10TH ANNUAL UNDERGRADUATE RESEARCH, SCHOLARSHIP, AND CREATIVE ACTIVITY SYMPOSIUM

APRIL 19 & 20, 2016

3RD FLOOR HUB
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## Schedule of Events: April 19, 2016

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## Schedule of Events: April 20, 2016

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10TH ANNUAL UNDERGRADUATE RESEARCH, SCHOLARSHIP, AND CREATIVE ACTIVITY SYMPOSIUM

SCHEDULE OF EVENTS

ORAL PRESENTATIONS

TUESDAY, APRIL 19, 2016

7:45 – 8:55  Presenter Registration & Poster Setup
HUB Lobby 3rd Floor

8:30  Registration Officially Opens
HUB Lobby 3rd Floor

ORAL PRESENTATIONS

9:00-10:00  Session 1  HUB 355  Moderator: Heidi Waltz, Comp Lit. & Foreign Language

1a  Caribbean Myth and History in the Poetry of Anne Sexton
Jill Hoo, English
Faculty Mentor: Steven Axelrod, English

1b  Feeling Disobedient: Affective Resistance and Performance and Performative Pranks in Harriet Wilson’s “Our Nig”
Kiersten King, English
Faculty Mentor: Emma Stapely, English

1c  The Power of Disguise: Removing the Veil of Idealism
Ricky St. Claire, English
Faculty Mentor: John Briggs, English

9:10 – 10:00  Session 2  HUB 367  Moderator: Ellen Reese, Sociology

2a  The Evaluation of Ancient Egyptian Agricultural Practices and their Implementation in Modern Egyptian Society
Giosiana Turchetti, Anthropology / Middle East and Islamic Studies
Faculty Mentor: Eugene Anderson, Anthropology
2b The Second Amendment: A New Beginning
Macy Wilens, History Law / Society
Faculty Mentors: Robert Parker, Sociology; Richard McFarlane, History

10:10-11:00 Session 3 HUB 355 Moderator: Michael McKibben, Geology and Divisional Dean of Student Affairs, CNAS

3a A Study of the Multijet Background for Inclusive, Hardronic Searches for Supersymmetry in the CMS Detector
Connor Richards, Physics
Faculty Mentor: Owen Long, Physics and Astronomy

3b Perceptions of Non-Verbal Communication Style
Pamela Osborn, Biology
Faculty Mentor: Howard Friedman, Psychology

3c Examining Adult Defects in Gut Specification Mutants
Christian Turner, CMDB
Faculty Mentor: Morris Maduro, Biology

10:10 – 11:00 Session 4 HUB 367 Moderator: Dr. Curt Burgess, Psychology

4a The Anti-Rape / Anti-Sexual Movement on College Campuses
Kristina Moisa, Political Science / International Relations
Faculty Mentor: Alicia Arrizon, Gender and Sexuality Studies

4c Correlates of Medical Jargon Use by Physicians and Patients During Surgical Consultations
Brandon Tran, Psychology
Faculty Mentor: Kate Sweeney, Psychology

11:30 – 12:00 Symposium Opening Ceremony
Welcome – Steven Brint, Vice Provost Undergraduate Education

Kennedy Center American College Theatre Festival Performances by:

Monologue from Sylvia by A.R. Gurney
Victoria Ringo, Political Science
Faculty Mentor: Robin Russin, Theatre, Film & Digital Production

Scene from The Elephant Man
Ephraim Eshete, Sociology, Theatre Minor and Fernando Echeverria, Political Science/Theatre
Faculty Mentor: Robin Russin, Theatre, Film & Digital Production
12:00 – 1:00  Poster Sessions  HUB 302
12:00 – 1:00  Resource Fair  HUB 302

ORAL PRESENTATIONS

1:10 – 2:00  Session 5  HUB 355-H302  Moderator: Paulo Chagas, Music
5a  Hearing Colors
    Adrianne Blackwood, Creative Writing
    Faculty Mentor: Michael Jayme, Creative Writing

5b  Latina Theatre for Young Audiences: MARIACHI GRIL
    Melanie Queponds, Theatre and English
    Faculty Mentor: Tiffany Lopez, Theatre, Film & Digital Production

5c  Two Road Converged
    Harrison Moulton, Business Administration Marketing
    Faculty Mentor: Erith Jeffe-Berg, Theatre, Film & Digital Production

1:10 – 2:00  Session 6  HUB 367  Moderator: Dr. Hill Harman, Chemistry
6a  Synthesis of Neuoprotective Limonoid Natural Products
    Johny Nguyen, Chemical Engineering
    Faculty Mentor: David Martin, Chemistry

6b  Investigation of the Cobalt Distribution in the Room Temperature Ferromagnetic Nanocomposite
    TiO2-Co Thin Films
    Cody Gonzalez, Mechanical Engineering
    Faculty Mentor: Sandeep Kumar, Mechanical Engineering

6c  Effects of Air Lubrication on Hydrokinetic Turbines
    Chirawat Sanpakit, Mechanical Engineering and Timothy Lam, Mechanical Engineering
    Faculty Mentor: Marko Princevac, Mechanical Engineering

1:10-2:00  Session 7  HUB 379  Moderator: Thomas Morton, Chemistry
7a  An Exploratory Study of the Geographic Distribution of Asthma Hospitalization Rates in Inland Empire, California
    Yuna Kwon, Biology
    Faculty Mentor: Tanya Nieri, Sociology

7b  The Synthesis and Biological Testing of Cupric Polypyridyl Complexes: An Alternative to Cisplatin?
    Noah Angel, Chemistry
Faculty Mentor: Jack Eichler, Chemistry

7c Copper(II) Complexes as Potential Anticancer Drugs
Michelle Smith, Chemistry, Julia Jenkins, Biochemistry, Youssef Daoudi, Biochemistry
Faculty Mentor: Jack Eichler, Chemistry

2:10 – 3:00 Session 8 HUB 355 Moderator: Marko Princevac, Mechanical Engineering

8a Fabrication of Silica Nanofibers for Nucleic Acid Extraction
Marissa Gonet-Gonzales, Bioengineering
Faculty Mentor: Wenwan Zhong, Chemistry

8b Biomimetic Impact Resistant Nanofiber Reinforced Composites
Brian Macdonald, Chemical Engineering
Faculty Mentor: David Kisailus, Chemical and Environmental Engineering

8c Conductive Reverse Osmosis-Polyamide Membranes for Silica-Containing Wastewater Treatment
Julianne Rolf, Environmental Engineering
Faculty Mentor: David Jassby, Chemical and Environmental Engineering

2:10-3:00 Session 9 HUB 367 Moderator: Joel Sachs, Biology

9a Captopril Suppresses Toxicant-induced Pressor Responses and Upregulation of RAAS Gene Markers
NR3C2 and SGK1 in Acutely Salt-loaded Rats
Alicia Ramirez, Biology and John Lindner, Biochemistry
Faculty Mentors: Margarita Curras-Collazo, Department of Cell Biology & Neuroscience

9b Hydraulic Characteristics as a Survival Trait in Woody Plant Species Found in California’s Chaparral Region
Luis Torres, Biology
Faculty Mentor: Louis Santiago, Botany and Plant Sciences

9c Increased Neuronal Activity in the Stress Center of the Brain in Response to Acute Ozone Exposure May Indicate Why Ozone Leads to Metabolic Disorder
Damon Platt, Biology
Faculty Mentor: Margarita Curras-Collazo, Department of Cell Biology & Neuroscience
SCHEDULE OF EVENTS
ORAL PRESENTATIONS

WEDNESDAY, APRIL 20, 2016

7:45 – 8:55   Presenter Registration & Poster Setup
HUB Lobby 3rd Floor

8:30   Registration Officially Opens
HUB Lobby 3rd Floor

ORAL PRESENTATIONS
9:10 – 10:00   Session 10   HUB 355   Moderator: Paulo Chagas, Music
10a   Constructing an Albertine Legacy: Sculptural Monuments in Saxon Court Chapels and Freiberger Dom,
      1554-1594
      Russel Altamirano, Art History
      Faculty Mentor: Kristoffer Neville, Art History

10b   The Dynamic Social Agency of the Kālacakra Sand Mandala
      Sierra LaPoint, Art History / Religious; Philosophy
      Faculty Mentor: Matthew King, Religious Studies, Gender and Sexuality Studies

10:10 – 11:00   Session 11   HUB 355   Moderator: Alicia Arrizon, Gender & Sexuality Studies
11a   Why is Google So Successful?
      Yvette Villalobos, Business Administration
      Faculty Mentor: Sean Jasso, Business Administration

11b   Semantic Weight and How Language Helps Children Understand Religion
      Eva M. Perez Cecenas, Business Administration and Linguistics
      Faculty Mentor: Rebekah Richert, Psychology

11c   The Role of Online Social Network Support in New Users Continued Interactions
      Juan Sanabria, Neuroscience
      Faculty Mentor: Megan Robbins, Psychology
10:10 – 11:00  Session 12  HUB 367  Moderator: Morris Maduro, Biology
12a  Microsatellite Characterization of Penicillium Digitatum, Casual Agent of Green Mold of Citrus
     Erika Varady, Biology
     Faculty Mentor: George Vidalakis, Plant Pathology and Microbiology

12b  Effect of Material Properties on Bacterial Attachment to Thin Film Photocatalytic Titanium
     Dioxide
     Madeline Luth, Microbiology
     Faculty Mentor: Sharon Walker, Chemical and Environmental Engineering

12c  The Effects of Climate and Forest Disturbances on the Growth of Calocedrus Decurrens at the
     Southern and Northern Portion of Its California Range
     Alina Geangu, Plant Biology
     Faculty Mentor: Jeffrey Diez, Botany and Plant Sciences

11:10-12:00  Session 13  HUB 355  Moderator: Rebekah Richert, Psychology
13a  The Effects of Gaming Exposure on Metacognitive Experience
     Cynthia Ibarra, Psychology
     Faculty Mentor: Rebekah Richert, Psychology

13b  Prayer’s Perceived Efficacy in Health Contexts
     Albert Ly, Psychology
     Faculty Mentor: Rebekah Richert, Psychology

13c  Ideas about Health and Medicine
     Rachel Nemeth, Psychology
     Faculty Mentor: Rebekah Richert, Psychology

12:00 – 1:00  Poster Sessions  HUB 302
12:00 – 1:00  Resource Fair  HUB 302
ORAL PRESENTATIONS

1:10-2:00  Session 14  HUB 355  Moderator: Matthew King, Religious Studies
14a  The Effect of Sibling Relationships on Resiliency Against Childhood Bullying  
Nina Caudill, Sociology  
Faculty Mentor: Robert Parker, Sociology

14b  Technocultural Citizenship and Counterpublicity: Player Agency and Worldmaking in Queer Videogame Spaces  
Mary Michael, Sociology / Law and Society  
Faculty Mentor: James Tobias, English

14c  Assessing the Knowledge, Beliefs, and Attitudes of HIV/AIDS Among Undergraduate and Medical Students  
Jason Tran, Public Policy  
Faculty Mentor: Emma Simmons, School of Medicine

1:10-2:00  Session 15  HUB 367  Moderator: Barry Mishra, Religious Studies
15a  Why Marriage? The Incompatibility of Marital Expectations with Individuation and Exhaustion  
Samantha St. Claire, English  
Faculty Mentor: Vorris Nunley, English

15b  Determining the Extent That a High Dimensional Memory Model Can Categorize Verbs Based on Fine Granularity  
Kimberly Miller, Linguistics  
Faculty Mentor: Curt Burgess, Psychology

2:10-3:00  Session 16  HUB 355  Moderator: Kurt Anderson, Biology
16a  Involvement of VPAC2 Receptors in Adrenal Mineralocorticoid and Glucocorticoid Gene Expression and Hormone Responses to Acute Stress in Mice  
John Lindner, Biochemistry and Neuroscience  
Faculty Mentor: Margarita Curras-Collazo, Cell Biology and Neuroscience

16b  Promoting Mindfulness and Acceptance: How a Week-long Mediation Training Program Influenced Youths Coping Self-Efficacy  
Akhila Nekkanti, Neuroscience  
Faculty Mentor: Elizabeth Davis, Psychology

16c  Relative Expression of Ecdysis Triggering Hormone Signaling Genes in Adult Drosophila Melanogaster  
Raymond Tran, Neuroscience  
Faculty Mentor: Michael Adams, Entomology, Cell Biology and Neuroscience

2:10-3:00  Session 17  HUB 367  Moderator: Dimitrios Morikis, Bioengineering
17a  Preparation, Degradation, and Cytocompatibility of Electronphoretically Deposited MgO Nanoparticle Coatings for Orthopedic Applications  
Mayra Celene and Cortez Alcaraz, Bioengineering
Stage-Specific Induction of Cardiomyogenic Differentiation in Dynamic Suspension
Joshua Karam and Daniel Nampe, Bioengineering
Faculty Mentor: Hideaki Tsutsui, Mechanical Engineering

2:10-3:00  Session 18  HUB 379  Moderator: Denver Graninger, History

18a Linguistic Analysis of Gender-Inclusive Language in English
Honeiah Karimi, Linguistics
Faculty Mentor: Heidi Waltz, Comparative Literature and Foreign Languages

18b Situational Experience Through the Lens of Relationships Around the World
Shazia Parekh, Psychology
Faculty Mentor: David Funder, Psychology

3:10-4:00  Session 19  HUB 337  Moderator: Jingsong Zhang, Chemistry

19a Adult C. Elegans Exhibit Physiological Abnormalities When Early Gut Development is Partially Compromised
Kollan Doan, Cell, Molecular and Development Biology
Faculty Mentor: Morris Maduro, Biology

19b CVD Growth and Characterization of TMD Materials on Patterned and Non-Patterned Substrates
Sahar Naghibi, Chemistry
Faculty Mentor: Ludwig Bartels, Chemistry

19c Investigating the Systematics of the Pseudochalcura (Hymenoptera: Eucharitidae) Populations of North America
Scott Heacox, Entomology
Faculty Mentor: John M. Heraty, Entomology

3:10-4:00  Session 20  HUB 379  Moderator: Perry Link, Comp. Lit. & Foreign Languages

20a The Evolution of Revolution – A Comparative Analysis of World Revolutions from 1789 to 2011
Sándor Nagy, Global Studies
Faculty Mentor: Christopher Chase-Dunn, Sociology

20b Does the Inclusion of Latin Culture Affect Latina Women’s Subjective Experience of Zumba
Christine Munoz, Sociology
Faculty Mentor: Tanya Nieri, Sociology

20c Student Explanations for their Attitudes Toward Cognitive Enhancement Drugs
Nicole Perez, Psychology and Music Performance
Faculty Mentor: Kate Sweeny, Psychology

4:00 – 5:00  CLOSING CEREMONY  HUB 302

Presentation of Best Oral and Poster Presentation Awards and Closing Remarks
SCHEDULE OF EVENTS

POSTER PRESENTATIONS

TUESDAY, APRIL 19, 2016
HUB 302

BCOE

A 01 Polydiacetylene-Coated Polyvinylidene Fluoride Strip Atpasensor for Colorimetric Detection of Zinc(II)
Karen Bohorquez, Mechanical Engineering
Faculty Mentor: Hideaki Tusutsui, Mechanical Engineering

A 02 Photocatalytic Oxidation of Nitrogen Oxides Using TiO2-incorporated Coatings
Eric Lin, Chemical Engineering
Faculty Mentors: Kawai Tam, Chemical/Environ. Engineering; David Cocker, Chemical and Environmental Engineering

A 03 Environmental Impacts of Titanium Dioxide Through A Model Colon and Septic Tank System
Diego Novoa, Chemical and Environmental Engineering
Faculty Mentor: Sharon Walker, Chemical/Environ. Engineering

A 04 Controlled BaTiO3 Nanofibers for Enhanced Piezoelectric Properties
Paymon Shirazi, Chemical Engineering
Faculty Mentor: Nosang Myung, Chemical and Environmental Engineering

A 05 A study of Poly (Glycerol Sebacate) on Magnesium as Biore-absorbable Materials
Larry Tran, Chemical Engineering
Faculty Mentor: Huinan Liu, Mechanical Engineering
1980 Iran-Iraq War: Impact of Illegal Use of Chemical Weapons
Arvanoush Boudaghians, Linguistics
Faculty Mentor: Denver Graninger, History

Support from Friends and the Academic Self-Efficacy and School Connectedness of First-Year College Students
Francine Can, Psychology
Faculty Mentor: Mary Gauvain, Psychology

Music as a Form of Migration
Alondra Clemente, Anthropology
Faculty Mentor: Susan Ossman, Anthropology

Reimagining Interdisciplinary Disciplines: A Case for Subjectivity in Knowledge Construction in Public Policy and the Social Sciences
Ariana Elizalde, English and Public Policy
Faculty Mentor: Fred Moten, English

Editing California: Félix Buelna
Evelyn Gamez, Linguistics and Spanish
Faculty Mentor: Covadonga Lamar Prieto, Hispanic Studies

Emotions and Cognitive Development in Early Childhood
Haydi Gerges, Psychology
Faculty Mentor: Rebekah Richert, Psychology

The Effect of Music on the Perception of Emotionally Neutral Faces
Jessica Grier, Psychology
Faculty Mentor: Rebekah Richert, Psychology

Children’s Analogical Connections and Physical Realism
Jennifer Hernandez, Psychology
Faculty Mentor: Rebekah Richert, Psychology

He Said/She Said: Boys and Girls Differ in Emotional Coherence
Thong Huynh, Anthropology
Faculty Mentor: Elizabeth Davis, Psychology

Audeamus Multidisciplinary Journal
Julia Krum, Neuroscience, Raymond-Tan Tran, Neuroscience, and Adrianne Blackwood, Creative Writing
Faculty Mentor: Richard Cardullo, Biology
A 16  Connections Between Task-irrelevant Perceptual Learning and the Attention Network Task
Jennie Linck, Psychology
Faculty Mentor: Aaron Seitz, Psychology

A 17  Effect of Emotional Arousal on Visual Working Memory Consolidation
Ana Martinez Flores, Psychology
Faculty Mentor: Weiwei Zhang, Psychology

A 18  Anthropomorphic Views of God and Religious Affiliation
Marisa Montoya, Psychology; Rachel Richardson
Faculty Mentor: Rebekah Richert, Psychology

A 19  What’s in a Name? Using the Hyperspace Analogue to Language Model of Semantic Memory to find Associations between Adjectives and Names
Derrick Tien, Statistics
Faculty Mentor: Curt Burgess, Psychology

SoBA

A 20  Can Yogurt Lids Cure Cancer? A closer understanding of the driving force behind philanthropic actions and the results of those actions.
Alyssa Stump, Business Administration
Faculty Mentor: Sean Jasso, Business Administration

CNAS

A 21  Mapping the m5C modification on small RNAs in C. elegans
Phillip Adilukito, Neuroscience
Faculty Mentor: Weifeng Gu, Cell Biology and Neuroscience

A 22  Identifying a Division Plane Orientation Mutant in Arabidopsis thaliana
Leslie Aranda, Biochemistry
Faculty Mentor: Carolyn Rasmussen, Botany and Plant Sciences

A 23  Synthesis of Copper(II) Complexes with Potential for Antitumor Activity
Michael Baird, Chemistry
Faculty Mentor: Jack Eichler, Chemistry

A 24  Overexpression of MiR-361 Promotes Osteogenesis From the Neural Crest
Linh Blackney, Biology
Faculty Mentor: Nicole zur Nieden, Cell Biology and Neuroscience

A 25  The Effects Of Electronic Cigarette Exhaled Aerosol Residue On Human Cell Morphology As An Indicator Of Cell Stress
Jessica Bustamante, Cell, Molecular Development Biology
Faculty Mentor: Prue Talbot, Cell Biology and Neuroscience
A 26  Effects of Electronic Cigarette Aerosol on Human Embryonic Stem Cell Health
       Iliana Cordova, Psychology
       Faculty Mentor: Prue Talbot, Cell Biology and Neuroscience

A 27  Cytotoxic Effects of Varying Humectant Concentrations and Voltage in Electronic Cigarettes
       Eriel Datuin, Biology
       Faculty Mentor: Prue Talbot, Cell Biology and Neuroscience

A 28  The Effect of Variable Connectivity on Richness in Spatially Fragmented Pond Microcosms
       Heather David, Microbiology
       Faculty Mentor: Kurt Anderson, Biology

A 29  Effect of Genetically Modified Soybean Oil (Plenish) on Pain Threshold through Diet-Induced Obesity
       Dave Enriquez, Neuroscience
       Faculty Mentor: Margarita Curras-Collazo, Cell Biology and Neuroscience

A 30  Investigating Associational Susceptibility of a Native Plant Mediated by and Invasive Plant and an Invasive Herbivore
       Seth Freitas, Entomology
       Faculty Mentor: Matt Daugherty, Entomology

A 31  Investigating the impact of fluidic agitation on human pluripotent stem cells in dynamic suspension
       Ronak Joshi, Neuroscience
       Faculty Mentor: Hideaki Tsutsui, Mechanical Engineering

A 32  The Role of HOTAIR M1 and HOX genes in Breast Cancer Development
       Alexia King, Biochemistry
       Faculty Mentor: Ernest Martinez, Biochemistry

A 33  Exploring Brain Gene Markers for Neurobehavioral Deficits Produced by Developmental Exposure to Indoor Flame Retardants
       Elena Kozlova, Neuroscience
       Faculty Mentor: Margarita Curras-Collazo, Cell Biology and Neuroscience

A 34  Morphological Variation in Natural and Synthetic Nicotiana tabacum Polyploids
       Amelia Kurti, Microbiology
       Faculty Mentor: Amy Litt, Botany and Plant Services

A 35  Effects of Fatherhood on Neuronal Morphology in the MPOA in Male California Mice
       Diane Luu, Cell, Molecular and Developmental Biology
       Faculty Mentor: Peter Hickmott, Psychology, and Wendy Saltzman, Biology

A 36  Analysis of the function of FRUITFULL paralogs in tomato using CRISPR
       Jenna Macon, Cell, Molecular and Developmental Biology
A 37 Characterization of a Plant Hormone Receptor: ABA-PYR1
Robert Mannatt, Biochemistry
Faculty Mentor: Sean Cutler, Botany and Plant Sciences

A 38 Assessing the dynamics of a generalist predator/prey model across different spatial configurations
Rosa McGuire, Biology
Faculty Mentor: Kurt Anderson, Biology

A 39 Replication of a honey bee virus in alfalfa leafcutter bees
Sarah Miller, Biology
Faculty Mentor: Quinn McFrederick, Entomology

A 40 Analysis of Reproductive Mode (Placental and Nonplacental) on Genetic Variation Across Geographically Isolated Populations of P. prolifica and P. infans
Anthony Nguyen, Biochemistry
Faculty Mentor: David Reznick, Biology

A 41 Role of Microtubule Dynamics in Cell Division using Maize tangled-1 Mutant
McKenzie Pickle, Biology
Faculty Mentor: Carolyn Rasmussen, Botany and Plant Sciences

A 42 Investigation of HOTAIRM1 in Hindbrain Tumors
Shawn Poag, Biochemistry
Faculty Mentor: Ernest Martinez, Biochemistry

A 43 Data Mining the 2010 National Health Interview Survey: What Characteristics are Common Among Those with Multiple Cancers?
Gabriel Ruiz, Statistics
Faculty Mentor: Subir Ghosh, Statistics

A 44 Disruption of Neurological Circuits Controlling Blood Pressure by Indoor Flame Retardants
Gissell Sanchez, Neuroscience
Faculty Mentor: Margarita Curras-Collazo, Cell Biology and Neuroscience

A 45 Synthesis of Flavalin Natural Products
Lauren Sangster, Biochemistry
Faculty Mentor: David Martin, Chemistry

A 46 Solid-State Upconversion with CdSe Nanocrystals and Anthracene
Gabriela Tablas, Chemistry
Faculty Mentor: Ming Lee Tang, Chemistry
SCHEDULE OF EVENTS
POSTER PRESENTATIONS

WEDNESDAY, APRIL 20, 2016
HUB 302

BCOE

B 01  Rice Husk: A Sustainable Building Material for the Philippines
      Jacqueline Ortega, Chemical Engineering
      Faculty Mentor: Kawai Tam, Chemical and Environmental Engineering

B 02  Using DNA-hybridized microspheres in paper-based assays
      Jenna Roper, Bioengineering
      Faculty Mentor: Hideaki Tsutsui, Mechanical Engineering

B 03  Free Fatty Acid Exposure Decreases Trans-epithelial Electrical Resistance of Caco-2 Cells
      Aaron Tan, Bioengineering
      Faculty Mentor: Victor Rodgers, Bioengineering

CHASS

B 04  Disproportionate Representation of Latino and African American Students in Special Education: An Auto-Ethnography
      Erica Guzman, Linguistics
      Faculty Mentor: Jennifer Najera, Ethnic Studies

B 05  How do Attentional and Physiological Components of Emotion Regulation Contribute to Children’s Risk for Externalizing Symptoms?
      Nikita D. Mahbubani, Psychology
      Faculty Mentor: Elizabeth L. Davis, Psychology

B 06  Reproducing Religious Icons: Our Lady of Guadalupe in Southern California
      Gabriela Perez, Religious Studies
      Faculty Mentor: Jennifer Hughes, History, and Matthew King, Religious Studies

B 07  Prosocial Views of God and Gender
      Styliani Petraki, Psychology
      Faculty Mentor: Rebekah Richert, Psychology

B 08  Intersecting Identities: The Experience of Coming Out as Undocuqueer
      Liliana Ramirez, Anthropology
How Language Proficiency Could Increase Semantic Relationships in Memory
Melissa Saidak, Psychology
Faculty Mentor: Curt Burgess, Psychology

Desire in Natsume Soseki’s Kokoro
Yesenia Sanchez, Languages and Literature, Japanese
Faculty Mentor: Annmaria Shimabuku, Comparative Literature and Foreign Languages

Children’s Desensitization to Violence in Video Games and TV News
Nancy Tang, Psychology
Faculty Mentor: Rekekah Richert, Psychology

Parents Overestimate Children’s Behavioral and Cognitive Emotion Regulation Strategy Repertoires
Austen Trainer, Psychology
Faculty Mentor: Elizabeth Davis, Psychology

Get Back Out There! Children’s Participation in Sports and Parent Emotion Socialization
Angie Truong, Psychology
Faculty Mentor: Elizabeth Davis, Psychology

Exploration of Memory and Language Function through the SCiL Application
Giselle Urquijo, Neuroscience
Faculty Mentor: Curt Burgess, Psychology

Availability of Primary Care Resources, Social Disadvantage, and Diabetes Mortality in US Counties: A Multi-level Analysis
Katy Wang, Statistics
Faculty Mentor: Augustine Kposowa, Sociology

The Effects of Framing Kind Acts on Life Satisfaction in Two Cultures
Zizhong Xiao, Psychology
Faculty Mentor: Sonja Lyubomirsky, Psychology

A Comedy of Migration: Commedia Dell’Arte and the Characterization of Migrant Workers
Natalia Zufferey, Theatre
Faculty Mentor: Erith Jaffe-Berg, Theater, Film and Digital Production

Identifying the Dust-Associated Core Microbiome of the Salton Sea Region
Taryn Barsotti, Microbiology
Faculty Mentor: Emma Aronson, Plant Pathology and Microbiology
| B 19 | Screening Drosophila Melanogaster Sensory Neurons to Characterize an Entire Neural Circuit, Connecting Sensory Input to Hormonal Release  
   | Riyan Bittar, Biology  
   | Faculty Mentor: Naoki Yamanaka, Entomology |
| B 20 | Characterization of DNA Transposable Elements from three Superfamilies in the Fairchild Mandarin Genome  
   | Alberto Corona, Biology, Travis Wrightsman, Biochemistry, and Cameron Hatch, Biochemistry  
   | Faculty Mentor: Susan Wessler, Botany and Plant Sciences |
| B 21 | Diel Patterns in Oviposition and Egg Hatching of *Ectomyelois ceratoniae* Zeller  
   | James Hepler, Entomology, Plant Biology  
   | Faculty Mentor: Thomas Perring, Entomology |
| B 22 | Soybean Oil High Fat Diet Reduces Hypothalamic Oxytocin Immunoreactivity  
   | Catherine Ho, Neuroscience  
   | Faculty Mentors: Margarita Curras-Collazo, Cell Biology and Neuroscience; Frances Sladek, Cell Biology and Neuroscience |
| B 23 | Big Head, Little Head: Tracing the evolution of exaggerated head shapes in *Nannocoris Reuter* (Hemiptera: Schizopteridae)  
   | Christy Hoong, Neuroscience  
   | Faculty Mentor: Christiane Weirauch, Entomology |
| B 24 | Expression of aquaporin 3 is a significant factor in outcomes of ascorbate treatment  
   | Andrew Huang, Neuroscience  
   | Faculty Mentor: Victor Rodgers, Bioengineering |
| B 25 | Plant Nutrition: Dynamics in gene regulation in response to phosphate starvation in *Arabidopsis*  
   | James Koo, Biology  
   | Faculty Mentor: Julia Bailey-Serres, Botany and Plant Sciences |
| B 26 | Floral Evolution in *Nicotiana*  
   | Amber Lawhorn, Biology  
   | Faculty Mentor: Amy Litt, Botany and Plant Sciences |
| B 27 | Drug Design to Prevent Cancer Cell Metastasis  
   | Taylor Le, Biochemistry  
   | Faculty Mentor: Thomas Morton, Chemistry |
| B 28 | Investigating the Role of EndoU in Developing T-cells  
   | Megan Lee, Biology  
   | Faculty Mentor: Fedor Karginov, Cell Biology and Neuroscience |
| B 29 | Structural study of the interaction between DNMT1 and histone modification H4K20me2  
   | Linhui Li, Biochemistry  
   | Faculty Mentor: Jikui Song, Biochemistry |
B 30  Testing for Heterodimerization of Moss Methyltransferases Through Genetic Crossing of Transgenic Tobacco Plants
Haley Masters, Biology
Faculty Mentor: Eugene Nothnagel, Botany and Plant Sciences; Martha Orozco-Cardenas, Botany and Plant Sciences

B 31  Cloning, Purification and Crystallization of ETR1
Taylor Meyer, Biology
Paul Larsen, Biochemistry

B 32  Impact of a Western Diet on Lipid Signaling Molecules in the Left Ventricle of Obese Mice
Kevin Mortazavi, Neuroscience
Faculty Mentor: Nicholas DiPatrizio, Biomedical Sciences

B 33  Screening for RNAi mutants deficient in silencing virus
Sona Naik, Neuroscience, Stephanie Ngo, Biology, and Christian Agatep, Genetics
Faculty Mentor: Weifeng Gu, Cell Biology and Neuroscience

B 34  Expression of glutamate aspartate transporter (GLAST) in the intrahippocampal kainic acid model of epileptogenesis
Andrew Nakla, Biology
Faculty Mentor: Devin Binder, Biomedical Sciences

B 35  Induction of M cells by Cholera Toxin
Sophia Parks, Neuroscience
Faculty Mentor: David Lo, School of Medicine (Biomedical Sciences)

B 36  Identification of Optimal Overexpression and Purification Conditions of Ribosomal Protein S1 from Escherichia coli (E.coli)
Yatna Patel, Biochemistry
Faculty Mentor: Gregor Blaha, Biochemistry

B 37  Auditory Fear Conditioning and Extinction in fmr1 and mmp-9 Knockout Mice
Kasim Pendi, Biology, Neuroscience
Faculty Mentors: Iryna Ethell, Biomedical Sciences; Khaleel Razak, Psychology

B 38  Assessing the Effect of Histone Methyltransferase Inhibitors on Plasmodium falciparum var Gene Expression and Genome Structure
Raphael Reyes, Biology
Faculty Mentor: Karine Le Roch, Cell Biology and Neuroscience

B 39  Examination of Potential i-Motif Binding Candidates
Ranier Rivera, Biochemistry
Faculty Mentor: Thomas Morton, Chemistry

B 40  Assessing the Knowledge, Beliefs, and Attitudes Toward Communities Affected By HIV/AIDS Among Undergraduate and Medical Students
Patrick Samones, Biochemistry
Faculty Mentor: Emma Simmons, School of Medicine

B 41  Defining Interactions between RNA Polymerase, NusG, RfaH, and the Ribosome
      Gabriela Sanchez, Biochemistry
      Faculty Mentor: Gregor Blaha, Biochemistry

B 42  The Role of Density Dependence on the Life History of the Trinidian Guppy
      Rajvee Sanghavi, Biological Sciences
      Faculty Mentor: David Reznick, Biology

B 43  Escape Behavior and Flight Initiation Distance of the Granite Spiny Lizard, Sceloporus orcutti
      Jennifer Shedden, Biology
      Faculty Mentor: Timothy Higham, Biology

B 44  Morphological and functional consequences of hippocampal demyelination and remyelination
      induced recovery
      Joselyn Soto, Cell, Molecular, Development Biology
      Faculty Mentor: Seema Tiwari-Woodruff, Biomedical Sciences

B 45  Macrobrachium Prawn Effects on Rivulus hartii Eggs' Developmental Time
      William Tedjo, Biochemistry
      Faculty Mentor: David Reznick, Biology

B 46  Glycosyl Composition of Polymeric Components of Gums Exuded from Uninfected and
      Neofusicoccum-Infected Almond Trees
      Bassam Theordory, Biochemistry
      Faculty Mentor: Eugene A. Nothnagel, Philippe E. Rolshausen, Sebastiaan Bol, Botany and Plant
      Sciences

B 47  Functionalized Tetracene Organic Field Effect Transistors
      Dominic Ventre, Bioengineering
      Faculty Mentor: Ming Lee Tang, Chemistry

B 48  Synthesis of Cobalt Containing Photocatalysts for Direct Alcohol Activation
      I-Chieh (Jack) Wang, Biochemistry
      Faculty Mentor: David Martin, Chemistry
Abstracts

Phillip Adiliukito, Neuroscience
Faculty Mentor: Weifeng Gu, Cell Biology and Neuroscience
Regina Li, and Lichao Li
Mapping the m5C modification on small RNAs in C. elegans

Small non-coding RNAs including miRNAs, piRNAs, and siRNAs exist in all kingdoms of life, and these RNAs play important roles in maintaining genome stability, regulating gene expression, and silencing viruses. Most non-coding RNAs such as tRNAs and rRNAs contain many modifications either on the bases or on the ribose groups of RNA molecules. These modifications help maintain RNA stability, contribute to the identity of RNA molecules, and play regulation roles in protein translation and gene regulation. RNA m5C (5 methyl cytosine) is a common RNA modification in small RNAs such as tRNAs and rRNAs. Collaborating with Dr. Wang’s lab, we found that this modification may exist on one type of endogenous small RNAs, piRNAs. To confirm the results and identify what piRNAs are modified and whether the modifications are position-specific or tissue-specific, we developed bisulfite small RNA-sequencing techniques and use high throughput sequencing to examine m5C modification on small RNAs. We confirmed that piRNAs may contain m5C modifications while miRNAs and piRNAs do not. piRNAs bind Piwi-Argonautes and play important roles in maintaining the genome stability of male germ lines by silencing transposons and other invading elements, such as viruses. This raises the possibility that the m5C modification may play important roles in maintaining the stability of piRNAs and/or regulating the functions of piRNAs. Currently we are screening for the enzyme that catalyzes the m5C formation.

