94th ANNUAL MEETING

PROGRAM with ABSTRACTS

University of Nevada
Las Vegas, Nevada
16 – 19 June 2013
### 94th Annual Meeting Program at a Glance

<table>
<thead>
<tr>
<th>SUNDAY – 16 JUNE</th>
<th>MONDAY – 17 JUNE</th>
<th>TUESDAY – 18 JUNE</th>
<th>WEDNESDAY – 19 JUNE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>REGISTRATION CENTER OPEN</strong>&lt;br&gt;Student Union, Second Floor</td>
<td><strong>REGISTRATION CENTER OPEN</strong>&lt;br&gt;Student Union, Second Floor</td>
<td><strong>REGISTRATION CENTER OPEN</strong>&lt;br&gt;Student Union, Second Floor</td>
<td><strong>REGISTRATION CENTER OPEN</strong>&lt;br&gt;Student Union, Second Floor</td>
</tr>
<tr>
<td>7:30 AM – 4:30 PM</td>
<td>7:30 AM – 4:30 PM</td>
<td>7:30 AM – 1:00 PM</td>
<td>7:30 AM – 1:00 PM</td>
</tr>
<tr>
<td><strong>FIELD TRIP</strong>&lt;br&gt;Engineering, Geology, and Engineering&lt;br&gt;Geology of Hoover Dam and the O’Callahan-Tillman Bridge&lt;br&gt;Departs from Lot D, just east of the Student Union</td>
<td><strong>FIELD TRIP</strong>&lt;br&gt; Devils Hole and Ash Meadows&lt;br&gt;National Wildlife Refuge&lt;br&gt;Departs from Lot D, just east of the Student Union</td>
<td><strong>FIELD TRIP</strong>&lt;br&gt;Landscape Photography of the&lt;br&gt;Desert Southwest&lt;br&gt;Departs from Lot D, just east of the Student Union</td>
<td><strong>FIELD TRIP</strong>&lt;br&gt;Boise Extravaganza in Set Theory (BEST)</td>
</tr>
<tr>
<td><strong>SYMPOSIUM</strong>&lt;br&gt;Structural and Computational Approaches for Novel Therapeutics Development and Biomedical Studies&lt;br&gt;SU Room 213</td>
<td><strong>SYMPOSIUM</strong>&lt;br&gt;Boise Extravaganzas in Set Theory (BEST)</td>
<td><strong>SYMPOSIUM</strong>&lt;br&gt;Climatic Change, Sustainability, and Water Resources in the Arid West&lt;br&gt;SU Room 205</td>
<td><strong>SYMPOSIUM</strong>&lt;br&gt;Current Progress in Infectious Disease Research and Therapeutic Interventions&lt;br&gt;SU Room 211</td>
</tr>
<tr>
<td>8:20 AM – 4:45 PM</td>
<td>8:30 – 5:00 PM</td>
<td>8:30 AM – NOON</td>
<td>8:00 AM – NOON</td>
</tr>
<tr>
<td><strong>SYMPOSIUM</strong>&lt;br&gt;Forensic Psychological Science of Juvenile Firestarters and Bomb Makers&lt;br&gt;SU Room 211</td>
<td><strong>SYMPOSIUM CONTINUING from MONDAY</strong>&lt;br&gt;Boise Extravaganza in Set Theory (BEST)</td>
<td><strong>SYMPOSIUM</strong>&lt;br&gt;Structural and Computational Approaches for Novel Therapeutics Development and Biomedical Studies&lt;br&gt;SU Room 213</td>
<td><strong>SYMPOSIUM</strong>&lt;br&gt;Boise Extravaganza in Set Theory (BEST)</td>
</tr>
<tr>
<td>9:00 AM – 11:50 AM</td>
<td>9:00 AM – 6:00 PM</td>
<td>8:40 AM – NOON</td>
<td>9:00 AM – 6:00 PM</td>
</tr>
<tr>
<td><strong>POSTER SESSION I</strong>&lt;br&gt;Cell and Molecular Biology&lt;br&gt;Chemistry and Biochemistry&lt;br&gt;Earth Sciences&lt;br&gt;Ecology, Organismal Biology and Env Sciences&lt;br&gt;Ballroom A</td>
<td><strong>SYMPOSIUM CONTINUING from MORNNG</strong>&lt;br&gt;Boise Extravaganza in Set Theory (BEST)</td>
<td><strong>SYMPOSIUM</strong>&lt;br&gt;Science and Feeling in the Arts&lt;br&gt;Student Union, Second Floor</td>
<td><strong>SYMPOSIUM CONTINUING from MORNNG</strong>&lt;br&gt;Boise Extravaganza in Set Theory (BEST)</td>
</tr>
<tr>
<td>9:00 AM – Noon</td>
<td>9:00 AM – 6:00 PM</td>
<td>10:15 AM – 5:00 PM</td>
<td>1:30 PM – 5:00 PM</td>
</tr>
<tr>
<td><strong>SYMPOSIUM CONTINUING from MORNNG</strong>&lt;br&gt;Structural and Computational Approaches for Novel Therapeutics Development and Biomedical Studies&lt;br&gt;SU Room 213</td>
<td><strong>SYMPOSIUM CONTINUING from MORNNG</strong>&lt;br&gt;Student-Awarded Outcomes Research and Patient Targeted Therapies&lt;br&gt;SU Room 213</td>
<td><strong>SYMPOSIUM</strong>&lt;br&gt;Science and Feeling in the Arts&lt;br&gt;Student Union, Second Floor</td>
<td><strong>SYMPOSIUM CONTINUING from MORNNG</strong>&lt;br&gt;Boise Extravaganza in Set Theory (BEST)</td>
</tr>
<tr>
<td>2:00 PM – 6:00 pm</td>
<td>1:30 PM – 4:50 PM</td>
<td>1:30 PM – 5:00 PM</td>
<td>2:00 PM – 6:00 pm</td>
</tr>
<tr>
<td><strong>SYMPOSIUM</strong>&lt;br&gt;Library Science and Archives: Forming Partnerships, Making Connections&lt;br&gt;SU Room 213</td>
<td><strong>SYMPOSIUM</strong>&lt;br&gt;Mechanisms of Tumor Progression and Cancer Therapeutics&lt;br&gt;SU Room 211</td>
<td><strong>SYMPOSIUM</strong>&lt;br&gt;Science and Feeling in the Arts&lt;br&gt;Student Union, Second Floor</td>
<td><strong>SYMPOSIUM</strong>&lt;br&gt;Boise Extravaganza in Set Theory (BEST)</td>
</tr>
<tr>
<td>1:00 PM – 4:45 PM</td>
<td>1:30 PM – 4:50 PM</td>
<td></td>
<td>1:30 PM – 4:50 PM</td>
</tr>
<tr>
<td><strong>SYMPOSIUM</strong>&lt;br&gt;Biological Psychology, Social Psychology&lt;br&gt;Psychology&lt;br&gt;Ballroom A</td>
<td><strong>SYMPOSIUM</strong>&lt;br&gt;Grant-Writing Workshop for Foundations&lt;br&gt;SU Room 205</td>
<td><strong>SYMPOSIUM</strong>&lt;br&gt;Science and Feeling in the Arts&lt;br&gt;Student Union, Second Floor</td>
<td><strong>SYMPOSIUM</strong>&lt;br&gt;Boise Extravaganza in Set Theory (BEST)</td>
</tr>
<tr>
<td>1:00 PM – 4:00 PM</td>
<td>1:30 PM – 5:00 PM</td>
<td></td>
<td>1:30 PM – 4:20 PM</td>
</tr>
<tr>
<td><strong>SYMPOSIUM CONTINUING from MORNNG</strong>&lt;br&gt;Student-Awarded Outcomes Research and Patient Targeted Therapies&lt;br&gt;SU Room 213</td>
<td><strong>SYMPOSIUM</strong>&lt;br&gt;DockBOT: Docking Calculations and Homology Modeling&lt;br&gt;SU Room 213</td>
<td><strong>SYMPOSIUM</strong>&lt;br&gt;Science and Feeling in the Arts&lt;br&gt;Student Union, Second Floor</td>
<td><strong>SYMPOSIUM CONTINUING from MORNNG</strong>&lt;br&gt;Boise Extravaganza in Set Theory (BEST)</td>
</tr>
<tr>
<td>1:30 PM – 3:30 PM</td>
<td>1:30 PM – 1:50 PM</td>
<td></td>
<td>1:30 PM – 4:20 PM</td>
</tr>
<tr>
<td><strong>SYMPOSIUM CONTINUING from MORNNG</strong>&lt;br&gt;Student-Awarded Outcomes Research and Patient Targeted Therapies&lt;br&gt;SU Room 213</td>
<td><strong>SYMPOSIUM CONTINUING from MORNNG</strong>&lt;br&gt;Boise Extravaganza in Set Theory (BEST)&lt;br&gt;SU Room 207</td>
<td><strong>SYMPOSIUM</strong>&lt;br&gt;Science and Feeling in the Arts&lt;br&gt;Student Union, Second Floor</td>
<td><strong>SYMPOSIUM CONTINUING from MORNNG</strong>&lt;br&gt;Boise Extravaganza in Set Theory (BEST)</td>
</tr>
<tr>
<td>1:30 PM – 4:20 PM</td>
<td>2:00 PM – 4:00 PM</td>
<td></td>
<td>2:00 PM – 4:00 pm</td>
</tr>
<tr>
<td><strong>SYMPOSIUM CONTINUING from MORNNG</strong>&lt;br&gt;Forming Partnerships, Making Connections&lt;br&gt;SU Room 209</td>
<td><strong>SYMPOSIUM CONTINUING from MORNNG</strong>&lt;br&gt;Structural and Computational Approaches for Novel Therapeutics Development and Biomedical Studies&lt;br&gt;SU Room 213</td>
<td><strong>SYMPOSIUM</strong>&lt;br&gt;Science and Feeling in the Arts&lt;br&gt;Student Union, Second Floor</td>
<td><strong>SYMPOSIUM CONTINUING from MORNNG</strong>&lt;br&gt;Boise Extravaganza in Set Theory (BEST)</td>
</tr>
<tr>
<td>1:30 PM – 4:20 PM</td>
<td></td>
<td></td>
<td>2:00 PM – 4:00 pm</td>
</tr>
<tr>
<td><strong>SYMPOSIUM</strong>&lt;br&gt;Forensic and Clinical Psychological Science Issues in Anti-Terrorism: An International Paradigm&lt;br&gt;SU Room 211</td>
<td><strong>SYMPOSIUM</strong>&lt;br&gt;Student Award Judges Meeting&lt;br&gt;to decide on Divisionwide awards&lt;br&gt;SU Room 218</td>
<td></td>
<td>3:00 PM</td>
</tr>
<tr>
<td>1:30 PM – 4:20 PM</td>
<td></td>
<td></td>
<td>3:00 PM</td>
</tr>
<tr>
<td><strong>SYMPOSIUM CONTINUING from MORNNG</strong>&lt;br&gt;Forensic and Clinical Psychological Science Issues in Anti-Terrorism: An International Paradigm&lt;br&gt;SU Room 211</td>
<td><strong>SYMPOSIUM CONTINUING from MORNNG</strong>&lt;br&gt;Boise Extravaganza in Set Theory (BEST)</td>
<td><strong>SYMPOSIUM</strong>&lt;br&gt;Science and Feeling in the Arts&lt;br&gt;Student Union, Second Floor</td>
<td><strong>SYMPOSIUM CONTINUING from MORNNG</strong>&lt;br&gt;Boise Extravaganza in Set Theory (BEST)</td>
</tr>
<tr>
<td>1:30 PM – 4:20 PM</td>
<td>2:00 PM – 4:00 PM</td>
<td></td>
<td>2:00 PM – 4:00 pm</td>
</tr>
<tr>
<td><strong>SYMPOSIUM CONTINUING from MORNNG</strong>&lt;br&gt;Forming Partnerships, Making Connections&lt;br&gt;SU Room 209</td>
<td><strong>SYMPOSIUM CONTINUING from MORNNG</strong>&lt;br&gt;Boise Extravaganza in Set Theory (BEST)&lt;br&gt;SU Room 207</td>
<td></td>
<td><strong>SYMPOSIUM CONTINUING from MORNNG</strong>&lt;br&gt;Boise Extravaganza in Set Theory (BEST)</td>
</tr>
<tr>
<td>1:30 PM – 4:20 PM</td>
<td>2:00 PM – 4:00 PM</td>
<td></td>
<td>2:00 PM – 4:00 pm</td>
</tr>
<tr>
<td><strong>SYMPOSIUM</strong>&lt;br&gt;Student Union, Second Floor</td>
<td><strong>SYMPOSIUM</strong>&lt;br&gt;Science and Feeling in the Arts&lt;br&gt;Student Union, Second Floor</td>
<td></td>
<td><strong>SYMPOSIUM</strong>&lt;br&gt;Science and Feeling in the Arts&lt;br&gt;Student Union, Second Floor</td>
</tr>
<tr>
<td>2:00 PM – 5:00 PM</td>
<td>1:30 PM – 5:00 PM</td>
<td></td>
<td><strong>SYMPOSIUM</strong>&lt;br&gt;Science and Feeling in the Arts&lt;br&gt;Student Union, Second Floor</td>
</tr>
<tr>
<td><strong>SYMPOSIUM CONTINUING from MORNNG</strong>&lt;br&gt;Boise Extravaganza in Set Theory (BEST)&lt;br&gt;SU Room 207</td>
<td></td>
<td></td>
<td>1:30 PM – 5:00 PM</td>
</tr>
<tr>
<td>3:00 PM – 5:00 PM</td>
<td></td>
<td></td>
<td>1:30 PM – 5:00 PM</td>
</tr>
<tr>
<td><strong>SYMPOSIUM CONTINUING from MORNNG</strong>&lt;br&gt;Boise Extravaganza in Set Theory (BEST)</td>
<td></td>
<td></td>
<td>1:30 PM – 5:00 PM</td>
</tr>
<tr>
<td>2:00 PM – 4:00 pm</td>
<td></td>
<td></td>
<td>1:30 PM – 5:00 PM</td>
</tr>
</tbody>
</table>
CONTENTS

94th ANNUAL MEETING of the AAAS, PACIFIC DIVISION

PROGRAM with ABSTRACTS

GENERAL INFORMATION

Program at a Glance ........................................ inside front cover
Policies ............................................................... 4
Governance ............................................................ 5
Greeting from Carolyn G. Goodman,
Mayor, of Las Vegas .............................................. 6
Greeting from Dr. Neil J. Smatresk, President,
University of Nevada Las Vegas ......................... 7
Greeting from Dr. Owen M. McDougal, President,
AAAS Pacific Division ......................................... 8
Sections Sponsoring Sessions at the Annual Meeting .... 9
Las Vegas and the University of Nevada, Las Vegas .... 9
Travel to the Meeting ................................................ 12
Parking ................................................................. 12
Registration ............................................................. 13
Messages ............................................................... 13
Breaks ................................................................. 13
On campus housing .................................................. 13
Off campus hotels ..................................................... 14
Food ................................................................. 14
Meeting Rooms, Computers,
and PowerPoint Presentations .............................. 14
Student Presentation Award Competition ................. 14
Public Lectures and Programs ............................... 15
Receptions and Awards Banquet ............................ 17
Business Meetings .................................................... 17
Field Trips ............................................................. 17

GENERAL SESSIONS

Sunday Evening Plenary Panel Discussion ................. 21
Sunday Evening Reception .................................... 21
Monday Noon Public Lecture .................................. 21
Monday Evening Pacific Division’s Plenary
Presidential Address .............................................. 21
Monday Evening UNLV President’s Reception ......... 22
Tuesday Noon Public Lecture ................................. 22
Annual Banquet, including the Announcement
of Student Awards ............................................... 22
Wednesday Noon Public Lecture ............................ 22

TECHNICAL SESSIONS

Program at a Glance ........................................ inside front cover

I. Symposia

Monday, 17 June
Structural and Computational Approaches for
Novel Therapeutics Development and
Biomedical Insights .............................................. 23
Boise Extravaganza in Set Theory (BEST) ............... 24
Library Science and Archives: Forming
Partnerships, Making Connections ......................... 25
Forensic Psychological Science of Juvenile Fire
Setters and Bomb Makers .................................... 26
Forensic and Clinical Psychological Science Issues
in Anti-Terrorism: An International Paradigm .......... 27

Tuesday, 18 June
Climate Change, Sustainability, and Water
Resources in the Arid West .................................. 28
Ion Channels: Integration of Computer Simulations
with Experiments .................................................. 28
Boise Extravaganza in Set Theory (BEST) II ............ 29
International Protected Area Exchange (IPAX) ......... 30
Patient-Centered Outcomes Research and Patient
Targeted Therapies .............................................. 31
Mechanisms of Tumor Progression and
Cancer Therapeutics .......................................... 32

Wednesday, 19 June
Current Progress in Infectious Disease Research
and Therapeutic Interventions ............................. 33
Innovations and Trends in K–16 STEM Education .... 33
Dinosaurs and Their Neighbors: Mesozoic
Paleontology and Paleogeography of
Nevada, Utah, and Adjacent States ....................... 34
Science and Feeling in the Arts ............................. 34
Management of Endangered Species in the
American West: Policy and Practice ..................... 35
II. Workshops

*Tuesday, 18 June*
Grant-Writing Workshop for Foundations.............37
DockoMatic: Docking Calculations and
Homology Modeling ..............................................37

III. Contributed Oral Paper Sessions

*Monday, 17 June*
Chemistry and Biochemistry ...................................39
Earth Sciences..........................................................40
Ecology, Organismal Biology, and
Environmental Sciences ...........................................40
Oral Biology and Dental Medicine.............................39

*Tuesday, 18 June*
Cell and Molecular Biology Section .......................41
Engineering, Technology, and Applied Sciences........41
General and Interdisciplinary Studies....................42
Social, Economic, and Political Sciences...............42

IV. Contributed Posters

*Monday, 17 June*
Poster Session Instructions .....................................43
Poster Session I (morning) .......................................43
  Cell and Molecular Biology
  Chemistry and Biochemistry
  Earth Sciences
  Ecology, Organismal Biology, and
  Environmental Sciences
Poster Session II (afternoon) .................................45
  Education
  Engineering, Technology and Applied Sciences
  Health Sciences
  History and Philosophy of Science
  Oral Biology and Dental Medicine
  Physics
  Psychology

ABSTRACTS .................................................................49

INDEX of NAMES ..........................................................109

MAPS
  Second floor of Student Union ...... Outside Back Cover
  UNLV Campus and Parking .......... Inside Back Cover
Publication
Publication of symposia or other technical sessions or talks that have been prepared under the auspices of the AAAS, Pacific Division requires written permission of the AAAS, Pacific Division as well as that of the individual organizers and speakers.

Video and/or audio taping of any session or parts thereof for commercial purposes is not permitted without prior approval from the speakers, organizers and AAAS, Pacific Division.

The AAAS, Pacific Division is not responsible for the accuracy of advertising information in these Proceedings. Advertising information contained herein is provided by the participating advertisers and does not constitute endorsement by the AAAS, Pacific Division.

Abstracts and summaries published in these Proceedings reflect entirely the individual views of the authors and not necessarily that of the AAAS, Pacific Division, its Council, Executive Committee or its officers. Presentation of ideas, products or publications at this AAAS, Pacific Division meeting or the reporting of them in news accounts does not constitute endorsement by the AAAS, Pacific Division.

SPECIAL NOTICE: This year’s meeting will be preserved in perpetuity as an on-line, searchable, archive in Digital Scholarship@UNLV. This archive will include abstracts, powerpoint presentations, and images of posters that authors choose to submit to the digital archive. For more information, contact the UNLV digital scholarship administrator, Marianne Buehler (marianne.buehler@unlv.edu).

Standards of Conduct
On April 14, 1978, the AAAS Board of Directors adopted the following position statement regarding standards of conduct at AAAS meetings:

“The Board takes it for granted that all who attend the Annual Meetings of the Association will conduct themselves with consideration for others and with particular consideration for those who generously give their time and thought to the sessions. Differing opinions will continue to be heard and respected. We recognize that there are areas of science that are both controversial and troubling. The Annual Meeting can serve as an effective forum to consider such issues so long as procedures of orderly debate and fairness are followed. Disrespectful or abusive behavior have no place in the annual Meeting. When excesses occur they do great injury to the Association and to the process of discussion. They cannot be condoned.”

The AAAS, Pacific Division, as part of the larger organization, ascribes to this position and will, if necessary, take appropriate measures to assure adherence to it.

No Smoking Rule
On December 30, 1971, the AAAS Council approved a motion requesting that persons in attendance refrain from smoking at Council meetings and scientific and public sessions. The AAAS, Pacific Division ascribes to this policy and asks that all persons who attend the meeting comply with this ruling.

Meeting Development
The technical programs of AAAS, Pacific Division meetings are developed by proposals submitted by individuals and/or groups of individuals and overseen by the Executive Committee and Executive Director of the Division. Symposium planners are responsible for developing lists of presenters that represent fairly the topic at hand. Papers submitted separately from symposia, referred to as Contributed Papers and Contributed Posters, are reviewed by section chairs prior to their inclusion in the program.

All program review is based on scientific significance, timeliness, balance, and clarity of organization. In the case of symposia and workshops, this review is based on materials provided by planners or submitters and does not include a technical examination of individual presentations.

Student Awards of Excellence
The Council, Executive Committee and officers of the AAAS, Pacific Division are committed to encouraging the scientific development of students by offering them a friendly yet scientifically robust environment in which to present their research results. Part of that environment includes evaluating student presentations and rewarding students’ superior efforts. To that end, the Division has developed an extensive program of student Awards of Excellence that are given at both the sectional and divisional levels. More information about this program may be found on page 14 of these Proceedings.
Planning Committee for the 94th Annual Meeting

Program Committee Chair at the University of Nevada, Las Vegas: Steve Rowland, Department of Geoscience

Program Organizers:
Sajjad Ahmad, University of Nevada, Las Vegas
Michael J. Aldape, Veterans Affairs Medical Center, Boise
Liljana Babinkostova, Boise State University
Josh Bonde, University of Nevada, Las Vegas
Allison Brody, University of Nevada, Las Vegas
Robert L. Chianese, California State University, Northridge
Andres Caicedo, Boise State University
Francesco Chiappelli, University of California, Los Angeles
H.K. Choi, California State University, Dominiguez Hills
Samuel Coskey, Boise State University
Jad D’Allura, Southern Oregon University
Michal Davidson, Idaho State Archives
Veronica V. Galván, University of San Diego
Crystal Goldman, San Jose State University
James R. Groome, Idaho State University, Pocatello
Silke Higgins, San Jose State University
Frank G. Jacobitz, University of San Diego
Ronn Johnson, University of San Diego
Cheryl Jorcyk, Boise State University
Susan Kendall, San Jose State University
Peter Kraus, University of Utah
Carl A. Maida, University of California, Los Angeles
C. Mark Maupin, Colorado School of Mines
Owen M. McDougal, Boise State University
Donald J. McGraw, Ephraim, Utah
Kristen Mitchell, Boise State University
Rob Mrowka, Center for Biological Diversity
Margaret N. Rees, University of Nevada, Las Vegas
Larry Rudd, Nevada State College
Marion Sheppers, Boise State University
Eva Stowers, University of Nevada, Las Vegas
Todd Talley, Idaho State University College of Pharmacy
Kimberly Tanner, San Francisco State University
Jesse James Thomas, San Diego State University
Richard W. Van Buskirk, Pacific University
Dong Xu, Idaho State University College of Pharmacy

Officers of AAAS
2013 – 2014
Chairman of the Board: William Press, University of Texas, Austin
President: Phillip A. Sharp, Massachusetts Institute of Technology
President-elect: Gerald Fink, Whitehead Institute, Massachusetts Institute of Technology
Treasurer: David E. Shaw, D. E. Shaw Research
Chief Executive Officer: Alan I. Leshner, AAAS, Washington, D.C.

Officers of the Pacific Division
2012 – 2013
President: Owen M. McDougal, Boise State University
President-elect: Francesco Chiappelli, University of California, Los Angeles
Past President: Robert L. Chianese, California State University, Northridge (emeritus)
Executive Director: Roger G. Christianson, Southern Oregon University

Executive Committee of the Pacific Division
2012 – 2013
Richard A. Cardullo, University of California, Riverside
Robert L. Chianese, California State University, Northridge (retired)
Roger G. Christianson, Southern Oregon University
Terrence Gosliner, California Academy of Sciences
John Hafernik, San Francisco State University
Frank Jacobitz, University of San Diego
Matthew J. James, Sonoma State University
Carl A. Maida, University of California, Los Angeles
Owen M. McDougal, Boise State University
Kimberly D. Tanner, San Francisco State University
Counselor, non-voting:
Alan E. Leviton, California Academy of Sciences

AAAS Liaison to the Pacific Division
Gretchen Seiler, AAAS, Washington, DC

Council of the Pacific Division
2012 – 2013
Kristine Albin-Stone, Borah High School, Boise, Idaho
Liljana Babinkostova, Boise State University
John J. Carroll, University of California, Davis (retired)
Robert L. Chianese, California State University, Northridge (retired)
Francesco Chiappelli, University of California, Los Angeles
H.K. Choi, California State University, Dominguez Hills
Roger G. Christianson, Southern Oregon University
Jad D’Allura, Southern Oregon University
(President Emeritus)
Clive Dorman, Scripps Institution of Oceanography
Armando J. Galindo, Pebble Beach, CA
Veronica Galván, University of San Diego
Crystal Goldman, San José State University
Terrence Gosliner, California Academy of Sciences
Frank Jacobitz, University of San Diego
Matthew J. James, Sonoma State University
Cheryl L. Jorcyk, Boise State University
Alan E. Leviton, California Academy of Sciences (non-voting)
Michael D. MacNeil, Miles City, MT
Carl A. Maida, University of California, Los Angeles
C. Mark Maupin, Colorado School of Mines
Owen M. McDougal, Boise State University
Donald J. McGraw, Ephraim, UT
Kristen A. Mitchell, Boise State University
George Quinnan, Southern Oregon University
Kimberly D. Tanner, San Francisco State University
Richard W. Van Buskirk, Pacific University
AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE
PACIFIC DIVISION
JUNE 16 - 19, 2013
LAS VEGAS, NEVADA

Dear Attendees,

Welcome to America’s most dynamic City – Las Vegas! You could not have chosen a better City to hold your Annual Meeting, and I am convinced that once you get a taste of Las Vegas has to offer, you will definitely be back. As the mayor of this great City, I am delighted to tell you why Las Vegas is the place to live, work and play!

Las Vegas continues to capture the world’s imagination as the City where anything is possible. With world-class hotels, award-winning restaurants, luxurious spas, fantastic shopping, the finest golf courses and spectacular entertainment, Las Vegas remains one of the most electrifying destinations in the world.

While attending the Annual Meeting at University Nevada Las Vegas, it is my hope that you will have a chance to explore Downtown Las Vegas, an area of our City that is undergoing a dramatic renaissance. It is evolving into a vibrant place for living, working, entertainment and the arts. Downtown Las Vegas is comprised of an enticing mix that includes:

- The neon-drenched excitement of the Fremont Street Experience, visited by over 21 million people each year.
- Multi-million dollar casino and hotel renovations and expansions.
- Fremont East Entertainment District featuring trendy new gathering places for dining, dancing, cocktails and enjoyment.
- An emerging eclectic mix of live-in artists and galleries known as the 18b Arts District.
- The World Market Center, a state-of-the-art home furnishings trade show complex with over 5 million square feet, has merged with another furniture complex in North Carolina and will now be called the International Market Center. The facilities in Las Vegas and North Carolina encompass 13 buildings, with 10.6 million square feet of furniture showrooms.
- Symphony Park, a phenomenal 61-acre planned development anchored by two key projects, the Cleveland Clinic Lou Ruvo Center for Brain Health, designed by renowned architect Frank Gehry, and The Smith Center for the Performing Arts, Las Vegas’ first world-class performing arts facility. Symphony Park will also be the planned future home of The Charlie Palmer, a luxury boutique business hotel; a first-class casino/hotel with significant retail space; abundant street-side retail offerings; a two-acre park; and an estimated 1000 urban style residences.
- A collection of world-class museums including the Neon Museum Boneyard, which houses over 100 donated and rescued Las Vegas signs that date from the late 1930s through the early 1990s; The Mob Museum, which provides a fascinating glimpse into our City’s history and Discovery Children’s Museum in Symphony Park, among others.

Again, welcome to fabulous Las Vegas! Best wishes for an enjoyable stay in our fine City.

Sincerely,

Carolyn G. Goodman
Mayor, City of Las Vegas
1 June 2013

Dear Conference Attendees,

It is my great pleasure to welcome you to the 94th annual meeting of the American Association for the Advancement of Science, Pacific Division, together with the Arizona-Nevada Academy of Science and the Northwest and Southwest regions of Sigma Xi, the Scientific Research Society. I extend my warmest greetings as you gather on the campus of the University of Nevada, Las Vegas. We are very pleased to host this meeting, and to introduce you to aspects of our campus and the Southern Nevada region with which you may not be familiar.

With an enrollment of more than 27,000 students, and more than two hundred academic programs leading to bachelor’s, master’s, and doctoral degrees, UNLV will certainly continue to play a critical role in the future economic and cultural well-being of Las Vegas and the Southern Nevada region, which now has a population of more than two million people. We take that role very seriously. We are especially proud of our faculty and students in the sciences and engineering. Some of their innovative research efforts will be on display at this meeting.

During your visit to UNLV and the Las Vegas region I strongly encourage you to take advantage of the ample opportunities for intellectual stimulation, cultural engagement, and exploration of the natural wonders of the Mojave Desert. As you explore our beautiful campus, I encourage you to stroll through the Lied Library and the new Science and Engineering Building, two dazzling showcases of the harmonious blending of form and function. In downtown Las Vegas, visit the fabulous new Smith Center for the Performing Arts, as well as the architecturally provocative, Frank-Gehry-designed, Lou Ruvo Center for Brain Health. Take a hike in the Red Rock Canyon Conservation Area. You’ll go home with an enhanced impression of Las Vegas.

Welcome to UNLV. We’re delighted to have you here!

Sincerely,

Neal J. Benatresk, Ph.D.
President
Welcome to the 94th Annual meeting of the Pacific Division of the American Association for the Advancement of Science. This year’s meeting promises exceptional opportunities for science enthusiasts to mingle on the University of Las Vegas, Nevada campus. We are delighted to engage members of the Arizona-Nevada Academy of Sciences, Northwest & Southwest regions of Sigma Xi, and local participants from UNLV. No meeting of the Pacific Division would be possible without the dedication and commitment of the program organizer and local organizing committee. Please extend your kind regards to Dr. Steve Rowland, Department of Geoscience at UNLV for his work to coordinate the organization of this event.

