34th ANNUAL CENTRAL CALIFORNIA RESEARCH SYMPOSIUM

PROCEEDINGS OF THE 2013 SYMPOSIUM

Convened on

Thursday, April 25, 2013

in the

University Business Center

California State University, Fresno

34th ANNUAL CENTRAL CALIFORNIA RESEARCH SYMPOSIUM

PROCEEDINGS

Sponsoring Institutions

California State University, Fresno

University of California, San Francisco
Fresno Medical Education Program

California School of Professional Psychology at Alliant International University

Fresno City College

American Chemical Society
San Joaquin Valley Section

Educational Employees Credit Union

Convened in the *University Business Center*
on the campus of

California State University, Fresno

Thursday, April 25, 2013

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PREFACE

Welcome to the *34th Annual Central California Research Symposium*.

From its inception, the purpose of this symposium has been to bring together investigators, students, and faculty from a variety of disciplines to share the results of their scholarly work. The continuation of these activities in the Central Valley is encouraged by this opportunity for exchange. We hope that all participants will gain new insights from this experience and that learning about the interests of other scholars will enrich their academic journey.

Abstracts for this year's event were reviewed and selected for presentation by the Symposium Coordinating Committee. In this review, the committee looked for a well-written abstract on a topic of scholarly merit.

This year *UCSF Fresno* has provided two cash awards for the best symposium presentations. *California School of Professional Psychology at Alliant International University* has provided one cash award for the best poster presentations by a student. The *American Chemical Society, San Joaquin Valley Section* has sponsored a cash award for best science presentation. The *Office of the Provost* at *California State University, Fresno* has provided a cash award for best undergraduate poster and best undergraduate oral presentation. The *Educational Employees Credit Union* has sponsored an award for best undergraduate presentation in Mathematical Sciences. The Davin Youngclarke Memorial Award, inaugurated in 2008 and sponsored by the *Office of Research and Sponsored Programs* at *California State University, Fresno*, is awarded to the presenter who best addresses a community issue with use of sophisticated and sound research methods. In addition to providing three cash awards, the *Office of Research and Sponsored Programs* at *California State University, Fresno* has planned and administered the symposium in cooperation with these institutions.

Presenters and guests are invited to a social hour following the concluding address and student awards ceremony, which will be held in the Alice Peters Auditorium in the University Business Center.

These proceedings are published as a permanent record of the work presented. We hope they will stimulate ideas for future work and subsequent symposia.

PLANNING COMMITTEE

UNIVERSITY OF CALIFORNIA, SAN FRANCISCO
FRESNO MEDICAL EDUCATION PROGRAM

Donna Hudson, Ph.D.
Symposium Co-Chairperson

Loren Alving, M.D.
Paul K. Mills, Ph.D.
Michael Peterson, M.D.
Joan Voris, M.D.
Kent Yamaguchi, M.D.

CALIFORNIA STATE UNIVERSITY, FRESNO

Thomas McClanahan, Ph.D.
Symposium Co-Chairperson

Saeed Attar, Ph.D.
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Alam Hasson, Ph.D.
Ramakrishna Nunna, Ph.D.
Karl Oswald, Ph.D.
Adnan Sabuwala, Ph.D.
Brian Tsukimura, Ph.D.

CALIFORNIA SCHOOL OF PROFESSIONAL PSYCHOLOGY

Siobhan O'Toole, Ph.D.

FRESNO CITY COLLEGE

Carl Johansson
Rick Stewart

EVENT AND PROCEEDINGS COORDINATORS

Millie C. Byers & Maral Kismetian
California State University, Fresno

FRESNO STATE
Discovery. Diversity. Distinction.

April 2013

MESSAGE TO ALL RESEARCH SYMPOSIUM PARTICIPANTS

California State University, Fresno is pleased to serve as the host campus for the 34th Annual Central California Research Symposium.

This symposium continues to provide a unique forum for the presentation and discussion of scholarly activities of interest to researchers throughout the Fresno region. The program for the symposium reflects our commitment to promoting interdisciplinary research, encouraging scholarly exchange on theoretical and pragmatic topics, and providing an opportunity for both students and research scholars to share common interests. Cooperative efforts such as these benefit the individual institutions involved and ultimately the public that we all serve.

We appreciate your participation in this symposium, and it is my pleasure to extend my warmest welcome to our campus.

Sincerely,

John D. Welty
President

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California State University, Fresno
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WELCOME

34th Annual Central California Research Symposium
April 25, 2013

It is my pleasure to welcome each of you to the 34th Annual Research Symposium. UCSF Fresno is very committed to conducting and supporting research, and this Symposium offers a wonderful venue to be able to review some exemplary local research projects. Every year I am impressed anew by the diversity and quality of the research that is ongoing in the Central Valley and it is exciting to witness the richness of academic activity that is evidenced here today. The studies represented here will lead to an improved quality of life for our communities, something we all care deeply about.

Whether you are attending today as a participant or a visitor, I believe you will feel challenged and energized as you explore the research projects on display.

Sincerely,

Joan Voris, MD
Associate Dean, UCSF Fresno Medical Education Program
Assistant Clinical Professor of Pediatrics, UCSF

CSPP CALIFORNIA SCHOOL OF PROFESSIONAL PSYCHOLOGY
ALLIANT INTERNATIONAL UNIVERSITY

April 10, 2013

Dear Symposium Participants,

The California School of Professional Psychology (CSPP) at Alliant International University is proud to be a sponsor of the 34th Annual Central California Student Research Symposium.

As the largest trainer of doctoral level psychologists in California with a focus on applied research in behavioral sciences and a commitment to international and multicultural education, CSPP is pleased to support the next generation of researchers in central California.

This annual symposium celebrates the contributions of a diverse range of disciplines, underscoring the value of research in improving professional services, influencing policy and changing lives.

Students, we applaud your creativity and dedication and we look forward to learning more about the research you are conducting,

Sincerely,

Morgan T. Sammons, PhD, ABPP
Dean

Office of the Dean • 1 Beach Street • San Francisco CA 94133 • 415.955.2047 • www.alliant.edu/cspp

Plenary Session

University Business Center
Auditorium, Room 191

9:00 a.m. ***Protection against Disulfide Stress Requires Genome-wide Involvement in Mycobacterium smegmatis***
Ruzan Orkusyan, Mamta Rawat, Ph.D.

9:30 a.m. ***Dissemination of Microprocessor Courses through Classroom and Interactive Cyber-Enabled Technologies***
Abhijit Suprem, Reza Raeisi, Ph.D.

9:45 a.m. ***Women as Social Interventionists:Fanny Burney "Brief Reflections Relative to the Emigrant French Clergy"***
Meghan Anderson, Maritere López, Ph.D.

10:00 a.m. ***Embedding Cycles in Projective Spaces***
Elaina Aceves, David Heywood, Ashley Klahr, Oscar Vega, Ph.D.

10:00 a.m. – 12:00 a.m. **Poster Session I**
Gottschalks Gallery

12:30 – 2:30 p.m. **Poster Session II**
Gottschalks Gallery

1:00 – 2:30 p.m. **Concurrent Oral Presentations**

2:45 p.m. **Concluding Address**
Why Mentors Matter?
Honora Chapman, Ph.D.
Auditorium, Room 191

3:00 p.m. **Student Award Presentations and Social Hour**
Gottschalks Gallery

Concurrent Session A

University Business Center
Auditorium, Room 191

10:45 a.m. ***Temperature Dependent Reaction Mechanisms of Cl-Atom Initiated Oxidation of Select Ketones***
Aroob Abdelhamid, Lucas Algrim, Alam Hasson. Ph.D.

11:00 a.m. ***Kinetic and Mechanistic Study of Isoprene 4,1-hydroxynitrate***
Nick Vizenor, Laxmi Ramya Addala, Catalina Olea, Srikar Middala, Kennedy Vu, Lucien Nana, Austen Scruggs, Alvaro Sosa, Santanu Maitra, Max Stephenson, Michelle Boyce, Geoffrey Tyndall, John Orland, Alam Hasson, Ph.D.

11:15 a.m. ***Effects of β-N-oxalylamino-L-alanine (BOAA) on the viability and locomotory behavior of Drosophila melanogaster***
Riann Egusquiza, Joy J. Goto, Ph.D.

11:30 a.m. ***Measurement of Select Pollutants Emitted from Dairy Operations***
Austen Scruggs, Sean Campbell, Catalina Olea, Alvaro Sosa, Lucien Nana, Kennedy Vu, Aroob Abdelhamid, Srikar Middala, Alam Hasson, Ph.D.

11:45 a.m. ***Competition of β-Methylamino-L-alanine (BMAA) with Serine and other Natural Amino Acids in Drosophila melanogaster***
Jonathan Rochin, Joy Goto, Ph.D.

12:00 p.m. ***Gadolinium Nanoparticle Synthesis Using AOT-Methanol-Hexane Reverse Micelles***
Ryan Fukuda, Maya Castro, Pei-Chun Ho, Ph.D. Melissa Golden, Ph.D., Saeed Attar, Ph.D., Dennis Margosan

12:15 p.m. ***Mechanical Properties of Stabilized Tire Derived Aggregate***
Matthew McCleod, Jesus Larralde-Muro, Ph.D.

2:45 p.m. **Concluding Address**
Why Mentors Matter?
Honora Chapman, Ph.D.
Auditorium, Room 191

3:00 p.m. **Student Award Presentations and Social Hour**
Gottschalks Gallery

Concurrent Session B

University Business Center
Room 192

10:45 a.m. ***The Category of sl(3) webs***
Serena McTeer, Jamie Peabody, Karen Willis, Carmen Caprau, Ph.D.

11:00 a.m. ***Invariants for Spatial Graphs***
Elaina Aceves, Jennifer Elder, Carmen Caprau, Ph.D.

11:15 a.m. ***Digits of Powers of Numbers in an Arbitrary Base***
Benjamin Wright , Oscar Vega, Ph.D.

11:30 a..m. ***A State Model for the SO(2n) Kauffman Polynomial***
David Heywood, Dionne Ibarra, Carman Caprau, Ph.D.

11:45 a.m. ***Pinning fronts in advection-reaction-diffusion systems: a dynamical systems approach***
John Li, Kevin Mitchell, Ph.D.

12:00 p.m. ***Redesigning an AC Magnetic Susceptometer for the Measurements of Smaller Samples***
Andres Felipe Vargas Quintana, Ryan Fukuda, Smitha Sunny, Pei-Chun Ho. Ph.D.

12:15 p.m. ***Relaxation Calorimetry to Measure Heat Capacities of Pr1-xNdxOs4Sb12 Samples***
Hank A. Anderson, Ulises I. Urbina, Pei-Chun Ho, Ph.D., M. Brian Maple, Tatsuya Yanagisawa

2:45 p.m. **Concluding Address**
Why Mentors Matter?
Honora Chapman, Ph.D.
Auditorium, Room 191

3:00 p.m. **Student Award Presentations and Social Hour**
Gottschalks Gallery

Concurrent Session C

University Business Center
Room 194

10:45 a.m. ***Great Power, Great Responsibility: a Multiethnic Spider-Man***
Manuel Jacquez, Clare Wall, Ph.D.

11:00 a.m. ***The Character of the Fox from Aesop's Fables to the Medieval and Seventeenth Century Fables and his Reincarnation Today***
Alicia Valle, Rose Marie Kuhn, Ph.D.

11:15 a.m. ***Pregnancy and Childbirth: Hmong Beliefs and Practices in the United States***
Nara Xiong, Mai Vang Lor, Kao-Ly Yang, Ph.D.

11:30 a.m. ***Hmong Oral Literature For Teaching***
Pa Houa Xiong, Kao-Ly Yang, Ph.D.

11:45 a.m. ***Social Economic Status, Race, and Heart Disease***
Berty Arreguin, Deborah Helsel, Ph.D.

2:45 p.m. **Concluding Address**
Why Mentors Matter?
Honora Chapman, Ph.D.
Auditorium, Room 191

3:00 p.m. **Student Award Presentations and Social Hour**
Gottschalks Gallery

Concurrent Session D

University Business Center
Auditorium, Room 191

1:00 p.m. ***Identifying potential growth-perturbing genes induced by Escherichia coli CRP* mutants***
Yevgeniy Mordvinov, Sanjiva Gunasekara, Joel Curiel, Hwan You, Ph.D.

1:15 p.m. ***Generating Specific Neural Subtypes Using Direct Reprogramming***
Christa D. Caneda, Rachel Tsunemoto, Kristin K. Baldwin, Ph.D.

1:30 p.m. ***A comparison of traditional grass lawn and waterwise gardens in a semi-desert urban landscape***
Amer Naik, Steven Jones, Crystal Espindola, Michael Flores, Paola Guerrero, Kaberi Kar Gupta, Ph.D.

1:45 p.m. ***Molecular basis of the reversed allostery of the Xanthomonas axonopodis Clp***
Amanda Foster, Hwan Youn, Ph.D.

2:00 p.m. ***Nanopatterning Wrinkles into Biodegradable Materials for Aligning Heart Cells***
Stacey Van, William Turner, Ph.D., Kara E. McCloskey, Ph.D.

2:15 p.m. ***Using New York Cities 2009 Historical Traffic Data to Develop an iPhone Routing Application***
Ixtli-Nitzin Sanchez, Eugene Fiorini, Ph.D.

2:45 p.m. **Concluding Address**
Why Mentors Matter?
Honora Chapman, Ph.D.
Auditorium, Room 191

3:00 p.m. **Student Award Presentations and Social Hour**
Gottschalks Gallery

Concurrent Session E

University Business Center
Room 192

1:00 p.m. ***Microbial Verification of Retail Milk "Best By" Date***
Tyler Davis, Boya Liu, and Amedalhi Papias, Erin Dormedy, Ph.D.

1:15 p.m. ***A Linked Series of Laboratory Exercises in Clinical Biochemistry for Dietetics Students: Metabolic Syndrome Diagnosis***
Hector Diaz, Kasuen Mauldin, Ph.D.

1:30 p.m. ***Association between Gestational Weight Gain & Body Mass Index in Later Life: A Review of the Literature***
Jessica Ponce, Deepika Goyal, Ph.D.

1:45 p.m. ***Examining Attitudinal Familism and Academic Self-Efficacy in Mexican-American College Students***
Armando Ayala, Mark Van Selst, Ph.D.

2:00 p.m. ***The Relationship Between American Indian Ethnic Identity and Postsecondary Academic Experiences***
Bethany Richmond, Clifton Oyamot, Ph.D.

2:15 p.m. ***An Exploratory Study on Migrant Farm Workers' Injury and Access to Health Care***
Emiliano J. Beltran, Martha Vungkhanching, Ph.D.

2:45 p.m. **Concluding Address**
Why Mentors Matter?
Honora Chapman, Ph.D.
Auditorium, Room 191

3:00 p.m. **Student Award Presentations and Social Hour**
Gottschalks Gallery

Concurrent Session F

University Business Center
Room 194

1:00 p.m. ***Lifting the Western Veil: A Study of Algerian Women's Involvement in the Policy Making System***
Merima Tricic, Lejla Tricic, Ph.D.

1:15 p.m. ***Sensationalism and Morality in Seventeenth Century English Witch-Trial Pamphlets***
Ashlee Small, Maritere Lopez, Ph.D.

1:30 p.m. ***Intercultural Competence of Business Students***
Dina Pavic, Priscilla Chaffe-Stengel, Ph.D., Rudy Sanchez. Ph.D.

1:45 p.m. ***Exploring Entrepreneurial Individuals' Intentions to Adopt Technology***
Gurbhupinder Singh Sahota. Eric Liguori, Ph.D.

2:45 p.m. **Concluding Address**
Why Mentors Matter?
Honora Chapman, Ph.D.
Auditorium, Room 191

3:00 p.m. **Student Award Presentations and Social Hour**
Gottschalks Gallery

Poster Session I — University Business Center
10:00 a.m. until 12:00 p.m. — Gottschalks Gallery

Authors will be available for questions from 10:00 a.m. until 12:00 p.m.

(1) ***Estradiol Increases PSD-95 Expression in Striatal Neurons***
Jillian M. Millares, Paul Mermelstein, Ph.D.

(2) ***Identification and Relevance of Stem Cell Markers in Pancreatic Cancer Cell Lines***
Lulu Wong, Alex Tran, Megha Kumar, Kristin Herring, Jason Bush, Ph.D.

(3) ***Obtaining natural substrates of Caspases via N-terminomics***
Andres J. Nevarez, Alex Tran, Guy Salvesen, Scott Snipas, Jason Bush, Ph.D.

(4) ***Authentic research experiences in undergraduate courses improve quantitative reasoning skills***
Joshua M. Scales, Kathleen M. Barman, Ulrike Müller, Ph.D.

(5) ***Post-embryonic Development of Legs and Wings in the Golden Campine Chicken***
Alexander Nardocci, Erika Porras, Amir Arasteh, Lori Ong, Kyle Besecker, Ulrike Müller, Ph.D.

(6) ***Determination of escape trajectories in larval zebrafish to horizontal and vertical predator simulations***
Darius Khorshidchehr, Nolan Avery, David Ryan, Otto Berg, Karla E. Feitl, Matthew J. McHenry, Ulrike K. Müller, Ph.D.

(7) ***Development of Electrospun Nanofibers to Promote Osteogenic Differentiation of Human Adipose Derived Mesenchymal Stem Cells***
Harry Calvin Cramer III, Alexis Fernandez, Ramesh Munnangi, Anand Gadre, Ph.D.

(8) ***Influence of Watering Regime and Vegetation on Urban Arthropod Numbers and Diversity***
S. Michael Flores, J.V.H. Constable, P. Guerrero, P.R. Crosbie, Ph.D., K. Kargupta, F.E. Schreiber, Ph.D.

(9) ***Brain development in hatchery-reared rainbow trout, Oncorhynchus mykiss: offering a variety of rearing environments vs. adding structural complexity***
Alexandra Krogman, Steve Blumenshine, Ph.D.