Russel Altamirano, Art History
Faculty Mentor: Kristoffer Neville, Art History
Constructing an Albertine Legacy: Sculptural Monuments in Saxon Court Chapels and Freiberger Dom, 1554-1594

In the second half of the sixteenth century, Lutheran courts in Germany began commissioning grander works of art after years of religious polarization and uncertainty. In Saxony, many scholars recognize this development as a reassertion of power due to the establishment of the Albertine electorate in 1547. However, the electorate’s projects, particularly in the Freiberg Cathedral, have not been studied in relation to the church’s distinct role within the court, nor their synchronicity with Catholic contemporaries on the eve of the Catholic Reformation. Though protectors of the Lutheran faith, Albertine leaders were not so much interested in theological claims as they were in the construction of authority in a local and trans-confessional context. I will argue that Albertine church commissions were endeavors to form a comparable political standing to Central and Northern European rulers. I first explore how the carefully integrated secular and religious traditions in converted court chapels culminated in the Moritz Tomb and burial chapel in the Freiberg Cathedral. I then seek to place these spaces in the context of a larger European power dynamic by examining Saxon ties to the Catholic Bavarian court. Through this we see that the Freiberg Cathedral’s program served as a symbol of the electorate’s overseeing power over the church and leading figure in the reformation of church interiors after the Council of Trent in Europe. This ultimately questions widely accepted claims that Italian influences, rather than competition and exchange between German courts, led to the resurgence of monumental church programs.
The addition of transition metal centers to organic compounds facilitates interesting changes in the qualities and functions of the original organic drugs, leading to the preparation of compounds known as metallotherapies. Cis-diamminedichloroplatinum (II) (cisplatin) is one such compound and is used as a chemotherapeutic agent. Unfortunately, cisplatin has unwanted side effects, so the search for an alternative is well underway. Investigators have studied the efficacy of gold transition metal complexes as alternatives to cisplatin, and it has been found in our laboratory that the parent organic ligands often have more enhanced anti-cancer activity than the corresponding gold (III) complexes. In order to determine if the organic ligands are the sole source of anti-tumor efficacy, new copper (II) complexes have been made to determine if changing the metal center has an impact on the anti-cancer activity. Four new complexes will be examined: 2-sec-butyl-1,10-phenanthroline dichloro copper (II) \( \left\{ \left[ \text{mono-sec-buty}l\text{phen} \right] \text{CuCl}_2 \right\} \), 2,9-di-sec-butyl-1,10-phenanthroline dichloro-copper (II) \( \left\{ \left[ \text{di-sec-buty}l\text{phen} \right] \text{CuCl}_2 \right\} \), 2-n-butyl-1,10-phenanthroline dichloro copper (II) \( \left\{ \left[ \text{mono-n-buty}l\text{phen} \right] \text{CuCl}_2 \right\} \), and 2,9-di-n-butyl-1,10-phenanthroline dichloro copper (II) \( \left\{ \left[ \text{di-n-buty}l\text{phen} \right] \text{CuCl}_2 \right\} \). The complexes were synthesized by reacting mono and di-substituted 1,10-phenanthroline ligands with cupric chloride. These complexes have been characterized via elemental analysis, ultraviolet-visible spectroscopy, X-ray crystallography, and mass spectrometry. X-ray crystallographic studies indicate that the geometries of the complexes are distorted square pyramidal for the 5-coordinate species and distorted tetrahedral for the 4-coordinate species, and the mass spectrometry data indicate that each complex equilibrates between the monomeric and dimeric forms in solution. \textit{In-vitro} SRB assays indicate these cupric compounds are more potent inhibitors of lung tumor cell growth than our previously reported gold(III) complexes. Testing with non-cancerous Human Foreskin Fibroblasts (HFF) imply selectivity for cancerous cells over healthy cells. Future studies will aim to provide a more detailed understanding of the dynamic structural interconversion as well as propose mechanisms of anticancer action that the cupric complexes may perform.
Leslie Aranda, Biochemistry  
Faculty Mentor: Carolyn Rasmussen, Botany and Plant Sciences  
Identifying a Division Plane Orientation Mutant in *Arabidopsis thaliana*

The way the division plane is placed in dividing cells is important for tissue organization and development. Because not much is known about factors determining division plane orientation, we want to identify new proteins involved in this process. Plant cells cannot migrate and cell division patterns can be easily visualized by staining the cell wall. I am screening a population of gamma-ray mutated *Arabidopsis thaliana* plants to identify recessive mutants with altered division plane orientation. The primary screen is for mutants with short roots, since previously identified division plane orientation mutants also have short roots. Once potential candidates have been identified, they will be analyzed by confocal microscopy. If the mutants have division plane defects, the responsible mutations will be identified by allelism test and genetic mapping. Additionally, not much is known about hormone activity during cell division. Therefore, I have been characterizing an auxin marker in maize that may be useful in analyzing auxin levels during the cell cycle. Auxin perception triggers the degradation of AUXIN/INDOLE-3-ACETIC ACID (AUX/IAA) repressors, allowing transcription of auxin response genes. Domain DII of AUX/IAA is sufficient to trigger its auxin-dependent degradation. Maize was transformed with an auxin reporter composed of the DII domain of an AUX/IAA repressor fused to yellow fluorescent protein variant (VENUS) with a nuclear localization signal (NLS). Using immunoblot, the accumulation and auxin-mediated degradation of the DII-VENUS-NLS marker was demonstrated. This tool will be used to assess auxin levels in individuals during various stages of the cell cycle.

Michael Baird, Chemistry  
Faculty Mentor: Jack Eichler, Chemistry  
Synthesis of Copper(II) Complexes with Potential for Antitumor Activity

The harmful side effects associated with the chemotherapeutic Cisplatin (cisplatinum(II)) and other platinum-based anticancer drugs have motivated research for drugs based on other transition metals, including copper. Copper(II) is thought to be safer than other transition metal ions because of its biological functionality and regulation by homeostasis. While copper is toxic at high levels of exposure, it has a much larger permitted daily exposure than platinum. The search for copper-based chemotherapeutics is bolstered by research showing their effectiveness against several cancerous cell lines. In an effort to build on these compounds, heteroleptic coordination complexes containing bipyridine (bipy) and L-tyrosine (tyr) ligands along with bis complexes containing two bipy ligands have been synthesized by adding appropriate equivalents of each ligand to a copper(II) ion. For the heteroleptic complexes, Cu(NO₃)₂ was reacted with tyr and bipy, forming [(4,4’dimethylbipy)(tyr)CuNO₃], and [(4,4’dimethylbipy)(tyr)CuNO₃]. For the bis complexes, [(bipy)CuCl₂] was reacted with bipy, forming [(4,4’dimethylbipy)₂CuCl₂] and [(6,6’dimethylbipy)₂CuCl₂]. Mass spectroscopy and combustion analysis confirmed that the proposed ligands are present. X-ray crystallography is being processed for each compound, although preliminary data indicates the ligands have bonded as expected. Future work will test the *in vitro* antitumor activity of the reported compounds against A549 lung cancer cells and compared to previous complexes in which copper was coordinated by one polydentate ligand. After these complexes are characterized and tested for cytotoxicity, similar copper complexes using substituted heterocyclic ligands will be synthesized. Promising results and the potential for improvement makes research in copper chemistry an exciting new field.
Taryn A. Barsotti, Microbiology  
Faculty Mentor: Emma Aronson, Plant Pathology and Microbiology
Identifying the Dust-Associated Core Microbiome of the Salton Sea Region

The recent conditions of the Salton Sea water and soil have created a concern for the air quality of valley residents. Dust pollution in the area is now exacerbated by the drought conditions, and may contribute to a high prevalence of respiratory diseases in the Coachella Valley. However, microbial communities associated with dust within this region are understudied, and we lack a comprehensive understanding of which pathogens are present and could potentially be linked to respiratory diseases. My project aims to identify the community composition of the airborne microbiome in the Salton Sea area. Specifically, I will sequence 16S rRNA genes to determine the spatial and temporal patterns of bacteria and archaea present in dust collected throughout the Salton Sea region. This will provide critical information on how dust-associated microbial communities change as drought conditions worsen over the summer, and how patterns in the air column contribute to dispersion of potentially pathogenic microorganisms. Upon identifying community composition, this information will later be applied in a more comprehensive study of how these microbes as well as other environmental toxins play a role in the development of respiratory diseases in the people that live in the surrounding Salton Sea community.

Riyan Bittar, Biology  
Faculty Mentor: Naoki Yamanaka, Entomology
Screening Drosophila melanogaster sensory neurons to characterize an entire neural circuit, connecting sensory input to hormonal release

Hormones control many biological processes in multicellular organisms, including sexual maturation, behavior, and homeostasis. Currently, little is known about how the neural networks are organized to control these hormone-mediated biological processes. Previous research conducted in our lab has found evidence that gustatory neurons in Drosophila melanogaster (fruit fly) connect to a key endocrine organ, the prothoracic gland (PG) that controls developmental timing in insects. The PG secretes a steroid hormone that’s in control of developmental timing. We are interested in screening neurons associated with two types of taste receptors, gustatory receptors (Gr’s) and ionotropic receptors (Ir’s), to see how they affect developmental timing. Using molecular genetic techniques (GAL4-UAS system) we can express mammalian TRPV1, a capsaicin receptor, specifically in neurons that express Gr or Ir. By adding capsaicin to the food it simulates the effects of adding the specific ligand for the Gr or Ir and can in turn activate the neuron. There is 52 Gr’s/Ir’s expressed in Drosophila larvae and so far I have screened 30 of them. Current results show that Gr93c-3 and Gr22d have a significant acceleration in developmental timing and Ir8a has a significant delay in developmental timing. After the screening is finished, we will try and find out the natural ligand to the receptors and see if adding that to the food gives the same results. We also plan to do Calcium imaging in the brain to see if activation of the Gr/Ir neurons actually does activate the PG.
Linh Blackney, Biology
Faculty Mentor: Nicole zur Nieden, Cell Biology and Neuroscience
Devon D. Ehnes, Dorota Kaniowska
Overexpression of MiR-361 Promotes Osteogenesis from the Neural Crest

Low bone density is a growing health problem in the U.S. Due to a limited understanding of stem cell differentiation into bone, scientists have yet to find a productive way of applying newfound cell-based therapies. Because of their role as a key regulator of protein expression during embryonic development, microRNAs (miRNAs) have opened a door to creating new ways of manipulating stem cell differentiation. Previous studies in our lab identified a set of miRNAs that were differentially expressed during embryonic stem cell differentiation into osteoblasts. Of these miR-361 had the highest pro-osteogenic effect when overexpressed. Calcification assays in a cell line null for Dgcr8, in which all microRNA biogenesis is disrupted, confirmed that osteogenesis was improved solely due to miR-361. miR-361 overexpression also increased Twist1 and Sox10, which are indicative of neural crest cells, suggesting that miR-361 supported osteoblast formation from the neural crest. Bioinformatic analysis and RNAi experiments then confirmed Prickle1/2 as a direct miR-361 target. Since Prickle has been reported as a member of the non-canonical Wnt pathway, we hypothesized that miR-361 promotes osteogenesis by using the non-canonical Wnt signaling pathway to direct cells towards osteoblasts. Using LEF/TCF-luciferase reporter assays we noted a decrease in canonical Wnt signaling when miR-361 was added, suggesting that miR-361 transmits non-canonical Wnt signals. This is the first step of many in understanding the role of miR-361 in osteogenesis. Because of these discoveries, there will be a new way to understand bone differentiation, possibly leading to new therapies.

Adrienne Blackwood, Creative Writing
Faculty Mentor: Michael Jayme, Creative Writing
Hearing Colors

My Honors capstone project is a historical fiction novel titled Hearing Colors. It is set in the Outer Banks of North Carolina in the early 1900s and the protagonist, Bert Bodkin, is a young man with sound-color synesthesia. In 1903, he witnessed the first engine-powered flight at Kitty Hawk beach and became determined to become a pilot. In 1910, when the majority of the story takes place, he struggles to save up enough money to leave North Carolina and travel to Ohio to work for the Wright brothers. When a French violinist moves to town and hires him to repair her house, Bert believes that he will finally be able to acquire enough funds to pursue his dreams of flight. However, he soon discovers that her music sounds purple—the only color he has never heard before—and his plans are once again thrown into disarray. The novel itself will examine the intersection of pragmatism and intuition, as well as the themes of alienation and belonging, all of which are rooted in the core subjects of synesthesia and flight. Ultimately, this project seeks to produce a creative interpretation of sound-color synesthesia by applying the theories of Richard E. Cytowic and other neurologists to a fictional character, in an attempt to hypothesize how sound-color combinations might manifest themselves within his mind and how these manifestations might affect his decisions.
Polydiacetylene-Coated Polyvinylidene Fluoride Strip Atpasensor for Colorimetric Detection of Zinc(II)

Polydiacetylene (PDA) polymers go through observable colorimetric transitions from blue to red. These occur when PDA is exposed to environmental perturbations, such as when a target protein binds to a detection probe that is conjugated onto the surface of the PDA liposomes. This research reports the development of a highly specific and sensitive PDA-based aptasensor strip for the detection of Zn\textsuperscript{2+}. The aim of this study is two-fold. Using Zn\textsuperscript{2+} aptamers as our detection probe, we first observed the relationship between aptamer length and formation (e.g. hairpin vs non-hairpin) on the sensitivity of PDA liposome color transitions. We found that longer aptamers and those with hairpin formations allowed for increasingly sensitive color transitions. We then implemented our Zn\textsuperscript{2+} detection technology into the fabrication of sensor strips. These were produced by dipping polyvinylidene fluoride (PVDF) strips into a chloroform solution containing a diacetylene (DA) lipid mixture that included Zn\textsuperscript{2+} aptamer-conjugated DA monomers. Subsequent UV photopolymerization resulted in a blue PDA layer on the surface of the PVDF strip that transitioned from blue to pink/red when dipped in solutions containing Zn\textsuperscript{2+}. Our strips exhibited two distinct color transitions. The first transition occurred at 8.16 ppm (detection limit), and the second at 32.65 ppm. The sensor developed in this study has great potential for in-field diagnostic applications due its user-friendly platform, simple production method, and the use of robust and specific DNA aptamers.

Arvanoush Boudaghians, Linguistics
Faculty Mentor: Denver Graninger, History
1980 Iran-Iraq War: Impact of Illegal Use of Chemical Weapon

This research examines the struggles that Armenian-Iranian military personnel faced during eight years of the Iran-Iraq War, particularly their exposure to chemical weapons. The project raises awareness about the impact of chemical warfare and contributes to contemporary policy debates about the use of such tactics, which violated the 1925 Geneva Protocol. To further explore the matter, I reveal religious, cultural, and social conflicts between the Islamic Republic of Iran and one of its minority communities, the Armenian-Iranian population. This work is a unique and important contribution to our understanding of the war. This war was a struggle for dominance between the opposing sides inflicting thousands of casualties. The leaders of the two countries, Saddam Hussein and Ayatollah Ruhollah Khomeini, each had ambitions for their countries beyond their borders. This study serves three purposes. First, it presents evidence of the impact of chemical weapons. Second, the outcome suggests that the Armenian-Iranian minority in Iran has struggled to determine and describe their identity. Finally, it contributes to the education of future generations. The Iraqi use of chemical weapons in the recent past must stand as an unsettling reminder that other countries can use these atrocious tactics against their enemies. This research is based on consultation of a primary source in Farsi, a selection of which I translated into English; this selection analyzes the history of interpersonal relationships between Iranians and Armenians and reflects on soldiers’ unique memoirs (Boudaghians 2006).
Jessica Bustamante, Cell, Molecular Development Biology  
Faculty Mentor: Dr. Prue Talbot, Cell Biology and Neuroscience  
The Effects Of Electronic Cigarette Exhaled Aerosol Residue On Human Cell Morphology As An Indicator Of Cell Stress

Electronic cigarettes (EC) have the potential to cause adverse effects on human health. EC exhaled aerosol residue (ECEAR) forms when a user exhales aerosol which then deposits and adsorbs onto surfaces such as carpet and furniture. The objective of this project is to determine if ECEAR affects human cell morphology, growth and blebbing as indicators of cell stress. Human fetal palatal mesenchyme cells, a model for the developing oral cavity, were exposed to ECEAR extracts from terrycloth that was placed in a business adjacent to a vape shop. Live video images were taken over a 24-hour period in a BioStation IM and CT and were analyzed manually and with image processing software (CL Quant) to quantify cell growth and determine changes in cell morphology. When manually observed, the 30% ECEAR extract inhibited cell division at all-time points except one when compared to the control groups. In addition, the ratio of blebbing cells to total cell number was increased relative to controls in groups treated with 30% ECEAR for 24 hours. Cell growth was increased in groups treated with 10% ECEAR for 24 hours, but not in groups treated with 30% extracts. This is the first study done to test the effects of ECEAR on cell viability and proliferation and will provide information on the risks associated with use of EC indoors and in public places. Results will also contribute to regulatory science dealing with the health impacts of ECEAR.

Francine Can, Psychology  
Faculty Mentor: Mary Gauvain, Psychology  
Yoram Cheong  
Support from Friends and the Academic Self-Efficacy and School Connectedness of First-Year College Students

Friends play an important role in helping students adjust to college. First-year college students who form close relationships with friends on campus are more likely to feel connected to the university and succeed academically (Pittman & Richmond, 2008). First-generation college (FGC) students, whose parents did not go to college, may especially benefit in this way (Orbe, 2008). This study examines how support from on- and off-campus friends relates to first-year college students’ school connectedness and academic self-efficacy (ASE), a belief that he or she can succeed at an academic task or reach an academic goal. The study also compares support from friends reported by FGC and non-FGC students and its relation to ASE and school connectedness in these groups. Participants were 170 freshmen (61% FGC, 39% non-FGC). They completed an online survey measuring their perceptions of support from friends, ASE, and school connectedness. Descriptive analyses revealed that friends are a major source of support for most students (82%). Qualitative responses reflected four types of friend support: emotional, advice, problem solving, and academic resource sharing. Most students (77%) reported emotional support and the rate was especially high among FGC students (87% vs. non-FGC 64%). More support from friends was associated with greater ASE (on-campus: \( r = .33 \), off-campus: \( r = .27 \)) and school connectedness (on-campus: \( r = .30 \), off-campus: \( r = .27 \)). These values are all significant at the \( p < .01 \) level. The results show the importance of supportive friends during students' transition to college for FGC and non-FGC students.
Bullying has been shown to be a risk factor for many negative external and internal problems (Arseneault, Bowes, & Shakoor, 2009; Barker, Arseneault, Brendgen, Fontaine, & Maughan, 2008; Schreier et al., 2009). Some bullied children behave better than research expects. These children are deemed as “resilient” (Rutter, 2006). This research will seek to determine if there is a positive connection between positive sibling relationships and the resilience against childhood bullying/peer victimization. The sample consists of students from University of California, Riverside ($N = 129$) between ages 18 and 26. Childhood bullying/peer victimization the participant experienced will be rated by intensity and the types will be revealed (physical abuse, verbal abuse, manipulation). Sibling relationships are rated and sibling victimization—physical, verbal, or manipulative acts—are identified. The variables chosen to access resiliency include GPA and self-esteem scored by the Self-Esteem Scale developed by Rosenberg (1965). After conducting a chi-squared test, when comparing resilient participants with non-resilient participants, there was not significant evidence ($\chi^2 = 3.82; \text{pr} = .28$) to indicate that quality of sibling relationships influences resiliency among victims of childhood bullying. Cramer’s V ($\phi_c = .24$) showed that quality of sibling relationships was only a small effect on being resilient to childhood bullying. The data also showed that there were significantly more resilient participants who experienced manipulation from siblings ($\chi^2 = 10.25; \text{pr} = .036$). Cramer’s V ($\phi_c = .347$) showed moderately high relationship between presence of manipulation between siblings at home and resiliency against childhood bullying.
Mayra Celene Cortez Alcaraz, Bioengineering  
Faculty Mentor: Huinan Liu, Bioengineering  
Aaron F. Cipriano, Pedro Soria, Jr.  
Preparation, degradation, and cytocompatibility of electrophoretically deposited MgO nanoparticle coatings for orthopedic applications

Magnesium (Mg) has shown to be a promising material for next-generation orthopedic implants; however, Mg degrades too rapidly for clinical purposes. In this project we optimized the electrophoretic deposition (EPD) of magnesium oxide (MgO) nanoparticles (NPs) on bulk Mg and investigated the in vitro degradation and cytocompatibility with bone marrow mesenchymal stem cells (BMSCs). The MgO NPs were suspended in ethanol (1-3 mg/ml) and deposited on commercially pure Mg using EPD at 23 V for durations of 1-3 min. Subsequently, the MgO-NP-coated Mg samples were annealed at 450 °C. The in vitro degradation was determined using electrochemical tests in revised simulated body fluid (r-SBF), and through 9-day immersion tests in r-SBF and Dulbecco’s Modified Eagle’s Medium (DMEM); the cytocompatibility and cell-biomaterial interactions were determined using the direct culture method with BMSCs. Inductive coupled plasma optical emission spectroscopy was used to determine Mg²⁺ ion concentration in the incubation media to determine in vitro degradation rates. Likewise, scanning electron microscopy, energy dispersive x-ray spectroscopy, and fluorescence microscopy were used to determine cell-biomaterial interactions at the surface of the MgO-NP-coated Mg samples. Coating optimization showed that the distribution of EP-deposited MgO NPs improved with increasing MgO NP concentration in ethanol. Additionally, although the average daily degradation rate of Mg did not improve significantly after the EPD of MgO NPs, the coating did initially mitigate hydrogen gas formation and was able to sustain BMSC adhesion at the cell-biomaterial interface. Hence, MgO-NP-coated Mg show favorable results for the further development of Mg-based orthopedic implants.

Alondra Clemente, Anthropology  
Faculty Mentor: Susan Ossman, Anthropology  
Music as an art of migration: Selena Quintanilla

As we all might know music is an art form that is interpreted and felt in many ways. Most often hearing a specific song or even a specific sound may cause a feeling of nostalgia. Music travels in the sense that it is heard in many different regions and in many different languages. Therefore, I argue that music is a form of non-physical migration that happens in a cultural perspective and here I focus on Tejano music in particular to Selena Quintanilla. Selena Quintanilla Perez was born on April 16, 1971 in Lake Jackson, Texas. She was known as the “Queen of Tejano Music.” Tejano music can be defined as “various forms of folk and popular music originating among the Mexican-American populations of Central and Southern Texas.” Tejano music has many roots and therefore has migrated from place to place. Selena Quintanilla revolutionized the Tejano music industry in which she crossed borders with her music. When we hear one of her songs we are reminded of memories of both our past and even our culture. Selena’s music resonated in many places and in both English and Spanish therefore it crossed many borders and allowed for people to share it across the world. Her music still speaks to many people today and is an important aspect to why I chose to focus on her because her music moved along with those who also migrated from place to place.
Electronic cigarettes (EC) are nicotine delivery devices that have become a popular alternative to conventional cigarettes due to the lack of burning tobacco. Despite this increase, there is limited data on the effects of EC usage, especially during pregnancy. Many pregnant women turn to EC as a substitute to conventional cigarette use for satisfying nicotine cravings. Although EC generate aerosols that contain fewer chemicals than conventional cigarettes, in addition to nicotine, they are still comprised of many potentially harmful chemicals, such as carbonyl compounds. The primary carbonyls found in EC aerosols, sometimes in amounts that far exceed those found in conventional cigarette smoke, are formaldehyde, acetaldehyde, and acrolein. Because the effects of these chemicals on human development are not fully elucidated, it is imperative that further research be conducted. The purpose of this experiment is to evaluate the effects of nicotine and carbonyl compound exposure on the overall health of human embryonic stem cells (hESC). hESC will be treated with authentic standards of nicotine and carbonyl compounds at varying concentrations to create dose-response data, generated by using video bioinformatics techniques. Treated cells will be evaluated using the Nikon BioStation CT to make time-lapse videos and analyzed using a powerful stem cell analysis software, StemCellQC, which analyzes various morphological and behavior parameters to determine cell health. Data from treated cells will be compared to untreated controls to determine the effects of nicotine/carbonyl exposure on hESC health and development.

Citrus accounts for $2 billion of California’s annual agricultural production. This economic impact is the reason that citrus is a focus of many research labs at University of California, Riverside. Transposable elements (TEs) are a major component of eukaryotic genomes and are likely to be a significant factor in diversifying the citrus genome. We recently participated in sequencing the Fairchild mandarin genome using PacBio technology. The goal of this project is to identify active TEs from the PIF/Harbinger, hAT, and TcMariner superfamilies in Fairchild sequence and to ultimately determine the contribution of these TEs to citrus diversity. To this end we used the Tree Analysis of Related Genes and Transposons (TARGeT) to identify Fairchild homologs of transposases characterized in other angiosperms. The phylogenetic tree provided by TARGeT allows for selection of putative active homologs, identified by the shortest branches between two or more element nodes. Full-length TEs containing these transposases can be identified by computational searches of flanking sequences for unique TE features such as terminal inverted repeats (TIRs) and target site of duplication (TSD). To date, several putative active hAT and PIF/Harbinger TEs have been selected as candidates for in vivo tests of transposition activity in S. cerevisiae and A. thaliana.
Eriel Datuin, Biology  
**Faculty Mentor: Prue Talbot, Cell Biology and Neuroscience**  
**Cytotoxic Effects of Varying Humectant Concentrations and Voltage in Electronic Cigarettes**

As electronic cigarettes (EC) continue to grow in popularity, new multivariable EC models have been created which allow users to adjust voltage and wattage settings to optimize vapor delivery. These models are utilized with little to no information on their potential health effects. There is evidence that increasing voltages may harm cells by increasing levels of cytotoxic compounds present in EC vapor. In this study, the voltages of non-variable and multivariable models, as well as the resistances of their cartomizers and tanks were measured and validated using a multimeter. Additionally, we compared the cytotoxicity of EC aerosols generated at varying voltages at differing humectant concentrations in lab-made refill fluids containing propylene glycol (PG), vegetable glycerin (VG) and water. Aerosol samples were generated at 3V and 5V and tested on human lung epithelial (A549) cells using the MTT assay. At 3V, none of the samples displayed cytotoxicity. At 5V, four out of five samples showed cytotoxic effects at TPE concentrations ranging from 0.75 to 4.2. At 3V, VG was the most potent sample. At 5V, VG had the lowest IC₅₀ TPE concentration of the four cytotoxic samples. These data show that aerosol generated using higher concentrations of VG tends to be more cytotoxic than those with lower concentrations. However, cytotoxicity may increase with voltage. These data suggest that adverse effects may occur in users that utilize refill fluids with higher concentrations of VG or operate their devices at high voltages and may also contribute information to future studies on multivariable models.

