Mentor: Dr. Darrell Guillaume

11:40 - 11:55

Uche Ofoma

Department: Mechanical Engineering

Autonomous UAV Concept for Titanic Missions

Faculty Mentor: Dr. Chivey Wu

Notes

Abstracts of Oral Presentations

Group 1

Behavioral and Social Sciences

Lara McCormick

Department: Anthropology

A Preliminary Analysis of the Trotter and Gleser Stature Estimation Formulae

Faculty Mentor: Dr. Elizabeth Miller

This study is a preliminary examination of the efficacy of formulae derived in the 1950s for the estimation of a modern decedent's stature from long bone length. The method currently used in physical anthropology was standardized in 1952 by Trotter and Gleser with the use of limb bone measurements from individuals born in the late 19th Century. Due to secular changes in growth and development in the past one hundred years, it is evident that these formulae must be examined for accuracy on modern human samples. Researchers have demonstrated that as mean heights for a given population increase, allometric changes occur between the different limb bones in addition to changes in overall length of each bone. Therefore, as height increases or decreases, the proportions between the body limbs will also change; potentially generating inaccurate estimated statures from regression equations that assume a constant ratio. For this study, the limb bones of ten skeletonized White males from L.A. County Coroner cases were measured and inserted into the Trotter and Gleser formulae. The estimated statures from the various limb bones of each decedent were analyzed using Chi Square to determine whether one may obtain similar stature estimations from each limb bone.

Victoria Stosel

Department: Anthropology

Observations on the diet of the Niceleno

Faculty Mentor: Dr. Patricia Martz

Using standardized formulas, meat and protein yields for twelve archeological sites on San Nicholas Island are calculated, providing previously unavailable information regarding the Niceleno diet and habitat exploitation. Sites included in this study come from the four main topographical zones on the island. Information from this study indicates a dietary preference for shellfish favoring the mid-tide and low tide zones, easily accessible areas with numerous species of shellfish present. Black abalones provide the majority of protein in comparison to other shellfish and were present in all units. Fish provided the majority of dietary protein. Large kelp forests surround the island, providing habitat for numerous fish species. Sea mammals were found in small quantities, and made minor dietary contributions.

Steven Pan

Department: Psychology

Sleep, Steroids, and Memory: Effects of Sleep Deprivation and Hormonal Treatment on an Olfactory Task

Faculty Mentor: Dr. Sonsoles de Lacalle

Sleep deprivation is known to adversely affect learning and memory. We examined the effects of sleep deprivation on attentional and memory processes in rats that received unilateral cholinergic lesions with 192IgG-saporin. Young Fisher 344 male

rats were evaluated on an olfactory discrimination task both before and after 8 hours of sleep deprivation. Rats were first trained to associate a specific scent with a food reward. They were then tested on their ability to successfully distinguish between two randomly placed, differently scented cups to retrieve the food reward. On a second test we investigated the possible effects of chronic estrogen administration on cognitive responses to sleep deprivation. Gonadectomized and intact rats were implanted s.c. with a pellet containing estrogen or placebo, and tested before and after sleep deprivation, one month after treatment. Untreated rats displayed impaired performance on retention of the olfactory task; sleep deprivation resulted in an inability to remember the association of the baited scent from the previous test day. Hormonal treatment ameliorated memory deficits in intact animals, while having deleterious effects in gonadectomized animals. These findings suggest a beneficial effect of sleep in memory, and also possible cognitive benefits of estrogen treatment in rats with normal hormonal functioning.

Oscar Ureno, Dalia Cuevas & Lisa Howell

Department: Psychology

Ethnicity and Cancer Screening in Female University Students

Faculty Mentor: Dr. Ramani Durvasula

Our previous studies have revealed that nearly 75% of Asian and Latina participants reported never having been screened. We hypothesized that lower acculturation and greater cultural barriers would be observed in women who were not screened, and that sexually active women would be more likely to be screened. Data are presented on 68 female students from CSULA (30 Asian and 38 Latina, mean age = 20 years). Acculturation was assessed with the SLASIA and the ARSMA. The Cultural Barriers to Screening Scale was employed to assess cultural factors. No differences on acculturation or cultural barriers were observed between those who reported receiving pap examinations and those who did not. Women who were sexually active were more likely to have received pap examinations ($p < .001$) and women who received pap examinations reported significantly more sexual partners ($p = .002$). Sexual activity was not a guarantee of screening. Only 50% of sexually active Latinas received a pap examination. These findings could not be attributed to access as nearly all of the women had access to a clinic which provided low or no-cost screening. These findings suggest that better education about routine cancer screening is necessary.

Isabela Carrillo

Department: Sociology

Affective Responses to Social Exchange within Positively Connected Networks

Faculty Mentor: Dr. Gretchen Peterson

The primary focus of this study is to examine positively connected networks and how the behavior of the actors in the network affects the emotional attachment generated by the positive network. Using conditions from a larger experiment, we examine how the equality of a direct exchange partner's behavior and the equality of a peripheral actor's behavior affect emotional reactions. The purpose

of this study is to build on Peterson and McKeever (2003) by examining how variations in behavior of the peripheral actor and direct exchange partner affect actor's evaluations of those partners just in the positively connected network structures.

Cesar Espinosa

Department: Anthropology

The Survival of Religious Beliefs and Practices in Ulama

Faculty Mentor: Dr. James E. Brady

After the conquest, Spanish priests quickly realized that the indigenous ballgame played a pivotal role in both social and religious life of the native cultures and so they actively suppressed the playing of the sport. While Spanish accounts provide a general outline of how the game was played, the sport disappeared before it could be adequately documented. This has hindered archaeologists' attempt to understand how the game actually functioned within the society. Fortunately, a form of the game, called Ulama from the Aztec name *Ullamalitzli*, survived as an institution in rural West Mexico. In the spring of 2003, I participated in an ethnographic field project in Sinaloa that documented the game of *Ulama* and investigated parallel with the ancient game. My research found that the *taste*, the ballcourt, still plays a central role in native sacred geography. It was also one of the principal mechanisms for maintaining close relationships between communities in the area. The data recovered have important implications for the reconstruction of the ancient institution.

Clarus J. Backes, Jr.

Department: Anthropology

More Than Meets the Eye: Fluorescence Photography for Enhanced Analysis of Pictographs

Faculty Mentor: Dr. James Brady

This study used ultraviolet fluorescence photography (UVF) to record aboriginal painted rock art sites and the value this non-destructive technique for revealing otherwise invisible traces of pigment and for making *in situ* comparison of pigment compositions were assessed. UVF has been employed for decades in the laboratory by conservators and forensic scientists, but there is no published literature describing its use in rock art analysis. When applied to CA-KER-735 and CA-KER-736, two previously analyzed pictograph sites in Kern County, California, some pictograph pigments emitted visible, colored light when exposed to ultraviolet radiation, and a field procedure is described by which this normally invisible color component can be isolated and recorded on standard photographic film. The technique led to the discovery of seven new pictograph elements, and three distinctive sets of pigment fluorescence attributes were recorded that allowed intra- and inter-site comparisons of paint types. This study demonstrated the effectiveness of ultraviolet fluorescence photography as a non-destructive, on-site procedure that can yield valuable data for rock

art analysis.

Hitomi Uchishiba

Department: Psychology

Testing the sequential superiority effect: Is the sequential method still superior when photo arrays are clearly biased?

Faculty Mentor: Dr. Mitchell L. Eisen

This experiment was designed to examine the efficacy of sequential procedure when the photo array was biased. Participants viewed a short simulated crime-event on video. After a ten minute filler task, the participants were asked if they could identify the perpetrator. Participants were randomly assigned to either sequential or simultaneous condition. They viewed a biased photo array where four of the six choices were clearly not similar to the perpetrator (i.e., not viable choices). Results indicated that participants, who were shown the picture sequentially, were less likely to make false identifications (13%) compared to those who were shown simultaneous displays (37%). These results demonstrated that the sequential methods may be robust to the effects of bias introduced by law enforcement officials who use poorly assembled photo arrays. The increased level of safeguard offered by the sequential display against the poor selection of fillers makes the sequential lineup a more attractive choice for law enforcement officials.

Wilson Segura

Department: Psychology

Coping Strategies Applied by Minority College Students

Faculty Mentor: Dr. Jean Phinney

College students face a lot of difficulties throughout their education paths. These difficulties can be very stressful to ethnic minority students whose parents did not attend college. The goal of this study was to investigate the stressfulness of difficulties faced by these students. The second goal was identifying what strategies these students used to cope with these difficulties. Finally, we also wanted to understand how successful students felt in coping with these difficulties. Students in this situation must learn how to cope with difficulties in college without having many of the necessary resources such as a high family income or knowledgeable advice from parents with first hand experience on how to deal with difficulties in college. The study included 103 minority college students from predominantly Asian and Latino descent. Results showed that academic difficulties were most stressful to students, followed by financial, personal and family difficulties. The same pattern followed in coping, since students felt most successful in coping with academic difficulties, followed by financial, personal and family difficulties. Finally, it was also found that the two coping strategies most widely used by these students were taking direct action to fix the problem and seeking support from family and friends.

Group 2

Biological Sciences

Haedy Shafeek

Department: Biological Sciences

The interaction between tubulin and M proteins from both wild-type Sendai virus and its variant, F1-R.

Faculty Mentor: Dr. Nancy McQueen

Wild-type (wt) Sendai virus causes a localized respiratory tract infection in mice, while a variant F1-R, causes a systemic infection. One factor that we believe contributes to F1-R's ability to cause a systemic infection is F1-R's ability to disrupt the microtubule network of infected cells. This is due to two mutations in F1-R matrix (M) protein. We hypothesize that both wt and F1-R's M interact directly with tubulin and that in F1-R is enhanced as compared to wt. A West-western analysis determined that

there is a direct interaction between tubulin and M from both wt and F1-R. Surface plasmon resonance supported that. We tested the effect of the pH, the salt concentration, and the presence of detergents in the tubulin- M incubation stage. Results showed a strong interaction at pH 7.0, less at pH 5.5, pH 6.0, pH 6.5, and pH 7.5, and none at pH 5.0, and pH 8.0. Although there was a strong interaction at a salt (NaCl) concentration of 150mM, it was stronger at 300mM, and weaker at 75mM. 0.1% NP40 had no effect on the interaction; while 1% Triton X100 inhibited the interaction. These results suggest that the M-tubulin interaction may be electrostatic in nature.

Dani Haack

Department: Biological Sciences

The Effect of Exercise and Stress on Brain-Derived Neurotrophic Factor in the Hippocampus

Faculty Mentor: Dr. Amelia Russo-Neustadt

Neurotrophins are a group of molecules important for the overall health of the brain; in particular Brain-Derived Neurotrophic Factor, BDNF, promotes neuronal health by activating cell survival pathways, which enhance neurotransmitter turnover and synaptic strength. Stress, in the form of restraint, has been shown to diminish neurotrophin levels, allowing hippocampal neurons to become vulnerable to various insults. This diminished neurotrophic support results in the retraction of dendritic branch points and is believed to lead to the neuronal death observed in neurodegenerative illnesses such as Parkinson's Disease and Alzheimer's Disease. Exercise, on the other hand, has been shown to enhance neurotrophic support within the hippocampus. This study focused on the possible compensatory effects exercise may have on neurotrophic loss induced by stress within the limbic structure of the brain called the hippocampus.

Julie King

Department: Biological Sciences

The Current Distribution Of The Fox Squirrel (Sciurus niger) In The Los Angeles Metropolitan Area And Its Behavioral Interaction With The Native Western Gray Squirrel (Sciurus griseus)

Faculty Mentor: Dr. Alan Muchlinski

The fox squirrel (*Sciurus niger rufiventer*) was introduced into Los Angeles County from the Mississippi Valley just prior to 1904 and has greatly increased its numbers and distribution since that time. After the initial introduction, numerous range-expanding introductions have taken place. The fox squirrel is now thriving in areas of high human population densities and is considered a pest species causing significant damage to property. Researchers are also concerned that range expansion by the non-native fox squirrel may be displacing native western gray squirrels (*Sciurus griseus*) from their less-populated foothill habitats. To better understand the growing fox squirrel population in the Los Angeles metropolitan area, we examined the current and historic distributions of the fox squirrel in Los Angeles, Orange and Ventura Counties. Data for the current range of the fox squirrel was submitted by residents of the three counties to an online data collection form that generated more than 800 address points. In areas where fox and gray squirrel distributions overlap, the two species compete for similar feeding and nesting sites. Behavioral interactions occurring between fox and gray squirrels therefore were documented twice weekly for the period of one year at San Dimas Canyon Park.