This year’s program covers a range of topics from applied and theoretical biomedical research to ecology, library sciences, soil science, STEM education, climate change, dinosaurs, set theory, and forensics among others. Join me in visiting with our up and coming scientists during the poster sessions and social events. Participate in guided field trips to geologic and visitor attractions in and around Las Vegas. Make an effort to attend the keynote addresses and later mingle with our invited guests. The Tuesday evening banquet provides an excellent venue to recognize the achievement of those students deemed to stand out from their peer presenters.

After twelve years of involvement, serving as the Section Chair for Chemistry and Biochemistry, Counselor, member of the Executive Committee, twice as program chair, and most recently, in my role as President, I extend my warm welcome to this year’s AAASPDP meeting. I hope you find this a rewarding and engaging event that becomes an annual meeting for each and every one of you. I look forward to seeing familiar faces and being introduced to many new ones.

Owen M. McDougall, Ph.D.
President, AAAS Pacific Division
94th Annual Meeting of the Pacific Division of AAAS
University of Nevada
Las Vegas, Nevada
16 – 19 June 2013

GENERAL INFORMATION

PACIFIC DIVISION SECTIONS and AFFILIATED SOCIETIES SPONSORING SESSIONS at the LAS VEGAS MEETING

Arizona–Nevada Academy of Sciences
Northwest and Southwest Regions of Sigma Xi, The Scientific Research Society
Cell and Molecular Biology
Chemistry and Biochemistry
Computer and Information Sciences
Earth Sciences
Ecology, Organismal Biology and Environmental Sciences
Education (Science and Technology)
Engineering, Technology and Applied Sciences
General and Interdisciplinary
Health Sciences
History and Philosophy of Science
Mathematics

Oral Biology and Dental Medicine
Physics and Materials Science
Psychology
Social, Economic and Political Sciences

LAS VEGAS and the UNIVERSITY of NEVADA, LAS VEGAS

BRIEF HISTORY OF LAS VEGAS¹
Unlikely as it may seem, the Las Vegas Valley and most of southern Nevada was once a marsh, awash with water and vegetation. As hundreds of thousands of years went by, the rivers went underground and the marshlands receded, eventually turning the valley into an arid landscape

¹Sources:
en.wikipedia.org/wiki/History_of_the_Las_Vegas_Valley
www.intermind.net/im/history.html
www.lvvol.com/lvoleg/hist/lvhist.html
www.lasvegasnevada.gov/FactsStatistics/history.htm
surrounded by the rain-trapping Sierra Nevada and Spring Mountains, that supported only the hardiest of animals and plants. However, water periodically resurfaced, flowing into the Colorado River and creating what has been described as a wetland oasis in the midst of the Mojave Desert.

As evidenced by petroglyphs, it is thought that Native Americans first explored the Las Vegas Valley several thousand years ago, followed by the Anasazi who lived along the Muddy and Virgin Rivers about 2,000 years ago. It is known that the Paiutes also traversed the Las Vegas Valley.

The first people of European ancestry to explore the area arrived in 1829, with Antonio Armijo leading a party of 60 on the Old Spanish Trail to Los Angeles. Camped about 100 miles from the present Las Vegas, a scouting party was sent out to explore for water. A young Mexican scout, Rafael Rivera, departed from the main party and headed due west over the desert, discovering an abundance of artesian spring water at an oasis. This discovery allowed early traders to shorten their routes by several days by cutting across rather than skirting around the Mojave Desert. The valley was named Las Vegas, “The Meadows” in Spanish.

On 13 May 1844 John C. Fremont, while leading an overland expedition to the west, camped at Las Vegas Springs. His journal accounts of two springs he discovered were very popular and caused many people to visit the area.

In 1855, members of the Mormon Church, looking for a halfway stopover between Salt Lake City and Los Angeles, built a fort at Las Vegas with the plan to raise fruits and vegetables and also to mine lead at Potosi Mountain to make into bullets. However, they abandoned the fort in 1858 because of Indian raids. A portion of this fort still stands near the intersection of Las Vegas Boulevard North and Washington Avenue.

Nevada was admitted as the 36th state of the United States in 1864. Twenty-one years later, the State Land Act of 1885 offered sections of land at $1.25 per acre, which spurred an agricultural boom for the next 20 years. Meanwhile, railroad development by 1904 had connected the west to the east through Las Vegas. The San Pedro, Los Angeles and Salt Lake Railroad, later to become Union Pacific, made its inaugural run from Los Angeles to the east, passing through Las Vegas, on 20 January 1905. This railroad traffic led to the founding of the city of Las Vegas when, on 15 May 1905, the railroad auctioned off 110 acres for home site and business development. Six years later, with a population of 800 and a vote of 168 for and 57 against, the city of Las Vegas was incorporated. Just prior to that, in 1910, a strict anti-gambling law that even forbade the western custom of flipping a coin for the price of a drink became effective in Nevada. This ban on gambling has been described as lasting about three weeks in Las Vegas, as private clubs sprouted up and locals who knew the appropriate passwords were again gambling. This illegal but accepted gambling continued until 1931, when the Nevada legislature once again legalized gambling. The population of Las Vegas hit 5,165 in 1930.

The other big event to hit Nevada and the Las Vegas area in 1931 was the beginning of the construction of Hoover Dam, which was completed in 1935. Construction of the dam caused the population to swell to over 25,000, with most of the newcomers being single males looking for jobs on the dam. This influx of single males resulted in the development of casinos and showgirl theaters. After completion of the dam, the dam itself and Lake Mead, which formed behind the dam, became tourist attractions on their own, leading to the development of additional higher class hotels in Las Vegas.

Electricity from Hoover Dam powered Las Vegas and Fremont Street which, because of the many bright lights, became known as “Glitter Gulch.” The extravagance of these lights can still be experienced today in the four block long stretch of Fremont Street known as the “Fremont Street Experience.”

The first hotel of the famous Las Vegas Strip, the El Rancho Vegas, opened on 3 April 1941. As gangster influences became greater, several Las Vegas landmark hotels, such as the Sahara, the Sands, the New Frontier, the Showboat, the Riviera, the Fremont, Binion’s Horseshoe, and the Tropicana, all offering top name entertainment, were built in the early 1950s.

During this spurt of hotel construction, the first atomic bomb was detonated at the Nevada Test Site on 27 January 1951. This was the first of over a hundred atmospheric explosions at the Nevada Test Site, which continued until the Partial Test Ban Treaty of 1963 was enacted and nuclear testing moved underground. Because the risks of these explosions were greatly underestimated at the time, they were advertised as another tourist attraction. Several
known as Nevada Southern. Students adopted the Rebel name and mascot to reflect their desire to break free from UNR. After Las Vegas residents exerted pressure, the regents decided to acquire land for a campus, finally selecting an 80 acre parcel along the two-lane dirt road known as Maryland Parkway.

On September 10, 1957, the first classes were held on campus in a new 13,000 square foot building, later named for Maude Frazier, a state assemblywoman and founding force behind Nevada Southern. A year later, the school received accreditation from the Northwest Association of Secondary and Higher Schools. To serve the growing enrollment, buildings went up in a flurry of construction, including a physical education and health center, a science and technology building, a classroom building named for regent Archie C. Grant, and the James R. Dickinson Library, named for the first director of the extension program.

Despite its expansion, Nevada Southern remained under UNR’s control. In fact, university officials required students to spend a semester in Reno before graduating. After fighting to become a degree-granting institution, Nevada Southern held its first commencement in 1964, graduating 29 students as the “Centennial Class” in honor of Nevada’s 100th anniversary as a state. The next year, the school became Nevada Southern University, with its own curriculum. Donald Moyer served as its first chancellor and then became its first president in 1968, when the university finally won its autonomy under the state’s higher education system, giving it equal status to UNR.

In 1969, with the board of regents’ approval, the university adopted its current name. By the following year, as Las Vegas’ metropolitan population reached 275,000, UNLV enrolled more than 5,500 students. During the 1977-78 academic year, UNLV surpassed UNR in total enrollment.

Over the next three decades, UNLV continued this heady rate of development — erecting more than 100 buildings, developing dozens of graduate programs, creating partnerships with the community, fielding nationally ranked sports teams, founding an alumni association, promoting scholarship, establishing a fundraising foundation, and recruiting diverse and talented students from across the country.

**UNLV TODAY**

Today, UNLV is an institution of approximately 27,000 students and nearly 2,900 faculty and staff located minutes from the Las Vegas Strip. Classified by the Carnegie Foundation
for the Advancement of Teaching as a research university with high research activity, UNLV offers more than 200 undergraduate, graduate and doctoral degree programs including innovative academic degrees in such fields as gaming management, entrepreneurship, entertainment engineering and much more. The entertainment capital of the world, Las Vegas offers students a “living laboratory” for research, internships, and a wide variety of job opportunities. UNLV is dedicated to developing and supporting the human capital, regional infrastructure, and economic diversification that Nevada needs for a sustainable future.

Additional information about UNLV can be found on the following web pages:
• ir.unlv.edu/IAP/Reports/Content/Common+Data+Set+2011-12.aspx
• news.unlv.edu/units/sciences
• news.unlv.edu/highlights
• www.unlv.edu/about/glance/highlights#university

ANNUAL MEETING

TRAVEL TO UNLV

From McCarran Airport:
• Take the Swenson Street exit towards Tropicana Avenue
• Go East (right) on Tropicana Avenue
• Go North (left) on Maryland Parkway
• Go West (left) on University Road (look for the In ‘N Out Burger on the corner)
• Park and follow the campus map on the inside back cover of this Proceedings and proceed to the Student Union or Tonopah Hall. Be sure to either park in a metered lot or have a valid parking permit on display. See the next section, “Parking on the UNLV Campus.”

From Interstate-15 heading north (coming from Southern California):
• Once in city limits, exit onto Interstate 215 East
• Take McCarran International Airport exit
• Exit Russell Road East (right)
• Go North (left) on Maryland Parkway
• Go West (left) on University Road (look for the In ‘N Out Burger on the corner)
• Park and follow the campus map on the inside back cover of this Proceedings and proceed to the Student Union or Tonopah Hall. Be sure to either park in a metered lot or have a valid parking permit on display. See the next section, “Parking on the UNLV Campus.”

From Interstate-15 heading south (coming from Utah):
• Once in city limits, exit onto Flamingo Road East (left)
• Go South (right) on Maryland Parkway
• Go West (right) on University Road (look for the In ‘N Out Burger on the corner on the far side of University)
• Park and follow the campus map on the inside back cover of this Proceedings and proceed to the Student Union or Tonopah Hall. Be sure to either park in a metered lot or have a valid parking permit on display. See the next section, “Parking on the UNLV Campus.”

PARKING on the UNLV CAMPUS

Parking Enforcement: According to the UNLV Parking Services web pages, parking permits are required in order to park on campus Monday – Thursday 7:00 a.m. – 7:00 p.m. and Friday 7:00 a.m. – 1:00 p.m. (http://www.unlv.edu/parking/permits-04-27/13). At other times (later Friday afternoon through 7:00 a.m. on Monday), you can park without a permit anywhere on campus except in a handicapped (unless you have a permit) or a reserved space. Do not ever park in a reserved parking space! These are clearly marked, monitored 24/7, and will be ticketed on weekends as well as during the week.

Visitor Parking Permits and Where To Get Them: Visitor parking permits allow the holder to park in student spaces only. The cost for a visitor permit is $3.00 per day or $7.00 per week. Daily and weekly visitor permits are available from the information desk on the lower level of the Student Union (#38 on the campus map; adjacent to Lot D). Hours of operation are 8:00 a.m. – 11:00 p.m. Mondays – Fridays and noon – 11:00 p.m. Saturdays and Sundays;
• the pay station in the Tropicana Parking Garage (#13 on the UNLV campus map);
• the Guest Suites or dorms for those staying on campus (purchase at time of check-in); and
• if purchased in advance with your meeting registration, at the Pacific Division Registration Desk, located on the second floor of the Student Union. The Registration Desk will be open Sunday, 2:00 p.m. – 6:00 p.m., Monday 7:30 a.m. – 4:30 p.m., Tuesday 7:30 a.m. – 4:00 p.m. and Wednesday 7:30 a.m. – 3:00 p.m.

Where to Park While Getting Your Visitor Parking Permit: If you arrive Friday afternoon, Saturday, or Sunday to check into your Guest Suite or dorm room, you can park in any lot except for the reserved spaces in Lot G or handicapped spaces unless you have a handicap vehicular permit. We suggest Lot E, the faculty lot which is beside Tonopah Hall and is accessed from University Road (turn west off of Maryland Parkway). Tonopah Hall is where the Guest Suites and dorm rooms are located.

If you arrive any time between 7:00 a.m. and 7:00 p.m.
on Monday through Thursday, there are a couple of options. The best is to park in Lot D, entry to which is gained at the intersection of Maryland Parkway and Harmon Avenue (turn west from Maryland Parkway into the parking lot at Harmon Avenue). This is a metered lot and costs $1 per hour. There are also a few metered parking spaces in Lot V, situated on the other side of the Harmon Avenue entrance to campus. If these lots are full, the next best place to park will be the Tropicana Garage, #13 on the map and which also has metered parking available. Tropicana garage is accessed off of Tropicana Avenue by turning north onto campus at Wilbur Street (signal between Swenson Street and Maryland Parkway).

Once you have purchased a short-term permit and parked, you can pick up your longer term permit by going to the Student Union (#38, adjacent to Lot D—see above) or upon check-in to your room in Tonopah Hall (#35 on the campus map and kitty-corner from the Student Union).

Where to Park Once You Have Your Parking Permit: Visitor permits allow parking only in student spaces. Parking is not available for persons with a visitor permit in faculty, staff, reserved, metered, handicap, resident, etc., parking spots. Student parking is available, not necessarily exclusively, in the following lots: A, F, H, L, M, O, P, Q, R, T, X, Black Lot, Red Lot, White Lot, and the Tropicana Garage (#13 on the map, identified as Parking Garage, Tropicana). Lot H is probably closest to the Student Union, but is relatively small due to on-going construction in Lot U. Lot F and the Tropicana Parking Garage are probably next closest to the Student Union.

Where to Get UNLV Campus Maps, Including Parking Lots: On your computer, go to http://www.unlv.edu/maps/maps or go to the inside back cover of this Proceedings!

REGISTRATION
The Registration Center is on the second floor of the Student Union. Hours of operation are:
Sunday: 2:00 p.m. – 6:00 p.m.
Monday: 7:30 a.m. – 4:30 p.m.
Tuesday: 7:30 a.m. – 4:00 p.m.
Wednesday: 7:30 a.m. – 3:00 p.m.

All persons attending the meeting, except for public sessions, must be registered for the meeting and must wear their name badges at all times while participating in meeting events. Those not displaying a meeting name badge may not make scheduled presentations and may be asked to leave the meeting site.

On-site registration fees are as follows: full-meeting professional, $110.00; full-meeting program planners, program presenters and field trip planners, $85.00; K–12 and community college teachers, post-docs, and retirees/emeritus, $62.50; and students, participating spouses and/or family members, and unemployed persons, $50.00. One-day professional registration is $85.00. Note that if you attend more than one day, you must pay the full registration fee.

Special stipends of $75 were given to the first twenty K–12 and community college instructors that registered in advance for this meeting and requested the stipend on their registration forms. The stipend is not available to teachers who register on-site.

Students were given the opportunity to apply for travel awards of up to $150 each to help defray their costs for coming to the meeting to present the results of their own research.

About field trips: Due to limited seating in vehicles and the need to inform some destinations of the number of people arriving, pre-registration was required for all field trips. If you didn’t pre-register for a particular field trip in which you are interested in participating, please inquire at the Division’s Registration Center to see if space is still available. At least one member of a family group requesting a field trip must be a paid meeting registrant. Participants who are not registered for the meeting will be charged a one-time $10 field trip registration fee in addition to the fee for the field trip.

About workshops: All workshops at this meeting are available without additional charge to meeting registrants. Some workshops have limited space and persons indicating their interest on the Advance Registration Form will have priority in attending should a workshop fill.

About refunds: Requests for refunds must have been made in writing and received in the Pacific Division office no later than 15 May 2013. Under extreme hardship conditions beyond a registrant’s control, requests for refunds may be honored beyond this date if presented in writing with an adequate explanation of the hardship that precipitated the request for the refund. A $15 handling fee is applied to all refunds. An additional 3.5% deduction is applied to the total amount for credit card refunds.

MESSAGES
To leave a message for a meeting registrant or to contact the AAAS, Pacific Division staff, call 541-292-1115. Please note that this line will be monitored only between the dates of 13 June and 20 June. Thereafter, please use the regular Pacific Division number, 541-552-6869, in order to contact Pacific Division staff.

BREAKS
Mid-morning and mid afternoon breaks are scheduled each day, as appropriate. Refreshments will be served in the second floor lobby area near the Division’s Registration Desk.

ON CAMPUS MEETING HOUSING
A limited number of rooms on campus were available for this meeting. UNLV offers two different types of housing units, standard dorm rooms and Guest Suites, both of which are located very near to the Student Union, where almost all meeting activities are taking place.

The standard dorm rooms are typical dorm rooms. Every two dorm rooms share a single bathroom, which contains a shower and toilet. Rooms are air-conditioned and come
standard with two twin beds, each with a mattress pad, pillow and blanket, two twin sheets, and a pillowcase. Additional linens provided are a bath towel and a washcloth per person, as well as one bath mat in each shared bathroom. Standard dorm rooms rent for $90 per person double or $180 single for three nights (Sunday, Monday and Tuesday) with extra nights available on either side for an additional $30 per person per night double or $60 per night single. Parking is an additional $7 for a one-week pass. For those who desire to have internet access in their room, a one-time $10 fee will be charged at check-in.

The Guest Suites are actually two dorm rooms combined into one suite. Each Guest Suite includes a queen-sized bed, resort style linen and drapery, a private bathroom, separate seating room, flat screen TV with high-definition cable, alarm clock, microwave, refrigerator/freezer, and iron/ironing board. Also standard are free wired internet and local phone calls. Guest Suites cost $40 per night for up to 2 persons per suite. In order to reserve a Guest Suite, registrants were asked to go to this web site and follow the directions: http://www.unlv.edu/eventservices/guestsuites. If you drove, be sure to request a parking permit at check-in. The cost is $3 per day or $7 for a week.

OFF CAMPUS HOTELS
Las Vegas is renowned for its resort hotels. The Division contracted with one hotel, the Hampton Inn near McCarran Airport (about 3.5 miles from the UNLV campus), which has given us a special group rate of $69 per night, plus taxes. Those who preferred to try one of the many other hotels in Las Vegas, were referred to search engines such as http://www.lasvegas.com/hotels/on-the-strip/ to find the hotel of their dreams, with the warning to be aware that many of the hotels charge a daily “resort fee” in addition to their daily rate.

Hampton Inn & Suites Las Vegas Airport
6575 South Eastern Avenue, Las Vegas, NV 89119
Local phone: 702-647-8000
Internet: www.lasvegasairportsuites.hamptoninn.com
Rate: $69 (1 to 4 persons in a double queen room) + 8.1% tax
Group Code: PDA
Dates Available: 16 June – 18 June (plus three days before and after, subject to availability)
Complementary amenities:
• hot breakfast
• self-parking
• high speed internet in rooms
• shuttle service from and to airport
• shuttle service to and from UNLV Student Union, as available
• workout room and swimming pool

FOOD SERVICES
The UNLV Student Union has a fairly extensive food court, which includes such establishments as Starbucks, Subway, Jamba Juice, Panda Express, and several others. Nearby, across from the Tonopah Hall (location of the Conference Housing front desk) is the Hazel M. Wilson Dining Commons where, for one price, you can eat to your fill. Breakfast is $7.75, lunch/brunch is $8.75, and dinner is $9.45. About a block away is an In ’N Out Burger and other eateries.

MEETING ROOMS, COMPUTERS, and POWERPOINT PRESENTATIONS
Technical sessions meet in rooms on the second floor of the UNLV Student Union. All meeting rooms are equipped with LCD projectors and computers running Windows and Microsoft Office. Only CD-ROMs and thumb/USB/flash drives may be used to load presentations onto the computers. If you are preparing your presentation on a Macintosh computer, make sure it will load to a computer running Windows and that it looks on that platform the way you want it to appear. Speakers requiring other specialized equipment such as slide or overhead projectors were asked to make their requests known when they submitted their abstracts. If available, specialized equipment will be provided. Any rental costs incurred are the responsibility of the requestor.

Should a presenter wish to use their own laptop computer for their presentation, it will be possible to connect the laptop directly to the LCD projector via a VGA port. It is the responsibility of the presenter doing this to make sure that they bring any needed adapters to connect their computers to the VGA cable of the LCD projector.

STUDENT AWARDS FOR EXCELLENCE
The AAAS, Pacific Division offers each affiliated society and section participating in the annual meeting the opportunity to recognize outstanding student participants through the presentation of Awards of Excellence and cash prizes of $150 for first place and $100 for second place. Additionally, each winner receives a one-year student membership in AAAS, which includes weekly issues of Science magazine. Societies often supplement these awards with their own cash prizes.

For this meeting, six division-wide awards may be given: Laurence M. Klauber Award for Excellence (unrestricted); Geraldine K. Lindsay Award for Excellence in the Natural Sciences; J. Thomas Dutro, Jr. Award for Excellence in the Geosciences; Rita W. Peterson Award for Excellence in Science Education Research; Best Poster Award (for posters only but otherwise unrestricted); and the AAAS–Robert I. Larus Travel Award, which will provide reimbursement up to $1,000 for travel and other meeting related expenses for the awardee to attend the national meeting of AAAS in Chicago, Illinois, 13 – 17 February 2014 for the purpose of presenting his/her winning presentation as a poster. The Klauber, Lindsay, Dutro, Peterson, Best Poster, and Larus awards are given to those students whose presentations are judged the most significant in the advancement or understanding of science.
To be eligible for a sectional award or one of the division-wide awards, a student must be registered for the meeting prior to judging, be the primary presenter of the paper or poster, and be the principal research investigator. Student presentations, oral and poster, are judged on their abstracts, content, style of delivery or presentation, and audiovisual aids and/or handouts (if used). The evaluation forms for both oral and poster presentations are posted on the Division’s meeting web page.

Students who are competing for Awards of Excellence are invited to be guests of the Division at the annual banquet Tuesday evening, 18 June 2013. Festivities that evening include the announcement of student awards. Students were asked to indicate on the Advance Registration Form if they were planning to attend the banquet. Those who responded affirmatively were provided a ticket with their registration materials. If you are a student who is in competition for an Award of Excellence and you do not have a ticket for the banquet, please inquire at the Registration Desk to see whether any tickets are still available.

**IMPORTANT NOTE:** All judging for student awards ends by 3:00 p.m. on Tuesday, at which time the judges go into closed session to determine the winners. Students with oral presentations beyond this cut-off time were instructed to present their oral presentations also as a poster in order to be judged and in the pool of potential prize winners. Double presentations of this nature may only occur if a student’s presentation is part of a symposium. All oral contributed paper sessions are scheduled to ensure that student presenters are judged prior to the cut-off on Tuesday afternoon.

**PUBLIC LECTURES and PROGRAMS**

The following public lectures and programs are planned. Additional ones may be scheduled as time permits. All members of the public are invited to attend these lectures at no charge.

**Sunday Evening Public Plenary Panel: 6:30 p.m. – 8:00 p.m. Scientific Publishing: Where Are We, and Where Are We Going? 6:30 p.m. – 8:00 p.m. in the Student Union’s Philip J. Cohen Theatre.** Moderator: Cory Tucker, Head of Collection Management, UNLV Lied Library. Panelists: Marianne A. Buehler, Digital Scholarship Administrator, UNLV Lied Library; Stan Smith, Associate Vice-President for Research at UNLV; Bob Schatz, BioMed Central; and Yacouba Moumouni, UNLV graduate student.

Cory Tucker is Head of Collection Management at the University of Nevada Las Vegas Libraries. He is responsible for administration and coordination of collection development activities for the University Libraries and leads the identification, evaluation, selection, and initial licensing of print and electronic information resources for the UNLV Libraries. In addition, he is the Chair of the Collection Management Section of the Association of Library Collections and Technical Services. Cory received his undergraduate degree in finance from the University of Tennessee-Knoxville and received his MLS from the University of South Florida.

Marianne Buehler is the Urban Sustainability Librarian at UNLV. She received an MA from the School of Information Resources and Library Science, University of Arizona, and a BA in English, at the University of Maine. Her experience, applied research, and publications are focused on aspects of sustainable scholarly communication, such as managing institutional repositories, open access journal publishing, traditional/self-publishing, copyright/plagiarism, and intersections in information literacy. Previously at Rochester Institute of Technology, Marianne also engaged as the Managing Editor of the Journal of Applied Science & Engineering Technology (3 yrs), the Scholarship@RIT newsletter (5 yrs), and the Promise of Sustainability (2008) anthology. She presents at regional and national conferences. Her monograph, Demystifying the Institutional Repository for Success, will be published in summer, 2013.

Dr. Stan Smith is the Associate Vice President for Research at UNLV, where he has served on the faculty for over 25 years. As the AVPR, he helps coordinate several administrative functions, including promotion of UNLV’s research programs, research compliance, sponsored programs, and technology transfer. He is also the Director of the Science & Engineering Building (SEB), a new 200,000 ft² interdisciplinary research building that houses researchers from multiple colleges plus most of the core research facilities on campus. He is a desert ecologist, specializing in the functional ecology of plants and how they survive in the desert. He received his B.S. and M.S. from New Mexico State University and his Ph.D. from Arizona State. After a two-year postdoctoral fellowship at UCLA and several years at the Desert Research Institute Institute in Reno, he joined the faculty in the Department of Biological Sciences at UNLV, where he is now a Professor of Life Sciences. He has also held appointments at the Australian National University in Canberra (visiting Fellow) and the Lamont-Doherty Earth Observatory at Columbia (adjunct senior scientist). He has 100 peer-reviewed scientific publications, has secured more than $15 million in research funding, and received UNLV’s highest research awards – the Harry Reid Silver State Research Award in 2003 and the Barrick Distinguished Scholar Award.
in 2006. In addition to his administrative duties, he is currently involved in global change research, particularly how elevated CO2 and climate change may affect ecosystems and watershed function in arid lands.

Bob Schatz is North American Sales Manager of BioMed Central. Before that, Bob spent many years in bookselling and journal vending to academic libraries around the US and internationally. Bob is a frequent speaker at library conferences and has published numerous articles over the years. He currently serves on the editorial board of Library Collections, Acquisitions and Technical Services. Bob has a master’s degree in library science from the University of Oregon and is a graduate of the Harvard University Publishing Procedures Course.

Yacouba Moumouni received his B.ENG degree in Electrical and Computer Engineering in 2003 and M.S degree in Mechanical Engineering in 2012 at the Federal University of Technology, Minna, Nigeria and the University of Nevada, Las Vegas (UNLV) respectively. He is currently working toward his Ph.D degree at UNLV with emphasis on Power/Renewable Energy. Since August 2010, he has been a Research Assistant at the Center for Energy Research (CER). His current research interests include energy storage applications, grid-tie CPV 7700, Solar cell chip design and Sustainability. 

Monday Noon Public Plenary Lecture: 12:15 p.m. – 1:15 p.m. in the Student Union, Room 208A. Las Vegas: Sustainable?, presented by Dr. Robert E. Lang.

Dr. Lang is a non-resident senior fellow at the Brookings Institution and co-director of Brookings Mountain West. He is also a professor of sociology at the University of Nevada, Las Vegas, director of The Lincy Institute, an editor of the new scholarly publication Opolis: An International Journal of Suburban and Metropolitan Studies and an associate editor of the journal’s; Housing Policy Debate and the Journal of the American Planning Association.

Monday Evening AAASPD Presidential Address: 6:45 p.m. in the Student Union’s Philip J. Cohen Theatre. _Veratrum californicum: Of One-eyed Sheep and Hedgehogs_, presented by Dr. Owen M. McDougal.

Dr. McDougal received his undergraduate education in upstate New York before heading west in 1992 to pursue his graduate work in the laboratory of National Academy of Sciences member, C. Dale Poulter at the University of Utah. His work focused on the structure elucidation of marine natural products using nuclear magnetic resonance spectroscopy. His love of the mountains and joy to engage undergraduate students in research led him to a faculty position at Southern Oregon University in 1998. He taught chemistry at SOU for eight years and began his involvement with the Pacific Division of the American Association for the Advancement of Science in 2001. Upon return from a sabbatical appointment, Dr. McDougal sought a flourishing research environment to engage students; an environment that he found at Boise State University where he has been since 2006. Dr. McDougal has served two years as the president of the Faculty Senate at Boise State University and now holds positions as the Chair of the Snake River Local Section of the American Chemical Society and President of the AAASPD. He enjoys chemical education, natural products research and skiing with his wife, Lynette, and daughters McKenzie and Riley; passions that will take them to New Zealand for the coming year.

**Tuesday Noon Public Plenary Lecture: 12:15 p.m. in the Student Union, Room 208A. New Frontiers of Cancer Research in 2013: A “Vademecum” for Emerging Scientists,** presented by Dr. Rafael Malagoli Rocha.

Dr. Rocha is Professor at Fundação Antônio Prudente and Senior Researcher at A.C. Camargo Cancer Center, São Paulo, Brazil. He also serves as Head of The Molecular Morphology Laboratory for the MSc and PhD programs.

Dr. Rocha received his Biomedical degree from Federal University of Triângulo Mineiro (UFTM) in 2004, and completed his MSc in Pathology at Federal University of Minas Gerais (UFMG), Belo Horizonte, Brazil. In 2009 he received his Ph.D. degree in Pathology at UFMG, together with the University of London (UCL), London, UK. Then, he became a member of the group of assessors at UK-NEQAS for external quality control in immunocytochemistry. In 2010, he visited the University of Eppendorf, Hamburg, Germany, for the study of circulating tumor cells.

Dr. Rocha’s main research expertise is in translational pathology with emphasis in predictive markers and biomarkers in diagnosis and prognosis of the tumors. The main emphasis of his research is to use morphology to better comprehend molecular biology findings and connect them with clinical data of patients with cancer. He is a senior investigator in several grants which have resulted in more than 70 peer-reviewed scientific papers in international journals.