(10) ***Calcium Induced Differentiation of Mouse Embryonic Stem Cells into Cardiomyocytes***
Jose Vera,Megha Kumar, Mina Al-Shahed, Jason Bush, Ph.D.

(11) ***A reverse genetics approach to characterize the function of Vlp, a putative transcription factor, from Pseudomonas aeruginosa***
Geil Merana, Joel Curiel, Nicholas Quitoriano, Yevgeniy Mordvinov, Joy J. Goto, Ph.D, Hwan Youn, Ph.D.

(12) ***Differential decline in locomotory behavior of Drosophila with ALS-induced neurodegeneration***
Nicole Shinkawa, Prasong J Mekdara, Nalong T Mekdara, Joy J Goto, Ph.D., Ulrike K Muller, Ph.D.

(13) ***Progress towards tagging Phytopthora capsici resistance genes in pepper using a candidate gene strategy***
Deanna Arsala, Davis Cheng, Brennan Fagan, James P. Prince, Ph.D.

(14) ***Elevated CO2 has minimal effect on vegetatively-propagated giant reed (Arundo donax) during the establishment phase***
Katrina Steinhauer, Anil Shrestha, Ph.D.

(15) ***Will Reduced Water and Nitrogen inputs increase weed competition in fresh market tomatoes?***
Jorge Angeles, Anil Shrestha, Ph.D.

(16) ***Development of small chalcone and chalcone-like organic molecules for apolipoprotein E (apoE) modulation through structure-activity relationship (SAR) study***
Martin A. Leon, Emilio L. Cardenas, Jhonnathan Brawley, Pooja P. Patel, Teresa Nguyen, Justin de Jesus, Nilay V. Patel, Ph.D., Santanu Maitra, Ph.D.

(17) ***Design and Synthesis of Heterocyclic Analogs of Curcumin as Anticancer Agents***
Nawras Samaan, George S Mikhail, Qiao-Hong Chen, Ph.D.

(18) ***Synthesis of Thiazole-containing Curcumin Analogs as Anticancer agents***
Ali M Hussain, Qiao-Hong Chen, Ph.D.

(19) ***Steric hindrance and restricted amide rotation: NMR studies of substituent effects in ortho- DEET analogs as a model system***
Sal Vazquez; Elizabeth Grossman, Quyen A. Nguyen, Kalyani Maitra, Ph.D., Viswanathan V. Krishnan, Ph.D., Santanu Maitra, Ph.D.

(20) ***Local and Long range dynamics of intrinsically disordered proteins (IDP) using experimental nuclear Overhauser effect spectroscopy (NOESY)***
Ashley M. Mendoza, Krish Krishnan, Ph.D.

(21) ***The effects of β-N-methylamino-L-alanine (BMAA) on the proteolytic processing of Amyloid Precursor Protein to Amyloid-β Peptide***
Luke Vera, Swetha Reddi, Joy Goto, Ph.D.

(22) ***Drosophila melanogaster mitochondria as a marker of oxidative stress in ALS-PDC***
Moriah Beltz, Kang Xiong-Hang, Joy J. Goto, Ph.D.

(23) ***Investigation of the molecular nature of intrinsically disordered proteins (IDP) using solvent perturbation studies***
Wafaa Araim, Krish Krishnan, Ph.D.

(24) ***Electrochemical and Spectroscopic Fundamental Study of C60 and C70 Fullerene in Various Condition***
Akiteru Ikeda, Randy Espinoza, Jai-Pil Choi, Ph.D.

2:45 p.m. **Concluding Address**
Why Mentors Matter?
Honora Chapman, Ph.D.
Auditorium, Room 191

3:00 p.m. **Student Award Presentations and Social Hour**
Gottschalks Gallery

Poster Session II
12:30 p.m. until 2:30 p.m.

University Business Center
Gottschalks Gallery

Authors will be available for questions from 12:30 p.m. until 2:30 p.m.

(1) ***The Effects of Guided Imagery on Balance in Older Adults***
Kari Johnson, Ashley Aliotti, Travis Brakeman, Peggy R. Trueblood, Toni Tyner, Leah Kidwell, Leslie Zarrinkhamen, Erica Prathaftakis, Peggy R. Trueblood, Ph.D., PT

(2) ***Establishing the Microbial Load on the Surface of Keys***
Alex Lopez, D. Shea Kilby, and Quang Trong, Erin S. Dormedy, Ph.D.

(3) ***Validation of At Home Cooking Methods in Reducing Enteric Pathogens in Ground Beef***
Chad Bower, Michael Handy, Macc Rigdon, Erin S. Dormedy, Ph.D.

(4) ***Beer Pong Sanitation***
Chee Her, Phillip So, Brandon Todd, Erin S. Dormedy, Ph.D.

(5) ***Arab Spring or Islamist Winter?***
Veronica Sester, William Reckmeyer, Ph.D.

(6) ***Deficits in Cognitive Executive Functions Were Not Observed in Heavy Marijuana Users***
Christleen Casem, Sandra Trafalis, Ph.D.

(7) ***Student Outcomes Associated with the Implementation of Positive Behavioral Interventions and Supports (PBIS) across California Central Valley Schools***
Ana Maravilla, Jason Immekus, Ph.D.

(8) ***The Role of Psychological Inflexibility in Body Image and Affect Disturbance***
Gabriela L. Alshafiem, Glenn M. Callaghan, Ph.D.

(9) ***Learning the Caregiver Role: Challenges and Coping Strategies of Hispanic Caregivers for Alzheimer's Disease Patients***
Erika Carrillo, Roberto Gonzalez, Ph.D.

(10) ***Evaluation of Contaminants in the Green Waste Stream in Fresno, California***
Nicole N. Hoke, Cory D. Robbins, Raquel A. Perez, Sergio Moreno Jr., Amber S. Olsson, Erika J. Mey, Mohan B. Dangi, Ph.D.

(11) ***Utilizing Multibeam Bathymetry and Geographic Information Systems (GIS) to Expand Our Mapping Ability of Potential Rockfish Benthic Habitats in the San Juan Islands, Washington***
Kayla Kelly-Slatten, Peter Van de Water, Ph.D.

(12) ***Analysis of Adipose Derived Human Mesenchymal Stem Cells Cultured on Electrospun Nanofiber Scaffolds Using Confocal Microscopy***
Selena Romero, Danielle Shults, Sahib Singh, Venu Polineni, Marwin Ko, Chi-Shuo Chen, Wei-Chun Chin, Anand Gadre, Ph.D.

(13) ***cancelled***

(14) ***Lightweight Aggregate Application as Backfill Material***
Bianca A. Rodriguez, Fariborz M Tehrani, Ph.D.

(15) ***Real-time Tuning of PID control gains in HVAC Systems***
Vu Dinh, Siyu Wu, Jian-Qiao Sun, Ph.D.

(16) ***Aerodynamics analysis of CSU, Fresno's Formula SAE racing car***
Ryan D. Pugh; The M. Nguyen, Ph.D.

(17) ***Inviscid flow models predict the physical limits of suction feeding in aquatic organisms***
Adrienne Olaivar, Matt Brown, Otto Berg, Ulrike Müller, Ph.D.

(18) ***Multi-physics idea in determining global simulation layer for the design and development of electrical generator to improve efficiency***
Steven M Siqueiros, Nitaigour Mahalik, Ph.D.

(19) ***Small-World Networks (SWN): Past, Present and Future***
Minh Le, Nitaigour Mahalik, Ph.D.

(20) ***MDX Supply***
Brett Williams, Nitaigour Mahalik, Ph.D.

(21) ***Design of a Torque Magnetometer***
Taylor McCullough-Hunter, Andres Felipe Vargas Quintana, Pei-Chun Ho, Ph.D.

(22) ***Synthesis and Characterization of Gadolinium Nanoparticles***
Maya Castro De La Torre, Ryan Fukuda, Pei-Chun Ho, Ph.D., Saeed Attar, Ph.D., Melissa Golden, Ph.D., Dennis A. Margosan

(23) ***Survival Analysis on Patients with Chronic Hepatitis B***
James Stinecipher, Lin Han, Ke Wu, Ph.D.

(24) ***The Linear Quandle Zp,q and the Torus Knot T(n,m)***
Pablo A. Flores, Larry Cusick, Ph.D.

2:45 p.m. **Concluding Address**
Why Mentors Matter?
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Auditorium, Room 191

3:00 p.m. **Student Award Presentations and Social Hour**
Gottschalks Gallery

Judges for Undergraduate Oral and Poster Presentations

Dr. Loren Alving	University of California, San Francisco
Dr. Carmen Caprau	California State University, Fresno
Dr. John Constable	California State University, Fresno
Dr. Stefaan Delcroix	California State University, Fresno
Dr. Kathleen Dyer	California State University, Fresno
Ms. Marie Fisk	California State University, Fresno
Dr. Tamas Forgacs	California State University, Fresno
Dr. Alam Hasson	California State University, Fresno
Dr. Donna Hudson	University of California, San Francisco
Ms. Susan Hughes	University of California, San Francisco
Ms. Shannon Hunter	University of California, San Francisco
Ms. Judy Kammerer	University of California, San Francisco
Ms. Grace Liu	California State University, Fresno
Dr. Thomas McClanahan	California State University, Fresno
Dr. Maria Nogin	California State University, Fresno
Mr. Rick Stewart	Fresno City College
Dr. Kent Yamaguchi	University of California, San Francisco

Moderators for Oral Presentations:

Mr. Doug Carey	California State University, Fresno
Dr. Daniel Griffin	California State University, Fresno
Dr. Tom McClanahan	California State University, Fresno
Dr. Jim Prince	California State University, Fresno
Dr. Ellen Shimakawa	California State University, Fresno

Presentations will be judged based on the following criteria and considerations:

- Merit, creativity, timeliness, and value to an audience of scholars not necessarily from the same discipline
- Authors are encouraged to present their work using terminology suitable for a multi-disciplinary audience
- Results of completed work, as well as work-in-progress, for which there is preliminary data

ORAL PRESENTATION ABSTRACTS

(IN ALPHABETICAL ORDER BY PRESENTING AUTHOR)

Aroob Abdelhamid, Alam Hasson, Ph.D.
aroobabdelha@mail.fresnostate.edu
Aroob Abdelhamid, Lucas Algrim, Alam Hasson, Ph.D.
California State University, Fresno
Department of Chemistry

Temperature Dependent Reaction Mechanisms of Cl-Atom Initiated Oxidation of Select Ketones

Due to the prevalence of carbonyl intermediates in many atmospheric oxidations of volatile organic compounds (VOCs), elucidating the mechanisms of carbonyl reactions is vital if we are to understand reactions in the atmosphere. Mechanisms of smaller carbonyls have been studied, but larger and branched carbonyls have not. Further, since the temperature of the atmosphere varies, it is also crucial to look at how the reaction mechanisms are affected by changing temperature. The mechanisms of 3 select ketones, namely 3-methyl-2-butanone, 3-pentanone, and 2,4-dimethyl pentanone, were investigated in their reaction with nitric oxide (abbreviated as MIPK, DEK, and DIPK, respectively). This study was done using a 142 liter reaction chamber to photolyze the reactants, and Fourier Transform Infrared Spectroscopy (FTIR) was used to analyze the products. The major reaction products observed from the reaction of DIPK are acetone, carbon dioxide and (in the presence of NOx) isobutyl peroxy acyl nitrate (PAN). The observed reaction products of MIPK are formaldehyde, acetaldehyde, carbon dioxide and (in the presence of NOx) peroxy acetyl nitrate. The main product from the reaction of DEK (in the presence of NOx) is acetaldehyde. Temperature was shown to not have a direct effect on reaction mechanisms.

Elaina Aceves, Oscar Vega, Ph.D.
ekaceves@mail.fresnostate.edu
Elaina Aceves, David Heywood, Ashley Klahr
California State University, Fresno
Department of Mathematics

Embedding Cycles in Projective Spaces

Our work builds from that of Dr. Vega, our mentor, along with his colleagues, Dr. Lazebnik and Dr. Mellinger about the embedding of graphs in finite projective planes. Our work focuses entirely on the embedding of cycles into projective spaces. Note that in these finite spaces, all lines with the same slope will meet at a point at infinity, so no parallel lines exist as in standard practice. Our first result is the embedding of a cycle in PG(2,q), a 3-dimensional space of order q. We then partition PG(3,q), a 4-dimensional space of order q, into PG(2,q)s. Using our result of the length of a cycle in PG(2,q), we embed our cycles in each of the PG(2,q)s and are able to piece the cycles together to form a longer cycle in PG(3,q). We also extend this process of partitioning the large space into smaller spaces to PG(n,q) where n is an arbitrary number. Thus for any projective space of the form PG(n,q) we can embed a cycle of length q^(n)+q^(n-1)-q^(n-2)-q^(n-3).

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Women as Social Interventionists:Fanny Burney "Brief Reflections Relative to the Emigrant French Clergy"

One of the most prominent and influential English novelists of the late eighteenth century, Fanny Burney was a brilliant recorder of English aristocratic and middle-class experiences. Though scholars have analyzed many of her letters and novels as commentaries on English culture and life at the turn of the eighteenth century, they have overlooked some major social and political aspects of her writings, particularly those evident in her 1793 pamphlet, "Brief Reflections Relative to the Emigrant French Clergy." In the pamphlet, Burney took on the role of social activist, pleading with the Ladies of Great Britain to aid the large number of destitute French clergymen fleeing France's Reign of Terror. In "Brief Reflections", Burney argued for the immediate relief of these men, a socially-conscious exercise she claimed the ladies of Great Britain were better equipped than Parliament to undertake, both because of women's greater empathy and the immediacy of their actions in the realm of charity. Through her pamphlet, I propose, Burney claimed for herself an untraditional authority, as an expert on upon the subject of the émigré clergy and as a voice for social action. To achieve this authority Burney played upon women's traditionally embraced domestic roles. In the process, she offered aristocratic and middle-class women the opportunity to empower themselves by appropriating an active socio-political role, taking her work from a mere reflection to a feminist call to action.

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Relaxation Calorimetry to Measure Heat Capacities of Pr1-xNdxOs4Sb12 Samples

Relaxation calorimetry is a technique used to determine the specific heat of various materials. Many strongly correlated electron materials exhibit interesting phenomenon such as superconductivity, magnetism, metal to insulator transitions, and structural transformations. With the specific heat data we can determine the temperature at which many of these phase transitions occur. The specific heat can also provide insight into the internal energy of a material, which includes properties such as entropy, electronic behavior, and lattice stiffness. By developing a better understanding of these properties, the strongly correlated electron materials can then be applied to new technology such as energy transfer and storage. The objective of our research is to develop calorimeters used to study the specific heat of rare earth compounds. PrOs4Sb12 is a filled skutterudite compound, which displays unconventional superconductivity at its critical temperature of Tc=1.85K. We are using Neodymium-doped samples with compositions in the form Pr1−xNdxOs4Sb12 in order to study the effect that ferromagnetism has on its superconductivity. In our lab we want to study the specific heat of these alloy systems in the high temperature range. Therefore, the relaxation calorimeter was built. In this presentation the construction and calibration of our calorimeter (by using a copper standard) and our recent measurements of specific heat of Pr1-xNdxOs4Sb12 (x = 0.25, 0.5, 0.75, 1) will be shown.

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Examining Attitudinal Familism and Academic Self-Efficacy in Mexican-American College Students

This study examined the relationship between Latino adolescent college students' (N = 93) endorsement of overall attitudinal familism, endorsement of specific attitudinal familism domains, and their self-reports of academic self-efficacy. This study also examined the domains of attitudinal familism that participants endorsed the most and the least. Attitudinal familism was measured as overall attitudinal familism and as four domains including familial support, familial interconnectedness, familial honor, and subjugation of the self for the family. Results did not indicate a significant relationship between participants' endorsement of overall attitudinal familism, including their endorsement of the four attitudinal familism domains, and their self-reported academic self-efficacy. In addition, findings indicated that participants significantly endorsed familial interconnectedness the most and familial honor the least compared to the other three domains. These findings contribute further to the literature about resources that may contribute to the academic success of Latino adolescent college students.

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An Exploratory Study on Migrant Farm Workers' Injury and Access to Health Care.

Title: An Exploratory Study on Migrant Farm Workers' Injury and Access to Health Care.

Background: Agriculture is among the most dangerous industries in the United States. Migrant farmworkers face numerous barriers to health care and many farmworkers lack health insurance. Migrant farmworkers are susceptible to chronic diseases and injuries. The nature of agricultural work puts farmworkers at risk of injuries and many times, they cannot afford to lose pay so they do not seek medical treatment for their injuries until it is unbearable. Migrant farmworkers face poverty, housing issues, and barriers to obtaining preventative care.

Methods: An interview guide strategy was used in this study. Hispanic college students 18+ years of age who speak English and whose parents are current migrant farmworkers were invited to participate in the study. Research questions focused on work-related injuries, health care, preventative care, and medical payment methods. For this study a migrant farm worker refer to individuals who travel 75 miles or more to do farm work in a single U.S. location and work within a 75-mile radius of the location. Work-related injury will include any injury to the farm worker that occurred on a farm they were working on in the U.S. or while traveling to or from a farm for work in the U.S… Any amount of time rendering the worker unable to work or rendered the worker unable to work as hard as he or she normally did will be included in the work-related injury definition.

Results: Findings from the interview will be discussed as well as study limitations.