Ana Valdes

Department: Biological Sciences

The Impact of Physical Activity on Learning Impairments Induced by Stress Anxiety and Depression affect the daily lives of a great number of people worldwide

Faculty Mentor: Dr. Amelia Russo-Neustadt

Brain-derived neurotrophic factor (BDNF), which is most extensively synthesized in the hippocampus, is involved in neuronal survival and is up-regulated resulting from antidepressant medications and physical exercise. BDNF expression is also associated with enhanced neuroprotection against stress and decreased behavioral depression. These findings suggest that BDNF is a viable target for the discovery of improved antidepressant medications and for protection against stress-induced neuronal damage. Exposure to prolonged, but not acute, restraint stress has been shown to reduce BDNF mRNA levels in the hippocampus. Prolonged restraint stress also impairs performance in spatial memory tasks in rats. The elevated levels of corticosterone secreted during stressful events appear to be responsible for impaired spatial memory performance. To test our hypothesis that exercise, which enhances BDNF levels, can counteract the learning impairments induced by 21 days of restraint stress, we conducted Barnes maze behavioral/learning studies. Unexpectedly, exercising rats who were subjected to restraint stress performed significantly worse than controls and rats allowed only exercise or only restraint stress. Mechanistically, it is possible that increased glutamate excitotoxicity could account for our observations.

Antonio D. Heras

Department: Kinesiology and Nutritional Science

The effects of robotic locomotor training combined with drug therapy on the recovery of stepping in spinal transected rodents

Faculty Mentor: Dr. Ray de Leon

Previous studies have shown that locomotor training can enhance the ability of spinal transected (ST) rodents to step. Other studies show the 5-HT₂ agonist (quipazine) can improve locomotor performance in ST animals. The purpose of our study is to determine the effects of combined treadmill training and quipazine therapy in enabling ST rats to regain stepping. Hindlimb locomotion was studied in four groups of rats: training + quipazine (n=7), quipazine only (n=6), training + saline (n=6), saline only (n=6). A robotic device was used to fully assist the hindlimb movement during 20minutes of stepping. Quipazine (or saline) was delivered to the spinal cord intrathecally or by intraperitoneal injection before training or simulated training session. After four months, preliminary tests have shown that daily quipazine administration has an acute, enhancing effect on the ST rat's ability to step. In particular, quipazine administration significantly increased plantar surface stepping during a training session. There was no improvement in the stepping of rats that received robotic training. This suggests that full assistance training algorithm does not provide the optimal sensory signals for improving the generation of stepping by the spinal cord. These results have implications for current therapeutic strategies used for humans with spinal cord injuries.

Amerigo Rossi

Department: Kinesiology and Nutritional Science

VO₂ max and lactate threshold as predictors of endurance running performance in master athletes

Faculty Mentor: Dr. Steven Hawkins

Previous research regarding the relative abilities of VO₂ max and lactate threshold to predict endurance performance in master athletes has been equivocal. The aim of this study was to

determine which parameter is a better predictor of endurance performance among male master athletes. Eighty-four male master athletes were divided into low and high aerobic fitness groups and then tested for VO_2 max and lactate threshold. Subjects reported their best times for the 5km, 10km, and Marathon from the previous year. Pearson correlations were used to determine the relationship between the two predictors and three performances. VO_2 max was significantly related to 5km and 10km performances for both the low and high aerobic fitness groups ($r=-0.44$ to $-0.66, p<0.01$). Lactate threshold showed a weaker, positive, relationship to 5km and 10km performance for only the high fitness group ($r=0.26$ to $0.46, p<0.05$), indicating that higher lactate threshold was associated with slower performances. The exercise protocol used does not accurately depict lactate threshold in master athletes, most likely due to the large elevation increases.

Helen C. Claudio

Department: Biological Sciences

Watching the Ecosystem Breathe: Using Remote Sensing to Measure Carbon and Water Fluxes in a Chaparral Ecosystem
Faculty Mentor: Dr. John Gamon

It is important to better understand the carbon and water transport (fluxes) between the biosphere and the atmosphere because these fluxes influence atmosphere composition, climate, and provide indicators of ecosystem health. Many ecosystems are inaccessible or are easily damaged by human presence, which makes it difficult to analyze ecosystem function with conventional field sampling. Optical remote sensing is a potential solution because it is a non-intrusive procedure that is non-damaging to vegetation. At Sky Oaks, a chaparral-dominated site in San Diego County, spectral data were collected using an automated tram, while the fluxes were measured with an eddy flux tower at the site. The study focused on the water band index, an optical indicator of water status in the vegetation and spanned a wet, record drought, and recovery year. The water band index's correlation with fluxes varied with time, precipitation, and species. In the wet year, there was a stronger correlation between the optical index and the fluxes, but in the drought, the correlation weakened as vegetation died. These results suggest while this optical index is a strong indicator for both water and carbon fluxes, additional factors need to be considered to improve flux estimates.

Diana Dupuis

Department: Anthropology

Decomposition in the Santa Monica Mountains: A Seasonal Taphonomical Analysis of Buried and Exposed Remains
Faculty Mentor: Dr. Elizabeth Miller

Trying to establish an accurate postmortem interval is one of the

most challenging assignments for the forensic anthropologist. Knowing a plausible time since death is imperative when trying to identify individuals who are potentially missing persons or when trying to establish a time frame for a possible crime scene. However, decomposition rates vary greatly depending upon mitigating circumstances such as climate, burial, insect activity and carnivore activity. This research is the first study of decomposition rates done in the greater Los Angeles area. Pig carcasses, one buried and one left on the surface, were observed during three different seasons in a calendar year. The carcasses that were buried decomposed at a much slower rate than the surface pigs until their subsequent excavation by carnivores. Surface pig decomposition varied greatly relative to insect activity and temperature. Carnivore activity proved to be an interesting and integral part of this study, disturbing not only the buried remains, but the surface ones as well, despite the latter being protected by a wire cage.

Christopher Martinez

Department: Chemistry and Biochemistry

The Generation of Reactive Oxygen Species (ROS) in Heart Mitochondria of Bulls and Mice
Faculty Mentor: Dr. Raymond E. Garcia (CSULA) and Dr. Martin Brand (University of Cambridge)

Oxidative phosphorylation is the process by which the cell makes ATP, the energy used by the cell. This is accomplished in an organelle called the mitochondrion, the powerhouse of the cell. Mitochondria produce ATP by allowing electrons to flow from reductants to oxidants in the electron transport chain. At each complex in this chain is a hydrogen (or proton) pump that transfers hydrogen from one side of the membrane to the other. It is this process that is essential to life, but it is also this process that may be the cause of aging. During this process reactive oxygen species (ROS), namely superoxide ($O_2^{\cdot-}$) and peroxide (H_2O_2), are produced in side reactions. These ROS are highly reactive and have been shown to damage DNA. The free radical theory of aging or the oxidative stress hypothesis states that it is the mitochondrial production of ROS and the resulting accumulation of damage to macromolecules that causes aging and determines maximum lifespan (MLSP). A prediction of this hypothesis would be that longer-lived species exhibit a relatively lower level of oxidative stress due to either a high level of antioxidant defenses and/or a low rate of oxidant generation. When respiring on succinate alone mouse and bull heart mitochondria produce 6.36 and 2.44 nmol/min./mg of ROS, respectively. When respiring on succinate in the presence of complex I inhibitor, rotenone, this rate decreases to 0.08 nmol/min/mg for mouse heart mitochondria and -0.12 nmol/min/mg for bull heart mitochondria. Therefore ROS seems to be generated from complex I through reverse electron transport.

Group 3

Education and Humanities

Cheryl T. Wilkinson

Department: Special Education

Educareconnect.org: A website development to educate educators and other professionals regarding physical and health impairments

Faculty Mentor: Dr. Sherwood Best

Communication is essential to social interactions, and to the educational process throughout our life span. This master's project

focuses on the provision of professional enrichment and practice enhancement through the development of instructional materials that are presented in a website format. The website informs interested individuals regarding the issues and challenges facing children with chronic health conditions and/or physical impairments. The website encourages professionals to contribute ideas and expertise to enhance collaboration amongst those who work with children professionally. Adult learning is enhanced and facilitated by four key principles: problem solving; scaffolding; opportunities for practice, feedback, revision, and reflection;

and socially shared learning environments. Educareconnect.org focuses on the enhancement of communication and information dissemination through utilization of a website geared toward special education teachers, teachers in general education, and medical personnel. This project has practical applications for professionals who provide services for children and adolescents who are long-term cancer survivors or who have other chronic health conditions that affect their educational achievements. The website mission is to encourage what Heinrich, Cote, and Solernou (2000) refer to as “communities of scholarly caring.”

Mario Cuéllar

Department: Modern Languages and Literatures
An Unofficial but Useful Pronoun: Salvadoran vos in L.A.
Faculty Mentor: Dr. Domnita Dumitrescu

The topic of this research is the use of the pronoun *vos* among Salvadoran speakers living in the Los Angeles area. *Vos* is the most typical Salvadoran intimate form of address, as opposed to *Usted*, the most formal, or *Tú*, which, according to the literature, is supposed to convey an intermediate level of formality (Lipski 1994). The use of *vos* – or *voseo* – has been investigated in many Latin American countries, but El Salvador has received little attention so far, from this point of view (Ortiz 2000). Even less attention was given so far to the use of this pronoun in the US (Schreffler 1994 investigated it in the Houston community). My study sheds light on the *voseo* as opposed to *tuteo* and *ustedeo* both within and outside El Salvador. My hypothesis is that among Salvadorans living in the US and coming in daily contact with speakers of other varieties of Spanish, especially in big cities such as Los Angeles – where dialect leveling or *koineization* is taking place- the use of *vos* will be less frequent than in their country of origin, which represents a much homogeneous speech community. In order to check my hypothesis, I have collected data by means of a questionnaire that was submitted to 38 Salvadorans living in Los Angeles and to 29 Salvadorans living in El Salvador. These data were quantified and analyzed with the SPSS program, and they appear to support my hypothesis.

Maria Isabel Ramos

Department: Art
An Ethnographic Study of the Roles of Women in Ulama: Implications for Understanding the Ancient Ballgame
Faculty Mentor: Dr. James Brady

Scholars have tended to picture the ancient Aztec game of *Ullamalitzli* as an exclusively male pastime even though ceramic figurines have been found that depict women dressed as ballplayers. The modern survival of the Aztec game, called *Ulama*, as been similarly characterized as a male sport. Previous

ethnographic studies have suggested that women were not permitted to touch the ball or enter the ballcourt, let alone play *Ulama*. My data document that women do play *Ulama* and there have been women’s teams for as long as my oldest informant can remember. The fact that the role of women has been minimized in the ethnographic situation should alert researchers to the probability that a similar bias has occurred in the reconstruction of the ancient ballgame.

Elena Rodriguez

Department: Chicano Studies
Social History of Chicana Muralists in Los Angeles, the 1960’s and 1970’s
Faculty Mentor: Dr. Richard T. Rodriguez

This is a qualitative research project on Chicana muralists in the Greater Los Angeles Area during the Chicano Movement and Chicano Art Movement of the 1960’s and 1970’s. It will track how Chicanas began an inter-communal evolution and collective development through an artistic medium not readily available to them in a predominately male oriented field. Chicana muralists, however, redefined and appropriated a feminist identity through breaking physical, gendered and sexual barriers, creating a new public space for women. Their shared ideology of the complexities in acquiring a new self-awareness and identity challenged the traditional values of their community, peers in the Chicano Movement and Chicano Art Movement, by achieving a new role as women cultural producers in the patriarchal public spheres.

Michael Sharrett

Department: History
Commercial and Financial Considerations for the Development of Washington, D.C.
Faculty Mentor: Dr. Daniel Creelius

It has been suggested that the baroque design and plan of Washington, D.C., was developed to “humble and intimidate” foreign heads of state. A more persuasive argument is that the plan for the United States’ capital was a by-product of financial arrangements and commercial opportunities, including a compromise between the North and South over war debt after the Revolutionary War, a strategy for putting government sales of capital lots in federal coffers, and a device for expanding commercial empires enjoyed by certain founding fathers, such as George Washington. That the baroque style was “trés passé” in Europe, and anti-Federalists such as Jefferson did not let their political ideologies preclude the design’s enforcement, suggest that Pierre Charles L’Enfant’s design and plan was developed and went forward due to a lack of innovation and by simple default.