Heather David, Microbiology  
**Faculty Mentor: Dr. Kurt E. Anderson, Biology**  
**THE EFFECT OF VARIABLE CONNECTIVITY ON RICHNESS IN SPATIALLY FRAGMENTED POND MICRO COSMS**

Food webs are fragmented across landscapes in nature. An understanding of how changing patterns of connectivity affects the persistence and dynamics of interacting species is limited. Theory predicts that specific patterns of spatial connectivity can influence richness and dynamics in food webs, but this has not been tested empirically. Protist microcosms are used to manipulate connections among food webs in a laboratory setting, simulating natural community dynamics. Microcosms in the laboratory have shown to reproduce wild ecosystem community dynamics. Microcosm samples are being collected from ponds in University of California at Riverside’s Botanical Gardens and Agricultural Operations Facility. They are added to networks of 175 milliliter bottles which are connected in various patterns by flexible tubing. The effect of connectivity on richness is explored by varying the number of bottles per network and varying the number of connections per bottle. In evenly connected networks, circle shaped networks of bottles have the same number of connections between them, each containing two connections per bottle. In uneven networks, a network of bottles will have variable numbers of connections to other bottles with a more random pattern. The networks of bottles with uneven connections are expected to support greater food web richness and the converse is expected with evenly connected networks. This study attempts to inform ecological theory by demonstrating how richness is affected by network size and level of connectivity variability.
Kollan Doan, Cell, Molecular and Development Biology  
**Faculty Mentor: Dr. Morris Maduro**  
Adult *C. elegans* exhibit physiological abnormalities when early gut development is partially compromised

The nematode *Caenorhabditis elegans* displays developmental robustness, such that nearly all embryos show normal development across a range of conditions. We are investigating properties of adults derived from embryos that are partially compromised for a very early step in the specification of the intestine (gut) primordium. While some of these embryos fail to develop to adulthood because they do not make a normal intestine, many do develop to adulthood with an apparently complete and functional gut, suggesting that intestine development has compensated for any defects in early development. As the gut provides essential nutrition functions to the animal, we hypothesized that if there were any abnormalities remaining in these adults, it may be visible through indirect measurements of characteristics that depend on normal metabolism and physiology. Here, we examine adults derived from strains in which early embryonic gut development has been partially compromised, and quantify three physiological properties: resistance to oxidative stress, rate of pharyngeal pumping, and longevity. Our results show that adults that result from partially-compromised gut specification exhibit detectable physiological abnormalities that are dependent on the degree to which the gut is compromised overall. We propose that in *C. elegans*, proper function of the adult gut requires robust early progenitor specification, and that there are limits to the ability of gut development to compensate for early perturbations in specification.

Ariana Elizalde, English and Public Policy  
**Faculty Mentor: Fred Moten, English**  
Reimagining Interdisciplinary Disciplines: A Case for Subjectivity in Knowledge Construction in Public Policy and the Social Sciences

What does it mean for a discipline like public policy to be interdisciplinary? Why is public policy’s interdisciplinary reputation celebrated even as it aggressively guards itself from the influence of the humanities? What significance does the humanities’ concern with and its subjective methodological approach have on constructing knowledge? What are the effects that emerge out of public policy being addressed only or primarily through objectivity? Can public policy both as a discipline and practice be reimagined? Why and how might this reimagining take place? Can taking public policy’s seemingly polar opposite methodology-subjectivity, into account, and not merely its conventional methodology-objectivity, enhance policymaking? In other words, does taking people’s stories into account enhance policy outcomes? What can literary forms such as fiction and poetry tell us about the effects of policy that statistics cannot? Can literature give us a clearer understanding of social issues? If so, what effect has the absence of subjectivity had on public policy and how might a different relationship between subjectivity and objectivity within public policy be created? Can the lack of subjectivity in policymaking be seen as a root cause of the dissonance between public policy’s primary functions, namely, the preservation of the status quo and growth and change in the law? Can the inclusion of subjectivity in public policy help reconcile this antagonism? My project seeks to address this question by attempting to enact just such a reconciliation.
Soybean oil is rich in omega-6 polyunsaturated fatty acids and is heavily consumed in the American diet. It is considered to be healthy although it is rich in linoleic acid (LA) which is reported to have inflammatory and neuroactive effects. For example, LA is a metabolite that leads to the production of arachidonic acid, which can be transformed into agents that mediate or modulate inflammatory reactions. Furthermore, LA can activate TRPV1 channels in the central and peripheral nervous systems, contributing to thermal hyperalgesia, i.e., oversensitivity to heat (Patwardhan et al, 2009; Huang et al, 2006). Other evidence suggests that high fat diets (HFD) can change the phospholipid composition of nerve membranes, thus possibly lowering pain threshold. The release of oxytocin is negatively regulated by synaptotagmin 4 (SytI4) (Zhang et al, 2011). I hypothesize that mice fed LA-containing diet will show decreased pain threshold compared to controls. In this study we measured the effects of different high fat diets on pain latency and hypothalamic mRNA levels of Oxytocin: Viv Chow (Control; regular rodent chow, <1 % LA), HFD (high fat diet based on coconut oil mostly containing saturated fatty acids; 2% LA), LA-HFD (Soybean oil; 50% LA), PL-HFD (genetically modified soybean oil; <5% LA). Contrary to my hypothesis our pilot data suggests that LA-HFD increases the latency to withdraw from a painful stimulus (increased pain threshold) as compared to regular Viv Chow (p<0.05). This effect was countered by PL-HFD (p <0.001), by stigmasterol diet (p <0.0001), and by HFD (p<0.01), suggesting that dietary LA may decrease pain. Using qPCR we measured mRNA levels of genes encoding components of oxytocin signaling. We found an apparent increase in oxt mRNA in LA-HFD relative to HFD group. Synaptotagmin-like 4 gene sytl4 showed significantly upregulated mRNA levels in LA-HFD vs HFD. No changes were noted in gene expression for oxytocin receptor, oxtr. Changes in oxt and sytl4 genes may inform about their possible contribution to LA-induced pain sensitivity. Ultimately, our data may indicate that LA contributes to higher pain threshold, and this may be due to altered oxytocin signaling. More research is needed in order to determine the mechanisms underlying the pain effect.
Invasive species pose a serious threat to the ecology of native species and ecosystems. Such species are capable of inflicting direct and indirect effects on the invaded landscapes, often altering the native community structure. From a broader scope, invasive species threaten public health, agriculture, and local and national economies. Therefore, understanding of the mechanisms by which invasive species generate negative effects is critical for the mitigation of their impact on the environment. Many invasive plants aid in increasing the vulnerability and/or detectability of native plants by attracting various herbivores. Associational susceptibility will occur when native plants are more detectable by herbivores when in proximity to invasive plants, consequently leading to increased predation to the native species. One mechanism by which this may occur is through differential tolerance to herbivory – an invasive plant more tolerant of herbivores than neighboring natives will induce negative indirect impacts on native plants. Invasive insects also threaten native ecology and biodiversity, and may change the biotic and abiotic environments they have invaded. To investigate the role of differential tolerance to herbivory in mediating interactions between invasive and native plants, we examined the responses of the invasive Brassica tournefortii and the native Atriplex canescens, to feeding by various densities of an invasive insect herbivore, Bagrada hilaris. Our goal is to assess whether B. tournefortii is more tolerant of B. hilaris mediated damage than A. canescens, and thus determine if this is a mechanism by which associational susceptibility is occurring.

The official history of Nineteenth Century California was written in English and it neglected the presence of Spanish speakers in the territory. As a consequence, and maybe because of it, the testimonies of these Spanish speakers remain for the most part unpublished and even undiscovered in different libraries and archives. This research aims to recover a hidden chapter of the sociolinguistic history of Southern California: the dialect of Spanish spoken by Californios, and how this dialect is related to contemporary Spanish language in the area. Some questions that arise and that may be answered upon concluding this research are: what was the Spanish language like in the nineteenth century? And, how did the US annexation affect the language use of the Californios? Such research focuses on Felix Buelna whose text Don Felix Buelna ciudadano californio, nacido en 1816, de profesion agricultor, de inclinacion musico, comico y poeta, shows the tension between Spanish and English that the Californios endured, that is, the native speakers of Spanish in California in the nineteenth century. By examining around five thousand words of his previously unpublished manuscript work, it is evident that the more salient features of contemporary Spanish of California, such as code-switching, code-mixing, and the presence of archaisms, have been present in California Spanish since the 1800s.
Alina Geangu, Plant Biology
Faculty Mentor: Jeffrey Diez, Botany and Plant Sciences
The effects of climate and forest disturbances on the growth of *Calocedrus decurrens* at the southern and northern portion of its California range

The study examined the impacts of climate (temperature and precipitation) and forest disturbances on the growth of *Calocedrus decurrens* (incense cedar), in the San Bernardino National Forest and Tahoe National Forest. *C. decurrens* is important for humans, with uses for timber, pencils, incense, etc. The conifer was examined at two elevations in the San Jacinto Mountains, and one elevation in Tahoe National Forest. The latitudinal gradients represent the Southern and Northern portion of the species’ California range. Dendrochronological analysis combined with climate data from the last century was used to analyze the plant’s growth response to changes in climate and potential forest disturbances (e.g. fire, herbivory, pathogens, human interaction, etc.). There is variation in forest vegetation and species distribution between the sites leading to differences in the tree’s seasonal growth structure. At 1800 m elevation in the San Jacinto Mountains, the conifer is not strongly influenced by climate, and forest disturbance may play a role in its growth. At higher elevations, available moisture is an important factor in its growth. The conifer thrives in Tahoe National Forest, and its yearly growth correlates to annual temperature averages. Overall, the study found that climate may not be the only factor shaping plant growth, and other biotic and abiotic influences may regulate much of *C. decurrens* seasonal growth patterns. In practice, assessing a plant’s growth response to variables in climate and changes in its environment can help predict the possible ecological outcome of future environmental shifts.

Haydi Gerges, Psychology
Faculty Mentor: Rebekah Richert, Psychology
Emotions and Cognitive Development in Early Childhood

The present study investigates children’s ability to distinguish between realistic and fantastical events between the ages of 3.5 and 7. In this study, 40 children heard realistic and fantastical events. After each story children were asked whether the extraordinary events could or could not occur in real life. We also wanted to examine children’s understanding of the reality status of the characters in the stories we have presented to them. Previous research indicated that children can make a clear distinction between realistic and fantastic events. So, in this study we have added the emotion component to see if it will influence children’s judgments. Analyses will examine whether children’s awareness of possible and impossible events will be affected by emotions and influence children’s judgments of realistic and fantastic events.
Marissa Gonet-Gonzales, Bioengineering  
Faculty Mentor: Wenwan Zhong, Chemistry  
Fabrication of Silica Nanofibers for Nucleic Acid Extraction  

DNA extraction is a vital technique in biology often used in the diagnosis of diseases, and DNA and RNA research. Commercially available silica coated iron oxide beads are able to extract as low as 1 fmol of DNA. However, silica nanofibers should better extract DNA because of their larger surface area. Silica fibers are also cheaper to produce than the silica beads, making them more economical as well as extraction efficient. In this research, silica nanofibers were produced via the sol-gel electrospinning method. Tetraethyl orthosilicate, a precursor of silica, was first treated with acid to produce silica, and then polyvinyl alcohol (PVA), an easily electrospun polymer, was added before electrospinning to increase the entanglements. After electrospinning, the fibers were calcinated to remove solvents and PVA. These fibers were then used in DNA extraction from a buffer solution or serum. After eluting the extracted DNA from the fibers, the DNA was quantified via real time PCR. These results showed that the DNA recovered from the fibers was higher than the silica beads and other fibers at 1 nM (50 fmol). This indicates that these fibers recovered a higher concentration of DNA and proves that silica nanofibers are able to extract DNA more efficiently. The use of silica fibers in DNA and RNA extraction can potentially increase detection of disease and lower the cost and time of biological and medical research that rely on extraction.

Cody Gonzalez, Mechanical Engineering  
Faculty Mentor: Dr. Sandeep Kumar, Mechanical Engineering  
Investigation of the cobalt distribution in the room temperature ferromagnetic nanocomposite TiO2-Co thin films  

This study is motivated by the interesting potential transition metal oxides such as Titanium Dioxide and Cobalt films have to form dilute ferromagnetic semiconductors. The goal of this study is to provide transmission electron microscopy (TEM) imaging of the TiO2/Co interface to determine if the mechanism responsible for ferromagnetism in the multilayer is Cobalt replacing Titanium in the lattice or Cobalt clusters that form nanoparticles. The creation of these devices relies on diffusion as the transport mechanism for the Cobalt as the multilayer is heated through Rapid Thermal Annealing. The TiO2 and Cobalt used in this study are deposited through Atomic Layer Deposition and Electron-beam Evaporation respectively. The multilayer is composed of Cobalt deposited between layers of TiO2. Magnetic moment has been measured through use of a Vibrating Sample Magnetometer (VSM) where hysteresis loops have been measured for varying film thickness ratios and annealing temperatures. Preliminary results have yielded significantly more magnetic moment in the films annealed at 600 centigrade than similar films annealed at 700 and 800 centigrade and the percentage of cobalt compared to Titanium Dioxide does not appear to have a consistent effect on magnetic moment throughout all annealing temperatures. However, 25 percent and 40 percent ratio of Co/TiO2 seem to have the largest magnetic moments when not accounting for the increased volume of Cobalt. The initial TEM imaging proved problematic as a charging effect was observed giving poor images. A thin electrode layer will be deposited to dissipate the charge and the imaging will be repeated.
Jessica Grier, Psychology  
Faculty Mentor: Rebekah Richert, Psychology  
Oluyemisi Eshugbohungbe, Destiny Watson and Garlli Tat  
The Effect of Music on the Perception of Emotionally Neutral Faces

Yuan et al. (2014)’s study linked music with influencing one’s perception of emotionally neutral stimuli. They found that musically-induced negative moods made participants more likely to perceive negative emotions from neutral objects, while musically-induced positive moods had the opposite effect. We expanded Yuan et al.’s study by not limiting our sample to native Chinese students and by examining how music can affect one’s perception of emotionally neutral faces. We hypothesized that listening to genres such as heavy metal and hip-hop would increase perceptions of aggression on emotionally neutral faces; and that genres such as pop would relate to more positive ratings of the same faces. To investigate this hypothesis, we randomly assigned participants (N = 54) to one of the four experimental conditions with music playing (e.g., either pop, hip-hop, classical or heavy metal) or a control condition with no exposure to auditory stimuli. In each condition, participants were shown a randomized series of neutral faces and asked to rate the emotional state of the faces on a scale of 1 to 7, with 1 being happy and 7 being aggressive. A One-Way ANOVA found a significant difference between the conditions, $F(4,53)=4.77, p < .004$. A post-hoc Tukey HSD test revealed that participants in the heavy metal condition rated the emotion of neutral faces as more aggressive than participants in the pop, classical and hip-hop conditions ($p < 0.05$). The implications of these results suggest that listening to heavy metal music may increase perceptions of facial expressions as more aggressive.

Erica Guzman, Linguistics  
Faculty Mentor: Jennifer Najera, Ethnic Studies  
Lucha ‘Lizette’ Arrevalo  
Disproportionate Representation of Latino and African American Students in Special Education

This research study will open up a conversation about how most of the population of special education students in the LAUSD school districts are Latino and African American students. Part of the reason why I have chosen to research this problem because my brother, diagnosed with autism has been denied through institutional discrimination, a well-deserved education. The literature and through me in class observations and personal experience, it is evident that these students in this population are being discriminated against. An institutional analysis of inequalities within special education exist through the disproportionate representation of student that identify in these racial categories, through the lack of resources and services to identify special education students, and teacher preparation are the factors that I implement in my research with supporting evidence to support my claim. I also bring into my research alternatives and solutions to this critical problem that can break these barriers such as Critical Race Theory (CRT) and the Community Cultural Wealth Model (Tara Yosso) to illustrate ways to and can cater to these students and their families and therefore building a strong community. Through the literature that I have uncovered and my own experience that my family has faced, this is not only subjective to our experience but intersects amongst other families and students as well. This ongoing research study and experience of many individuals can illuminate new perspectives into this conversation. What I hope to gain out of this project is more attention to this issue and to give back to my community and in the future have an effect on education policy.
Scott Heacox, Entomology  
Faculty Mentor: John Heraty, Entomology  
Investigating the Systematics of the Pseudochalcura (Hymenoptera: Eucharitidae) Populations of North America

*Pseudochalcura gibbosa* Provancher (Chalcidoidea: Eucharitidae) is a widespread Nearctic species of wasp that is parasitic upon *Camponotus* (carpenter ant) brood. Populations of *P. gibbosa* can be found across the entirety of the United States and as far north as the Yukon and Alaska. As with all eucharitids, eggs are laid into plant tissue away from the ant host. Upon emergence, larvae are encountered by foraging ants and are passively transported back to the ants’ brood, where they initially attach to the ant larvae and begin development on the pupae. Based on morphological analyses, two previously described Nearctic species, *P. californica* (Ashmead) and *P. arizonensis* (Crawford), were synonymized under *P. gibbosa*. The goal of this research is to revisit these synonymies with *P. gibbosa* by using molecular comparisons based on combined ribosomal 28S-D2 and mitochondrial cytochrome oxidase I sequence data sampled from 45 individuals across six genera of Eucharitinae. The results provide preliminary evidence for the existence of cryptic species within the currently defined *P. gibbosa*. A new plant host, *Rhododendron occidentale* (Torrey & A. Gray) A. Gray (Ericaceae) (western azalea), is recorded from a recently discovered population of *P. gibbosa* from the central Sierra Nevada Mountains of California. This indicates a close relationship with other known populations from the western U.S. and Canada that also utilize *Rhododendron* for oviposition.

James Hepler, Entomology, Plant Biology  
Faculty Mentor: Thomas Perring, Entomology  
Diel patterns in oviposition and egg hatching of carob moth, *Ectomyelois ceratoniae* Zeller.

The carob moth is a perennial pest of dates, resulting in annual losses of $3-$15 million. Newly hatching larvae must enter date fruit soon after eclosion to survive the harsh desert climate. Inside the fruit they are not exposed to management tactics, and they cause damage to the inside of the fruit. Thus, the timing of the egg hatch event has implications for when control strategies should be implemented. The periodicity of oviposition and egg hatching was investigated under a 14:10 L:D regimen. Twelve cohorts of eggs collectively representing one 24-hour cycle were collected, placed individually in gelatin capsules, and observed every two hours for neonate eclosion. Studies revealed that hatching activity was highest in the hours immediately before and after dawn, with the greatest number of eggs hatching in the first two hours of photophase. Eggs laid in the hours immediately after dawn had shorter developmental times and hatched earlier in the L:D cycle than those laid at other times. Additionally, oviposition activity peaked in the early scotophase period and declined as dawn approached. These findings indicate that the hours before and after dawn are important in immature carob moth biology and that factors other than oviposition timing contribute to diel patterns in egg hatching. Furthermore, mitigation tactics timed in the early morning hours should result in the highest mortality of young larvae.
Jennifer Hernandez, Psychology  
Faculty Mentor: Rebekah Richert, Psychology  
Children's Analogical Connections and Physical Realism

Educational television programs remain prevalent in young children’s lives. Children’s understanding of fantasy and reality has implications for the connections between the concepts they are exposed to on television and the real world. This study examined whether children’s perceptions of character’s physical realism are related to the analogical connections they make through media exposure. Children (N=53, 54.7% female, M=3.89, SD=.711) watched a video of a popular educational television character making a lever to get toys to fly through the air. After, children were asked to find a way to get a ball to fly through the air using objects that could be combined to create a lever (problem solving). Researchers asked children which real life objects reflected the video items used to make the lever (analogical connections). Additionally, children were asked whether the character could go to school with them, play tag with them, or could be seen at the store (physical realism). We hypothesized children who perceived the character to be less real would be more likely to solve the problem and make analogical connections between the video and problem-solving task. Children’s successful problem solving was not related to physical realism, however, children’s analogical connections significantly differed by their physical realism scores; children who made 2 analogical connections had lower physical realism scores than children who made no connections or only made one, F(2,29) = 4.087, p=0.027. This finding has implications for children’s learning from educational programs that include fantasy.

Catherine Ho, Neuroscience  
Faculty Mentor: Margarita Curras-Collazo, Cell Biology and Neuroscience; Frances Sladek, Cell Biology and Neuroscience  
Soybean Oil High Fat Diet Reduces Hypothalamic Oxytocin Immunoreactivity

It is well established that the intake of fatty foods induces obesity, although relatively little attention is given to the type of fat. Male mice fed a high-fat diet (HFD) rich in saturated fat had significantly less weight gain, adiposity, glucose intolerance and fatty liver as compared to mice fed a high-fat diet containing soybean oil (SO), rich in the polyunsaturated omega-6 fatty acid linoleic acid (LA-HFD) or a diet rich in a genetically modified, low LA soybean oil (PL-HFD). Both LA-HFD and PL-HFD also have similarly higher levels of the phytosterol, stigmasterol, than HFD. The adverse effects of SO may be mediated, in part, by brain oxytocin, although this has not been studied. Oxytocin is anorexigenic and mouse models of obesity show reduced brain Oxt. We examined the effect of SO diet on oxytocin. Male C57BL/6N mice were fed for 17-27 weeks either vivarium chow (VC) or one of 4 iso-caloric diets: HFD (coconut oil), LA-HFD (SO), PL-HFD (GM SO) or Stigma-HFD (coconut oil with same amount of stigmasterol as LA- and PL-HFD). Immunoreactivity (IR) to an antibody specific for oxytocin-neurophysin in the paraventricular nucleus was markedly lower in LA-, PL- and Stigma-HFD groups relative to HFD and VC. For the supraoptic nucleus a similar pattern was observed except that oxytocin IR in PL-HFD was not reduced (n=5-6 experiments, 3-5 animals per group). Our findings demonstrate that the stigmasterol can decrease paraventricular oxytocin and may help explain the obesity and diabetic propensity associated with a diet rich in SO.
Jill Hoo, English  
**Faculty Mentor: Steven Stapely, English**  
Caribbean Myth and History in the Poetry of Anne Sexton

Anne Sexton’s poetry, including working copies of all the major collections of her verse, manuscripts, correspondence, scrapbooks, journals – even her small portable typewriter – all are archived at The Harry Ransom Library at The University of Texas at Austin, one of the great repositories of archival materials about American poetry. I went there to discover what connections existed for Sexton between the Afro-Caribbean myth of Anansi, who was half spider and half human being, and her late poem, “Rowing, which alludes to Anansi, and which poem quotes directly from a retelling of the myth by children’s author, Gail E. Haley. Digital photographs of Sexton’s materials evidence several important connections. The Pulitzer Prize winning poet James Wright, who was Sexton’s friend and lover, reviewed, at her request, the working manuscripts of all the poems in her collection, *The Awful Rowing Toward God*, of which “Rowing” is a part. In the margins of the manuscript he wrote in pencil not only his suggestions about the construct of the poems, but also his suggestions as to writers and philosophers she should read and study in order to broaden the global perspective in her work. The final version of the poems in *The Awful Rowing* connect Sexton to the avant-garde, to French modernism, to the visual arts, and not just to her “confessional” material. Sexton’s poetry says something about the way a postcolonial, global perspective was beginning to complement or displace a previously enuncted Eurocentric perspective in American poetry of the mid twentieth-century.

Christy Hoong, Neuroscience  
**Faculty Mentor: Christiane Weirauch, Entomology**  
Big Head, Little Head: Tracing the evolution of exaggerated head shapes in *Nannocoris* Reuter (Hemiptera: Schizopteridae)

Head morphology in the minute litter bug, genus *Nannocoris* Reuter 1891 shows dramatic variation between species. The genus consists of 12 described species, but numerous species especially from the Neotropics remain to be discovered and described. Evolutionary relationships amongst species in this genus are unknown and it is unclear where in the phylogeny and how many times exaggerated head shapes have evolved. We here use the first molecular phylogenetic hypothesis of *Nannocoris* and outgroups and trait reconstruction analyses to answer these questions. We extracted DNA from specimens of *Nannocoris* that represent the range of head shapes amongst described and undescribed species. Phylogenetic hypotheses were generated based on maximum likelihood and parsimony optimality criteria. *Nannocoris* is recovered as monophyletic, and the first hypothesis on species-level relationship is presented. Ancestral state reconstruction shows that the greatly elongated head shape found in certain evolved multiple times within the group.
Andrew Huang, Neuroscience  
Faculty Mentor: Victor Rogers, Bioengineering  
Expression of aquaporin 3 is a significant factor in outcomes of ascorbate treatment  

Pancreatic cancer is the fourth leading cause of cancer-related deaths in the world. Recent phase 1 clinical trials have shown ascorbate therapy is a promising adjuvant to current pancreatic cancer treatment. Intravenously injected ascorbate selectively generates pharmacological levels of hydrogen peroxide (H$_2$O$_2$) within the extracellular space which then permeates into the cell ultimately causing cell death. In order to enter the cell, H$_2$O$_2$ utilizes a transmembrane protein, aquaporin 3 (AQP3), as a passive transport mechanism. In pancreatic cancer cells, AQP3 expression is elevated compared to normal pancreatic cells. This AQP3 expression difference suggests increased intracellular transport of H$_2$O$_2$ in pancreatic cancer cells than in normal pancreatic cells. It is hypothesized that AQP3 expression is a critical factor for the overall intracellular H$_2$O$_2$ accumulation and thus contributes to the selective toxicity between pancreatic cancer and normal cells. Our results show that decreasing AQP3 expression in pancreatic cancer cells significantly decreases H$_2$O$_2$ uptake and increases its clonogenic survival fraction. These results suggest AQP3 to be a major source of H$_2$O$_2$ transport and thus a contributor to the selective toxicity of H$_2$O$_2$.

Thong Huynh, Anthropology  
Faculty Mentor: Elizabeth Davis  
He Said/She Said: Boys and Girls Differ in Emotional Coherence  

Emotion regulation (ER) includes any process that increases or decreases emotions. ER has been examined by measuring children’s respiratory sinus arrhythmia (RSA) reactivity. RSA is a parasympathetic measurement of the body's calming response to challenges. ER can also be measured by examining changes in the intensity of children’s positive/negative emotions after an emotional experience. Although these are all believed to index ER skill, how they relate remains unknown. We examined: 1) Whether boys’ and girls’ skill in decreasing negative emotion related to upregulating positive emotion after they experienced a negative emotional evocation and 2) whether RSA reactivity could predict these abilities.
Interactive media is a substantial part of the environment in which children develop; yet research is limited on individual differences in children’s gaming experiences. We examined whether individual differences in metacognitive awareness and preference for challenge impact the metacognitive experiences children have while gaming. Because previous research demonstrates that children’s preference for challenge predicts higher self-competence and control, we hypothesized that increased preference for challenge would predict higher metacognitive awareness. We also hypothesized that higher metacognitive awareness would predict more metacognitive experiences while gaming.

For this study, 66 children (34F, \(M_{age}=8.65, SD=1.57\)) played a 5-minute gaming session and screen-capture recordings were coded for metacognitive experiences (MC-Experiences). Before gaming, baseline metacognitive awareness (MC-Awareness) was assessed using the Jr. Metacognitive Awareness Inventory\(^3\) and preference for challenge was assessed using a subscale Harter’s Intrinsic vs. Extrinsic Scale\(^4\). Preliminary analyses indicate that children’s preference for challenge was positively related to MC-Awareness (\(r=.32, p=.01\)). Linear regression demonstrated that children’s MC-Awareness accounted for 7% of the variance in MC-Experiences while gaming (\(F(1,61)=4.37, p=.04, R^2=0.07\)), such that MC-Awareness positively predicted MC-Experiences (\(\beta=.26, p=.04\)). However, multiple linear regression indicated that together MC-Awareness and preference for challenge do not significantly predict children’s MC-Experiences, \(F(2,60)=2.16, p=.12, R^2=0.07\). These findings demonstrate that children’s preference for challenge and metacognitive awareness are related and that gaming experience is impacted by metacognition. Although preference for challenge was not predictive of metacognitive experiences in this sample, future research should further investigate this relationship and explore other potential individual differences that impact children’s gaming experiences.

Ronak Joshi, Neuroscience

Faculty Mentor: Hideaki Tsutsui, Mechanical Engineering

Investigating the impact of fluidic agitation on human pluripotent stem cells in dynamic suspension

The indefinite ability of self-renewal and differentiation into any cell type makes human pluripotent stem cells (hPSC’s) a primary candidate in cell therapy. Biological stirred suspension bioreactors are ideal for a culturing system, but still lacks in ability to reach the high numbers needed for clinical based application. Unfortunately, propagation of undifferentiated hPSCs in dynamic suspension has not been looking until recently, and the microenvironment factors have not been properly understood. The agitation rate of the dynamic suspension is unique in the sense that it plays a major factor in the survival, differentiation, and self-renewal of hPSCs. In the research we assessed the impact of multiple agitation rates between 1-200rpm using a conventional spinner flask for 7 days in mTeST medium, in which moderate agitation at 60 rpm achieved the highest cell yield, along with the most uniform sized aggregates. Conditions under 60rpm resulted in very large sized aggregates, mostly above 400um, and conditions over 60 rpm resulted in very small sized aggregates, mostly bellow 400um. This result presented a strong relationship between size of the cell aggregates and the cell yield, indicating there is an optimal aggregate size for survival and growth of hPSCs. To certify this observation, we cultured aggregates of hPSC from 100-500um in mTeSR under static condition for 7 days. Aggregate size of 300um provided the highest cell yield with a 90% viability and high expression of pluripotency markers. Understanding the cellular and molecular mechanisms of dynamic suspension will help develop a scalable stem cell culture.
Joshua Karam and Daniel Nampe, Bioengineering  
Faculty Mentor: Hideaki Tsutsui, Mechanical Engineering  
Stage-Specific Induction of Cardiomyogenic Differentiation in Dynamic Suspension

Human pluripotent stem cells (hPSCs) have the ability to self-renew indefinitely and differentiate into any cell type, making them an ideal tool as a source for cell-based therapeutics. Progress towards clinical implementation of hPSCs, however, has been limited partly due to the lack of a robust scalable culture system to generate clinically relevant numbers of hPSCs and their products. Unlike conventional monolayer-based methods, suspension culture strategies offer greater scalability by enabling tighter control of the fluidic microenvironment that could minimize heterogeneity and improve culture outcomes. Our previous data suggests that moderate agitation could be exploited to achieve the highest cell yield while maintaining high expression of pluripotency markers, as well as a shear-induced mechanotransduction response associated with phosphorylated-Akt (pAkt), but a more thorough analysis is needed to fully understand interactions between fluidic forces and core biochemical signals within these culture systems. Furthermore, we explored if dynamic suspension can also be leveraged to optimize cardiac differentiation of hPSCs. Using small molecules and stage-specific intermittent agitation, we were able to generate 90% cardiomyocytes, confirmed by cardiac troponin T (cTNT) and α-actinin (ACTN) expressions. Altogether, we present potential parameters that can be optimized to tailor hPSC expansion and differentiation in dynamic suspension.