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Generating Specific Neural Subtypes Using Direct Reprogramming

Transdifferentiation techniques may be used to convert somatic cells into a variety of cell types, including those of the nervous system. Although neural circuits contain an immense diversity of cell types, as of yet there has been limited success in the transdifferentiation of somatic cells into specific neuronal subtypes. This brings into question whether direct reprogramming methods may be used to generate all or only a subset of neuronal cell types. We hypothesize that it is possible to use direct reprogramming to generate neurons enriched for a new specific subtype, the mitral/tufted (M/T) cells of the mammalian olfactory bulb. We applied two strategies to test this hypothesis. First, we tested sets of mouse transcription factors found in M/T neurons for their ability to convert fibroblasts into MT neurons in vitro. Second, we tested whether these factors could convert endogenous neural precursors destined for a non-M/T neuron cell fate into M/T neurons in vivo. In both strategies, the identity of the reprogrammed cells was evaluated by immunofluorescence analysis. We have identified a new combination of transcription factors that can convert fibroblasts into induced neurons which express numerous neuronal and M/T cell markers in vitro and in vivo. These results support our hypothesis, suggesting that potential M/T cells can be generated by transdifferentiation of MEFs and other neurons. Future work will confirm these results by electrophysiology testing and optimize the efficiency of neural precursor reprogramming.

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A Linked Series of Laboratory Exercises in Clinical Biochemistry for Dietetics Students: Metabolic Syndrome Diagnosis

Background: Metabolic syndrome is clinically recognized as the presence of three out of five specific metabolic abnormalities. Metabolic syndrome is associated with an increased risk for cardiovascular disease. Evidence has linked postprandial hyperglycemia, from over-nutrition, to oxidative stress and oxidative stress to the development of diabetes, characterized by beta-cell failure, and increased cardiovascular disease risk.

Methods: A course curriculum was developed for dietetics students in an advance human nutrition laboratory course. The curriculum is a five week series of laboratory exercises. In each week, students will learn how to diagnose one of the five diagnostic criteria for metabolic syndrome. Students will use their own biological samples and learn about the biochemical mechanisms involved in every exercise.

Conclusion: The aim of this course curriculum is to educate dietetics students about the biochemical mechanism underlying and the clinical diagnosis of metabolic syndrome. Students will learn several bench-based laboratory procedures and reflect about how metabolic syndrome applies to the field of nutrition and dietetics.

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Effects of β-N-oxalylamino-L-alanine (BOAA) on the Viability and Locomotory Behavior of Drosophila Melanogaster

β-Methylamino-L-alanine (L-BMAA) is a neurotoxin produced by cyanobacteria and found in the Cycas Circinalis plant. This compound has been linked to amyotrophic lateral sclerosis-Parkinson dementia complex (ALS-PDC), a neurodegenerative disease that causes symptoms similar to ALS, Parkinson's disease, and dementia including loss of muscle control and progressive mental decline. β-N-oxalylamino-L-alanine (L-BOAA) is a chemical very similar to BMAA and has shown to cause similar abnormal neurological symptoms. BOAA is found in the chickling pea, Lathyrus sativus, found in parts of India and Ethiopia. The consumption of the seeds of this pea has caused neurolathyrism, a neurological disease that involves partial loss of motor ability in the lower limbs.

Preliminary studies investigated the locomotor behavior and viability of fruit flies fed 0, 12.5, 25, and 50 mM BMAA. A dose-dependent decrease in both parameters was observed. In a parallel experiment, various concentrations of L-BOAA was added to standard fly food and given to a group of age-matched female flies. The inactive D-form of BOAA, was fed to a separate group of flies as a negative control. The results indicate that BOAA is not as potent as BMAA under the same conditions. When BOAA was applied directly to the nerve cord of decapitated fruit flies spastic wing movements were observed, which suggests that the compound can affect motor neurons and/or the muscles involved in flight. More studies are needed to be done to determine the type of effect BOAA has on locomotor ability and whether or not it is the compound responsible for the neurolathyrism.

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Invariants for Spatial Graphs

A knot is a circle embedded in three dimensional space, and a link is a collection of knots that do not intersect each other, but can be knotted together. In particular, a knot is a link with one component. When studying knots (and links) we work with knot diagrams which are projections of a knot into a plane. The goal of Knot Theory is to come up with ways of telling two different knots (or links) apart. A polynomial invariant for knots is a polynomial assigned to a knot that is independent of the diagram of the knot, and it is used to detect different knots. A spatial graph is a graph embedded in three-dimensional space. In this project, we construct invariants for spatial graphs by performing certain replacements at the vertices of a graph diagram, which results in a collection C of arcs and knot/link diagrams. We then use known polynomial invariants for knots/links to evaluate the objects in the collection C, and obtain a Laurent polynomial associated with our original spatial graph, which is independent on the embedding type of the graph.

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Molecular Basis of the Reversed Allostery of the Xanthomonas Axonopodis Clp

Members of the CRP/FNR superfamily of bacterial transcription factors have been known to require the binding of their cognate ligands to become activated for DNA binding and transcription initiation. The dogmatic concept of this ligand-action mechanism in this family has been fundamentally challenged by Clp's (CRP-like protein) reversed allostery. Clp is constitutively active (active without any ligand) and is inactivated by the ligand cyclic di-GMP. Nonetheless, Clp has high sequence similarity (45% identity) to the Escherichia coli cAMP receptor protein (CRP), the prototype member of this family. The crystal structure of Clp superimposes that of CRP, indicating high structural similarity as well.

The Youn lab has been using a chimeric protein approach to elucidate the sequence basis of the reversed allostery in Clp. Our efforts so far have led to the conclusion that the C-terminal domain of Clp is critical for the novel property. This conclusion was based on the CRP-Clp chimeric protein (Phe 136 junction) and several Clp site-directed mutants. Here we expand the chimeric protein approach, which includes four CRP-Clp fusion proteins: CRP-Clp (Pro 110 junction), CRP-Clp (Phe 136 junction), CRP-Clp (Arg 142 junction) and CRP-Clp (Pro 154 juction). To create each chimeric gene, two consecutive PCR amplifications were performed. The first PCR generates two partial gene fragments and the second PCR reaction joins the gene fragments together. Then, each PCR product was cloned into pEXT20, an E. coli expression plasmid. Next, an in vivo transcriptional activity assay was carried out to detect constitutive activities of the chimeric proteins. For this, each plasmid was transformed into HYC30, a CRP/Clp reporter strain, in which the lacZ gene is under the control of CRP/Clp.

An important result is that the CRP-Clp (Arg 142 junction) chimera retained full constitutive activity of Clp while the CRP-Clp (Pro 154 junction) chimera completely lost the constitutive activity of Clp. It is also notable that the CRP-Clp (Pro 154 junction) chimera showed full in vivo transcriptional activity in the presence of cAMP and is therefore functional. This strongly suggests that the C-terminal residues 142-154 of Clp are pivotal for Clp's constitutive activity. These results not only validated our previous conclusion on Clp's constitutive activity, but also further narrowed down the residues responsible for the constitutive activity of Clp. Future research will include site-directed mutagenesis of each of the residues between 142 and 154 and monitor the functional impact.

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Gadolinium Nanoparticle Synthesis Using AOT-Methanol-Hexane Reverse Micelles

The growing interest in nanotechnology has prompted our investigation of synthesizing rare earth nanoparticles. The reverse micelle method was used to form spherical clusters of AOT surfactant and reduced Gd. Having a minority of polar methanol and majority of nonpolar hexane causes the surfactant molecules to form spherical cages around the reactants, and thus create the reverse micelles. Ultrasonication makes the reverse micelles collide and reform, allowing the contents to mix. This mixing of contents permits GdCl3 to be reduced by the reducing agent NaBH4. Energy dispersive x-ray analysis shows Gd, Gd2O3, NaCl, and other compounds as products of the reaction. Future growths will be conducted at lower temperatures and in a controlled atmosphere glove box to shrink the size of the clusters, decrease the amount of Gd2O3, and increase the amount of Gd.

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A State Model for the SO(2n) Kauffman Polynomial

A mathematical knot can be thought of as a knotted piece of string whose ends have been fused together so that the knot cannot be undone. A link is a union of one or more knots. A link projection is a two-dimensional drawing of a link. The same link can have many different projections, so in order to distinguish between links, knot theorists define certain quantities to link projections so that different projections of the same link have the same quantity assigned to them. These quantities are known as link invariants, and some of the most powerful invariants (in terms of their ability to distinguish between links) are polynomials.

Francois Jaeger presented the two-variable Kauffman polynomial of an unoriented link L as a weighted sum of HOMFLY-PT polynomials of oriented links associated with L. Murakami, Ohtsuki and Yamada (MOY) used planar graphs and a recursive evaluation of these graphs to construct a state model for the sl(n)-link invariant (a one-variable specialization of the HOMFLY-PT polynomial). We apply the MOY framework to Jaeger's work, and construct a state summation model for the SO(2n) Kauffman polynomial.

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Great Power, Great Responsibility: a Multiethnic Spider-Man

Over this past summer, I served as the Stage Manger and Dramaturg for the Woodward Shakespeare Festival's adaptation of William Shakespeare's Henry V. After being awarded Fresno State's undergraduate research grant, I used my funding to attend the world renowned Oregon Shakespeare Festival to view their own production of Henry V. In addition to these two live productions, the release of a new film adaptation of Henry V was produced by the BBC in July. My research involves the performance critique of these three 2012 adaptations of Henry V from a literary standpoint. Using our local Woodward Shakespeare Festival's production as the central focus, my paper argues that the interpretative decisions made in these contemporary productions reveal how audiences and consequently society in general feel toward topics such as patriotism, war, and political responsibility at varying national, state, and community levels. Shakespeare's Henry V, is a play that, in regard to popular literary criticism, presents two disparate philosophies. The first asserts a patriotic and positive attitude toward leadership and faith, while the latter operates as a satire of this notion, deflating this optimism with assertions of cynicism in government.

The results I have drawn from this research are that the nationally aimed production of Henry V has opted to create an adaptation of the original text that would promote patriotism and national pride, while obscuring murkier elements of political distaste. The two stage productions have widened their view to include a more convoluted interpretation that serves justice to the original text. However, The Woodward Shakespeare Festival's production of Henry V is unique from the Oregon Shakespeare Festival's in that a focus was drawn away from the main character, Henry V, and was redirected at the commoners. This production, differing from its counterparts, has spun the themes of the play to a different viewpoint altering attention on how the average person feels about these political issues. In effect, this production provided local viewers a perspective of being on the sidelines of government policy, creating an atmosphere of political dissatisfaction.

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Pinning Fronts in Advection-Reaction-Diffusion Systems: A Dynamical Systems Approach

Classical fluid mechanics describes a standard reaction-diffusion-advection fluid system in terms of a set of differential equations, which must heavily rely on numerical computations to simulate the fluid flow. This research analyzes one-sided invariant barriers of chemical reaction fronts found in the fluid flow, which we call those barriers Burning Invariant Manifolds (BIMs). Experimentally, the flows were magneto-hydrodynamically-generated, quasi-two-dimensional, and vortex-dominated, on centimeter length scales. BIM theory analyzes the system in terms of only these BIM barriers, which can provide a more visually intuition. This theoretical research improves the understanding of the BIM theory by numerically solving for and analyzing the fixed points in the reaction front dynamical system, where BIM theory simplified this front dynamical system into 3D ODE. We found that, BIM theory is an explanation for the pinning phenomenon, where pinning is the situation that the advection cancels the reaction forming a stationary reaction front. By numerical simulation of channel flow, we categorized type 1, 2, 3 pinning. By studying the basins of attraction of different types of pinning locally, we generalized a theory to globally describe the pinning behavior of any general flow. In conclusion, this theoretical research provided a broader understanding of this new BIM theory; it provides a global picture and a systematic scheme to summarize a flow into a graph.

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Microbial Verification of Retail Milk "Best By" Date

Consumers use the "best by" date on food products as a means to predict the shelf life of a food product. The objective of this study is to determine the validity of best by dates of whole milk packaged in high-density polyethylene (HDPE) bottles using microbial analysis.

Whole milk from 3 different lots with similar best by dates was obtained in local supermarkets. The pooled milk sample was analyzed for mesophilic aerobic bacteria course of four weeks through the best by date. Exponential growth of aerobic bacteria was observed through the four-week period of study.

Two weeks before the best by date, the mesophilic aerobic plate count was 32 colony forming units (cfu) per mL of milk. One week before the best by date, the mesophilic aerobic plate count was 32,200 cfu per mL of milk. It was determined that at the point of the best by date, aerobic plate count was at 158,500,000 cfu per mL of milk. The UDSA microbial standard for Grade A pasteurized milk at the time of processing is <20,000 cfu per mL of milk.

Although properly pasteurized milk will not contain human pathogens, the microorganisms present at milk can spoil the milk, having an unappealing sour odor/taste and chunky texture. The high microbial count of the milk sample near the best by date indicates that the milk was indeed spoiling, thereby verifying the best by date as a good predictor of product shelf life.

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Identifying Potential Growth-Perturbing Genes Induced by Escherichia Coli CRP* Mutants

The Escherichia coli cAMP receptor protein (CRP) is a global transcription factor controlling more than 200 genes and is required for optimal growth of the organism. Paradoxically, too much CRP activity conferred by some constitutively active (CRP*) mutants causes perturbedfxcxx growth in E. coli. Our objective is to unravel the molecular basis underlying this growth-perturbing effect of CRP* mutants. For this, we have recently completed whole genome transcriptomes of the CRP* mutants during perturbed growth conditions and identified many genes that might be relevant to the toxicity. The results were compared with that of wild-type CRP, which led to two important conclusions: (i) There is a higher percentage of enzymes (many of which are involved in metabolism) and transporter genes among the upregulated genes in the CRP* mutants. (ii) Periplasmic and outer membrane proteins are overrepresented in the upregulated genes in the CRP* mutants. This suggests that CRP* toxicity most likely results from metabolic defects due to impaired outer membrane and/or periplasm transport functions. In order to see if one of the upregulated genes in the CRP* mutants (as identified by RNA-seq analysis) could be directly connected to the toxicity, we individually cloned 8 genes in pEXT20, an E. coli expression plasmid vector. When overexpressed, one of the gene products resulted in severely perturbed growth in E. coli. We are now expanding this approach to all of the 53 genes to fully understand the CRP*'s growth impact. This project may lead to the discovery of novel CRP functions otherwise inaccessible through the study of wild type CRP, since the toxicity is only adventitiously induced by CRP* mutants. In addition, the knowledge gained form this research can be extended to understand the behaviors of CRP-like proteins in other microorganisms, especially constitutively active proteins.

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A Comparison of Traditional Grass Lawn and Waterwise Gardens in a Semi-Desert Urban Landscape

Urban residential vegetation is driven by homeowners' socioeconomic status, city government policy, and price and availability of water. Water use in a semiarid urban landscape should reflect the natural habitat of the area. Urban vegetation in the Fresno-Clovis Metropolitan Area (FCMA) in Central California, where annual rainfall is 28.5cm, however, is similar to high rainfall areas. Fresno did not have water meters until the end of 2012. With new metering and changes in water prices a few homeowners are transitioning to waterwise yards but most retain traditional grass lawns. We focus on homeowners' perception of water use, and the effect of residential water use on biodiversity in the FCMA. We mapped all non-grass yards in FCMA using Google Earth imagery. We compared plants and bird diversity between waterwise yards and traditional grass lawns (N=20 each). We conducted focus group meetings with a random sample of homeowners in 3 socioeconomic strata (n=18), engaged community members in Audubon and Café Scientifique meetings (n=28), and surveyed parents of 5-6th grade students (n=150). Waterwise yards have more plant species than traditional grass lawns and require less water in the peak summer. The survey results suggest homeowners were unaware of their monthly water consumption. The homeowners would change their yards if water prices go up with metering, but lack information about waterwise options. A toolkit for creating low-water yards is under construction.

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Protection Against Disulfide Stress Requires Genome-wide Involvement in Mycobacterium Smegmatis

In eukaryotes and Gram-negative bacteria, the low molecular weight thiol – glutathione (GSH) – plays an important role in protecting cells against oxidative stress. Actinomycetes however, including Mycobacterium tuberculosis and Mycobacterium smegmatis, synthesize mycothiol (MSH), which serves analogous functions to GSH. Disulfide stress is a subset of oxidative stress that results in the oxidation of low molecular thiols thereby inactivating them and leading to the accumulation of nonnative disulfide bonds in the cytoplasm. Diamide reacts with thiols resulting in a disulfide bond and hydrazine and has been widely used to induce disulfide stress.

To identify M. smegmatis genes that play an important role in maintaining viability under disulfide stress, a transposon mutant library was screened for mutants sensitive to diamide. 118 diamide sensitive mutants were identified. Using inverse PCR and direct sequencing of the PCR product, genes disrupted in these mutants were identified.

The identity of the disrupted genes revealed that disulfide stress affects a variety of cell processes including protein transport and binding, protein fate and degradation, biosynthesis of cofactors, amino acids, nucleotides, and polysaccharides, fatty acid and phospholipid metabolism, toxin production and resistance, central intermediary and energy metabolism. Among the genes identified in mutants sensitive to diamide were mshC, which is involved in the biosynthesis of mycothiol and thus this mutant lacked mycothiol, and the transcription factor, sigH, coding for the alternative sigma factor H that in M. tuberculosis and M. smegmatis is a central regulator of the response to oxidative and heat stress. Through disk diffusion assays, we validated diamide sensitivity and concluded that many diamide mutants are also sensitive to oxidants such as hydrogen peroxide, cumene hydroperoxide, and plumbagin.

In conclusion, identification of the transposon mutants in sigH and mshC validated the diamide screen and highlighted the importance of mycothiol in the disulfide stress and thus the oxidative stress response in mycobacteria.

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Intercultural Competence of Business Students

It is widely recognized that intercultural competence is essential for effective interaction with people from diverse backgrounds. This competence has become especially important in today's global workplace, meaning that the intercultural competence of university students is an important factor in their future success in global business. Much research has focused on identifying the key components of intercultural competence. The main components explored in this study are: attitudes and beliefs, curiosity, personality, self-efficacy, ethnocentricity, and global knowledge pertaining to geography and current events. This study examines the way in which these components of intercultural competence affect each other, the potential effect a university program can have on the development of student intercultural competence, and the ways in which these aspects of intercultural competence differ among three distinct student groups: foreign students, local students majoring in international business, and local students majoring in all other business options.