Group 4

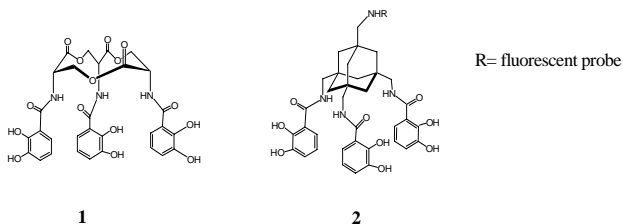
Physical and Mathematical Sciences

Maya Popova

Department: Chemistry and Biochemistry
Synthesis of Bifunctional Enterobactin Analogs
Faculty Mentor: Dr. Carlos G. Gutierrez

The FepA receptor is responsible for iron uptake mediated by

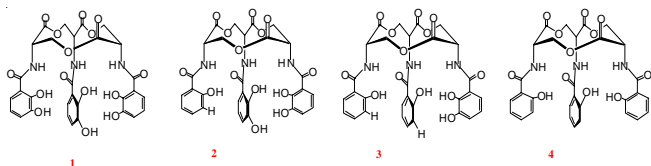
enterobactin (1), the *E. coli* siderophore. This receptor has not been yet investigated as to its ability to transport into the cell bi-functional molecules that contain a catecholate siderophore domain and second functional unit. We present here the synthesis of new bifunctional enterobactin analogs 2, which consists of a siderophore mimic domain formed by attaching 2,3-dihydroxybenzoyl units to three of 1,3,5,7 tetra (aminomethyl) adamantane, and fluorescence probes coupled to the fourth.



Nancy Carrillo

Department: Chemistry and Biochemistry
Derivatives of Enterobactin
 Faculty Mentor: Dr. Carlos G. Gutierrez

In response to biochemical need for iron, and its great insolubility in aqueous environment, *E. coli* produces the siderophore enterobactin (1) to complex, transport and deliver ferric iron to the bacterial cell. We report here the synthesis of enterobactin analogs 2-4. The iron complexes of 1-4 are the models to mimic the stepwise protonation of ferric enterobactin, one of the proposed iron release mechanisms.

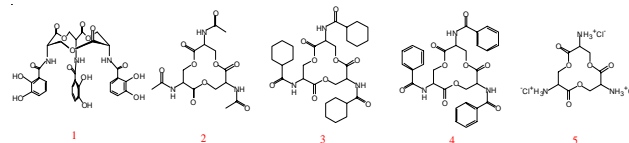


Andres Garcia Jr.

Department: Chemistry and Biochemistry
Solution Studies of Enterobactin Conformation
 Faculty Mentor: Dr. Carlos G. Gutierrez

In response to biochemical need for iron and its insolubility in aqueous environment, *E. coli* produces the siderophore enterobactin (1) to complex, transport, and deliver ferric iron to the bacterial cell. Enterobactin has the highest affinity for iron of known siderophores ($\log K_f=49$). A factor that is believed to

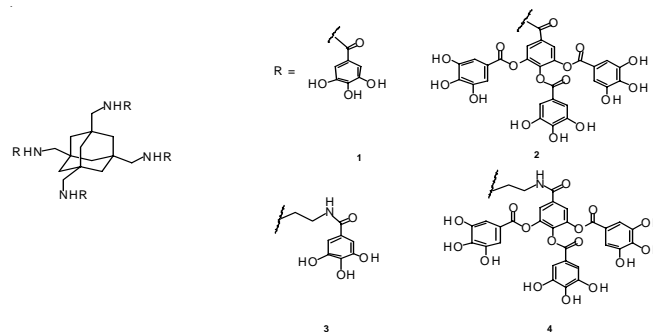
contribute to its high affinity, is its hypothesized axial conformation that holds the three 2,3-dihydroxybenzoyl units predisposed towards iron complexation. We report the synthesis of analog 2 and 3, along with solution NMR studies of 1- 5 to investigate the contributing factors that influence the predisposition of enterobactin (1) towards metal binding.



Jaime Anguiano and Gina E. Ramirez

Department: Chemistry and Biochemistry
Synthesis of Galloyl Dendrimers
 Faculty Mentor: Dr. Carlos G. Gutierrez

There is considerable interest in polyphenols for their potential biological, analytical, and medicinal applications. Polyphenols such as gallic acid have been used as building blocks in the synthesis of dendritic molecule. Here we report the synthesis of polyphenolic dendrimers 1-4 which incorporate tetra(methylamino)adamantane as a rigid tetrahedral core and dendrons consisting of galloyl units.



Group 5

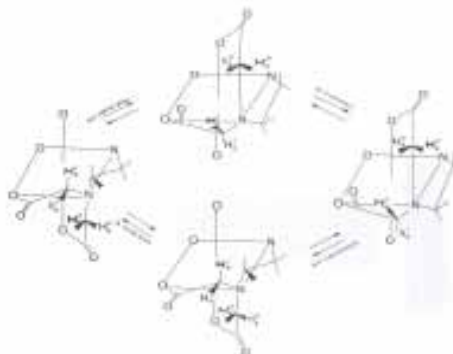
Physical and Mathematical Sciences

Steven Han

Department: Chemistry and Biochemistry
Further Analysis of Group IIIB Metal-Ligand Complexes By Dynamic NMR
 Faculty Mentor: Dr. Yong Ba

In analytical chemistry, we have used EDTA to bind different metals to form 1:1 molar ratio of its corresponding metal-EDTA complex. In its corresponding complex, studying the intramolecular dynamics the different protons can be observed using Variable Temperature NMR (VT-NMR) to understanding the influence in the N-backbone with the protons in the 5-membered rings in its corresponding 6, 7, or 8-coordinate structure. Previous study worked with different metals from alkaline earth metals to transitional metals to metalloids with successful determination of its activation energy and dynamics. For simplistic purposes we want to study a family of elements of Group IIIB in the transitional metal block to understand the different

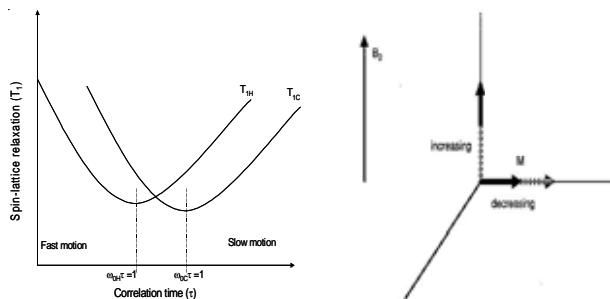
trends in the three complexes by not only its activation energy, but also to correlate that to its ionic radii, dynamics, and structure.



Karara Muhoro

Department: Chemistry and Biochemistry
Relaxation Studies of the Dynamics and Interaction of ¹³C-Labeled Side-Chain of Type I Anti-Freeze Protein
Faculty Mentor: Dr. Yong Ba

The spin-lattice Relaxation Time (T_1) for the ¹³C labeled side chain **Type I Anti-Freeze protein** was measured by inversion recovery and saturation methods using Cross-Polarization (CP)-Magic-Spinning (MAS) sequences. Three temperatures, -3 °C, -20 °C, and -40 °C, were employed in this study. It was found that molecular motion of the protein decreases upon the lowering of temperature. T_1 measurements revealed that as temperature was decreased, dipole-dipole interactions between the ¹³C-labeled side-chains increased, and ultimately exchange of energy between spins was relatively, increased. To facilitate the T_1 measurements a pulse sequence was created to trigger the inversion-recovery method. First, a 180° pulse was followed by purely spin-lattice relaxation. A 90° pulse was then applied to monitor the state of the magnetization. This was the basis for all the T_1 measurements because the application of the 90° pulses inverted the magnetization. The T_1 for ¹³C and T_1 for ¹H values were obtained with the CP-based sequence when saturation of the magnetization during the delay period estimated the Nuclear Overhauser Effects (NOES). The experimental data were fitted with a double exponential function using Microco Origin. In this study we present the T_1 results obtained using the inversion recovery method of ¹³C-Labeled side chain of **Type I** Anti-Freeze Protein. Sicheri, F., Yang, D. S. C. Ice-binding structure and mechanism of an antifreeze protein from winter flounder. *Nature*, **1995**, 375, 427-431.



Melanie Xie

Department: Mathematics
The Radio Numbers for Square Paths and Square Cycles
Faculty Mentor: Daphne Liu

For a graph G , $diam(G)$ denotes the diameter of G , which is the maximum distance between any two pair of vertices. The radio labeling is motivated by the Channel Assignment Problem. A valid channel assignment for a given set of transmitters or stations is a one-to-one function that assigns to each station with a nonnegative integer known as a channel, such that the interference is reduced or avoided. That is, f is a radio labeling if for any pair of vertices

$$u, v \in V(G),$$

where $d_G(u, v)$ is the distance between vertices u and v . The *span* of f is the maximum label assigned to a vertex of a simple graph G . The *radio number* of G , denoted $rn(G)$, is the minimum span over all radio labelings of G . The radio number for paths and cycles were studied by Chartrand et al in three research articles,

and were recently completely solved by Liu and Zhu. In this talk, the exact value of the radio numbers for square paths, square of even cycles and square of only some odd cycles are presented. In addition, a lower bound is obtained for the square of other odd cycles.

Danny Chagolla

Department: Chemistry and Biochemistry
Variable Temperature-Dependent ¹²⁹Xe NMR used to Study the Interaction of Chromatographic Column Material and Solvent Molecules
Faculty Mentor: Dr. Yong Ba

The purpose of this research is to use variable temperature-dependent and two-dimensional-exchange ¹²⁹Xe NMR to probe the structure, dynamics and interactions of xenon and solvent molecules with the SBC-18 chromatographic column material. Bonded-stationary phase of column materials are composed of brush-like structures of siloxane coatings on the surface of porous silica, which are formed as uniform, porous and mechanically sturdy particles. To understand the retention mechanisms of column materials, it is necessary to study the mobile phase properties, such as the molecular diffusion, and interaction between the mobile-phase molecules and the stationary-phase molecules. The reason for using the solvents is to develop an understanding of the structure, dynamics and interactions of chromatographic material in different environments, to help in understanding the retention mechanism in the separation of mixtures. In order to trace these properties we used ¹²⁹Xe as a probe. The absorption enables the interactions among xenon atoms, solvent molecules and column materials to be studied, the variable temperature dependent experiments helped to probe the molecular and chain dynamics of the solvent and the column materials. 2D exchange ¹²⁹Xe NMR revealed the exchange of xenon atoms within different cavities. Cross Polarization (CP) between ¹H and ¹²⁹Xe also help to probe a more direct interaction of the mobile phase xenon and the column material's protons observing the interactions.

Jesse Chapman

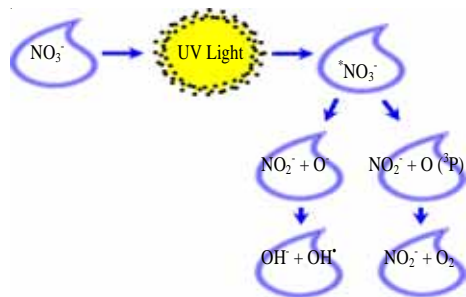
Department: Chemistry and Biochemistry
Exploration of the Photochemical Dissociation of Nitrate in Aqueous and Frozen Samples
Faculty Mentor: Dr. Krishna Foster

Globally, anthropogenic activity is responsible for increased concentrations of NO_x, CO₂, and O₃ into the environment. These compounds share a link, in that they can interconvert and interact in chemical and photolytic processes that can affect the state of the atmosphere. A compound of particular interest is NO₃⁻. Upon photo dissociation, NO₃⁻ forms products of NO₂⁻ and OH⁻. Concentrations of the radical produced may escape into the gas phase. OH⁻ is very reactive, and oxidizes many species that are toxic to the environment. OH⁻ may potentially react with these high concentrations of non-toxic species (starting a catalytic chain of events which contribute to greenhouse gas production).