This lecture is dedicated to aspirant and young scientists, directed to the conflicts, challenges and experiences – the good, the bad and the ugly – that an emerging cancer researcher encounters.

**Wednesday Noon Public Plenary Lecture: 12:15 p.m. in the Student Union, Room 208A. The Incredible Contributions of Nikola Tesla,** presented by Michael Pravica.

Michael Pravica is an associate professor of physics at
the University of Nevada, Las Vegas (UNLV) and a member of the High Pressure Science and Engineering Center (HiP-SEC) there. He obtained his B.Sc. degrees in physics and applied mathematics (with honors) from Caltech and then went on to earn his A.M. and Ph.D. degrees from Harvard University, studying the ortho-para conversion of hydrogen at very high pressures in a diamond anvil cell using Nuclear Magnetic Resonance (NMR).

Professor Pravica’s research interests involve the study of organic materials (including explosives) under extreme conditions of pressure, temperature, and ionizing radiation. He has also enabled a new field of science that he terms useful hard x-ray induced chemistry wherein the highly penetrating, highly ionizing, and highly focused properties of hard x-rays are harnessed to perform in situ chemistry.

Professor Pravica is also passionate about communicating the importance of science to the public and has thus been very active in promoting science and education in the mainstream media.

RECEPTIONS and AWARDS BANQUET
Sunday Evening Welcome Reception: 7:45 p.m. – 9:00 p.m. in Lily Fong Geoscience, Room 202 (#67 on the campus map). Immediately following the conclusion of the Sunday Evening Public Plenary Panel discussion on scientific publishing, all registrants and their guests are invited to take a short walk to the Lily Fong Geoscience building and enjoy the conviviality of this event. Light refreshments will be available.

Monday Evening UNLV President’s Reception: 7:45 p.m. – 9:00 p.m. in the Student Union, Ballroom B. Immediately following the AAAS, Pacific Division Presidential Address, UNLV President Neal Smatresk will host a reception for all meeting registrants and their guests. Non-registered guests are welcome, but must be accompanied by a registrant. Please wear your registration badge to this event.

Tuesday Evening Student Awards Banquet: 6:00 p.m. – about 9:00 p.m. in the Student Union’s Ballroom. Tuesday evening will be an exciting time for students as Division representatives will announce the names of student winners of sectional Awards of Excellence and also winners of the Division’s Laurence M. Klauber Award for Excellence (unrestricted), Geraldine K. Lindsay Award for Excellence in the Natural Sciences, J. Thomas Dutro, Jr. Award for Excellence in the Geosciences, Rita W. Peterson Award for Excellence in Science Education Research, the Best Poster Award (for poster presentations only but otherwise unrestricted), and the AAAS Robert I. Larus Travel Award.

The evening is planned to begin at 6:00 p.m. with a no-host reception including a cash bar serving beer and wine. Dinner service will begin about 6:45 p.m. After dinner will be the presentation of student awards, followed by a short program. The evening should end by about 9:00 p.m.

Banquet attendees had the choice of three entrées: roasted and seasoned Top Round of Beef, Grilled Salmon with dill butter, and a Vegetarian Dish. All entrées come with a mixed green salad with raisins and cranberries tossed with raspberry vinaigrette, broccoli, roasted red potatoes, rolls and butter, dessert plate of three mini desserts—eclair, cream puff and cookie, and iced tea, iced water and, on request, coffee. Please note that details may change as we approach the banquet date. If a substitution must be made, every effort will be made to assure that the replacement is comparable to that which is listed above. Banquet tickets are $40 each and needed to be purchased in advance. If you failed to purchase a ticket in advance and would like to attend the event, please check at the Registration Desk about availability of tickets.

Students in competition for Awards of Excellence are invited to be guests of the Division for this event. Note that if you are such a student and requested a complimentary ticket, we expect you to attend the banquet! Please don’t dishonor the Division’s generosity in offering you this opportunity to fully participate in the meeting with minimal out-of-pocket expenses by asking for a ticket and then not showing up!

BUSINESS MEETINGS
Executive Committee of the Pacific Division of AAAS. Saturday, 15 June, Noon – 5:00 p.m. in Tonopah Hall Room 400.
Arizona-Nevada Academy of Sciences. Monday, 17 June, 12:30 p.m. – 1:30 p.m. in SU Room 205.
Council of the Pacific Division of AAAS. Wednesday, 19 June, 7:00 a.m. – 10:00 a.m. in SU Room 208A. At this time the Council will hold its annual breakfast and business meeting, including the elections of officers and Council members, discussion of programs for the 2014 and 2015 annual meetings, and the transaction of such other business as is required by the Division’s By-Laws. This is an open meeting and Pacific Division members with an interest in the governance of the Division are invited to attend.

FIELD TRIPS
All field trips are open to meeting registrants and their families. At least one member of a family group must be registered for the meeting. Unregistered family members are charged an additional one-time-only $10 field trip registration fee. This fee is paid only once for this meeting, regardless of how many field trips a non-registered participates in.

Due to limited space, advance registration was requested for all field trips. Reservation and payment of field trip fee(s) was included on the Advance Registration Form. If you didn’t pre-register for a field trip on which you would like to participate, inquire at the Registration Desk to see whether any space remains.

A full refund will be granted if a trip is cancelled by the Division. If a registrant cancels via e-mail or written
Field Trip #1: Engineering, Geology, and Engineering Geology of Hoover Dam and the O’Callahan-Tillman Bridge. Sunday, 16 June: 8:00 a.m. – 2:00 p.m.

Hoover Dam lies within a Miocene (about 14 million years old) caldera. The walls of Black Canyon below the dam display spectacular exposures of volcanic ash (ashflow tuffs). This trip will include a special engineering-emphasis tour of Hoover Dam. We will view and discuss the engineering that went into the construction of the dam and also the construction of the new Mike O’Callahan-Pat Tillman bridge that crosses the Colorado River just downstream of the dam. We will walk across the bridge and view the volcanic rocks and faults that have fractured them.

Due to the access we will be granted during this field trip, all participants must be U.S. citizens; names and social security numbers need to have been submitted at least two weeks in advance, so this field trip is not available for last minute sign-up.

This field trip involves easy walking on paved surfaces.

Includes transportation, box lunch and water, and miscellaneous fees. Cost: $60 per person.

Field Trip #2: Devils Hole and Ash Meadows National Wildlife Refuge. Sunday, 16 June: 8:00 a.m. – 3:00 p.m.

The Devils Hole pupfish is one of the most famous endangered species in the world. A 1970s U.S. Supreme Court decision protecting the habitat of this pupfish was a landmark decision in American environmental law. This trip will include a visit to Devils Hole and other sites within Ash Meadows National Wildlife Refuge, located about 1.5 hours from Las Vegas. Many endemic species occur in Ash Meadows; boardwalks facilitate access to viewpoints where spring discharge and wildlife can be observed.

This field trip complements a symposium on the management of endangered species (Management of Endangered Species in the American West: Policy and Practice) and involves easy walking on flat terrain.

Includes transportation, box lunch, and water. Cost: $45 per person.

Field Trip #3: Landscape Photography of the Desert Southwest. Wednesday, 19 June: 5:00 a.m. – 3:00 p.m. Led by Dr. Peter Starkweather (Department of Biology, University of Nevada, Las Vegas, and photographer). Dr. Starkweather has 30 years of photographic experience in the region and throughout North America as well as in Asia and Africa; during this time he studied fine art landscape photography with the late Galen Rowell and photographic field techniques with Center for Creative Photography-inductee David Muench. Some of Dr. Starkweather’s work can be viewed at www.redwallphoto.com.

We will start early to catch the morning photographic “magic hour,” planning to be ready to shoot by sunrise (5:24 am PDT ‘round these parts!). The Desert Southwest provides unparalleled opportunities and substantial challenges for landscape photographers, with striking visual contrasts, wide color palettes and – almost always – BLUE skies. Your leader will select specific destinations based on road conditions, weather and photo opportunities, but no matter where we go we are sure to become well-acquainted with the vibrant geological landscape, some desert biology and, if possible, some Puebloan rock art of the region. The trip philosophy will be that the photographer makes the photo, not the camera, and pro equipment definitely is not essential. That said, if participants happen to have tripods and remote shutter releases, plus familiarity with the manual functions of their cameras, those will come in handy for the best results.

We likely will be in, or close to, federally-designated Wilderness areas, and hiking is the only way in to the really good spots. Participants should be prepared accordingly, with sturdy rock/sand footwear, appropriate clothing (in layers), hats and daypacks for carrying gear, snacks and water. Note that the local average daily high temperature for June 19 is 38°C (100°F), so the ability for each person to carry ~2L of water is very important, as is wearing sunscreen.

Participants will be required to sign a Release of Liability form in order to participate in this trip.

This field trip involves short hikes over rocky desert terrain in what could be very warm weather.

Includes transportation, box lunch, water and snacks. Cost: $35 per person.

Field Trip #4: Tule Springs Fossil Beds. Wednesday, 19 June: 3:00 p.m. – 6:30 p.m. Leader: Dr. Josh Bonde (College of Sciences, University of Nevada, Las Vegas).

Tule Springs Fossil Beds is a region in northern Las Vegas Valley with abundant and diverse Pleistocene fossils, including Columbian mammoths, camels, horses, bison, and sloths. Legislation is pending in Congress to create a new national monument for the protection, study, and interpretation of these fossils. Participants will visit an area of active, on-going paleontological research.

This field trip includes short hikes over irregular terrain. Be sure to bring sun hats, appropriate clothing, and wear sunscreen!

Includes transportation and water; no food provided. Cost: $25 per person.

Field Trip #5 Evening Hike to Potato Knoll in Red Rock Canyon National Conservation Area. Wednesday, 19 June: 4:45 p.m. – 9:15 p.m. Leader: Dr. Nick Saines (Geologist,
Red Rock Canyon Interpretive Association).

This hike is the perfect way to experience the non-glitzy, scenically spectacular side of Las Vegas. It is 7°F cooler at Red Rock Canyon (elevation 4000 ft) than in Las Vegas (elevation 2000 ft). On this hike we will walk into the shadow of the mountain where it is even cooler. Potato Knoll is a large slump block of Jurassic Aztec Sandstone that broke off from the Wilson Cliffs. The hike affords nice views of the majestic sandstone cliffs. We will see Triassic shales of the Moenkopi Formation near Oak Creek on our way to a ridge of Shinarump Conglomerate. The Shinarump is the lowest member of the Triassic Chinle Formation. Above the Shinarump is the Petrified Forest Member of the Chinle. We will see petrified logs and a strange controversial geological feature that has yet to be satisfactorily explained. What will you think? Dinner on the ridge, then back to the vehicles. The hike is about 3 miles round trip, with very little change in elevation. Bring a daypack for water and box dinner, and appropriate footwear.

This field trip complements the symposium on the Mesozoic paleontology and paleogeography of Utah, Nevada and adjacent states (see Symposium #10: Dinosaurs and Their Neighbors: Mesozoic Paleontology and Paleogeography of Nevada, Utah, and Adjacent States).

Included in this field trip is a three mile round trip hike with low relief during the cooler evening hours.

Includes transportation, box dinner, and water. Cost: $30 per person.

**Field Trip #6 Nevada Solar One 400 Acre Concentrated Solar Power Plant. Thursday, 20 June: 8:30 a.m. – noon.**

Nevada Solar One is a 400 acre, concentrated solar power plant located south of Boulder City, Nevada, about an hour from Las Vegas. The plant uses 760 parabolic trough concentrators with more than 182,000 mirrors to concentrate the sun’s rays onto more than 18,240 receiver tubes placed at the focal axis of the troughs and containing a heat transfer fluid. The trough concentrators track the sun’s location and concentrate its rays during peak demand hours. Nevada Solar One is the second solar thermal power plant built in the United States in more than 16 years, and the largest plant of its type built in the world since 1991. Its nominal capacity is 64 MW and maximum capacity is 75 MW. The plant went into operation in 2007.

Participants will tour the plant for about 45 minutes. Wear long pants and closed-toed shoes. Have sunscreen along for times with sun exposure.

Includes transportation and water; no food is provided. Cost: $20 per person.

**Field Trip #7 An Ecological Transect of the Sheep Range – A great Basin Sky Island. Thursday, 20 June: 8:00 a.m. – 2:00 p.m.** NOTE: This field trip was cancelled due to lack of adequate advance registrations.

**Field Trip #8 Zion National Park: Geology, Natural Resource Management Policy, and Dinosaur Tracks.**
Future Meetings

Pacific Division Annual Meetings
2014.....17 – 20 June in Riverside, California
sponsored by the University of California, Riverside
2015*...14–17 June in San Francisco, California
sponsored by San Francisco State University

AAAS National Meetings
2015.....12 – 16 Feb. in San Jose, California
2016.....11 – 15 Feb. in Washington, D.C.
2017.....16 – 20 Feb. in Boston, Massachusetts

*Invitation to be considered at the June Council meeting.
**GENERAL SESSIONS**

### Sunday, 16 June 2013

**EVENING PUBLIC PANEL DISCUSSION***

SU Theatre  
Sunday  
6:30 p.m. – 7:45 p.m.

*Scientific Publishing: Where Are We, and Where Are We Going?* Panelists: Moderator: Cory Tucker, Head of Collection Management, UNLV Lied Library. Panelists: Marianne A. Buehler, Digital Scholarship Administrator, UNLV Lied Library; Stan Smith, Associate Vice-President for Research at UNLV; Bob Schatz, BioMed Central; and Yacouba Mounouni, UNLV graduate student.

**WELCOME RECEPTION**  
LILY FONG GEOSCIENCE ROOM 202  
Sunday  
7:45 p.m.

Sponsored by the Pacific Division, this low key reception features beer, soft drinks and salty snacks. It begins immediately following the conclusion of the evening public plenary panel and continues until about 9:00 p.m. All registrants and their families are invited to enjoy the conviviality of this event. Please wear your registration badge.

**STUDENT AWARDS JUDGES ORGANIZATIONAL MEETING**  
LILY FONG GEOSCIENCE ROOM 102  
Sunday  
8:15 p.m.

### Monday, 17 June 2013

**NOON PUBLIC LECTURE***

SU ROOM 208A  
Monday  
12:15 p.m.

1 *Las Vegas: Sustainable?*, presented by Dr. Robert E. Lang, non-resident senior fellow at the Brookings Institution and co-director of Brookings Mountain West, professor of sociology at the University of Nevada, Las Vegas, director of The Lincy Institute, and an editor of the new scholarly publication *Opolis: An International Journal of Suburban and Metropolitan Studies*. Please turn to page 16 in these Proceedings for additional information about Dr. Lang.

**BUSINESS MEETING of the ARIZONA-NEVADA ACADEMY of SCIENCES**  
SU ROOM 205  
Monday  
12:30 p.m. – 1:30 p.m.

2 *Veratrum californicum: Of One-eyed Sheep and Hedgehogs*, presented by Dr. Owen M. McDougal (Department of Chemistry and Biochemistry, Boise State University). Please turn to page 16 in these Proceedings for additional information about Dr. McDougal.

**UNLV PRESIDENT’S RECEPTION**  
SU BALLROOM B  
Monday  
7:45 p.m.

Sponsored by UNLV President Dr. Neal Smatresk, this informal reception begins immediately following the conclusion of the evening plenary talk. All all meeting registrants and their guests are invited to attend. Non-registered guests are welcome, but must be accompanied by a registrant. Please wear your registration badge to this event.

*The public is invited to attend this program at no charge.
### Tuesday, 18 June 2013

**NOON PUBLIC LECTURE***

SU ROOM 208A  
*Tuesday*  
12:15 p.m.

3 **New Frontiers of Cancer Research in 2013: A “Vademecum” for Emerging Scientists**, Dr. Rafael Malagoli Rocha (Department of Pathology, Hospital AC Camargo, Liberdade São Paulo, Brazil; rafael.malagoli@gmail.com). Please turn to page 16 in these *Proceedings* for additional information about Dr. Rocha.

**STUDENT AWARDS JUDGES MEETING**

SU ROOM 218  
*Tuesday*  
3:00 p.m.

**RECEPTION and STUDENT AWARDS BANQUET**

SU BALLROOM  
*Tuesday*  
6:00 p.m.

The evening will begin at 6:00 p.m. with a reception that includes a cash bar featuring beer, wine and soft drinks. Dinner service will begin about 6:45 p.m. Be sure to bring your dinner ticket with you, as it is needed not only to verify that you are on our dinner list but also to let the servers know your choice of entrée. Tickets to the banquet cost $40 and needed to be purchased in advance. Students in competition for Awards of Excellence were invited to attend the banquet as guests of the Division by requesting a ticket in advance (at no charge). If you do not have a ticket but would like to attend the banquet, please check at the Registration Center to see if any tickets remain. Following dinner will be the announcement of the winners of the student Awards of Excellence as part of a short program. *Student award winners are asked to stay until the end of the program so that photographs may be taken of the group.* The evening is expected to end by about 9:00 p.m.

### Wednesday, 19 June 2013

**MEETING of the COUNCIL of the PACIFIC DIVISION**

SU ROOM 208A  
*Wednesday*  
7:00 a.m. - 10:00 a.m.

The Council of the AAAS, Pacific Division will hold its annual breakfast business meeting starting at 7:00 a.m. in the Student Union, Room 208A. The Council will elect officers, discuss programs for the 2014 and 2015 annual meetings, and transact such other business as is required by the Division’s By-laws.

**NOON PUBLIC LECTURE***

SU THEATRE  
*Wednesday*  
12:15 p.m.

4 **The Incredible Contributions of Nikola Tesla**, presented by Dr. Michael Pravica (Associate Professor of Physics, University of Nevada, Las Vegas). Please turn to page 16 in these *Proceedings* for additional information about Dr. Pravica.

*The public is invited to attend this program at no charge.*
I. SYMPOSIAS

Monday, 17 June 2013

Structural and Computational Approaches for Novel Therapeutics Development and Biomedical Insights

SU ROOM 213
Monday 8:00 a.m. – 4:45 p.m.

Organizers: Todd Talley and Dong Xu (Idaho State University College of Pharmacy).

Program sponsored by the Pacific Division sections on Cell and Molecular Biology, and Chemistry and Biochemistry.

During the past decade there has been rapid growth in the number of crystal structures of known drug targets and the advancements of state-of-the-art computational methods. Putting this wealth of information to use requires the skills of researchers from a wide array of fields including biophysics, medicinal chemistry, molecular and computational biology. The goal of this symposium is to facilitate the exchange of ideas and develop collaborations to take advantage of the data and methods now available.

Session Co-Chairs: Todd Talley and Dong Xu

8:00  5 Chimeras of the Acetylcholine Binding Proteins as Templates for the Development of New Therapeutics, TODD T TALLEY¹, JOSHUA WU², KWOK-YIU HO³, BANUMATHI SANKARAN³ and PALMER TAYLOR² (¹Department of Biomedical and Pharmaceutical Sciences, Idaho State University College of Pharmacy; ²Skaggs School of Pharmaceutical Sciences, University of California, San Diego; ³The Berkeley Centre for Structural Biology, Lawrence Berkeley National Laboratory).

8:25  6 Bioinformatics Studies of CYP450 SNPs and Personalized Drug Metabolism, DONG-QING WEI, LI LI and HAO DAI (State Key Lab of Microbial Metabolism and College of Life Science and Biotechnology, Shanghai Jiaotong University, Shanghai, China).


9:15  8 From Folding@Home to AMBER: Five Years of Molecular Dynamics with CUDA, SCOTT LE GRAND (NVIDIA Corporation, Mountain View, CA).

9:40  9 Access to Millisecond Time Scale Events with Accelerated Molecular Dynamics and GPU technology, ROMELIA SALOMON FERRER (San Diego Supercomputer Center, University of California, San Diego).

10:05 BREAK

10:30 10 Computationally Guided Discovery of Novel Influenza Endonuclease Inhibitors, ROBERT V SWIFT¹, ERIC CHEN¹, NAZILLA ALDERSON², GEN-SHENG FENG² and ROMMIE E AMARO¹ (¹Department of Chemistry and Biochemistry, University of Michigan Medical School; ²Department of Pathology, University of California, San Diego).

10:55 11 Common Functional Dynamics of Molecular Motor and Switch Proteins, BARRY J GRANT (Department of Computational Medicine and Bioinformatics, University of Michigan Medical School).

11:20 12 The Translocation Kinetics of Antibiotics Through Porin OmpC: Insights from Structure-based Solvation Mapping Using WaterMap, SARAH WILLIAMS¹*, QUE-TIEN TRAN¹, GÜL ERDEMLI¹ and ROBERT PEARLSTEIN² (¹Novartis Institutes for BioMedical Research, Center for Proteomic Chemistry; ²Novartis Institutes for BioMedical Research, Global Discovery Chemistry, Computer-Aided Drug Discovery).

11:45 LUNCH

1:00 13 Recommendations for Hit Identification and Hit Optimization in Virtual Screening, KIRK E HEVENER (Idaho State University, College of Pharmacy).
1:25 14 Computational Studies of Sortase Enzymes, JEFF WERESZCZYNSK1 (University of California, San Diego).


2:15 16 Quantum Chemical Studies of Electron Coupled Proton Transfer in B-type Cytochrome C Oxidases, ANDREAS W GÖTZ,1*, ROSS C WALKER1,2, DONALD BASHFORD3, MICHAEL E PIQUE4, WEN-GE HAN4 and LOUIS NOODLEMAN4 (University of California San Diego, San Diego Supercomputer Center; 3University of California San Diego, Department of Chemistry and Biochemistry; 4St. Jude Children’s Research Hospital, Department of Structural Biology; 5The Scripps Research Institute, Department of Integrative Structural and Computational Biology).

2:40 17 A Complete Configurational Ensemble Approach to Expand LSD1/CoREST Druggability, JAMES C ROBERTSON1*, NATE C HURLEY1, NADEEM A VELLORE1, ANDREA MATTEVI2 and RICCARDO BARON1 (1Department of Medicinal Chemistry, College of Pharmacy, The University of Utah; 2Department of Biology and Biotechnology, University of Pavia, Pavia, Italy).

3:05 BREAK

3:30 18 Using All Atom Molecular Dynamics Simulations to Predict Passive Small Molecule Membrane Permeability, ROBERT V SWIFT and ROMMIE E AMARO (Department of Chemistry and Biochemistry, University of California, San Diego).

3:55 19 Discovery of a Pocket Full of Promise for Cancer, OZLEM DEMIR (University of California, San Diego).

4:20 20 Insights into Ligand Binding on Neuronal Nicotinic Receptors and Acetylcholine Binding Proteins through Computational Analyses, DONG XU* and TODD TALLEY (Department of Biomedical and Pharmaceutical Sciences, College of Pharmacy, Idaho State University).

Boise Extravaganza in Set Theory (BEST)
SU ROOM 207
Monday, 8:50 a.m. – 4:40 p.m.
Tuesday, 9:00 a.m. – 4:00 p.m.

Program organizers: Liljana Babinkostova, Andres Caicedo, Samuel Coskey and Marion Scheepers (Department of Mathematics, Boise State University, Boise, Idaho).

Program sponsored by the Pacific Division section on Mathematics.

This program is a continuation of the well-known conference BEST (Boise Extravaganza in Set Theory). BEST focuses on the mathematical discipline called Set Theory, and its applications in other disciplines in Mathematics. BEST was for its first nineteen years hosted in Idaho at Boise State University.

Set Theory is the mathematical foundation for the study of the infinitary objects that routinely arise in Mathematics and its applications, and in the mathematical sciences. Contemporary set theoretic research addresses basic questions about provability, consistency and independence, and the relative strength of postulates or hypotheses in mathematized scientific theories. The methods developed by set theory serve as powerful tools for applications in many other mathematical disciplines, including algebra, analysis, combinatorics, complexity, topology and more.

The invited speakers for this program are successful set theorists from different career stages and will present high level scientific talks in several areas of set theory and its applications. The BEST symposium will also host contributed talks in Set Theory and its applications by participants. Undergraduate and graduate students will also present research accomplishments in these areas.

Session chair: Liljana Babinkostova

8:50 Opening

9:00 21 From Subcompact to Domain Representable, WILLIAM G FLEISSNER1 and LYNNE YENGULALP* (1Department of Mathematics, University of Kansas; 2Department of Mathematics, University of Dayton).

10:00 22 Universal Subgroups, KONSTANTINOS A BEROS (Department of Mathematics, University of Wisconsin).

10:30 23 Admissible Determinacy, SHEHZAD AHMED (Department of Mathematics, Boise State University).

10:55 24 Hausdorff Gaps and Towers, PIOTR BORODULIN-NADZIEJA1 and DAVID CHODOUNSKI2*
(1Mathematical Institute, University of Wroclaw, Wroclaw, Poland; 2Department of Mathematics and Statistics, York University, Toronto, Ontario, Canada).

**11:25** 25 Information not available at press time. Please refer to updates sheet for information about this presentation.

12:00 LUNCH

2:00 26 Higher Cardinal Characteristics and PCF, TODD EISWORTH (Department of Mathematics, Ohio University).

3:00 27 A Generalization of the Notion of Strong Measure Zero to Quasi Uniform Spaces, KAMERYN J WILLIAMS (Department of Mathematics, City University of New York).

3:25 28 Remarks on Countable Tightness, MARION SCHEEPERS (Department of Mathematics, Boise State University).

3:50 29 Information not available at press time. Please refer to updates sheet for information about this presentation.

4:15 30 Information not available at press time. Please refer to updates sheet for information about this presentation.

---

Library Science and Archives: Forming Partnerships, Making Connections

SU ROOM 209

Monday

8:55 a.m. – 4:20 p.m.

Program organizers: Crystal Goldman (Dr. Martin Luther King, Jr. Library, San Jose State University), Frank Jacobitz, (Mechanical Engineering Program, University of San Diego), Michal Davidson (Idaho State Archives, Division of the Idaho State Historical Society), Silke Higgins (Digital Initiatives Librarian, King Library, San Jose State University), Susan Kendall (Collection Development Coordinator, King Library, San Jose State University), and Eva Stowers (University Libraries, University of Nevada, Las Vegas).

Program sponsored by the Pacific Division section on General and Interdisciplinary Studies.

Libraries and archives in the digital age are often strengthened by developing partnerships. The form these take are as varied as the individuals who create them, but they can expand the capabilities of all involved and make possible projects that would otherwise not be realized. Librarians and archivists are often accustomed to working in a team structure, which fosters a cooperative environment that capitalizes on the strength of many. This interconnectedness can lead to innovation within the library or archives, and outreach to other individuals or groups can lead to progressive new projects.

This symposium will focus on the strengths of libraries and archives, both traditional and innovative, that serve to build the success of the academy as a whole. Rarely is such success achieved in a vacuum; thus, this symposium will also focus on the partnerships and connections librarians or archivists create with each other, with teaching faculty members, with other departments, other institutions, and other academic organizations in order to advance initiatives in instruction, reference, collection development, and digital projects.

Session Co-chairs: Crystal Goldman and Frank Jacobitz

8:55 Introductory Remarks


9:30 32 Using Open Educational Resources to Engage Faculty on Scholarly Communications Issues, CRYSTAL GOLDMAN* and CHRISTINA MUNE (King Library, San Jose State University).

10:00 33 Grant Writing Instruction at the J. Willard Marriott Library, 2002-2013: A Case Study, PETER L KRAUS (J. Willard Marriott Library).

10:30 BREAK

11:00 34 Assessing Modularized Online Library Instruction, CRYSTAL GOLDMAN (King Library, San Jose State University).

11:30 35 Assessment of Information Literacy Pilot Project: Impressions of Researchers, Classroom and Library Faculty, AMY BESNOY*, FRANK JACOBITZ*, HUGH BURKHART1, CAROLE HUSTON2 and
PAULA KRIST\textsuperscript{4} (\textsuperscript{1}Copley Library, \textsuperscript{2}Department of Engineering, \textsuperscript{3}Associate Dean, College of Arts and Sciences, \textsuperscript{4}Director of the Office of Institutional Research and Planning, University of San Diego).

12:00 LUNCH

1:30 36 Students’ Confidence in Conducting Research, VALERIA E MOLTENI and EMILY K CHAN (Academic Liaison Librarians, Dr. Martin Luther King Jr. Library, San Jose State University).

2:00 37 Collaborative K-12 Outreach: K-12 STEM and Beyond, SUSAN WAINSCOTT\textsuperscript{*}, FREDERIC RAUBER\textsuperscript{*}, XAN GOODMAN\textsuperscript{*} and SAMANTHA GODBEY\textsuperscript{*} (University of Nevada, Las Vegas).

3:00 BREAK

3:20 38 Panel Discussion: Teaching and Library Faculty Partnerships, AMY BESNOY\textsuperscript{1*}, VERONICA GALV\textsuperscript{2*}, CRYSTAL GOLDMAN\textsuperscript{3*}, FRANK G JACOBITZ\textsuperscript{4*} and PETER L KRAUS\textsuperscript{5*} (\textsuperscript{1}Copley Library, \textsuperscript{2}Department of Psychological Sciences, University of San Diego; \textsuperscript{3}Dr. Martin Luther King Jr. Library, San Jose State University; \textsuperscript{4}Department of Engineering, University of San Diego; \textsuperscript{5}J. Willard Marriott Library).

Forensic Psychological Science of Juvenile Fire Setters and Bomb Makers
SU ROOM 211
Monday
9:00 a.m. – 11:50 a.m.

Program organizer: Ronn Johnson (School of Leadership and Education Sciences, University of San Diego).

Program sponsored by the Pacific Division Psychology Section.

Juvenile fire setting (JFS) or as it is referred to by the current term, Youthful Misuse of Fire (YMF) has received considerable research attention over the past several decades in public safety. There has been little systematic review of integrated risk assessments and treatment factors for these often diverse clinical groups. For example, what are some of the differences between JFS/YMF and bomb makers? How many sessions should a JFS/YMF client receive? This symposium presents an overview of a variety of risk assessment factors that are of particular relevance to consider for any work done with juvenile fire setters in clinical or forensic settings. The presentation considers the importance of JFS-YMF across a broad array of clinical domains, including developmental, diagnostic, and the prognostic utility anticipated by the release of the DSM-5. National standards and risk assessment levels are examined. The presentation provides a starting place for developing conceptualizations for the diverse assessment and cross-cultural evidenced-based treatment needs for these treatment populations. Preliminary data from the JFS research project of the Burn Institute of San Diego County will be presented.

Session Chair: Ronn Johnson

9:00 39 Use of the DSM-5 with Juvenile Fire Setters and Bomb Makers, RONN JOHNSON\textsuperscript{*}, ELIZABETH CALLAHAN, CHRISTOPHER WEHRLE, JOJO LEE, ALEJANDRA STEPANSKY and ELIZABETH GRACE (Clinical Mental Health Program, University of San Diego).