Students from these three groups were asked to complete a survey that measures the various constructs believed to have an impact on overall intercultural competence. The survey for this study was based on assessments for the individual components of intercultural competence that exist in the literature which were then modified and rearranged to better fit the research model.

Analyses completed at this time show that self-efficacy does not significantly differ among the three groups as originally thought. On the other hand, consistent with the hypothesis, curiosity does differ significantly between the three groups. Surprisingly, local students majoring in international business scored higher in curiosity than did foreign students.

These results provide greater insight into the nature of the components of intercultural competence and how they differ among various students, thus providing universities with information which could be used to tailor their programs to the students' needs.

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The Category of sl(3) Webs

An sl(3) web is an oriented, planar, trivalent graph whose vertices are either sources or sinks. These graphs play a central role in the construction of the sl(3) polynomial invariant for knots and links. Our objective has been to describe the category of sl(3) webs.

Our method has been to use known results from the category of oriented tangles and the sl(3) polynomial to study the category of sl(3) webs.

We describe the category of sl(3) webs with boundary using generators and relations. We also define a unique functor from the category of oriented tangles to the category of sl(3) webs, inspired by skein relations coming from knot theory.

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Association Between Gestational Weight Gain & Body Mass Index in Later Life: A Review of the Literature

Obesity is a global epidemic affecting 400 million worldwide. The World Health Organization predicts that 700 billion people will be obese by 2015 (Begum, Sachchithananthan, and Somsubhre, 2011). In the United States alone, 47 million individuals are obese, with annual health care costs in excess of 140 million dollars. Obesity increases the risk of developing chronic diseases such as: diabetes mellitus, cardiovascular disease, and sleep apnea. Pregnancy is one point in a woman's life where a significant amount of weight can be gained which may also affect her future weight gain. In addition, women that are obese during pregnancy have a higher risk of pregnancy-related complications and their infant is at an increased risk for neural tube defects, stillbirth, heart defects, and being obese at a young age.

A review of the literature was conducted to examine the association between gestational weight gain (GWG) and body mass index (BMI) in later life. Findings largely indicate a strong association between GWG and BMI later in life. Clinical implications of this study include patient education regarding appropriate weight gain, careful monitoring of gestational weight gain and encouraging pregnancy weight loss within six months postpartum.

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The Relationship Between American Indian Ethnic Identity and Postsecondary Academic Experiences

American Indian postsecondary educational achievement has consistently lagged behind other minority groups but the specific components which contribute to this phenomenon are uncertain (Huffman, 2003). Recent data shows that nearly 40% of college-going American Indians will dropout before graduating (Larimore & McClellan, 2005). Due to this fact, a primary area of concern is the underrepresentation of American Indian postsecondary retention. However, although American Indian postsecondary attrition is a concern, studies have not extensively examined the relation between enculturation/ acculturation and postsecondary academic persistence and experiences of American Indians.

To address gaps in the research, this study compared reservation/ non-reservation American Indian college students postsecondary academic experiences and orientations. Participants were 24 (7 men, 17 women) current or former college students from various institutions around the United States who completed an online survey. Participants completed enculturation and acculturation scales, and indicated if they had been reservation or non-reservation raised. To measure students' academic orientations, I used Liem and Martin's (2011) Academic Motivation and Engagement Scale (MES), and to measure aspects of American Indian students' connection to their postsecondary institute and experiences, I used the National Survey of Student Engagement (NSSE).

Those raised on a reservation scored significantly higher on enculturation and lower on acculturation than those who were not. Contrary to my hypotheses, reservation and non-reservation upbringing was generally not related to general postsecondary academic orientations and experiences. Also, contrary to my hypotheses was that reservation participants were significantly more concerned with fail avoidance than non-reservation participants.

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Competition of β-Methylamino-L-alanine (BMAA) with Serine and Other Natural Amino Acids in Drosophila Melanogaster

Degenerative neuronal diseases (Alzheimer's disease, Parkinson's Disease and amyotrophic lateral sclerosis) affects activities associated with motion and cognition. Amyotrophic Lateral sclerosis/Parkinsonism-dementia complex (ALS/PDC) is a variant form of ALS. β-methylamino-L-alanine (BMAA), a non-natural amino acid produced by many species of the abundant and ancient cyanobacteria have been associated with the cause of ALS/PDC. Fruit flies (Drosophila melanogaster) are a convenient, inexpensive and well-defined animal model used to investigate many human-derived disease. Experiments were to design and implemented to test if in-vivo BMAA competes with serine, a structurally similar amino acid, along with other natural amino acids (e.g Arginine). BMAA and an equivalent concentration of either serine or arginine were fed to female age-matched Canton S fruit flies. Our methods used three independent trials of ten Drosophila melanogaster per vial, per treatment. The control group were fed with a special gel-pellet containing: 1. Regular fly food (control); 2. BMAA alone (25 or 50 mM); 3. amino acid alone (25 or 50 mM); 4. the combination of equimolar BMAA and the tested competing amino acid. The acute effects were measured over a 5-day period and included viability and locomoter ability. My results show serine and arginine rescue the acute loss of viability in BMAA alone. Sequential treatment and competition with each of he twenty natural amino acids will give further insight into the structure-function relationship between BMAA and role in neuronal dysfunction.

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Exploring Entrepreneurial Individuals' Intentions to Adopt Technology

Entrepreneurs, and their ventures, play a large role in the business environment. Without these individuals, many small- and medium-sized business would not be in existence today. The purpose of this research is to examine the intentions of technology adoption among individuals with entrepreneurial intent. Using a Theory of Planned Behavior framework, a new scale, called the Technology Adoption Intention Scale (TAIS), assessing individual intentions to adopt technology in their entrepreneurial ventures is developed and tested. The three factors analyzed in TAIS are the attitudes, subjective norms, and the perceived behavioral control.

A sample of 262 individuals, of which 205 were currently enrolled as students at a Western U.S. University and the remaining 57 were non-students recruited for the survey by those students, was surveyed for this study. Of these respondents, there were 159 females and 103 males with an average age being 26.8 years old. Factor analysis was conducted to test the underlying structure of the the measure created. Inspection of the correlation matrix revealed the presence of many coefficients of .30 and above. The three-component solution explained a total of 60.73% of the variance, with Component 1 contributing 31.84%, Component 2 contributing 15.58%, and Component 3 contributing 13.32%.

Upon initial analysis, all factors seem to correlate and accurately validate TAIS. Although the Theory of Planned behavior has been applied to entrepreneurs and technology adoption before, the significance of this study is the creation of TAIS and its application in measuring individuals with entrepreneurial intent and their intentions towards technology adoption.

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Using New York Cities 2009 Historical Traffic Data to Develop an iPhone Routing Application

It is reported that the United States uses about half of the world's gasoline and the exhaust produced contributes to 60% of all the carbon monoxide emissions in the US ("The Problem", 2012). As the commuter's driving become more educated with the use of technology, such as smart phones, sustainable navigation for smart phone applications will be a necessity for the future reduction of carbon monoxide emissions. Beginning with New York City as a proof of concept, the intended iPhone application will use 2009 hourly traffic data, provided by the New York State Department of Transportation, and algorithmic graph theoretic techniques to generate a results page showing the path for the best route and it's total cost where edge weight is determined by traffic density along each segment. The routing program will also show traffic quantities for other time intervals that precede the driver's perspective present time, providing the user with alternative starting times, thus allowing the user to choose an optimal alternative starting time with subsiding traffic conditions that fits within the traveler's time frame. Future research includes extending the iPhone application to include a ride share program that will allow users to carpool with others interested in taking similar routes.

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Measurement of Select Pollutants Emitted from Dairy Operations

The San Joaquin valley experiences some of the worst air quality in the United States and is ranked nationally by the American Lung Association as one of the most polluted regions under the categories of short term particulate matter, year round particulate matter, and ozone pollution. Ozone is created through chemical reactions involving sunlight, nitrogen oxides (NOx), and volatile organic compounds (VOCs). In urban regions, VOC concentrations are dominated by vehicular sources. However, in agricultural regions like the San Joaquin Valley, dairy operations are believed to be major sources of these ozone precursors. Dairies are also known to be an important source of greenhouse gases (GHGs). The concentrations of select VOCs and GHGs were measured over time to evaluate the emission over the year at a commercial dairy. Measurements were conducted via gas chromatography mass spectrometry, infra-red photo acoustic detection (IR-PAD), and Flame Ionization Detection. Sampling was conducted utilizing flux chambers, thermo-desorption tubes, and evacuated gas canisters. Fluxes were then calculated using a dispersion model. The measurements show that dairies are a significant source of oxygenated VOCs including alcohols, carboxylic acids and esters. Dairies also emit substantial quantities of two GHGs: methane and carbon dioxide. The implications of these results will be discussed.

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Sensationalism and Morality in Seventeenth Century English Witch-Trial Pamphlets

In the seventeenth century in the midst of the English witch-craze, tales of witches and their crimes captivated the English and began to pervade popular literature. Revolutions in printing technology led to an explosion in the production of pamphlets, cheap news tracts to be sold in front of shops and on street corners. These pamphlets, particularly in regard to witch-trials, were very sensational in nature. Some scholars have determined that the sensationalism of pamphlets was meant to increase their popularity and consumption. While agreeing that their sensationalist aspect was designed to draw in consumers, my analysis of various witch-trial pamphlets has revealed that they were also intended to serve a moral purpose. This essay proposes that, while the authors of these pamphlets certainly used sensational language to increase the popularity of their works, they also used the stories of the arrest and condemnation of witches as a deterrent from religious deviance. Modern studies regarding witch-trial pamphlets suggest that perhaps we should treat them solely as literature because they were so sensational in nature. In contrast, this essay also proposes that the moral messages contained within these pamphlets give them historical relevance as cultural products taken within the context of the religious and political turmoil of seventeenth-century England.

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Dissemination of Microprocessor Courses through Classroom and Interactive Cyber-Enabled Technologies

This project presents work on new ways of delivering instructions to engineering students by utilizing off-the-shelf technology tools and infrastructure without sacrificing pedagogical needs and establishing an as-and-when learning environment. The project has been funded by the National Science Foundation, USA to develop and disseminate a cyber-enabled learning platform (CELP) to deliver instruction and course materials on topical areas in Microcontroller Technologies. The CELP provides students with the opportunity to best utilize the existing off-the-shelf technology tools during their preferred time so that they can gain knowledge and experience to pursue more advanced courses in the aforementioned topic. Note that traditionally, microcontroller technology has been taught in a face-to-face mode. This attempt is a step forward to distance learning technology based instructional delivery. Technology-enabled hybrid classrooms will be the primary mode of teaching engineering and computer science courses to students. The instruction delivery method should consider various aspects of industrial needs at workplaces. For such classrooms to be effective, the technology tools must be compatible and student-friendly. Above all, there should be a standardized curriculum to train the students. We have developed a microcontroller training system which is modular in nature in that the students can start learning lessons from a module without maintaining a strict chronology. A curriculum focusing on microcontroller programming and utilizing the developed training system (microcontroller breadboard) was written, with lessons focused on Assembly Programming and the usage of various components on the board. It is anticipated that the course delivery system, an open source framework, can contribute towards adoption in more universities as the course modules are scalable. The updated curriculum provides a better learning system than courses utilizing older systems. The delivery system also provides an interactive mode for assignment submissions and lessons through the use of distance learning technologies such as videos and online submissions. The developed training system is affordable to institutions. The developed course and training system have been tested as a pilot program and its impact has been positive. In the future, the course will be proposed as a new addition to current secondary education in the central valley. There is a dearth of engineering courses in the current primary and secondary education. Consequently, there are many courses in science and math, but very few courses in engineering and technology. This addition to the current curricula will be able to introduce engineering to students at an earlier age to promote interest and pursuit of higher education in the Science, Technology, Engineering, and Mathematics (STEM) disciplines.

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Lifting the Western Veil: A Study of Algerian Women's Involvement in the Policy Making System

The objectives of my study is to demonstrate the misrepresentation of Muslim women in the policy-making system where they are depicted in the media as oppressed and domestic beings that do not range outside of the home. My study is to demonstrate, through the example of Algeria (although it does not limit to only Algeria but also Morocco, Qatar, Tunisia, Egypt, and the Arab Emirates) that women are a part of policy making as presidential candidates (earlier than the United States), cultural ministers, heads of organizations, and a large part of the National Assembly. The study is not to say that there are no areas of female oppression in the Middle East: rather it is to debunk current modern and orientalist ideologies frequently depicted on the media that all women are oppressed. Rather, statistics show that, although some oppression is found in more rural areas, the majority of strong Arab states do include women in not just voting rights but in governmental aspects as well. Through the usage of legislative reports from Algeria, I am able to present statistics regarding female involvement as well as direct translated sources of misrepresentation of Islamic culture by Orientalists that grew to be the main source of modern day understanding of Islamic culture. My conclusion shows that women are a growing aspect of the government and, although there are opposing parties and attempts to remove them, women are conclusively an important aspect to the modern day Arab state in diplomacy and policy-making.

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The Character of the Fox from Aesop's Fables to the Medieval and Seventeenth Century Fables and His Reincarnation Today

(Original Title in French: Le personnage du renard de la fable d'Esope aux fables françaises du moyen-âge et du dix-septième siècle et à sa réincarnation contemporaine)

Introduction and Objectives of my Study

This is a paper dealing with French Literature. In my study, I examine the transformation undergone by one fable written by three different fabulists: Aesop from Greek Antiquity, Marie de France, a French writer from the twelfth century, and the well-known French author and master of the seventeenth-century fable, Jean de la Fontaine. To start, I have chosen Aesop's famous fable "The Fox and the Raven" and explain how its main character the fox is portrayed by Aesop. I then proceed to describe how Marie de France and Jean de la Fontaine rewrote Aesop's fable while managing both: to keep the original character of the fox and to make him their own. Finally, I discuss how contemporary writers took these texts, as well as others such as the medieval Roman de Renart, added playfulness, kept their moral instruction, and, most importantly, eliminated their adult content to make them appropriate for today's children, their main audience.

Description of the Methods used in my Study

To analyze these three fables and their transformation today, I primarily use the explication de text. This is the method most used in my field of French literature. This "textual analysis" is based on a series of written observations that explain the content as well as the stylistic, contextual, phonetic aspects of a literary text. I also use a second method which is to compare and contrast several texts to determine what specific changes these texts have undergone in the different time periods in question.

Results of my Study

In the course of my examination of the fox as viewed by three fabulists, I discovered first that the fox had an important image that authors did not want to eliminate regardless of the different political and religious issues they faced at the time; however, they still made the fox their own by adding or eliminating some particular features. And, second, I also found that fables were not only aimed at their respective audiences, but were also used to instruct their public, criticize society and remark on specific historical events. Today, fabulists tend to take a different approach: using both, ancient and modern means, they rejuvenate the character of the fox.

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Nanopatterning Wrinkles into Biodegradable Materials for Aligning Heart Cells

Myocardial infarctions (MI), also known as heart attacks, are the most common cause of death in industrialized countries. The ability to replace damaged cardiac tissue through cell injection is one strategy for MI repair, but the delivery of cardiomyocytes (CM) alone does not provide structural support or physical cues to facilitate cell-cell communication. Wrinkled polydimethylsiloxane (PDMS) nano- and micro-topographies have been shown to align cardiac cells in vitro. However, PDMS is not biocompatible, and requires a tricky isolation step for removing a pre-aligned cell-sheet for implantation. We hypothesize that the utilization of a "heart patch," as a delivery vehicle, is essential for retaining and integrating viable cells. Here, our patch material was created from an inexpensive, biocompatible, degradable, tunable, and elastic polymer, known as poly(glycerol-sebacate) (PGS). The goal of this study was to capture the 'wrinkled' alignment topography onto the implantable PGS microchips for the pre-alignment of CM. Molded chips were produced by placing PGS directly onto smooth-surfaced glass plates or wrinkled PDMS surfaces. The PGS was cured by baking at 140-160°C nitrogen for 5-17 hours. It was determined that the elimination of air-bubbles from the polymer required a reduction of pressure in the vacuum oven, and a slow increase in temperature to 160°C prior to baking. The optimal temperature for baking was 160°C with no additional pressure. Elasticity of PGS correlated with temperature and baking time. A 90% glucose-coat allowed for the polymer's removal from the mold. Lastly, the wrinkled topography was achieved on the PGS chips. The next steps will be to align our embryonic stem cell derived-cardiomyocytes on the wrinkles PGS microchips for evaluation of biological shape and cell-cell signaling. We will also continue to optimize the design in order to generate a more efficient protocol; to optimize sugar-coating; and to reduce the thickness of the PGS chips. This study plays an important role in developing biomimetic materials for transfer, which may lead to the prevention of cardiac degradation after MI, mitigating the need for heart transplantation.

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Redesigning an AC Magnetic Susceptometer for the Measurements of Smaller Samples

Our lab is currently in the process of synthesizing rare earth nano-particles. In order to measure the magnetic properties of these nano-particles, we designed and created an AC magnetic susceptometer that can be fit with smaller samples. The susceptometer is made up of a primary coil, a secondary coil, a beryllium copper case, and a sample holder. The primary coil is the outer most solenoid, with the secondary coil and sample holder lying inside. An AC current is applied to the primary coil in order to create a magnetic field; this field is created due to Ampere's Law. The magnetic field polarizes the magnetic moments in the sample, which induce a voltage on the secondary coil. This induction is due to Faraday's Law of Induction. The induced voltage measured is proportional to the magnetic susceptibility of the sample. All of these components are placed inside of a beryllium copper case for protection.

To test our AC Magnetic Susceptometer, the phase transition of an 11 mg gadolinium sample was measured. To do this, a 100μA current is applied to the primary wire. The magnetic susceptibility was measured from 10 K to 300 K. The results showed a sharp increase in the induced voltage around 293 K, which agrees with the known ferromagnetic transition of Gd. The old susceptometer was tested with the Nd sample and the data will be compared it to the new susceptometer.