Monica Mc Dowell

Department: Chemistry and Biochemistry
Detection of Hypophosphite, Phosphite and, Orthophosphate in Natural Geothermal Waters
Faculty Mentor: Dr. Krishna Foster

Literature regarding the fates of inorganic phosphorous on natural processes is at present time sparse or non-existent. Even fewer studies have been done regarding the reduction of this element



despite in-depth reduction studies of other Group V elements, such as nitrogen and arsenic. This presentation will discuss the ion phosphate (V), phosphite (III), and hypophosphite (I) in a matrix representative of natural geothermal waters. Initial examination confirms literature assertions that IC could be used as a reliable method of detection for the desired reduced compounds. Optimizations of IC detection methods were performed using preliminary analysis of each reduced compound. Confirmational data for all samples was found using mass spectrophotometry (MS). Detection limits at 3s levels of 0.35, 0.39 and, 0.83 mM were found for phosphate (V), phosphite (III), and hypophosphite (I) respectively. Future work includes implementing current methods of analysis to characterize the transport and oxidation-reduction cycles of phosphorus compounds through geothermal waters. Additional work includes investigating the microbiological and possible photochemical implications in the environment.

Amir Massoudi

Department: Mechanical Engineering
Mixture Air-Fuel in Combustion Chamber
 Faculty Mentor: Dr. Darrell Guillaume

The focus of this paper is the optimization of fuel consumption in continuous combustion engines. In this line of research, the key factors are placement of injector location, mixing and combustion. These studies that vary these parameters were conducted using a computer model developed in "FLUENT" with a numerical solver. The goals were to determine the optimal mixture of fuel and air to reduce emissions and improve efficiency. To accomplish this goal, three different fuels (gaseous heptane, liquid heptane and jet A fuel) were analyzed in Pre-PDF (Probability Density Function) files and utilized. There are several parameters that were accounted for:

chamber design, injection design, number of species in each fuel and changes in temperature and pressure and velocities. The ultimate goal of the study was to predict the best value for fuel-air mixing, to reduce emissions such as oxide, mono oxide nitrogen and mono oxide carbon, and to improve efficiency. For all flows, FLUENT solved conservation equations for mass and momentum. For flows involving heat transfer or compressibility, an additional equation for energy conservation was solved. For flows involving species mixing or reactions, a species conservation equation was evaluated or, if the non-premixed combustion model was used, conservation equations for the mixture fraction and its variance were solved. Additional transport equations were also solved when the flow was turbulent. Work completed to date has focused on testing different fuels with different numbers of species. Analysis has involved making 2-D models and meshes, comparing liquid and gas fuel in combustion, changing the diameter of fuel and air injectors, creating a jet engine model and running it with combustion, modifying the injection angles of fuel and air (by changing the x-y velocities) and lastly, varying air inlet velocities (different mach numbers for ramjet/scramjet).o

Uche Ofoma

Department: Mechanical Engineering
Autonomous UAV Concept for Titanic Missions
 Faculty Mentor: Dr. Chivey Wu

This presentation details the work completed on the Titan Aerial Vehicle (TAV), an autonomous vertical lift aerial vehicle designed to operate on Saturn's largest moon, Titan. The TAV was designed as the California State University, Los Angeles entry to the 2002 Vertical Lift Aerial Vehicle Student Design Competition sponsored by NASA's Minority University Research and Education Program. Some of the design requirements included: vertical takeoff from a lander, flight to 2 km cruise altitude in 100 km/h headwinds, mid-mission hover out-of-ground-effect for 1 minute, followed by a vertical landing at a remote site for sample pickup. Moreover, the vehicle's minimum range was to be at least 300 km while carrying a 10% payload fraction. The TAV is required to conduct multiple flights and missions with a takeoff gross mass not exceeding 100 kg. Finally, the vehicle was required to land on a variety of surfaces while assuming the presence of surface debris up to 0.03 m³ in volume. The Titan Aerial Vehicle incorporates a unique ring wing, central fuselage and canards. It is powered by a novel methane & oxygen burning piston engine. It is hoped that an aircraft like this will one day fly on Titan.

Notes

Abstract of Poster Presentations

1. Lizette Ivy Chuateco

Department: Psychology

What Role Does Discouragement Play in the College Persistence of First Generation College Students?

Faculty Mentor: Dr. Jean Phinney

Given that social support, such as encouragement, is an important factor in the educational attainment of first generation college students (Torres & Solberg, 2001), this study raised the question of how not only the lack of encouragement, but also the presence of discouragement can affect the educational experience of these students. Despite some of them being labeled “not college material,” these students have made it into college. The outcome variable we wanted to examine is persistence – will these students stay? The original longitudinal sample included 132 participants attending California State University, Los Angeles (CSULA). Participants were interviewed during the Fall quarter of their freshmen year. Thirty-seven reported being discouraged from going to college. At the end of their sophomore year, we looked at the enrollment status of all the participants in the project. Results indicate that almost half (48.6%) of the students who were discouraged are no longer enrolled at CSULA as opposed to less than a quarter (14.7%) of those who were not discouraged. A regression analysis was conducted to determine if other factors could account for the results. Out of all the factors examined, high school GPA, college GPA, family support and discouragement were significantly related to persistence.

2. Maria G. Corona, Kevin Bilisland, and Diana G. Flores

Department: Psychology

Sensorimotor Gating: Left and Right Eye Prepulse Inhibition Asymmetry and Schizotypal Personality

Faculty Mentor: Dr. Joel W. Ellwanger

Sensorimotor gating is an automatic filtering of internal and external stimuli before this information enters consciousness. Prepulse-inhibition (PPI) of the acoustic eyeblink reflex is an operational measure of sensorimotor gating. Individuals with schizophrenia spectrum disorders show impaired filtering of information as measured by PPI, a deficit linked to attentional and cognitive impairments. Animal studies indicate a contralateral organization of PPI between brain hemispheres and the eyes. Almost all studies linking schizophrenia spectrum disorders to deficits in PPI used recordings from the right eye only. The present study assesses the relationship of schizotypal characteristics and attentional capacity to PPI measured from both eyes. We hypothesized that the relationship between impaired PPI and versus schizotypal characteristics would be stronger for the right versus the left eye, reflecting greater left hemisphere involvement in sensorimotor gating deficits. Eighty-seven college students (60 female) participated in a bilateral startle eyeblink reflex testing session and were also assessed for attentional capacity (digit span) and schizotypal characteristics (Schizotypal Personality Questionnaire-brief). The results confirmed the prediction that more schizotypal characteristics would be correlated with impaired sensorimotor gating, but they did not strongly support the prediction of a stronger relationship for the right versus the left eye.

3. Dalia Cuevas and Oscar Ureno

Department: Psychology

Stress and Personality Factors in Relation to Dietary Behavior in University Students

Faculty Mentor: Dr. Ramani Durvasula

Current literature suggests that higher levels of stress are associated with unhealthy behaviors. Personality variables have also been suggested to impact health behaviors. Past work with our sample has demonstrated an association between Openness and unhealthy behaviors, with higher openness associated with a greater likelihood of experimenting with controlled substances. The present study examines stress and personality and their association with healthy unhealthy behaviors. The data are derived a diverse sample of 181 CSULA students. Mean age of the sample was 22 years, and it was 75% female. Stress was assessed using the Perceived Stress Scale, personality was measured using the NEO-PI-R. A significant association was found between stress and diet, with those who exhibited healthy behaviors reporting lower levels of stress ($p < .05$). Personality was also associated with healthy behaviors. Higher levels of personality traits such as Extraversion, Openness, and conscientiousness were observed among those endorsing more regular fruit consumption ($p < .05$). Although there was a relationship between stress and healthy behaviors, an association between stress and unhealthy behaviors was not observed. Overall, these findings suggest that both stress and personality need to be considered when looking at and studying health behaviors.

4. Laura Juarez, Alejandra Lopez, Teresa Monreal, Tara Matus, Robert Schug, Carolina Bravo, Araksiya Dovlatyan, and Fary M. Cachelin

Department: Psychology

Comparison Between European American/White and Mexican American Women with Eating Disorders and Psychiatric Co-Morbidity

Faculty Mentor: Dr. Fary M. Cachelin

This study Faculty Mentor: Fary Cachelin, Ph.D. examines the occurrence of psychiatric co-morbidity in a community sample of women with eating disorders. Psychiatric co-morbidity was characterized as the diagnosis of an eating disorder with the diagnosis of at least one other Axis I disorder. Participants were 185 (107 European American/White and 78 Mexican American) women with clinical eating disorders. Disordered eating was identified with the Structured Clinical Interview for the DSM-IV-TR (SCID-IV-TR). Axis I disorders were identified with the SCID-IV-TR. Results indicated that 85% (52% European American, 33% Mexican American) of our sample experienced psychiatric co-morbidity. The mean number of co-morbid Axis I disorders experienced by each group was significantly different, European American women ($X = 2.22$) and Mexican American Women ($X = 1.58$), $t(184) = 19.13$, $p = .000$. European American women were more likely to experience multiple co-morbidities, while Mexican American women were more likely to have experienced no co-morbidity, $\chi^2(5) = 11.17$, $p = .048$ or less co-morbidity. Both groups were most likely to experience mood disorders as their primary Axis I disorder. Research has yet to report the prevalence of psychiatric co-morbidity among Mexican American women with eating disorders. More outreach programs are needed to aid in the treatment of women with co-morbidity and to help identify women who may present with the symptoms of disordered eating under the guise of mood disorders or other Axis I disorders.

5. Haydee Lopez and Azucena Garcia

Department: Psychology

The Womanist Consciousness Scale

Faculty Mentor: Kimberly King

This poster describes the development and psychometric properties of the Womanist Consciousness Scale (WCS). The WCS, designed by King and Fujino (1994), is a 14-item questionnaire designed to measure the degree to which women of color (African American, Latina, Asian American, and Native American) hold their ethnic and feminist consciousness as equally important and inseparable aspects of themselves. Responses are given on a 7-point Likert scale (1= strongly disagree to 7= strongly agree). The validity and reliability of the WCS was examined in three samples of female college students, one at the community college level and two at four-year colleges. Results revealed internal consistency scores ranging from .80 to .86. Validity was shown through correlations with perceptions of racial and gender discrimination and sexual harassment. The WCS demonstrates considerable promise as a measure of the integration of ethnic and feminist consciousness.

6. Teresa K. Monreal

Department: Psychology

Is Alcohol and Substance Abuse/Dependency Related to Eating Disorders? An Examination of a Community Sample of European-American and Mexican-American Women

Faculty Mentor: Dr. Fary M. Cachelin

Many research studies have demonstrated the co-occurrence of substance abuse/dependence (SAD) and alcohol abuse/dependence (AAD) with eating disorders. The purpose of the present study was to further examine the relationship between SAD, AAD, and eating disorders among both White and Mexican-American participants, particularly in terms of eating disorder behavior (bingeing, purging, bingeing/purging, restriction). A total of 180 (74 Mexican-American, 106 White) participants with eating disorders were analyzed for lifetime co-morbidity of 1) substance abuse/dependence, 2) alcohol use/dependence. Overall chi-square analyses revealed no evidence of a relationship between a history of SAD or AAD and type of eating disorder (Anorexia Nervosa, Bulimia Nervosa, Binge Eating Disorder, Eating Disorder Not Otherwise Specified) or between SAD or AAD and particular disordered eating behaviors. One significant relationship was found when ethnic groups were analyzed separately; a one way ANOVA revealed that participants who abused or were dependent on substances binged more frequently than those who did not abuse/depend on substances ($F=4.321$; $p=0.04$, $M(SAD)=43.22$, $M(non-SAD)=21.68$). These results suggest a potential relationship between binge frequency and substance use that should be further examined. The proposal that type of eating disorder (i.e., Bulimia Nervosa) is associated with substance and alcohol abuse and dependence may need to be reevaluated.

7. Martha Rea

Department: Psychology

Locus of Control and Risky Sexual Behavior Among University Students

Faculty Mentor: Dr. Ramani Durvasula

Behaviors, such as risky sexual behaviors, are believed to be associated with locus of control (LOC), with external LOC associated with more sexual partners (Lee & Mancini, 1981). It was hypothesized that external individuals would engage in riskier sexual practices. Participants were enrolled in a study of health behaviors at CSULA. The ethnically diverse sample was comprised

of 42 men and 130 women with mean age of 22 years. LOC was assessed using Rotter's (1966) Internality/Externality Scale. Sexual behavior questions assessed participants' sexual activity during the past 6 months, number of partners, and frequency of condom use. Contrary to expectations, a 2x2 ANOVA revealed sexually active participants had higher internality ($p = .024$). ANOVAs by gender found history of sexual behavior related to LOC in men only. A trend suggesting that those endorsing abstinence were more external ($p= .07$) was noted. No correlation was found between number of partners, frequency of condom use and LOC. This sample was not highly risky, with most of those sexually active reporting only one partner. The Internality/Externality scale may not be capturing the construct "control" adequately for this sample. Higher internality may be indicative of having a relationship, but not riskier behavior per se.