9:30 40 Forensic Psychological Evaluations and Risks Assessments of Juvenile Fire Setters and Bomb Makers Using the CBCL, RONN JOHNSON, PATRICIA JONES\textsuperscript{*} and ELIZABETH CALLAHAN (Clinical Mental Health Program, University of San Diego).

10:00 BREAK

10:20 41 Clinical and Forensic Psychological Issues in Work with Latino/A Juvenile Fire Setters, RONN JOHNSON, ALEJANDRA STEPANSKY and CHRIS ZURES\textsuperscript{*} (Clinical Mental Health Program, University of San Diego).

10:50 42 Clinical Decision Making in the Treatment of Juvenile Fire Setters Referred by the Courts: Transdisciplinary Service Coordination, RONN JOHNSON and PATRICIA JONES\textsuperscript{*} (Clinical Mental Health Program, University of San Diego).

11:20 43 Towards A National Data Base from A Community-Based Juvenile Fire Setter Service In San Diego County: Fatjam Program, RONN JOHNSON, ALEJANDRA STEPANSKY and PATRICIA JONES\textsuperscript{*} (Clinical Mental Health Program, University of San Diego).
Forensic and Clinical Psychological Science Issues in Anti-Terrorism: An International Paradigm
SU ROOM 211
Monday
1:30 p.m. – 4:20 p.m.

Program organizer: Ronn Johnson (School of Leadership and Education Sciences, University of San Diego).

Program sponsored by the Pacific Division Psychology Section.

Acts of terrorism are traumatic incidents that have no international border restrictions. The lessons learned from 9/11 taught Americans that no target is invulnerable to acts of terror. Moreover, successful and thwarted acts of terrorism and reconnaissance response probes have fueled a growing need for mental health professionals to expand health safety-related trainings to include behavioral threat assessments related to terrorism. Why? Because terrorists use a variety of tactics, techniques, and procedures to achieve their often unstated objectives. Research has consistently demonstrated that Post-traumatic Stress Disorder (PTSD) can be one of the clinical outcomes for terrorism that can potentially result in forensic consequences. At the same time, the speed of globalization fused with ideology has resulted in a need to address issues of radicalization. Unfortunately, there is a non-linear relationship between timely intelligence gathering, acts of terror, and understanding radicalization. The objective of this symposium is to review several areas related to mental health professionals implementing anti-terrorism responses.

Session Chair: Ronn Johnson

1:30 44 Is There A Nexus Between Historical Trauma and PTSD Vulnerability in Military Personnel? RONN JOHNSON, BONNIE KUO*, CHRIS ZURES, ELIZABETH GRACE and ANGELICA GARCIA (Clinical Mental Health Program, University of San Diego).

2:00 45 Evidence-Based Treatment Issues for Victims of Terrorism: Boston Marathon Explosion, RONN JOHNSON, BONNIE KUO*, CHRISTOPHER WEHRLE and MEGGIE WILHELM (Clinical Mental Health Program, University of San Diego).

2:30 46 Radicalization of Prison Inmates: An Antiterrorism Paradigm, RONN JOHNSON* and CHRISTOPHER WEHRLE (Clinical Mental Health Program, University of San Diego).

3:00 BREAK

3:20 47 Can Stress Inoculation Training Be Used As An Evidence-Based Antiterrorism Strategy? RONN JOHNSON*, ANDI FESSLER and ANGELICA GARCIA (Clinical Mental Health Program, University of San Diego).

3:50 48 Radicalization Resistance Training As An Antiterrorism Strategy: Is This A Pipe Dream? RONN JOHNSON, CHRIS ZURES* and ANGELICA GARCIA (Clinical Mental Health Program, University of San Diego).
Tuesday, 18 June 2013

**Climate Change, Sustainability, and Water Resources in the Arid West**

SU ROOM 205  
Tuesday  
8:30 a.m. – Noon

Program organizer: Sajjad Ahmad (Department of Civil and Environmental Engineering, University of Nevada, Las Vegas).

Session sponsored by the Pacific Division section on Ecology, Organismal Biology, and Environmental Sciences.

This symposium will focus on the energy-water nexus in arid portions of North America, in the face of climatic uncertainties. What range of climate change should we expect, and how will natural ecosystems and human communities respond? Optional field trips to Hoover Dam and Nevada Solar One concentrated solar power plant complement this symposium.

Session Chair: Sajjad Ahmad

8:30 Introductory Comments

8:40 49 Analysis of Spatio-Temporal Behavior of Urban Heat Island Intensity in Relation to Urban Sprawl and Urban Forestry Initiative in Las Vegas, Haroon Stephen (Civil and Environmental Engineering, University of Nevada Las Vegas).

9:10 50 Understanding Climate Change and Extremes with Regional Climate Models, Rachindra Mawalagedara*, Debasish Das†, Robert J Oglesby‡ and Auroop R Ganguly* (†Northeastern University; ‡University of Nebraska, Lincoln).

9:40 51 Using Pacific Ocean Sea Surface Temperature for Improving Streamflow Estimates in the Colorado River Basin, Ajay Kalra¹, Sajjad Ahmad² and Navin K Twarakavi¹ (¹Division of Hydrologic Sciences, Desert Research Institute; ²Department of Civil and Environmental Engineering, University of Nevada, Las Vegas).

10:10 BREAK

10:30 52 Regional and Seasonal Intercomparison of CMIP3 and CMIP5 Climate Model Ensembles for Precipitation and Temperature, Devashish Kumar*, Evan Kodra and Auroop R Ganguly (Northeastern University).

11:00 53 A Simultaneous Analysis of Trend and Step Changes in the Streamflow of the Continental United States, Soumya Sagarika*, Ajay Kalra² and Sajjad Ahmad¹ (¹Department of Civil and Environmental Engineering, University of Nevada, Las Vegas; ²Division of Hydrologic Sciences, Desert Research Institute).

11:30 54 Water-Energy Nexus in the Arid Southwest: Implications for Sustainable Water Management, Sajjad Ahmad (Department of Civil and Environmental Engineering, University of Nevada Las Vegas).

**Ion Channels: Integration of Computer Simulations with Experiments**

SU ROOM 209  
Tuesday  
8:40 a.m. – Noon

Program organizers: C. Mark Maupin (Department of Chemical and Biological Engineering, Colorado School of Mines) and Owen M. McDougal (Department of Chemistry and Biochemistry, Boise State University).

Session sponsored by the Pacific Division sections on Chemistry and Biochemistry, and Computer and Information Sciences.

Due to the difficulty of crystallizing transmembrane ion channel proteins, the use of computational techniques such as homology modeling, docking calculations, and molecular dynamics are increasingly being used to generate molecular-level information. These computational techniques are rapidly becoming a complementary component to experiment in an effort to unravel ion channel structure, function, and interactions with ligands. This symposium will address experimental and computational work conducted on ion channels with an emphasis on complimentary techniques that enhance our understanding of ion channels.

Session co-chairs: C. Mark Maupin and Owen M. McDougal

8:40 Introductory Comments

9:00 55 Small Peptides Equate to Big Computational Challenges, Owen M McDougal (Boise State University, Department of Chemistry and Biochemistry).
9:20 56 Introducing DockoMatic: A Computational Tool for Scientists, NIC CORNIA¹*, OWEN M McDOUGAL² and TIMANDERSON¹ (¹Department of Computer Science, Boise State University; ²Department of Chemistry and Biochemistry, Boise State University).

9:40 57 Insights into Acetylcholine and α-Conotoxin MII Binding to αβ, Nicotinic Acetylcholine Receptors from Homology Modeling and MM/PBSA Studies, CONRAD ROHLEDER², VIVEK S BHARADWAJ¹, SOMISETTI V SAMBASIVARAO¹, JASON G SLINGSBY¹, CHRIS MALLORY³, JAMES GROOME³, OWEN M McDOUGAL² and C MARK MAUPIN*² (¹Chemical and Biological Engineering Department, Colorado School of Mines; ²Department of Chemistry and Biochemistry, Boise State University; ³Department of Biological Sciences, Idaho State University).

10:00 BREAK

10:20 58 Computational Evaluation of the Gating Mechanism for a Heteropentameric Nicotinic Acetylcholine Receptor, JASON G SLINGSBY* and C MARK MAUPIN (Chemical and Biological Engineering Department, Colorado School of Mines).

10:40 59 pKₐ Determination of Histidine Residues in α-Conotoxin MII Peptides by ¹H NMR and Constant pH Molecular Dynamics Simulation, OWEN M McDOUGAL, DAVID M GRANUM*¹, MARK SWARTZ¹, CONRAD ROHLEDER² and C MARK MAUPIN² (¹Department of Chemistry and Biochemistry, Boise State University; ²Chemical and Biological Engineering Department, Colorado School of Mines).

11:00 60 Discovery of Potent, Selective Multidrug and Toxin Extrusion Transporter 1 (MATE1, SLC47A1) Inhibitors through Prescription Drug Profiling and Computational Modeling, MATTHEIAS B WITTWER¹, ARIK A ZUR¹, NATALIA KHURI²*, YASUTO KIDO³, C ALAN KOSAKA⁴, XUEXIANG ZHANG⁴, KARI M MORRISSEY¹, ANDREJ SALI², YONG HUANG⁴ and KATHLEEN M GIACOMINI¹ (¹University of California San Francisco; ²Department of Bioengineering and Therapeutic Sciences, University of California, San Francisco, Department of Bioengineering and Therapeutic Sciences, Department of Pharmaceutical Chemistry, and California Institute for Quantitative Biosciences; ³Drug-Drug Interaction Group, Drug Metabolism and Pharmacokinetics, Shionogi & Co., Ltd., Osaka, Japan; ⁴Optivia Biotechnology Inc.).

11:20 61 Domain-Specific Functions of the S4 Segment in Voltage-Gated Sodium Channels, JAMES R GROOME, VERN WINSTON and NISHANT MOHAN (Department of Biological Sciences, Idaho State University).

11:40 62 Molecular Dynamics Simulations of the Domain IV Skeletal Muscle Sodium Channel with an Explicit Membrane Potential, JASON G SLINGSBY¹*, JAMES GROOME³ and C MARK MAUPIN¹ (¹Chemical and Biological Engineering Department, Colorado School of Mines; ²Department of Biological Sciences, Idaho State University).

Boise Extravaganza in Set Theory (BEST)
SU ROOM 207
Tuesday
9:00 a.m. – 4:00 p.m.

Continuing from Monday. Please refer to page 24 of these Proceedings for information about this program.

Session chair: Liljana Babinkostova

9:00 63 How Many Miles to BW, After All? MASARU KADA (Department of Mathematics and Information Sciences, Osaka Prefecture University, Osaka, Japan).

10:00 64 Cone Measures and Bi-Embeddability of the Kazhdan Groups, JAY WILLIAMS¹* and SIMON THOMAS² (¹Department of Mathematics, California Institute of Technology; ²Department of Mathematics, Rutgers University).

10:30 65 A Ramsey Classification Theorem with an Application to the Tukey Theory of Ultrafilters, TIMOTHY O TRUJILLO (Department of Mathematics, University of Denver).

10:55 66 Locally Nilpotent Group Actions and Hyperfinite Equivalence Relations, SCOTT SCHNEIDER* and BRANDON SEWARD (Department of Mathematics, University of Michigan).

11:25 67 Information not available at press time. Please refer to updates sheet for information about this presentation.

12:00 LUNCH
2:00  68  Information not available at press time. Please refer to updates sheet for information about this presentation.

3:00  69  A Playful Variation of the Countable Chain Condition, ANGELO BELLA¹ and SANTINO SPADARO* (¹Dipartimento di Matematica, Catania, Italy; ²Department of Mathematics, Silesian University in Opava, Czech Republic).

3:30  69a  Some New Applications of Core Model Induction, GRIGOR SARGSYAN (Department of Mathematics, Rutgers University, Piscataway, NJ).

International Protected Area Exchange (IPAX)
SU ROOM 205
Tuesday 1:00 p.m. – 5:00 p.m.

Program organized by Margaret N. Rees (Vice–Provost for Educational Outreach and Executive Director of Public Lands Institute, University of Nevada, Las Vegas) and Allison Brody (Project Manager, Public Lands Institute, University of Nevada, Las Vegas).

Program Sponsored by the Pacific Division section on Ecology, Organismal Biology, and Environmental Sciences.

This symposium invites presentations on advances in understanding protected area management, including conceptual and empirical research results, reviews, case studies, and meta-analyses. Whether study outcomes have global, regional, or local impact, their findings positively contribute to or provide compelling examples of natural or cultural heritage protection.

Collectively around the globe, protected areas secure irreplaceable natural, ecological, and cultural treasure. Without healthy ecosystems, sustained human health and well-being is impossible. Effective management of these protected areas is critical, regardless of their designation, particular objectives, multiple uses, or administrative authorities. Furthermore, it requires balancing the environmental, cultural, economic, and political issues within and surrounding the management area. Approaches to achieving this balance are being creatively developed and applied. Specific vulnerabilities, challenges, and responses vary based on availability of data, geographical location, and other parameters often closely tied to a site’s location (e.g., biome type, political stability, levels of poverty). Modern stressors, such as climate change and increases in urbanization at the wildland–urban interface, require ongoing adaptation in management strategy. However, fundamental to all sustainable protected area management is the adoption of more participatory, inclusive, and equitable models, which consider a variety of benefits and values while utilizing effective partnerships, including with the local community within and adjacent to the area and relevant governance and policy–makers. Designed to facilitate information transfer and foster new connections, this symposium provides a forum for an international exchange of insights and findings related to the cooperative conservation of healthy ecosystems and the services and benefits they provide.

Session chair: Margaret N. Rees

1:00  Welcome and Introduction, GARRY OYE

Policy

1:05  70  KEYNOTE ADDRESS: International Protected Area Exchange, GARRY OYE (Wilderness Stewardship Division, National Park Service).


1:50  72  Harmony and Dissonance: Protecting Lake Tahoe from Aquatic Invasive Species Versus Development, MELISSA THAW (Water Resources Management Program, Department of Geoscience, University of Nevada, Las Vegas).

2:05  Moderated Questions and Answers

Science and Research

2:20  73  Recent Research at House 47: Evaluating the Impacts of Fluctuating Lake Levels on Southern Nevada’s Archaeological Sites, KAREN G HARRY (Department of Anthropology, University of Nevada, Las Vegas).

2:35  74  Integrating Science and Research Activities for Southern Nevada Public Lands: Development and Status, KENT TURNER* and JENNELL M MILLER* (¹Lake Mead National Recreation Area, National Park Service; ²Public Lands Institute, University of Nevada, Las Vegas).

3:05  Moderated Questions and Answers

3:20  BREAK
**People**

3:40 75 The Need for Stakeholder Cooperation over Competition to Adapt to Climate Change, TRICIA DUTCHER (School of Environmental and Public Affairs, University of Nevada Las Vegas).

3:55 76 Dynamically Engaging the Public through Facilitated Dialogue, CAROL L BLANEY*, THERESA G COBLE and ELIZABETH BARRIE (Arthur Temple College of Forestry and Agriculture, Stephen F. Austin State University; Public Lands Institute, University of Nevada, Las Vegas).

4:10 77 Community Led Resource Conservation, DEBORAH REARDON (Rivers, Trails, and Conservation Assistance Program, National Park Service).

4:25 78 Paths to the Future—Community, Collaboration and Stewardship, MAURICIA M M BACA (Outside Las Vegas Foundation).

4:40 Moderated Questions and Answers

4:55 Concluding Remarks and Close, GARRY OYE and MARGARET N REES

**Patient-Centered Outcomes Research and Patient Targeted Therapies**

SU ROOM 219

Tuesday

1:30 p.m. – 4:50 p.m.

Program organizer: Francesco Chiappelli (UCLA School of Dentistry, University of California at Los Angeles).

Program sponsored by the Pacific Division sections on Health Sciences; General and Interdisciplinary Studies; Oral Biology and Dental Medicine; and Social, Economic and Political Sciences.

Current global trends in health care emphasize patient-centered outcomes research of molecular-targeted evidenced-based interventions. Treatment modalities in medicine, nursing, dentistry and psychotherapy increasingly integrate translational research - going from the patient to the laboratory bench and back to the patient (NIH) - with translational effectiveness - integrating the best available evidence for optimizing evidence-based health care interventions in specific clinical settings (AHRQ). Innovative models of patient targeted therapies are timely and critical. This symposium is dedicated to the dissemination of the current state of knowledge about targeted molecular therapies in the context of patient-centered outcomes research. Its scientific focus will pertain to the patient-centered identification of disease-specific biomarkers for the elucidation of targeted molecular therapies in selected clinical conditions. Specifically, this symposium will present a concerted program of presentations that are aimed to address current, timely and cutting edge research about patient-centered targeted small molecule therapies (both small molecules and biomolecules, with broad therapeutic applicability and benefiting from a patient-centered outcomes), in the context of translating cost- and benefit effectiveness into specific clinical settings.

Session Chair: Francesco Chiappelli

1:30 79 Search for Patient Targeted Therapies: The Crux of Patient-Centered Research Outcomes Research, FRANCESCO CHIAPPELLI (UCLA School of Dentistry, Division of Oral Biology and Medicine, University of California at Los Angeles).

2:00 80 Patient Targeted Biomarkers of Osteo-immune Pathologies: Microenvironment Epigenetics, ANDRÉ BARKHORDARIAN (UCLA School of Dentistry, University of California at Los Angeles).

2:30 81 Individual Patient Data Analysis and Meta-Analysis, RASHI ARORA (UCLA School of Dentistry, University of California at Los Angeles).

3:00 BREAK

3:20 82 Patient-Centered Outcomes Research in HIV and NeuroAIDS: The Role of HIV Infection in Executive Dysfunction, Depression, and Poor Decision-Making, APRIL THAMES (UCLA Department of Psychiatry and Biobehavioral Sciences, University of California, Los Angeles).

3:50 83 Patient-Centered Diagnosis and Therapies of Systemic Sequelae of Temporomandibular Joint Disorders, GARY DEMERJIAN (Center for TMJ and Sleep Therapy, Glendora, CA).

4:20 84 Prognostic and Predictive Importance of MicroRNAs in Vulvar Cancer, RAFAEL MALAGOLI ROCHA (International Center of Cancer Research, São Paulo, Brazil).
Cancer is a large group of different diseases, all involving uncontrolled growth of cells in the body. During tumor progression, cells proliferate, form malignant tumors, invade to nearby parts of the body and metastasize, or spread, to more distant parts of the body through the lymphatic system or bloodstream. This program will provide scientific presentations addressing different mechanisms of tumor progression and metastasis, as well as mechanistic discussions on established and emerging cancer therapeutics. This symposium is designed for all types of biomedical researchers, undergraduate and graduate students, physicians and oncologists, nurses, pharmacists, and others who research or manage patients with cancer.

Session chair: Cheryl Jorcyk

1:30 85 A Function for the Inflammatory Cytokine Oncostatin M during Different Stages of Breast Cancer Metastasis, CHERYL JORCYK (Department of Biological Sciences, Boise State University).

2:00 86 Synthetic Aziridinomitosenes: Probing the Role of the C6/C7 Electrophilic Sites in Human Carcinoma Cytotoxicity, DON L WARNER (Department of Chemistry and Biochemistry, Boise State University).

2:30 87 Epithelial to Mesenchymal Transition in Gynecological Carcinomas, RAFAEL MALAGOLI ROCHA (Department of Pathology, Hospital AC Camargo, São Paulo, Brazil).

3:00 BREAK

3:20 88 Small Molecule Inhibition of the Inflammatory Cytokine Oncostatin M? JIM MOSELHY*, CHERYL JORCYK and DONG XU (Department of Biological Sciences, Boise State University; Department of Biomedical and Pharmaceutical Sciences, College of Pharmacy, Idaho State University).

3:50 89 A Co-Evolutionary Strategy to Discovery Novel Anticancer Drugs Breast Cancer Metastasis: A Role for the Inflammatory Cytokine Oncostatin M? JENNIFER S FORBEY (Department of Biological Sciences, Boise State University).

4:20 90 Prostate Tumor Progression and Metastasis: The Cytokine Connection, STEVE R PEKOVIĆ and CHERYL L JORCYK (Department of Biology, Northwest Nazarene; Department of Biological Sciences, Boise State University).
**Wednesday, 19 June 2013**

**Current Progress in Infectious Disease Research and Therapeutic Interventions**
SU ROOM 211  
**Wednesday**  
8:00 a.m. – Noon

Program organizers: Dong Xu (Department of Biomedical and Pharmaceutical Sciences, College of Pharmacy, Idaho State University) and Mike Aldape (Veteran’s Affairs Medical Center, Boise, Idaho).

Sponsored by the Pacific Division sections on Cell and Molecular Biology, and Chemistry and Biochemistry.

This research symposium focuses on the current experimental and computational research progress in infectious disease molecular pathology and therapeutic design. The purpose of the symposium is to provide a dynamic forum to facilitate the exchange of research advancements and ideas among infectious disease experts, and to report the latest discovery and development in the understanding, prevention and inhibition of the most life-threatening, pandemic and drug-resistant pathogens.

Session co-chairs: Dong Xu and Mike J. Aldape

8:00 91 Multiscale Spatiotemporal Dynamics of C-type Lectins During Innate Immune Fungal Recognition, **Aaron K Neumann** (Department of Pathology, University of New Mexico).

8:30 92 Reactivation of Latent HIV-1 in Central Memory CD4\(^+\) T Cells Through TLR-1/2 Stimulation, **Alberto Bosque** (Division of Microbiology and Immunology, Department of Pathology, University of Utah School of Medicine).

9:00 93 Hypervirulent Salmonella Derived from Natural Microbial Populations, **Michael J Mahan** (Molecular, Cellular, and Developmental Biology, University of California, Santa Barbara).

9:30 94 Understanding Transcriptional Silencing and Anti-Silencing of Virulence Genes in Shigella, **HeLEN J wing** (School of Life Sciences, University of Nevada, Las Vegas).

10:00 BREAK

10:30 95 Structural and Biochemical Characterization of *Porphyromonas gingivalis* Enoyl-ACP Reductase II (FabK), a Novel Antibacterial Target, **Kirk E HevenE** (College of Pharmacy, Idaho State University Meridian Health Science Center).

**11:00 96 Advanced Polyfunctional Sialochimerics, PAOLO ALBERTO VERONESI** (Chief Executive Officer and R&D Director, Therapicon Biopharmaceuticals, Milan, Italy).

11:30 97 Spatial and Temporal Colonization Dynamics of *Giardia intestinalis* Infection Exposed by In Vivo Bioluminescent Imaging, **Nanelle Barash and Scott Dawson** (Department of Microbiology and Molecular Genetics, University of California, Davis).

**Innovations and Trends in K-16 STEM Education**
SU ROOM 209  
**Wednesday**  
8:20 a.m. – Noon

Organizer: Larry Rudd (School of Education, Nevada State College).

Sponsored by the Pacific Division section on Education.

How can we be more effective in STEM (science, technology, engineering, mathematics) education? How will online courses, technological gadgetry, and increasingly tight budgets affect teaching-learning dynamics in the sciences? Teachers and science education professionals at all levels have been invited to participate in this symposium to share their successful strategies and war stories.

Session co-chairs: Larry Rudd and Aubrey Bonde

8:20 98 Reaching Nevada's Teachers through NSF-EPS-CoR Climate Change Science Institutes, **Aubrey Bonde**¹*, **Lawrence Rudd**², **Paul Buck**³ and **Juan McAlister**³ (¹Department of Geoscience, University of Nevada Las Vegas; ²School of Education, Nevada State College; ³School of Liberal Arts and Sciences, Nevada State College).

8:50 99 A Multidisciplinary Approach to Integrating Climate Change Science Curriculum, **Freda Vine** (Clark County School District, Las Vegas, NV).

9:20 100 Using Online Data Sets to Teach K-12 Students and Teachers about Climate Change, **Lawrence Rudd** (School of Education, Nevada State College).
9:50 BREAK


10:40 102 Integrated STEM Model-Eliciting Activities: Developing 21st Century Thinkers, MICAH STOHL-MANN (Department of Teaching and Learning, University of Nevada, Las Vegas).

11:10 103 Camping in the Curriculum, ELIJAH BONDE* and EDWIN HOWELL (Nativity Prep Academy, San Diego, CA).

11:40 Final Questions and Wrap-Up

Dinosaurs and Their Neighbors: Mesozoic Paleontology and Paleogeography of Nevada, Utah, and Adjacent States
SU ROOM 219
Wednesday
9:10 a.m. – 11:30 a.m.

Organizer: Josh Bonde (Department of Geoscience, University of Nevada, Las Vegas).

Program sponsored by the Pacific Division Earth Sciences Section.

Until very recently, dinosaurs were essentially unknown from strata in Nevada. In contrast, Utah is perhaps the epicenter of dinosaur diversity for the entire Milky Way galaxy. On the Nevada side of the state line, that picture has changed dramatically within the past few years. We now have spectacular dinosaur trackways (along with trackways of coexisting protomammals and arthropods) in southern Nevada and also a diverse assemblage of dinosaur body fossils from both southern and central Nevada. Meanwhile, paleontologists in Utah continue to discover new taxa at an amazing rate. This symposium will focus on recent research on Mesozoic fossils, stratigraphy, and paleogeography in Nevada, Utah, and adjacent states.

Two optional field trips complement this symposium: (1) an Wednesday evening hike into Red Rock Canyon National Recreation Area, and (2) a two-day, post-meeting field trip to Zion National Park and the Johnson Farm Dinosaur Discovery Site in St. George, Utah.

Session chair: Josh Bonde

9:10 104 Tracks of Synapsids and Arthropods in the Aztec Sandstone of Southern Nevada, STEPHEN M ROWLAND* and HEATHER M STOLLER (Department of Geoscience, University of Nevada, Las Vegas).

9:40 105 Tracks of Dinosaurs in the Aztec Sandstone of Southern Nevada: A Progress Report, HEATHER M STOLLER* and STEPHEN M ROWLAND (Department of Geoscience, University of Nevada, Las Vegas).

10:00 BREAK

10:30 106 Nevada’s Mid-Cretaceous Biota, JOSHUA BONDE (Geoscience Department, University of Nevada Las Vegas).

11:00 107 Campanian Dinosaurs of the Southern Basin and Range Province, ROBERT McCORD (Arizona Museum of Natural History, Mesa, AZ).

Science and Feeling in the Arts
SU ROOM 213
Wednesday
10:15 a.m. – 5:00 p.m.

Program organizers: Robert L. Chianese (California State University Northridge, Emeritus) and Jesse James Thomas (San Diego State University).

Program sponsored by the Pacific Division section on General and Interdisciplinary Studies.

This interdisciplinary symposium brings together the humanities and sciences in an exploration of the connections between science and aesthetics. It features two distinct though related topics: 1) scientific analysis and understanding of our responses to art (visual art, sculpture, music, dance, literature, film, architecture, etc.), and 2) the emotional/psychological responses we experience in relation to science-inspired art and the impact science-based art has on our appreciation of it.

The first topic seeks discussions of such matters as the scientific measurement of the impacts of the arts on intelligence, consciousness, mood, etc.; the attempts of psychology and brain science to explain our emotional responses to art; the semiotic processing of art; and the connections between scientific and artistic creativity.
The second topic explores the aesthetics of special categories of art—science-inspired art and eco-art—by exploring such questions as “Does using science as a source for art compromise our appreciation of it?”; “Do we have to understand the science principles behind it in order to respond appropriately?”; and “Does knowing that a work of eco-art actually performs some restorative function change our responses to it?”

Session chair: Robert L. Chianese


10:45 109 Biology and Contemporary Sculpture, ALEXANDRA HART (Alexandra Hart metals artist/designer goldsmith, San Diego, CA).

11:15 110 Symbol, Feeling and Ritualization in Anthropological Praxis, CARLA MAIDA (University of California, Institute of the Environment and Sustainability, Los Angeles, CA).

11:45 111 Hope, Truth, and Science, MARK RICHARD WHEELER (San Diego State University).

12:15 LUNCH

1:30 116 The Tule Springs Local Fauna – Unearthing an Ice Age Wetlands Ecosystem in Southern Nevada, ERIC SCOTT*, KATHLEEN SPRINGER and CRAIG R MANKER (Division of Geological Sciences, San Bernardino County Museum).


2:30 118 Fish in Hot Water: Conservation of Southern Nevada’s Imperiled Aquatic Legacy, LEE H SIMONS (U.S. Fish and Wildlife Service, Las Vegas, NV).

3:00 BREAK

3:30 Performance of “Rolling in Foaming Billows,” an aria from “The Creation” by Joseph Haydn. JESSE JAMES THOMAS singing basso, accompanied by SHERIDON STOKES on the flute.


4:05 Panel Discussion

4:50 Wrap-up

Management of Endangered Species in the American West: Policy and Practice
SU ROOM 209
Wednesday
1:25 p.m. – 5:00 p.m.

Program organized by Rob Mrowka (Ecologist, Center for Biological Diversity).

Program sponsored by the Pacific Division sections on Ecology, Organismal Biology and Environmental Sciences, and Social, Economic and Political Sciences.

This symposium will focus on the successes and failures of the Endangered Species Act in preserving vulnerable species in the west, with case studies and progress reports.

An optional field trip to Devils Hole and Ash Meadows National Wildlife Refuge complements this symposium, as does a second optional field trip to Zion National Park.

Session Chair: Rob Mrowka

1:25 Introductions

1:30 116 The Tule Springs Local Fauna – Unearthing an Ice Age Wetlands Ecosystem in Southern Nevada, ERIC SCOTT*, KATHLEEN SPRINGER and CRAIG R MANKER (Division of Geological Sciences, San Bernardino County Museum).


2:30 118 Fish in Hot Water: Conservation of Southern Nevada’s Imperiled Aquatic Legacy, LEE H SIMONS (U.S. Fish and Wildlife Service, Las Vegas, NV).

3:00 BREAK

3:20 119 Conservation of the Sierra Nevada Red Fox in the Real World: Challenges, Gaps, and Management Tools, CATE QUINN* and BEN SACKS (University of California Davis).

3:50 120 Effective Conservation of a Rare Amphibian through Partnerships, MICHAEL BURROUGHS* and CHRISTIANA MANVILLE (U.S. Fish and Wildlife Service, Las Vegas, NV).