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Kinetic and Mechanistic Study of Isoprene 4,1-hydroxynitrate

Isoprene is the most abundantly emitted biogenic source of carbon in the atmosphere. It is formed as a by-product of photosynthesis in many species of trees and shrubs. Isoprene readily reacts with radicals found in the lower troposphere to form many products including isoprene 4,1-hydroxynitrate. This compound may be a key intermediate in the formation of secondary organic aerosols which impact atmospheric pollution and climate change.

In this work, the reactions of isoprene 4,1-hydroxynitrate with common tropospheric radicals were investigated to gain a better sense of the chemistry that causes pollution and hazards to human health.

Using a smog chamber, the kinetics of the reactions of isoprene 4,1-hydroxynitrate with chlorine, hydroxyl, and nitrate radicals, as well as ozone, were studied using FT-IR to monitor the progress. The rate constants were calculated using the relative rate technique. For the reaction with chlorine radical, the rate constant was found to be 5.51 × 10-10 cm3.molecule-1.s-1. With ozone the rate constant for the reaction is 2.15±0.22 x 10-18 cm3.molecule-1.s-1. This rate constant is two orders of magnitude slower than that measured by Lockwood et al (2010). The reaction with nitrate radical proceeds at a rate of 2.8±.4 x 10-18 cm3.molecule-1.s-1. Finally the rate constant for the reaction with hydroxyl radical was measured as 3.3±0.3 × 10-11 cm3.molecule-1.s-1. This rate constant is on the same order of magnitude with the Structure Activity Relationship prediction, but differs by a factor of three. The product yields of each reaction were also measured. Of particular interest is the high yield of formaldehyde in the reaction with hydroxyl radical. This yield indicates a mechanism that is not a major source of nitrate.

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Digits of Powers of Numbers in an Arbitrary Base

Numbers are written as strings of digits, but they can be represented in other ways as well. We will show how to represent digits of powers of numbers in an arbitrary base using theoretical "machines" known as cellular automata. Our methods have been number theoretical in essence but also use some ideas from computer science. We present a `quadratic reciprocity' like result relating the digits of the positive powers of a base b to the digits of the negative powers of b base a.

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Pregnancy and Childbirth: Hmong Beliefs and Practices in the United States

This study focuses on the Hmong practices and their associated beliefs in relationship to pregnancy and childbirth, and their connection to explaining problems that medical doctors encounter when dealing with Hmong women during the three stages of pregnancy: before birth, during labor and postpartum.

The methodological approach is based mainly on qualitative approach. Interviews are made with Hmong mothers living in the California Central Valley, regarding their knowledge of Hmong beliefs on birth and their experiences of it living in Laos/Thailand and the United States. Contributing to the interviews is information gathered from previous research available through the Internet and books.

Like the Western medical practices, the Hmong culture also has their practices accommodating the pregnancy process and the birth. To protect and reinforce good health for both mother and fetus/child, every action must be followed properly so that there won't be any harsh consequences. For example a woman giving birth must not scream or to ensure a healthy recovery, she must follow a specific diet composed of hot meal with rice, chicken and/or egg during the first month after delivery. In the United States, numerous changes have been made to the Hmong practices to the extent of extinguishing some. Nonetheless, some of the barriers for Hmong women still prevail such as the first-month diet after delivery and the unwillingness to visit a doctor at an early stage of the pregnancy.

The Hmong belief --to give mother and fetus/child the best care before, during and after birth – has the same purpose as for the Western medical culture. Although there are differences between the Hmong beliefs and sociocultural practices, and the Western medical practices, thus there is common ground. The barriers could be resolved to some extent through education for both sides.

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Hmong Oral Literature for Teaching

With the few readily available textbooks and adequate teaching materials in the Hmong language, the objective of this study is to collect folktales and to use them to develop teaching materials. Such a study was possible thanks to the Undergraduate Research Grant at California State University, Fresno.

The method consisted of gathering ten Hmong stories through qualitative interviews with five informants of both genders, ages 30-90 years old. The interviews were formally based on the collection of general information regarding the informant's level of expertise and experience with oral transmission. The stories have been recorded, transcribed and translated into both the Hmong and English languages. The stories are analyzed on relevant themes such as the usage of human and non-human characters to reflect expected female roles of Hmong women.

The first outcome of this study will emphasize methodological issues at collecting, transcribing data and translating from Hmong into English; otherwise from a language with a strong oral tradition into some written materials targeting children from 5 to 17 years old. The second outcome will focus on analyzing the choice of relevant themes for teaching purpose. Presenter will discuss one of the themes on the gender roles.

Writing textbooks for children requires pedagogy, thus oral stories cannot be translated as they are into texts. There is need to carefully choose vocabulary and themes when developing lesson chapters in order to teach with efficiency. Folktales studies are needed in order to offer more authentic texts in classroom because they will bring up students' knowledge of vocabulary, language accuracy, and furthermore a better understanding of the Hmong culture and history.

POSTER PRESENTATION ABSTRACTS

(IN NUMERICAL ORDER BY POSTER BOARD NUMBER)

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Poster Board No. 1

Estradiol Increases PSD-95 Expression in Striatal Neurons

The steroid hormone estradiol has been found to modulate the synapse, the site where neurons communicate. A prominent component of the synapse is the scaffolding protein PSD-95. We decided to test whether estradiol induces changes in PSD-95 expression in the striatum and the hippocampus of female rat pups. The striatum is a critically important brain region that when compromised contributes to pathologies such as Parkinson's Disease and drug addiction. The hippocampus is a known locus of estradiol action involved in learning and memory. On postnatal days 0 and 1, female rat pups were injected with either estradiol in cottonseed oil or cottonseed oil alone. On postnatal day 2, hippocampal and striatal tissue were extracted. After performing western blotting and qPCR on the hippocampus and striatum to measure protein and mRNA, respectively, we found that there was a change in PSD-95 expression in the striatum for both protein and mRNA. Contrary to expectations, no change was detected in the hippocampus. This indicates that estradiol can modulate synapses in the striatum. Broadly, this finding may contribute towards understanding how estradiol modulates both normal striatal function and relevant pathologies.

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Poster Board No. 2

Identification and Relevance of Stem Cell Markers in Pancreatic Cancer Cell Lines

Pancreatic adenocarcinoma is an aggressive disease characterized by rapid progression and invasiveness. Patients diagnosed with this disease often have poor outlook due to lack of early detection and ineffective therapies. Profound resistance to standard therapies in pancreatic tumors may be attributed by the presence of Cancer Stem Cells (CSCs). CSCs are hypothesized to make up a small subpopulation within the tumor, maintaining an undifferentiated stem cell-like state. These cells are thought to be major culprits in the initiation and maintenance of tumor re-growth and metastases after treatment. Very little is known about CSCs characteristics, and the primary goal for this project was to investigate the presence of stem cell biomarkers in pancreatic cancer cell-line populations derived from different stages of the disease. Varying expression of canonical stem cell markers were identified in human pancreatic cancer cell lines BxPc3 and AxPc1, particularly high expression of Nanog, Oct-4, Sox-2, and CD44. Further analysis involved identifying subpopulations within the two cell lines that differentially expressed specific stem cell markers. We have currently identified OCT4+/SOX2+ population in BxPC3 and AsPc1 cell lines that we intend to isolate in upcoming experiments. Proteomic analyses of these cell lines were also conducted and demonstrated high levels of Mindbomb homolog 2 (MIB2). MIB2 is an E3 ubiquitin ligase that is involved in Notch signaling, a pathway known for its importance in cell differentiation. Our current results suggest that 1) Pancreatic cancer cells are a strong model for identification and isolation of cancer stem cell biomarkers, and 2) Notch signaling may play an important role in the de-differentiation of tumor cells. These findings offer an expanded mechanistic understanding of CSCs in pancreatic tumors. Ultimately, our hope is that our findings could be used as diagnostic markers to identify pancreatic cancers at an earlier stage while still treatable.

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Poster Board No. 3

Obtaining Natural Substrates of Caspases via N-Terminomics

Proteases occur characteristically in all organisms: from simple digestion to signaling complex pathways. Proteases play a vital role in cell signaling cascades by cleaving specific-limited protein substrates. It is imperative to identify and characterize which proteins are substrates to the proteases and what the cleavage sights of the substrates are; this characterization will provide insight into the biochemical mechanisms of a pathway and relevance to other pathways.

We have chosen the apoptotic pathway due the majority of human tumors, which are caused by the lost of the ability to undergo programmed cell death (apoptosis), thus allowing neoplastic cells to proliferate. The exquisite cleavage specificity of Caspases (Aspartic Acid specific) allows us to identify protein substrates of the intrinsic apoptotic pathway: first in vivo with preferred synthetic substrates, as proof of concept; then in vivo with HEK 293 cell lysates. We then separately introduced inhibitors of Caspases 3/7 and 9 to the lysates in order find the specific targets of these individual caspases.

We obtained hundreds of putative caspase cleavage sites through a focused proteomics procedure termed N-terminomics. We filtered the data by high stringency to obtain real world relevant data and referenced found peptide sequences to existing protein databases to reveal the identity and cleavage site of each protein identified. The caspase inhibitor XIAP was found to inhibit Caspases, but we found differential inhibitor capacity of the individual inhibitory domains of XIAP.

We plan to further explore the anomalies of XIAP inhibition and apply this N-terminomics approach to T-cells undergoing physiologic activation and apoptosis.

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Poster Board No. 4

Authentic Research Experiences in Undergraduate Courses Improve Quantitative Reasoning Skills

We developed an integrated lab experience that helps students to use simple analytical models in quantitative arguments. The goal of the project was to improve students' quantitative reasoning skills through an authentic research experience in an undergraduate biology course, Comparative Vertebrate Morphology. We developed a multiphase lab with three steps. Throughout the course, students collect their own data and then use simple analytical models (scaling laws) to explain how body shape changes with body size. In the first step, students compare bones across species, from shrew to elephant, to make a quantitative argument about whether changes in bone shape can be explained by increasing body mass. This step builds their ability to develop quantitative arguments by applying scaling laws to the their own data. In the second step, the students learn how to prepare bone and muscle specimens. This step teaches the students the how natural variation and measurement errors affect the power of quantitative arguments. In the third step of the project, the students conduct an authentic research project to address the question "Do the limbs of precocious chicks grow slower or faster than the rest of their body from hatchling to adulthood?". In this step, students combine the quantitative reasoning and data analysis skills that they developed in steps 1 and 2 to answer an original scientific question. Student written reports and in-class presentations show marked improvements in quantitative reasoning: between the first and the third report, students are more proficient at assessing data quality (identify outliers and sources of variation) and at using scaling laws to make quantitative arguments about growth patterns. By the end of the projects, the students not only apply scaling laws successfully, but are also able to develop new quantitative hypotheses based on their observations and calculations. Furthermore, students self-report increased confidence in their scientific reasoning skills and their ability to conduct research.

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Poster Board No. 5

Post-embryonic Development of Legs and Wings in the Golden Campine Chicken

Not all parts of an organism's body grow at the same rate. Precocious chicks have functional legs immediately after hatching whereas birds with altricial chicks have neither functional legs nor wings. In this study we explored the growth pattern of Golden Campine chicken, that procreate precocious chicks. We hypothesized that between hatching and adulthood, the wing bones and muscles would grow faster than the body (allometric growth) whereas the legs would grow at the same rate as the body (isometric growth). We further hypothesized that the bones and muscles within the same limb would grow at the same rate to ensure that the muscle development will not outrun bone development. We used male chicken ranging from 1.5 to 113 days of age. We dissected seven wing muscles and four leg muscles, five wing bones and three leg bones to measure their length, thickness and mass. To quantify relative growth, we calculated scaling coefficients of length/mass relationships for each bone and muscle relative to body mass. The scaling coefficient of bone or muscle mass relative to body mass for isometric growth is 1, for negative allometric growth (slower growth) is <1 and for positive allometric growth (faster growth) >1. We found that all wing muscles and bones grew faster than the body with scaling coefficients of up to 1.5; leg muscles also grew positively allometrically with scaling coefficients up to 1.3, yet leg bones grew isometrically with scaling factors close to 1. When comparing growth rates within each limb we found that muscles grew consistently faster than bones: the scaling coefficients for muscles were on average 0.13 larger than the coefficients for bones in both wings and legs. Conclusively we found that most of our hypotheses were contradictory. While the wings did grow faster than the body as expected, the legs also grew faster rather than at the same rate as the body. We also found that muscle development outpaces bone development.

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Poster Session I
Poster Board No. 6

Determination of Escape Trajectories in Larval Zebrafish to Horizontal and Vertical Predator Simulations

Fish execute a maneuver known as a C-start when they escape from a predator. Previous studies indicate that fish change their horizontal escape trajectories randomly when perceiving a predator, but there is a bias to moving away from the stimulus. The few studies that looked at the vertical trajectory found that fish larvae respond to a horizontal stimulus with a downward escape trajectory. We hoped to determine in this project if fish escape responses are hardwired into an evolved behavior, or a result of physical proportions. This study quantifies the escape trajectories of fish larvae in three dimensions. We used a vertical and a horizontal suction mechanism to determine the effects of direction on the escape trajectory. We found that zebrafish larvae (age 3 to 12 days post-fertilization) consistently responded to a horizontal stimulus with a downward trajectory. For the horizontal stimulus, out of 70 video recordings, 54 showed escape responses (77.1%). 52 of those responses showed a downwards trajectory (96.3%). The data suggests that the same trend holds true when we use a vertical stimulus, simulating a predator attacking from below. The vertical stimulus, out of 131 video recordings, 131 showed escape responses (100%). 129 of those responses showed a downwards trajectory (98.8%). Given the age range of the larvae, the downward trajectory cannot be explained by asymmetry of the body due to the presence of a yolk sac; the yolk sac is absorbed usually at age 5 to 6 days. So the downward trajectory might be a hardwired response or indicate that fish have less control over their pitch than their yaw angle – the body movements during an escape response might be able to generate a wide range of yawing moments, but not pitching moments, leading to the observed downward bias in the trajectories.

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Development of Electrospun Nanofibers to Promote Osteogenic Differentiation of Human Adipose Derived Mesenchymal Stem Cells

There exists a need for a biocompatible nano-scale scaffold that can serve as a viable substitute for autograft bone, and serve as a temporary matrix to mimic the microenvironments necessary for the regeneration of bone material. Development of a biocompatible nano-scaffold, which mimics the mechanical strength, pore size, porosity, hardness, and overall architecture of the microenvironments present during osteogenic differentiation is a major focus of the field of tissue engineering. Electrospinning can be used to engineer a two-dimensional polymeric matrix with a wide variety of controllable characteristics including: pore size, fiber width, and general architecture. Standardization of the electrospinning process within our experiment began with the manipulation of experimental conditions in regards to distance between the charged needle and the grounded aluminum collector plate, in addition the voltage supplied to the needle. Initially a voltage of 8kV was delivered to a fixed needle 10cm from the collector plate, and gradually the voltage was increased and the distance between needle and plate was decreased to achieve the most consistent fiber deposition. Optimum fiber deposition was achieved at 7cm distance from needle tip to collector plate at a voltage of 14kV. Our experiment utilized electrospun nano-fibers from a biocompatible polymer poly lactic-co-glycolic acid (PLGA) developed using different concentrations to create a suitable scaffold to promote osteogenic differentiation. Adipose derived human mesenchymal stem cells (ADhMSCs) were used to conduct osteogenic differentiation tests with analysis performed through Scanning Electron Microscopy (SEM) and mineralization assay using Alazarin Red S (Sigma) to detect the presence of calcium. Our experiment showed that 10% PLGA fibers presented an increased rate of osteogenic differentiation within the ADhMSCs compared to fibers of developed differing concentrations while providing a viable polymeric matrix to support propagation and differentiation of ADhMSCs.

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Poster Board No. 8

Influence of Watering Regime and Vegetation on Urban Arthropod Numbers and Diversity

Ecosystem structure, especially vegetation, in urban residential areas is influenced by a broad range of factors including homeowner socioeconomic status, local governmental policies and in many locations the price/availability of water. Ideally, urban vegetation water-use should reflect natural water availability, however, the vegetation in the Fresno-Clovis Metropolitan Area (FCMA) is similar to regions receiving much greater rainfall. A large fraction of residential water use in the FCMA supports lawn growth, but the introduction of water meters and stricter water-use policies in 2012 may reduce watering amount and frequency. This study examined arthropod numbers and familial diversity in lawns maintained under high-water (HW) and low-water (LW) irrigation regimes to test the hypothesis that arthropods communities may be altered by changes in homeowner irrigation practices. Arthropods were sampled using pit traps and sweep netting techniques in addition to recording the presence of ground cover and the number of flowering plants at each site (n=10). Pit traps collected primarily Coleoptera, Dermaptera and Formicidae. Sweep netting collected nectar feeders (Tipulidae, Syrphidae, Sarcophagidae, Muscidae, Anthomyiidae, Apidae and Hesperiidae); xylem or phloem feeders (Aphididae, Cicadellidae, and Miridae); and predators (Vespidae). The mean number of arthropod families at LW sites was marginally greater than at HW sites, 4.75±2.2 (range 2-7) and 4.0±2.8 (range 1-7), respectively. The total number of individual arthropods and familial diversity differed little between the HW (20 families) and LW (19 families) irrigation regimes. No clear association was found between arthropod diversity and either the presence of ground cover or the number of flowering plants. The limited influence of the LW irrigation regime may suggest limited use of lawn areas by urban arthropods.

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Poster Board No. 9

Brain Development in Hatchery-Reared Rainbow Trout, Oncorhynchus Mykiss: Offering a Variety of Rearing Environments Vs. Adding Structural Complexity

The development of vertebrate brains may be affected by stimuli, such as the complexity of their environment. This may be an issue in fish hatcheries where fish are exposed to very homogeneous and simple rearing tanks from birth. Two recent studies have found that simply adding gravel to rearing tanks can affect cerebellar development in salmonids. These recent discoveries have provided evidence that early exposure to more complex environments positively impacts the brain development of hatchery-reared salmonids but that this effect diminishes as fish grow and age. However, we know of no published studies which resolve: 1) whether or not there is a critical time at which exposure should take place, and 2) whether the effects are temporary or fixed. We tested the impacts of different exposure times to simple and complex environments on the brain development of juvenile rainbow trout.