8. Edgar Sarabia and Lorena Gomez

Department: Psychology

Multicultural Aspect of Domestic Violence: A Review and Analysis

Faculty Mentor: Gaihari Fernando

Every year, there are over 2 million reports of interpartner violence or domestic violence (DV) between men and women in the United States. Actual incidents are likely to far outnumber the reported incidents. Witnessing violence can lead to both mental and physical health problems. While many studies have been conducted on the socioeconomic and sociocultural aspects of domestic violence (DV), studies on its psychological and ethnocultural aspects are still relatively few. The purpose of this presentation is to review the current literature on the psychological and multicultural aspects of DV, with some consideration given to the sociodemographic profiles of perpetrators and victims. In addition, the role of substance use and abuse with regard to DV will be reviewed. Recommendations for future studies include development of a multicultural phenomenology of domestic violence, which would include attitudes towards physical, verbal, and psychological violence, gender and family role stereotypes, and acculturation.

9. Anny Ku

Department: Curriculum and Instruction

Channel Island Foxes

Faculty Mentor: Dr. Paul Narguizian

The Channel Island Fox (*Urocyon littoralis*) are one of the rarest and most unique of all carnivore species, and is the only carnivore unique to the state of California. As the largest native terrestrial mammal on the Channel Islands, they have come to symbolize for many the unique and fragile nature of the islands. Since 1993, the National Park Service has monitored the population of Island Fox on San Miguel Island. Park biologists estimated there to be over 400 foxes on San Miguel in 1994, but by 1995, an alarming decline had begun. Populations on other Channel Islands such as Catalina, Santa Cruz, and Santa Rosa, and San Clemente had experienced similar decline. It has been predicted that without any conservation management plan, San Miguel Island Fox will be extinct in five (5) years. In this poster presentation, you will learn about the natural history of the foxes, the various factors contributed to its rapid decline, and the ways scientists are helping to save the foxes. You will also learn about current science state standards and ways to integrate conservation biology in your classroom.

10. Marianela Arias

Department: Biological Sciences

The Role of Cyclic Nucleotide Gated Channels in Estradiol Production in Rat Granulosa Cells (CNGs)

Faculty Mentor: Dr. Philip LaPol

In females, the production of estradiol (E2) is essential for reproductive function. Previous studies suggest that increased intracellular calcium levels contribute to the stimulatory effects of follicle-stimulating hormone (FSH) on E2 production. Cyclic nucleotide gated channels (CNGs) are cation channels which mediate calcium influx into cells. To determine the role of CNG-mediated calcium flux on E2 production, this study examined the expression of CNG channels in the ovary, and determined the effects of EGTA (a calcium chelator) and LCD (a CNG blocker) on FSH-stimulated E2 levels. RT-PCR of ovarian RNA using specific primers for CNG3 resulted in the amplification of a product of expected size, suggesting the presence of CNG3 in the ovary. The role of CNGs in E2 production was examined using cultured rat granulosa cells. While untreated cells displayed low E2 production, incubation with FSH markedly increased E2 levels. Removal of extracellular calcium by incubation with EGTA markedly inhibited FSH-stimulated E2 levels, indicating that calcium influx into cells contributes to the stimulation of E2 synthesis. Similarly, blockage of CNG channels with LCD abolished FSH-stimulated E2 production, indicating a role of CNG channels in calcium influx. These findings suggest important roles of CNG.

11. Andre M. Hernandez

Department: Biological Sciences

Novel Host Protein Interaction With Sendai Virus (SeV) Variant F1R's Matrix Protein

Faculty Mentor: Dr. Nancy L. McQueen

Search for novel protein interactions with the Sendai virus (SeV) variant F1R's matrix protein (M) through the use of a yeast two-hybrid expression system. F1R is a naturally isolated host-range mutant variant of SeV that causes systemic infections in rodents. This unusual pathology is partially due to M-F1R's ability to disrupt the microtubule network within the cell to induce bipolar budding of new virions. Literature has also shown that tubulin interacts with wild type SeV M proteins to regulate genomic transcription. To identify new interactions, AH109 *S. cerevisiae* cells were used to screen interactions between M-F1R and a CV1, African Green Monkey Kidney cells, cDNA library. The results from screening over a thousand two-hybrid clones isolated a single positive interaction with M-F1R. This positive interaction was further characterized by X-Gal/IPTG quantitative assays. Sequencing results of this library vector identified the mRNA insert as an ATP-binding cassette with homology to the ABCF1 superfamily, GCN20 subfamily of proteins. GCN20 proteins may be regulated by tumor necrosis factor-alpha (TNF- α) and play a role in enhancement of protein synthesis and the inflammation process. These results suggest that M-F1R may indirectly inhibit host inflammatory responses.

12. Jose G. Martinez

Department: Biological Sciences

Synergistic Activity between Lysozyme and Fatty Acids: A New Mechanism of Innate Immunity

Faculty Mentor: Dr. Edith Porter

Innate immunity plays a major role in preventing mucosal microbial invasion. Major key players are antimicrobial (poly)peptides, small membrane-disrupting, cationic amphipathic peptides. Lysozyme, known for its enzymatic, peptidoglycan hydrolyzing activity recently was included in this family as a direct membrane targeted activity was documented. Fatty acids are also present in mucosal secretions. Several reports describe lower levels of linoleic and

docosahexaenoic acids in cystic fibrosis patients that typically suffer from chronic lung infection with the *Pseudomonas aeruginosa*. We explored whether there is a synergism against *Pseudomonas aeruginosa* between lysozyme and selected fatty acids. A fluorescence-based metabolic assay was employed to measure continuously the bacterial reduction of resazurin to resofurin reflecting the numbers of bacteria and their individual reducing activity. Lysozyme alone suppressed bacterial reducing activity in a dose-dependent manner. Oleic and palmitoleic acids antagonized lysozyme. In contrast, docosahexaenoic acid demonstrated synergistic activity with lysozyme and we speculate that these hydrophobic molecules together cause severe ultrastructural damage. Our findings suggest a novel role of host-derived fatty acids in innate immunity and a hitherto unrecognized interaction between lipid and peptide mediators of host defense.

13. Marquis Patrick and James Dale

Department: Chemistry and Biochemistry

Differential Gene expression during the bolting transition of Arabidopsis thaliana

Faculty Mentor: Dr. Robert L. Vellanoweth

Changes in leaf gene expression during the early development of the floral meristem of *Arabidopsis thaliana* are suspected to be involved in the senescence of its cells late in the lifespan of the plant. This suggests that there are signals that are released during the onset of bolting (bolting transition) that initiate a cascade of events leading to senescence. In order to illuminate the regulatory mechanisms that initiate and carry out senescence, we have identified a set of genes that are differentially expressed during the bolting transition. Investigations into their regulation can then reveal the mechanisms that initiate senescence. To identify genes that are differentially expressed during the bolting transition, mRNA from pre-bolt and bolting plants was isolated and subjected to two separate microarray analyses. Microarray analysis revealed 65 genes that had significant changes in gene expression. To confirm the microarray results, pre-bolt and bolt total RNA from a subset of the genes found via the microarray analysis will be isolated and subjected to RT-PCR analysis.

14. Suzanne Brunelle

Department: Biological Sciences

Relating NDVI and WBI to Carbon Flux and Biomass in a Grassland Ecosystem

Faculty Mentor: Dr. John Gamon

This study explored relationships between optical signals of ecosystem greenness, gas exchange (photosynthesis and respiration), and biomass (active plant material) at Cheseboro Canyon, a grassland ecosystem in the Santa Monica Mountains National Recreation Area. Field sampling conducted in the winter and spring of 2003 consisted of measuring ecosystem greenness, using instruments that measure reflected light and CO₂ exchange, and harvesting biomass. Two optical indices, the Normalized Difference Vegetation Index (NDVI), a measure of greenness, and the Water Band Index (WBI), a measure of water status, were derived from the amount of light reflected. There were strong correlations between these optical indices, (NDVI and WBI), the amount of CO₂ exchanged and amount of biomass. While it is possible to directly detect the amount of CO₂ exchanged or biomass, these methods are expensive, time consuming, and destructive to the ecosystem. Optically measuring greenness or water in an ecosystem is fast, inexpensive, and nondestructive and can be linked to remote sensing for effectively studying large areas. The strong relationships between these optical indices, gas exchange, and the amount of active plant material suggest that

NDVI and WBI can be used to estimate gas exchange and that remote sensing can provide good estimates of key ecosystem properties and processes.

15. Mircea Voda

Department: Biological Sciences

Cloning, expression and purification of MECP2 from Arabidopsis thaliana

Faculty Mentor: Dr. Robert L. Vellanoweth

In recent years a direct link between DNA methylation and repressive chromatin structure was established. CpG methylation is the most common epigenetic modification in vertebrates and is mediated by the family of methylated DNA specific binding proteins. These proteins bind methylated sequences and are primarily associated with transcriptional repression. They all share the methyl-CpG-binding domain (MBD). DNA methylation in eukaryotes involves addition of a methyl group to the carbon 5 position of the cytosine ring. MECP2 is one of the genes that shares the common MBD and was found to have an important role in DNA methylation and silencing of genes in mammals. The mechanism of gene silencing remains largely unknown in plants compared to mammals, where many studies show the importance of MECP2 in methylation and silencing. Our project will involve studies of protein binding and identification of proteins that bind to the MECP2 homologue. We will also solve the structure of the protein bound to its DNA element by NMR analysis. We are focusing on AtMBD5, which is a small 186 amino acids protein. The coding sequence for the AtMBD5 was amplified by PCR and then cloned in bacterial expression vector. We performed a time course expression for the clone. Using optimum conditions, we purified the MECP2 homolo

16. Rochelle Songco

Department: Biological Sciences

Effect of chronic restraint stress in combination with exercise on brain-derived neurotrophic factor mRNA expression in the hippocampus

Faculty Member: Dr. Amelia Russo-Neustadt

Brain-derived neurotrophic factor (BDNF), a neurotrophin that promotes survival and growth of the brain is also involved in the maintenance and plasticity of neurons. BDNF also has important roles in regulating activity in adult brains such as long-term potentiation (LTP) and in behaviors such as learning and stress. Mental activities such as exercise have been shown to enhance BDNF expression. Chronic stress has been shown to lead to neurodegeneration and decrease BDNF mRNA expression in the hippocampal region of the brain. This study investigated whether exercise can offset the damaging effect of chronic stress. Sprague-Dawley rats were subjected to chronic restraint stress for three weeks. During this period they were free to access running wheels in their cages. BDNF mRNA levels were measured by *in situ* hybridization. The group of rats that were active and not stressed showed significantly higher levels of BDNF than the group that underwent chronic stress and no activity in all regions of the hippocampus except for CA1. There was also a significant difference in levels of BDNF between the group that was active with no stress and the group that was sedentary with no stress in the CA4 and dentate gyrus regions of the hippocampus.

17. Anahid Mirzaton

Department: Biological Sciences

Expression of Adenylyl Cyclase Types V and VI in Rat Ovaries

Faculty Mentor: Dr. Philip LaPol

Adenylyl cyclase (AC) is an enzyme which converts ATP into

the second messenger cAMP. Elevated cAMP levels increase hormone production in rat ovarian cells. Nitric oxide (NO), however, inhibits hormone synthesis and decreases cAMP levels. While NO inhibits levels and activity of AC types V and VI in other tissues, it is not known if these ACs are expressed in rat ovarian cells. Therefore, this study examined the presence of mRNAs for ACV and VI in the rat ovary. RNA was extracted from ovaries and subjected to RT-PCR amplification using oligonucleotide primers specific for ACV and ACVI mRNAs. PCR products of the expected size were obtained, indicating expression of these AC isoforms in the ovary. To confirm this finding, the PCR products were ligated into self-replicating plasmids, transfected into bacteria, and amplified. The identities of the cDNAs were confirmed by restriction mapping and DNA sequencing. These results demonstrate expression of ACs V and VI in the rat ovary, consistent with inhibitory effects of NO on cAMP production. Future studies will examine the effects of NO on levels and activity of ACV and VI in cultured rat granulosa cells, and determine their cell-specific expression in rat ovaries by *in situ* hybridization.