4:20 121 Measuring the Success Rate of the Endangered Species Act, KIERAN SUCKLING (Center for Biological Diversity, Tucson, AZ).
II. WORKSHOPS

Tuesday, 18 June 2013

**Grant-Writing Workshop for Foundations**
SU ROOM 209
Tuesday
1:30 p.m.

Afternoon workshop organized by Peter Kraus (J. Willard Marriott Library, University of Utah; peter.kraus@utah.edu). Currently scheduled for Tuesday afternoon, 18 June.

Participants will review the process of writing effective grant applications and assembling a good proposal to foundations. The basic components of a competitive grant proposal will be presented including the common pitfalls to avoid in grant writing and submission. Appropriate project funding sources will be discussed as well as establishing positive sponsor relationships, satisfying sponsor requirements, and the proposal review process.

Limited to 50 participants.

Fee: None for meeting registrants; one-day registration fee for non-registrants.

**DockoMatic: Docking Calculations and Homology Modeling**
SU ROOM 213
Tuesday
1:30 p.m.

Half-day workshop organized by C. Mark Maupin (Chemical and Biological Engineering Department, Colorado School of Mines, Golden, Colorado; cmmaupin@mines.edu) and Owen M. McDougal (Department of Chemistry and Biochemistry, Boise State University, Boise, Idaho; owenmcdougal@boisestate.edu).

This workshop will focus on the use of the program DockoMatic. Created at Boise State University, DockoMatic is a wrapper that links several different codes, including AutoDock4 and Modeller, into a single user friendly graphical user interface (GUI). During this workshop the participants will be guided through the use of DockoMatic to create a homology model of a macromolecule. After the successful creation of the 3D structure for the macromolecule, DockoMatic will then be used to automate docking calculations between the macromolecule and a ligand. The workshop will finish with an analysis of the calculations and a question answer phase to help participants formulate ways in which to use DockoMatic for their own research or teaching needs.

Fee: None for meeting registrants; one-day registration fee for non-registrants.
III. CONTRIBUTED ORAL PRESENTATIONS

1100 (time italicized and underlined) indicates a student presentation
* identifies the speaker from among several authors listed
63 (bolded number) indicates abstract number

Quick Directory of Sponsoring Sections
for these Oral Presentations

Cell and Molecular Biology .............................. page 41
Chemistry and Biochemistry .............................. page 39
Earth Sciences ............................................. page 40
Ecology, Organismal Biology and
Environmental Sciences ................................. page 40
Engineering, Technology, and Applied Sciences ...... page 41
General and Interdisciplinary Studies ................ page 41
Mathematics ................................................ page 41
Oral Biology and Dental Medicine .................. page 39
Social, Economic, and Political Sciences ........... page 41

Organizer for the Chemistry and Biochemistry Section: Owen M. McDougal (Department of Chemistry and Biochemistry, Boise State University).

Organizer for the Oral Biology and Dental Medicine Section: Francesco Chiappelli (University of California Los Angeles School of Dentistry).

Monday, 17 June 2013

Joint Session
Chemistry and Biochemistry
Oral Biology and Dental Medicine
SU ROOM 219
Monday
1:30 p.m. – 3:30 p.m.

Session Chair: Owen M. McDougal

1:30 122 Optimizing Extraction of Biologically Active pH Sensitive Steroidal Alkaloids from Veratrum californicum, JARED MATTOS*, PETR MALEK, CHRIS CHANDLER and OWEN M McDOUGAL (Department of Chemistry and Biochemistry, Boise State University).

1:50 123 Synthesis of (4,4’-bis[oligo(oxyethylene)]-2,2’-bipyridine)PtCl2 Complexes and Their in vitro Effects in Human Lung Cancer Cells, VAN VO*, ONTIDA TANTHMANATHAM, HAESOOK HAN, PRA- DIP K BHOWMIK and BRYAN L SPANGELO (Department of Chemistry, University of Nevada Las Vegas).

2:10 124 Synthetic Peptides that Sense the Curvature of Lipid Nanovesicles, JONEL P SALUDES1,2*, LES- LIE A MORTON2, SARA K COULP3, LIDA BENINSON2, BRANDAN COOK1, HANG YIN2, MONIKA FLESHNER1 and EDWIN R CHAP- MAN4 (1Department of Chemistry, Washington State University, Pullman; 2Department of Chemistry and Biochemistry and BioFrontiers Institute and 3Department of Integrative Physiology, University of Colorado, Boulder; 4Howard Hughes Medical Institute and Department of Neuroscience, University of Wisconsin, Madison).

2:30 125 Beryllium Inhibits the Kinase Activity of Gsk-3 Beta Independent of the Inhibitory Ser-9 Phosphorylation Pathway, ATA UR RAHMAN MOHAMMED ABDUL*, SWAPNA MUDIREDDY, PRIYATHAM GORJALA and RONALD K GARY (Department of Chemistry, University of Nevada Las Vegas).

2:50 126 Stability Indicating HPLC Method for Determination of Pantoprazole and Its Related Substances, GAURAV SHARMA1,2*, SAURABH PANDEY3 and JAMES C BIGELOW3 (1Department of Biomedical and Pharmaceutical Science, Idaho State University, Pocatello; 2Institute of Pharmacy, Pranveer Singh Institute of Technology, Kanpur, Uttar Pradesh-209305, India; 3Department of Biomedical and Pharmaceutical Science, Idaho State University, Pocatello).

Oral Biology and Dental Medicine

3:10 127 Systemic Correlates and Local Responses to Temporomandibular Joint Disorders, ANDRE BARKHORDARIAN1,2*, GARY DEMERJIAN1,3 and FRANCESCO CHIAPPELLI1,2 (1Evidence-based Decisions Practice-Based Research Network; 2UCLA School of Dentistry, Division of Oral Biology and Medicine, University of California at Los Angeles; 3Center for TMJ & Sleep Therapy, Glendora, CA).
Joint Session
Earth Sciences
Ecology, Organismal Biology, and Environmental Sciences
SU ROOM 218
Monday
1:20 p.m. – 5:00 p.m.

Organizer for the Earth Sciences Section: Jad D’Allura (Emeritus, Department of Geology, Southern Oregon University).

Organizer for the Ecology, Organismal Biology, and Environmental Sciences Section: Richard Van Buskirk (Pacific University).

Ecology, Organismal Biology, and Environmental Sciences

Session Chair: Richard Van Buskirk

1:10 128 Identifying Areas with a High Risk of Human Infection with the Avian Influenza A(H7N9) Virus in East Asia, TREVON FULLER1, THOMAS B. SMITH2, XIANGMING XIAO2, PARVIEZ HOSSEINI3, YOUN-JEONG LEE4 and PETER DASZAK2 (1Center for Tropical Research, Institute of the Environment and Sustainability, University of California, Los Angeles; 2Earth Observation and Modelling Facility, University of Oklahoma; 3EcoHealth Alliance, New York, NY; 4Avian Influenza Lab, Avian Disease Division, The Animal, Plant and Fisheries Quarantine and Inspection Agency, Gyeonggi-do, Republic of Korea).

1:30 129 Social Networking in the Columbian Ground Squirrel, THEODORE G MANNO (Department of Biological Sciences, Auburn University).

1:50 130 ZomBee Watch: Citizen Scientists Make Important Discoveries about the Range of Zombie Honey Bees, JOHN E HAFERNIK1,2, ASIM UTKU ZIHNIOGLU1,2, CHRISTOPHER D QUOCK1,3, JONATHAN IVERS1,3, JEAN-BAPTISTE SOUVRESTRE1,3, ROBERT D MACKIMMIE1,3, ANDREW G ZINK1,3 and DRAGUTIN PETKOVIC1,2 (1Department of Biology, 2Department of Computer Science, 3Center for Computing for Life Sciences, San Francisco State University).

2:10 131 How Does a Hungry Herbivore Subsist on a Poisonous Plant? NATASHA L WIGGINS* and JENNIFER SORENSEN FORBEY (Department of Biological Sciences, Boise State University).

2:30 132 Environmental Impact of the Three Kids Mine Tailings, Henderson, NV, JI HYE PARK*, VERNON HODGE, SHAWN GERSTENBERGER and KRYSTYNA STAVE (University of Nevada Las Vegas).

2:50 133 A Model for Soil-Plant-Surface Water Relationships in Arid Flat Environments, BONNI J KEALY and DAVID J WOLLKIND* (Department of Mathematics, Washington State University, Pullman).

3:10 BREAK

3:30 134 Assessing Interannual Variation in Great Basin Big Sagebrush Growth Response to Climate, LORENZO APODACA1,2, DALE A DEVITT1 and L F FENSTERMAKER2 (1School of Life Sciences, University of Nevada Las Vegas; 2Division of Earth and Ecosystem Sciences, Desert Research Institute, Las Vegas, NV).

3:50 135 Cold Air Drainage Flow Along a Narrow Wash Within a Montane to Pinyon Juniper Ecotone, BRIAN M BIRD* and DALE A DEVITT (School of Life Sciences, University of Nevada Las Vegas).

Earth Sciences

Session Chair: Jad D’Allura

4:10 136 Testing the Assumptions Implicit in the Use of Stalagmites as Paleoclimate Proxies at Juxtlahuaca Cave, Mexico, LAURA ROSALES-LAGARDE1, MATTHEW LACHNIT1 and JUAN PABLO BERNAL-URUCHURTU1 (1Geoscience Department, University of Nevada Las Vegas; 2Centro de Geociencias, UNAM Campus Juriquilla, Querétaro, Mexico).

4:30 137 Paleontology of an Assemblage of Late Holocene Bison from Cathedral Gorge State Park, Lincoln County, Nevada, ALEXANDRA KOSMIDES* and STEPHEN M ROWLAND (Department of Geoscience, University of Nevada Las Vegas).

4:50 138 Petrology and Geochemistry of the Upper Oligocene to Lower Miocene Volcanic Rocks of the Wason Formation, Western Cascades Volcanic Series, Southwest Oregon, JAD A D’ALLURA (Department of Chemistry, Physics, Materials, and Engineering, Southern Oregon University).
**Tuesday, 18 June 2013**

**Cell and Molecular Biology**

SU ROOM 211  
**Tuesday**  
8:20 a.m. – Noon

Organizer for the Cell and Molecular Biology Section: **Kristen Mitchell** (Department of Biological Sciences, Boise State University).

Session Chair: **Kristen Mitchell**

**8:20** 139 *Aryl Hydrocarbon Receptor Signaling in Liver Regeneration and Fibrosis*, **KRISTEN A MITCHELL** (Department of Biological Sciences, Boise State University).

**8:50** 140 *Altered Gene Expression in Pimephales promelas Fish Brains Exposed to Psychoactive Pharmaceuticals is Associated with Autism Spectrum Disorders*, **GAURAV KAUSHIK**, **KEN AHO** and **MICHAEL A THOMAS** (Department of Biology, Idaho State University).

**9:10** 141 *Analysis of Volutin Formation in Saccharomyces cerevisiae*, **PAMELA A MARSHALL***, **DAVID B DE LA ROSA**, **LORENZO G SANCHEZ** and **MATTHEW L STARR** (School of Mathematical and Natural Sciences, Arizona State University).

**9:40** 142 *Characterizing Pluripotency of Primary Cells Derived from Elasmoid Scales of Zebrafish (Danio rerio)*, **KENNETH WEEKES**, **LINDSEY CAITLIN**, **JONATHEN REECK** and **JULIA OXFORD** (Department of Biological Sciences, Boise State University).

**10:00** BREAK

**10:20** 143 *Interaction of Anthracyclines and Topoisomerase II Isozymes*, **NICOLE FRANK**, **RICHARD D OLSON**, **GERALD M WALSH**, **DONG XU**, **TODD TALLEY** and **BARRY J CUSACK** (Research Service, Department of Veterans Affairs Medical Center, Boise, ID; Department of Biomedical and Pharmaceutical Sciences, College of Pharmacy and ISU Biomedical Institute, Idaho State University, Pocatello; Gem Pharmaceuticals, LLC, Birmingham, AL).

**10:50** 144 *Inhibition of the Saccharomyces cerevisiae Low Affinity Calcium Channel*, **LORENZO G SANCHEZ***, **JENNIFER MUIR**, **JENNIFER L KEPLER** and **PAMELA A MARSHALL** (School of Mathematical and Natural Sciences, Arizona State University).

**11:10** 145 *Aryl Hydrocarbon Receptor Regulates Activation of Hepatic Stellate Cells during Experimental Liver Fibrosis*, **CHERI L LAMB*** and **KRISTEN A MITCHELL** (Department of Biological Sciences, Boise State University).

**11:30** 146 *High Dimensional Data Analysis in Oncology*, **AKASH SINGH** (IBM Corporation, Sacramento, CA).

**Joint Session**

**Engineering, Technology, and Applied Sciences**

**General and Interdisciplinary Studies**

**Social, Economic, and Political Sciences**

**SU ROOM 218**  
**Tuesday**  
8:40 a.m. – Noon

Organizer for the General and Interdisciplinary Studies section: **Robert L. Chianese** (California State University, Emeritus)

Organizer for the Social, Economic, and Political Sciences section: **Carl A. Maida** (University of California Los Angeles).

Session Chair: **Robert L. Chianese**

**8:40** 147 *Fluctuating Helicity in Homogeneous Turbulence*, **FRANK G JACOBITZ**, **KAI SCHNEIDER**, **WOUTER J T BOS** and **MARIE FARGE** (Mechanical Engineering Program, University of San Diego; Laboratoire de Mécanique, Modélisation, et Procédés Propres du Centre National de la Recherche Scientifique, Aix-Marseille Université, Marseille, France; Laboratoire de Mécanique des Fluides et d’Acoustique du Centre National de la Recherche Scientifique, Ecole Centrale de Lyon, Université de Lyon, Ecully, France; Laboratoire de Méteorologie Dynamique du Centre National de la Recherche Scientifique, Ecole Normale Supérieure, Paris, France).
9:00  148 Research Exploiting Parallelism and Scalability (XPS), AKASH SINGH (IBM Corporation, Sacramento, CA).

General and Interdisciplinary Studies

9:20  149 Journeying through Zen and the Art of Motorcycle Maintenance, JESSICA BUCKLEY*, FRANK JACOBITZ1 and BARTON THURBER2 (1Engineering Department, University of San Diego; 2English Department, University of San Diego).

9:40  150 Spiny Science: Multi-Media Explorations on the Collaborations Between Scientists and Fishermen: A Case Study of the California Commercial Spiny Lobster Fishery, VICTORIA MINNICH (San Diego, CA).

10:00 151 DesignBuildBLUFF: Coyote Architecture on the Colorado Plateau, JOHN MURRAY*, RICK SOMMERFELD2, GLEN LONGHURST1, CINDY BITHELL1, CORTLAND WILSON1, ATSUSHI YAMAMOTO2, HIROKO OGISO3, ANJEE BRADSHAW3 and HANK LOUIS3 (1Integrated Engineering Department, Southern Utah University; 2College of Architecture and Planning, Denver, CO; 3DesignBuildBLUFF, Park City, UT).

10:20 BREAK

10:40 152 A Love Affair With Pidgin, AMY E TILLMAN (Sandy Springs, GA).

11:00 153 Gen Y-ers as Consumers of Good Causes: Examining Student Attitudes, Knowledge, and Behaviors Regarding Cause Marketing, Company-Nonprofit Partnerships, and Cause-Linked Products, ANNIE PAUL (University of Utah).

Social, Economic, and Political Sciences


11:40 155 The Last of the Hominidae, LAWRENCE H WOOD (Physicist, Retired, Lacey, WA).
IV. CONTRIBUTED POSTER PRESENTATIONS

189 poster number is also the abstract number
193 (number italicized and underlined) identifies a student presentation
*identifies the presenter from among several authors listed

Boards on which to attach poster presentations will be set up in BALLROOM A. The poster boards have numbers on them that coincide with the numbers assigned to the posters in this program (see number to the left of the title of each presentation). You are expected to use the appropriately numbered board for your poster.

Posters for the Monday morning session can be set up starting at 8:15 a.m. Monday morning and must be in place no later than 8:45 a.m. Morning session posters must be taken down no later than 12:15 p.m. Posters for the Monday afternoon session can be set up starting at 12:15 p.m. and must be in place no later than 12:45 p.m. Afternoon session posters must be taken down no later than 4:15 p.m. All presenters must be present with their posters for the duration of the session in which they are presenting in order to discuss their work. No posters are to be removed before noon for the morning session or 4:00 p.m. for the afternoon session.

Presenters are expected to be available for the entire session in order to talk with interested parties about their research.

Presenters assume full responsibility for the security of their poster and other materials. Unclaimed posters will be discarded at the close of the technical sessions on Wednesday afternoon.

Quick Directory of Sponsoring Sections for these Posters

<table>
<thead>
<tr>
<th>Section</th>
<th>poster numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cell and Molecular Biology</td>
<td>165 – 174</td>
</tr>
<tr>
<td>Chemistry and Biochemistry</td>
<td>175 – 178</td>
</tr>
<tr>
<td>Earth Sciences</td>
<td>156 – 160</td>
</tr>
<tr>
<td>Ecology, Organismal Biology and Environmental Sciences</td>
<td>161 – 164</td>
</tr>
<tr>
<td>Education</td>
<td>198 – 199</td>
</tr>
<tr>
<td>Engineering, Technology, and Applied Sciences</td>
<td>193 – 195</td>
</tr>
<tr>
<td>Health Sciences</td>
<td>186 – 191</td>
</tr>
<tr>
<td>History and Philosophy of Science</td>
<td>200</td>
</tr>
<tr>
<td>Oral Biology and Dental Medicine</td>
<td>179 – 185</td>
</tr>
<tr>
<td>Physics and Material Sciences</td>
<td>192</td>
</tr>
<tr>
<td>Psychology</td>
<td>196, 197</td>
</tr>
</tbody>
</table>

Monday Morning, 17 June 2013

POSTER SESSION I
BALLROOM A
Monday
9:00 a.m. – Noon

Earth Sciences

156 Carbon Isotope Variations Associated with a Late Ordovician Karstic Unconformity, P SUZY WILLIAMS* andGANQING JIANG (Department of Geoscience, University of Nevada Las Vegas).

157 A Review of the Paleogeography, Sedimentology and Paleontology of the Jurassic and Cretaceous Eolian Sandstones of Gondwana, MARTIN COBOSS-NUnez1* and STEPHEN M ROWLAND (Department of Geosciences, University of Nevada, Las Vegas).

158 Origin of Glass Shards from Pinnacle Point, South Africa: Are They from the Super-Eruption of Toba? AMBER CIRAVOLO* and GENE SMITH (Department of Geoscience, University of Nevada - Las Vegas).

159 Study of Therapsid Trackways in the Jurassic Aztec Sandstone, CHRISTOPHER C CHesser*, HEATHER M STOLLER andSTEPHEN M ROWLAND (Department of Geosciences, University of Nevada Las Vegas).

160 Synthesis of a Mars Dust Analog, ROSENDOR BORJAS1*, PAUL FORSTER1 and ELISABETH HAUSRATH2 (1Department of Chemistry, 2Department of Geoscience, University of Nevada Las Vegas).

Ecology, Organismal Biology, and Environmental Sciences

161 Environmental Microscopy: Metallic-Oxide Surface Films from Wetland Environments and Biological Habitat at the Air-Water Interface, a Study in Structure, RANDALL W SMITH1,2* and ERIK J SÁNCHEZ1 (1Department of Physics, Portland State University; 2School of the Environment, Environmental Sciences and Resources Program, Portland State University).
CONTRIBUTED POSTERS – Monday

162 Improving Management Practices of a Faster Osmia lignaria (Hymenoptera: Megachilidae), RUBEN ALARCON and ALINA MITITINA* (Biology Program, California State University Channel Islands).

163 Distribution, Thermal Limit, and Biogeography of Nitrite-Oxidizing Bacteria in Geothermal Springs throughout the US West, NAMRITHA MANOHARAN1*, NICOLE A CALICA1, ERIC S BOYD2 and BRIAN P HEDLUND1 (School of Life Sciences, University of Nevada Las Vegas; 2Department of Chemistry and Biochemistry, Montana State University).

164 Analysis of Mosquito (Culex quinquefasciatus) Host Volatiles by Gas Chromatography-Electroantennographic Detection (GC-EAD) System, ALYSSA DE LA ROSA* and WALTER S LEAL (Agricultural and Environmental Chemistry Graduate Group, University of California, Davis).

Cell and Molecular Biology

165 The Putative Role of Resveratrol in SIRT-1-mediated Modulation of the Vitamin D Pathway, ANGELIKA DAMPF STONE1*, SHANE F BATIE1, G KERR WHITFIELD2, MARK R HAUSSLER2 and PETER W JURUTKA12 (Mathematical and Natural Sciences, Arizona State University; 2Basic Medical Sciences, University of Arizona College of Medicine).

166 Evaluation of Resveratrol as a Novel Modulator of the FOXO and Vitamin D Pathways in Colon Cancer, MARYA S SABIR1*, ANGELIKA DAMPF STONE1, SHANE F BATIE1, G KERR WHITFIELD2, MARK R HAUSSLER2 and PETER W JURUTKA12 (Mathematical and Natural Sciences, Arizona State University; 2Basic Medical Sciences, University of Arizona College of Medicine).

167 Profiling Cryptic Splice Sites in the Breast Cancer Type 1 (BRCA1) Gene, ANTHONY BORTOLAZZO1* and SAMI KHURI1 (Department of Biological Sciences, San Jose State University; 2Department of Computer Science, San Jose State University).

168 YAP Overexpression in Immortal Oral Keratinocytes, KAYLA RAYFORD1*, DAVID BAE2 and CUN’YU WANG2 (Howard Hughes Medical Institute Pre-College Science Education Program, UCLA School of Dentistry; 2UCLA School of Dentistry).

169 The Effect of Stress-Enhanced Fear Learning on a Glutamatergic Receptor Sub-unit in the Cerebellum of Male Long Evans Rats, CAMERON STEVENSEN MONROE1*, EDWARD MEYER2, JAMES MAKSMETYZ2 and IGOR SPIGELMAN2 (Howard Hughes Medical Institute Pre-College Science Education Program, UCLA School of Dentistry; 2UCLA School of Dentistry).

170 Unique Localization and Role of the Transient Receptor Potential, Melastatin-2 (TRPM2) Cation Channel in Breast Cancer Cells, MENGWEI LIU*, XIAOXING FENG, MANDI M HOPKINS and DAVID W KOH (Department of Pharmaceutical Sciences, Washington State University).

171 Novel Role of Transient Receptor Potential, Melastatin 2 (TRPM2) Channels in Promoting Genomic Integrity in Breast Cancer Cells Independent of Calcium Influx, MANDI M HOPKINS12*, XIAOXING FENG1, MENGWEI LIU1 and DAVID W KOH12 (Department of Pharmaceutical Sciences and NIH Protein Biotechnology Training Program, Washington State University).

172 Identification of Differentially Expressed Genes as Biomarkers for Diagnosis of Irritable Bowel Syndrome (IBS): A Pilot Gene Discovery Hypothesis Generating Study, MARYAM M HOCKLEY1*, MICHAEL A GALLIGAN1, LIN ZHANG1, TODD R SANDRIN1 and PETER W JURUTKA12 (School of Mathematical and Natural Sciences, New College of Interdisciplinary Arts and Sciences, Arizona State University; 2Department of Basic Medical Sciences, University of Arizona College of Medicine).

173 Role of TNF-alpha In the Promotion of Stem Cell Differentiation and Prevention of NK Cell Mediated Lysis, DARRETT DAVIS1*, DERRIAN DRISCOL1*, HELEN TSENG2 and ANAHID JEWETT2 (Howard Hughes Medical Institute Pre-College Science Education Program, UCLA School of Dentistry; 2UCLA School of Dentistry).

174 Patterned Spontaneous Activity in the Retina is Necessary for the Normal Functional Development of Visual Neurons in the Lateral Geniculate Nucleus, ZACHARY DAVIS*, BARBARA CHAPMAN and HWAI-JONG CHENG (Center for Neuroscience, University of California, Davis).
Chemistry and Biochemistry

175 Novel (4,4′-dialkoxy-2,2′-bipyridine)Pt(II)Cl₂ Complexes Induce Apoptosis in Breast Cancer Cells, VAN VO*, HAE SOOK HAN, PRADIP K BHOWMIK and BRYAN L SPANGELO (Department of Chemistry, University of Nevada Las Vegas).

176 Oxyhalogen-Sulfur Chemistry: Kinetics and Mechanism of Oxidation of N-(2-Mercaptopropiony] Glycine (MPG) by Acidified Chlorite and Aqueous Chlorine Dioxide, THAI TRAN, WILBES MBIYA and REUBEN SIMOYI (Chemistry Department, Portland State University).


178 Synthesis and Characterization of Polypyridinium Salts Containing Dioxylethylene Units in the Main-Chain and their Sensing Performance toward Acids in Organic Solvents, TAE SOO JO¹, JUNG JAE KOH², ALEXI K NEDELTCHEV¹, HAE SOOK HAN¹, PRADIP K BHOWMIK¹ and HARI MANDAL² (¹Department of Chemistry, University of Nevada Las Vegas; ²Department of Biology and Chemistry, Texas A&M International University).

Monday Afternoon, 17 June 2013

POSTER SESSION II
BALLROOM A
Monday
1:00 p.m. – 4:00 p.m.

Oral Biology and Dental Medicine

179 Effect of Grainless Head Like-2 Knockdown on Carcinogenesis of Squamous Cell Carcinoma 4, CHRISTOPHER WILSON*, ANDY MARQUEZ*, RICHARD LEE², WEI CHEN² and MO KANG² (¹Howard Hughes Medical Institute Pre-College Science Education Program, UCLA School of Dentistry; ²LA School of Dentistry, Los Angeles, CA).

180 Psychometric Validation of a Tool for the Assessment of Quality Individual Patient Data Meta Analysis, PAULINA NGUYEN, MOLLY UYEDA*, RASHI ARORA and FRANCESCO CHIAPPELLI (UCLA School of Dentistry).

181 The Effect of Ultraviolet Photofunctionalization of Titanium Alloy Grade 5 on Bone Bioactivity, KATHERINE TORRES¹, DIANA ROSALES¹, MASAKO TABUCHI¹, KAORI NAKAGAWA¹ and TAKAHIRO OGAWA¹ (¹Howard Hughes Medical Institute Pre-College Science Education Program, UCLA School of Dentistry; ²The Weintraub Center for Reconstructive Biotechnology, UCLA School of Dentistry).

182 The Role of miR-22 as a Potential Inhibitor of Cancer Stem Cells Proliferation, MONICA RANGEL¹, MARTHA SECUNDINO¹, JUSTIN LEE² and KI-HYUK SHIN² (¹Howard Hughes Medical Institute Pre-College Science Education Program, UCLA School of Dentistry; ²Jonsson Comprehensive Cancer Center, David Geffen School of Medicine, UCLA School of Dentistry).

183 Revision of the Risk of Bias Instrument (R-Risk of Bias) for Cytokine Inhibition in the Treatment of Arthritis, PETER A PELLIONISZ*, ANDRÉ BARKHORDARIAN, VIVIAN LAM, LAUREN GLEASON, MAHSA DOUSTI, MONA DOUSTI and FRANCESCO CHIAPPELLI (Evidence-Based Dentistry Practice-Based Research Network and Oral Biology and Medicine, UCLA School of Dentistry).
**Implications of Translational Effectiveness for the Treatment of Diabetic Patients with Periodontal Disease: An Evidence-based decision Practice Based Research Network (EBD-PBRN) Study,** NAZANIN S OLYAEI*1, OLIVIA S CAJULIS1 and FRANCESCO CHIAPPPELLI1 (1University of California, Riverside; 2Dental Group of Sherman Oaks; 3UCLA School of Dentistry).

**Role of SOX9 in Oral Cancer Cell Invasion,** VICTOR DAVID1,2, MARTHA GARCIA1,2, RAMI RABII1, FENG SIZHE2 and SHEN HU1,2 (1Howard Hughes Medical Institute Pre-College Science Education Program, 2UCLA School of Dentistry).

**Super Resolution Microscopy Reveals the Microstructure of β-Glucan on Candida albicans Cell Walls,** JIA LIN*1, AARON K NEUMANN1 and KEITH A LIDKE2 (1Department of Pathology, University of New Mexico; 2Department of Physics and Astronomy, University of New Mexico).

**Imaging Maturing Candida Biofilms Under Flow Conditions Reveals Structural Changes Due To Dynamic Hyphal Growth,** LAURA GORHAM1*, ANITA RAY1, AARON NEUMANN1, RUSSELL M TAYLOR1, LISA DAVIDSON1, XIAOJIE ZHAO2, JOE PING-LIN HSIAO2 and EVELYN DIAL1 (1Department of Pathology, University of New Mexico; 2Center for Computer Integrated Systems for Microscopy and Manipulation (CISMM), Department of Computer Science, University of North Carolina).

**A Propotypical Multimodal Perceptual Analysis of Hospice Patient Reports of Transcendent Experiences: Developing Mixed-Methodology to Extend Clinical Applications of Metaphors for Effective Communication in Palliative Care,** BRUCE L ARNOLD1,2, and LINDA LLOYD2 (1Department of Sociology, University of Calgary, Alberta, Canada; 2San Diego Hospice and The Institute for Palliative Medicine, San Diego, CA; barnold@ucalgary.ca. NOTE: The San Diego Hospice and The Institute for Palliative Medicine has this past March been forced to close after many years of pioneering palliative medicine).

**A Global Perspective on Translational Effectiveness: Dissemination of Evidence Based Dentistry to the Maasai Population of Kenya,** AMY GIROUX, MOLLY UYEDA* and FRANCESCO CHIAPPPELLI (UCLA School of Dentistry).

**Assigning Causality to Anti-Cancer Agents: Decision Making in Early Phase Oncology Clinical Trials,** JACQUELINE M I TORTI1*, JAROLD L COSBY2 and ANDREW ARNOLD1 (1School Of Public Health, University of Alberta, Edmonton, AB, Canada; 2Department of Kinesiology, Brock University, St. Catharines, ON, Canada; 3Department of Oncology, McMaster University, Hamilton, ON, Canada).

**Effects of Teriparatide on Calcium Signaling in Bone Cells During Parabolic Flight, with Implications for Astronaut’s Health in Space,** NIC BAUGHMAN1,2*, TRAVIS BAKER2, KELLEN MATHER2, LANDON NYE3*, DAN LAMBERT3, TARA SMITH2, JIM PELTON2*, MATT DOLAN2* and LINDSEY CATLIN3 (1Department of Business, 2Department of Biological Sciences, 3Department of Engineering, 4Department of Education, Boise State University).