Honeiah Karimi, Linguistics  
Faculty Mentor: Heidi Waltz, Comparative Literature and Foreign Languages  
Linguistic Analysis of Gender-Inclusive Language in English

Language often reflects social change as demonstrated in English when the second wave of feminism began in the 1960s. The limitations of our language in terms of gender thus came into the forefront and they are still subject to much debate. When proponents of gender-inclusive language exhort others to refrain from using sexist or even unnecessarily gendered language, they are often confronted with the puzzling reality that certain gender-inclusive terms catch on while others do not; however, which terms do end up spreading is never arbitrary. On the other hand, opponents of gender-inclusive language argue that it will never or should not universalize. For this reason, I wanted to evaluate which way the English language leads its speakers. I conducted a linguistic analysis of commonly used gendered terminology while also considering syntactic processes that can be employed to avoid marking gender. One major challenge language reformists face is the misconception that some words, such as history and manufacture, exclude women and non-binary individuals although etymologically linguists know this is not the case. Inquiry regarding gender-inclusive language proves vital within academia when we consider how gendered occupational titles can exclude on a cognitive linguistic level by looking at prototype theory. Approaching gender-inclusive language from a linguistic standpoint is a pragmatic matter that can give us answers as to which side of the debate is correct, or at least help us to understand that the relationship between language and gender is never black and white.
Alexia King, Biochemistry  
**Faculty Mentor:** Ernest Martinez, Biochemistry  
Michael Hamilton  
**The Role of HOTAIR M1 and HOX genes in Breast Cancer Development**

The National Breast Cancer Foundation reports breast cancer as being the second leading cause of death among all women. Of the estimated 230,000 women that will be diagnosed with breast cancer in the United States, about a sixth of these women will not survive. Recent studies have shown a correlation of HOX genes, a subset of homeotic genes, and breast cancer as they show aberrant expression in tumors compared to normal breast tissue. These HOX genes are transcriptional factors that are sequentially expressed during embryonic development. Initially discovered in Drosophila, HOX genes are responsible for regulating the transcription of developmental genes that direct body segmentation in animals. One of the special properties of HOX genes is their clustered nature within chromosomes which gives rise to their expression occurring in an ordered fashion. Within these clusters are genes that encode for proteins with similar functions as well as long non coding RNAs (lncRNAs) that regulate their expression. Studies have shown that although HOX genes are important for development, these genes also play a role in tumor development. In our lab, we are interested in the involvement of the lncRNA HOTAIRM1, located in the HOXA cluster, in the multiple molecular subtypes of breast cancer. Through Quantitative PCR (qPCR), we have analyzed cDNA from patients diagnosed with various types of breast cancer. As a result, we have found a down regulation of HOTAIR M1 in patients with Luminal A, Luminal B, Her2, and Triple Negative subtypes of breast cancer. This result is also mirrored in our bioinformatics data from the Cancer Genome Atlas. Future research to further validate our findings will include: analyzing matched tumor and normal adjacent tissues from patients diagnosed with these breast cancers and performing knockdowns of HOTAIR M1 and other HOXA genes in normal and cancerous breast cell lines to observe any phenotypic differences.

Kiersten King, English  
**Faculty Mentor:** Emma Stapely, English  
**Feeling Disobedient: Affective Resistance and Performative Pranks in Harriet Wilson’s *Our Nig***

With the guidance of Black feminist scholars such as Saidiya Hartman, Hortense Spillers, and Alexander Weheliye, this paper explores how Harriet Wilson’s autobiographical novel, *Our Nig; or, Sketches from the Life of a Free Black* (1859), challenges juridically imposed notions of liberty and broadens our available vocabulary for defining and recognizing feminized acts of resistance. As a young indentured girl to two abusive mistresses, *Our Nig*’s protagonist, Frado/Nig, engages in more radical resistant efforts than scholars have accredited to her by emphasizing moments of verbal resistance over other affective and performative disobedient acts. What if we were to consider less striking feminine behaviors, such as weeping and “jollity,”—behaviors perceived as criminal and deserving of punishment by Frado/Nig’s abusers—within the larger scope of Black revolutionary acts? Although often neglected as political failures, this paper will examine the silences, sounds, gestures, and movements in weeping and “jollity” to ultimately trace Black feminine resistance along a continuum of repeated doings of freedom that may never be fully done.
Human activities, such as unsustainable irrigation, have caused a rapid depletion of soil nutrients required for plant growth such as the macronutrient phosphorous (P), a component of important molecules including ATP and DNA. Insufficient P impacts the growth, energy levels and stress responses of a plant, leading to a loss of crop production and, ultimately, the well-being of humans. Fertilizer is used to compensate for P deficiency, but it is a limited natural resource and has negative effects on the environment, particularly fresh water. The sessile nature of plants has required them to evolve systems to respond to and lessen P starvation. In the model plant Arabidopsis thaliana, low concentration of P induces the development of lateral roots and root hairs that increase success in P uptake. This is caused by changes in gene expression, including the switching on or off of specific genes. My study aims to understand the responses to low P by roots in order to improve crops. The goals are (1) to explore if gene regulation occurs at other levels, specifically in the translation of individual mRNAs into protein and (2) to evaluate gene regulation that occurs in specific types of root cells. To do so, the method Translating Ribosome Affinity Purification (TRAP) will be used to provide insight into the molecular mechanisms behind lateral root induction. Plants engineered with TRAP constructs that allow evaluation of five groups of root cells (meristem region (RPL11C), epidermis (COBL9, GL2), lateral root cap (BRN2), phloem (SUC2)) have been generated, exposed to P starvation and root tissue harvested. An additional TRAP construct for the pericycle is under development. TRAP will be performed to isolate ribosomes and the associated mRNAs, which will be processed to obtain information on the number and position of individual ribosomes on individual mRNAs (Ribo-seq: ribosome footprints). These data will provide insight into cell-type specific responses associated with changes in root development and metabolism under low P stress.
Elena Kozlova, Neuroscience
Faculty Mentor: Margarita Curras-Collazo, Cell Biology and Neuroscience
Exploring Brain Gene Markers for Neurobehavioral Deficits Produced by Developmental Exposure to Indoor Flame Retardants

Autism Spectrum Disorder (ASD) is characterized by social and behavioral deficits emerging during development. Genetic heritability alone cannot account for an epidemic-like increase in ASD, suggesting the possible contribution of environmental factors. Polybrominated diphenyl ethers (PBDEs), flame retardants added to consumer products, have neurotoxicological effects and may increase susceptibility to ASD. Our lab investigated genes that serve as markers in forebrain social circuits. Behavioral testing identified that DE-71 impairs social recognition ability in male mice. Preliminary data indicates reduced gene expression of AVP (Avp), oxytocin receptor (Oxtr) and the PACAP-specific receptor (PAC1R; Adcyap1r1) in the amygdala (AMG) of PBDE-dosed mice showing social behavior deficits. The current objective is to examine correlative changes in gene expression in other socially relevant brain regions.

We hypothesize that PBDEs alter the gene expression in AMG, lateral septum (LS) and medial preoptic area (MPO). Another cohort of C57BL/6 dams that were dosed for 10 weeks (pre-conception: 4 weeks; gestation: 3 weeks; lactation: 3 weeks) has been generated. Dosing consisted of low dose (0.1 mg/kg/d), high dose (0.4 mg/kg/d), or corn oil vehicle (control) via ingestion of infused corn flakes. Flash frozen brains will be cut into 200μm sections using a cryostat. Micropunchers constructed with methodology designed and optimized in our lab will be used to collect micropunches of selected brain regions: AMG, MPO and LS. RNA will be isolated using a Micro-RNeasy kit (Qiagen) and analyzed with quantitative PCR. The findings may provide new targets of PBDEs relevant to neurodevelopmental abnormalities found in ASD.

Julia Krum, Neuroscience
Faculty Mentor: Richard Cardullo, Biology
Raymond-Tan Tran, Neuroscience and Adrianne Blackwood, Creative Writing
Audeamus Multidisciplinary Journal

Audeamus is an eclectic, multidisciplinary journal that publishes anything reproducible on paper, from research papers to fiction stories to comic strips. From 2007-2016, we were the only UC-wide Honors journal. The word Audeamus is Latin for “Let us dare” and, in recognition of our tenth edition and our desire to expand our readership, next year we are “daring” to transform from a UC-wide Honors journal to a National Honors journal—opening submissions to any undergraduate in the United States. Although a UC Riverside University Honors Counselor advises Audeamus, it is primarily student-run; the editorial board is made up of University Honors undergraduates at UC Riverside who select and edit the submissions and design the journal themselves. Throughout the past ten years, the Audeamus editorial board has succeeded in publishing exemplary journals with limited funding; the journal continues to strive to serve as a platform for publishing original and innovative research and creative projects. Our methods for organizational structure and publishing process, from advertising to reviewing submissions to publication, will be outlined in our presentation.
**Amelda Kurti, Microbiology**  
**Faculty Mentor: Amy Litt, Botany and Plant Services**  
Morphological Variation in Natural and Synthetic *Nicotiana tabacum* Polyploids.

Polyplody, or having three or more sets of chromosomes, has occurred within all angiosperms. The polyploid hybrid, *Nicotiana tabacum* (tobacco), arose 0.2 million years ago from the diploid progenitors *N. sylvestris* and *N. tomentosiformis*. Recently, synthetic polyploids were made in the lab from the same two parent species of *Nicotiana tabacum*. Synthetic polyploids allow us to compare the immediate effects of polyploidy with the changes that occur in the natural polyploids over time. We hypothesize that synthetic polyploids will show greater morphological variation than natural polyploids. We measured the floral tube length and width of the natural and synthetic polyploids and their progenitors. We used the average of the progenitors’ morphologies (the progenitor midpoint) to compare to both the natural and synthetic polyploids in order to evaluate the extent of polyploid variation. We analyzed the distance of the synthetic and natural polyploids from the progenitor midpoint, as well as the direction of that change. The data showed that the synthetic polyploids had two distinct morphologies: one group had a longer and wider floral tube than the progenitor midpoint, whereas the other group had a shorter floral tube. The natural *Nicotiana tabacum* accessions fell into one morphological group that displayed a shorter and wider floral tube than predicted. The results support our hypothesis that the synthetic polyploids show greater variation because they show two different morphologies, whereas the natural polyploids share similar morphology. This suggests the initial process of polyploidy can lead to different phenotypes, but variation decreases over time.

**Yuna Kwon, Biology**  
**Faculty Mentor: Tanya Nieri, Sociology**  
An exploration Study of the Geographic Distribution of Asthma Hospitalization Rates in Inland Empire, California

Asthma is a leading chronic disease in the U.S. and according to Centers for Disease Control in 2008, 2,326,451 adults and 644,122 children in California suffer from it. This study focuses on the Counties of Riverside and San Bernardino, California to explore factors that may relate to asthma hospitalization rates. In particular, it examines the geographic distribution of asthma hospitalization rates by median household income, % minority, % not speaking English as first language, size of the uninsured population, status as a medically underserved area, size of the foreign-born population, size of the naturalized foreign-born population, and air quality. Using data from HealthyCity.org, a public-access data and mapping tool for California, maps of the two counties were created to permit an assessment of the geographic overlap of potential risk factors and high asthma hospitalization rates. The analysis examined data from 2006-2013. Although the data did not permit statistical tests of association, the maps revealed patterns that can inform future research. Results were that areas with lower median household income tended to have higher asthma hospitalization rates. Areas with high non-citizens of foreign-born populations tended to have higher asthma hospitalization rates, but in San Bernardino County only. The size of the uninsured population, status as a medically underserved area, the size of the foreign-born population, and air quality appeared not to relate to asthma hospitalization rates.
Sarah LaPoint, Art History/Religious; Philosophy
Faculty Mentor: Matthew King, Religious Studies, Gender & Sexuality Studies
The Dynamic Social Agency of the Kālacakra Sand Mandala

The Tibetan Buddhist initiation rite known as the Kālacakra (“Wheel of Time”) involves the creation and destruction of a highly complex representation of enlightened experience known as a sand mandala. While the intricate design and ephemeral nature of the mandala have long piqued the interest of Buddhists and non-Buddhists alike, the history of Kālacakra scholarship has either focused on historical and philosophical accounts of the ritual, or has offered a semiotic didacticism for deciphering the mandala’s encoded symbols. These approaches fail to consider the lived experiences of those individuals who interact with the mandala, whether spiritually or secularly. Based on qualitative research conducted among Kālacakra practitioners in several Tibetan-American Buddhist communities, this paper examines the integration of this practice into the American cultural landscape through the mandala’s invention of new and diverse publics ranging from casual observers and volunteers, to refugees, tantric disciples, and New Age seekers. To do this, I weave considerations of the non-practicing publics through my explanation of the practitioners’ ritual engagement. I argue that the mandala functions with a secondary social agency that affords specific modes of subject formation, and that by engaging with the mandala in particular ways, individuals construct and negotiate the many overlapping worlds they inhabit. Such a perspective makes evident that the conventional historical and semiotic approaches to Kālacakra scholarship neglect how the mandala functions ethnographically. I therefore offer a method for understanding the function of the mandala that maps more fully onto the expressed realities of the mandala’s engaged publics.

Amber Lawhorn, Biology
Faculty Mentor: Amy Litt, Botany and Plant Sciences
Floral Evolution in *Nicotiana*

Morphological changes are important to understand because of their possibility to have broader ecological effects. For example, shifts in floral morphology such as tube length or width can lead to shifts in pollinators as the ability of the pollinators to reach the nectar changes. Throughout flowering plant evolution, we see constant variation in morphology. Because of this we decided to look at the evolution of floral tube length and width within *Nicotiana*, the genus containing tobacco. In order to do this, we took photos of *Nicotiana* flowers to obtain the floral tube length and width for 27 out of the 35 diploid species found within the genus. The information obtained from the measurements was then used for ancestral character reconstruction, which was done to obtain an estimate of the morphology of the ancestral species in order to observe how the morphologies have evolved to become the species we see today. This works by mapping the characters we are interested in onto a phylogenetic tree which is then used to reconstruct morphologies for the ancestral nodes on the tree. The end product is a map that shows the changes in morphology of different characters. The results of this study have found that similar morphologies arise independently along with the possibility of shifts co-occurring in both tube length and width. With changes simultaneously happening to the tube length and width, it is possible that there may be a change in pollinator as well.
Taylor Le, Biochemistry
Faculty Mentor: Thomas Morton, Chemistry
Drug Design to Prevent Cancer Cell Metastasis

For many cancers, metastasis can lead to fatal complications. In oncogenes, under wound DNA can produce single stranded self-associations in guanine and cytosine rich sequences known as the G-quadruplex and the i-motif, respectively. These structures utilize hydrogen bonds within the same strand, incorporating charged ions into their newly formed domain. The i-motif utilizes protons to create hemiprotonated dimers, while the G-quadruplex uses sodium or potassium ions to increase stability. This project consists of synthesizing a small molecule candidate in hopes of favorably binding to nucleotides of various i-motif strands. Multiple hydrogen-bond sites on drug candidates allow favorable binding with various nucleotides. DNA melting point experiments demonstrate the strength of binding between candidate and single-stranded DNA under different conditions. Other experiments include mass spectrometry, circular dichroism, and cell culture analysis. The following explores the results for benzylidencreatinine (1) (a previously known compound) and (5E,5’E)-5,5’-(1,4 phenylene bis(methylidene)) bis(2-imino-1-methylimidazolidin-4-one) (2) (here synthesized for the first time).

Megan Lee, Biology
Faculty Mentor: Fedor Karginov
Investigating the Role of EndoU in Developing T-cells

In T cell maturation, cells in the thymus develop from a double positive (CD4+, CD8+) state to a single positive state. The EndoU gene in T cells is suspected to play a role in the double positive to single positive development. EndoU is thought to encode for endoribonuclease with binding preference for structures of U residue and regulate mRNA post-transcriptionally. However, EndoU’s specific role in modulating and regulating functions is still unknown. The VL3-3M2 T cell line is specifically used to explore and characterize EndoU functions; it is a convenient system since the cells can be stimulated to induce maturation from double positive to the single positive. Using the CRISPR/Cas9 system, EndoU was targeted in VL3-3M2s and knocked out of the genome. Next, we constructed a targeting plasmid. Using homology directed repair (HDR), we knocked in the construct consisting of a G418-resistance gene flanked by homology arms specific to the cut site made by the Cas9 complex. Then, G418 selection and clonal expansion were used to screen for possible clonal deletion candidates. Following initial screening of the cell colonies, we currently have one knockout and are continuing to screen for more. We are checking for the candidates’ genotypes by PCR. The validated knockouts will be undergoing further exploration. This entails the replication of the confirmed candidates, using staurosporine to check the apoptotic phenotype, RNA sequencing, rescues, and various stimulation experiments to observe the absence of EndoU. Ultimately, we want to explore how EndoU affects the transcriptome and specific cellular pathways.
Linhui Li, Biochemistry  
Faculty Mentor: Jikui Song  
Structural study of the interaction between DNMT1 and histone modification H4K20me2

DNA methyltransferase 1 (DNMT1) mediates maintenance of DNA methylation patterns in genome, thus, results in epigenetic inheritance during cell division. DNMT1 is composed of a replication foci targeting sequence (RFTS), a DNA-binding CXXC domain, a pairs of Bromo-adjacent homology (BAH) domains, and a C-terminal methyltransferase domain. From previous structural studies of the DNMT1-DNA complex, the CXXC domain and the methyltransferase domain are responsible for interactions with unmethylated and hemimethylated CpG dinucleotides, respectively. However, the functions of the DNMT1 BAH domains remain unresolved. Our recent study identified that the BAH domain of origin of replication complex subunit 1 (ORC1) recognizes epigenetically modified histone, histone H4 dimethylated at lysine 20 (H4K20me2); such recognition is important for cell-cycle progression and body growth. Along this line, we aim to investigate the molecular interaction between the DNMT1 BAH domain and H4K20me2 through structural study, which promises to provide critical insights into the biological function of the DNMT1 BAH domain.

Eric Lin, Chemical Engineering  
Faculty Mentors: Kawai Tam, Chemical/Environ. Engineering; David Cocker, Chemical and Environmental Engineering  
Photocatalytic Oxidation of Nitrogen Oxides Using TiO$_2$-incorporated Coatings

Air pollution is a life threatening issue that is a major cause in many cases of acute and chronic health problems throughout the world. A chief contributor to this poor air quality is the production of nitrogen oxides (NO$_x$) through industrial, commercial, and residential processes. We have successfully developed a photocatalytic coating to eliminate atmospheric NO$_x$ through the use of titanium dioxide. Titanium dioxide (TiO$_2$) is a widely studied photo-catalyst due to its bandgap of 3.2eV, allowing it to drive photocatalytic reactions in the ultraviolet spectrum (λ < 380 nm). TiO$_2$ nanoparticles were incorporated in an acrylic emulsion based coating on an evenly coated asphalt shingle substrate. The photocatalytic oxidation of nitrogen oxides over this coating was then studied at 50 and 150 ppm NO$_x$. Analysis of these experiments yielded exceptional NO$_x$ reduction of up to 80%. In addition, multiple tests were run to simulate the weathering of this coating. These tests simulated rainfall on the coated shingles and a negligible change was recorded in the observed photocatalytic activity. Samples were taken of the run-off water and were then characterized using ICP-MS and AQ2 for TiO$_2$ and nitrate concentrations respectively.
Involvement of VPAC2 Receptors in Adrenal Mineralocorticoid and Glucocorticoid gene expression and hormone responses to acute stress in mice

Pituitary adenylate cyclase-activating polypeptide (PACAP) and vasoactive intestinal peptide (VIP) are peptides that function as neurotransmitters and neuroendocrine hormones. In the adrenal gland, these hormones trigger catecholamine responses to stress. Both these peptides can stimulate VPAC1 and VPAC2 receptors, while only PACAP can activate PACAP type 1 receptor (PAC1R). However, the role of these receptors in adrenal hormone synthesis and secretion is not completely understood. Recent studies in our lab have confirmed a role of VPAC2R in stress-induced epinephrine responses involving the adrenal gland. However, little is known about the participation of VPAC2R in other adrenal stress responses involving corticosterone (CORT) and aldosterone hormones. Male C57Bl6 mice were divided into groups with and without psychogenic restraint stress. A VPAC2R genetic knockout (KO) was employed to address our research question in a transgenetic model. Stressed animals were placed in small, breathable, conical tubes for one hour, then placed back into home cages for an hour before harvest. Plasma was collected via cardiac puncture and separation, and plasma levels of corticosterone and aldosterone were measured using EIA. Plasma CORT levels were significantly increased in a genotype-specific manner under stressed and unstressed conditions. For plasma aldosterone VPAC2 KO showed an increase in response to acute stress; however, there was no difference seen for wildtype (WT). Together, these data show that the VPAC2 receptor may play a crucial role in modulating the response to acute psychogenic restraint stress. RNA was isolated from the adrenal gland, and selected genes were analyzed by PCR. mRNA transcript levels of Cyp11b1, that encodes for the rate limiting enzyme in the synthesis of the steroid hormones, CORT and aldosterone, was elevated in VPAC2R KO under basal (unstressed) conditions, possibly contributing to the elevated plasma CORT (unstressed and stressed). The significantly reduced Cyp11b1 response to stress may represent a reduced threshold for production of steroid stress hormones that may impact physiological responses beyond the acute period of stress. Transcript levels of the gene encoding the transport protein for cholesterol, steriodogenic acute regulatory protein, Star, showed a similar expression profile, indicating that VPAC2R may regulate basal steroid hormone production. Adcyap1, the gene encoding for PACAP, pituitary adenylate cyclase-activating polypeptide, was significantly reduced during stress in both WT and KO mice, suggesting that PACAP signaling and VPAC2R expression may be related. Our findings suggest that VPAC2R regulates basal steroid hormone synthesis involved in mineral balance and glucose metabolic responses to stress.
Jennie Linck, Psychology  
Faculty Mentor: Aaron Seitz, Psychology  
Connections Between Task-irrelevant Perceptual Learning and the Attention Network Task  

Research suggests that neurochemical systems may mediate attention and learning processes. To investigate the role of these systems, pupil dilation was used as a biomarker of neurochemical activity. To measure attention and learning participants completed an Attention Network Task (ANT) (n=48) and a Task-Irrelevant Perceptual Learning (TIPL) task (n=33). Results from the TIPL task indicate that increased pupil size is associated with learning, in line with previous studies. Results from the ANT task are in line with previous results and show an alerting, validity and executive attention effect. Due to excessive eye movements during the ANT, pupil dynamics could not be assessed. When comparing participants who performed both TIPL and ANT (n=6) results indicate that the executive network, as measured by ANT, is strongly correlated (r=0.7491, p=0.03) with TIPL. This result suggests that the executive attention network, and the underlying neurochemical systems may be more important in TIPL than other attentional and neurochemical networks. Future studies will include larger sample sizes and control for eye movements during the ANT to investigate neurochemical processes in learning and attention.

Madeline Luth, Microbiology  
Faculty Mentor: Sharon Walker, Chemical and Environmental Engineering  
Effect of Material Properties on Bacterial Attachment to Thin Film Photocatalytic Titanium Dioxide  

According to the CDC, 1 in 6 Americans contract foodborne illnesses annually, and 20% of cases are associated with contaminated leafy green vegetables. Photocatalytic thin films could be implemented on surfaces within food processing plants to disinfect pathogenic bacteria and reduce incidents of cross-contamination from infected produce, thus reducing the number of outbreaks. This study aims to identify optimal material characteristics of titanium dioxide (TiO$_2$), a commonly used photocatalytic material, for this industrial application. Under ultraviolet light, the TiO$_2$ photocatalyst produces reactive oxygen species (ROS) that degrade bacterial cells, but ROS are generated only within close proximity to the TiO$_2$ surface. Therefore, attachment of bacteria to the surface is critical for disinfection. It is hypothesized that TiO$_2$ characteristics such as phase (Degussa or rutile), pH, and firing temperature alter surface characteristics of the material, which directly affect bacterial attachment. TiO$_2$ samples at pH 1.5 and 3.3 for the Degussa phase, and pH 6 for rutile phase, were prepared on glass slides and fired at 400°C, 600°C, and 700°C. Bacterial attachment assays were performed in parallel plate flow cell setup and observed under a fluorescence microscope to quantify attachment of *Escherichia coli* O157:H7 to the TiO$_2$ surfaces. Increasing firing temperature from 400°C to 600°C and pH from 1.5 to 3.3 yielded greatest levels of attachment in the Degussa phase, due to greater surface roughness at these conditions. Degussa samples experienced significantly more attachment than the rutile, which may be a result of varying crystal structure between the two phases.
Diane Luu, Cell, Molecular and Developmental Biology
Faculty Mentor: Peter Hickmott, Psychology, and Wendy Saltzman, Biology

Nathan Horrell,
Effects of Fatherhood on Neuronal Morphology in the MPOA in Male California Mice

Male parental care is rare in mammals, occurring in only 5-10% of species, including humans. In contrast to maternal care, the mechanisms of paternal care are poorly understood. Using the monogamous, biparental California mouse as a model, this project aims to reveal how fatherhood affects the paternal brain, specifically with respect to changes in neuronal morphology, a major determinant of neuronal activity. We tested the hypothesis that fatherhood affects neuronal morphology in the medial preoptic area (MPOA) of the hypothalamus. We chose MPOA because it is known to be involved in paternal and maternal behavior and increases its excitability in new fathers. We predict that fathers will have neurons with larger cell bodies and increased measures of dendritic arborization, compared to reproductively inexperienced males. Preliminary results show that fathers have more dendrites leaving the soma, greater length of longest dendrite, and a trend for increased dendritic branching. This study will contribute to a better understanding of the effects of fatherhood on the paternal brain, and might provide new insights into the neural correlates of paternal behavior in humans.

Albert Ly, Psychology
Faculty Advisor: Rebekah Richert, Psychology

Prayer’s Perceived Efficacy in Health Contexts

Prayer is a common complementary intervention used for health concerns (Bell et al., 2005). People consider it helpful when applied to their health, particularly for certain illnesses such as cancer, arthritis, and depression (McCaffrey et al., 2004; O’Connor et al., 2005). Certain forms of prayer (e.g., intercessory) are linked to positive health outcomes, although evidence is mixed (i.e. some refute that claim) (Astin et al., 2000; Harris et al., 1999; Matthews et al., 2000). There are reported differences in how people perceive prayer to be helpful among certain illnesses; however, research is unclear on the different forms and settings of prayer and how effective people perceive prayer to be in those areas. This study sought to explore this by examining (a) differences in responses made for private, group, personal, and intercessory prayer, and (b) if respondents answer similarly for different illnesses and medical conditions. The current study surveyed 320 undergraduates in introductory psychology courses at a large public four-year university. Participants completed an online survey rating the effectiveness of two types of prayer (personal and intercessory) in two types of contexts (private and group) for a range of medical conditions and illnesses (e.g., the common cold, arthritis). Participant responses range from “0” (not effective) to “3” (very effective). The primary analysis will be a Repeated-Measures Analysis of Variance (ANOVA) with perceived effectiveness as the dependent variable, and three independent variables: (a) prayer context (private, group), (b) prayer target (self, other), and (c) illness type (acute, chronic, mental). It is hypothesized that there are differences in the responses made for different contexts, targets, and illness types. Findings from this study may be helpful in improving the understanding of how people consider different types of prayer in addressing health concerns.
Biomimetic Impact Resistant Nanofiber Reinforced Composites

With a growing demand for lightweight impact resistant materials with certain applications in aerospace, automobiles, and human protection, global society often turns towards fiber reinforced composites. Fiber reinforced composites, which are composed of a fiber component and matrix, often offer the combination of high modulus, impact resistance, and low mass. This research investigates the synthesis methods and mechanical properties of biomimetic fiber reinforced composite materials containing engineering fibers with diameters close to an order of magnitude lesser than the current standard. The fiber reinforcement is composed of electrospun polymer fiber mats which may undergo thermal annealing. These mats were cut and laid upon one another with varying angles of rotation and finally infused with an epoxy-resin matrix. Scanning Electron Microscopy (SEM) of the ultrathin composites revealed a high apparent fiber fraction. Each composite was then cut into strips to undergo three-point bend testing following ASTM D790 standards. The findings reveal our composites to retain novel elastic modulus properties while being ultralight-weight.

Analysis of the function of FRUITFULL paralogs in tomato using CRISPR

It has been noted in previous studies that FRUITFULL, a MADS-box transcription factor, is important in the regulation of fruit development. In previous research, it was found that when down regulating FRUITFULL (FUL), it reduced ethylene levels but there was also found to be no change in ethylene in another study. When our group previously studied the down regulation of this gene, they found that there was a reduced pericarp thickness, where in other groups they found that there was a reduced thickness when the gene was overexpressed. The varying results could be due to tomato having four FUL paralogs, which are duplicated genes inside the same genome, SIFUL1, SIFUL2, SIMBP10 and SIMBP20, and the previous research that was done accidentally knocking down more than one of the paralogs. Our goal in this study is to figure out the function of each of the individual FUL paralogs by creating single, double, and quadruple knockout mutants using CRISPR/Cas9. CRISPR is a procedure that allows us to specifically modify the genome. Using CRISPR we can target each specific gene to analyze the difference in functions of the paralogs. To accomplish this, we have assembled SIFUL1 CRISPR constructs. We will compare the phenotypes of the mutants generated using these constructs, and the wildtype plants to identify SIFUL1 functions in tomato development.
Nikita D. Mahbubani, Psychology  
Faculty Mentor: Elizabeth Davis, Psychology  
Phoebe Kao, Parisa Parsafar, James Russo, Emily Shih  
How do Attentional and Physiological Components of Emotion Regulation Contribute to Children’s Risk for Externalizing Symptoms?

Attention biases (AB) toward or away from certain information in the environment are components of emotional regulation (ER). Bias towards threat is often implicated in internalizing symptoms, but attentional bias toward reward is rarely examined and may relate to children’s externalizing symptoms. In addition to attention biases, ER can be measured with objective assessments including respiratory sinus arrhythmia, (RSA), a parasympathetic measure of the body’s calming response. The goal of this study was to examine whether children’s physiological functioning and attention biases toward reward were associated with externalizing symptoms. 187 3- to 11-year-olds participated in an attentional dot-probe computer task to measure bias toward rewarding stimuli (happy faces). Physiological regulation was measured by RSA collected during a brief resting period. Parents reported on children’s externalizing symptoms using the MacArthur Health and Behavior Questionnaire (HBQ). As expected, children’s resting RSA was negatively associated with parent-reported externalizing symptoms, $r = -.223, p = .004$, such that higher resting RSA (e.g., a more adaptive pattern) was related to lower externalizing symptomology. Interestingly, higher resting RSA was also associated with greater AB towards reward, although this association was marginal, $r = .163, p = .052$, suggesting positive associations between reward bias and more adaptive physiological regulation. We found no significant direct associations between AB to reward and externalizing symptoms, $r = .067, p = .412$. Future analyses and discussion will consider whether resting RSA and AB toward reward interact to predict externalizing, and whether these associations are qualified by children’s gender or age.

Robert Mannatt, Biochemistry  
Faculty Mentor: Sean Cutler, Botany and Plant Sciences  
Characterization of a Plant Hormone Receptor: ABA-PYR1

The plant hormone abscisic acid (ABA) is important in many aspects of growth and development. The receptor PYRABACTIN RESISTANCE 1 (PYR1) binds ABA activating a signaling pathway involved in stress response. The PYR1 receptor is a dimer, which initiates signaling following binding and subsequent dissociation to its monomeric state. The state of the receptor, either monomeric or dimeric, can affect its affinity for ABA. Increasing ABA-PYR1 affinity has the potential to activate stress responses with low levels of ABA in the plant. This study looks at PYR1 and the hypersensitive mutant PYR1$^{A160V}$ to identify their monomeric and/or dimeric states. This will then be used to determine if this plays a role in higher ABA affinity.
**Ana Martinez Flores, Psychology**  
**Faculty Mentor: Weiwei Zhang, Psychology**  
**Effect of Emotional Arousal on Visual Working Memory Consolidation**

Emotion affects various perceptual and cognitive processes. However, it is unclear whether and how emotion affects short-term memory (STM) consolidation, the initial process of transferring fragile sensory inputs into durable STM representations. To answer these questions, the present study examined STM consolidation in different emotional states. On each trial, participants memorized a briefly presented array of color squares and reported, after a two-second delay, whether a test color was one of the previously presented colors. The amount of time for STM consolidation was manipulated with pattern masks presented at different intervals after the onset of memory stimuli. Critically, the STM task was tested immediately after emotional arousal was induced using auditory sound varying in emotional intensity (high, moderate, and low arousal) from the International Affective Digital Sound (IADS) system. Participant’s pupil size was measured with an eye-tracker simultaneously to obtain objective assessment of induced emotional arousal. We found that arousal exerted a significant impact on STM performance at a short consolidation time in that STM performance was more accurate for low and high arousal as compared to moderate arousal. In contrast, arousal had little effect on STM when consolidation time was long. Together, these results provide preliminary evidence supporting modulation of STM consolidation by emotional arousal.