18. Gloria Preza, Edith Porter, S. Dixon, O. Murillo, Heriberto Lima, and Alison Quayle

Department: Biological Sciences

Up-regulation and post-translational processing of epithelial defensin HD5 in the male urethra during sexually transmitted diseases

Faculty Mentor: Dr. Edith Porter

Innate immunity plays an important role in mucosal defense, in part mediated by antimicrobial peptides including defensins. Whereas some progress has been made in understanding mucosal defense in the respiratory and intestinal tract, the genital tract particularly in the male, is still under-investigated. This is despite the continuing major impact of sexually transmitted diseases on public health. Human defensin 5 (HD5) was first described in the small intestine in Paneth cell granules as a propeptide (proHD5) that is fully processed by Paneth cell derived trypsin. We have previously reported HD5 up-regulation in inflamed female genital tract. Employing semi-quantitative Western blot techniques, we describe here the up-regulation of HD5 in urethral washes of men with urethritis caused by *Neisseria gonorrhoea* or *Chlamydia trachomatis* as reflected in the appearance of proHD5. Upon incubation with neutrophil granule extract, recombinant proHD5 was cleaved *in vitro*. Recombinant proHD5 was inactive against *N. gonorrhoea* when tested in 70% RPMI medium supplemented with glucose and vitamins, in contrast to processed HD5. These data suggest that HD5 is likely to contribute to mucosal defense in the male genital tract and also shows how different components of innate immunity interact to provide better protection against microbial invasion.

19. Haedy Shafeek

Department: Biological Sciences

The interaction between tubulin and M proteins from both wild-type Sendai virus and its variant, F1-R

Faculty Mentor: Dr. Nancy McQueen

Wild-type (wt) Sendai virus causes a localized respiratory tract infection in mice, while a variant F1-R, causes a systemic infection. One factor that we believe contributes to F1-R's ability to cause a systemic infection is F1-R's ability to disrupt the microtubule network of infected cells. This is due to two mutations in F1-R matrix (M) protein. We hypothesize that both wt and F1-R's M interact directly with tubulin and that in F1-R is enhanced as compared to wt. A West-western analysis determined that there is a direct interaction between tubulin and M from both wt and

F1-R. Surface plasmon resonance supported that. We tested the effect of the pH, the salt concentration, and the presence of detergents in the tubulin- M incubation stage. Results showed a strong interaction at pH 7.0, less at pH 5.5, pH 6.0, pH 6.5, and pH 7.5, and none at pH 5.0, and pH 8.0. Although there was a strong interaction at a salt (NaCl) concentration of 150mM, it was stronger at 300mM, and weaker at 75mM. 0.1% NP40 had no effect on the interaction; while 1% Triton X100 inhibited the interaction. These results suggest that the M-tubulin interaction may be electrostatic in nature.

20. Dennis Yang

Department: Chemistry and Biochemistry
Visualization of the Expression of the Arabidopsis Methyl CpG Binding Protein 2 Gene Using Green Fluorescent Protein
Faculty Mentor: Dr. Robert L. Vellanoweth

Methylation of DNA and its subsequent binding by methyl CpG binding protein 2 (MeCP2) has been correlated with gene silencing in mammalian cells. Mutations in the human MeCP2 gene have been linked to Rett syndrome and cancer. Furthermore, recent research has established a connection between below normal gene silencing and premature cellular senescence. Based on this information, our laboratory hypothesized that a programmed variation of the endogenous levels of MeCP2 may affect the timing of senescence in *Arabidopsis thaliana*. In our laboratory, we have found and isolated a gene known as AtMBD5 in *Arabidopsis thaliana* that is 33% to 35% homologous to the human MeCP2 gene. We constructed 3 plasmids: AtMBD5 promoter fused with GFP to see the expression level, AtMBD5 promoter + AtMBD5 coding sequence fused with GFP to see the localization, and 35s / GFP for control. Our two hypotheses are: the expression of AtMBD5 will decrease after seeding and thus correlate with the onset of senescence, and the translated AtMBD5 protein will be transported to the nucleus of the *Arabidopsis* cell. Currently we have positively identified transformed plants and we are waiting for these plants to enter the seeding stage. Once we collect these seeds, we will be able to generate data to test our hypothesis.

21. Susan Sanchez

Department: Chemistry and Biochemistry
The Role of Isoleucine 230 in Maize Phosphoenolpyruvate Carboxylase
Faculty Mentor: Dr. Scott Grover

Maize (*Zea Mays* L.) is a C4 plant that uses the enzyme phosphoenolpyruvate carboxylase (PEPc) for the uptake of carbon dioxide in photosynthesis. PEPc is a tetramer composed of four identical subunits. This enzyme is highly regulated, and the goal of this project is to determine the role of the isoleucine at position 230 in the allosteric regulation of this enzyme. This residue is conserved in all known plant PEP carboxylases. Previous studies in our lab have shown that the region near isoleucine 230 is important in the enzyme's response to regulators. For example, the mutant E229A has been shown to have reduced affinity for inhibitors. The mutations we are studying are ones in which isoleucine 230 is replaced by either the basic amino acid histidine (I230H) or the less hydrophobic alanine (I230A). These mutants were prepared by using site-directed mutagenesis, a technique for specifically altering DNA sequences at any desired location. These two mutants are currently being sequenced to verify that the mutagenesis was done correctly. Once the sequence has been obtained, the mutant proteins will be isolated and their regulatory properties characterized.

22. Raymond Quon

Department: Biological Sciences
The Influence of Aging and Reproductive Status on Galanin Protein Levels in the Anterior Pituitary Gland of Female Rats
Faculty Mentor: Dr. Philip LaPolt

Female rats entering middle age (8-9 months) transition from regular ovulatory cycles to prolonged, irregular cycles, followed by a chronic anovulatory, persistent-estrous (PE) state associated with low luteinizing hormone (LH) levels. The neuropeptide galanin is expressed in hormone-secreting cells of the anterior pituitary, and acts locally to inhibit LH release. Our previous findings demonstrate increased galanin mRNA levels in pituitaries of PE rats, compared to young females. My study tested the hypothesis that galanin protein levels are similarly elevated in PE rats, reflecting increased numbers of galanin-producing cells within the anterior pituitary. Pituitaries were obtained from young and middle-aged cyclic and middle-aged PE rats, and processed for immunohistochemical analysis of galanin, prolactin, growth hormone (GH), and LH levels. While pituitaries of young and middle-aged cyclic rats exhibited few galanin-producing cells, those of PE females displayed higher numbers of galanin cells per pituitary section. In all groups, galanin co-localized primarily in prolactin- and GH-secreting cells, with less colocalization in LH-producing gonadotrophs. The increase in galanin cells in PE rats could not be accounted for by increase numbers of prolactin, GH- or LH-secreting cells. This age-related increase in galanin protein levels may potentially contribute to attenuated LH release during reproductive senescence.

23. Rosie Alvarez and Leyma de Haro

Department: Chemistry and Biochemistry
Extraction, Amplification And Sequencing Of Mitochondrial Dna From A Fossil Of Urocyon Littoralis
Faculty Mentor: Dr. Robert L. Vellanoweth

Urocyon littoralis (Channel Island fox) a descendant of *Urocyon cinereoargenteus* (mainland fox), lives in the California Channel Islands and is considered an endangered species. It has been hypothesized that the foxes swam to the northern islands about 16000 years ago when the islands were a single land mass, and then were taken to the southern islands by Native Americans about 3400 years ago. Several samples of *Urocyon littoralis* bones were found on excavation sites throughout the San Miguel and San Nicholas islands. One of the bones is speculated to be 3400 years old approximately. Using a bone DNA extraction protocol, PCR with specific primers, cloning and sequencing techniques, a portion of the D-loop region of the mitochondrial genome was analyzed to figure out the mutation rate in the DNA. Preliminary data showed two single base mutations among four different bones analyzed. Subsequent experiments yielded no mutations when compared to a reference sequence from extant Channel Island fox. Repetitions of experiments are needed to reach a conclusive number of mutations, and to confirm findings. The information will later be used to determine the time of divergence of the species.

24. Jacqueline A. Levy

Department: Biological Sciences
Construction of Plasmid used to Develop MDCK stable cell lines that can be Induced to Express M-42
Faculty Mentor: Dr. Nancy McQueen

Different mutations are found in the M protein of wild-type (wt) Sendai virus and a variant Sendai virus, F1-R. Several of the

the mutant M proteins of these viruses cause bipolar budding. A new plasmid, pIND-M42-GFP, has been constructed using a 3-way ligation to create stable cell lines in Madin Darby canine kidney (MDCK) cells. The stable cell lines can be induced to express M-42, which has been confirmed by the presence of green fluorescent protein (GFP) using fluorescent microscopy. We hypothesize that newly created mutant M-42, when co-expressed with wt fusion protein (F), will redirect the transport of the wt F protein to both apical and basolateral domains of polarized cells. To test our hypothesis, this project will focus on expressing wt F protein individually in the polarized cell line, MDCK, and in the developed stable MDCK cell line that expresses M-42, by integration of the pIND-M42-GFP plasmid. A surface biotinylation assay will be used to determine the site of transport, when wt F is expressed by itself versus when wt F is co-expressed with M-42.

25. Carolina Reyes

Department: Biological Sciences

Variability in the Microbial Populations in Soils with Elevated CO₂

Faculty Mentor: Dr. Tina Salmassi

Elevated concentrations of soil CO₂ (14.6-65.2 %) have created tree-kill areas at Horseshoe Lake, Mammoth Mountain, California. High concentrations of CO₂ can kill trees by preventing either nutrient or O₂ uptake. Increased soil CO₂ levels have also been shown to cause a shift in the pH and chemical composition of the soil. Forest soils vary in their ability to buffer acids which is normally by silicate weathering. Because the soil CO₂ concentration is high in the soils near Horseshoe Lake, silicate weathering is not enough to buffer the acids in these soils. We hypothesized that microbial communities would differ in overall numbers and composition at this site based on soil CO₂ levels. Previous molecular analysis (based on 16S rRNA) suggested a decrease in bacterial diversity in the affected areas. The aim of this study was to assess the effects of elevated soil CO₂ on cultivatable bacterial populations in these soils. We compared recoveries of heterotrophs, anaerobes, and acidophilic bacteria in soil samples collected from three different sites: high CO₂ (~60%), located in the tree-kill zone; medium CO₂ (~15%), between the tree-kill zone and the adjacent live forest area; and low CO₂ (<0.4%), located in the live forest area.

26. Erika D. Reynoso

Department: Biological Sciences

A New Tool to Study Processing of Human Defensin 5, An Important Mediator of Mucosal Immunity

Faculty Mentor: Dr. Edith Porter

Paneth cells (PC) in the small intestine contribute to innate mucosal immunity by secreting defensins, natural peptide antibiotics that are small cationic, amphipathic molecules with membrane disrupting activity. Many defensins are produced as propeptides that undergo posttranslational sequential processing. Human defensin 5 (HD5) is found in PC granules as a propeptide (proHD5) and is further processed by PC derived trypsin. As biological activities of the different HD5 forms vary and processing may be altered in diseases of the gastrointestinal tract, it is important to have a tool to identify the various HD5 forms. We describe here epitope mapping of monoclonal antibodies raised against proHD5 employing fluorimetric ELISA, dot blot and Western immunoblot analysis. As antigens, recombinant and natural HD5 forms with varying N-terminus and synthetic peptide fragments were used. Polyclonal rabbit antisera raised against fully processed rHD5 reacted with all HD5 forms, except the synthetic fragments. Most monoclonal forms were reactive only with incompletely processed HD5 forms and non-reactive with fully processed HD5. These

antibodies will be useful in the study of HD5 processing and intestinal diseases involving PC.

27. José Alfonso Silva and Evelyn Lima

Department: Biological Sciences

Do parasitic plants and their host plant have equal protection against sunlight?

Faculty Mentor: Dr. John A. Gamon

Cuscuta californica (dodder) is a parasitic plant that extracts nutrients from its host plant. Some species of dodder conduct little photosynthesis and they cannot survive without their host plant (Hibberd et al. 1998). Dodder and its host plant have photoprotective carotenoid pigments that include carotenes and xanthophyll cycle pigments, which can protect the plant and its photosynthetic apparatus under high light. Most plants have more chlorophyll than carotenoids, but we find that dodder species has more carotenoid pigments than chlorophyll. In this study we are exploring functional significance of these pigment differences. Both destructive and nondestructive methods (HPLC and spectroscopy) indicate that the xanthophyll cycle pigments of dodder function to protect the plant and its photosynthetic apparatus from sunlight. Yet it is not clear why dodder possesses a high carotenoid pigment concentration since it does not conduct a significant amount of photosynthesis. We are conducting further studies to reveal the functional significance of these pigment differences.