We experimentally manipulated the environment (simple vs. complex) of rainbow trout at three different point through the egg stage to 20 days post swim-up. At 10 days post swim-up, we found that fish brain weight to body weight ratios were highest when the same environment had been experienced and that the ratio did not necessarily correspond to the time spent in a complex habitat. However, at 20 days post swim-up, we found that brain development was greater in trout that had switched habitats after 10 days post swim-up. This suggests that offering a variety of environments over time may stimulate brain development rather than sustaining experiences in either simple or complex environments.

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Calcium Induced Differentiation of Mouse Embryonic Stem Cells into Cardiomyocytes

Embryonic Stem Cells (ESCs) are capable of differentiating into any cell type such as cardiomyocytes (CMs). To induce differentiation of ESCs, they must be must be deprived of differentiation specific factors and allowed to form Embryoid Bodies (EBs). Formation of EBs by the Hanging Drop Culturing (HDC) method, forces them to differentiate into CMs. In our current study, we established in vitro differentiation of CMs. We show that EBs grown in bacteriological dishes form uniform circular EBs that differentiate within 7 days. These CMs are precursor cells that resemble the initial stages of embryonic development and this process is an essential component of primitive develop responsible for cardiac functions such as multi-nucleated fibers known as myotubes and excitation-contraction coupling. Coupling is generated by stimuli that produce an action potential allowing a calcium transient to fuel crossbridging in myotubes resulting in mechanical contraction. Multiple subpopulations of contractile foci or "beating clumps" have been characterized in ESC-derived CMs. EBs generated through HDC were cultured in 0.001mM calcium-conditioned media for 72 hours after initial transfer from low attachment dishes to tissue culture dishes. The results indicate that exogenous calcium induces faster generation of CMs, myotubes, and longer and sustained contractile ability of the generated fibres. To verify the presence of cardiac precursor cells, we assessed the expression level of muscle-specific markers across four developmental stages using RT-PCR: mESCs, EBs, cardiomyocytes, and myocardial tubes. Preliminary results indicate that cardiac-specific markers were highly expressed in the late stages. To extend this project, we will compare RT-PCR results for cardiac markers between CMs generated with and without supplemental calcium to isolate and observe the change in beating pattern of beating clumps. This data will provide a better understanding of how calcium homeostasis is essential in sustaining excitation-contraction coupling in cardiac precursor cells and enhance our understanding of cardiac development

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Poster Board No. 11

A Reverse Genetics Approach to Characterize the Function of Vlp, a Putative Transcription Factor, From Pseudomonas Aeruginosa

Advances in genome sequencing techniques have facilitated the understanding of pathogens like Pseudomonas aeruginosa. The availability of genome sequences allows us to systematically identify virulence factors within an organism using reverse genetics. Vfr is a well-known virulence regulator in P. aeruginosa. In this study, we identified a protein sequentially similar to Vfr (termed Vlp) in the P. aeruginosa genome and applied a reverse genetics approach to Vlp in order to characterize its role in P. aeruginosa physiology and pathogenicity.

First, based on the sequence information, Vlp appears to have novel target DNA sequence(s) that are not recognized by any of the CRP/FNR superfamily of bacterial transcription factors to which Vlp belongs. In order to identify the target DNA, we have created a chimeric protein of CRP-Vlp, in which the ligand-binding domain of CRP (Escherichia coli cAMP receptor protein) is fused to the DNA-binding domain of Vlp. We then confirmed the functionality of this chimera by changing the DNA-contacting Vlp residues to mimic CRP ones via site-directed mutagenesis and then by measuring in vivo CRP transcriptional activity. We will use the method of SELEX (Systematic Evolution of Ligands by Exponential Enrichment) to identify the target DNA sequences of the CRP-Vlp chimera (and therefore the Vlp protein).

Secondly, two vlp-deleted, but not fully confirmed, P. aeruginosa mutant strains were purchased from University of Washington Genome Sciences (http://www.gs.washington.edu/labs/manoil/libraryindex.htm). We confirmed one of the two vlp-deleted mutants to be true via PCR amplification. Then, the vlp–deleted P. aeruginosa mutant, along with the vfr-deleted and wild-type strains, was grown and prepared to several different cell concentrations. Each cell suspension was then injected into ten 5-7 day old male Drosophila melanogaster using the needle pricking method and the infected flies were monitored for their survival every 12 hours for up to 96 hours. Unexpectedly, the vlp–deleted P. aeruginosa killed fruit flies with higher efficiency than wild-type P. aeruginosa. This might suggest that Vlp is a negative regulator of P. aeruginosa virulence. Future experiments will include the virulence test of a vlp- vfr- double P. aeruginosa mutant, in order to see if the Vlp regulation is through Vfr.

In short, the reverse genetics approach was applied to the P. aeruginosa Vlp, which led to further testable hypotheses regarding the physiological function of the Vlp protein.

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Poster Board No. 12

Differential Decline in Locomotory Behavior of Drosophila With ALS-Induced Neurodegeneration

The underlying mechanism of Amyotrophic Lateral Sclerosis (ALS) remains unresolved even after thorough investigation in the last two decades. Part of the problem is our lack of knowledge of a definitive pathogenic pathway linking the biochemical process to the neurodegeneration. Beta-methylamino-L-alanine (BMAA) is a non-essential amino acid that has been linked to ALS, a severe human neurodegenerative disease. In humans, long exposure to BMAA causes Parkinson-like symptoms. The functional properties of BMAA in the nervous system are similar to glutamate, suggesting that BMAA is a glutamate agonist. Since glutamate is a major neurotransmitter in both insects and vertebrates, we used Drosophila melanogaster (fruit flies) to study the effects of BMAA toxicity. In insects, glutamate functions as the excitatory neurotransmitter at the neuromuscular junctions, and is also a neuromodulator in the central pattern generator, making glutamate an important factor in controlling locomotory behavior. To study the role of glutamate and BMAA, a large arena was developed in which we could track individual fruit flies as they walked around in groups. The study (1) quantified the effects of BMAA injection on locomotory behavior, (2) compared these effects to the effects of injected glutamate to determine if BMAA has the same effects as glutamate, and (3) explored the idea of a sequestering mechanism by observing transient effects of the toxin. The data suggested that there were behavioral differences between BMAA and glutamate through walking ability. Fruit flies injected with glutamate were able to recover from their initial locomotory deficits toward the end of the filming duration while the symptoms of the BMAA treated flies continued. Although fruit flies were able to recover from high doses of glutamate, the notion of a sequestering mechanism for BMAA needs further exploration.

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Poster Board No. 13

Progress Towards Tagging Phytopthora Capsici Resistance Genes in Pepper Using a Candidate Gene Strategy

Phytophthora capsici is a deadly soil-borne disease that is responsible for root rot and crown blight of bell and chili pepper. It also affects tomatoes, cucurbit crops, and many other species.

Currently, there is no major commercial variety of pepper that shows resistance to a majority of the pathogen isolates. Our project investigates the genetics of resistance against P. capsici through the use of a candidate gene strategy. Candidate genes are genes suspected of being involved in the expression of a particular trait. We are using previously cloned resistance genes from other members of the Solanaceae, Brassicaceae, Poaceae, and Asteraceae families as candidate genes for quantitative trait loci (QTL) that confer resistance to P. capsici. PCR amplification of DNA from our two mapping parental plant lines can detect differences, or polymorphism, between the two lines. Analyzing these polymorphisms in the progeny lines will indicate where the candidate genes are located. After conducting multiple searches on GenBank for potential candidate gene DNA sequences, primers were designed that amplify those sequences. Polymorphisms between parental lines are currently being sought. Polymorphic candidate genes will be placed onto the pepper linkage map by amplification of the same genes in a segregating recombinant inbred line population and analysis using JoinMap software. Additionally, melting curve analysis using quantitative real-time PCR will potentially reveal polymorphisms between the parental lines. Amplicons that are monomorphic in size on a gel will be digested using restriction enzymes to seek cleaved amplified polymorphism or will be cloned and sequenced to identify any single-nucleotide polymorphisms (SNPs). If any candidate genes map to the same location as any of our previously identified resistance genes, then there is a high likelihood that the candidate gene actually confers resistance to P. capsici.

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Elevated CO2 Has Minimal Effect on Vegetatively-Propagated Giant Reed (Arundo Donax) During the Establishment Phase

Giant reed (Arundo donax) is an invasive weed with a high transpiration rate and can cause strain on both natural and agricultural systems. As a C3 plant, it theoretically has the potential to capitalize on an increased atmospheric CO2 levels in its photosynthetic process. However, the effect of increased CO2 levels on newly establishing giant reed plants from rhizomes is not known. Therefore, the objective of this experiment was to study the effect of ambient (390 ppm) and elevated (600 ppm) CO2 levels on the above- and below-ground growth of vegetatively-propagated giant reed rhizomes during its establishment phase.

The study was conducted for two years. One plant was placed into each of the 16 open top field chambers, 8 of which had ambient CO2 and 8 had elevated (600 ppm) CO2. The CO2 was pumped into the chambers and the plants were exposed to these two CO2 regimes for approximately three months. Weekly measurements were taken on the growth of the plants (stem height, leaf numbers, and number of tillers) and water use. Photosynthesis and stomatal conductance was measured three times during the course of the experiment. At the end of three months, final plant height was measured and the plants were harvested and separated into leaves, stems, and below-ground material. Number of leaves on each plant was counted and leaf area was estimated with a leaf area meter. The leaves, stems, and below-ground plant material were then dried and recorded. Data were analyzed using ANOVA procedures at a 0.05 level of significance. Results showed that there were no significant differences between the two treatments in plant height, leaf numbers, leaf area, and above- and below-ground dry weight,. However, measurement close to harvest showed that the photosynthesis rate of the plants in the elevated CO2 chambers was greater than those in the ambient CO2 chambers. Therefore, this study showed that initial above- and below-ground growth of giant reed was not affected by elevated CO2 and long-term exposures may be required to study the effect of CO2 levels on giant reed.

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Poster Board No. 15

Will Reduced Water and Nitrogen inputs increase weed competition in fresh market tomatoes?

Water shortages and nitrate leaching is leading to the development of resource-efficient cropping systems in California. However, a concern with reducing these inputs is increased competition from weeds. A study was conducted to evaluate the effect of 3 levels of irrigation [100%, 80%, and 60% of evapotranspiration (ETc)], 3 rates of N (100, 150, and 200 lbs/ac), and soil-surfactant on weed densities, biomass, and tomato growth. Tomato seedlings were transplanted in May on 60-inch beds. The experimental design was a split-split plot with irrigation, surfactant, and N rates as the factors. The irrigation system was subsurface drip. Fertilizer was applied through the drip tape. Surfactant was applied at 1 gal/acre + 2 gallons of water. Similar amount of water was also applied to the no-surfactant plots. Weed densities were estimated on June 7 and 21, and on August 21. Weed biomass was estimated on July 19. Tomato plant height in each plot was also measured. Weed densities were similar in all the treatments on June 7; but on June 21 and August 10, densities were greatest in the 100% ETc plots. Surfactant and N had no effect on weed densities. Weed biomass was greatest in the 60% ETc plots and in the 200 lbs/ac N plots. Surfactant had no effect on weed biomass. At harvest, tomato plants were tallest in the 100% ETc plots. Nitrogen and surfactant had no effect on tomato height. In conclusion, reduction in irrigation reduced weed densities but increased weed biomass. Tomato plants were shorter when irrigation was reduced. This may mean that the weeds were more competitive than the crop at the lowest irrigation level. However, weed biomass was reduced by lower N rates. Therefore, an adequate balance between irrigation and N will be required to reduce weed competition while developing resource-efficient cropping systems.

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Development of Small Chalcone and Chalcone-Like Organic Molecules for Apolipoprotein E (Apoe) Modulation Through Structure-Activity Relationship (SAR) Study

Apolipoprotein E (apoE) is a prominent transport lipoprotein in the body and brain that helps distribute cholesterol and triglycerides between organs in the human body. Genetic variance in apoE alleles has been shown to increase the probability of developing Alzheimer's disease. We have previously screened a small library of small molecules that identified two structurally diverse scaffolds. Specific chalcones have previously shown the ability to modulate the production of apoE in ELISA assays. This presentation aims at describing our efforts with further structure-activity relationship (SAR) studies in an attempt to improve efficacy and develop drug-likeness.

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Design and Synthesis of Heterocyclic Analogs of Curcumin as Anticancer Agents

The overarching goal of this study is to develop curcumin analogs with improved bioavailability and the potential to treat advanced hormone-refractory prostate cancer. Curcumin (diferuloylmethane) is a component of turmeric, a spice that gives the yellow color to curry powder. Curcumin itself has a high safety profile in humans and has been demonstrated, in several culture cell systems and human xenograft mouse models, to have anti-cancer potential, in particular hormone-refractory prostate cancer. However, the clinical advancement of curcumin has been hindered by its low bioavailability due to poor water solubility and rapid in vivo metabolism. The fundamental hypothesis of this project is that replacement of two substituted phenyls in curcumin with two identical N-containing heterocycle scaffolds will produce compounds with improved bioavailability and retain the anticancer activity.

Synthesis of curcumin analogs possessing N-containing heterocycles has been explored employing various aldol condensation reaction conditions. The structures of the synthesized compounds have been established using various spectroscopic techniques including NMR, MS, and IR. The cytotoxicity of the synthesized curcumin analogs will be determined against two human androgen-independent prostate cancer cell lines (PC-3 and DU-145). During this study, we have observed that introduction of N-containing heterocycle scaffolds significantly decreases the yields of the associated curcumin analogs when we employed the double aldol condensation reaction conditions described in the literature for the synthesis of curcumin. After analyzing the reaction mechanism, we have figured out an alternative method to synthesize our target compounds.

In conclusion, we have explored the synthesis of N-containing heterocyclic curcumin analogs and found that employing basic conditions was a successful alternative approach to make our target compounds. Curcumin has also been synthesized as positive control for biological assay. The design and synthesis of our target compounds will be presented.

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Synthesis of Thiazole-Containing Curcumin Analogs as Anticancer Agents

Prostate cancer is the second leading cause of cancer-related deaths in the United States among men. Approximately 40,000 men die each year of hormone-refractory prostate cancer. The results of treatment with chemotherapy have been disappointing to date, with no trials demonstrating a benefit with respect to survival duration. Curcumin is a well-studied, non-toxic (at 12 g/kg each day) natural product that exhibits therapeutic promise for both early-stage and advanced-stage (hormone-refractory) prostate cancer in several cancer cell lines and in human tumor models. However, curcumin's efficacy in the clinic has been limited by its poor water solubility and rapid removal out of human's body. The objective of this project is to engineer more effective curcumin analogs for potential clinical use to treat advanced hormone-refractory prostate cancer. The fundamental hypothesis of this project is that replacement of two substituted phenyls in curcumin with two identical thiazole scaffolds will improve the bioavailability of the compounds but retain its anticancer activity.

Synthesis of curcumin analogs possessing thiazole scaffolds has been explored using various Aldol condensation reaction conditions. The structures of the synthesized compounds have been established using various spectroscopic techniques including NMR, MS, and IR. The cytotoxicity of the synthesized curcumin analogs will be determined against two human androgen-independent prostate cancer cell lines (PC-3 and DU-145). We have observed that introduction of thiazole scaffolds led to a byproduct instead of our target curcumin analogs when we employed the double aldol condensation reaction conditions described in the literature for the synthesis of curcumin. Based on the fact that the formation of the byproduct is caused by the basicity of thiazole, we have figured out an alternate synthetic approach to our target compounds.

In conclusion, we have explored the synthesis of thiazole-containing curcumin analogs and figure out an alternate approach to our target compounds. In addition, curcumin has been synthesized as positive control for biological assay. The synthetic investigation and synthesized compounds will be presented.

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Poster Board No. 19

Steric Hindrance and Restricted Amide Rotation: NMR Studies of Substituent Effects in Ortho- DEET Analogs as A Model System

The partial double bond character of the amide bond is generally responsible for its restricted rotation and has been extensively studied by NMR spectroscopy. We have previously carried out the conformational analysis of DEET (N, N-diethyl-meta-toluamide), a widely used pest-repellant and its several close analogs using NMR spectroscopy. In the e ortho- analogs of DEET the restricted rotation was further modulated by the ortho-substitution leading three interconverting conformations, instead of two. We intended to further explore the conformational exchange process by incorporating a variety of aryl substituents in place of the methyl group at the ortho- position. The primary goal was to evaluate the effects of electron-donating or withdrawing groups on the restricted rotation, thereby investigating the effect of sterical interaction on the observed three-site exchange process. This presentation will describe the design, synthesis, and conformational analysis of various ortho-DEET analogs using a combination of NMR spectroscopy and molecular mechanics calculations.

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Local and Long Range Dynamics of Intrinsically Disordered Proteins (IDP) Using Experimental Nuclear Overhauser Effect Spectroscopy (NOESY)

Nuclear magnetic resonance (NMR) spectroscopy is perhaps the only experimental method that is capable of determining the three dimensional structure of proteins at atomic resolution. Nuclear Overhuaser Effect (NOE) is a tool within NMR that allows for the translation of dipole-dipole interactions between the nuclei to an inverse sixth power distance between them. Though NOE is routinely used in many folded proteins, the use of the NOE in highly flexible structure is not very well understood. In this research, we provide a systematic approach to determine the local and long range dynamics of IDPs in the solution state using a combination of NOE in the laboratory frame (NOESY), rotating frame (ROESY) experiments as a function of temperature. The validity of this approach will be demonstrated in a small fragment of the protein derived from Nup-159, one of the IDPS in the yeast nucleopore complex.