**Haley Masters, Biology**  
**Faculty Mentor: Eugene A. Nothnagel, Botany and Plant Sciences; Martha Orozco-Cardenas, Botany and Plant Sciences**  
**Bassam G. Theodory**  
**Testing for Heterodimerization of Moss Methyltransferases Through Genetic Crossing of Transgenic Tobacco Plants**

Sugar residues with O-methyl ether substituents occur in plant cell walls, but little is known about the function of these methylated sugars or the genes responsible for their synthesis. Arabinogalactan proteins of the moss *Physcomitrella patens* contain 3-O-methylrhamnosyl residues not found in advanced plants. The aim is to identify the gene encoding the methyltransferase (MT) responsible for synthesis of 3-O-methylrhamnose. Moss genes considered candidates for encoding this methyltransferase were transformed into tobacco. MT1 and MT6, two moss genes encoding closely related proteins, were both found to cause synthesis of 3-O-methylgalactose when separately expressed in tobacco. Because no moss genes were found that cause synthesis of 3-O-methylrhamnose, the hypothesis is that when MT1 and MT6 are both expressed, as occurs in moss, their polypeptide products form a heterodimer enzyme that synthesizes 3-O-methylrhamnose. This hypothesis is being tested by genetically crossing MT1 and MT6 transgenic tobacco plants to produce progeny that express both genes. T3 seeds from MT1 and MT6 transgenic plants were germinated separately. Leaves from the seedlings were tested by genomic PCR for the presence of the expected transgene and by glycosyl analysis for the presence of 3-O-methylgalactose. MT1 and MT6 seedlings confirmed to have these properties were grown to flowering and are now being genetically crossed. Plants resulting from the cross will be tested by PCR for the presence of both MT1 and MT6 transgenes, and by glycosyl analysis for the presence of methylated sugars. Supported by CNAS HSI-STEM Undergraduate Research Program and USDA NIFA grant 2008-35318-04599.
Taylor Meyer, Biology  
Faculty Mentor: Paul Larsen, Biochemistry  
Cloning, Purification and Crystallization of ETR1

ETR1 is responsible for sensing ethylene, a plant hormone responsible for fruit ripening and flower senescence. We have successfully cloned ETR1 (Ethylene Receptor 1) receiver domain into a bacterial system for protein production. The goal was to produce enough protein and sufficiently purify the material so it could be crystallized under the previously published conditions. Using these crystals, we would then introduce chemical functional groups to determine possible drugs that may interact with ETR1 and alter its conformation and therefore its activity. We were able to purify ETR1 to approximately 95% purity, but could not concentrate the sample beyond 1mg/mL without the protein precipitating. We required a higher concentration for crystallization because there must be enough material per well for crystal formation. To achieve a higher concentration, we used 0.2M MgSO4, increasing the solubility of the protein and were able to concentrate it to approximately 9.5mg/mL. This material was introduced to the crystallization conditions, but no crystals have formed. Material generated this way can still be useful for other assays when identifying potential drugs. Using a predictive computer model with the known structure, we have been directed toward a selection of chemicals which may interact with the surface of ETR1. Our future work will be aimed toward examining the possible effects these chemicals may have on ETR1 and the Arabidopsis organism. Using mutant plants with the inability to sense ethylene and wild-type plants we can examine if any of these chemicals can constitutively activate ethylene signaling or confer ethylene insensitivity.

Rosa McGuire, Biology  
Faculty Mentor: Dr. Kurt E. Anderson  
Assessing the dynamics of a generalist predator/prey model across different spatial configurations

The major human impacts in ecosystems are habitat destruction and fragmentation. Spatial structure can promote heterogeneity by dividing communities into independent patches loosely connected by the dispersal of organisms. Spatial heterogeneity allows recolonization from other patches resulting in long-term species persistence and preventing species from going extinct. Unfortunately, the underlying principles that govern the relationship between connectivity and persistence are poorly understood. Microcosm experiments have shown that habitat fragmentation can alter the persistence and population densities of members of a community. However, most microcosm studies of habitat fragmentation have focused on predator/prey interactions that include specialist protist predators. Here, we use protist microcosms to study the persistence of a predator/prey system using *Amoeba proteus*, a generalist predator, and *Paramecium caudatum* as prey. A predator/prey model is currently being parameterized and then a study of population dynamics across different spatial configurations will be completed. These results will be used to determine whether certain habitat configurations are better at maintaining persistence. Unlike specialist predators, generalists are expected to be over represented in fragmented habitats and have longer persistence times, meaning that understanding their dynamics is important. In this way, protist microcosm experiments represent an inexpensive and straightforward approach to understanding the effects of spatial configurations in predator/prey persistence. This will help in understanding and predicting the ecological impacts of habitat fragmentation, a major concern in conservation biology.
Mary Michael, Sociology  
Faculty Mentor: James Tobias, Sociology/Law and Society  
Technocultural Citizenship and Counterpublicity: Player Agency and Worldmaking in Queer Videogame Spaces

Queer spaces in videogames are often thought of as spaces within a game in which queer characters, relationships, or sex exist (Consalvo 2003). However, discussions of such queer spaces tend to be limited to game content, failing to include accounts of the queer potential of the game space itself - that is, its design, operation or navigation, and experience. This failure is further demonstrated in the separation of scholarly work on game spaces from work on queerness in games. Drawing upon José Esteban Muñoz’s discussion of queer horizons and potentialities (2009), as well as a reframing of Janet Murray’s discussion of agency and authorship in virtual environments (1997), I argue that queer game spaces are not marked exclusively by the presence of queer representation or content, but rather can be identified by the player agency that these spaces allow for constructing queer futurities, specifically in terms of programming queer counterpublics in gaming discourse. The player agency made possible by queer game spaces suggests a notion of technocultural citizenship that extends from the simultaneous creation and occupation of agency in games to the creation and occupation of different understandings of equality in digital space. Such an understanding of queer game space is significant in that it highlights the problematic notions of equal or democratic participation usually associated with discussions of queer game content and digital spaces, while also emphasizing the potential of queer game design elements in queer counterpublics to initiate digital world making as a new form of gendered, sexed literacy.

Kimberly Miller, Linguistics  
Faculty Mentor: Curt Burgess, Psychology  
Determining the extent that a high dimensional memory model can categorize verbs based on fine granularity

This research investigates Levin and Hovav's (1991) approach to the linguistic subcategorization of verbs of motion and whether a computational model of semantics will validate this approach. Audet and Burgess (1998) used the Hyperspace Analogue to Language (HAL) semantic model and found that it could distinguish manner of motion verbs (e.g., creep, jump) from inherently directed motion verbs (e.g., rise, escape) supporting Levin's (1993) claim that these two verb subtypes were semantically distinct. Levin and Hovav's proposal about the specific organization of a type of motion verb referred to as verbs of removal and they hypothesized that there are two removal verb subtypes: run verbs (e.g., skip, jump) and roll verbs (e.g., rotate, float). From Levin (1993), we used the initial verb sets of 123 run and 27 roll verbs. Verbs that were ambiguous or low frequency were removed yielding 10 roll and 10 run verbs that were matched for word frequency. The HAL model represents word meaning by recording the contextual co-occurrences of a word with other words. Similar words (e.g., road, street) have similar vectors. A Multi-Dimensional Scaling solution suggests that the run verbs occupied a semantic space mostly separate from the roll verbs. This was supported by finding a reliable difference between the within and between group distances ($p < .05$). Additionally, human word recognition time reflects semantic activation. Roll verbs were marginally faster (620 ms) than the run verbs (676 ms, $p = .06$). The computational and the human results support this linguistic distinction.
Sarah Miller, Biology
Faculty Mentor: Quinn McFrederick, Entomology
Pearl Le
Replication of a honey bee virus in alfalfa leafcutter bees

Several social pollinators such as honey bees (*Apis mellifera*) and bumble bees (*Bombus* spp.) have been shown to be susceptible to the Deformed wing virus (DWV). This virus causes morphological deformities and can cause the collapse of a colony. Our research tested the hypothesis that DWV can replicate in the solitary alfalfa leafcutter bee, *Megachile rotundata*. In order to test the infectivity of the virus in this novel host, we used two different methods to inoculate the *Megachile*. In one method, we injected adult *Megachile* with DWV that was extracted from symptomatic honey bees. Our second method consisted of a DWV inoculation to the pollen provisions that are consumed by the *Megachile* larvae. To detect viral replication within the host, we used strand-specific RT-PCR on *Megachile* collected five days post inoculation. The results will provide insights to the risk DWV poses to wild *Megachile* populations.

Kristina Moisa, Political Science/International Relations
Faculty Mentor: Alicia Arrizon, Gender and Sexuality Studies
The Anti-Rape/Anti-Sexual Assault Movement on College Campuses

My presentation will discuss my field research and conducted interviews about the recent escalation of the anti-rape/anti-sexual assault movement which responds to the underlying problem of sexual assault on college campuses. I apply empirical and ethnographic methods to study the types of changes that are taken place to accommodate the demands of affected students. I am also exploring how satisfactory to victims and survivors are these changes and what steps are needed to push this movement forward. Initiatives such as the It’s On Us Campaign is a good enterprise that can positively generate cultural and societal changes. Initiative such as It’s On Us, I believe, can help to combat the effects of rape culture and the stigma of sexual violence. From my previous interactions with the anti-rape/anti-sexual assault movement at UC Riverside, I have observed a gap between fixing the reporting process and ending the stigma of sexual violence, which plays a huge factor in deterring victims and survivors from coming forward. I hypothesize that the higher education institutions are making some efforts to increase reporting and awareness, but in this battle we need to collectively act as an ally, not an obstacle. We need to battle the negative effects of rape culture and slut shaming, and of the lack of awareness for underrepresented groups.
Marisa Montoya, Psychology  
Faculty Mentor: Rebekah Richert, Psychology  
Rachel Richardson

Anthropomorphic Views of God and Religious Affiliation

Anthropomorphism is the assigning of human-like properties to non-human entities (Barrett, 2000; Bering, 2002). Previous studies found that adults do and do not anthropomorphize God (Shtulman 2008; Heiphetz et al., 2015). It has been suggested that the degree to which God is anthropomorphized may be affected by religiosity (Shtulman, 2015). This study expanded previous work by examining the impact of religiosity and religious affiliation on views of God. 322 undergraduates (62.2% female) enrolled in an introductory psychology course at the University of California, Riverside participated. Participants identified as Christian (n=93), Catholic (n=98), Muslim (n=34), and non-affiliated (n=98). They were asked how often they engage in private religious practices (i.e., measure of religiosity). Answers ranged from never [0] to multiple times a day [8]. Participants’ overall anthropomorphic views were an average of eight questions about God’s abilities or needs (Cronbach’s α =.81). Responses ranged from no-really sure [-2] to yes-really sure [2]. Analyses revealed a moderate, negative relationship between anthropomorphism and private religious practices, r = -.21, p < .01. One-Way ANOVAs with religious group as the between-subjects variable found significant differences between groups’ views of God, F(3,319)= 10.04, p < .01; and engagement in private religious practices, F(3,319) = 37.41, p < .01. Post hoc Tukey’s tests showed that Muslim students anthropomorphized God less (p < .05) and engaged in religious practices more (p < .05) than Christian, Catholic, and non-affiliated students. Together, the findings suggest that engagement in private practices (e.g., prayer) may play some role in the degree to which students conceptualize God as humanlike.

Kevin Mortazavi, Neuroscience  
Faculty Mentor: Nicholas DiPatrizio, Biomedical Sciences

Lipid Signaling Molecules in the Left Ventricle of Obese Mice

Cardiovascular disease is the primary killer worldwide, and a major contributor to obesity [1][2]. To combat this problem, we require a better understanding of the biochemical processes that affect heart health in obesity. Endocannabinoids are a class of lipid signaling molecules (LSM) that regulate many physiological processes, including cardiovascular function. The DiPatrizio lab discovered that endocannabinoids are linked to vagal signaling that helps regulate hunger; specifically, the endocannabinoids, anandamide and 2-arachidonoyl-sn-glycerol, increase food intake when levels rise in the jejunum of rats [3]. In contrast to anandamide and 2-arachidonoyl-sn-glycerol, oleoylethanolamide – another LSM – reduces feeding when active in the jejunum and functions as a satiety signal. The present study strives to understand changes in the production of these LSM in the left ventricle (LV) of lean mice maintained on a standard diet (SD) and diet-induced obese mice maintained on a Western Diet for 60 days (WD). Lipids were extracted from the LV of the heart via lipid extractions, and analyzed using Ultra-performance Liquid Chromatography/Tandem Mass Spectrometry. In contrast to SD mice, we found a significant increase in anandamide and oleoylethanolamide levels in the LV of fasting WD mice. Fasting for 24 hours had no impact on levels of anandamide, 2-arachidonoyl-sn-glycerol, or oleoylethanolamide in mice on a SD. We conclude that a diet-dependent endocannabinoid response in the LV of obese mice exists. Further exploration is needed to understand the biochemical processes involved in this endocannabinoid response and its physiological relevance to cardiovascular disease.
Harrison Moulton, Business Administration Marketing
Faculty Mentor: Erith Jeffe-Berg, Theatre, Film, & Digital Production
Two Roads Converged

My research/creative project has been slightly over a year long process in collaboration with Professor Erith Jaffe-Berg of the Theatre, Film and Digital Production Department here at UCR. The project will be presented and published as a completed honors thesis in spring of 2016. The initial project set out to be a musical with the theme of finding your own way admits a sea of distractions, and pressures. The final project has been narrowed down to ten pages and four scenes. The story follows two boys, Finn and Jared, as they try to find their way through college in two different eras. Jared is set in the 1950s, while Finn is set in the present. Both have an overwhelming pressure to pursue a career that their Fathers want them to pursue, but that they are not invested in. The two come together in a time continuum, and have to figure out their struggles together. Even though the plot is focused around these two, there are other characters and the storyline plays with the genres of comedy. Research was conducted in order to build a play from scratch including the books Naked Playwriting written by Robin Russin of the UCR TFDP department, Backwards and Forwards written by David Ball, the play The Metal Children written by Adam Rapp, and finally “Two Roads Converged” is based on a play written by Tom Stoppard called Arcadia.

Christine Munoz, Sociology
Faculty Mentor: Tanya Nieri, Sociology
Does the Inclusion of Latin Culture Affect Latina Women’s Subjective Experience of Zumba?

Zumba, a Latin-inspired dance-fitness program, is an immensely popular form of physical activity that may reduce health disparities through its involvement of large numbers of Latinos and African Americans. Zumba’s minimal verbal cueing, simple, repetitive choreography, and focus on fun as well as its explicit inclusion of Latin and other world cultures make it accessible and attractive to both new and experienced consumers of physical activity. The data for the present analysis come from a broader study of Zumba’s impact based on qualitative interviews conducted in 2013-2014 with ethnically diverse, female Zumba participants in the Inland Empire, California. Zumba is described by its creators as “Latin-inspired” fitness. The present study investigates what that means to the 41 self-identified Latina participants from the broader sample. It explores the relation of Zumba’s “Latinness” to participants’ subjective experience of Zumba.
**Sahar Naghibi, Chemistry**  
Faculty Mentor: Ludwig Bartels, Chemistry  
Brandon Davis, Ariana Nguyen, Velveth Klee, I-Hsi Lu, Edwin Preciado, David Barroso, Aimee Martinez  
CVD Growth and Characterization of TMD Materials on Patterned and Non-Patterned Substrates

Two-dimensional transition metal dichalcogenides (TMDs) are promising new materials due to their direct-bandgap and semiconducting capabilities present at the monolayer limit. Through chemical vapor deposition (CVD) I am able to synthesize monolayer MoS$_2$ onto a variety of substrates including patterned and non-patterned Si/SiO$_2$ substrates. This method yields single domain “islands” and continuous films, which range from µm to cm scale growth. Through the use of pillared substrates, the transistor channel-length is defined independent of the lithographic lateral resolution. These CVD growth methods of MoS$_2$ on the vertical sidewalls of micron- and nano-scale pillars fabricated out of SiO$_2$ is possible. Optical characterization with Raman and photoluminescence spectroscopy verify single-layer growth of MoS$_2$ on and off the pillared substrate, leading to the possibility for preliminary transport measurements of pristine MoS$_2$.

**Sandor Nagy, Global Studies**  
Faculty Mentor: Christopher Chase-Dunn, Sociology  
THE EVOLUTION OF REVOLUTION - A Comparative Analysis of World Revolutions from 1789 to 2011

The purpose of this paper is to provide a comparative analysis of World Revolutions$^1$ from 1789 to 2011. We examine and compare the French Revolution (1789), the European revolutions (1848), the Russian Revolution (1917), the student revolutions (1968), the anti-communist/democratic revolutions (1989), and the revolutions of the Arab Spring (2011). These world historical events had become the centers of world revolutionary clusters. According to our research, the first cluster (1789) includes fifteen, the second (1848) ten, the third (1917) twelve, the fourth (1968) seven, the fifth (1989) nine, and the sixth cluster (2011) five major revolutions, respectively. We take a closer look and examine the similarities and the differences between these world revolutionary clusters. We analyze their contributing factors/causes, methods, goals, achievements, consequences, and impacts in a political, economic, social, as well as cultural and religious context, from a world historical perspective. We also investigate whether these revolutions were violent or non-violent/peaceful, and we determine whether they were successful/triumphant or failed/crushed. Finally—in addition to drawing a conclusion from our comparative analysis—we will examine the possibility and inevitability, as well as the nature and primary characteristics of the next, future World Revolution of 20XX.
RNA interference (RNAi) is critical for silencing viruses in animals and plants including humans, mice, flies and C. elegans. Flock House virus (FHV) virus transgene was the first to be used to infect C. elegans by Dr. Ding's group at UCR, and the gene expression is silenced by RNAi in C. elegans. Since almost all RNAi and RNAi-related processes including miRNAs were first identified in C. elegans, this organism serves as a powerful model system to study RNAi-related processes including virus silencing. There are many existing genetic and biochemical tools available in C. elegans which makes it a very convenient and robust system to study the functions of RNAi in vivo. Although many genes in RNAi-mediated virus silencing in C. elegans have been identified, many aspects of the silencing process remains unknown, including how the virus is detected, and why some viruses only infects a few specific cells. We have collaborated with Dr. Ding's lab and used genetics screen to obtain several RNAi mutants which displayed increased levels of FHV transgene expression, a phenotype of RNAi-deficiency in virus silencing. In this project we used genetics to exclude the known RNAi mutations, thus shortening the list of the candidate genes. We will analyze the high-throughput sequencing data to identify the mutated genes in these mutants and examine how they are involved in silencing viruses.

Epilepsy, estimated to effect 2% of the population, is a neurological disorder characterized by spontaneous recurrent seizures. Excess glutamate levels in the synaptic cleft are known to over-excite neurons and play a role in seizure initiation. Glutamate aspartate transporter (GLAST), a protein found on astrocytes is responsible for removing glutamate. Despite its importance in maintaining normal glutamate levels, the role of GLAST in epilepsy is not well understood. We studied the regulation of GLAST in epileptogenesis (development of epilepsy) using an intrahippocampal kainic acid (IHKA) mouse model at 1, 4, 7, and 30 days. Kainic acid is injected into the hippocampus to induce seizures via glutamate receptor activation. Using polymerase chain reaction (PCR) and immunohistochemical techniques, we found that 1) there was no significant difference in GLAST mRNA levels post kainic acid injection and post saline control; and 2) there was upregulation of GLAST immunoreactivity after 1 day followed by a persistent downregulation. These results may lead us to glial cell-specific seizure therapeutics to avoid the development of epilepsy.
Akhila Nekkanti, Neuroscience  
**Faculty Mentor:** Elizabeth Davis, Psychology  
Parisa Parsafar  
Promoting Mindfulness and Acceptance: How a Week-Long Meditation Training Program Influenced Youths’ Coping Self-Efficacy

The practice of mindfulness meditation (MM) may foster self-kindness and increase confidence in coping ability for adolescents by helping them cultivate attitudes of acceptance and non-judgment. Effective coping includes successful emotion regulation (ER) during stressful situations, and can be measured across multiple levels of analysis. For example, physiological indices (cortisol and respiratory sinus arrhythmia; RSA) can be used to examine adolescents’ ability to manage stress. In this study, we longitudinally examined whether MM improved self-kindness and ER self-efficacy, and whether individual differences in stress physiology predicted which youths benefited the most from MM. Over a week-long MM camp, 29 adolescents (ages 11 to 16, M=13.97, 17 girls) provided self-reports of ER functioning. On day one, we acquired a measure of parasympathetic functioning (e.g., resting RSA; higher values indicate greater parasympathetic dominance and are considered adaptive) and diurnal cortisol samples over the day (steeper decreases indicate better functioning). Diurnal cortisol slope was calculated by subtracting evening from afternoon time-points. Campers’ reported ability to handle feelings, ($t\,(24)=5.297, p<0.001, d=-1.404$) and confidence in their ER ability ($t\,(24)=-2.916, p=0.008, d=-0.810$) increased over the week. Youths’ self-kindness did not significantly improve ($t\,(22)=-.572, p=.573, d=-.068$). Yet, youths’ diurnal cortisol slope and baseline RSA interacted to predict changes in self-kindness ($b=.523, t=2.655, p=.019$). Self-kindness increased over the week more for campers with higher resting RSA and a steeper cortisol slope (e.g., a more adaptive profile of stress physiology). Discussion will focus on findings that indicate the utility of MM training for promoting youths’ ER ability.

Rachel Nemeth, Psychology  
**Faculty Mentor:** Rebekah Richert, Psychology  
Ideas about Health and Medicine

This research examined how people from various backgrounds utilize concepts of folk biology and folk medicine as a substitute for the treatment plans prescribed by their doctors. The major aim of this research was to study the relationship between the practices of folk medicine during childhood and how undergraduate students approach illness and treatment as young adults. 55 undergraduate UCR psychology students between the ages of 17 to 30 years old from various ethnic backgrounds were interviewed about their parents’ cultural practices and beliefs about illness and medicine during their childhood and their present beliefs. Participants for this study were from the UCR Psychology subject pool and completed an oral interview. The mean age was 20.0 years ($SD=2.5$) and the majority of the sample population (i.e., the mode) was 19 and 20 years of age. The majority of the sample population were Hispanic 43.6% and Asian 38.2%. In addition to demographic questions (e.g., gender, age, ethnicity, and religious affiliation), the participants were asked questions about illness and the types of treatments they were exposed to as children, as well as their current beliefs to see if there was a significant change or consistency. These responses have been coded for if participants’ used folk remedies when participants were children and if participants still use folk remedies. Analyses will examine the hypotheses that participants used folk remedies more as children than as adults and their use of folk remedies is related to their strength of identification with their cultural identity.
Anthony Nguyen, Biochemistry  
Faculty Mentor: David Reznick, Biology  
Analysis of Reproductive Mode (Placental and Nonplacental) on Genetic Variation Across Geographically Isolated Populations of P. prolifica and P. infans

At a first glance, the relationship between the placental mother and the developing embryo seems to be an adaptive relationship to mutually benefit both. Yet, recent examinations of placental organisms show that there is support for conflict of resources between the offspring and the mother (Trivers, 1974). Differences between individual offspring would lead to variability in fighting for resources, and the mother is fighting to control her resource distribution. These differences manifest into an evolutionary arms race between offspring and mothers (Holland and Rice, 1997). Yet, analyzing the placenta can be a difficult task. Mammalian placentas have only one lineage from a single common ancestor, and the nearest relative reproductive system of analysis is over 100 million years of evolution apart (Springer et al. 2003). Analyzing the placenta in this matter would cause confounding results amongst millions of years of evolutionary processes. In my project, I am analyzing rates of evolution between non-placental and placental species in Poeciliidae where there are several independent origins of a placenta (Reznick et al. 2003). Increases in geographical distance should increase genetic distance for both placental and nonplacental species (Malécot, 1948). By using phylogenetic analysis, GPS map data will be analyzed against DNA variation of P. prolifica (placental) and P. infans (nonplacental) to see if placentation has a higher rate of evolution (Avais, 2000).

Johny Nguyen, Chemical Engineering  
Faculty: David Martin  
Synthesis of Neuroprotective Limonoid Natural Products

Neurodegenerative diseases such as Alzheimer’s and Parkinson’s disease affect the lives of millions of people. Neurodegeneration results in the deterioration of structure and function of neurons that carry electrical impulses within the central nervous system (CNS) and to the body. When glutamate neurotransmitter receptors are over-stimulated, it leads to a process referred to as glutamate toxicity that leads to the eventual death of neurons. Understanding the role of glutamate toxicity in these diseases remains a tremendous challenge and identifying molecules to further study these processes is of great interest. Our project entails creating an efficient methodology for the synthesis of the limonoid family of natural products. These chemical compounds are found in Rutaceae and Meliaceae medicinal plants, including common citrus varieties, and recent research has shown these compounds to display notable neuroprotective properties. Through a concise and convergent approach, we aim to synthesize various derivatives of the limonoid fraxinellone. The synthesis of fraxinellone will be achieved via an olefin isomerization reaction, while using a Diels-Alder cycloaddition method to combine butenolide and diene precursors. Further investigation to improve selectivity for the desired butenolide will consist of evaluating preformed catalysts and additional ligands. The structural diversity of these compounds offers a wide array of novel synthetic pathways that have yet to be discovered. This study will provide a faster synthetic route to limonoid natural products, and will allow us to investigate their structural-activity relationship (SAR) through ongoing collaborative studies.
Diego Novoa, Chemical and Environmental Engineering  
Faculty Mentor: Sharon Walker, Chemical/Environ. Engineering  
Environmental Impacts of Titanium Dioxide Through a Model Colon and Septic Tank System

Nanomaterials are being studied in application to environmental engineering for both natural and engineered water systems. Understanding the toxicological impacts of these materials will aid in maximizing these water systems. Increasing the water quality of septic tank systems through the use of nanomaterials would allow for the recycling of the effluent to a standard that would allow for reuse of the water without the need of an intermediate step of a wastewater treatment process. A model colon and septic tank system is being used to study the effects of titanium dioxide (TiO$_2$) through the septic tank system and its effects on the microbial community of the septic tank. To date, extensive control experiments have been conducted to characterize the physical, chemical, and biological conditions in the septic tank system with the absence of TiO$_2$. Ongoing experiments will include introducing food and industrial grade TiO$_2$ through the colon. Water quality tests and bacteria characterization will be done to determine the implications of TiO$_2$. Future work will involve exposing the effluent of the secondary chamber of the septic tank to an ultraviolet light source to induce photocatalytic activation of the TiO$_2$ particles. It is anticipated that the presence of TiO$_2$ will lead to photocatalytic breakdown of organics in the effluent. This additional ultraviolet induced reaction may be used to optimize the water treatment process in the septic tank system at residential and commercial locations.

Jacqueline Ortega, Chemical Engineering  
Faculty Mentor: Kawai Tam, Chemical and Environmental Engineering  
Rice Husk: A Sustainable Building Material for the Philippines

Following a 7.1 magnitude earthquake and subsequent typhoons that damaged thousands of structures in Bohol, Philippines, there has been a great need for reliable building materials. The International Deaf Education Association (IDEA), a local non-governmental organization, builds homes made of coconut lumber, plywood, and bamboo for disaster victims; however, these homes last only two years due to termite damage. Realizing that no currently available options fit their needs, IDEA contacted our team to design an affordable, sustainable building material. Our team, Husk-to-Home, is designing a plywood replacement made of rice husks, a waste product of the rice milling process. This waste is termite-resistant and because of its abundance in the Philippines, it is commonly disposed of using environmentally-harmful open-field incineration. Rice straw and recycled plastic (the binding agent) are also used to form the proposed fiber plastic composite (FPC) board. The FPCs were determined to have considerable water-resistivity, high termite-resistivity, and comparable strength to commercially available building materials. In addition, rice husk, rice straw, and plastic are found in abundance on the island which allows for local sourcing. By utilizing these low-cost materials, the team will reduce local air pollution and plastic pollution (the country is one of the world’s largest plastic waste generators), in addition to producing boards at a lower cost than IDEA’s current process. Husk-to-Home’s goal is to create an innovative, robust, termite-resistant, and water-resistant building material, composed of rice husks and a formaldehyde-free binder, to construct long-lasting homes for the Bohol Island community.
Gestures provide additional emotional context to verbal content and can visually display symbolic concepts. For example, during mathematics instruction, gestures help maintain the audience’s attention, reinforce verbal content, and spatially display novel strategies for solving the problem. Thus, they are a crucial part of effective interpersonal communication skills. Specific gestures are difficult to isolate experimentally because they are complex, often occur simultaneously with other body movements, and may convey abstract concepts. In the current study, undergraduate students (N=72) provided self-reports of their personal charisma (a desire to entertain, inspire, and invoke emotion in others; Friedman, Prince, Riggio, & DiMatteo, 1980) and self-monitoring (evaluating social cues of peers and modifying behavior in specific contexts; Snyder, 1974). Participants were randomly assigned to watch videos of an avatar giving an elementary-aged mathematics lesson which included either no gestures, charisma gestures only, comprehensive, explanation-related gestures only, or both. Then, participants were filmed giving the same lessons themselves, and these videos were rated by judges for charisma and attractiveness. Additionally, separate judges coded the gestures that participants made in their videos. Participant charisma and self-monitoring were correlated with judges’ ratings of charisma and attractiveness, as well as the gestures they produced in their videos. Results add to the understanding of the nonverbal style of charismatic and self-monitoring individuals, and why they are perceived more favorably and excel in communication.