28. Michael Soto, Jonathan Janer, and Valerie Nevarez

Department: Civil Engineering

Mini-Cone Penetration Testing of Seafloor Soils

Faculty Mentor: Dr. Mark Tufenkjian

The Navy routinely conducts geotechnical seafloor surveys to aid in the design of moorings, piers, and cable arrays. A fast, reliable method for determining the seafloor soil properties is a vital part of these surveys. Poor and unreliable soil data can lead to costly installation delays, cost overruns, and even failure of the system. This effort describes a multi-year research project funded by the Office of Naval Research to test and calibrate a new mini-cone penetration system to provide accurate and reliable geotechnical soil information within the upper 5 to 6 feet of the seafloor. The primary objective of this project is to obtain calibration information needed to correlate the measured mini cone penetration test parameters to soil stratigraphy and strength properties. This will be accomplished by performing full-scale test-bed mini-cone penetration tests on soil in a controlled condition, conducting parallel laboratory tests on the same soil to determine test-bed soil parameters, and then calibrating the mini-cone penetration test results against the laboratory soil parameters. In this way, specific correlations for the mini-cone penetration test can be developed.

29. Loren MacKinney and Jose Cano

Departments: Mechanical Engineering and Biological Sciences

Non-Intrusive Method to Ecosystem Sampling by Automated Tram System

Faculty Mentor: Dr. John A. Gamon

Non-intrusive methods are needed to measure ecosystem optical and gas exchange processes leading to the development of an automated tram system. The system provides both a platform and controller for the required instruments, while introducing minimal disturbance to the ecosystem and allowing repeat sampling. The current tram system, located at a chaparral site,

consists of a robotic sampling cart that travels above the vegetation along 100m long track. On board instruments are used to take optical, thermal, & moisture samples of the ecosystem. Improvements to the system include the ability of the cart to recognize its position. Instrument triggering from track markers rather than triggering on timed intervals greatly improves the precision of data taken by providing constant sampling positions. Current plans for improving the tram system include controlling the cart from a base station located on campus, which will enable truly remote control and provide novel research and student training opportunities. Many challenges arise from this including the integration of real time wireless communication between the cart, the base station, and the campus network, on board power supply and solar charging capabilities, and the integration & orientation of sensors. This system will enable improved monitoring of ecosystem processes.

30. Komal Patel and Ruby Argumedo

Department: Chemistry and Biochemistry
Determination of the Induced Isoform of Lipoxygenase at the Bolting Transition in Arabidopsis thaliana
Faculty Mentor: Dr. Robert L. Vellanoweth

Lipoxygenase (LOX) is the enzyme that starts a cascade of reactions leading to the synthesis of second messengers. The enzyme uses molecular O₂ to form lipid peroxides from unsaturated fatty acids. Our lab recently demonstrated that in Arabidopsis LOX activity increases during the bolting transition. In whole cell extracts, two isoforms predominate, one with a pH optimum at 5.0 and the induced form at pH 7.4. From the genome sequence, LOX2 (At3g45140) contains a chloroplast targeting sequence but LOX1 (At1g55020) does not. We hypothesize that the chloroplast-targeting LOX has a pH 7.4 optimum and the cytoplasmic isoform has the pH 5.0 optimum. Cytoplasmic and chloroplast fractions were prepared from two stages of leaves and used to assay for LOX and marker enzyme activities. For the LOX measurements, the formation of the conjugated HOO-FA product was observed spectrophotometrically at 234nm. The specific activity of LOX was observed at two different pHs. Our current results show significant LOX activity in cytoplasmic extracts at pH 5.0 whereas at pH 7.4 there was no activity. In the chloroplast extracts, the opposite was observed, higher LOX activity at pH 7.4 and essentially no activity at pH 5.0. In order to support our hypothesis, the experiment needs to be repeated multiple times.

31. Juan Apodaca, Christopher Martinez, and Ramon Mercado

Department: Chemistry and Biochemistry
Determination of the Concentration of Jojoba Oil that Affects High Density Lipoprotein Metabolism in New Zealand White Rabbits
Faculty Mentor: Dr. Raymond E. Garcia

Previous studies in our laboratory have shown that female New Zealand White rabbits fed a 2% jojoba oil diet for seven days results in a significant increase in HDL-C concentration. Jojoba oil is composed of 20-carbon acid and alcohol, namely eicosenoic acid and eicosenol respectively. Our objective is to determine the concentration of jojoba oil that is not excreted in the rabbits' feces, but remains in the body. It is our hypothesis that it is the unhydrolyzed jojoba oil that is responsible for increasing the HDL-C concentration in rabbits. This objective was achieved by feeding female New Zealand White rabbits a rabbit chow supplemented with 3 and 9% (w/w) jojoba oil for 39 days. Blood was collected from an ear vein and serum was obtained by centrifugation. Lipids were extracted from serum and feces by the method of Bligh and

Dyer. This was followed by separation and quantification using gas-liquid chromatography. The HDL fraction was separated from the VLDL+LDL fraction by polyanion precipitation of the serum, and total cholesterol (free cholesterol + cholesteryl ester) concentration was measured enzymatically. After 28 days of consuming the diet, an elevated steady state of eicosenoate was observed for the feces and the blood, as well as an elevated steady state of HDL-C levels in the blood. The change in HDL-C concentration in the blood, therefore, can be attributed to the elevated concentration of eicosenoate in the body. (Supported by MBRS-RISE grant R25 GM61331.)

32. Preciliano R. Duran

Department: Kinesiology and Nutritional Science
The effect of weight bearing levels on hindlimb stepping kinematics in rats
Faculty Mentor: Dr. Ray de Leon

Recent studies have shown the kinematics of locomotion is influenced primarily by the levels of weight bearing on the limbs. The purpose of this study is to examine the effects of loading on hindlimb stepping in rats using a robotic device that measures the amount of loading during treadmill locomotion. Rats(n=44) were placed in a body weight support(BWS) system using a computer controlled counterbalance mechanism to support a percentage of the weight of a rat suspended above a motorized treadmill. Hindlimb stepping was tested at 95% (low weight bearing), 85% and 75% (moderate weight bearing), and 65% (weight bearing) BWS at a treadmill speed of 6cm/s. Robotic arms attached to the ankles recorded limb movement. Preliminary behavioral analyses indicated the rats had difficulty stepping at 95% BWS with the step cycle characterized by inconsistent swing and stance phases. At 85% and 75% BWS, a consistent stepping pattern was observed with clear swing and stance phases. Currently, we are analyzing the data to determine if significant differences were observed in kinematic measurements using different weight bearing levels. Findings will provide information regarding the normal responses to loading in rats for comparing load adaptations in spinal cord injured rats.

33. Maria Flores, Monica Hernandez and Maritza Hernandez

Department: Chemistry and Biochemistry
Dose-Dependent Response of Dietary Jojoba Oil on Lecithin:Cholesterol Acyltransferase Activity in Cholesterol-Fed Rabbits
Faculty Mentor: Dr. Raymond E. Garcia

Previous dietary studies indicate high density lipoprotein cholesterol (HDL-C) concentration decreases when New Zealand White rabbits are fed a 1% cholesterol diet, but remains at a normal level when fed a 1% cholesterol + 2% jojoba oil diet. The difference observed between the two diets suggests that dietary jojoba oil alters HDL-C metabolism in cholesterol-fed rabbits. Our objective is to determine the mechanism of action of jojoba oil on HDL metabolism. A dose-response experiment was proposed to determine the optimal concentration of dietary jojoba oil. It is our hypothesis that dietary jojoba oil activates lecithin:cholesterol acyltransferase (LCAT), which esterifies free cholesterol to cholesteryl esters. The validity of our hypothesis was tested by feeding adult female New Zealand White rabbits the following diets: 1% cholesterol (C), 1% cholesterol + 1% jojoba oil (CJ1), 1% cholesterol + 2% jojoba oil (CJ2), and 1% cholesterol + 3% jojoba oil (CJ3). Blood samples were collected at 0 and 7 days. Total cholesterol (TC) and free cholesterol (FC) concentrations were measured enzymatically, while the rate of LCAT was obtained with

fluorometric assays. Preliminary results show that 3% jojoba oil is the optimal dietary concentration of jojoba oil. The results also indicate a dose-dependent increase in the rate of LCAT activity ($N > CJ3 > CJ2 > CJ1 > C$). These results, therefore, indicate that dietary jojoba oil activates LCAT. Future studies will determine if the activation of LCAT is due to substrate fatty acid specificity.

34. Jingjing Zhang and Susana Nava

Department: Chemistry and Biochemistry
Arabidopsis MeCP2 L Protein (AtMeCP2 L) Localization and Transcriptional Regulation Using GFP Fusions
Faculty Mentor: Dr. Robert L. Vellanoweth

The methyl-CpG binding protein MeCP2 of mammalian cells plays an important role in gene silencing. AtMeCP2 L is a gene in *Arabidopsis* that is partially homologous to human MeCP2. Mutations in human MeCP2 have been linked to Rett Syndrome and cancer, while decreased levels of AtMeCP2 L in *Arabidopsis* occur during senescence. Fusion genes with both AtMeCP2 L and Green Fluorescent Protein (GFP) will facilitate localization and transcriptional regulation studies of MeCP2. To make these fusion genes, a pair of primers were designed for each of AtMeCP2 L and GFP and used in PCR I to amplify them. The reverse AtMeCP2 L primer and the forward GFP primer were specifically designed to be complementary to each other, and it allows a perfect fusion between both genes in PCR II. We found a fused gene about 7kb in length with both AtMeCP2 L and GFP exclusively at 49.7°C during the annealing stage in PCR II. Based on the optimal fusion temperature discovered by using the gradient method, we are able to make clones of the GFP fusion of AtMeCP2 L to produce transgenic plants to study the localization and transcriptional regulation of Arabidopsis MeCP2 L protein.

35. Maira Soto and Denise Delgado

Department: Chemistry and Biochemistry
Enzymes Involved in Plasma Cholesterol Metabolism are Regulated by Dietary Jojoba Oil
Faculty Mentor: Dr. Raymond E. Garcia

Seven day dietary studies indicate that high density lipoprotein cholesterol (HDL-C) concentration decreases when New Zealand White rabbits are fed a 1% cholesterol diet, but remains at a normal level when fed a 1% cholesterol + 2% jojoba oil diet. Dietary jojoba oil, therefore, alters HDL-C metabolism in cholesterol-fed rabbits. It is our hypothesis that dietary jojoba oil inhibits cholesteryl ester transfer protein (CETP) and activates lecithin:cholesterol acyltransferase (LCAT) activities. CETP transfers cholesteryl esters from HDL to LDL, whereas LCAT esterifies free cholesterol to cholesteryl esters. The validity of our hypothesis was tested by feeding adult female New Zealand White rabbits the following diets: 1% cholesterol (C), 1% cholesterol + 1% jojoba oil (CJ1), 1% cholesterol + 2% jojoba oil (CJ2), and 1% cholesterol + 3% jojoba oil (CJ3). The CJ3-fed rabbits maintained close to normal HDL-TC levels and exhibited a substantial reduction in CETP activity and elevation in LCAT activity compared to the C-fed rabbits. These results, therefore, indicate that dietary jojoba oil inhibits CETP and activates LCAT. Future studies include increasing the animal pool size and measuring other enzymes that influence cholesterol metabolism in the blood. (Supported by NIH MBRS-RISE grant R25 GM61331 and NIH-MARC grant GM 08228.)