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Poster Board No. 21

The Effects of β-N-Methylamino-L-Alanine (BMAA) on the Proteolytic Processing of Amyloid Precursor Protein to Amyloid-β Peptide

The neurotoxin, β-N-methylamino-L-alanine (BMAA) is a suspected causal factor in neurological diseases including Parkinsons (PD), Alzheimers Disease (AD), and Amyotrophic Lateral Sclerosis-Parkinsonism Dementia Complex (ALS-PDC). BMAA, produced in both terrestrial and aquatic cyanobacteria, is found all over the world, and has been shown to bio-accumulate in food chains such that humans may be ingesting toxic concentrations. A known mechanism of the neurodegenerative processes of these diseases, (most clearly seen in Alzheimer's disease), is the formation of Amyloid-β (Aβ) plaques in the brain. Aβ is a peptide fragment produced by one of the proteolytic processing pathways of Amyloid Precursor Protein (APP).

The objective of my research is to determine the effects of BMAA on the production of Aβ in NT2N human neuronal-like cells. The outcome of this research will be an enhanced understanding of the neurotoxic influence of BMAA on the neurodegenerative processes of ALS-PDC, PD, and Alzheimers Disease. Our lab is using NTera-2 cells (NT2) to characterize the production of APP and APP fragments. APP is processed through either amyloidogenic or non-amyloidogenic pathways and we are analyzing APP fragments as an indication of those pathways. We have initially characterized the fragments and are now examining BMAA's neurotoxic influence on those pathways.

The NT2 cells will be differentiated into NT2-neuronal like cells (NT2N) by exposure to retinoic acid. The NT2N neurons will then be grown with varying concentrations of BMAA: 0, 30, 100, 300, 1000, and 3000 μM. After 72 hours of exposure to BMAA, the cell lysates will be analyzed for Aβ production via Western blot, and immunoprecipitation analysis using the Monoclonal Anti-human β Amyloid protein 4G8 antibody.

We have demonstrated that BMAA induces neuronal toxicity independent of NMDA receptors, at a concentration of 3mM and that BMAA activates the amyloidogenic pathway of APP processing. My research addresses this knowledge gap. If BMAA can be shown to increase Aβ production we can conclude that BMAA exposure has a causal influence on Alzheimer's.

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Poster Board No. 22

Drosophila Melanogaster Mitochondria as A Marker of Oxidative Stress in ALS-PDC

ALS-PDC (amyotrophic lateral sclerosis-Parkinsonism dementia complex) is a motor neuron disease with symptoms of ALS (also known as Lou Gehrig's disease), Parkinson's, and Alzheimer's disease. Risk factors include lifestyle choices that can be adjusted, such as smoking, alcohol consumption, and strenuous exercise. On the other hand, there are risk factors that cannot be changed such as oxidative stress. Oxidative stress occurs when the body is overwhelmed with free radicals, associated with normal aging and neurodegenerative disease. An excess of glutamate in neurons or a naturally occurring environmental neurotoxin, BMAA, has been implicated with ALS-PDC. BMAA, beta-methylamino-L-alanine, is a widely studied neurotoxin with a structure similar to glutamate, in the presence of bicarbonate. This neurotoxin is produced by cyanobacteria and is found in oceans, lakes, and soil. BMAA has become a concern, not only because it causes oxidative stress in cyanobacteria, but because it has been found in the brain of Alzheimer's patients.

Our laboratory has shown that BMAA causes oxidative stress in Drosophila melanogaster (fruit flies) fed BMAA. The organelle of interest in this study is the mitochondrion due to its central role in resisting or maintaining normal levels of oxidative stress. Oxidative stress is determined by measuring superoxide dismutase (SOD) protein levels and enzymatic activity; SOD is an enzyme whose role is to prevent oxidative stress. We have optimized a protocol to isolate mitochondria from fruit flies (control, glutamate, and BMAA-fed). Using methods including a BCA protein assay, SDS-PAGE, SOD enzymatic assays, and Western blot, the SOD concentrations in the mitochondria were measured in fruit flies. Western blot was used to identify SOD-1 (cytosolic and mitochondrial CuZnSOD) and SOD-2 (mitochondrial, MnSOD) in fruit fly tissue lysates and isolated mitochondria. Our initial studies show SOD-1 protein and enzyme levels are highest in flies fed with BMAA. If BMAA causes stress in a particular organelle, such as the mitochondria, a target can now be addressed for a better understanding of the mechanism of toxic action.

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Poster Board No. 23

Investigation of the Molecular Nature of Intrinsically Disordered Proteins (IDP) Using Solvent Perturbation Studies

There are two classes of proteins: structured proteins and intrinsically disordered proteins. Intrinsically disordered proteins (IDPs), found in nature, correspond to regulatory functions such as translation. IDPs can take on folded structures, under specific physiological conditions, upon binding to their specific biological targets. As the same protein can be either structured or disordered, depending on the environment, this in turn deems solvent effects to play a significant role on the state of these proteins. In this research we study the systematic changes of solvent induced structural changes in model proteins. Using a range of biophysical measures (spectroscopic and calorimetric methods) we performed co-solvent experiments in a water:methanol system. In addition to quantifying structural changes, we will provide thermodynamic variables that are responsible for the structured to disordered transitions. This research provides a new way to understand the molecular nature of IDPs using solvent perturbation methods.

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Electrochemical and Spectroscopic Fundamental Study of C60 and C70 Fullerene in Various Condition

Since its discovery back in 1985, fullerene has become a hot topic for chemists. Fullerene is a name given for the group of compounds that has a hollow cages structure consisting entirely of carbon atoms interconnected in pentagonal or hexagonal rings. Due to this characteristic structure, fullerene expresses unique behavior such as exhibiting a very rich redox property. In this project, possible application of fullerene as a chemical sensor is studied by investigating the fundamental properties of C60 and C70 fullerenes in various solvent systems. In the first study, electrochemical properties of fullerene were investigated utilizing cyclic voltammetry. The correlation between half wave potential and the size of supporting electrolytes were discovered. As the size of cation and anion increases, half wave potential of both C60 and C70 approached the positive values. This trend is described as the result of solvophobic interaction. Solvophobic interaction was consistent in all three trials carried out for each solvent medium. Furthermore, a positive correlation between dielectric constant of solvents and half wave potential is seen. Other electrochemical properties such as diffusion coefficient and heterogeneous electron transfer rates are compared with viscosity of solvents but did not show any correlation. In the current study, spectroscopic study in Ultra Vilet-visible range was carried out. For C60 fullerene, absorptivity around 405 nm and 330 nm were investigated in six different solvents containing eight different supporting electrolytes. Meanwhile, absorptivity around 470 nm, 380 nm, 360 nm and 330 nm were investigated for C70 fullerene at selected solvent system. No definite trends were observed in spectroscopic study due to the fact that there were less interaction between supporting electrolytes and neutral fullerenes.

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The Effects of Guided Imagery on Balance in Older Adults

Background and Purpose – Guided Imagery (GI) has shown a recent growth in popularity as an exercise to improve balance. There are many of anecdotal claims of effectiveness, unfortunately there is little objective data to support these claims. The purpose of this study was to examine if guided imagery incorporated into a group balance and mobility class provides significant improvement in balance outcome measures of community dwelling older adults.

Design - Pre-test, post-test, two-group quasi-experimental design with allocation to GI in place of traditional FallProofTM cool down and home exercise program (HEP).

Setting - General community.
Participants – A total of twenty-seven community dwelling adults. Men (n=6) and women (n=21) aged 65 to 90. Control and experimental groups had no significant differences in demographics or pre-test scores.

Intervention - Participants were divided into two groups. A FallProofTM class with a strengthening and flexibility home exercise program, and a FallProofTM class with GI in place of the traditional cool-down and home exercise program. Both classes were held twice a weekly for 12 weeks, each class lasting one hour. Home exercise programs were comparable in duration for both groups.

Measurements – Multiple measures were used to investigate influence of GI on various aspects of balance. Specific outcome measures were the Fullerton Advance Balance Scale (FAB), the 30-foot walk test, the 8-Foot Up and Go (TUG), and the Composite Physical Function Scale (CPF).

Results – Both groups had clinically significant improvements on both the FAB and the TUG, however improvement was not dependant on intervention received. There were no significant improvements in either group for the 30-foot walk and CPF.

Conclusion – The results do not support the efficacy of incorporating guided imagery into group balance and mobility classes for community dwelling adults.

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Establishing the Microbial Load on the Surface of Keys

The objective of this study was to determine the microbial load of common household keys. The Center for Disease Control and Prevention estimates that 5,200 deaths every year are attributed to foodborne illnesses in the United States. The transfer of microorganisms to hands and then onto food is the number one cause of foodborne illness. Because keys are carried and handled by people extensively and rarely if ever cleaned and sanitized, it is possible that microorganisms build up on keys, leading to massive contamination. Because people handle keys and handle food, for the purpose of this study, keys will be characterized as a food contact surface.

A random sample of keys belonging to 15 male and 15 female subjects was swabbed for microbial testing. Two keys from each subject was swabbed using standard methodology for the swabbing of food contact surfaces. Samples were plated on selective microbial and enumerated for mesophilic aerobic bacteria, generic coliforms, and Escherichia coli. These selective groups of bacteria will give some indication of the source of contamination. An aerobic bacteria count will indicate the total microbial load; however coliforms are an indication of fecal contamination. An Escherichia coli population will be a subset of the coliform family, some of which are pathogenic for humans.

The estimated mesophilic aerobic plate count (APC) for male subjects ranged from below detection (<1 colony forming units (cfu) per square inch) to 480 cfu per square inch, and averaged 47 cfu per square inch. For female subjects the APC ranged from below detection to 155 cfu per square inch, and averaged 25 cfu per square inch. Results show coliform and Escherichia coli counts that were below detection (<1 cfu/per square inch) for all subjects.

The United States Public Health Service sanitation standard for food contact surfaces is fewer than 12.5 cfu per square inch. The data collected in this study indicate that the average key has a microbial load 2 times to 4 times higher than what is considered safe for food contact surfaces. The encouraging news is that the source of bacteria is not enteric microorganisms (most foodborne pathogens are enteric or fecal organisms). However, the microbial count on the keys samples is very high, especially for the male subjects in this study. People should consider washing and sanitizing their keys on a regular basis, and washing their hands after handling their keys and before touching food.

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Validation of At Home Cooking Methods in Reducing Enteric Pathogens in Ground Beef

This study was done to validate the suggested cooking temperatures that should be used for a safe home style cooking method of ground beef hamburgers. The Center for Disease Control and Prevention estimates that there are 76 Million Cases of foodborne illnesses annually in the United States, with 325,000 hospitalizations and 5,200 deaths. Forty-eight percent of these cases are due to food of animal origin (beef, poultry, eggs, pork, fish, and dairy products). The United States Department of Agriculture (USDA) recommends an internal cooking temperature of 160 degrees F for ground beef.

Ground beef was inoculated with Lactobacillus, which is considered a suitable bacterial surrogate for Salmonella, a common foodborne pathogen associated with beef. Three ground beef patties were cooked to specific internal temperatures (raw, 120, 140, 150, 160, and 180 degrees F). Patties were then core sampled and enumerated for mesophilic aerobic bacteria using standard microbial methods.

The results showed that a significant reduction of microorganisms in ground beef patties cooked to an internal temperature of 160 degrees F. These results validate the recommendations of the USDA for the cooking of ground beef hamburgers.

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Beer Pong Sanitation

Beer pong is a common drinking game played by college students. In a game of beer pong, teams of two stand on opposite sides of a table and aim towards 10 plastic cups filled with about one ounce of beer arranged in a triangle formation. When a ping pong ball lands in a cup, a member of the opposing team must drink the beer in the cup. Each team is equipped with a cup full of water to rinse the ball when it lands on the floor. The beer cups and water rinse cups are rarely replaced. Balls, beer cups, and water rinsing cups can be considered food contact surfaces as they come in contact with the beer consumed during the game.

Balls, beer cups, and water rinsing cups were aseptically collected at the end of the night and stored in sterile bags. The samples plated were evaluated for mesophilic aerobic bacteria, coliforms, generic Escherichia coli, and yeast and mold. The water used to rinse ping pong balls had a mesophilic aerobic bacteria count of 1900 colony forming units (cfu) per mL of rinse water, a coliform count of 55 cfu per mL, a yeast count of 25 cfu per mL, and a mold count of 35 cfu per mL. These numbers are astounding and high above what would be considered safe. No detectable (1 cfu/mL) coliforms, yeast or mold were found on the red plastic cups used for beer pong, however, the mesophilic aerobic bacteria count was 1876 cfu per square centimeter. This is about one thousand times above the US Public Health Service sanitation standard for food contact surfaces of fewer 2 cfu per square centimeter. The ping pong ball itself has a mesophilic aerobic bacteria count of 44 cfu per square centimeter, about twenty times high than the standard. Tap water, unused cups and ping pond balls were evaluated as negative controls, and these results were below the detection limit of 1 cfu per mL or square centimeter.

Results suggest that beer pong games can lead to massive contamination of food contact surfaces involved in the game. In conclusion, the traditional game itself is a very unsanitary and not recommended for those who are afraid to get sick before an exam.

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Arab Spring or Islamist Winter?

Growing instability in the Middle East has heightened political and economic turmoil, particularly during the past two years as conflicts in many Arab nations have been brought to global attention through cyber news networks and public television broadcasts. The most influential of these was the Arab Spring, which began with the public suicide of Tunisian Mohammad Bouazizi December of 2010. This study, conducted under the guidance of Dr. William Reckmeyer for the San José State McNair Scholarship Program, analyzes the fundamental causes of the Arab Spring, focusing on Tunisia. It examines the social changes in the Middle East and determines what type of changes they reflect. Finally, it assesses the implications for Tunisia's future and the overall significance of the newly, established Arab world. Did Tunisia really undergo a re-birth, or has it already entered a cold and harsh Islamist Winter?

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Deficits in Cognitive Executive Functions Were Not Observed in Heavy Marijuana Users

Because recreational and medical use of marijuana is on the rise, it is important to identify its effects on human cognition. The present study investigated the effects of marijuana use among 44 college students who reported one of the following: heavy marijuana use, light to moderate use or no use. The author hypothesized that heavy marijuana users would perform more poorly than light to moderate users and non-users on measures of executive brain function that included a delayed recall test, a word recognition test, trail making tests A, trail making test B, and a verbal fluency test. The findings revealed no between group differences among users on any of the cognitive measures. However, a significant inverse relationship between age of first use and frequency of use was observed ($r = -.64$, $p < .05$) which suggest transient effects of marijuana use on memory. Future research should consider the cumulative effects of marijuana use beginning in adolescence into later adulthood (Fletcher et al. 1996).

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Student Outcomes Associated with the Implementation of Positive Behavioral Interventions and Supports (PBIS) across California Central Valley Schools

Positive Behavioral Interventions and Supports (PBIS) has emerged as an evidence-based multi-tiered approach of systems and practices to establish supports in order to promote student behavioral outcomes (Horner, Sugai, & Anderson, 2010). The purpose of this study was to examine (a) the characteristics (behavioral and academic) before and during PBIS implementation and (b) the extent of perceptions associated with PBIS implementation towards implementation fidelity, school safety, and students' behavioral outcomes during the 2012-2013 academic year across California Central Valley schools. The study used an interrupted time series experimental design to examine trends in repeated measurements over time (Creswell, 2008). Measurements included school enrollment rates, Academic Performance Index scores, suspension rates, the Benchmark of Quality scores, Team Implementation Checklist, and office discipline referrals. Results indicate PBIS fidelity of implementation across academic years and behavioral data (suspension rates, office discipline referrals) shows the effects across diverse school types - elementary, middle, and high school.

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The Role of Psychological Inflexibility in Body Image and Affect Disturbance

The literature examining body dysmorphic disorder (BDD) and major depressive disorder (MDD) is filled with theoretical constructs at the bases of the problem. Recent studies on psychopathology suggest that psychological inflexibility (experiential avoidance) correlate with higher levels of psychopathology. The present study aimed to investigate the relationship of body image disturbance diagnosable BDD, diagnosable MDD and experiential avoidance. A large sample of 336 diverse undergraduate students, 75.6% of whom were female and 24.4% male ranging from 18 to 48 years old were examined, including those with diagnosable BDD and MDD. Results indicated body image disturbance, depressed mood, and experiential avoidance are highly correlated. In addition, findings revealed that experiential avoidance and body image disturbance predict depressed mood and that depressed mood predicts meeting criteria for BDD, however experiential avoidance does not predict BDD cases. MDD is common in individuals with BDD, with higher severity. One limitation is that the sample used was of convenience and is composed solely of college students and a clinical sample would be a desirable form of comparison.

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Learning the Caregiver Role: Challenges and Coping Strategies of Hispanic Caregivers for Alzheimer's Disease Patients

The purpose of this study was to gain insight into the experience of being an informal caregiver for a dementia patient in the Hispanic community. This would further contribute to the challenges and coping techniques the caregivers utilize to help them care for their loved ones and manage their own health. Furthermore, it was intended to investigate which types of outside resources and facilities the caregivers are using. Nine caregivers participated in semi-structured interviews. All the participants were caring for a loved one who had been diagnosed with Alzheimer's for at least a year. They were all recruited from an adult activity center specifically designed for Alzheimer's patients. All the participants were either currently utilizing the center or had used it at some point. All participants identified as Hispanic and some of the interviews were conducted in English, Spanish, or a mixture of the two languages. Three of the participants were male and six were female but all the participants were caring for females (mother or wife) formally diagnosed with Alzheimer's disease. The age range of the participants was 49 to 89 years old. The majority of the participants had been caregiving for at least four years. The study provide preliminary insight to the gender differences in the caregiver role. It also reveals that the types of resources the caregivers preferred to use to help them manage their loved one's health. It demonstrated that caregivers prefer to utilize resources that keep their loved one in the community and either refused or were extremely reluctant to use those that removed their loved one from the community.