**Quantifying Corrosion Using a Non-Contact Visual Method,** RUKMINI A RAVI*, VILUPANUR A RAVI and THUAN K NGUYEN1 (1Claremont High School, Claremont, CA; 2Department of Chemical and Materials Engineering, California State Polytechnic University, Pomona, CA).

**Free Your Mind—Unlocking Your Inner Creativity,** ALYSSA BLACK, WILLIAM DOW, STEPHANIE HARRISON*, ADAM KREBS, KATHLEEN McGUIRE, PHILIPP STORCH, JESSICA URBANO, BRADLEY CHASE, FRANK JACOBITZ and THOMAS SCHUBERT (Department of Engineering, University of San Diego).

**Producing Electric Power from the Wind: A Study of Windmill Blade Flow Mechanics,** ELEANOR O FROST (Chaminade College Preparatory, Los Angeles, CA; Mentor: Karthik Duraisamy, Stanford Center for Turbulence Research, Stanford University).

**Knife-edge Scanning Microscopy for High Throughput 3D Imaging,** TODD HUFFMAN*, MEGAN KLIMEN, MATTHEW GOODMAN, CODY DANIEL and KATY PELTON (3Scan, San Francisco, CA).
Psychology

196 Oculomotor Performance Indicates Adult Male Fragile X Premutation Carriers Asymptomatic for FXTAS Exhibit Impaired Inhibitory Control, LING M WONG1,2,*, TONY J SIMON1,2, NAOMI J GOODRICH-HUNSAKER1, FLORA TASSONE1,3 and MELODY ZHANG4 (1MIND Institute, University of California Davis Medical Center; 2Department of Psychiatry and Behavioral Sciences, 3Department of Biochemistry and Molecular Medicine, 4Department of Neurobiology, Physiology, and Behavior, University of California Davis).

Education

197 The Effects of Cell Phone Conversations on the Attention and Memory of Bystander, VERONICA V GALVÁN1, ROSA S VESSAL1, MATTHEW T GOLLEY2, SARAH JENSEN1,* and NEESHA DAULAT1,* (1Department of Psychological Sciences, College of Arts and Sciences, University of San Diego; 2Department of Liberal Arts, D’Youville College, Buffalo, NY).

History and Philosophy of Science

200 Pacific History and the Littoral Truth: Edward F. Ricketts and Joel W. Hedgpth on Estuaries and the Ocean Shores, RANDALL W SMITH1,2,3,* and GRETTA SIEGEL1 (1Department of Physics, Portland State University; 2School of the Environment, Environmental Sciences and Resources Program, Portland State University; 3Portland State University, Science Librarian, The Joel Hedgepth Papers Project).
ABSTRACTS

Abstracts are grouped by program.
Not all presenters submitted an abstract.
Except for editing of titles, authors and affiliations for consistency, abstracts have not been edited.
Grammar and content are presented as submitted by the authors.

PLENARY TALKS

Monday Noon Public Lecture
Monday, 12:15 p.m. in SU Room 208A

1 Las Vegas: Sustainable? ROBERT E LANG (Department of Sociology, University of Nevada, Las Vegas, NV 89154-4022; robert.lang@unlv.edu).
No abstract was submitted for this talk.

Monday Evening Public Lecture
Monday, 7:00 p.m. in SU Theatre

2 Veratrum californicum: Of One-eyed Sheep and Hedgehogs, OWEN M McDOUGAL (Department of Chemistry and Biochemistry, Boise State University, 1910 University Drive, Boise, ID 83725-1520; owenmdougal@boisestate.edu).
In the mountains of Idaho grows the corn lily (a.k.a. Veratrum californicum). This plant gained national recognition when in the 1950’s sheep herders noticed unusually high rates of lambs born with cyclopian-type malformations. An extensive effort by the United States Department of Agriculture’s Agricultural Research Service-Poisonous Plant Research Laboratory in Logan, Utah, spent the next twenty years identifying a bioactive steroidal alkaloid as the culprit. They called this compound cyclopamine. By the 1970’s, embryologists Christiane Nüsslein-Volhard and Eric Wieschaus witnessed the growth of pointy denticles reminiscent of a hedgehog growing on Drosophilia melanogaster larvia. They termed the genetic locus responsible for formation of these denticles, when absent, hedgehog, a finding that contributed to their 1995 Nobel Prize in medicine. Cyclopamine was later identified by researchers at Johns Hopkins University School of Medicine to inhibit the hedgehog signaling pathway; a pathway that becomes abnormally active in basal cell carcinoma and several other cancers. This presentation will overview Veratrum californicum and describe our efforts to obtain bioactive alkaloids from it.

Tuesday Noon Public Lecture
Tuesday, 12:15 p.m. in SU Room 208A

3 New Frontiers of Cancer Research in 2013: A “Vademecum” for Emerging Scientists, RAFAEL MALAGOLI ROCHA (Department of Pathology, Hospital AC Camargo, Rua Professor Antônio Prudente 211, Liberdade São Paulo, SP, 01509-900, Brazil; rafael.malagoli@gmail.com).
This talk is dedicated to aspirant and young scientists, directed to the conflicts, challenges and experiences – the good, the bad and the ugly – that an emerging cancer researcher encounters.

Wednesday Noon Public Lecture
Wednesday, 12:15 p.m. in SU Room 208A

4 The Incredible Contributions of Nikola Tesla, MICHAEL PRAVICA (Associate Professor, Department of Physics, University of Nevada Las Vegas, 4505 S Maryland Pkwy, SEB 4022, Las Vegas, NV 89154-4022; pravica@physics.unlv.edu).
Just over 150 years ago, one of the world’s greatest geniuses was born (in 1856), the inventor Nikola Tesla. He was the progenitor of the 20th Century was largely responsible for a significant portion of the ubiquitous technology that we all benefit from today. Most of his original inventions such as the radio, alternating current, fluorescent lighting, and hydroelectric dynamos, and the Tesla coil, are still being used to this day, and have been scarcely modified. Many of his other inventions (such as the bladeless turbine) are only now beginning to become practically realized. The Serbian inventor was in many cases far too advanced in his visionary work and this affected his ability to turn his ideas into practical reality. Tesla was also a passionate humanist who sought free energy for all. Only now are we really beginning to understand the sheer magnitude of Tesla’s many contributions. This talk will discuss the life and times of Nikola Tesla, some of his greatest inventions, and how these inventions continue to impact all of us.

SYMPOSIA

Structural and Computational Approaches for Novel Therapeutics Development and Biomedical Insights
Monday, 8:00 a.m. in SU Room 213

5 Chimeras of the Acetylcholine Binding Proteins as Templates for the Development of New Therapeutics, TODD T TALLEY1, JOSHUA WU2, KWOK-YIU HO2, BANUMATHI SANKARAN3 and PALMER TAYLOR2 (1Department of Biomedical and Pharmaceutical Sciences, Idaho State University, 801 S 8th Street, Logan, UT 84322; 2Department of Chemistry, University of Nevada, Las Vegas, NV 89154; 3Nanyang Technological University, Singapore, Singapore).
Bioinformatics tools and databases have been developed and applied to study diversified biological problems, for example, CYP450 enzymes. In our structural bioinformatics studies, the three-dimensional (3D) structure of selected enzymes were built, for example, 2C19, 2E1. By a series of docking studies and MD simulations. These findings accord with the results obtained from photo-affinity labeling studies, and will be very useful for conducting mutagenesis studies, providing useful information for drug metabolism and personalization of drug treatments, as well as stimulating novel strategies for finding desired personalized drugs.

We developed an effective computational model to predict SNPs by SVM training on features which are extracted from candidate residues and flanking protein sequence. These features range from classic features such as amino acid type, composition, physicochemical properties, to evolutionary information as position-specific scoring matrix (PSSM), phylogenetic entropy and number of available codons of residues. 16 hybrid feature sets were constructed by combining different kinds of features and building prediction classifiers respectively. During training SVM classifiers, a learning method which based on fuzzy set theory is applied to eliminate the model bias caused by the imbalance of positive dataset (SNPs) and negative dataset (non-SNPs). We further trained SVM classifier and get an accurate model with 91.25% sensitivity, 93.75% specificity, 92.5% accuracy and an AUC value of 0.925, respectively.

The performance of our method achieves significant improvement over other DNA sequence-based and protein sequence-based methods whose accuracy is less than 70%. The extracted features, especially amino acid type, the number of available codons, PSSM and phylogenetic entropy, are shown to be responsible for enhancing SNPs prediction performance. The accurate and validated prediction model presented here will provide useful information for the studies of genome mutation dynamics and personalized drug metabolism.


Lead optimization, evolving a hit compound into a potential drug molecule, requires insight, experience, data, application and a good portion of luck. Correctly modeling protein-ligand interactions is difficult at the current state of the art, so making correct predictions of which alterations to make to a molecule to achieve a given goal (potency, selectivity, modulating off-target effects) is uncertain. Based on the idea that water is an excellent ligand for a protein and that highly potent ligands must make all the interactions that water does with a protein binding site, we have developed a tool, SZMAP, to model water energetics in a binding site. Uniquely in this area SZMAP uses a semi-continuum approach to calculating water thermodynamics, combining the speed and power of continuum solvent methods with the discrete nature of explicit
solvent methods. In lead optimization, SZMAP can guide ligand design decisions by identifying waters that increase or decrease binding affinity, rapidly highlighting where small ligand modifications could mimic water interactions and geometry better, and suggesting where a substituent could displace neighboring waters that are hindering binding. The speed of SZMAP and its ability to focus on synthetically accessible modifications to a ligand allows it to have significant impact on chemistry decisions in lead optimization programs, reducing cycle time and increasing the rate at which project goals can be met.

8 From Folding@Home to AMBER: Five Years of Molecular Dynamics with CUDA, SCOTT Le GRAND (NVIDIA Corporation, Mountain View, CA; varelse2005@gmail.com).

In 2008, NVIDIA demonstrated that CUDA-enabled GPUs accelerated molecular dynamics calculations by nearly 3 orders of magnitude compared to traditional CPUs. This allowed a single GPU to achieve the performance of a supercomputer at this task. Additionally, performance has improved by 1.5x to 2x per GPU generation. Despite these obvious benefits, there is still entrenched resistance to porting many existing codes to GPUs because of the work involved in doing so. However, with 5 years of performance data now in the rearview mirror, it is clear that not only is it of huge benefit to port to GPUs now, but also that failing to do so will only result in having to do so later when many-core architectures become the standard. Finally, given you have already ported your code to GPUs, the next logical step is make your code cloud-accessible, freeing your users from having to purchase any hardware whatsoever and allowing them to take advantage of exponentially improving performance.

9 Access to Millisecond Time Scale Events with Accelerated Molecular Dynamics and GPU technology, ROMELIA SALOMON FERRER (San Diego Supercomputer Center, University of California, San Diego, La Jolla, CA; romesalomon@gmail.com).

One of the main challenges in computational Biology is the need to span several orders of magnitude in the temporal and spatial scale. Atomic based simulations offer a great insight into the functionality and interaction of biomolecules. The need for methods and algorithms that can both, allow for the treatment of a large number of atoms as well as allow efficient configuration sampling is evident. This work presents the ability of the all-atom enhanced sampling method accelerated molecular dynamics (aMD) to investigate conformational changes in proteins that typically occur on the millisecond time scale. Combining aMD with the inherent power of graphics processor units (GPUs) we show that a 500 ns simulation produces a similar conformational space sample compared to a previous millisecond unbiased traditional MD simulation carried out on BPTI. Results on a Adenovirus protease (AVP), an enzyme activated upon a significant conformational change, will be presented as well. AVP is an enzyme essential for virus replication and hence an important target for antiviral drugs.

10 Computationally Guided Discovery of Novel Influenza Endonuclease Inhibitors, ROBERT V SWIFT1, ERIC CHEN1, NAZILLA ALDERSON2, GEN-SHENG FENG2 and ROMMIE E AMARO1 (1Department of Chemistry and Biochemistry, 2Department of Pathology, University of California, San Diego, La Jolla, California, 92039; robvswift@gmail.com).

Influenza causes seasonal global pandemics that result in millions of cases of severe illness and hundreds of thousands of deaths. Drugs, such as oseltamivir and zanamivir, target influenza neuraminidase, and are good alternatives if vaccination fails. However, their long-term efficacy is threatened by emerging strains of resistant virus. One attractive alternative influenza target is the endonuclease that resides in the N-terminal of the PA subunit of the RNA-dependent RNA polymerase. Fortuitously, while the endonuclease is required for viral replication, it lacks a human counterpart, which minimizes toxicity risks. A three-dimensional pharmacophore was developed and applied to screen a library of half a million compounds. From the virtual screening results, two hundred and thirty seven compounds were selected, purchased and assayed for inhibition, antiviral activity and cytotoxicity. Five new classes of inhibitors were found. Two compounds are potent inhibitors, suppress viral replication, and have low toxicity, making them promising candidates for further characterization and development.

11 Common Functional Dynamics of Molecular Motor and Switch Proteins, BARRY J GRANT (Department of Computational Medicine and Bioinformatics, University of Michigan Medical School; bjgrant@umich.edu).

Understanding how protein ligand binding can promote distinct conformational states, with different affinities for binding partners, is key to understanding the structural basis of protein efficacy. Here we study eight molecular motor and G-protein families that undergo GTP or ATP associated conformational changes to regulate important cell processes, including signal transduction and intracellular transport. Employing comparative structure analysis, accelerated molecular dynamics and Brownian dynamics simulations we unveil the pervasive similarity of functionally associated dynamical fluctuations. Different families were observed to have variable inactive but common active nucleotide binding site configurations. Activating conformational changes that reconfigure analogous nucleotide binding site residues were also observed in nucleotide free molecular dynamics simulations. This result suggests that this common flexibility is an intrinsic feature of these families. In addition, conformational changes at the nucleotide binding site in all families were observed to accompany the concerted rearrangements of distinct family specific sub-domains. These sub-domains range from 16-202 residues.
in length and are joined to common core structural elements at topologically equivalent sites. Moreover, structural changes, correlated with those at the nucleotide binding site, were found to alter the geometry, dynamics and electrostatic field properties of these sites. Furthermore, Brownian dynamics simulations reveal that for kinesin, ras, rab, and rho families these electrostatic differences can modulate the kinetics of protein-protein association events. In summary, our accumulated results indicate that similar activating conformational changes link nucleotide binding to distal topologically equivalent sub-domains that in turn play a role in modulating distinct protein-protein interactions. We speculate that this fundamental mechanism operates in all motor and switch proteins. These results have implications for allosteric drug development and future protein engineering efforts on these systems.

Images and animations related to this work can be found at: http://thegrantlab.org/

12 The Translocation Kinetics of Antibiotics Through Porin OmpC: Insights from Structure-based Solvation Mapping Using WaterMap, SARAH WILLIAMS1, QUE-TIEN TRAN1, GÜL ERDEMLİ1 and ROBERT PEARLSTEIN2 (1Novartis Institutes for BioMedical Research, Center for Proteomic Chemistry, Cambridge, Massachusetts 02139; 2Novartis Institutes for BioMedical Research, Global Discovery Chemistry, Computer-Aided Drug Discovery, Cambridge, Massachusetts 02139; sarah.williams@novartis.com).

Poor permeability of the lipopolysaccharide-based outer membrane of Gram-negative bacteria is compensated by the existence of protein channels (porins) that selectively admit low molecular weight substrates, including many antibiotics. Improved understanding of the translocation mechanisms of porin substrates could help guide the design of antibiotics capable of achieving high intracellular exposure. Energy barriers to channel entry and exit govern antibiotic fluxes through porins. We have previously reported a hypothesis that the costs of transferring protein solvation to and from bulk medium underlie the barriers to protein-ligand association and dissociation, respectively, concomitant with the gain and loss of protein-ligand interactions during those processes. We have now applied this hypothesis to explain the published rates of entry (association) and exit (dissociation) of six antibiotics to/from reconstituted E. coli porin OmpC. WaterMap was used to estimate the total water transfer energies resulting from transient occupation by each antibiotic. Our results suggest that solvation within the porin cavity is highly energetically favorable, and the observed moderately fast entry rates of the antibiotics are consistent with replacement of protein-water H-bonds. The observed ultrafast exit kinetics is consistent with the lack of intrachannel solvation sites that convey unfavorable resolvation during antibiotic dissociation. These results are aligned with known general relationships between antibiotic efficacy and physicochemical properties, namely unusually low logP, reflecting an abundance of H-bond partners. We conclude that antibiotics figuratively “melt” their way through porin solvation at a rate determined by the cost of exchanging protein-solvent for protein-antibiotic H-bonds.

13 Recommendations for Hit Identification and Hit Optimization in Virtual Screening, KIRK E HEVENER (Idaho State University, College of Pharmacy; khevener@pharmacy.isu.edu).

In recent years, the drug discovery arena has seen an exponential increase in the application of computer-based methodologies toward the identification of hit or lead compounds. Often, virtual screening techniques are employed in parallel with or in place of traditional high-throughput screening methods, particularly within academic laboratories. Although the hit identification, or ‘hit-calling’, criteria for traditional high-throughput screens are well defined, there is less of a consensus in the literature as to how to define a hit compound identified from computational screening methods based upon the experimental activity of the compounds tested. We have performed a critical analysis of virtual screening results published between 2007 and 2011. The activity of reported ‘hit’ compounds from over 400 studies was compared to their hit identification criteria. Hit rates and ligand efficiencies were calculated to assist in these analyses and the results were compared with factors such as the size of the virtual library and the number of compounds tested. A series of promiscuity, drug-like, and ADMET filters were applied to the reported ‘hits’ to assess the quality of the compounds reported and a careful analysis of a subset of the studies which presented hit optimization was performed. This data allows us to make several practical recommendations with respect to selection of compounds for experimental testing, defining ‘hit identification’ criteria, and general VS hit criteria that will allow for realistic hit optimization. A key recommendation is the use of size-targeted ligand efficiency values as hit identification criteria.

14 Computational Studies of Sortase Enzymes, JEFF WERESZCZYNSKI (University of California, San Diego, La Jolla, CA; jmweresz@gmail.com).

Gram-positive bacteria are responsible for a host of human ailments, such as meningitis, sepsis, and bacterial pneumonia. The processes by which these pathogens infect host cells involve a series of virulence factors that are embedded into their cell wall by sortase enzymes. Therefore, sortases are an attractive target for the development of new anti-bacterial compounds, as inhibition of these enzymes directly interferes with the pathogen’s ability to colonize its host. To further understand the process by which sortases function, I report on a series of atomic-scale computational studies aimed at elucidating the mechanisms of substrate binding, recognition, and catalysis. In addition, results from these studies have been used in computer aided drug design efforts that have guided the discovery of new sortase inhibitors, which may potentially be
developed into new drugs to combat bacteria that are resistant to conventional therapeutics.

15 Insights from Free Energy Calculations: Driving Forces, Ligand Binding Modes and Drug Design, CHIA-EN CHANG (University of California, Riverside, Riverside, CA; chiaenc@ucr.edu).

Accurately calculating ligand-protein binding affinity has practical applications in computer-aided drug design but it is still challenging in computational chemistry. In this study, we performed the mining minima algorithm (M2) to compute the binding affinities of various types of inhibitors to p38α MAP kinase. This end-point approach uses an empirical force field and implicit solvent models to find stable conformations in the free and bound states of a system and then compute the binding free energy of each species. Kinase is an important drug target; here we selected 30 different p38α inhibitors that can bind to either DFG-in or DFG-out conformations. Notably, some analogs do not have ligand-p38 co-crystal structures. Our computed absolutely binding free energies yield excellent agreement with experimental data and reveal the driving forces of binding. Moreover, the conformational changes and stability through switching the conserved DFG motif are of great interest. Our results also suggest the dynamic equilibrium and the forces stabilizing both the DFG-in and DFG-out states. The method can be very useful for proteins containing flexible regions for structure based drug design.

16 Quantum Chemical Studies of Electron Coupled Proton Transfer in B-type Cytochrome C Oxidases, ANDREAS W GÖTZ*, ROSS C WALKER1,2, D ANN GIAMMONA1, DONALD BASHFORD1, MICHAEL E PIQUE1, WEN-GE HAN1 and LOUIS NOODLEMAN4 (1University of California San Diego, San Diego Supercomputer Center, La Jolla, CA 92093; agoetz@sdsc.edu; 2University of California San Diego, Department of Chemistry and Biochemistry, La Jolla, CA 92093; 3St. Jude Children’s Research Hospital, Department of Structural Biology, Memphis, TN 38105; 4The Scripps Research Institute, Department of Integrative Structural and Computational Biology, La Jolla, CA 92037).

Building on the fundamental experimental and computational analysis work of J. A. Fee, we present density functional theory (DFT) based quantum chemical studies of the mechanism of proton pumping by B-type cytochrome c oxidases (CcO’s). CcOs play major roles as terminal oxidases of respiratory chains in mitochondria and prokaryote cells, where they reside in the inner- and plasma membranes, respectively [1]. Their function is to catalyze the reduction of O₂ to water with concomitant pumping of protons across the membrane to form an electrochemical gradient that is utilized by the cell in numerous ways, most prominent of which is ATP formation [2]. We discuss the mechanistic steps that are involved in chemical bonding and electron/proton flow to oxygen within the Fe₃₅Cu₈ dinuclear complex of the CcO active site as obtained from DFT calculations of active site models [3]. We present our latest refinements of the reaction mechanism which consider different protonation states and tautomers as well as different exchange-correlation (XC) functionals. Our choice of the most appropriate XC functionals for the reaction cycle is guided by comparisons to available experimental data including structural information and Mössbauer spectroscopic data to distinguish the spin states of the intermediates. Electrostatic potential maps yield insight into how proton pumping is linked with molecular oxygen reduction to water. This work is supported by NIH grant R01 GM100934 and computer time via NSF award TG-CHE13001

17 A Complete Configurational Ensemble Approach to Expand LSD1/CoREST Druggability, JAMES C ROBERTSON*, NATE C HURLEY1, NADEEM A VELLORE1, ANDREA MATTEVI and RICCARDO BARON4 (1Department of Medicinal Chemistry, College of Pharmacy, The University of Utah, Salt Lake City, UT 84112-5820; 2Department of Biology and Biotechnology, University of Pavia, via Ferrata 9, 27100 Pavia, Italy; j.c.robertson@utah.edu).

Lysine specific demethylase-1 (LSD1/KDM1A) in complex with its corepressor protein CoREST is a promising target for epigenetic drugs yet no therapeutics targeting LSD1/CoREST are currently available. Recently, extended molecular dynamics (MD) simulations indicated that LSD1/CoREST nanoscale clamp dynamics is regulated by substrate binding and highlighted key hinge points of this large-scale motion as well as the relevance of local residue dynamics. Prompted by the urgent need for new molecular probes and inhibitors to understand LSD1/CoREST interactions with small-molecules, peptides, protein partners, and chromatin, we undertake here a complete configurational ensemble approach to expand LSD1/CoREST druggability. The independent algorithms FTMp and SiteMap and our newly developed Druggable Site Visualizer (DSV) software tool were used to predict and inspect favorable binding sites. We find that three hinge points revealed by MD simulations are new targets for the discovery of molecular probes to block association of LSD1/CoREST with chromatin or protein partners. A fourth region was also predicted from simulated configurational ensembles and was experimentally validated to have strong binding propensity. The observation that this prediction would be prevented when using only the X-ray structures available (including the X-ray structure bound to the same peptide) underscores the relevance of protein dynamics in protein interactions. A fifth region was highlighted corresponding to a small pocket on the AOD domain. This study sets the basis for future virtual screening campaigns targeting the five novel regions reported herein and for the design of LSD1/CoREST mutants to probe LSD1/CoREST binding with chromatin and various protein partners.
Neuronal nicotinic receptors (NNRs) belong to the Cys-loop family of ligand-gated ion channels, are formed from five subunits either as homologous or heterologous, oligomeric receptors, and are of interest as targets for treatment of a variety of central and peripheral nervous system disorders. Acetylcholine binding proteins (AChBPs) are water soluble structural surrogates of the extracellular domain of both heteropentameric and homopentameric NNRs. Examinations of both binding affinities and crystal structures of AChBPs co-crystallized with NNR ligands substantially increased our understanding of the key ligand binding domain interactions of both NNR agonists and antagonists. To date, only limited comparisons of binding affinities at both NNR subtypes and AChBPs have been published. Our analyses provide statistical and molecular insight into the ability of various NNR ligands to elicit interactions with similar, but not identical, features of both the NNR and AChBP ligand binding domains, thus teasing out essential correlative information on these two systems. Combining statistical data mining methods with structural biomolecular modeling, we present comparative affinity data analyses for a diverse set of NNR ligands binding to α4β2, α3β4 and α7 NNR subtypes, in parallel with binding affinity data for two different AChBPs (Aplysia and Lymnaea) and data for an Aplysia-AChBP where an important (-)-face tyrosine has been mutated to tryptophan, a structural feature conserved in the NNR subtypes. Principle component and statistical clustering analyses indicate there are underlying binding patterns that classify ligands into groups with different binding preferences to NNR and AChBP receptors. These subtle binding characteristic differences are further elucidated through structural biomolecular modeling, which reveals the molecular mechanisms that contribute to these differences and correlations. The ligand classification and structural elucidation establish the molecular basis of NNR ligand binding profiles. This information is critical to rationalize the difference between NNR and AChBP systems. It is anticipated that the findings from this study will have broad implications in pharmaceutical design and development to modulate NNR and other important membrane proteins relevant to human diseases.

Boise Extravaganza in Set Theory (BEST)
Monday, 8:50 a.m. in SU ROOM 207
continues on Tuesday, 9:00 a.m. in SU ROOM 207

21 From Subcompact to Domain Representable, WILLIAM G FLEISSNER1 and LYNEE YENGULALP2* (1Department of Mathematics, University of Kansas, Lawrence, KS, 66045; 2Department of Mathematics, University of Dayton, 300 College Park, Dayton, OH 45469; lyengulalp1@udayton.edu).

A property, P, is a strong completeness property if any
product of spaces, each with property \( P \), is a Baire space: the intersection of any countable collection of open dense sets is dense. We will discuss various completeness properties including game-theoretic properties and the strong completeness properties of subcompactness and domain representability. We explore the relationships between subcompactness, domain representability and a new property we call generalized subcompactness, GSC.

22 Universal Subgroups, KONSTANTINOS A BEROS (Department of Mathematics, University of Wisconsin, Madison, WI 53706-1325; kberos@math.wisc.edu).

Given a class \( C \) of subgroups of a topological group \( G \), define a subgroup \( K \) in \( C \) to be a “universal” \( C \) subgroup if every subgroup \( H \) in \( C \) is the \( f \)-preimage of \( K \) for some continuous endomorphism \( f \) of \( G \). A universal \( C \) subgroup is an algebraic analog of a Wadge-complete set for a pointclass and, in a concrete sense, captures all of the possible algebraic and topological complexity of subgroups in the class \( C \).

I have shown that, for any Polish group \( G \), there is a universal analytic subgroup of the countable power of \( G \). Moreover, if \( G \) is locally compact, there are also universal sigma-compact and compactly generated subgroups of the countable power of \( G \).

I will put these results in context and, if time permits, sketch one of them in the context of the Specker group.

23 Admissible Determinacy, SHEHZAD AHMED (Department of Mathematics, Boise State University, Boise, ID 83725; shehzadahmed@u.boisestate.edu).

We say that an ordinal \( a \) is \( x \)-admissible if \( \text{L}a[x] \) is a model of KP. In the case where \( x \) is a real, we use \( w(x) \) to denote the least ordinal that is \( x \)-admissible. Ordinal definable determinacy (abbreviated OD-determinacy) is hypothesis that all sets of reals that are ordinal definable are determined. Admissible determinacy is the hypothesis that there is a real \( x \) such that \( \text{L}w(x) \) satisfies OD-determinacy. This was first considered by Andy Lewis. Of course, we have to take OD-determinacy here as ranging over classes since we are working with models that do not necessarily satisfy full comprehension.

In the past few decades, a significant amount of work has been done towards measuring consistency strength of determinacy hypotheses in terms of large cardinal hierarchy, as there seems to be a rather natural correspondence between the two. This correspondence leads to the notion of the large cardinal companion of a particular determinacy hypothesis. In this talk, we will investigate the large cardinal companion of admissible determinacy, and discuss its known upper and lower bounds.

24 Hausdorff Gaps and Towers, PIOTR BORODULIN-NADZIEJA\(^1\) and DAVID CHODOUNSKY\(^2\)* (\(^1\)Mathematical Institute, University of Wroclaw, pl. Grundwaldzki 2/4, 50-384 Wroclaw, Poland; \(^2\)Department of Mathematics and Statistics, York University, Toronto, Ontario, Canada M3J-1P3; david.chodounsky@matfyz.cz).

The classical result of Kunen states that a gap \( (\omega_{\omega}, \omega_\alpha) \) in \( P(\omega)/\text{fin} \) is indestructible if, and only if, \( (\omega_\alpha \cap \beta \\mid \omega_\alpha) \neq \emptyset \) for each \( \alpha < \beta \in \omega_\alpha \). (This has to hold for some cofinal subgap.) The classical construction of Hausdorff produces a gap such that \( \{\alpha < \beta \mid \text{L} \omega_\beta \in \text{fin} \} \) is finite for each \( \beta \in \omega_\alpha \), and \( n \in \omega_\alpha \). We show that these two indestructibility conditions are consistently different.

We also study combinatorics of towers - well ordered \( \subset ^* \)-chains in \( P(\omega)/\text{fin} \). We call the tower \( (\omega_\alpha \cap \beta, \omega_\beta) \) Suslin if every cofinal subtower contains two elements in inclusion, and Hausdorff if \( \{\alpha < \beta \mid \text{L} \omega_\beta \in \text{fin} \} \) is finite for each \( \beta \in \omega_\alpha \) and \( n \in \omega_\alpha \). We show that assuming MA all towers are Hausdorff, Hausdorff towers generate ideals of maximal Tukey order among posets of size \( \omega_\alpha \) and there can be a tower, which is not equivalent to any Hausdorff nor Suslin tower.

25 Abstract submitted after publication deadline. Please refer to Program Changes sheet.

26 Higher Cardinal Characteristics and PCF, TODD EISWORTH (Department of Mathematics, Ohio University, Athens, OH 45701; eisworth@math.ohiou.edu).

We will give an overview of the “cov vs. pp problem” from pcf theory, and then briefly outline some recent work. This talk is intended as an introduction and invitation to a part of pcf theory that cries out for more development, and we will try to highlight similarities with the theory of cardinal characteristics of the continuum.