36. Raffie Avakian, Janet Maya, Osmundo Franco, and Danny Chagolla

Department: Chemistry and Biochemistry
Synthesis of Xenon Deuteriohydrate and the Observation Using NMR Spectroscopy

Faculty Mentor: Dr. Yong Ba

Clathrate hydrates (from an overall perspective) are crystal lattice structures that are formed by the reaction (contact) of host ice molecules and guest gas molecules. Various types of hydrates have been formed from gases like methane (CH_4) and carbon dioxide (CO_2), and these have been great focuses in the past and even today. In the past, a new form of clathrate hydrate was synthesized, using a noble gas; in this case, xenon (Xe). Xenon gas has been revealed to create a great range of chemical shift in Nuclear Magnetic Resonance Spectroscopy due to a large electron cloud which affects the behavior of the nucleus, which allows for the study of structure of gas hydrates. Many researchers and chemists performed various methods of synthesizing clathrate hydrates with xenon gas. Their starting materials were xenon gas and deuterium oxide as ice. The problem with this method was the long time it would take ice to react with gas. A new method of synthesis was tried out in our lab, by using xenon gas and liquid deuterium oxide to prepare gas hydrates. From this method, methane and carbon dioxide hydrates were also attempted to be made. The main focus involves the synthesis of one type of clathrate hydrates; in this case, xenon with deuterium oxide (a gas-liquid reaction). In addition, this will enhance further study on the kinetics of the formation of these clathrate hydrates.

37. Jeremiah Fields

Department: Chemistry and Biochemistry
Synthesis of Ferrocenyl- Derivatives of 1,7- and 1,2- $C_2B_{10}H_{12}$
Faculty Mentor: Dr. Frank Gomez

Synthetic routes to mono-substituted carboranes are important in the development of di-substituted heterofunctional derivatives for biomedical applications. Of equal importance is the need for chemical transformations that are facile and require mild reaction conditions. Anionic derivatives of 1,7- and 1,2- $C_2B_{10}H_{12}$ can be generated following reaction with base to produce highly reactive species susceptible to electrophilic attack that, upon reaction, yield a statistical mixture of di- and mono-substituted products. Hence, there is a great need to develop simple and versatile routes to mono-substituted carborane species. Herein, we describe the synthesis of 1-[ferrocenyl(hydroxy)methyl]-1,7-dicarba-closo-dodecaborane (**1**) and 1-[ferrocenyl(hydroxy)methyl]-1,2-dicarba-closo-dodecaborane (**2**). In THF compound **1** was synthesized in 20% and 40% yields using tetrabutylammonium fluoride (TBAF) and n-butyllithium (n-BuLi) respectively. Compound **2** was synthesized in 45% (TBAF) and 55% (n-BuLi) yields. Crystal structures for **1**, figure below, and **2** were obtained. For structure **1**, formula weight = 359.17, orthorhombic, Pna21, refined to $R = 0.0424$ for 4137 observed reflections. For structure **2**, formula weight = 358.26, monoclinic, P2(1)/c, refined to $R = 0.0481$ for 4014 observed reflections. Further work describing the versatility of TBAF and the reactivity of **1** and **2** is in progress.

38. Elizabeth Abeja and Margaret Banda

Department: Geological Sciences
A Comparative Petrologic Analysis of Detrital Grains Present in Paleocene Paleosols and a Quartz-Rich Sandstone Exposed in Southern California
Faculty Mentor: Dr. Pedro Ramirez

For the purpose of this analysis, two study sites were investigated. This investigation consists of comparing textural features of quartz, feldspars, and other minerals present in a paleosol exposed in the Santa Monica Mountains and a paleosol and quartz-rich sandstone exposed in the San Joaquin Hills. The purpose of this study is to determine if the quartz-rich

sandstone unit was derived from recycling of quartz grains originally present in a paleosol. Petrographic analysis reveals that the paleosols primarily consist of fractured, etched, embayed and mostly monocrystalline quartz grains floating in a kaolinitic matrix. Biotite and feldspars show kaolinization, and feldspars also show etching and dissolution voids. The dissolution and kaolinization features result from the paleosol development during a tropical to subtropical climate. The quartz-rich sandstone primarily contains monocrystalline quartz that has undergone dissolution, etching and embayment. There is less kaolinite matrix present in the quartz-rich sandstone. These similar textural features suggest that the sandstone may be derived from the underlying paleosol. Further analysis is required to substantiate our preliminary observations.

39. Ruth Avila

Department: Chemistry and Biochemistry

Multi-Step Synthesis of a Photoreversible Calcium Chelator

Faculty Mentor: Dr. Alison McCurdy

Calcium plays an integral role in cell signaling. The release and uptake of calcium in an oscillatory manner triggers various important physiological processes. In order to study the effects of calcium oscillations in proteins and cells, calcium signals will be mimicked. The aim of this project is to synthesize a molecule that can bind and release calcium reversibly in response to irradiation of light. The synthesis of this molecule requires three steps for its completion. The first step is the synthesis of 4,4'-dimethylazobenzene which was successfully completed via two methods, using Zn and CuCl, which yielded 43.25% and 75.20%, respectively. The second step is the synthesis of 4,4'-Bis(bromomethyl) azobenzene, followed by the substitution of iminodiacetic acid for bromine. The molecule will be characterized in terms of calcium binding and photochemistry in aqueous media.

40. Abby Brown

Department: Chemistry and Biochemistry

Optimization of Experimental Conditions for Flow-Through Partial-Filling Affinity Capillary Electrophoresis (FTPFACE) to Determine Binding Constants Between Receptors and Ligands
Faculty Mentor: Dr. Frank A. Gomez

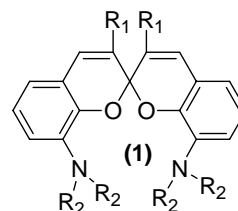
In the FTPFACE technique, the capillary is first partially-filled with ligand followed by a sample of receptor and non-interacting standards. Upon application of a voltage the receptor and standards flow into the ligand plug where a dynamic equilibrium is achieved between receptor and ligand. Continued electrophoresis results in the receptor and standards flowing through the domain of the ligand plug. Analysis of the change in the migration time of the receptor, relative to the non-interacting standards, as a function of the concentration of ligand, yields a value for the binding constant. Herein, we discuss the optimization of FTPFACE using a model system carbonic anhydrase B (CAB, EC 4.2.1.1) with areylsulfonamides. A minimal injection time for the ligand has been determined so as to minimize amount of sample experimental operation time. The results support the use of FTPFACE to estimate affinity constants under variable experimental conditions. Data demonstrating the quantitative potential of this method is presented. FTPFACE has been shown to effectively estimate binding constants of ligands to receptors. FTPFACE can be used effectively under variable experimental conditions to estimate binding constants.

41. Cindy Chau

Department: Chemistry and Biochemistry

Effects of Ligand Environment on the Binding Strength and Selectivity of a Calcium Chelator
Faculty Mentor: Dr. Alison McCurdy

Calcium ions, which are second messengers, are released inside certain cells in an oscillatory signal. This signal is associated with a variety of important physiological processes such as hormone secretion. To study their effects on cells and proteins, a molecule that will mimic these oscillations has been designed. An unsubstituted bis-spiropyran is known to be photochromic. Addition of substituted amines ($R_1=H$; $R_2=CH_2CO_2^-$) creates a binding site for Ca^{2+} , which should reversibly be disrupted upon irradiation. Compound (1), $R_1=CH_3$; $R_2=CH_2CO_2^-$, was found to bind Ca^{2+} moderately and selectively over Mg^{2+} , and is not photochromic. To examine the effects of changing R_2 on binding strength and selectivity, compound (1), $R_1=CH_3$; $R_2=CH_2CH_2CO_2^-$, will be synthesized. The results of binding M^{2+} ions to this chelator will be presented.



42. Marco Orozco

Department: Chemistry and Biochemistry

Investigating photo dissociation of phosphorus oxyanions
Faculty Mentor: Dr. Krishna Foster

Phosphate is one of the most abundant nutrients that is found in natural and man-made environments. Conversely, not much is known about the reduced forms of phosphorus such as phosphite, and hypophosphite, nor how they are produced in nature. This poster will look at the photochemical activity of different 1 mM solution samples of phosphate, phosphite, and hypophosphite that have been exposed to a 200-watt Hg- Xe lamp with a wavelength range of 280 to 400nm. Each sample was photolyzed for different amounts of time within a 60 to 300 min range and were analyzed with ion chromatography. The implication and results will be discussed in this poster.

43. Rayshonda Williams

Department: Chemistry and Biochemistry

Synthesis and Characterization of Chiral Piano Stool Complexes containing Pentaphenylcyclopentadienyl (C_5Ph_5) ligands

Faculty Mentor: Dr. Wayne Tikkanen

We are interested in preparing chiral Lewis acids to act as catalysts in reactions such as [4+2] cycloaddition. Compounds of this sort are of significance in many industrial reactions such as petroleum, pharmaceutical and plastic production. These compounds act as catalysts by lowering activation energies of a reaction through coordination of a substrate to a metal (e.g. Zr). Ideally, we want these substances to catalyze the stereoselective formation of one enantiomer. This is important because different enantiomers may have biological activity that may not be understood or expected. We are developing methodologies to readily prepare many candidates for catalysts. We have prepared pentaphenylcyclopentadienyltris(dimethylamido)zirconium (C_5Ph_5)Zr (NMe_2)₃ and some alkoxide derivatives ((C_5Ph_5)Zr (NMe_2)_{3-x}(O-CH(Ph)CH₃)_x). (C_5Ph_5)Zr (NMe_2)₃ was synthesized by reacting of tetrachloride ($ZrCl_4$) with four equivalents of lithium dimethyl amide ($LiNMe_2$) in toluene over a hot oil bath. Next, the

compounds $((C_5Ph_5)Zr(NMe_2)_{3-x}(O-CH(Ph)CH_3)_x)$ were prepared by reacting $((C_5Ph_5)Zr(NMe_2)_3)$ with either racemic or resolved *R* or *S* sec-phen-ethyl alcohol in toluene at varied temperature and addition rates. The ratios of $Cp^{PRO}Zr(NMe_2)_3$ to $PhCH_2CHOH$ were varied in 1:1, 1:2, and 1:3 proportions. The 1:1 ratio has a very complex 1H

NMR spectrum, while the 1:2 spectra shows signs of the 1:2 and 1:3 present in the mixture, with the 1:2 product predominating. Lastly, the spectrum of the 1:3 stoichiometry is very clean indicating the selective formation of a single product. We will present details of these reactions.

Notes

The Ten Winners from CSULA who Competed at
the CSU Statewide Competition
at CSU Stanislaus on May 2 - 3, 2003:

Behavioral and Social Sciences (Graduate)

Deborah E.R. Hanan (Interdisciplinary—Anthropology/Communication Studies/History)

"NBC's The West Wing: Virtual Democracy for a Divided Nation," (Faculty Mentor: Dr. John Ramirez)

Behavioral and Social Sciences (Graduate)

Benjamin Hidalgo (Psychology)

"How Do At-Risk College Students Handle Stress? A New Approach to an Old Question," (Faculty Mentor: Dr. Jean Phinney)

Behavioral and Social Sciences (Undergraduate Level)

Kirstin Aschbacher (Undeclared) Winner – 1st Place

"The Impact of Openness on Stress, Support, and Health Behaviors," (Faculty Mentor: Dr. Ramani Durvasula)

Behavioral and Social Sciences (Undergraduate Level)

James McKeever (Sociology)

"Network Connections and Affective Responses to Social Change," (Faculty Mentor: Dr. Gretchen Peterson)

Engineering and Computer Science (Graduate level)

Alexander Tascon (Electrical Engineering)

"BER in IEEE 802.11 WLANs for Different Modulation Schemes," (Faculty Mentor: Dr. Martin Roden)

Health, Nutrition and Clinical Sciences (Graduate Level)

Cynthia Acosta (Biological Sciences) Winner – 1st Place

"Using Robots to Teach the Spinal Cord to Walk," (Faculty Mentor: Dr. Ray de Leon)

Humanities and Letters (Undergraduate level)

Jacqueline Vidal (Interdisciplinary—Spanish/Psychology)

"Compliment Responses in Salvadoran Spanish: A Pragmatic Study," (Faculty Mentor: Dr. Domnita Dumitrescu)

Physical and Mathematical Sciences (Graduate Level)

Steven Han (Chemistry and Biochemistry)

"Determination of Y^{+3} and Al^{+3} Concentrations by Using 1H NMR (Proton NMR)," (Faculty Mentor: Dr. Yong Ba)

Physical and Mathematical Sciences (Undergraduate Level)

Margaret Banda (Geological Sciences)

"The Petrology of a Paleocene Quartz Arenite," (Faculty Mentor: Dr. Pedro Ramirez)

Physical Sciences (Undergraduate Level)

Mary Lee (Biochemistry) Winner – 2nd Place

"A New Method for the Characterization of Polycyclic Aromatic Hydrocarbons (Pahs) and Polycyclic Aromatic Compounds (Pacs) in the Environment," (Faculty Mentor: Dr. Krishna Foster)

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