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Poster Board No. 10

Evaluation of Contaminants in the Green Waste Stream in Fresno, California

The City of Fresno collects green waste by curbside pick-up and delivers it to a green waste transfer station. From there, some of it is chipped and sold for landscaping, some is sent to a biomass incinerator, but most is sent to a commercial compost facility. During the course of the characterization of the green waste, we observed significant amounts of contaminants. Although some is screened out at the transfer station and some at the compost facility, some makes its way into the finished product, compromising its quality. Our objective is to determine the percentage by weight of contaminants in the green waste. Our methods are to obtain 30 random samples from among the 122 routes collected each week. Based on preliminary data, we observed 3.47% contaminants among six randomly sampled routes, well above the 1% maximum allowed in California. The individual routes ranged from 0.05% to 16.72%. We are finding significant variation by route as we continue collecting data. We have identified several areas of further research, each with practical application. Our data can be compared to the demographic information for each route. We may find that there is a correlation between higher levels of contaminants and age, ethnicity, or income. This could help Fresno and other cities to identify ways to launch effective educational campaigns to reduce contamination. Additional research could be done to find the percentage of contaminants in the finished compost product to show how effective the current processes are for removing contaminants.

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Utilizing Multibeam Bathymetry and Geographic Information Systems (GIS) to Expand Our Mapping Ability of Potential Rockfish Benthic Habitats in the San Juan Islands, Washington

To better understand, maintain, conserve, and preserve potential rockfish habitats around the San Juan Archipelago, Washington, Geographic Information Systems (GIS), aerial photographs, and bathymetric data were utilized to depict a more complete diagram of the marine world. Because the three types of rockfish that inhabit this Puget Sound region are either threatened or endangered, this study is highly significant in aiding their future production and health.

In order to construct an accurate cartographic representation of the researched habitat zone, bathymetric data is needed to form layers within GIS that include, but are not limited to, slope, hillshade, and aspect. Backscatter data is also important in order to demonstrate the induration of the marine floor, which in turn may tell the researcher what type of sediment and substrate makes up that part of the benthic region. Once these layers are added to the GIS map, another layer (referred to as Potential Benthic Habitats) is created and inserted. This layer uses the same induration data but groups them into polygons, which are then color-coded and displayed on the map. With all the layers now pictured, it is clear that the intertidal zones are not complete. Aerial photographs are then added to fill in the gaps according to the GPS coordinates associated with the middle point of each picture. When all pictures and layers have been included, the GIS map is a somewhat three-dimensional, color-coordinated, aerial photograph enhanced depiction of Skipjack, Waldron, Orcas, and Sucia Islands.

The bathymetric and backscatter data are plugged into Excel to graphically illustrate specific numbers that represent the various potential habitats. The given data support the idea that potential rockfish habitat (Sedimentary Bedrock and Fractured Bedrock) must be closely monitored and maintained in attempt to preserve and conserve the rockfish species within the Puget Sound locale.

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Analysis of Adipose Derived Human Mesenchymal Stem Cells Cultured on Electrospun Nanofiber Scaffolds Using Confocal Microscopy

As stem cell technologies have evolved, there has been an increasing need for the development of methods to analyze proliferation and differentiation of stem cell cultures. Current research at the Stem Cell Instrumentation Foundry (SCIF) at the University of California, Merced (UCM) involves the generation of nanofiber scaffolds with various concentrations of the biocompatible polymer polylactic-co-glycolic acid (PLGA). These nanofiber scaffolds serve as a surface to induce the growth of adipose derived human mesenchymal stem cells (ADhMSC) and their differentiation into osteocytes, cells that compose the hard part of bones. ADhMSCs were cultured on the nanofiber scaffold for two weeks before analysis of data. In order to analyze stem cell compatibility with the nanoscaffold, a Live/Dead® cell assay was completed. Results from the Live/Dead ® cell assay showed no difference in cell vitality of nanofiber scaffolds compared to the controls. Stem cell differentiation and proliferation was then determined using confocal microscopy. The confocal microscope used multiple lasers and EZ-C1 software to image both the nanofiber scaffolds and the stem cells. Immunohistochemistry was then used to analyze cell morphology, proliferation, differentiation and scaffold structure. To do this, Collagen X stain and Osteocalcin were used to stain the various components of hyaline cartilage and osteocytes to infer stem cell proliferation and differentiation. Based on results obtained from confocal microscopy, Collagen X and Osteocalcin staining, scaffolds containing 10% PLGA showed greater amount of ADhMSC proliferation than those containing 5% PLGA. This higher proliferation viewed using confocal microscopy suggests that scaffolds containing 10%PLGA may serve as a biocompatible surface to induce osteocyte differentiation.

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Lightweight Aggregate Application as Backfill Material

Lightweight aggregates such as expanded shale, clay, and slate have proven to meet design criteria for backfill applications. The low density of these aggregates significantly reduces the earth pressures behind bridge abutments and other retaining structures. In addition, the lower density reduces the transportation cost, and thus, the overall cost of the project. Further, the high permeability of the aggregate allows for proper drainage in the backfill and internal curing when mixed in concrete. Moreover, manufactured and recycled lightweight aggregates have lower environmental impacts in comparison with conventional aggregates and their cementitious products. Despite these advantages, current standards generally address backfill applications using weight-based methods, which is only appropriate for most conventional normal-weight aggregates. Therefore, the low density of lightweight aggregates is an obstacle in the implementation of these standards. Public and private entities are thus reluctant to use these alternative materials, unless they can afford to develop special specifications. Modification of weight-based standards and implementing volume-based procedures will allow various stakeholders to incorporate lightweight aggregates in projects. The aim of this research is to gather information on current standards and specifications within local, state, federal, and international jurisdictions. Further, this project will develop and illustrate a methodology for testing materials using a volume-based approach in comparison to a weight-based approach. The literature study also covers current in-progress efforts by entities such as ASTM, DOT, and Eurocode, towards the development of new standards for lightweight aggregates.

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Real-time Tuning of PID Control Gains in HVAC Systems

The tuning of proportional-integral-derivative (PID) coefficients affects the overall efficiency of a heating, ventilating, and air conditioning (HVAC) system's energy consumption and thermal comfort. If calibrated properly, the system can achieve optimum efficiency in both comfort and energy consumption by up to 35% in energy saving and by up to 52% in meeting effective temperature set points. The current PID coefficient settings in the science and engineering (S&E) building create temperature fluctuations. To decrease the temperature fluctuation, the PID coefficients need to be recalibrated. The objective of this research project is to develop a precise calibration method to fine tune PID control gains. A bisection method for real-time tuning is developed to determine optimal PID coefficients from estimated PID control gain intervals. The method was applied to a specific room in the S&E building during the summer. We hypothesize by utilizing the bisection method to recalibrate the PID coefficients, the temperature fluctuations will decrease substantially improving energy efficiency and personal comfort.

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Aerodynamics Analysis of CSU, Fresno's Formula SAE Racing Car

This research is an integral part of Fresno State Formula SAE racing car design and fabrication. The car is planned to participate in the Formula SAE 2013 competition at Lincoln Airpark, Nebraska. This research is to design an optimal body for the Fresno State Formula SAE car. Different body designs are evaluated in SolidWorks Flow Simulation to maximize the car performance criteria, including reducing weight, air drag, lift force, and increasing air flow to the radiators. The research consists of multiple phases. The first phase is involved with reading technical articles related to the racing car body design and its aerodynamics. The information about other Formula SAE cars is also reviewed to identify the positive features of their body designs. The second phase is when different designs of the body are modeled and analyzed in SolidWorks Flow Simulation. The design is iteratively improved based on the performance criteria mentioned above. The performance factors along with other constraint such as cost, time, risk factors, and benefit to the overall objective, determine selection of the final body design.

The knowledge I have gained through coursework and reviewing technical documents has led me to the following conclusions. Adding wings to the SAE car will improve the overall performance (S.M. Sapuan). Wings provide a slight increase in the overall performance by improving the handling of the vehicle while minimizing vibrations and drag. These improvements will only take effect if the wings are designed and built perfectly otherwise it would hinder the team. The limited resources and lack of experience molding, designing, and fabricating in members of Fresno State's SAE team has brought me to the conclusion that adding wings will more likely hinder the car's performance. Future results of SolidWorks flow simulations are expected to show that placing two radiators on the side of the car instead of behind the head of the driver will increase the air flow to the radiators. Ducts will be used to take advantage of the laminar flow between the tires and the body. The disadvantage of this method is that air drag of the overall car will be increased due to the additional of surface area. While placing the radiator behind the drivers head will reduce drag, it will also increase the risk of the engine overheating during competition.

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Inviscid Flow Models Predict the Physical Limits of Suction Feeding in Aquatic Organisms

Suction feeding, a method of prey capture in aquatic organisms, involves the generation an imposed pressure gradient that causes water (and prey) to flow from the surroundings to an area of negative pressure within the mouth. Suction-feeding organisms described in the literature range in size from ~0.6 m (largemouth bass M. salmoides) to ~1 mm (bladderwort Utricularia). Nevertheless, the peak fluid speeds reported for feeding strikes are strikingly similar: 1-2 m/s at the mouth aperture. In all cases that have been documented in sufficient detail, the suction-feeding flows are found to be effectively inviscid (inertial considerations dominating viscosity) and incompressible. In the context of our investigation of bladderwort, we considered the mechanical basis of this observation. The corresponding Eulerian equations of motion predict that the limiting flow speed will depend on the imposed pressure drop only, not on aperture dimensions. This dependence is furthermore sublinear, so the range of biologically achievable peak pressures translates to a narrow range of peak speeds, as observed. In cases of unsteady flow, the Eulerian analysis makes additional predictions: fluid acceleration will depend only on pressure drop and channel length, and the time required to reach steady state will be vary inversely with pressure drop. We measured vectorial flow fields outside the bladderwort's mouth using high speed video Particle Image Velocimetry and found that axial velocity transects correspond to an inviscid flow model in the bladderwort. A literature review was completed in order to compare our experimental results with published data on suction events in other aquatic organisms. Scaling analysis showed that peak flow speeds are limited by the peak pressures an organism can generate, not the organism's body length or gape size. Suction feeding is thus feasible for small organisms, which are able to bypass limitations imposed by steady-state fluid mechanics by operating in an inviscid flow regime.

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Poster Board No. 18

Multi-Physics Idea in Determining Global Simulation Layer for the Design and Development of Electrical Generator to Improve Efficiency

The generator is a machine that is used to generate electrical power for many applications. Wind mills and hydroelectric dams are two important methods for accomplishing rotational movement to make a generator function. The world has been trying to develop alternative ways to generate electricity. Fossil fuel based generation pollute the air causing global warming. The United States consumes up to 95.7 Quadrillion BTU of energy a year, and 50 percent of that is from fossil fuels. Many people have been in a search of an alternative fuel, but the cost of switching from fossil to another would also have similar impact. This study reports a design and development framework that would possibly make the traditional electrical generator more efficient. The objective of this senior problem is to study the viability of incorporating another layer in the design and development process of typical generators in order to improve efficiency. This layer can be defined in terms of global simulation layer. Global simulation layer should consider the design and development of the entire system. Note that a generator uses a magnet or an electromagnet that rotates the two polarities. North and South poles of the magnetic field that interacts with a group of coils output electricity. Every electrical wire or loop that has electricity running through it has a magnetic field. Other factors about the generator are that the faster you spin the magnetic field around a coil and if the magnetic field gets stronger more electricity will be outputted. Further, heat is an enemy of electricity. Furthermore, the overall physical structure of the generator is an important factor to consider. Therefore, there is a need to consider all these aspects prior to its real development. The concept Multi-Physics is thus important in designing Engineering Technology systems. The global simulation study should include all aspect of design and development of an electromechanical system, a complex system like, such as electrical generator. We present a conceptual framework to validate this idea.

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Poster Session II
Poster Board No. 19

Small-World Networks (SWN): Past, Present and Future

This senior problem studies the concept and applications of Small-World Networks (SWN). In social network settings, we can imagine that there is a network of friends: one knows another friend or group of friends, whose friends further propagate this acquaintanceship. Such networks are affected by the randomness of association. Each single person is a walking node. A person who is extremely popular may have a connection to someone who is not at all. This is due to intermediary people if there is not a mutual friend or acquaintance between the two. The network allows users to define key nodes that allow us to figure out a particular person with many major connections. These people may connect to another major person that further extends their network of intermediary contacts. There is a strong mathematical and empirical concept behind the SWN. We can apply this concept to many fields in the social world. In a nutshell, the social interaction of people and even their behavior can be modeled using SWN. The main focus of the project is to synthesize existing model. The working principle of a SWN is also discussed. In order to theoretically explain such networks, the encapsulation of certain properties pertaining to both randomness and order are summarized. These are (1) the structural characteristics are inherently nonlocal, (2) the larger the size of the network, the more difficult it is to analyze, and (3) it is difficult to measure the distance between the people, given the major nodes. Several researchers who have been working on application areas of SWN are then presented. In particular, this paper presents comparison of different networks, early experiments, its inner working, order and randomness in networks and graphs, clustering coefficient, correlation of the theory with the experiments in real world, SWN today, and future applications. Continual improvements in modeling of such a network have allowed an increase in the abilities of the theoretical researcher. It is concluded that the SWN cannot be completely modeled because it is not a completely nonrandom system. Neither can it be completely ordered. The future application of SWN can be applied to study the propagation of various epidemics and how in real-world they differ from each other, so that a predictive model for each can be readily available at hand, therefore preventive measures can be undertaken when a particular epidemic would burst.

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MDX Supply

Facilities design has played a huge role in our world for longer than most people may imagine, and has shaped many of the products we use and the way we do things today. This project aims to reduce costs for a local company whose identity I will protect by referring to as WDX Supply; which supplies many of the city and county workers with their uniforms and cleaning products. My objective is to apply what I have learned from scenarios in the operations and facilities design classes to this current business needing improvement.

The project is to develop and deliver a portfolio of diagrams, data tables, and charts showing current daily demand and activities needed to meet them. The main objective of the project portfolio is to produce a future state value stream map that reduces lead time between materials received, washing, embroidery and labeling processes, and finally delivery.

Tasks will include multiple plant visits for layout analysis and data recording which I will use to develop my portfolio. I will include the background of lean production and wastes commonly incurred in industrial plants and explain how I have applied them in the final report section of the portfolio. Being a competitive industry, somewhat costly standards must be met to keep a large amount of client accounts. Currently the company has a surplus of inventory which is not being rotated at an optimal level. By designing a layout that has automated sorting systems I hope to minimize the surplus of inventory and help meet the 80/20 rule of inventories. The results will be discussed during the symposium, stating whether implementing automated systems would be a viable solution.

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Poster Board No. 21

Design of a Torque Magnetometer

A torque magnetometer is an instrument that measures a material's magnetic properties. One feature of the torque magnetometer is to measure the magnetic moments of materials. The torque magnetometer is composed of a cantilever and a base. The cantilever acts both as a sample holder, and as the top component of a capacitor plate. The base acts as both the stabilizer and the bottom component of the parallel plate. The magnetometer is planned to be placed inside of a Janis Cryogenic System; which provides both a magnetic field (up to 9 Tesla) and a cooling system down to 1.6K. The applied magnetic field interacts with the sample, which feels a magnetic force that causes it to move. This change in position of the cantilever creates a change in the capacitance measured. This change in capacitance is used to calculate the sample's magnetic moment. A magnet with a near homogeneous field must be used in order to ensure that only the interaction with the sample causes the change in capacitance. In the Strongly Correlated Electron Laboratory, we plan to use the torque magnetometer in order to find the magnetic moments of nanoparticles that are currently being synthesized. We are currently in the concept stage of designing the torque magnetometer. However, we hope to construct our first design in the near future.

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Poster Board No. 22

Synthesis and Characterization of Gadolinium Nanoparticles

The study of nanoparticles is currently an area of great interest in the scientific field because of its numerous applications in areas such as biomedicine, optics, electronics, etc. Our laboratory has been focused on the synthesis and characterization of gadolinium nanoparticles using the reverse micelle method. In this method, small spherical cages are formed around the reactants when the surfactant is combined with a polar and nonpolar solvent. A solution containing the reducing agent is then added in order to produce the desired metallic nanoparticles. The small inverse micelles protectively confine the reduced reactant and prevent it from combining into larger size. In previous growths, a combination of toluene/water/DDAB was used in order to produce the reverse micelle system. Due to the reason that the rare earth metal reacts with water and the packing parameter of the surfactant DDAB is not favorable to form small micelles, we recently changed our reverse micelle system to hexane/methanol/AOT. Liquid-liquid extraction used in earlier growths was also replaced with vacuum filtration in order to separate our products and excess surfactant. Scanning Electron Microscopy (SEM) and a light microscope was used in order to identify the shape and size of the particles while Energy Dispersive X-ray (EDX) spectroscopy was used to check the composition of the product. The size of our synthesized particles was in the range of 1-5 micrometers.

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Poster Board No. 23

Survival Analysis on Patients with Chronic Hepatitis B

Chronic hepatitis B is a major health problem that affects over 350 million people worldwide. In this research, we use methods from a field of statistics called survival analysis to model the onset of liver cancer in Taiwanese patients with chronic hepatitis B using a dataset of over 23,000 individuals. We construct a new model for cancer risk which considers liver cirrhosis on a time-dependent basis and we demonstrate that this model is more efficient than previous time-independent models using a variety of criteria. We also show that the development of liver cirrhosis is the greatest risk-factor among other covariates in the model. Using our model, we conclude that early diagnosis and treatment of liver cirrhosis in hepatitis B patients can have a major effect in preventing the onset of liver cancer.

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Poster Board No. 24

The Linear Quandle Zp,q and the Torus Knot T(n,m)

The T (2, m) knot/braid is a two strand torus knot with m itera- tions. In this paper we aim characterize the conditions with which T (2, m) supports a Zp,q linear quandle labeling. The result charac- terizes all m, p and q for which T (2, m) supports the linear quandle Zp,q. The proof of this result will lead us toward a more general result for the torus knot/braid with m iterations and n strands, T (n, m).