27 A Generalization of the Notion of Strong Measure Zero to Quasi Uniform Spaces, KAMERYN J WILLIAMS (Department of Mathematics, City University of New York, New York; kameryn.j.w@gmail.com).

Quasi-uniform spaces generalize metric spaces, in particular dropping the requirement for symmetry. As such, it should not be surprising that there is a natural generalization of the notion of strong measure zero (SMZ) from metric spaces to quasi-uniform spaces (denoted U-SMZ, where \( U \) is the underlying quasi-uniformity). In this talk we investigate some consequences of this generalization. The main results are:

- If a uniform space \( (X, U) \) is U-SMZ and its induced topology has a covering property of Hurewicz, then the induced topological space has the Rothberger property. This is a generalization of a result of Fremlin and Miller regarding metric spaces.

Let \( (X, t) \) be a zero-dimensional topological space. If for every quasi-uniform space \( (X, U) \) whose induced topology is \( t \), \( X \) is U-SMZ, then \( X \) has the Rothberger property.

For any uncountable set \( X \), there exists a quasi-uniformity \( U \) over \( X \) such that \( X \) is U-SMZ but the induced topology of \( U \) is discrete. This is very different from the metric case: for any uncountable metric space \( (X, d) \) which induces the discrete topology, \( X \) is not SMZ.
28 Remarks on Countable Tightness, MARION SCHEEPERS (Department of Mathematics, Boise State University, Boise, ID 83725; mscheep@boisestate.edu).

Countable tightness is a weakening of first countability and may be destroyed by generic extensions. We discuss the mutability of countable tightness in generic extensions by countably closed partially ordered sets.

29 Abstract submitted after publication deadline. Please refer to Program Changes sheet.

30 Abstract submitted after publication deadline. Please refer to Program Changes sheet.

Note: Program continues on Tuesday. Please refer to page 65 of these Proceedings for the schedule for Tuesday.

Library Science and Archives:
Forming Partnerships, Making Connections
Monday, 8:55 a.m., SU Room 209

31 Issues and Challenges in the Development of Open Access Publishing and Scholarly Communications in Nigeria, IFEOMA ANN OLUWASEMILORE (Law Library, University of Lagos, Akoka-Yaba, Lagos, Nigeria; ifeomashodeinde@yahoo.com).

The paper notes that advances in technology have resulted in the emergence of open access publishing and scholarly communication. Open access publishing typically provides an internet based digital platform for the publication of research output with unrestricted access to the public while scholarly publication networks encompass interlinked information access to database by educational institutions. The growth of open access publishing and scholarly communication has been very remarkable in many developed countries. However, academic and research institutions in many developing countries like Nigeria are still battling to overcome many challenges in an attempt to make their research outputs openly accessible. At the same time, cross access to digital libraries is in its embryonic stages amongst research institutions. This paper identifies the challenges and their effects. Notable amongst these are: lack of awareness of open access publishing; a dearth of cross linked e-libraries; inadequate information and communication technology infrastructure; inadequate and epileptic power supply; inadequate funding of research institutions; and an inhibiting copyright protection regime.

The paper concludes by prescribing a copyright regime that will assure researchers of intellectual property rights protection for research outputs published in digital networks.

32 Using Open Educational Resources to Engage Faculty on Scholarly Communications Issues, CRYSTAL GOLDMAN* and CHRISTINA MUNE (King Library, San Jose State University, One Washington Square, San Jose, CA 95192-0028; crystal.goldman@sjsu.edu, christina.mune@sjsu.edu).

The scholarly communications model in academia has seen rapid expansion and change in the last two decades. Rising publisher costs for journals and textbooks have created an unsustainable model in which libraries that subscribe to journals and students who purchase textbooks are expected to pay ever-increasing prices in a time when budgets are contracting significantly.

There are two open access initiatives administered by San Jose State University librarians that seek to alleviate parts of this problem. Affordable Learning Solutions (ALS) is an Open Educational Resources program wherein librarians help faculty find low-cost or no-cost course materials that can supplement or replace expensive textbooks. The Institutional Repository (IR) hosts peer-reviewed journals, Master’s Theses and Projects, and archives eligible faculty publications in an open access format.

However, in respect to the tenure and promotion process, faculty members have a great deal invested in the current scholarly communications model and have been, on the whole, among the most reluctant to see significant alterations to the traditional paradigm.

During the outreach process for both the ALS and IR initiatives, librarians found that a number of faculty had questions or concerns about scholarly communications topics such as author rights, copyright, fair use, and intellectual property. Librarians began to collect data to better understand how to continue this process of increasing awareness and engagement on these issues, and to develop a model that might be used to engage faculty at other universities.

33 Grant Writing Instruction at the J. Willard Marriott Library, 2002-2013: A Case Study, PETER L KRAUS (J. Willard Marriott Library, 295 South 1500 East, Salt Lake City, UT 84112; peter.kraus@utah.edu).

In a majority of academic disciplines grant writing is a skill that is often self-taught or acquired informally by trial and error. Unfortunately, grant writing has received little if no emphasis in traditional instruction in higher education. Grant writing is a critical skill for new and experienced faculty. For many the prospect and challenge of writing a grant can seem daunting. However, with institutional support and the support of colleagues this endeavor can be a meaningful, learned and rewarding professional experience. Today, as budgets of colleges and universities continue to meet the challenges of the current economy, faculty at all levels are looking to external funding to support research and creative endeavors within their academic fields. Among the institutions that universities and colleges are becoming dependent upon for funding are foundations, which are a unique American institutions of philanthropy. Since 2002 the J. Willard Marriott Library has provided grant writing classes for the university community and the general public in the area of foundations and charities as
well as instruction to faculty and staff thru workshops offered by the Vice President for Research. This talk will present the evolution and development of these classes at the University of Utah.

34 Assessing Modularized Online Library Instruction, CRYSTAL GOLDMAN (King Library, San Jose State University, One Washington Square, San Jose, CA 95192-0028; crystal.goldman@sjsu.edu).

This presentation will discuss the process for developing and assessing online library research modules that have been embedded into the San Jose State University (SJSU) course management system. Originally created for Speech Communication Lab (COMM 80), a lower division Communication Studies class, the basic level modules were designed to introduce library research concepts, with each module covering a different aspect of college-level research. The online format allowed for the inclusion of elements such as video tutorials, YouTube videos, and an interactive concept map, to engage students’ interest and enhance learning. Following the success of the basic modules, the library was asked to produce a set of advanced modules geared toward upper division students. Five modules were developed for the basic series and an additional five formed the advanced series.

Faculty members outside of the COMM 80 course have also begun using these modules. Instructors select from the ten modules only those which suit the needs of their specific course research assignment.

In addition to the modules, pre- and post-tests were created to assess student learning. Each module was matched to questions on the assessment, making the tests adaptable depending on the modules the instructor chose for his or her class. These tests were designed to meet the need for information literacy assessment data required by the Western Association of Schools and Colleges (WASC), the accrediting body for SJSU. This presentation will put assessment for the online modules into context of the broader assessment program at the SJSU King Library.

35 Assessment of Information Literacy Pilot Project: Impressions of Researchers, Classroom and Library Faculty, AMY BESNOY**, FRANK JACOBITZ**, HUGH BURKHART^, CAROLE HUSTON^ and PAULA KRIST^ (Copley Library, 2Department of Engineering, 3Associate Dean, College of Arts and Sciences, 4Director of the Office of Institutional Research and Planning, University of San Diego, 5998 Alcala Park, San Diego, CA 92110; abesnoy@sandiego.edu).

This is an assessment of a campus-wide information literacy [IL] pilot project that included five teaching teams, each comprised of a faculty librarian and classroom faculty. We will explore and demonstrate how IL is essential to the development of one’s critical thinking skills. We will suggest, based on our findings, ways to approach embedding a librarian into a classroom to engage students and teach fundamental skills in parallel with learning the subject material in an iterative process. Further discussion with regard to considerations of a second year experience where more complex skills may be introduced. We will discuss how connections between IL and critical thinking can be infused in student research. Teaching and assessment of these two key competencies are being demanded across the institution and by accrediting entities; this is an opportunity to be prepared. We will share how instructional and librarian faculty learning communities constructed and assessed innovative course design models in varying disciplines, with a focus on an engineering class.

36 Students’ Confidence in Conducting Research, VALERIA E MOLTENI and EMILY K CHAN (Academic Liaison Librarians, Dr. Martin Luther King Jr. Library, San Jose State University, One Washington Square, San José, CA 95192-0028; Valeria.Molteni@sjsu.edu, Emily.Chan@sjsu.edu).

Librarians often design lesson plans based upon a set of assumptions regarding the information literacy levels of the students. Those presumptions are generally guided by conversations with the teaching faculty, demographic data from the Office of Institutional Research, syllabi, and the assignments upon which the session is based. This project seeks to include student feedback into the lesson-planning process. Students from a mandatory writing course were surveyed on their confidence in performing research-related activities. The survey instrument included demographic distributions of the students who are taking this course, as well as their confidence in engaging in the research process. Disparities between faculty and student perceptions have significant impact on the content of the information literacy session, as librarians generally only work with faculty members in assessing what materials should be covered. This project empowers librarians to have meaningful conversations with teaching faculty about the students’ confidence in performing research. This, in turn, may help in modifying the content to best meet the expressed needs of students. In the study, the authors will display how student confidence information was gathered, collected, and analyzed. In addition, the authors will present preliminary results from the study and discuss how the results have shaped conversations with teaching faculty about their expectations and students’ assurance in conducting research processes.

37 Collaborative K-12 Outreach: K-12 STEM and Beyond, SUSAN WAINSCOTT*, FREDERIC RAUBER*, XAN GOODMAN* and SAMANTHA GODBEY* (University of Nevada, Las Vegas, 4505 S. Maryland Parkway, Box 457014, Las Vegas, NV 89154; sue.wainscott@unlv.edu, frederic.rauber@unlv.edu, xan.goodman@unlv.edu, samantha.godbey@unlv.edu).

Outreach to our local communities is central to our mission at University of Nevada, Las Vegas, within the Libraries and the university as a whole. This session will describe a project in which a group of liaison and instruction librarians
coordinated library outreach to K-12 students, parents, and instructors in the disciplines of science, technology, engineering, and mathematics (STEM) and beyond (allied health sciences). We will present examples of our application of multiple technologies to science outreach, made available to the public via a STEM outreach online subject guide. Our objectives in this project were to galvanize interest in STEM among these populations by exposing them to university-held and publicly accessible information sources, to teach information literacy skills that could be applied across multiple resource types and sources, and to build personal connections with the University Libraries.

38 Panel Discussion: Teaching and Library Faculty Partnerships, AMY BESNOY*, VERONICA GALVÁN*, CRYSTAL GOLDMAN**, FRANK G JACOBITZ* and PETER L KRAUS** (Copyley Library, 2Department of Psychological Sciences, University of San Diego, 5998 Alcala Park, San Diego, CA 92110; 3J. Martin Luther King, Jr. Library, San Jose State University, One Washington Square, San Jose, CA 95192; 4Department of Engineering, University of San Diego, 5998 Alcala Park, San Diego, CA 92110; 1J. Willard Marriott Library, 295 S 1500 E, Salt Lake City, UT 84112; jacobitz@sandiego.edu).

This panel discussion focuses on partnerships formed by teaching and library faculty. Topics include collaboration models to enhance information literacy and critical thinking among university students, methods for assessment of library instruction, best practices for forming partnerships between teaching and librarian faculty members as well as faculty development approaches.

Forensic Psychological Science of Juvenile Fire Setters and Bomb Makers
Monday, 9:00 a.m., SU Room 211

39 Use of the Dsm-5 with Juvenile Fire Setters and Bomb Makers, RONN JOHNSON*, ELIZABETH CALLAHAN, CHRISTOPHER WEHRLE, JOO LE, ALEJANDRA STEPENSKY and ELIZABETH GRACE (Clinical Mental Health Program, University of San Diego, 5998 Alcala Park, San Diego, CA, 92110; ronnjohn@sandiego.edu).

Fire setting and bomb making by children under the age of 18 is a nation-wide concern that has impacted mental health services (i.e., diagnosis and treatment). Juvenile fire setting, or Youthful Misuse of Fire, and bomb making can be categorized into four motivation types: curiosity, delinquent, troubled, and extreme (FEMA, 2012). Curiosity and delinquent motivation-type have a non-pathological or psychological interest in fire or bomb making, with the delinquent involving more rule breaking and aggressive behaviors. Troubled motivation-type can stem from acute or chronic symptoms of psychological or neurological based distress. The extreme motivation-type of fire setting or bomb making is exhibiting symptoms of a severe pathological condition. When there is a deeper psychological concern, the fire setting and bomb making can be correlated with mental health diagnoses that exist in children under the age of 18. The American Psychiatric Associations’ recently published DSM-5 will continue to be utilized in the mental health field when working with children under 18. Especially those offenders that exhibit a pathological and psychological connection to their fire starting and bomb making behavior. This paper examines the diagnostic and treatment role of the DSM-5 for youthful misuse of fire and bomb making.

40 Forensic Psychological Evaluations and Risks Assessments of Juvenile Fire Setters and Bomb Makers Using the CBCL, RONN JOHNSON, PATRICIA JONES* and ELIZABETH CALLAHAN (Clinical Mental Health Program, University of San Diego, 5998 Alcala Park, San Diego, CA, 92110; ronnjohn@sandiego.edu).

The most persistent and destructive patterns of youthful misuse of fire (YMF) have been described as symptomatic behaviors, the physical manifestation of underlying psychological or neurological issues. As such, Jessor states YMF is driven by both individual and environmental factors, leading to this maladaptive behavioral pattern. Additionally, Kolko describes YMF as an externalized behavioral pattern, with markedly less internalization noted in youth with patterns of fire setting behavior. The Achenbach System of Empirically Based Assessment (ASEBA) is an objective and comprehensive, but brief, screening tool to be used by clinically trained staff. The ASEBA provides an overview of relevant psychological symptoms, as well as scales for internalized and externalized problems, and DSM-IV diagnostic categories. The ASEBA allows multi-informant assessment using the Child Behavior Checklist (CBCL) for parents, Youth Self Report (YSR), and a Teacher Report Form (TRF), but may be scored using only one of the forms, or multiple forms simultaneously. The use of the ASEBA in conjunction with a thorough, diagnostically oriented, exploration of the youths fire setting behavior patterns can provide support for YMF treatment planning, alert the clinician to potentially significant psychological or medical concerns, and provide a nonjudgmental, evidence-based approach to discussing these concerns with the youth and parents.

41 Clinical and Forensic Psychological Issues in Work with Latino/A Juvenile Fire Setters, RONN JOHNSON, ALEJANDRA STEPENSKY and CHRIS ZURES* (Clinical Mental Health Program, University of San Diego, 5998 Alcala Park, San Diego, CA, 92110; ronnjohn@sandiego.edu).

Psychological factors are not difficult to identify in various juvenile offenders. Although there has been little empirically based attention on the clinical and forensic psychological issues of research that has addressed the prevalence of fire setting among Latino/a juveniles. It is important that mental
health professionals understand the unique differences within diverse populations and take ethnoracial and cultural factors into consideration, especially when conducting forensic psychological assessments. It is critical that mental health professionals become competent in the cultural associations in working with the Latino/populations in order to provide services that are in line with the customs, morals, and values of the specific culture. Doing so, clinicians make sure to deliver the most culturally-responsive services with the highest potential for reinforcing evidenced-based practice. This paper specifically focuses on the unique clinical and forensic implications of Latino/juvenile fire setters by conducting a meta-analysis of peer-reviewed research articles.

42 Clinical Decision Making in the Treatment of Juvenile Fire Setters Referred by the Courts: Transdisciplinary Service Coordination, RONN JOHNSON and PATRICIA JONES* (Clinical Mental Health Program, University of San Diego, 5998 Alcala Park, San Diego, CA, 92110; ronnjohn@sandiego.edu).

Converting disciplinary competence into about evidence-based services requires considerable skill in clinical decision making while working with juvenile fire setters and bomb makers. Why, because juvenile offenders often present with a long list of pre-existing risk factors and previous service providers who may still be involved with their case. Although well-intentioned, the interventions are ostensibly crafted to produce desirable psycho-legal outcomes, the same services may in fact work against the juvenile offender. Juvenile courts often mandate services but dwindling economic resources means that vital transdisciplinary services are absent. In other words, the missing healthcare elements are frequently transdisciplinary in nature. Assuming attention to these forensic psychological issues occur over time, such professional support would serve a valuable prevention role that is hypothesized to reduce recidivism for this vulnerable juvenile offender group. In this case, a lack of coordinated services could fuel undesirable behavioral relapses that often result in a revolving door of forensic mental health issues and increased legal contacts for juveniles. This presentation provides impetus toward opportunities to improve the delivery of forensic psychological services to juvenile fire setters. A transdisciplinary framework for working with court-referred cases is reviewed. First, it clarifies the concept of transdisciplinary services and differentiates it from other forms of collaboration. Second, it presents an example of a multifaceted juvenile fire setting case in an effort to address issue relevant through transdisciplinary service coordination.

43 Towards A National Data Base from A Community-Based Juvenile Fire Setter Service In San Diego County: Fatjam Program, RONN JOHNSON, ALEJANDRA STEPENSKY and PATRICIA JONES* (Clinical Mental Health Program, University of San Diego, 5998 Alcala Park, San Diego, CA, 92110; ronnjohn@sandiego.edu).

In order to assess the elements and the outcome effectiveness of a juvenile fire setter program (FATJAM), there must be a fundamental understanding of how research data can be efficiently and appropriately accessed as well as assessed. Factors such as validity, reliability, and accuracy of measures should be considered when initiating the data collection, as well as throughout the evaluation of the data collection itself. It is important that clinicians consider all of the internal and external factors that may affect the reliability, validity, and accuracy of the data that is collected, in order to better understand the limitations of the research, as well as of the program. This presentation examines effective strategies and organization techniques for successfully extracting data regarding juvenile fire setter programs. It also explores the impact that the community has on both the development of the research, as well as the program in place. Implementing strategies that allow for clarity will allow a more thorough, concise, and effective research process.

Forensic and Clinical Psychological Science Issues in Anti-Terrorism: An International Paradigm
Monday, 1:30 p.m., SU room 211

44 Is There A Nexus Between Historical Trauma and PTSD Vulnerability in Military Personnel? RONN JOHNSON, BONNIE KUO*, CHRIS ZURES, ELIZABETH GRACE and ANGELICA GARCIA (Clinical Mental Health Program, University of San Diego, 5998 Alcala Park, San Diego, CA, 92110; ronnjohn@sandiego.edu).

The term historical trauma was coined by Dr. Maria Yellow Horse Brave Heart in the 1980’s. The construct was developed based on the well-documented experience of Native Americans. Historical trauma is cumulative emotional and psychological wounding over the lifespan and across generations that resulted in mass cross-generational group trauma. The historical trauma response (HTR) is a constellation of psychological features in reaction to this trauma. The concept of oppression is comparable to other confirmed tragic historical events such as the Holocaust. Generationally, there is lingering and significant impact on the descendants from these diverse groups. The recurring behavior cycle has prompted individual susceptibility to other mental health disorders. A closer look at the historical trauma response and its associated clinical symptoms and behaviors are highly similar to those of posttraumatic stress disorder for OEF/OIF veterans. This presentation explores the commonality between historical trauma response and risk factors for posttraumatic stress disorder in veterans. Current assessment and evidence-based interventions are examined. The relevance of cultural impact is also explored for civilian readjustment and post-military employment (e.g., law enforcement).
45 Evidence-Based Treatment Issues for Victims of Terrorism: Boston Marathon Explosion, RONN JOHNSON, BONNIE KUO*, CHRISTOPHER WEHRLE and MEGGIE WILHELM (Clinical Mental Health Program, University of San Diego, 5998 Alcala Park, San Diego, CA, 92110; ronnjohn@sandiego.edu).

Mental health professionals are a critical component of the first responders that are deployed to assist survivors of terrorism (e.g., Boston Marathon Explosion). Very few treatment approaches are specifically designed for victims of terrorism existed prior to the Twin Tower attacks on 9/11. Terrorist based violence continues to result in psychological fear. It also occurs with physical harm to men, women, and children throughout the globe. The current evidenced based treatment interventions for victims of terrorism have historically evolved from programs designed to treat military and peace officers following critical incidents. This presentation reviews a variety of evidenced based treatment interventions that include on-scene intervention, immediate posttraumatic stages, and long term psychotherapy. The specific evidenced based treatment interventions discussed include Critical Incident Stress Debriefing (CISD) theory and Eye Movement Desensitization Reprocessing Psychotherapy (EMDR). EMDR and CISD are both endorsed by the Department of Defense and World Health Organization as efficacious psychological triage interventions for individuals with acute trauma. The presenters examine these evidenced based interventions in the context of events like the Boston Marathon Explosion, Oklahoma City Bombing and Newton Elementary School Shooting.

46 Radicalization of Prison Inmates: An Antiterrorism Paradigm, RONN JOHNSON* and CHRISTOPHER WEHRLE (Clinical Mental Health Program, University of San Diego, 5998 Alcala Park, San Diego, CA, 92110; ronnjohn@sandiego.edu).

The purpose of this presentation is to discuss several antiterrorism risk assessment factors that are relative to radicalization of inmates. The presentation uses a detailed analytical review of the research and best practices relevant to understanding the inmate radicalization process. The overall findings were that the circumstances surrounding arrest and incarceration fuel unwanted conditions where radicalization can function as a greater risk. The research implications include evaluating current institutional risk assessment practices as they pertain to radicalization. Other criminal psychological research implications include assessing training programs for correctional officers and Homeland Security personnel in areas relative to inmate radicalization. There are several practical implications that are mostly related to public safety. The lessons learned from 9/11 taught Americans that there is no soft target completely free from being vulnerable to senseless acts of terror. Moreover, successful and thwarted acts of terrorism and reconnaissance response probes have spawned a growing need for prison staff to expand training to include behavioral threat assessments related to terrorism. There is a non-linear relationship between timely intelligence gathering, acts of terror, and understanding inmate radicalization. Prisons are prime locations for violence and radicalization that both pose an ongoing risk assessment demand for Homeland Security personnel. The originality of the issues examined in this presentation is underscored by the paucity of theoretical and empirical data on the topic of prison radicalization of inmates. Moreover, examining these issues is expected to assist in crafting an antiterrorism risk assessment framework that can be deployed in uncovering actionable information from within a prison.

47 Can Stress Inoculation Training Be Used As An Evidence-Based Antiterrorism Strategy? RONN JOHNSON*, ANDI FESSLER and ANGELICA GARCIA (Clinical Mental Health Program, University of San Diego, 5998 Alcala Park, San Diego, CA, 92110; ronnjohn@sandiego.edu).

Over the course of recent years, specifically post 9/11, a marked increase in the demand for anti-terrorism strategies and health-safety related training has arisen within the mental health profession in an effort to help individuals cope with trauma experienced as a result of terrorist acts, and consequently the associated mental health concerns, such as PTSD, that occur as a result. As such, this presentation reviews the utility of Stress Inoculation Training (SIT) as an intervention to bolster coping skills of individuals in the aftermath of exposure to significantly distressing events, particularly terrorism. Research has previously demonstrated the treatment efficacy of SIT in relation to chronic intermittent stressors, commonly observed within military combat populations. Given the analogous nature of acts of terror and combat stressors, in conjunction with the current demand for evidence based treatment techniques and practices in mental health services, this presentation will review the current literature that informs the use of Stress Inoculation Training and address the appropriateness of implementing SIT as an evidence based treatment. The paper concludes with a discussion of the implications for the future research regarding mental health practitioner training and practice as an anti-terrorism strategy.

48 Radicalization Resistance Training As An Antiterrorism Strategy: Is This A Pipe Dream? RONN JOHNSON, CHRIS ZURES* and ANGELICA GARCIA (Clinical Mental Health Program, University of San Diego, 5998 Alcala Park, San Diego, CA, 92110; ronnjohn@sandiego.edu).

This paper conceptualizes radicalization as a dimension of the increasing extremes noted in the beliefs, feelings, and behaviors in support of intergroup conflict and violence. Across various individuals, and groups particular forms of radicalization are distinguished and compared. The power and strength of individuals within these groups points to the need to understand radicalization and its connection to terrorism. The challenge posed by authorities in dealing with radicalization is discussed by drawing on previous experiences and
lessons. Behavioral indicators of radicalization are identified and analyzed. We establish potential techniques that would potentially counteract radicalization. Discussions of how to impede radicalization and recruitment as well as present guiding principles for actions are reviewed. Current strategies of the United States are assessed in order to determine how effective and adequately they address this issue. The aim is to provide techniques, understand how to establish ways in which we can minimize radicalization and establish a potential anti-terrorism strategy of resistance.

**Climate Change, Sustainability, and Water Resources in the Arid West**

**Tuesday, 8:30 a.m., SU Room 205**

**49 Analysis of Spatio-Temporal Behavior of Urban Heat Island Intensity in Relation to Urban Sprawl and Urban Forestry Initiative in Las Vegas**, HAROON STEPHEN (Civil and Environmental Engineering, University of Nevada Las Vegas; haroons2@unlv.nevada.edu).

Ground and satellite bases temperature measurements have been used to produce urban heat island intensity (UHII) maps. The ground based measurements of air temperature are available from 29 ground stations in the valley. This dataset has been analysed to study the multiannual trends of temperature. Satellite based temperature data is derived from thermal infrared remote sensing imagery of LandSat 5 mission’s Thematic Mapper (TM) instrument calibrated to ground measurements. This provides land surface temperature maps of the area. The UHII maps have been created for each LandSat imagery available since 1984 (approximately 360 images) and are used to study the temporal behavior of UHII in relation to urban sprawl and tree canopy density.

We analysed the time series of UHII maps in relation to the urban growth of the valley visible in the LandSat optical imagery over the last 30 years. The times when a high UHII location appears in the UHII map time series is identified. The analysis of underlying urban infrastructure is helpful to understand the cause of the these UHIs. We analyzed the UHII maps of last five years in relation to the urban areas where tree plantation efforts have been conducted. Although the tree canopy may not have fully grown in the last five years, we were able to see their signatures in the LandSat TM imagery. We were able to document the changes over time in urban heat island in the older neighborhoods.

In 2008, City of Las Vegas adopted a resolution (R-26-2008) called “City of Las Vegas Urban Forestry Initiative” with goals of doubling Las Vegas tree canopy to 20% by 2035 and preparing an urban forest management plan. The management plan of City of Las Vegas can benefit from knowing the evolution of the urban heat island effect during the three decades and changes during last five years. The results can identify the hotspots needing increased urban forest and thus would help the City of Las Vegas and the Nevada Division of Forestry to focus their tree planting efforts.

**50 Understanding Climate Change and Extremes with Regional Climate Models**, RACHINDRA MAWALAGE-DARA¹, DEBASISH DAS¹, ROBERT J OGLESBY² and AUROOP R GANGULY³ (¹Northeastern University, Boston, MA 02115; ²University of Nebraska, Lincoln, NE 68508; s.mawalagedara@neu.edu).

We examine whether dynamical downscaling of global climate model (GCM) simulations, using Regional Climate Models (RCMs), may help in enhanced understanding of the science of climate change and extremes, in addition to providing credible adaptation relevant insights at scales that matter to decision makers. One possible value addition from RCMs is the generation of local to regional scale projections that may have a better chance to generalize under non-stationary conditions compared to statistical downscaling. The second possible value addition is the use of RCMs for model-driven hypothesis examination and extraction of climate science insights. However, despite a large volume of prior literature based on RCMs, their value has been questioned in the recent literature, and in editorials and news articles. We share our experiences in these areas, through highlights from assorted case studies based on our prior and ongoing work, with the Weather Research and Forecasting (WRF) model. The first case study presents a model-driven hypothesis study over South and Southeast Asia which examines the impact of deforestation on regional climate. The second case shows the results from an emerging dynamical downscaling study over Sri Lanka which attempts to generate credible insights on heat waves. The third case is based on a prior study with collaborators at the Oak Ridge National Laboratory and elsewhere, to understand bias-variance tradeoffs in statistical versus dynamical downscaling, in the context of climate impacts on the water and energy sector in the Southwest United States. Finally, we briefly discuss a proposed line of work over Puerto Rico, which will attempt to understand climate change impacts on surface and ground water resources, with possible consequences for public health. The last study will be in close collaboration with colleagues at Northeastern University and the University of Puerto Rico. Our case studies, while preliminary, appear to argue for hybrid approaches that bring together RCMs and sophisticated data analysis for novel climate science and adaptation insights.

**51 Using Pacific Ocean Sea Surface Temperature for Improving Streamflow Estimates in the Colorado River Basin**, AJAY KALRA¹, SAJJAD AHMAD² and NAVIN K TWARA-KAVI³ (¹Division of Hydrologic Sciences, Desert Research Institute, 755 E. Flamingo Rd., Las Vegas, NV 89119; ²Department of Civil and Environmental Engineering, University of Nevada, Las Vegas, 4505 S. Maryland Parkway, Las Vegas, NV 89054).

Over the years, hydrologist and climatologist have been
engaged in developing relationship between oceanic-atmospheric oscillations and hydroclimatology within a region. Several modes of oceanic-atmospheric climate phenomena are available that have periodicity ranging from annual-to decadal-to multidecadal and can provide predictive information that can be used to improve forecast lead time of hydrologic variables. The most commonly understood and studied oceanic-atmospheric oscillations representing the variability in sea surface temperatures (SSTs) are the Pacific Decadal Oscillation, El Niño-Southern Oscillation, and Atlantic Multidecadal Oscillation. Although, these climate patterns are indicative of SST variability, spatial bias is introduced as these oscillations represent specific predetermined regions. The exploitation of entire Pacific/Atlantic Ocean SST eliminates the ocean or region specific bias impacting the hydroclimatology. With this motivation, we propose a time lagged analyses between the Pacific Ocean SSTs and spring-summer and water year streamflow volume for improving the forecast lead time. Singular Value Decomposition (SVD) statistical technique is used to identify coupled regions of SST and three streamflow naturalized gages in Colorado River Basin, located in the western United States, for a 103-year period (1906-2008). The significant SST regions are used as predictors in a data-driven model, Support Vector Machine (SVM), for providing streamflow volumes with 1-10 months lead time. The Pacific Ocean 1st mode temporal expansion series explained 93% of the variability in streamflow. Additionally, the results indicated improved streamflow forecasts using only Pacific Ocean SST information compared to using predefined indices. The SVD based SVM technique may assist in identifying regions not represented in existing indices and help in improving the streamflow forecast lead time.