Melanie Queponds, Theatre and English  
Faculty Mentor: Tiffany López, Theatre, Film & Digital Production  
Contemporary Latina Theatre for Young Audiences: Mariachi Girl

While Riverside is a central hub of art and culture in Southern California with a predominantly Latina/o population, there is a lack of theatre produced by Latina theatre artists, for Latina/o audiences, especially youth. On February 18th, 2016 at the Culver Center of the Arts in Downtown Riverside, the UCR Latina/o Play Project, student theatre ensemble, addressed this need for culturally responsive theatre for families in the community by producing Mariachi Girl, a bilingual musical by playwright Roxanne Schroeder-Arce. With funds and support from the Chancellor’s Research Fellowship and the Gluck Fellows Program of the Arts, we were able to bring this beautiful story to life as a fully-staged production, with live mariachi band, folklorico dancers, talented actors and singers – all free and open to the public. Through use of presenting performance photos and short video clips, I will describe my artistic process and experience as director and producer, and how my directorial process evolved over the seven weeks of rehearsals. I will also discuss various responses from anonymous surveys that were filled out by audience members after the show. Plus, I will present feedback about the production from a theatre scholar who is an expert in Latino Theatre for Young Audiences, my directing mentor, and the playwright herself. Finally, I will discuss further developing culturally responsive theatre for young people not only in Riverside, but all over, and how Latina voices in theatre can and continue to empower youth and be proud of their culture and identity.
Shazia Parekh, Psychology  
Faculty Mentor: David Funder, Psychology  
Situational Experience Through the Lends of Relationships Around the World

The International Situations Project is an ongoing cross-cultural study which investigates the situational experience across 20 countries in 5 continents ($N = 5,447$ participants; 64% female; mean age = 22 years). Participants were asked to provide a brief description of what they were doing at 7:00 PM the previous night and then to quantify this experience using the 89 items of the Riverside Situational Q-sort (RSQ). In the current analyses, participants’ open-ended responses were coded according to a highly reliable coding scheme that identified what, where, and who the participant was interacting with (e.g. Alone, Family, Friend, etc.). These codes enabled us to compare the objective measure of participants’ situation with their RSQ ratings, allowing us to investigate the within and between cultural differences and similarities based on their interactions. Results indicate that situations in which “Talking is permitted,” ($F= 1.83$) and “[The participant] is being asked for something,” ($F= 1.82$) are equally likely to occur no matter who the participant was interacting with. Conversely, situations in which “Success requires cooperation,” ($F= 20.14$) was more likely to occur if participants were with colleagues whereas situations in which “Social interaction is possible,” ($F= 19.61$) was more likely to occur if participants were with friends. These analyses along with additional within cultural analyses underscore the importance of viewing situational experiences through the lens of relationships and enables us to better understand the nature of situations both within and across countries around the world.

Sophia Parks, Neuroscience  
Faculty Mentor: David Lo, School of Medicine (Biomedical Sciences)  
Induction of M cells by Cholera Toxin

The purpose of this study is to examine how density dependence influences characteristics such as mean body size, size at maturity and offspring size at birth. Guppies that are found in the same river often share greater genetic similarity with one another than with guppies from other rivers. In the lower elevations of all rivers, guppies co-occur with predators. Guppies from high predation environments experience much higher mortality rates. It has been shown that high mortality is associated with earlier maturity (Travis et. al). The guppies from high-predation localities also produce smaller offspring and more offspring per brood (Reznick and Endler, 1982). Despite the advantages associated with the high-predation phenotype, the low-predation phenotype continues to evolve in tributaries from which predators are excluded by waterfalls. Perhaps this is because, in the absence of predators, guppy populations attain much higher population densities, to the point where there may be lower per-capita food availability. I hypothesize guppies from low predation communities are adapted to high population density. I predict that when guppies from high and low predation environments are raised at high and low population densities, guppies from low predation environments will be superior at high population density because they have higher growth rates, higher survival and higher reproductive success under those conditions than do guppies from high predation environments. I will be dissecting specimens derived from experiments performed in replicate, artificial streams in which guppies from high and low predation environments were reared at high and low population densities. I will be able to quantify survival, individual growth rate and reproduction in female guppies.
Yatna Patel, Biochemistry  
Faculty Mentor: Gregor Blaha, Biochemistry  
Identification of optimal overexpression and purification conditions of ribosomal protein S1 from Escherichia coli (E.coli)

The coupling of transcription and translation is one of the fundamental regulatory mechanisms in bacteria, including many pathogens. Understanding this coupling mechanism can help us understand how bacteria regulate protein synthesis, which can have potential biomedical applications. In Escherichia coli (E.coli), the coupling is mediated by the mRNA strand that connects the RNA Polymerase (RNAP) with the ribosome. An important protein in this connection is S1, which is a ribosomal protein that is loosely bound to the small ribosomal subunit 30S. S1 assists in the initiation of translation by binding to polypyrimidine-rich region of mRNA at the 5’ end, which helps the mRNA unfold. This process results in a better accessibility of the start codon to pair with tRNA-fMet at the P site of the ribosome, which is a crucial step in the initiation of protein translation. The goal of this project is to overexpress the S1 protein and find the optimal conditions to purify it. The purified protein could be used to grow protein crystals to determine the crystal structure of the full-length protein. This would be the first step in developing a molecular model, which describes the role of S1 in the specific interactions between RNAP and ribosomes. This would lead to a clearer understanding of transcription-translation coupling.

Kasim Pendi, Biology, Neuroscience  
Faculty: Iryna Ethell, Biomedical Sciences; Khaleel Razak, Psychology  
Auditory fear conditioning and extinction in fmr1 and mmp-9 knockout mice

Fragile X Syndrome (FXS), which results in intellectual and behavioral disabilities, is characterized by increased methylation in the Fragile X Mental Retardation 1 (FMR1) gene, decreasing FMR protein expression. This study investigates anxiety and fear circuitry of genes related to FXS using fear conditioning and extinction by comparing freezing behavior among mice with the following genotypes: WT, FMR1 KO mice (FMR1) MMP-9 KO, FMR1/MMP-9 KO (dKO), and FMR1 KO/HET MMP-9 partial knockout (HET). FXS is associated with elevated levels of MMP-9, so reducing MMP-9 may affect conditioning. Following training, tone extinction occurred for 3 days in alternate context and for 1 day in conditioning context. Freezing behavior was measured as percent of time using FreezeFrame software. All mice exhibited similar low freezing levels during habituation and increased freezing during training. Exposure to tone in alternate context showed no difference between genotypes. For context recall, MMP-9 mice appeared to freeze as much as WT. FMR1, dKO, and HET animals however, froze at similarly low levels. During extinction, freezing decreased for all genotypes. These results provide better understanding of FXS mechanisms relating to anxiety and memory deficits that lay the bedrock for future FXS treatments that target MMP9 expression levels.
Eva M. Perez Cecenas, Business Administration and Linguistics  
Faculty Mentor: Rebekah Richert, Psychology  
Semantic Weight and How Language Helps Children Understand Religion  

How do children use information from their environment to construct understanding, especially when such understanding is about concepts that cannot be seen? This study will focus on one source of input from which children learn (i.e., language) and how it conveys meaning and beliefs. Data was used from the CHILDES database, where conversations from 164 participants were reviewed for mentions of religious terms. Embedded within a conversation are cues that signal the speaker’s intended meaning. Therefore, it is interesting to see how the manner in which God and religion is spoken about affects a child’s understanding of them. Religious terms are commonly used as expressions, to point out a location, or to reference a religious being. As such, this study will focus on the age of a child when religious terms are used in those three contexts. It was found that the age of a child when first exposed to religious terms increases the more semantic weight is attributed to the conversation. Expressions, which have the lowest semantic weight, account for 79% of the religious terms mentions, and it is in this context that a child is first exposed to religious terms. These findings provide insight into a child’s ability to comprehend religion and the different manners in which religious terms are used.

Nicole Perez, Psychology and Music Performance  
Faculty Mentor: Kate Sweeny, Psychology  
Student Explanations for their Attitudes Toward Cognitive Enhancement Drugs  

The use of cognitive enhancement drugs (CEDs), Adderall® or Ritalin®, for academic purposes has gained popularity on college campuses due to their presumed abilities to enhance cognitive ability, increase thought processing, and mental endurance. Previous research found that personality, experience, and demographic factors predict students’ views towards CEDs. The goal of the current study was to take a closer look at those students’ explanations for their views. Participants (N = 118, diverse undergraduate sample) completed an online questionnaire including measures of demographics, personality, academic characteristics and habits, and perceptions of CED use. Along with these measures, participants completed open-ended responses delineating the reasons for their views of CEDs. Trained coders rated these responses to provide a deeper understanding of the factors that might predict CED acceptance and use. Results suggest that students are most concerned about the legality of CED use but also note autonomous health choices.
Gabriela Perez, Religious Studies  
Faculty Mentor: Jennifer Hughes, History, and Matthew King, Religious Studies  
Reproducing Religious Icons: Our Lady of Guadalupe in Southern California

Following the work of David Morgan and Jeanette Rodriguez, this paper contrasts community engagement with two different works of art by two different artists. Although they are both interpretations of Our Lady of Guadalupe, both images garnered distinct reactions from their respective communities. In 1999, Alma Lopez’s Our Lady was officially installed in the Museum of International Folk Art in Santa Fe, New Mexico. The work received negative feedback from the community. In 2011, the Surfing Madonna, by Mark Patterson, an Anglo artist, appeared illegally under a train overpass in Encinitas, California. The work was so well received that an environmental group called the Surfing Madonna Ocean Projects was established soon after. Both offer noncanonical interpretations of Our Lady of Guadalupe but one is created from an outsider’s perspective and the other from an insider’s perspective. This paper looks at material religion leading to the conclusion that religion, and religious identity, is hardly explainable by text or ritual. It is also defined through, and made possible by, materiality.

Styliani Petraki, Psychology – Poster  
Faculty Mentor: Rebekah Richert, Psychology  
Prosocial Views of God and Gender

Previous research by psychologists has explored prosocial conceptions of God and religion; as well as, the gender differences in religiosity (Norenzayan, 2014; Tzeboatowska & Bruce, 2012). However, little research has explored the interaction between conceptions of a prosocial God and gender differences in religiosity. 289 University of California, Riverside students (62% females) enrolled in introductory psychology courses participated in this study. They identified as: religiously affiliated (n=191: Christian and Catholic) and non-affiliated (n=98). Participants were asked whether or not God helps people (i.e. prosocial), from no-really sure [-2] to yes-really sure [2]; and whether or not God exists, from definitely does not exist [-2] to definitely does [2]. There was a strong, positive correlation between belief in God and views of God as prosocial, $r = 0.66, p < .01$. Therefore, analyses were run separately for believers in God and non-believers. Using Factorial ANOVAs, prosocial views of God were the dependent variable; gender and religious affiliation were independent variables. Among agnostics and non-believers, there was a main effect of religious affiliation, $F(1,104)= 33.10, p < .001$; but no main effect of gender ($p=.670$), or an interaction effect between gender and affiliation ($p=.161$) (see figure 1). Among believers in God, there was a main effect of religious affiliation, $F(1,104)= 34.102, p < .001$; no main effect of gender ($p=.670$), but there was a trending interaction effect between gender and religious affiliation ($p=.057$) (see figure 2). Altogether, this suggests that perceptions of God’s prosociality may be gendered among believers in God.
McKenzie Pickle, Biology  
Faculty Mentor: Carolyn Rasmussen, Botany and Plant Sciences  
Victoria Morris, Pablo Martinez  
Role of Microtubule Dynamics in Cell Division using Maize tangled-1 Mutant

In maize, tangled1 (tan1) mutants display aberrant cell divisions that cause a dramatic dwarf phenotype. In the mutant, delays in mitosis may lead to a higher proportion of cells in division than wild-type. Quantification for this delay was done through cell counting. Using microscopy on plants expressing YFP-tubulin, we were able to image samples and count the cells in each stage of mitosis in wild-type and the tangled1 mutant. So far, tan1 mutants and wild-type have similar proportion of cells in different stages of mitosis. From live cell imaging data, tan1 mutants have mitotic delays due to decreased microtubule dynamics. Interestingly, TANGLED1 binds microtubules in vitro, so it may directly alter microtubule stability through a direct interaction. I will be testing the following hypothesis along with another undergraduate: the primary role of TANGLED1 is to depolymerize microtubules during division. Therefore, I expect that tan1 mutants will be hypersensitive to the microtubule stabilizing drugs (taxol) and potentially rescued by depolymerizing drugs (oryzalin). When the tan1 mutants are grown in taxol media we expect they will have shorter roots and more serious defects in division and microtubule organization than those without treatment. By adding oryzalin, we expect some degree of rescue of the mutant phenotype due to depolymerization of hyperstabilized microtubule structures observed in the mutant. Together, these experiments will provide insight into the molecular function of TANGLED1.

Shawn Poag, Biochemistry – Poster  
Faculty Mentor: Ernest Martinez, Biochemistry  
Alexia King*, Michael Hamilton, Matthew Young, Silvia Sauer  
Investigation of HOTAIRM1 in Hindbrain Tumors

Pediatric brain tumors comprise approximately 20% of all childhood cancers. Among these pediatric brain tumors, many of them are derived from the hindbrain, which controls vital functions such as breathing, swallowing, and heart rate. Our research focuses on a specific group of genes, referred to as the HOXA cluster that has been implicated in the hindbrain development. Medulloblastoma is the second most common brain tumor and the most common malignant brain tumor among children representing 14.5% of new cases. To analyze gene expression in the HOXA cluster we are using a well-established cell line called DAOY. DAOY is a cell line derived from biopsy material that was taken from a four-year-old boy in 1985 and has been widely studied by many scientists around the world. HOTAIRM1 is a long non-coding RNA (lncRNA) located between HOXA1 and HOXA2 and our preliminary results show that HOTAIRM1 is deregulated in many types of human cancer. However, little is known about the cellular functions of HOTAIRM1. Our project is to investigate whether HOTAIRM1 is also differentially expressed in brain tumor cells to see if there is a correlation between the expression of HOTAIRM1 in high grade versus low grade brain tumors. Our hypothesis is that HOTAIRM1 could be a contributing factor in hindbrain tumor development. We believe that HOTAIRM1 is up regulated compared to normal hindbrain tissue. To test the hypothesis, DAOY will be used to obtain gene expression levels and we will perform a knockdown experiment of HOTAIRM1 to see how growth, proliferation and apoptosis occur in these cells.
**Damon Platt, Biology**  
**Faculty Mentor: Margarita C. Curras-Collazo**

**Increased Neuronal Activity in the Stress Centers of the Brain in Response to Acute Ozone Exposure May Indicate Why Ozone leads to Metabolic Disorder**

We have observed physiological changes in the neuroanatomy of adult male Wistar rats after an introduction to acute ozone stress exposure. Rats exposed to merely 1 hour of ozone (2.0 ppm) have shown a marked increase in the amount of cFos exposure in the hypothalamus; specifically, within the Paraventricular Nucleolus – an important region of the brain containing groups of neurons that are activated in response to stress. These rats have been shown to exhibit detrimental changes in their metabolic health, similar to those exhibited by diabetics. The PVN projects directly to the posterior pituitary gland, leading to the biological cascade release of oxytocin or vasopressin into the bloodstream. PVN neurons can also control various anterior pituitary functions, while still others directly regulate appetite and autonomic functions in the brainstem, and therefore plays a significant role in metabolic regulation. The hypothalamus is responsible for regulating basal metabolic processes and other autonomic nervous system activity in response to various stresses. It is therefore our primary target of interest when researching the cause for why and how a direct acute exposure to ozone was able to cause such a significant change on the metabolic heath of rats. It is therefore plausible that the mechanism for how ozone exactly affects metabolic heath in rats is through a neuronal pathway. More experimentation is required in this study. We plan to examine other areas in the brain involved in stress including the arcuate of the hypothalamus (Arc) and the nucleus tractus solitarii (NTS) of the brain stem.

**Alicia Ramirez, Biology and John Linder, Biochemistry**  
**Faculty Mentor: Margarita Curras-Collazo, Cell Biology & Neuroscience**

**Captopril Suppresses toxicant-induced pressor responses and upregulation of RAAS gene markers NR3C2 and SGK1 in acutely salt-loaded rats**

Polybrominated Diphenyl ethers (PBDEs) are organohalogen pollutants shown to cause detrimental neuroendocrine effects. Perinatal exposure to PBDEs exaggerates systolic blood pressure in hyperosmotic-induced rat models. The angiotensin converting enzyme (ACE) inhibitor, captopril, reverses this effect. We hypothesize that RAAS gene markers become altered in hyper-PBDE dosed rats. Dams were dosed perinatally from gestation day (GD) 4 to postnatal day (PND) 20 (except on day 0) with DE-71, an industrial mixture of penta-brominated and other congeners. At PND 60, baseline measurements of systolic, mean arterial blood pressure, and heart rate were recorded using non-invasive blood pressure (NIBP) monitoring under isoflurane anesthesia (4% induction; 1.75% maintenance). Afterwards, captopril was administered ad libitum via drinking water for 14 days. On experiment day, rats were given intra-peritoneal injections of 3.5 M NaCl (0.6ml/100g b.w, ip), and NIBP measurements recorded 3 hours later. Plasma aldosterone and kidney RAAS gene expression was examined. Perinatal PBDE exposure increases plasma aldosterone responses to hyperosmotic stimulation compared to oil controls, and this effect is unchanged with captopril and spironolactone, a blocker of the kidney mineralocorticoid receptor nr3c2. qPCR experiments revealed statistically significant increases in serum glucocorticoid kinase 1 (sgk1), regulated by nr3c2 activation, in PBDE hyper rats compared to oil controls, an effect reversed by Captopril. This result indicates a novel mechanism of action for PBDEs that may lead to acute salt-induced hypertension via epithelial sodium channels. Captopril may provide benefit against salt-induced hypertension by interfering with sgk1 gene upregulation. Moreover, Captopril had additional upstream events, decreasing nr3c2 transcripts in both
oil and PBDE groups. This suggests that captopril reduces aldosterone actions mediated by renal mineralocorticoid receptors under general conditions.

Liliana Ramirez, Anthropology  
Faculty Mentor: Jennifer Najera, Ethnic Studies  
Coming Out as Undocuqueer

To give visibility to undocumented students, scholars have written about undocumented students in terms of political experiences with the purpose of educating readers about the legal barriers undocumented students face while trying to obtain a higher education. Although this literature has been helpful to humanize the experiences of these individuals navigating political and educational barriers, there is still gaps to fill about the experience of undocumented students in scholarly conversations. Scholars are starting to address the intersectionality of identities within undocumented students but not much has been produced through research. My research holds importance because it will contribute to the existing gap in the literature surrounding undocumented students by addressing the experiences of undocumented and queer (undocuqueer) students. UndocuQueer students experience a double coming out, that is coming out as undocumented and Queer, which gives them a distinct experience that other undocumented students identifying as straight. Although California has various undocumented student friendly policies such as the CA DREAM Act, and AB 540, undocumented students in California continue to face obstacles connected to their status. Undocuqueer students face obstacles both rooting from their legal status and sexual orientation. My research question is: How does coming out for undouqueer student’s influence they navigate family dynamics and navigate institutional obstacles such as with employment and/or education? In carrying on this project, I plan to use in depth interviews, fieldwork and an ethnography because they are traditional anthropological methods and because those methods are best fit to conduct my research.

Raphael Reyes, Biology  
Faculty Mentor: Karine Le Roch, Cell Biology and Neuroscience  
Assessing the Effect of Histone Methyltransferase Inhibitors on Plasmodium falciparum var Gene Expression and Genome Structure

P. falciparum has the ability to evade the human immune system through the use of virulence factors known as var genes. The P. falciparum genome contains approximately 60 var genes; however, each parasite only expresses a single var gene while the other var genes are silenced. Strict regulation of var gene expression is essential for parasite survival and pathogenesis. Previous studies have revealed that depletion of heterochromatin protein 1 (PfHP1) in P. falciparum results in arrested parasite development and disrupted var gene repression. PfHP1 is involved in the processes of regulating gene silencing, differentiation of the parasite’s sexual forms, and maintenance of its genome structure by binding to a methylated lysine on histone H3, H3K9me3. Our aim is to use histone methyltransferase inhibitors on the parasite to block the methylation of H3K9, thereby preventing the activation of PfHP1. With successful inhibition, we predict that PfHP1 protein activity will be reduced causing up regulation in the expression of all var genes and altering the parasite’s ability to maintain normal genome structure. Currently, we are testing different inhibitors and using semi-quantitative reverse transcription PCR (qRT-PCR) to confirm that inhibitor treatment results in an increase in var gene transcription in P. falciparum. As a next step, we will use next generation sequencing technologies to explore the effect of treatment with histone methyltransferase inhibitors on the parasite’s three-dimensional genome structure.
Connor Richards, Physics  
Faculty Mentor: Owen Long, Physics and Astronomy  
A Study of the Multijet Background for Inclusive, Hadronic Searches for Supersymmetry in the CMS Detector

A study of the multijet background for inclusive new physics searches with all-hadronic final states and large missing transverse momentum is presented using 13 TeV Monte Carlo simulation. Supersymmetry (SUSY), arguably the most attractive extension to the standard model (SM), offers an elegant solution to three Nobel Prize-worthy problems, including the identity of dark matter. Searches for evidence of SUSY are underway at CERN’s Large Hadron Collider (LHC), and this study aims to contribute to the Compact Muon Solenoid (CMS) Collaboration’s ongoing efforts. The multijet background is crucial for SUSY searches with hadronic final states, and this study analyzed event displays of multijet events that were not rejected by our group’s current procedure in order to assess room for improvement. The dominant areas for improvement (with additional percentage of events they would reject in parentheses) are: introducing a minimum requirement on $\Delta \Phi_4$ (36%), loosening the requirement on $|\eta|$ from $|\eta| < 2.4$ to $|\eta| \leq 3.1$ (25%), and requiring $\Delta \Phi_1 \leq 3.0$ (23%). Further results, current outlook, and potential for further study are presented.

Ranier Rivera, Biochemistry  
Faculty Mentor: Thomas Morton, Chemistry  
Examination of Potential $i$-Motif Binding Candidates

Many DNA sequences of oncogenes or their promoters contain cytosine-rich and guanine-rich strands. The $i$-motif and G-quadruplex are single stranded secondary structures made from cytosine and guanine rich strands, respectively. The $i$-motif is composed of hemiprotonated cytosine dimers that adopt a parallel connection with an inverse topology. In vitro $i$-motifs are easily made, characterized, and controlled by different environmental conditions. Evidence for the $i$-motif in vivo has yet to be discovered and has been far less investigated compared to the complementary G-quadruplex. Because the pKa of cytosine is 3 units lower than physiological pH, it is an open question whether the $i$-motif can exist under physiological conditions. However, evidence of the $i$-motif up to pH 7 has been reported, suggesting that it might not be absent in vivo. This research project involves the examination of several small organic compounds capable of binding to the $i$-motif. Binding of these molecules may allow for detection of the $i$-motif and suppression of DNA processes, such as transcription, via hindrance of Topoisomerase I. N,N–Dihydroxybenzamidines, Aplysinopsin, Noraplysinopsin, and Guanylated Cytosine and isocytosine derivatives have been synthesized so as to explore their interactions with the $i$-motif. Different intermolecular forces, such as base-stacking or hydrogen-bonding, may drive these interactions. Characterizing binding to the $i$-motif has been monitored with UV/Vis spectroscopy, Circular Dichroism spectroscopy, and Cell Culture Experiments. These experiments offer insight about the stability of the complex, where and how small molecules bind to the $i$-motif, and the effectiveness of these compounds as potential drug candidates.
Julianne Rolf, Environmental Engineering  
Faculty Mentor: David Jassby, Chemical and Environmental Engineering  
Conductive Reverse Osmosis- Polyamide Membranes for Silica-Containing Wastewater Treatment

Chemical mechanical planarization (CMP) is a process used in the manufacturing of integrated circuits (IC). With the amount of wastewater generated likely to increase to millions of liters per day with the demand for more IC, a reliable, practical treatment method must be developed to treat the wastewater in order to comply with the surface water discharge and IC water recycling requirements. Silica (SiO₂), one of the main constituents in the wastewater from the CMP process, is a difficult and costly component to remove from CMP wastewater. Currently, several different methods are being used by the semiconductor industry, such as coagulation/flocculation, electrocoagulation, and filtration. To minimize and improve filtration methods, my project seeks to use electrically conductive, reverse osmosis-polyamide membranes to treat silica-containing wastewater. The goal is to reach silica concentration levels below the 120 milligrams per liter retentate maximum. These membranes, made with carbon nanotubes, will be a more efficient and less expensive treatment method, which will reduce the rate of fouling on the membrane’s surface. Successful filtration of the CMP wastewater will lead to the reuse of water with the potential for nutrient recovery.

Jenna Roper, Bioengineering  
Faculty Mentor: Hideaki Tsutsui, Mechanical Engineering  
James Luong, Brent Kalish  
Using DNA-hybridized microspheres in paper-based assays.

Paper-based microfluidic devices are low-cost, easy-to-use diagnostic tools that are predominantly used for qualitative yes/no detection. The goal of this project is to create a paper-based assay that quantitatively determines the concentration of a target nucleotide sequence and displays it in a simple and easy-to-read manner. This is achieved by conjugating single stranded DNA (ssDNA) aptamers to colored latex microspheres, with two different non-complimentary sequences attached to two different microsphere populations. Each aptamer is partially complementary to a target DNA strand. When the two populations of microspheres are mixed in solution with the target strand, the strands hybridize and the microspheres form aggregates. When deposited onto a porous substrate, such as filter paper, the microsphere aggregates travel varying distances based on their size. The presence of large aggregates decreases wicking distance, allowing an immediate, visual read out of the presence of a target DNA sequence. The expectation is that there is an inversely proportional relationship between the wicking distance of the microspheres and the concentration of the target DNA, allowing for a quantitative read out.
Gabriel Ruiz, Statistics  
Faculty Mentor: Subir Ghosh, Statistics  
Data Mining the 2010 National Health Interview Survey: What characteristics are common among those with multiple Cancers?

Along with the continuous innovations in technology have come a myriad of information, or “big data”, that we can use to our collective advantage. The aim of this poster is to express the role that data mining such large data sets can have in suggesting further study of a topic of interest to researchers. In our case, the topic of interest is the the causes of multiple cancers in adults, and the “big data” we take a closer look at is the 2010 National Health Interview Survey (NHIS). The NHIS is conducted annually by multiple agencies, primarily by the Centers for Disease Control and Census Bureau, in order to assess health conditions across the United States and better devote resources where they are needed. In this poster, we study the NHIS data in order to assess the possible association between certain cancers and its dependence on the influential explanatory variables. We use the Ridge Logistic Regression method to identify these influential explanatory variables. The major goal of our ongoing work is to identify the most important explanatory variables in the NHIS out of so many candidates and establish their relationship with the outcome of interest: the presence or absence of one or more cancers.

Melissa Saidak, Psychology  
Faculty Mentor: Curt Burgess, Psychology  
How language proficiency could increases semantic relationships in memory

How an associative relationship differs from a semantic relationship in memory has been an issue of much controversy in cognitive psychology. Computational semantic models that learn word meaning from lexical co-occurrence have shed much light on this question. These models suggest that semantics has to do with the word’s context where association appears to be predictive of upcoming words in a sentence (Lund, Burgess, & Atchley, 1995). This experiment is a replication and extension of the Lund, et al., study where they manipulated three different condition types: Semantic (dog-wolf), Associated (dog-bone), and Semantic and Associated (cat-dog). They found that when the associated condition did not contain the semantic (or similarity) information, little priming occurred with human participants or the computational model. This differs considerably from earlier research that argued for the “associative boost” where the association is a key component to memory organization. The experiment to be reported here is a direct replication of Lund et al. with the same stimuli with the addition of a language comprehension and a vocabulary measure. The hypothesis is that associative priming will be more robust with lower vocabulary levels whereas semantic priming will hinge on vocabulary strength and comprehension ability. The data collection for this project is currently underway.
According to the CDC, youths between the ages of thirteen and twenty-four are disproportionately affected by HIV/AIDS. In 2010, they comprised 17% of U.S. population but 26% of new diagnoses. Several studies have shown that possible causes include low perception of risk and declining health education. Thus, assessing this group's knowledge, attitudes, and beliefs toward HIV/AIDS is crucial toward improving educational interventions. Several studies have assessed the knowledge, attitudes, and/or beliefs of young adult undergraduate and medical students. Their results have documented mixed results in levels of knowledge towards HIV/AIDS while also highlighting barriers to learning about HIV/AIDS. These studies have also shown that many students hold negative perceptions towards people with HIV and/or AIDS. Overall, these conclusions underscore the continual need to focus on young adults. To the best of our knowledge, no published studies have focused on the knowledge, attitudes, and beliefs toward HIV/AIDS among undergraduate or medical students who attend or have recently graduated from UC Riverside. In this study, we assessed these three factors among 29 students or recent graduates of UC Riverside. After employing surveys and conducting qualitative interviews, we coded the transcriptions into themes on how students formulate their opinions toward communities affected by HIV/AIDS. Themes include stigmatization of LGBTQ communities and HIV+ people. Overall, we hope to identify barriers and facilitators in learning about HIV/AIDS to improve cultural awareness and education of HIV/AIDS for young adults.

Social support is necessary for those managing the daily stress of suffering from a chronic illness (White, Richter & Fry, 1992), such as diabetes. Online social networks are a relatively new medium used to find others coping with similar problems that can provide support and help in moments of emotional crisis. To better understand what factors lead to continued interaction by new users, 56 new members' first posts and the replies to the posts were categorized by trained coders for support. Data was analyzed by quantifying the total users that sought specific support and continued their membership and correlating different provisions of social support patterns within a thread and their relationship with the likelihood to continue their membership. Overall, less than half of the users (46.4%) went on to post outside of the current thread anywhere on the site. Of the first time users first posts, 69.6% sought informational support and 92.3% of those threads contained provision of informational support. Additionally, presence of gratitude within a thread was related to a new member’s continued participation ($r (54) = .33, p = .012$). Findings contribute a foundation to growing research on member participation in online social networks and give insight as to what support might potentially help patients, seeking online assistance, benefit from participation and better cope with their illness.
**Gabriela Sanchez, Biochemistry**

**Faculty Mentor: Gregor Blaha, Biochemistry**

Defining Interactions between RNA Polymerase, NusG, RfaH, and the Ribosome

Transcription factors RfaH and NusG are conserved amongst many pathogenic bacteria, making them interesting in the investigation of virulence regulation. For bacteria, transcription and translation of DNA is coupled; RNA Polymerase (RNAP) and ribosomes are at the site of this coupling. Past studies have shown that the N-terminal domains (NTDs) of these transcription factors bind to the RNAP. To determine that the C-terminal domains (CTDs) of these transcription factors can interact with the 70S ribosome, a His-tagged GFP was attached to the N-terminus of these CTDs. Through ultrafiltration, we demonstrated that both CTDs bind to 70S ribosome. Further testing will investigate the competition between both transcription factors for binding to the ribosome. We would also like to determine if a complex can form between the full-length transcription factors, ribosome, and RNAP, simultaneously. Understanding in depth how these proteins interact in the coupling of transcription and translation has biomedical implications by providing insight regarding the regulation of virulence factors in pathogenic bacteria.

**Gissell Sanchez, Neuroscience**

**Faculty Mentor: Margarita Curras-Collazo, Cell Biology and Neuroscience**

Disruption of Neurological Circuits Controlling Blood Pressure by Indoor Flame Retardants

Polybrominated diphenyl ethers (PBDEs) are organohalogens that act as environmental pollutants in consumer products. These chemicals produce adverse biological effects in the endocrine and cardiovascular systems. Previous data from our lab suggests that perinatal exposure to an industrial mixture of PBDEs, DE-71, exaggerates systolic blood pressure in response to osmotic activation which we hypothesize is caused by altered central and/or peripheral Renin-Angiotensin-Aldosterone-System (RAAS) function. Hypertension may also be caused by activation of central Angiotensin receptor (Agtr1) which can reduce neuronal Nitric Oxide Synthase (nNOS) in the brainstem. Unlike nNOS, the neurotransmitter Pituitary Adenylate Activating Polypeptide (PACAP) works to increase blood pressure in sympathetic regions of the brain. Our aims include testing for gene expression of Agtr1, nNOS, and PACAP in specific regions of the brain obtained using the micro-punch technique, and eNOS in kidney. These brain micro-punches have already been collected from rats dosed perinatally with DE-71. Also, some Hyper PBDE rats received captopril, a RAAS inhibitor. Primers for nNOS, Agtr1, and PACAP have been designed and optimized. Efficiencies have been tested using gel electrophoresis and qPCR. nNOS showed good efficiency in both tests; amplicon length 270, and efficiency of 101.5%. One PACAP iteration did not show clear bands in Agarose gel electrophoresis, but another PACAP iteration gave positive results in a melting curve analysis for qPCR primer validation. eNOS qPCR data showed many primer dimers and an exaggerated efficiency. After optimizing all desired primers, we will use qPCR to measure gene expression on the micro-punch brain samples and kidney.
Yesenia Sanchez, Languages and Literature, Japanese  
Faculty Mentor: Annmaria Shimabuku, Comparative Literature and Foreign Languages  
Desire in Natsume Soseki’s *Kokoro*

Intimate male relationships were once considered important bonds in Japan; male, Japanese authors often portrayed these relationships in either a homosocial light or homoerotic light. This essay will argue for the interconnection between sexual desire and the desire for modernity. Instead of looking at Japan’s movement towards modernity through its politics, I will look at it through Japan’s homosocial novels. Natsume Soseki’s *Kokoro* (Heart) is an ideal example of such a novel. First published in 1914 during the Taishō period (1912-1926), just at the beginning of the democracy movement in Japan, *Kokoro* explores the friendship between a young man and his teacher. The novel has been questioned as a homoerotic piece of literature due to this close friendship, but Soseki never stated that he meant for his novel to be homoerotic in any way. Once Japan began its movement towards modernity and enlightenment these bonds were slowly rejected and homoerotic relationships stopped being represented in novels. *Between Men: English Literature and Male Homosocial Desire* by Eve Sedgwick is considered one of the best references for the homosocial continuum. *Two-Timing Modernity: Homosocial Narrative in Modern Japanese Fiction*, by J. Keith Vincent, analyzes Japanese texts through the lens of queer theory and feminism, and using the homosocial continuum. *Between Men* and *Two-Timing Modernity* are my two major points of reference to explain and illustrate the homosocial continuum and homosocial narrative, and to question how and why the depiction of the homosocial continuum changed.

Rajvee Sanghavi, Biological Sciences  
Faculty Mentor: David Reznick, Biology  
The Role of Density Dependent on the Life History of the Trinidian Guppy

The purpose of this study is to examine how density dependence influence characteristics such as population size, mean body size, and embryonic development. Despite the advantages associated with the high-predation phenotype, the low-predation phenotype continues to evolve in low-predation environments. I hypothesize that density dependence may play a role in how guppy life histories evolve. I will be dissecting specimen of guppies from the Caribbean island of Trinidad collected for the mesocosm study. In addition to conducting density measurements, I will observe the stages of embryonic development in female guppies. Guppies from high-predation and low-predation streams are genetically distant from each other and often display varying phenotype. (Travis et. al). Guppies that are found in the same drainage often share greater phenotypic similarity. In the lower elevations of all streams, guppies co-occur with predators, which are excluded from higher elevations by waterfalls. It is thus possible to find guppies living with or without predators in many different rivers. Guppies from high predation environments experience much higher mortality rates. Life history theory predicts that high adult mortality rates will select for the evolution of earlier maturity and an increase in investment in reproduction. In fact, it has been shown that high mortality is indeed associated with earlier maturity. (Travis et. al). The guppies from high-predation guppies also produce offspring with smaller density and more offspring per brood (Reznick and Endler, 1982).
Lauren Sangster, Biochemistry  
Faculty Mentor: David Martin, Chemistry  
Natural Product Synthesis of Flavalins

Neurodegenerative diseases, such as Alzheimer’s, Parkinson’s, and Huntington’s disease, affect millions of people worldwide. Symptoms include memory loss, cognitive decline, and movement impairment. Current treatments only address the symptoms of these diseases due to a lack of understanding of the causes and mechanisms of these diseases. To address this, attention was turned to natural products because of their intrinsic neuroprotective properties. The flavalins, a family of molecules isolated from a soft coral species, are being targeted by our lab in order to further investigate their neuroprotective, anti-inflammatory, and cytotoxic properties. A key step in our proposed synthesis of the flavalins is to construct the flavalin core using a novel cyclization reaction using visible light because it is an abundant energy source. We will do this through the use of ruthenium and iridium photocatalysts because they absorb light in the visible region and can excite organic molecules to facilitate the desired ring closure. We have created a synthetic scheme to test if we are able to achieve this cyclization. We have evaluated different aspects of these reactions including concentration and photocatalyst to find the best conditions. Once we are able to show that visible light with a photocatalyst can cyclize our target molecule in the model system, we will investigate the same reaction conditions to synthesize the flavalin family of molecules.

Chirawat Sanpakit, Mechanical Engineering and Timothy Lam, Mechanical Engineering  
Faculty Mentor: Marko Princevac, Mechanical Engineering  
Effects of Air Lubrication on Hydrokinetic Turbines

Much of our demand for energy is met by fossil fuels, which unfortunately is no longer ubiquitous and poses serious environmental repercussions. Thus, the need to generate or improve clean and renewable energy sources has never been more urgent. One possible solution is hydrokinetic turbines, a mechanical device, similar to a wind turbine, that generates energy through moving water. Our research focuses on improving these turbines’ efficiency by injecting air into the blades of the propeller. Injecting air between the boundary layer on a solid wall has already been shown to significantly reduce friction. By researching ways to increase the efficiency and viability of hydrokinetic turbines, we could provide an economical and reliable source of green energy. Laboratory experiments were conducted inside of a 20-gallon tank. We utilized cameras for visualization, 3D-printed turbines, and an in-house developed MATLAB script to analyze the frequency of the turbine. By controlling the rate of injection, bubble size and air injection method, we were able to quantify changes in the turbine’s frequency. The turbine was placed inside the tank and a water pump was used to simulate a flowing river. Using an air pump, a stream of air is added to the flowing water. Preliminary trials have shown that the turbine’s efficiency increases after a specific flow rate of air is achieved. Experimental results will be presented, delineating the influence of air on hydrokinetic turbines.
Jennifer Shedden, Biology  
Faculty Mentor: Timothy Higham, Biology  
Escape Behavior and Flight Initiation Distance in the Granite Spiny Lizard, *Sceloporus orcutti*

While escaping a threat, a lizard must balance the cost of staying—the chance of being captured—with the energetic costs of flight. Lizards often move on rocks, which present unique challenges to locomotion, including vertical or inclined surfaces, gaps, narrow crevices, and a lack of cover. This experiment examined how the escape behavior of *Sceloporus orcutti*, which dwell exclusively on granite boulders, reflected its current habitat and environmental conditions. We examined male and female adult lizards in habitat consisting of rock outcrops interspersed by low vegetation. We examined three populations, one exposed to regular human traffic, one with unknown human traffic levels, and one in the Motte Rimrock Reserve with restricted access. We simulated predation attempts by approaching the lizards at a constant speed. We took measurements in spring and fall when lizards were most active, and observed different escape patterns reliant on temperature and habituation levels. We found that the lizards in the higher-trafficked region had, on average, a shorter flight initiation distance, but the distance fled did not correspond with flight initiation distance. Most lizards fled to a point on the rock out of the observer’s line of sight rather than entering a crevice, even when initially positioned near a crevice. These results suggest habituation level and temperature are the strongest predictors of escape behavior on rocks.

Paymon Shirazi, Chemical Engineering  
Faculty Mentor: Nosang Myung, Chemical and Environmental Engineering  
Christopher Anderson  
Controlled BaTiO$_3$ Nanofibers for Enhanced Piezoelectric Properties

Piezoelectric-based energy has gained much attention as a clean energy source due to the ability to harness attenuated mechanical energy. Compared to bulk piezoelectric materials, their nanostructured counterparts have shown to possess enhanced piezoelectric properties. Reducing the dimensions of the piezoelectric structures increases piezoelectric performance due to high surface area-to-volume ratio. Electrospinning was used to inject a barium titanate (BaTiO$_3$)/poly(vinyl pyrrolidone) (PVP) composite to form nanofibrous structures. To reduce the fiber diameter, a full-factorial design of experiment (DOE) was conducted to optimize the precursor solution properties (viscosity, surface tension, electrical conductivity), electrospinning parameters (voltage, flow rate, distance between needle and collector), and environmental conditions (temperature, moisture content). The as-spun nanofiber mats were subsequently calcinated and annealed to produce BaTiO$_3$ nanofibers. Scanning electron microscopy (SEM) was utilized to characterize the morphology and diameter of the as-spun fibers, giving uniformly sized fibers with minimal beading and an average diameter of 76 ± 15 nm.
Michelle Smith, Chemistry, Julia Jenkins, Biochemistry, Youssef Daoudi, Biochemistry  
Faculty Mentor: Jack Eichler, Chemistry  
Copper (II) Complexes as Potential Anticancer Drugs  

In an effort to find a better alternative to the current chemotherapy cisplatin, our group has researched the anticancer activity of new copper-based compounds. Eight new copper (II) complexes have been synthesized, characterized, and tested for their in-vitro anti-tumor activity via Sulforhodamine B (SRB) assays. A549 lung cancer cells were plated along with varying concentrations of the drug in question, and the absorbance of SRB dye was measured after cells were lysed. To analyze the effect of each drug, IC$_{50}$ values representing the dosage of drug required to kill fifty percent of cancer cells, were compared to that of cisplatin. Each complex displayed more significant antitumor activity than cisplatin, yet a control study verified that these compounds do not inhibit the growth of non-cancerous cells. To confirm the ligand-copper complex in its entirety was responsible for the anticancer activity shown, a SRB assay was performed investigating copper chloride, ligand, and the physical mixture of both, in comparison to the corresponding complex. Results supported the notion our copper compounds posses a distinct mechanism of anticancer activity independent of the free metal center, free ligand, and/or a synergistic combination of copper chloride and ligand. To further study copper compounds as potential anticancer drugs, we hope to determine the underlying structure-activity relationship and to expand our drug testing to glioma cells and in-vivo models.

Joselyn Soto, Cell, Molecular, Development Biology  
Faculty Mentor: Seema Tiwari-Woodruff, Biomedical Sciences  
Jonathan Hasslemann, Anthony Gobran  
Morphological and functional consequences of hippocampal demyelination and remyelination-induced recovery  

Multiple Sclerosis (MS) is a neuroinflammatory disease that causes extensive chronic demyelination in the central nervous system. In addition to motor deficits, MS also commonly presents with cognitive deficits, with learning and memory deficiencies being among the most prominent. Because the hippocampus has been shown to play a crucial role in memory formation and hippocampal demyelination is frequent and pervasive in MS, we used the cuprizone-diet mouse model of MS to better understand the progression of demyelinated hippocampal related functional and morphological deficits, specifically in the CA1 region of the hippocampus. Male C57BL/6 mice were fed a diet containing 0.2% cuprizone for 12 weeks. Some groups were then switched to normal diet for 3 weeks to induce remyelination in the presence of vehicle or estrogen receptorβ ligand treatment. Assessment of spatial learning and memory was performed using Barnes maze testing, followed by morphological analysis using Golgi staining and immunohistochemistry in hippocampus-containing brain slices. Barnes maze testing showed significant changes in spatial learning and memory in demyelinated groups when compared to normal groups. Golgi analysis revealed decreases in CA1 stratum radiatum dendrite arborizations and recovery in remyelinated groups. Immunohistochemistry analysis revealed significant demyelination and alterations in synaptic proteins as well as degeneration of the CA1 neuronal layer, while recovery in all stains was shown in the remyelination groups. Our data not only suggests that chronic demyelination has significant consequences on both hippocampal related behavior and structure, but also supports the idea that remyelination can repair the associated cognitive deficits.
Ricky St. Claire, English  
Faculty Mentor: John Briggs, English  
The Power of Disguise: Removing the Veil of Idealism

In this paper, I examine the use of disguise, both actual and metaphorical, in William Shakespeare’s *As You Like It*, and how it serves as an agent to challenge the superficiality of idealism and unveil the complicated reality of human life. Rosalind’s disguise as the male Ganymede and her subsequent test of Orlando’s love for her provides an exploration of romanticized love and true devotion, and the necessity of journeying from one to the other. The optimistic idealism of Duke Senior is examined in contrast with the melancholic idealism of Jaques. This paper examines the context of the pastoral setting of Arden and compares Orlando’s idealism in love with Duke Senior and Jaques’ idealism in living. The story of *As You Like It* guides the reader to build upon notions of how things should be and come to a deeper understanding of how things actually are.

Samantha St. Claire, English  
Faculty Mentor: Vorris Nunley, English  
*Why Marriage? The Incompatibility of Marital Expectations with Romance and Individuation*

Roughly half of all marriages in America end in divorce. Nevertheless, the belief that everyone has one soulmate waiting to complete them and provide a marital “happily ever after” remains pervasive in Western culture. Therefore, in order to more effectively understand the rhetorics and discourses mediating romantic and marital practices and my own decision whether or not to marry in the near future, I endeavor to understand particular narratives informing thinking informing the institution of marriage. Given the breadth of the topic, I limit my scope by structuring my exploration around, elaborating on, and disagreeing with aspects of Laurie Essig’s TED Talk, “Love.Inc: How Romance and Capitalism Could Destroy Our Future.” Essig where s argues that in the mid-19th century capitalism initially introduced, intertwined romance within marriage. I utilize certain texts, including Henrik Ibsen’s *A Doll’s House* (1879), to mark how participants in romance and marriage may productively challenge thoroughly upheld traditional gender roles within relationships. These counter-cultural texts/acts would eventually develop into more modern views of the ever slippery goal of individuation free from societal expectations as seen in foundational texts such as Betty Friedan’s *The Feminine Mystique* (1963). I ultimately argue that romantic ideals and marital expectations distort individual growth and productive relationships by maintaining and producing unrealistic *soulmate* expectations along with the desultory effects of categorization relationships as being either “successful” or a “failure.”
Alyssa Stump, Business Administration  
Faculty Mentor: Sean Jasso, Business Administration

Can Yogurt Lids Cure Cancer? A closer understanding of the driving force behind philanthropic actions and the results of those actions.

The ultimate objective of this paper is to gain a larger understanding of the intentions behind corporate philanthropy. Through first studying the difference between corporate philanthropy and corporate social responsibility, I aim to determine the importance, if there is one, of philanthropy. I seek to discover insight of the difference between corporate philanthropy and charitable giving to ultimately determine what philanthropy is. Then, I will resolve if philanthropy is a media ploy, a façade for shareholders, or an action of goodwill through the following questions: Where does philanthropy stem from? Why are corporations still philanthropic? Is there a correlation between company success and philanthropy? What are the benefits and costs of corporate philanthropy? Finally, I will review the results of philanthropic actions to conclude what philanthropy actually achieves.

Gabriela Tablas, Chemistry  
Faculty Mentor: Ming Lee Tang

Jesse Tamayo, Zhiyuan Huang, Duane Simpson,  
Solid-State Upconversion with CdSe Nanocrystals and Anthracene

Upconversion is the process of converting lower-energy photons to higher energy photons. Here, we study the upconversion of incoherent light using semiconductor nanoparticles to absorb the low energy photons, and molecular annihilators to emit the high energy photons. Two triplet excited states ‘annihilate’ each other to give one molecule in the ground state, and the other in its first excited singlet state, thus upconverting light. This platform can be used to inexpensively enhance the efficiency of solar cells. In this work, we use a poly(pentafluorophenyl acrylate) PFPA polymer to covalently bind anthracene. This creates a solution-processible thin film that allows controllable loading of anthracene and CdSe nanocrystals, while preventing spontaneous crystallization. This precludes undesirable phase separation that results in physical isolation of the nanocrystal light absorber from the anthracene annihilator. The design, synthesis and characterization of this thin film is vital to harnessing this hybrid upconversion platform in third-generation photovoltaic cells.
Aaron Tan, Bioengineering
Faculty Mentor: Victor Rodgers, Bioengineering
Free Fatty Acid Exposure Decreases Trans-epithelial Electrical Resistance of Caco-2 Cells

Under physiological conditions, the intestine houses enzymes that are self-contained by a mucosal barrier lining the lumen of the intestine. However, during shock, the mucosal barrier is compromised and these enzymes are free to interact with the underlying epithelia. Proteases cleave surface receptors on cells and lipases generate cytotoxic free fatty acids (FFAs) from luminal contents; both actions increase the permeability of the epithelial layer, allowing these biomolecules to enter circulation and damage distant organs. Previous research by Schmid-Schoenbein et al. (2012) has characterized protease activity in the epithelium across a mucosal barrier of varying integrity. However, not much work has been directed towards the interaction of FFAs and the gastric mucosal barrier. Because there are many confounding factors that lead to the increased permeability of the gastric mucosal barrier, this study aims to isolate the contributions of FFAs generated by lipases. The transepithelial electrical resistance (TEER) of Caco-2 cells, treated with oleic acid, a type of FFA, was measured over the course of an hour to monitor changes in cellular permeability. There was an observed drop in TEER upon exposure to higher concentrations of oleic acid, indicating that FFAs may play a role in the degradation of the intestinal mucosal barrier.

Nancy Tang, Psychology
Faculty Mentor: Rebekah Richert, Psychology
Children’s Desensitization to Violence in Video Games and TV News

Children are frequently exposed to real and fictional violence such as news and video games, both of which may include varying levels of violent images, concepts, and themes. Research has indicated that exposure to fictional violence as is found in video games has positive relations with aggressiveness and desensitization to violence. In this study, 9- to 12-year-old children are interviewed about the types of video games they play and amount of time spent playing them. Children are also asked to recall news stories they have watched. Children’s attitudes toward violence are assessed using a battery of questions (Attitudes Towards Violence Scale: Child Version), and their emotional reactions and empathy are measured through responses to short vignettes. Children’s video games are rated for severity of violence, and children’s recall of news stories are coded for the amount and types of violence. Children’s negative affect toward news violence is also evaluated. It is hypothesized that children who express more aggression and desensitization to violence will also recall more news stories containing violent themes, and will express less negative affect in response to the news stories. By finding support for the hypothesis, we will be replicating research linking fictional violence in video games to aggressiveness with real violent events from the news. If a significant relationship is found between exposure to violent video games and children’s emotions regarding violent news stories, then these findings will have implications in understanding children’s cognitive, affective, and behavioral processes and wellbeing.
William Tedjo, Biochemistry  
Faculty Mentor: David Reznick, Biology  
Macrobrachium Prawn Effects on Rivulus *hartii* Eggs' Developmental Time

There have been multiple studies of the influence of environmental factors, such as temperature, on egg development in a variety of organisms (Gillooly et al. 2002). These include studies of the ability of amphibian eggs to accelerate development in response to the perceived threat of predation. For example, Warkentin and colleagues found that the developing tadpoles of hatched immediately when exposed to snakes that were actively consuming eggs while their unexposed siblings did not hatch. This response enabled the tadpoles to escape the predator (Warkentin et al. 1995). In a different study, Moore found that a chemical cue of predatory sunfish caused a delay in the hatching of streamside salamander eggs. In both cases, the rate of development was drastically changed (Moore et al. 1996).

The killifish *Rivulus hartii* is a model species for this experiment, because some populations are known to exist with *Macrobrachium* prawns while other populations are found in streams that lack prawns. *Macrobrachium* prawns are bottom feeders that will readily eat the eggs of *Rivulus hartii* in aquaria. Furthermore, *Rivulus hartii* are much less abundant in rivers that contain prawns. *Rivulus* eggs are also known to have differing hatching times as well as the ability to absorb small, water-born molecules from the surrounding environment. We hypothesize that populations of fish found with egg predator’s water-born chemical cues will accelerate developmental rates relative to eggs produced by fish from streams that lack egg predators. We have obtained raw data from differing techniques and are currently working on methods to refine our data collection by removing even more confounding variables.

Bassam Theordory, Biochemistry  
Faculty Mentor: Eugene A. Nothnagel, Philippe E. Rolshausen, Sebastiaan Bol, Botany and Plant Sciences  
Jiha Lee, Allison Cid  
Glycosyl Composition of Polymeric Components of Gums Exuded from Uninfected and *Neofusicoccum*-Infected Almond Trees

Approximately 75% of world-wide almond production currently occurs in California. Almond and other stone fruit trees commonly exhibit gummosis, the production and exudation of gums, particularly from wounds or pathogenic sites in the bark. Gum function remains uncertain but is widely assumed to involve wound healing or disease resistance. This project is focused on the polymeric components in almond gum with emphasis on comparison of glycosyl compositions of gums from infected and uninfected trees. The pathogen of interest is *Neofusicoccum parvum*, a virulent fungus that significantly aborts fruit production and may kill parts of the tree. Gummosis at an infection site is usually greater than at a wound or mock-infection site. Gums from infected and mock-infected trees were ground in liquid nitrogen and extracted with 70% ethanol to remove low molecular weight components. The insoluble materials were collected on nylon filtering cloth and dried in a vacuum desiccator. The dried samples were cleaved with methanolic-HCl, trimethylsilylated, and then analyzed by gas chromatography. The results showed that gums from infected and mock-infected trees were both rich in galactosyl, arabinosyl, and glucuronosyl residues, which are characteristics of arabinogalactan proteins, and also contained abundant xylosyl residues, which are common in hemicelluloses. Arabinogalactan proteins are involved in many biological processes including cell division and signaling. Ongoing work has the goal of determining whether glycosyl compositions differ between infected and mock-infected almond gums, and determining if the gum aids in defense against the pathogen. Supported by the CNAS HIS-STEM Pathway Program.
Derrick Tien, Statistics
Faculty Mentor: Curt Burgess, Psychology
Flynn McGettigan
What’s in a Name? Using the Hyperspace Analogue to Language Model of Semantic Memory to find Associations between Adjectives and Names

The Name Brain Project addresses a long-standing problem in selecting names by using a computational model of memory that encodes the meaning of words by “reading” large samples of language. Parents often struggle when deciding on a name for a new baby hoping that a name will convey qualities they believe would be positive associations for their child. Foreign students who attend English-speaking universities often take names that will be easier to pronounce. Chinese names tend to be difficult for Native-English speakers to pronounce and English names are often taken to facilitate business communication. In this research, the Hyperspace Analogue to Language model of semantic memory is being used to empirically derived (1) the connotative meaning of proper names or (2) proper names with specific connotations. The model encodes word meaning by calculating word similarity using a lexical co-occurrence procedure so that names and adjectives are represented in a hyperspace matrix where each name and adjective is represented by a vector of co-occurrence values (see Lund & Burgess, 1996). The website will have a user interface that takes up to three adjectives and will return a name that is connotatively associated with those adjectives based on the HAL model or return name characteristics given the adjectives. Our research involves determining which statistical procedures (e.g., vector correlations, multiple regression) will make the best predictions of connotation compared to human ratings. Technical issues we are addressing involve the determining the most computationally efficient algorithms and managing storage overhead.

Luis Torres, Biology
Faculty Mentor: Louis Santiago, Botany and Plant Sciences
Eleinis Ávila-Lovera, Mark De Guzman
Hydraulic characteristics as a survival trait in woody plant species found in California’s chaparral region

Drought in California has been challenging the survivability of native vegetation with scarce rainfall and rising temperatures associated with climate change. California’s shrub tolerance to drought-induced stress has become increasingly significant in order to anticipate how they may withstand climate change as it continues. Several hydraulic traits found in the chaparral have been measured to characterize their physiological ability to subsist during drought. To further understand drought resistance, I explored two further traits among chaparral shrubs: 1) Leaf hydraulic conductance; 2) cuticular conductance. To quantify these traits, three or more leaf samples belonging to distinct plants were taken per species. Stomatal conductance was measured using a SC-1 Leaf Porometer. Leaf hydraulic conductance was evaluated using the Evaporative Flux Method and cuticular conductance was done by dehydrating each leaf for twenty minutes and measuring its mass to calculate water loss through the cuticle over time. There was large variation in these traits among species, but variation was not related to phenology (evergreen versus deciduous). These traits were not correlated with other measures of drought resistance. It was concluded that not all species found in California’s chaparral show the same hydraulic survival strategies, but instead each plant may incorporate a differing combination of traits to combat drought as climate change progresses.
Emotion regulation (ER) strategy repertoire describes the number of strategies children are able to use to modulate their emotions. Although parents can accurately predict their children’s behavior (Parrish et al., 2007), they are less accurate when asked to assess children’s cognitive and emotional states (Lagattuta et al., 2012). Therefore, we predicted that parents would overestimate children’s repertoire of behavioral ER strategies (e.g., seeking social support), but underestimate children’s repertoire of cognitive ER strategies (e.g., thinking positively). Children (N=186; 96 girls; ages 3-11) came to the lab with a parent, and were asked to remember and describe times they had felt sad, scared, or angry. They were also asked what they had done to help themselves feel better in each situation; responses were coded as ER strategies. Parents were given a list of ten possible ER strategies and selected those that their children had ever used in response to sad, scary, and angering events. Paired t-tests were used to compare children’s and parents’ reports of children’s ER strategy repertoire. As predicted, parents overestimated children’s repertoire of behavioral strategies, t(175)=14.72, p < .001, d=1.52. Contrary to prediction, parents overestimated children’s cognitive strategy repertoire, t(175)=7.07, p < .001, d=.69. These results did not differ by children’s age or the emotion being regulated. Results suggest that while parents overestimate the number of behavioral and cognitive strategies that children are able to use, parents do understand that children use more behavioral than cognitive strategies, t(177)=22.21, p < .001, d=.91.

Effective communication within healthcare interactions is associated with a plethora of benefits. However, the use of technical language (“jargon”) often leaves patients with a lack of understanding of their health. Utilizing a multi-faceted approach integrating self-report measures with ambient audio recordings, the present study sought to extend previous findings and explore the consequences of jargon within real world healthcare interactions. Patients at a surgical consultation completed questionnaires and had their consultation audio recorded and ultimately transcribed; the surgeon also completed a brief post-consultation questionnaire. Findings suggest that physicians use jargon more frequently with patients who also use jargon, who are in middle to late adulthood, and who are more educated. Moreover, our results also reveal that patients’ education and health literacy can buffer the negative consequences of physicians’ jargon use. That is, less educated and health literate patients reported lower ratings of happiness and perceived control over their treatment when their physician used more jargon, but patients higher in education and health literacy did not show these detrimental consequences of jargon use. Our results offer insight into factors to consider when designing interventions to improve physician-patient communication. As each patient is unique, physicians should tailor interaction styles accordingly to improve patient comprehension and provide the highest quality of care.
Jason Tran, Public Policy  
Faculty Mentor: Emma Simmons, School of Medicine  
Assessing the Knowledge, Beliefs, and Attitudes of HIV/AIDS Among Undergraduate and Medical Students

According to the CDC, youths between the ages of thirteen and twenty-four are disproportionately affected by HIV/AIDS. In 2010, they comprised 17% of U.S. population but 26% of new diagnoses. Several studies have shown that possible causes include low perception of risk, declining health education, and substance use. Thus, assessing this group’s knowledge, attitudes, and beliefs toward HIV/AIDS remains crucial toward improving educational interventions. Several studies have assessed the knowledge, attitudes, and/or beliefs of young adult undergraduate and medical students. Their results have documented mixed results in levels of knowledge towards HIV/AIDS while also highlighting several barriers to learning about HIV/AIDS. These studies have also shown that many students hold low susceptibility to getting tested and negative perceptions toward others who have HIV and/or AIDS. These conclusions underscore the continual need to focus on young adults. To the best of our knowledge, no published studies have focused on the knowledge, attitudes, and beliefs toward HIV/AIDS among undergraduate or medical students who attend or have recently graduated from UC Riverside. In this study, we assessed these three factors among 29 students or recent graduates of UC Riverside. After employing surveys and conducting qualitative interviews, we coded the transcriptions into themes on how students learn about HIV/AIDS. Themes include learning HIV/AIDS through media, social groups, and clinical settings. Overall, discovering these facilitators and barriers in education about HIV/AIDS can highlight possible solutions toward improving HIV/AIDS intervention for young adult.

Larry Tran, Chemical Engineering  
Faculty Mentor: Huinan Liu, Mechanical Engineering  
A study of Poly(Glycerol Sebacate) on Magnesium as Bioresorbable Materials

Poly(glycerol sebacate) (PGS) is a bioresorbable polymer that has a lot of potential in biomedical and tissue engineering. Biomedical devices require a good biocompatibility and some require a controllable biodegradability. The flexibility and elastomeric nature of PGS make it an excellent material for soft tissue engineering such as cardiac muscle, cartilage, and retina tissue regeneration. Unfortunately for cardiovascular engineering, most polymer materials, including PGS, do not have necessary mechanical strength compared to a permanent metallic stent. Coating PGS on magnesium (Mg), a novel bioresorbable metal that has already shown many benefits, could address out this problem. Mg is a metal that could provide adequate mechanical support to PGS, PGS and Mg are both bioresorbable and PGS can slow down Mg degradation rate. The combination of PGS coating and Mg substrate is supposed to be a promising material solution for next-generation bioresorbable cardiovascular scaffolds. This study aims to develop PGS-coated Mg and investigate the microstructure of the combined coating. Characterization of microstructures of PGS coating will be conducted via Scanning Electron Microscopy. The controlling effect of PGS coating on Mg degradation will then be evaluated.
Relative Expression of Ecdysis Triggering Hormone Signaling Genes in Adult *Drosophila melanogaster*

Hormones are important regulators of development, physiological state, and behavior in all animals. In insects, ecdysis triggering hormone (ETH) secreted by endocrine Inka cells signals the end of each molt by initiating a behavioral sequence necessary for shedding of the cuticle. Inka cells and ETH persist into the adult stage, raising questions about post-developmental signaling functions of this hormone. The purpose of this study was to determine relative expression levels of genes encoding ETH and ecdysis triggering hormone receptor (ETHR) subtypes A and B in virgin and mated male and female fruit flies (*Drosophila melanogaster*) at specific time points during adulthood. Virgin male and female flies were collected at several times relative to eclosion: day -2, day -1, day 0, day 3, day 5, day 8, day 10, day 13, day 16 and day 20. Singly mated female flies were mated on day 4, and collected 6 hours later, 12 hours later, and 24 hours later. Singly mated male flies were mated on day 4, then collected on day 5 (24 hours later), day 8, and day 10. Doubly mated male flies were mated on day 4 and day 7, and collected on day 8 (24 hours later). Using reverse transcriptase polymerase chain reaction (RT-PCR), male- and female-specific patterns of expression were revealed for ETH, ETHR-A, and ETHR-B precursor transcripts. These results suggest that ETH, ETHR-A, and ETHR-B play important functions in adult male and female flies.

Get back out there! Children’s Participation in Sports and Parent Emotion Socialization

Parents shape their children’s developing emotion regulation (ER) skills through emotion socialization (ES; Denham et al., 2003). Problem-focused reactions (PFR; problem-solving methods to modify the stressor) and emotion-focused reactions (EFR; regulating negative emotions by substituting them with another) are types of ES that support ER development. Children who participate in activities that incorporate both exercise and character development show improvement in executive functioning, a key correlate of ER, suggesting that participation in team sports may support ER (Diamond, 2012). We hypothesized that sports would support children’s emotion regulation, and parents would provide less PFR and EFR as a result. 177 parents reported on their use of PFR and EFR on the Coping with Children’s Negative Emotions Scale (CCNES; Fabes, et al., 1990) and reported on children’s (ages 4-11, \(M=7.71, SD=2.28\)) participation in sports. First, we ran t-tests to look for gender differences in parent provision of these reactions; results were non-significant. We ran two ANCOVAs to test for main effects of gender and sports participation, and their interaction, with age covaried. Parents provided less PFR for children who played sports (\(M=5.65, SE=.09\)) than non-players (\(M=5.93, SE=.09\)), \(F(1,172)=3.12, p=.028, \eta^2_p=.028\). They also provided less EFR for children who played sports (\(M=5.54, SE=.10\)) than for non-players (\(M=5.90, SE=.10\)), \(F(1,172)=6.50, p=.012, \eta^2_p=.037\). Results indicated that sports may support children’s ER skills, though how exactly ER is influenced by sports needs to be further elucidated. Future studies should investigate how ER varies across children who participate in sports to varying degrees.
Giosiana Turchetti, Anthropology / Middle East and Islamic Studies  
Faculty Mentor: Eugene Anderson, Anthropology  
The Evaluation of Ancient Egyptian Agricultural Practices and their Implementation in Modern Egyptian Society

The Revolution of 2011, coupled with detrimental agricultural practices, has caused the Egyptian state to be in a compromised position. The Revolution of 2011 had a negative impact on the financially beneficial tourism industry of Egypt and caused severe political instability. In addition, the construction of the Aswan High Dam preventing the annual flooding of the Nile River, continued monocropping of cotton that is highly destructive to the soil, increased urbanization and population growth by Sudan and Ethiopia, and excessive pollution of the Nile River have all contributed to a rapidly declining agricultural situation. In order to begin to rectify this and create a prospering environment for the long-term outlook of Egypt, both Ancient Egyptian and modern agricultural practices should be implemented. Ancient Egypt focused on the cultivation of barley, different types of wheat, vegetables, and other crops needed to feed its ever-increasing population. Through the growth of diverse crops that did not remove all nutrients from the soil and the abundance of fish in the Nile River, the Ancient Egyptians flourished. This crop arrangement, along with the reduction of pollution in the Nile River, desalination plants in the Red Sea, and a focus on domestic production are the beginning steps into navigating Egypt into a more stable future. This research only provides specific examples as to the possible agricultural implementations to remedy the situation. However, it must be understood that these changes cannot occur without a stable government and agreements with Sudan and Ethiopia over water rights.

Christian Turner, CMDB  
Faculty Mentor: Morris Maduro, Biology  
H. Choi, G. Broitman-Maduro  
Examining Adult Defects in Gut Specification Mutants

The nematode *C. elegans* is a small, non-parasitic roundworm with a simple anatomy. The intestine, or gut, consists of 20 cells that are all descendants of a single cell that is born in early embryonic development. Specification of the gut progenitor involves the activation of a small set of genes that form an essential ‘gut specification network.’ When genes in this network are not expressed, gut cannot be made and animals die. We are studying strains in which this network is only partially blocked. In particular, we have investigated the development of the gut in a strain, MS404, containing mutations in the gut specification genes *med-1* and *end-3*. In this strain, progenitor specification still occurs most of the time, but development of the gut becomes stochastically variable. Many of the embryos survive the stochastic nature of the intestine’s development, and can survive through adulthood. Although these mutants survive, they carry defects, physiological, metabolic, and behavioral, that persist throughout their lifespan. Here we seek to understand these defects through a differential gene expression analysis, using the method of RNA-Seq to compare the expression of intestine-specific genes between MS404 and a wild-type control. Our findings suggest that in MS404, animals enter an alternative pattern of gene expression that causes changes in immunity and metabolism.
The Semantic Cognition in Language (SCiL) project is a collaboration between the Computational Cognition Lab (CCL) at UCR, Apple Inc’s ResearchKit framework, and a developer team at the University of Sao Paulo and The National Service for Commercial Education (SENAC) in Brazil. The goal of this project is to develop an app for iOS devices that can collect data and conduct cognitive experiments to investigate normal and neurologically impaired memory and language function. A benefit of this application platform is its availability to a diverse and world-wide population. As a precursor to the launch of this app is the development of a set of questionnaires and tasks that can be used to pre-screen users and collect data that could serve as potential independent variables (e.g., psychiatric history, literacy, reading activity). Online databases such as Google Scholar and PsycINFO were used to find relevant research in order to verify the validity and reliability of the questions being asked and how these twenty-one topics could be useful for the future of dementia research. These empirical articles either served as evidence for us to create our questionnaires or supplied us with questionnaires used by related studies that may be useful in this research. After the questionnaires were finalized, an ordering process was implemented to organize and determine which questions were to be kept. Ultimately, the app will be available for other researchers to utilize in their research.

Penicillium digitatum (Pd) is one of the most important post-harvest pathogens of citrus on a global scale causing significant annual losses due to fruit rot. However, little is known about the diversity of Pd populations both within the field and subsequently after processing where significant post-harvest treatments for control could influence the population dynamics. The genome of Pd was recently sequenced, providing an opportunity to determine the microsatellite distribution within Pd to develop markers that could be valuable tools for studying the population biology of this pathogen. In the analyses, mono, di, tri, tetra, penta, and hexanucleotide microsatellites within the genome of Pd were restricted to 12 repeats for mononucleotides and above while the rest were restricted to 5 repeats and above. A total of 3,134 microsatellite loci were detected; 66.73, 23.23, 8.23, 1.24, 0.16, and 0.77% were detected as mono, di, tri, tetra, penta, and hexanucleotide repeats, respectively. As consistent with other ascomycete fungi, the genome size of Pd does not seem to correlate with the density of microsatellite loci. However, significantly longer motifs of mono, di, and tetranucleotide repeats were identified in Pd compared to 10 other published ascomycete species with repeats of over 800, 300, and 900 motifs found, respectively. Specific loci are currently being tested to determine their utility at studying the population genetics of this important pathogen of citrus.
Dominic Ventre, Bioengineering
Faculty Mentor: Ming Lee Tang, Chemistry
Functionalized Tetracene Organic Field Effect Transistors

Organic semiconductors have great potential in low cost, large area electronic applications. So far, pentacene is the workhorse of the organic thin film transistor field, with reliably high mobilities and decent on-off ratios. Tetracene has proven to be a good option for organic field effect transistors (OFETs), with mobilities as high as 1.3 cm^2/V*s. In comparison to pentacene, tetracene is more stable and soluble, properties that make it more amenable to solution-based, roll-to-roll processing. Here, we present a series of novel tetracene molecules, functionalized at the 2- and 5- positions with bromo, methyl, phenyl and carboxylic groups. We probe the effect of chemical structure on their thin film properties in FET geometry..The FET current-voltage measurements of these thin films, made by evaporation under high vacuum, will be related to their order and structure. This work sheds light on the structure-property relationships that govern the relationship between structure and thin film mobility for organic semiconductors.

Yvette Villalobos, Business Administration
Faculty Mentor: Sean Jasso, Business Administration
Why is Google So Successful?

Google was founded in 1998 and has since become one of the most innovative and top ranked companies in the world. This presentation shows how brand positioning and corporate culture have led to Google’s success, specifically in terms of brand strength, overall profit, and company innovation. For this presentation, I will determine a company’s success by the standards of: achieving their overall company mission, brand positioning, monetary success compared to competitors, and popularity of products and company. Furthermore, I will use comparative analysis to compare Google to other companies. This comparative analysis allows for techniques used by Google that are not practiced by other companies to be seen. Through the analysis, I expect to find that Google employees are motivated by Google’s sense of teamwork and innovative atmosphere which has led to successful team work and management techniques. Google’s innovative atmosphere has led to the company’s brand recognition, high number of users, and strong financial numbers. My primary objective is to research Google’s corporate culture and marketing to discover why Google is successful.
Friends play an important role in helping students adjust to college. First-year college students who form close relationships with friends on campus are more likely to feel connected to the university and succeed academically (Pittman & Richmond, 2008). First-generation college (FGC) students, whose parents did not go to college, may especially benefit in this way (Orbe, 2008). This study examines how support from on- and off-campus friends relates to first-year college students’ school connectedness and academic self-efficacy (ASE), a belief that he or she can succeed at an academic task or reach an academic goal. The study also compares support from friends reported by FGC and non-FGC students and its relation to ASE and school connectedness in these groups. Participants were 170 freshmen (61% FGC, 39% non-FGC). They completed an online survey measuring their perceptions of support from friends, ASE, and school connectedness. Descriptive analyses revealed that friends are a major source of support for most students (82%). Qualitative responses reflected four types of friend support: emotional, advice, problem solving, and academic resource sharing. Most students (77%) reported emotional support and the rate was especially high among FGC students (87% vs. non-FGC 64%). More support from friends was associated with greater ASE (on-campus: $r = .33$, off-campus: $r = .27$) and school connectedness (on-campus: $r = .30$, off-campus: $r = .27$). These values are all significant at the $p < .01$ level. The results show the importance of supportive friends during students’ transition to college for FGC and non-FGC students.

Mortality from diabetes is a growing problem not only in the United States, but worldwide. From 1980 to 2011, the number of diagnosed adults (ages 18-79) with diabetes increased more than three times, from 5.6 million to 20.9 million in the US alone [Centers for Disease Control and Prevention, 2015]. Diabetes is currently the 7th leading cause of death and negatively impacts the nation’s economy. The estimated cost of diabetes was $245 billion dollars in the United States in 2012 and this cost only rapidly continues to rise [Centers for Disease Control and Prevention, 2014-15]. While numerous studies have been done on diabetes, most of them have been done at the individual level for clinical purposes. Since the medical field has heavily focused on individual risk factors, relatively little is known about the social factors that promote diabetes at the structural level. The aim of the present study was to identify the structural sources of diabetes mortality using county and state characteristics. More specifically it was investigated whether higher levels of primary care, social disadvantage, and minority concentration elevate mortality from diabetes. The question asked was the following: Do higher levels of primary care resources, social disadvantage and minority concentration elevate mortality from diabetes? If so, does the effect of primary care persist after controlling for variables such as immigration, health insurance availability, and housing cost?
Macy Wilens, History Law / Society
Faculty Mentor: Robert Parker, Sociology and Richard McFarlane, History

The Second Amendment: A New Beginning

My research will demonstrate that, contrary to the view advocated by some jurists and scholars, the main component of the Second Amendment is the right of self-defense. In other words, the Second Amendment has been misconstrued by those who argue that the right to bear arms only refers to participation in a militia and that those weapons used are limited to only those weapons which are necessary for participation in a militia. Only in recent years has the Supreme Court begun to cautiously revitalize the Second Amendment. I will rely on primary sources, secondary sources, and Supreme Court and lower court decisions to draw my conclusions. This information will be collected from various archives, peer-reviewed studies, historical monographs, and articles. I will challenge the argument that participation in the militia is the only essential justification of the Second Amendment because limiting the right to bear arms to this circumstance would undermine the basic right of self-defense that was being advocated by the Framers of the Constitution. Moreover, I will take an originalists position in regards to the Second Amendment, especially when analyzing what the right meant to the Founding Fathers and the intentions behind the language used in the amendment. Conclusively, I will draw upon recent court decisions and historical evidence to determine a possible judicial future for the Second Amendment.

Zizhong Xiao, Psychology
Faculty Mentor: Sonja Lyubomirsky, Psychology

Lilian Shin

Framing Kind Acts on Life Satisfaction in Two Cultures

Recent findings indicate that performing kind acts increases life satisfaction (LS). The current study assessed whether performing kind acts were effective cross-culturally by testing the effect of framing kind acts within two cultures. We predicted U.S. participants were likely to increase in LS when kind acts were framed as beneficial for oneself since the U.S. is an individualistic/independent culture. In contrast, we predicted South Korean (S.K.) participants were likely to increase LS when kind acts were framed as good for others since S.K. is a collectivist/interdependent culture. Participants from S.K. (n = 340) and the U.S. (n = 309) completed baseline LS measures. Participants were then randomly assigned to read that kindness was beneficial for either oneself, others, or to a control condition. Participants performed kind acts and reported LS after 1 week. A mixed ANOVA revealed a Time x Culture x Condition interaction, $F(2, 547) = 4.51, p = .011$; LS increased for U.S. participants who read that kindness was good for oneself or others, but decreased in the control. The LS of S.K. participants increased in the other and control conditions whereas the self-condition remained nearly constant. Results supported our hypothesis: kind acts were most beneficial when framed as good for the self but also when framed as good for others in the U.S. We conclude U.S. participants may require reasons to perform kindness. Kind acts framed as good for others and without framing were beneficial in S.K. perhaps because performing kindness aligns with their interdependent mindsets.
The Italian theatrical form of commedia dell’arte has helped to shape our perceptions of modern comedy and theatrical performance. Originating in the Italian peninsula in 1586, commedia’s use of improvisation, popularized stock characters, and masks are a few of the factors that made it popular in its day, and have helped this art form to endure throughout history. One of the most essential themes of commedia is the topic of serial migration. In my research I examined the ways in which this classical art form was impacted by migration, and if these impacts have helped create a lasting legacy for the art. Migration in commedia dell’arte can be seen in a literal form, such as the fact that commedia troupes traveled to different cities and countries between the Italian peninsula, France, and Spain. The serial migrant is also seen in a symbolic way in the characterization of one of commedia’s most iconic characters, the comedic servants known as the zanni who were migrant workers. I also explore the meanings of these characterizations, and if they reflect negative perceptions of the migrant workers of this era. Serial migration was necessary to the success of these classical theater troupes, meaning their impact on history would have been vastly different had these troupes remained in their native cities or regions.
Adrianne Blackwood, Creative Writing – Poster
Faculty Mentor: Michael Jayme, Creative Writing
Hearing Colors

My Honors capstone project is a historical fiction novel titled Hearing Colors. It is set in the Outer Banks of North Carolina in the early 1900s and the protagonist, Bert Bodkin, is a young man with sound-color synesthesia. In 1903, he witnessed the first engine-powered flight at Kitty Hawk beach and became determined to become a pilot. In 1910, when the majority of the story takes place, he struggles to save up enough money to leave North Carolina and travel to Ohio to work for the Wright brothers. When a French violinist moves to town and hires him to repair her house, Bert believes that he will finally be able to acquire enough funds to pursue his dreams of flight. However, he soon discovers that her music sounds purple—the only color he has never heard before—and his plans are once again thrown into disarray. The novel itself will examine the intersection of pragmatism and intuition, as well as the themes of alienation and belonging, all of which are rooted in the core subjects of synesthesia and flight. Ultimately, this project seeks to produce a creative interpretation of sound-color synesthesia by applying the theories of Richard E. Cytowic and other neurologists to a fictional character, in an attempt to hypothesize how sound-color combinations might manifest themselves within his mind and how these manifestations might affect his decisions.

Damon Platt, Biology
Faculty Mentor: Margarita C. Curra-Collazo
Increased Neuronal Activity in the Stress Centers of the Brain in Response to Acute Ozone Exposure May Indicate Why Ozone leads to Metabolic Disorder

We have observed physiological changes in the neuroanatomy of adult male Wistar rats after an introduction to acute ozone stress exposure. Rats exposed to merely 1 hour of ozone (2.0 ppm) have shown a marked increase in the amount of cfos exposure in the hypothalamus; specifically, within the Paraventricular Nucleolus – an important region of the brain containing groups of neurons that are activated in response to stress. These rats have been shown to exhibit detrimental changes in their metabolic health, similar to those exhibited by diabetics. The PVN projects directly to the posterior pituitary gland, leading to the biological cascade release of oxytocin or vasopressin into the bloodstream. PVN neurons can also control various anterior pituitary functions, while still others directly regulate appetite and autonomic functions in the brainstem, and therefore plays a significant role in metabolic regulation. The hypothalamus is responsible for regulating basal metabolic processes and other autonomic nervous system activity in response to various stresses. It is therefore our primary target of interest when researching the cause for why and how a direct acute exposure to ozone was able to cause such a significant change on the metabolic heath of rats. It is therefore plausible that the mechanism for how ozone exactly affects metabolic heath in rats is through a neuronal pathway. More experimentation is required in this study. We plan to examine other areas in the brain involved in stress including the arcuate of the hypothalamus (Arc) and the nucleus tractus solitarii (NTS) of the brain stem.
Friends play an important role in helping students adjust to college. First-year college students who form close relationships with friends on campus are more likely to feel connected to the university and succeed academically (Pittman & Richmond, 2008). First-generation college (FGC) students, whose parents did not go to college, may especially benefit in this way (Orbe, 2008). This study examines how support from on- and off-campus friends relates to first-year college students’ school connectedness and academic self-efficacy (ASE), a belief that he or she can succeed at an academic task or reach an academic goal. The study also compares support from friends reported by FGC and non-FGC students and its relation to ASE and school connectedness in these groups. Participants were 170 freshmen (61% FGC, 39% non-FGC). They completed an online survey measuring their perceptions of support from friends, ASE, and school connectedness. Descriptive analyses revealed that friends are a major source of support for most students (82%). Qualitative responses reflected four types of friend support: emotional, advice, problem solving, and academic resource sharing. Most students (77%) reported emotional support and the rate was especially high among FGC students (87% vs. non-FGC 64%). More support from friends was associated with greater ASE (on-campus: $r = .33$, off-campus: $r = .27$) and school connectedness (on-campus: $r = .30$, off-campus: $r = .27$). These values are all significant at the $p < .01$ level. The results show the importance of supportive friends during students’ transition to college for FGC and non-FGC students.

As electronic cigarettes (EC) continue to grow in popularity, new multivariable EC models have been created which allow users to adjust voltage and wattage settings to optimize vapor delivery. These models are utilized with little to no information on their potential health effects. There is evidence that increasing voltages may harm cells by increasing levels of cytotoxic compounds present in EC vapor. In this study, the voltages of non-variable and multivariable models, as well as the resistances of their cartomizers and tanks were measured and validated using a multimeter. Additionally, we compared the cytotoxicity of EC aerosols generated at varying voltages at differing humectant concentrations in lab-made refill fluids containing propylene glycol (PG), vegetable glycerin (VG) and water. Aerosol samples were generated at 3V and 5V and tested on human lung epithelial (A549) cells using the MTT assay. At 3V, none of the samples displayed cytotoxicity. At 5V, four out of five samples showed cytotoxic effects at TPE concentrations ranging from 0.75 to 4.2. At 3V, VG was the most potent sample. At 5V, VG had the lowest IC$_{50}$ TPE concentration of the four cytotoxic samples. These data show that aerosol generated using higher concentrations of VG tends to be more cytotoxic than those with lower concentrations. However, cytotoxicity may increase with voltage. These data suggest that adverse effects may occur in users that utilize refill fluids with higher concentrations of VG or operate their devices at high voltages and may also contribute information to future studies on multivariable models.
**Catherine Ho, Neuroscience**  
*Faculty Mentor: Margarita Curras-Collazo, Cell Biology and Neuroscience; Frances Sladek, Cell Biology and Neuroscience*  
Soybean Oil High Fat Diet Reduces Hypothalamic Oxytocin Immunoreactivity

It is well established that the intake of fatty foods induces obesity, although relatively little attention is given to the type of fat. Male mice fed a high-fat diet (HFD) rich in saturated fat had significantly less weight gain, adiposity, glucose intolerance and fatty liver as compared to mice fed a high-fat diet containing soybean oil (SO), rich in the polyunsaturated omega-6 fatty acid linoleic acid (LA-HFD) or a diet rich in a genetically modified, low LA soybean oil (PL-HFD). Both LA-HFD and PL-HFD also have similarly higher levels of the phytosterol, stigmasterol, than HFD. The adverse effects of SO may be mediated, in part, by brain oxytocin, although this has not been studied. Oxytocin is anorexigenic and mouse models of obesity show reduced brain Oxt. We examined the effect of SO diet on oxytocin. Male C57BL/6N mice were fed for 17-27 weeks either vivarium chow (VC) or one of 4 iso-caloric diets: HFD (coconut oil), LA-HFD (SO), PL-HFD (GM SO) or Stigma-HFD (coconut oil with same amount of stigmasterol as LA- and PL-HFD). Immunoreactivity (IR) to an antibody specific for oxytocin-neurophysin in the paraventricular nucleus was markedly lower in LA-, PL- and Stigma-HFD groups relative to HFD and VC. For the supraoptic nucleus a similar pattern was observed except that oxytocin IR in PL-HFD was not reduced (n=5-6 experiments, 3-5 animals per group). Our findings demonstrate that the stigmasterol can decrease paraventricular oxytocin and may help explain the obesity and diabetic propensity associated with a diet rich in SO.

**Christy Hoong, Neuroscience**  
*Faculty Mentor: Christiane Weirauch, Entomology*  
Big Head, Little Head: Tracing the evolution of exaggerated head shapes in *Nannocoris* Reuter (Hemiptera: Schizopteridae)

Head morphology in the minute litter bug, genus *Nannocoris* Reuter 1891 shows dramatic variation between species. The genus consists of 12 described species, but numerous species especially from the Neotropics remain to be discovered and described. Evolutionary relationships amongst species in this genus are unknown and it is unclear where in the phylogeny and how many times exaggerated head shapes have evolved. We here use the first molecular phylogenetic hypothesis of *Nannocoris* and outgroups and trait reconstruction analyses to answer these questions. We extracted DNA from specimens of *Nannocoris* that represent the range of head shapes amongst described and undescribed species. Phylogenetic hypotheses were generated based on maximum likelihood and parsimony optimality criteria. *Nannocoris* is recovered as monophyletic, and the first hypothesis on species-level relationship is presented. Ancestral state reconstruction shows that the greatly elongated head shape found in certain evolved multiple times within the group.
Elena Kozlova, Neuroscience  
Faculty Mentor: Margarita Curras-Collazo, Cell Biology and Neuroscience  
Exploring Brain Gene Markers for Neurobehavioral Deficits Produced by Developmental Exposure to Indoor Flame Retardants

Autism Spectrum Disorder (ASD) is characterized by social and behavioral deficits emerging during development. Genetic heritability alone cannot account for an epidemic-like increase in ASD, suggesting the possible contribution of environmental factors. Polybrominated diphenyl ethers (PBDEs), flame-retardants added to consumer products, have neurotoxicological effects and may increase susceptibility to ASD. Our lab investigated genes that serve as markers in forebrain social circuits. Behavioral testing identified that DE-71 impairs social recognition ability in male mice. Preliminary data indicates reduced gene expression of AVP (Avp), oxytocin receptor (Oxtr) and the PACAP-specific receptor (PAC1R; Adcyap1r1) in the amygdala (AMG) of PBDE-dosed mice showing social behavior deficits. The current objective is to examine correlative changes in gene expression in other socially relevant brain regions. We hypothesize that PBDEs alter the gene expression in AMG, lateral septum (LS) and medial preoptic area (MPO). Another cohort of C57BL/6 dams that were dosed for 10 weeks (pre-conception: 4 weeks; gestation: 3 weeks; lactation: 3 weeks) has been generated. Dosing consisted of low dose (0.1 mg/kg/d), high dose (0.4 mg/kg/d), or corn oil vehicle (control) via ingestion of infused corn flakes. Flash frozen brains will be cut into 200μm sections using a cryostat. Micropunchers constructed with methodology designed and optimized in our lab will be used to collect micropunches of selected brain regions: AMG, MPO and LS. RNA will be isolated using a Micro-RNeasy kit (Qiagen) and analyzed with quantitative PCR. The findings may provide new targets of PBDEs relevant to neurodevelopmental abnormalities found in ASD.

Julia Krum, Neuroscience  
Faculty Mentor: Richard Cardullo, Biology  
Raymond-Tan Tran, Neuroscience and Adrianne Blackwood, Creative Writing  
Audeamus Multidisciplinary Journal

Audeamus is an eclectic, multidisciplinary journal that publishes anything reproducible on paper, from research papers to fiction stories to comic strips. From 2007-2016, we were the only UC-wide Honors journal. The word Audeamus is Latin for “Let us dare” and, in recognition of our tenth edition and our desire to expand our readership, next year we are “daring” to transform from a UC-wide Honors journal to a National Honors journal—opening submissions to any undergraduate in the United States. Although a UC Riverside University Honors Counselor advises Audeamus, it is primarily student-run; the editorial board is made up of University Honors undergraduates at UC Riverside who select and edit the submissions and design the journal themselves. Throughout the past ten years, the Audeamus editorial board has succeeded in publishing exemplary journals with limited funding; the journal continues to strive to serve as a platform for publishing original and innovative research and creative projects. Our methods for organizational structure and publishing process, from advertising to reviewing submissions to publication, will be outlined in our presentation.
RNA interference (RNAi) is critical for silencing viruses in animals and plants including humans, mice, flies and C. elegans. Flock House virus (FHV) virus transgene was the first to be used to infect C. elegans by Dr. Ding's group at UCR, and the gene expression is silenced by RNAi in C. elegans. Since almost all RNAi and RNAi-related processes including miRNAs were first identified in C. elegans, this organism serves as a powerful model system to study RNAi-related processes including virus silencing. There are many existing genetic and biochemical tools available in C. elegans which makes it a very convenient and robust system to study the functions of RNAi in vivo. Although many genes in RNAi-mediated virus silencing in C. elegans have been identified, many aspects of the silencing process remains unknown, including how the virus is detected, and why some viruses only infects a few specific cells. We have collaborated with Dr. Ding's lab and used genetics screen to obtain several RNAi mutants which displayed increased levels of FHV transgene expression, a phenotype of RNAi-deficiency in virus silencing. In this project we used genetics to exclude the known RNAi mutations, thus shortening the list of the candidate genes. We will analyze the high-throughput sequencing data to identify the mutated genes in these mutants and examine how they are involved in silencing viruses.

Diego Novoa, Chemical and Environmental Engineering
Faculty Mentor: Sharon Walker, Chemical/Environ. Engineering
Environmental Impacts of Titanium Dioxide Through a Model Colon And Septic Tank System

Nanomaterials are being studied in application to environmental engineering for both natural and engineered water systems. Understanding the toxicological impacts of these materials will aid in maximizing these water systems. Increasing the water quality of septic tank systems through the use of nanomaterials would allow for the recycling of the effluent to a standard that would allow for reuse of the water without the need of an intermediate step of a wastewater treatment process. A model colon and septic tank system is being used to study the effects of titanium dioxide (TiO₂) through the septic tank system and its effects on the microbial community of the septic tank. To date, extensive control experiments have been conducted to characterize the physical, chemical, and biological conditions in the septic tank system with the absence of TiO₂. Ongoing experiments will include introducing food and industrial grade TiO₂ through the colon. Water quality tests and bacteria characterization will be done to determine the implications of TiO₂. Future work will involve exposing the effluent of the secondary chamber of the septic tank to an ultraviolet light source to induce photocatalytic activation of the TiO₂ particles. It is anticipated that the presence of TiO₂ will lead to photocatalytic breakdown of organics in the effluent. This additional ultraviolet induced reaction may be used to optimize the water treatment process in the septic tank system at residential and commercial locations.
Ranier Rivera, Biochemistry
Faculty Mentor: Thomas Morton, Chemistry
Examination of Potential $i$-Motif Binding Candidates

Many DNA sequences of oncogenes or their promoters contain cytosine-rich and guanine-rich strands. The $i$-motif and G-quadruplex are single stranded secondary structures made from cytosine and guanine rich strands, respectively. The $i$-motif is composed of hemiprotonated cytosine dimers that adopt a parallel connection with an inverse topology. In vitro $i$-motifs are easily made, characterized, and controlled by different environmental conditions. Evidence for the $i$-motif in vivo has yet to be discovered and has been far less investigated compared to the complementary G-quadruplex. Because the pKa of cytosine is 3 units lower than physiological pH, it is an open question whether the $i$-motif can exist under physiological conditions. However, evidence of the $i$-motif up to pH 7 has been reported, suggesting that it might not be absent in vivo. This research project involves the examination of several small organic compounds capable of binding to the $i$-motif. Binding of these molecules may allow for detection of the $i$-motif and suppression of DNA processes, such as transcription, via hindrance of Topoisomerase I. $N,N$-Dihydroxybenzamidines, Aplysinopsin, Noraplysinopsin, and Guanylated Cytosine and isocytosine derivatives have been synthesized so as to explore their interactions with the $i$-motif. Different intermolecular forces, such as base-stacking or hydrogen-bonding, may drive these interactions. Characterizing binding to the $i$-motif has been monitored with UV/Vis spectroscopy, Circular Dichroism spectroscopy, and Cell Culture Experiments. These experiments offer insight about the stability of the complex, where and how small molecules bind to the $i$-motif, and the effectiveness of these compounds as potential drug candidates.

Austen Trainer, Psychology
Faculty Mentor: Elizabeth L. Davis, Psychology
Adam McDonald, Angela A. Sillars
Parents Overestimate Children’s Behavioral and Cognitive Emotion Regulation Strategy Repertoires

Emotion regulation (ER) strategy repertoire describes the number of strategies children are able to use to modulate their emotions. Although parents can accurately predict their children’s behavior (Parrish et al., 2007), they are less accurate when asked to assess children’s cognitive and emotional states (Lagattuta et al., 2012). Therefore, we predicted that parents would overestimate children’s repertoire of behavioral ER strategies (e.g., seeking social support), but underestimate children’s repertoire of cognitive ER strategies (e.g., thinking positively). Children ($N=186$; 96 girls; ages 3-11) came to the lab with a parent, and were asked to remember and describe times they had felt sad, scared, or angry. They were also asked what they had done to help themselves feel better in each situation; responses were coded as ER strategies. Parents were given a list of ten possible ER strategies and selected those that their children had ever used in response to sad, scary, and angering events. Paired t-tests were used to compare children’s and parents’ reports of children’s ER strategy repertoire. As predicted, parents overestimated children’s repertoire of behavioral strategies, $t(175)=14.72$, $p < .001$, $d=1.52$. Contrary to prediction, parents overestimated children’s cognitive strategy repertoire, $t(175)=7.07$, $p < .001$, $d=.69$. These results did not differ by children’s age or the emotion being regulated. Results suggest that while parents overestimate the number of behavioral and cognitive strategies that children are able to use, parents do understand that children use more behavioral than cognitive strategies, $t(177)=22.21$, $p < .001$, $d=.91$. 


Parents shape their children’s developing emotion regulation (ER) skills through emotion socialization (ES; Denham et al., 2003). Problem-focused reactions (PFR; problem-solving methods to modify the stressor) and emotion-focused reactions (EFR; regulating negative emotions by substituting them with another) are types of ES that support ER development. Children who participate in activities that incorporate both exercise and character development show improvement in executive functioning, a key correlate of ER, suggesting that participation in team sports may support ER (Diamond, 2012). We hypothesized that sports would support children’s emotion regulation, and parents would provide less PFR and EFR as a result. 177 parents reported on their use of PFR and EFR on the Coping with Children’s Negative Emotions Scale (CCNES; Fabes, et al., 1990) and reported on children’s (ages 4-11, $M=7.71$, $SD=2.28$) participation in sports. First, we ran t-tests to look for gender differences in parent provision of these reactions; results were non-significant. We ran two ANCOVAs to test for main effects of gender and sports participation, and their interaction, with age covaried. Parents provided less PFR for children who played sports ($M=5.65$, $SE=.09$) than non-players ($M=5.93$, $SE=.09$), $F(1,172)=3.12$, $p=.028$, $\eta^2_p=.028$. They also provided less EFR for children who played sports ($M=5.54$, $SE=.10$) than for non-players ($M=5.90$, $SE=.10$), $F(1,172)=6.50$, $p=.012$, $\eta^2_p=.037$. Results indicated that sports may support children’s ER skills, though how exactly ER is influenced by sports needs to be further elucidated. Future studies should investigate how ER varies across children who participate in sports to varying degrees.
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