52  Regional and Seasonal Intercomparison of CMIP3 and CMIP5 Climate Model Ensembles for Precipitation and Temperature, DEVASHISH KUMAR, EVAN KODRA and AUROOP R GANGULY (Northeastern University, Boston, MA).

We examine the hypothesis that the new generation of climate models, the Coupled Modeled Intercomparison Project version 5 (CMIP5) suites of models, improves over the previous generation, CMIP3 suites. The bases of the hypothesis are that higher grid resolutions, more sophisticated physics, and comprehensive earth system model components, may enhance finer scale projections. The ensemble of models is evaluated in terms of their ability to simulate precipitation and near-surface air temperature at regional scales for two seasons December-January-February (DJF) and June-July-August (JJA). A set of diagnostic and performance metrics has been computed for 11 approximate model pairs from both generations of climate models. The diagnostics considered for the evaluation include past performance skills, quantified here through bias maps, as well as model agreement, assessed through inter-model comparisons. The bias maps use the Global Precipitation Climatology Project (GPCP) for precipitation and NCEP-II for temperature as reference data. Performance metrics considered in the study include computation of skill score based on probability density function, Taylor Diagrams, times series plots, and multi-model bounds. Historical performance and future model agreements are based on multi-model ensemble statistics as well as pairwise comparisons of model versions in CMIP3 and CMIP5. To compare model projections in the future, moderate and comparable greenhouse gas emissions scenarios, SRES B1 for CMIP3 and RCP4.5 for CMIP5, are selected to enable effective comparisons. While the models and scenarios across CMIP3 and CMIP5 may not always be directly comparable, our premise is that projections still need to be evaluated across versions to understand the science, improve predictions, and inform adaptations. For future projections, of particular interest are regions and seasons where the sign of the change differs within or across model generations, as well as any changes in multi-model ensembles. Results suggest that newer generation global circulation models do not appear to improve significantly either in terms of skills (past performance) or consensus (model agreement). However, in certain cases, the possibility of solidifying important insights may be suggested. In addition, regional and seasonal differences appear to persist between model pairs across generations, for example, over regions such as South America and parts of Africa and Asia.

53  A Simultaneous Analysis of Trend and Step Changes in the Streamflow of the Continental United States, SOUMYA SAGARIKA, AJAY KALRA and SAJJAD AHMAD (1Department of Civil and Environmental Engineering, University of Nevada, Las Vegas, 4505 S. Maryland Parkway, Las Vegas, NV 89054; 2Division of Hydrologic Sciences, Desert Research Institute, 755 E. Flamingo Rd., Las Vegas, NV 89119).

With increasing evidence of non-stationarity in climate variables, several studies have recognized the changing character of streamflows. Unimpaired streamflows gauge stations can represent catchment’s response to complex climate variability and this study attempts to analyze the effect of clustering of streamflow variations on long term trends and identifies change points (discontinuities). Water year streamflow volumes for 864 unimpaired stations for a 60 year period i.e. 1951-2010 across the continental United States are analyzed. The non parametric Mann-Kendall (MK) test with variations accounting for long term and short term persistence are used to evaluate the long term trends whereas the abrupt changes (discontinuities) are evaluated using the Pettit test. The MK test indicated increasing streamflow trends in the Eastern U.S. and decreasing streamflow trends in the Pacific Northwest and South Atlantic Gulf regions. Statistically significant shifts in mean streamflow are identified for the Upper Mississippi, Mid Atlantic, and Ohio regions during the 1970-80 decadal periods. The use of different variations of MK tests helped in evaluating the effect of autocorrelation and long term persistence, which if
not accounted can lead to spurious trends whereas the change point analysis highlighted the abrupt shifts in streamflow, which are important for climate change studies. The findings from the current study may assist water managers in understanding the trends and shifts brought by climate change and aid in planning and management of water resources.

54 Water-Energy Nexus in the Arid Southwest: Implications for Sustainable Water Management, Sajjad Ahmad (Department of Civil and Environmental Engineering, University of Nevada Las Vegas, Las Vegas, NV 89119; Sajjad. Ahmad@unlv.edu).

With a resident population of two million as well as 40 million tourists visiting annually, the Las Vegas Valley (LVV), located in a semi-arid area, faces major water management challenges. These challenges are further compounded due to the low local rainfall, the deteriorating quality of the water supply, and an expected decline in flows in the Colorado River, a major source of water supply to the Valley. Water extraction from Lake Mead and distribution in the Valley is energy intensive.

This talk will present findings from an ongoing study in the LVV. An integrated decision support system (DSS) has been developed, using system dynamics approach to evaluate different water management policies in response to increasing population and changing climatic conditions. To assist in policy relevant informed decision making, DSS uses data and results from Global Climate Models, hydrologic models, reservoir operations models, water quality models, and energy use and carbon emission models. Implications of the various management policies regarding water demand and supply – in terms of the ability to meet future demands as well as the impact on water quality, energy use, and carbon footprint – will be discussed.

Ion Channels: Integration of Computer Simulations with Experiments
Tuesday, 8:40 a.m., SU Room 209

55 Small Peptides Equate to Big Computational Challenges, Owen M McDOUGAL (Boise State University, Department of Chemistry and Biochemistry, 1910 University Drive, Boise, ID 83725-1520; owenmcdougal@boisestate.edu).

Conotoxins are small, cysteine rich peptides that demonstrate an uncanny ability to differentiate between biomacromolecular receptors in mammals. Understanding how these peptides act is an amazingly complex problem from a molecular biology, chemistry, and computational chemistry perspective. Here we discuss the challenges to understanding the role played by the binding of alpha-conotoxin MII on neuronal acetylcholine receptors, and provide insights into how this information may lead to the development of therapeutic drugs for Parkinson’s disease.

56 Introducing DockoMatic: A Computational Tool for Scientists, Nic Cornia*, Owen M McDOUGAL and Tim Anderson (1 Department of Computer Science, Boise State University, 1910 University Drive, Boise, ID 83725; 2 Department of Chemistry and Biochemistry, Boise State University, 1910 University Drive, Science Bldg Room 153/154, Boise, ID 83725; nscornia@gmail.com, owenmcdougal@boisestate.edu).

DockoMatic is a free and open source application that unifies a suite of software programs within a user-friendly Graphical User Interface (GUI) to facilitate molecular docking experiments. Here we describe the release of DockoMatic 2.0; significant software advances include the ability to: (1) conduct high throughput Inverse Virtual Screening (IVS); (2) construct 3D homology models; and (3) customize the user interface. Users can now efficiently setup, start, and manage IVS experiments through the DockoMatic GUI by specifying a receptor(s), ligand(s), grid parameter file(s), and docking engine (either AutoDock or AutoDock Vina). DockoMatic automatically generates the needed experiment input files and output directories, and allows the user to manage and monitor job progress. Upon job completion, DockoMatic simplifies result analysis by automatically summarizing the results. DockoMatic functionality was also expanded to facilitate the construction of 3D protein homology models using the Timely Integrated Modeler (TIM) wizard. The wizard TIM provides an interface that accesses the basic local alignment search tool (BLAST) and MODELLER programs, and guides the user through the necessary steps to easily and efficiently create 3D homology models for biomacromolecular structures. The DockoMatic GUI can be customized by the user, and the software design makes it relatively easy to integrate additional docking engines, scoring functions, or third party programs. DockoMatic is a free comprehensive molecular docking software program for all levels of scientists in either research or education.

57 Insights into Acetylcholine and α-Conotoxin MII Binding to αβ2 Nicotinic Acetylcholine Receptors from Homology Modeling and MM/PBSA Studies, Conrad Rohleder1, Vivek S Bharadwaj1, Somisetty V Sambasivaram1, Jason G Slingsby1, Chris Mallory2, James Groome3, Owen M McDOUGAL2 and C Mark Maupin* (1 Chemical and Biological Engineering Department, Colorado School of Mines, 1500 Illinois Street, Golden, CO 80401; 2 Department of Chemistry and Biochemistry, Boise State University, 1910 University Drive, Boise, ID 83725-1520; 3 Department of Biological Sciences, Idaho State University, 650 Memorial Drive, Pocatello, ID 83209-8007; cmmaupin@mines.edu).

α-Conotoxin MII (α-CTxMII) is a 16 amino acid peptide
with the sequence GCCSNPVCHLEHSNLC containing disulfide bonds between Cys2-Cys8 and Cys3-Cys16. This peptide, isolated from the venom of the marine cone snail Conus magus, is a potent and selective antagonist of neuronal nicotinic acetylcholine receptors (nAChRs). To evaluate the impact of channel-ligand interactions on ligand binding affinity, homology models of the heteropentameric α3β2-αAChR were constructed. The models were created in MODELLER using both the Torpedo marmorata-αAChR (Tm-αAChR, PDB ID: 2BG9) and the Aplysia californica-acetylcholine binding protein (AChBP, PDB ID: 2BR8) crystal structures as templates for the α3 and β2 subunit isoforms derived from rat neuronal nAChR primary amino acid sequences. Molecular docking calculations were then performed with AutoDock to evaluate interactions of the heteropentameric nAChR homology models with the ligands acetylcholine (ACh) and α-CTxMII. nAChR structures with the ligands present in the binding pocket were subjected to 10ns of NPT molecular dynamics and the last 5ns of the resulting trajectories were analyzed using MM/PBSA. The nAChR homology models described here bind ACh with commensurate binding energies to previously reported systems, and identify critical interactions that facilitate both ACh and α-CTxMII ligand binding. The MM/PBSA calculations revealed an increased binding affinity of the α3β2-αAChR for α-CTxMII with ACh bound to the receptor. These findings provide insights into the inhibition and mechanism of electrostatically driven low-nanomolar antagonist properties of the α-CTxMIIIs on nAChRs.

58 Computational Evaluation of the Gating Mechanism for a Heteropentameric Nicotinic Acetylcholine Receptor, JASON G SLINGSBY* and C MARK MAUPIN (Chemical and Biological Engineering Department, Colorado School of Mines, 1500 Illinois Street, Golden, CO 80401; Jason.slingsby@gmail.com).

Nicotinic acetylcholine receptors (nAChRs) are ligand-gated ion channels belonging to the Cys-loop family of receptors which play an important role in ion regulation, cellular function, and neurotransmitter release. Although nAChRs are one of the most studied neuronal ion channels, a molecular level knowledge of the complete gating mechanism (i.e. ligand binding, C-loop closure, channel opening, and desensitization) is still poorly understood. Long term MD simulations of 100ns were performed to study the unbiased behavior of the ion channel in a 3:1:1 POPC:POPA:CHOLESTEROL lipid bilayer. C-loop flexibility over the course of the trajectory was analyzed for each subunit and found to alternate between open and closed conformations with no apparent preference. Through the use of AutoDock and steered MD, acetylcholine (ACh) molecules were then placed in the binding pocket of each subunit binding site to study the effects of a bound ligand on C-loop dynamics. The ligand bound experiments revealed a significant and abrupt closing of the C-loop around the binding pocket. The difference in the PMF of the ligand bound and unbound systems are calculated through the use of metadynamics. The reaction coordinate for these simulations is given by a collective variable describing the overall C-loop state which was developed from the observed motions of the previous experiments. These findings demonstrate the strong binding of ACh and its effect on stabilizing the C-loop in a closed conformation.

59 pKₐ Determination of Histidine Residues in α-Conotoxin MII Peptides by ¹H NMR and Constant pH Molecular Dynamics Simulation, OWEN M McDOUGAL†, DAVID M GRANUM‡*, MARK SWARTZ‡, CONRAD ROHLEDER and C MARK MAUPIN‡ (†Department of Chemistry and Biochemistry, Boise State University, 1910 University Drive, Boise, ID 83725-1520, ‡Chemical and Biological Engineering Department, Colorado School of Mines, 1500 Illinois Street, Golden, CO 80401, †authors contributed equally; dgranum@mines.edu).

α-Conotoxin MII (α-CTxMII) is a potent and selective peptide antagonist of neuronal nicotinic acetylcholine receptors (nAChRs). Studies have shown that His9 and His12 are significant determinants of toxin binding affinity for nAChR, while Glu11 may dictate differential toxin affinity between nAChR isoforms. The protonation state of these histidine residues and therefore the charge on the α-conotoxin may contribute to the observed differences in binding affinity and selectivity. In this study, we assess the pH dependence of the protonation state of His9 and His12 by ¹H NMR spectroscopy and constant pH molecular dynamics (CpHMD) in α-CTxMII, α-CTxMII[E11A], and the triple mutant, α-CTxMII[N5R:E11A:H12K]. The E11A mutation does not significantly perturb the pKₐ of His9 or His12, while N5R:E11A:H12K results in a significant decrease in the pKₐ value of His9. The pKₐ values predicted by CpHMD simulations are in good agreement with ¹H NMR spectroscopy, with a mean absolute deviation from experiment of 0.4 pKₐ units. These results support the use of CpHMD as an efficient and inexpensive predictive tool to determine pKₐ values and structural features of small peptides critical to their function.

60 Discovery of Potent, Selective Multidrug and Toxin Extrusion Transporter 1 (MATE1, SLC47A1) Inhibitors through Prescription Drug Profiling and Computational Modeling, MATTHIAS B WITTWER*, ARIK A ZUR*, NATALIA KHURI†‡, YASUTO KIDO*, C ALAN KOSAKA, XUEXIANG ZHANG#, KARI M MORRISSEY, ANDREJ SALIF, YONG HUANG# and KATHLEEN M GIACOMINI† (these authors contributed equally to this study, †University of California San Francisco, San Francisco, CA; ‡Department of Bioengineering and Therapeutic Sciences, RH 581, 1550 4th Street, San Francisco, CA 94158, University of California, San Francisco, Department of Bioengineering and Therapeutic Sciences, Department of Pharmaceutical Chemistry, and California Institute for Quantitative Biosciences)
Domain-Specific Functions of the S4 Segment in Voltage-Gated Sodium Channels, JAMES R GROOME, VERN WINSTON and NISHANT MOHAN (Department of Biological Sciences, Idaho State University, 650 Memorial Drive, Pocatello, ID 83209; groojame@isu.edu).

Voltage gated sodium channels provide excitatory drive for action potentials in nerve and muscle fibers. A variety of experimental approaches have shown that positively charged amino acids in the S4 transmembrane segments respond to changes in membrane potential with a limited movement, coupled to activation and inactivation state transitions in the sodium channel. Here, we present findings using mutagenesis to define the roles of individual voltage sensor residues in S4 segments for each of the four domains of the skeletal muscle sodium channel. A homology model of the skeletal muscle sodium channel hNaV1.4 was created and molecular dynamics simulations of Domain IV were completed in the NPT ensemble to evaluate the dynamic and energetic properties of the voltage-sensing domains. The system was created with an explicit membrane potential in order to study the activation response of the channel, specifically the response of the residues on the S4 helix. Three systems were created with membrane potentials of 0mV, 120mV and 500mV to examine the effects of both a physiological potential and a significant over-potential to an unbiased basis system.

Boise Extravaganza in Set Theory (BEST)
Tuesday, 9:00 a.m. in SU Room 207
NOTE: This is a continuation of the symposium begun Monday at 8:50 a.m. in the same room.

How Many Miles to BW, After All? MASARU KADA (Department of Mathematics and Information Sciences, Osaka Prefecture University, 1-1 Gakuen-cho, Nakaku, Sakai, Osaka 599-8531, Japan; kada@mi.s.osakafu-u.ac.jp).

Woods proved that the Stone-Cech compactification bX can be approximated by the collection of Smirnov compactifications of X with respect to all possible compatible metrics on X. We may ask the following general question: How many metrics do we actually need for such approximation? In particular, how many metrics on w do we need to approximate bw in a nontrivial way? These questions suggest various cardinal characteristics. We examine the relationship among those cardinals and other well-known cardinal characteristics of the continuum.

Molecular Dynamics Simulations of the Domain IV Skeletal Muscle Sodium Channel with an Explicit Membrane Potential, JASON G SLINGSBY*, JAMES GROOME* and C MARK MAUPIN* (*Chemical and Biological Engineering Department, Colorado School of Mines, 1500 Illinois Street, Golden, CO 80401; *Department of Biological Sciences, Idaho State University, 650 Memorial Drive, Pocatello, ID 83209-8007; jason.slingsby@gmail.com).

Voltage gated sodium channels are a complex transmembrane structure that plays an essential role in the cell’s electrical stability. The channel is composed of four domains which are each composed of a voltage sensing region (segments S1-S4) and a pore region (S5 and S6). Voltage sensitivity is caused by a string of charged residues on the S4 segments of the channel. A homology model of the skeletal muscle sodium channel hNaV1.4 was created and molecular dynamics simulations of Domain IV were completed in the NPT ensemble to evaluate the dynamic and energetic properties of the voltage-sensing domains. The system was created with an explicit membrane potential in order to study the activation response of the channel, specifically the response of the residues on the S4 helix. Three systems were created with membrane potentials of 0mV, 120mV and 500mV to examine the effects of both a physiological potential and a significant over-potential to an unbiased basis system.
65 A Ramsey Classification Theorem with an Application to the Tukey Theory of Ultrafilters, TIMOTHY O TRUJILLO (Department of Mathematics, University of Denver, Denver, CO 80208; timothy.trujillo@du.edu).

The Pudlak-Rodl Theorem is a generalization of the Erdos-Rado Theorem which in turn is a generalization of the well-known Ramsey Theory. The generalizations are from finitely many colors to infinitely many colors (Erdos-Rado), and furthermore to barriers on the natural numbers in place of the n-elements subsets of the natural numbers (Pudlak-Rodl). These theorems are canonization theorems on the Ellentuck space.

In this talk, we present some joint work with Natasha Dobrinen. We construct a new topological Ramsey space H^2 and prove the analogues of the Erdos-Rado and Pudlak-Rodl Theorems for H^2. These are then used to completely classify all the Rudin-Keisler (isomorphism) classes of ultrafilters which are Tukey reducible to an associated “Ramsey for H^2” ultrafilter. These are exactly the countable iterations of Fubini products of ultrafilters from among an easily definable countable collection of ultrafilters. The structure of the Tukey types below the “Ramsey for H^2” ultrafilter is isomorphic to the four element Boolean algebra. More generally, we construct topological Ramsey spaces with associated ultrafilters such that the structure of the Tukey types below the ultrafilter is isomorphic to the Boolean algebra of size 2^n.

66 Locally Nilpotent Group Actions and Hyperfinite Equivalence Relations, SCOTT SCHNEIDER* and BRANDON SEWARD (Department of Mathematics, University of Michigan, Ann Arbor, MI 48109; sschnei@umich.edu).

An equivalence relation E is hyperfinite if E is the increasing union of a sequence of Borel equivalence relations with finite classes. Recently Gao and Jackson used Borel marker sets with orthogonal marker regions to prove that the orbit equivalence relation arising from a Borel action of a countable group is hyperfinite. We extend their methods to prove the analogous result for Borel actions of countable locally nilpotent groups.

67 Abstract submitted after publication deadline. Please refer to Program Changes sheet.

68 Abstract submitted after publication deadline. Please refer to Program Changes sheet.

69 A Playful Variation of the Countable Chain Condition, ANGELO BELLA1 and SANTINO SPADARO2* (1 Dipartimento di Matematica, Viale A. Doria 6, 95125 Catania, Italy; 2 Department of Mathematics, Silesian University in Opava, Czech Republic; kada@mi.s.osakafu-u.ac.jp).

We discuss a game-theoretic strengthening of the countable chain condition studied by Aurichi (2013) Daniels, Kunen and Zhou (1994) and Scheepers (2000). Two players play an inning per positive integer: at the n-th inning, player I picks a maximal family of pairwise disjoint open set and player II picks an open set from that family. Player II wins if he’s able to select a family with a dense union. If player II has a winning strategy in this game on the space X then X has the ccc. Moreover, player II has an easy winning strategy when playing this game on spaces of countable pi-weight.

We characterize the cellularity of a topological space in terms of transfinite generalizations of this game and use this framework to give a game-theoretic proof of Shapirovskii’s classical bound for the number of regular open sets of a regular space. As a byproduct we obtain that the playable ccc and countable pi-weight are equivalent for spaces of countable pi-character.

69a Some New Applications of Core Model Induction, GRIGOR SARGSYAN (Department of Mathematics, Rutgers University, Piscataway, NJ 08854-8019; grigor@math.rutgers.edu).

Core model induction is a technique due to Woodin which has been used to calibrate lower bounds of combinatorial statements. We will present some current applications of it at the level of AD_R+Theta is regular.

International Protected Area Exchange (IPAX)
Tuesday, 1:00 p.m., SU Room 205

70 International Protected Area Exchange, GARRY OYE (Wilderness Stewardship Division, National Park Service, 4505 S. Maryland Parkway, Box 452040, Las Vegas, NV, 89154-2040; gary_oye@nps.gov).

For more than 50 years, the National Park Service (NPS) has provided leadership in global conservation efforts. The U.S. National Park model has been studied and replicated in many countries. Emphasis has been placed on site visits to U.S. Parks, manager training, internships, and international technical assistance trips. One key challenge faced—after the initial introductions and sharing—is the need for lifelong support and maintenance of these professional relationships. Too often protected area managers fall back to the occasional site visit, dialogue at a conference, or an email. Yet, a long-term, interdisciplinary approach that includes in-depth consideration of socio-political factors, science and research, and community engagement is critical. The NPS and University of Nevada, Las Vegas (UNLV) are exploring ways to develop opportunities to build long-term relationships, generate structured learning, and create an International Protected Areas Exchange. The initial concept is to bring protected area managers to the greater Las Vegas area, and provide access to our many conservation challenges and success stories. The landscapes of Zion, Death Valley, and Lake Mead, and other Mojave Desert sites provide inspiring locations for study. UNLV resources provide the structured learning environment, information technology,
Harmony and Dissonance: Protecting Lake Tahoe from Aquatic Invasive Species Versus Development, MELISSA THAW (Water Resources Management Program, Department of Geoscience, University of Nevada, Las Vegas, 4505 S. Maryland Parkway, Box 454010, Las Vegas, NV 89154-4010; thawm@unlv.nevada.edu).

Lake Tahoe, situated on the California-Nevada border in the Sierra Nevada Mountains, is one of the most highly regulated areas in the world. The watershed is protected through a unique compact with regulations administered through the bi-state Tahoe Regional Planning Agency. The Lake Tahoe basin contains both public and private land and it is not a park. It is regulated for the purpose of upholding environmental thresholds. One of the most significant threats to the lake are aquatic invasive species, in particular, the quagga mussel, which was discovered in Lake Mead in 2007. Agencies, NGOs, and business interests have coordinated to protect Lake Tahoe from the continued spread of aquatic invasive species. Policy toward development has been highly contentious. In 2011, Nevada Senate Bill 271 was introduced, which threatened to pull Nevada out of the bi-state compact. This presentation will discuss the contrast in the implementation of environmental protection in the context of aquatic invasive species and development, within the Lake Tahoe Basin.

Creating Community Support for Tule Springs Fossil Beds National Monument: Looking Ahead to Building a Model Urban National Park Unit, LYNN DAVIS (Nevada Field Office, National Parks Conservation Association, 10161 Park Run Drive, Suite 150-227, Las Vegas, NV 89145; ldavis@npca.org).

In an arid desert wash dotted with scrappy salt brush remain thousands of fossils of Ice Age mammoths, massive bison, American lions, saber tooth cats, dire wolves, camelops (a larger version of today’s Bactrian camels), and sloths the size of small sports cars. The Tule Springs area, on the northern outskirts of Las Vegas, is significant for the vast span of time the fossils represent. Fossils and fossilized pollen in the area span over 200,000 years, offering important insight into at least two Ice Ages and multiple warming and cooling periods.

Community support for protecting this area has been unprecedented with bi-partisan support from Nevada’s congressional delegation and local elected officials, business and tourism leaders, educators and conservationists. This notable support, resulting in federal legislation that sets up the creation of Tule Springs Fossil Beds National Monument, provides great opportunity to create a model urban national park unit that enhances Southern Nevada’s overall quality of life. As legislation moves through Congress, discussion and an “envisioning process” are developing with goals to research, prioritize and report recommendations on urban design standards, innovative funding mechanisms, and public-private partnerships. This presentation will examine an over-arching question: How do we use the urban interface of Tule Springs National Monument for the optimal advantage of Southern Nevada and the nation?

Recent Research at House 47: Evaluating the Impacts of Fluctuating Lake Levels on Southern Nevada’s Archaeological Sites, KAREN G HARRY (Department of Anthropology, University of Nevada, Las Vegas, 4505 S. Maryland Parkway, Box 455003, Las Vegas, NV 89154-5003; karen.harry@unlv.edu).

House 47 is a large prehistoric settlement associated with the Virgin River Puebloan culture. First excavated in the 1920s and 1930s, it was inundated by Lake Mead following the completion of Hoover Dam in the early 1940s. With the onset of drought conditions nearly a decade ago, the lake waters have receded and the site is once again exposed. To evaluate the effect that inundation has had on these deposits, archaeologists from the University of Nevada, Las Vegas conducted excavations at the site. Data from this project indicate that, despite substantial impacts to the site’s archaeological record from the rising and falling of the lake waters, important information can still be retrieved. The implications of these findings for agency land managers and policy-makers are discussed.

Integrating Science and Research Activities for Southern Nevada Public Lands: Development and Status, KENT TURNER* and JENNELL M MILLER* (Lake Mead National Recreation Area, National Park Service, 601 Nevada Way, Boulder City, NV 89005; Public Lands Institute, University of Nevada, Las Vegas, 4505 S. Maryland Parkway, Box 452040, Las Vegas NV, 89154-2040; jennell.miller@unlv.edu).

Within Clark County in Southern Nevada are vast public land resources managed by four federal land management agencies and contained within a geographic area of seven million acres. Included among these resources is Lake Mead: the largest reservoir by volume in the U.S., supplier of water for 25 million people in three western states, and provider of other significant ecosystem services. This presentation reports on two different large-scale science and research efforts that were initiated in 2005 and are ongoing. The first is an interagency science and research strategy that was developed for Southern Nevada public lands managed by the Bureau of Land Management, National Park Service, U.S. Fish and Wildlife Service, and U.S. Forest Service. The goal of the strategy was to create a holistic and ecosystem-based framework for science and research activities on public lands to effectively inform land management. The second is a multi-agency effort led by the
Participants and facilitators at these events reported that facilitated dialogue advanced learning and learning retention; broadened perspectives; deepened respect for other people and their views; developed civic skills; and built community, among other outcomes. Repeatedly engaging in dialogue programs appeared to enhance their benefits. Participants in these programs were relatively homogeneous in ethnicity, education level, and age. Future research should examine how to extend the experience of dialogue to other groups and determine whether these outcomes hold true in more diverse populations.

Protected areas could benefit from using dialogue to engage their visitors. Such engagement could help create a more informed public, build communities linked to protected areas, and increase civic engagement and stewardship.

77 Community Led Resource Conservation, DEBORAH REARDON (Rivers, Trails, and Conservation Assistance Program, National Park Service, 4505 S. Maryland Parkway, Box 452040, Las Vegas, NV 89154-2040; deborah_reardon@nps.gov).

Even if a strong desire to be part of protected area management exists, there are often substantial barriers to communities and community members becoming effectively involved. Elements of success in addressing important protected area issues include the ability to strategically plan, organize, coordinate, gather knowledge, and facilitate large groups. To be able to effectively integrate into larger planning processes, communities can benefit from the assistance of an impartial liaison with the expertise to overcome these barriers. The Rivers, Trails, and Conservation Assistance (RTCA) program facilitates U.S. communities in being able to engage in strategic action by implementing the natural resource conservation and outdoor recreation mission of the National Park Service. Through an annual application process, RTCA works with nonprofit organizations, community groups, tribes or tribal governments, and public agencies to plan and implement conservation and recreation projects. Learn more about RTCA and how this program could support climate change and large landscape conservation efforts. Additionally, learn tips for effective community engagement through the Red Hill case study, where researchers, public agencies, educators, youth, community groups and local residents came together to protect a 438-acre site in Sun Valley, NV. Home to desert wildlife and a rare plant species, Red Hill was beginning to show signs of misuse that threaten its unique cultural and natural resources. Through the use of on-line surveys, youth workshops, and a design charrette, the community developed a conceptual plan that included recreation, restoration and conservation areas, and learning opportunities.
This presentation will look at the development of a regional trail system in Southern Nevada and the role that these trails play in growing community stewardship of our environment. The regional trail system is known as the Neon to Nature system. It is the result of collaborative efforts of a large number of agencies and jurisdiction. Over the past 10 years, the system has grown to over 900 miles of trails. These trails and the open spaces link residents and visitors to the Mojave Desert and an experience of our natural environment. They also literally and figuratively link our communities to each other. The system includes urban and rural trails, and urban and rural recreation areas. Inviting both residents and visitors to enjoy and experience these trails and these spaces is the first step towards creating a community that enjoys, values, and protects the special outdoor places that are found throughout southern Nevada. The community has made tremendous strides in the past decade, and faces many challenges and opportunities as we move into the future. The next steps in the evolution of our Valley system include ensuring access to information about the trails and open space, creating opportunities for use of these spaces as outdoor classrooms, encouraging volunteer engagement in these spaces, and emphasizing the role of these spaces as community assets.

Patient-Centered Outcomes Research and Patient Targeted Therapies
Tuesday, 1:30 p.m., SU Room 219

79 Search for Patient Targeted Therapies: The Crux of Patient-Centered Research Outcomes Research, FRANCESCO CHIAPPELLI (UCLA School of Dentistry, Division of Oral Biology and Medicine, University of California at Los Angeles, 10833 Le Conte Avenue, Los Angeles, CA 90095; fchiappelli@dentistry.ucla.edu).

Translational science consists of two similar, distinct, independent and intertwined facets. The first is the transaction between the patient at the bedside/chairside and the fundamental patho-biology emerging from testing the patient’s biopsies at the bench (i.e., translational research); the second reflects the utilization, application and implications of the best available evidence in specific clinical settings (i.e., translational effectiveness). Translational science results from a transaction between translational research and translational effectiveness, and applies to all fields and specializations of healthcare. The *sine qua non* for effective translational science is the evidence-based process of research synthesis because of its very focus on patient-centered outcomes research (PCOR). In the practical everyday clinical realm, translational science and PCOR are integrated and synchronized to function in unison and are harmonized into models of care such as the patient-centered medical/dental/health care home/neighborhood, and the practice-based research networks. We discuss these models, which today stand at the forefront model of healthcare, particularly in the context of the importance of the search of patient-targeted therapies for PCOR. We emphasize comparative effectiveness research that aims at the generation and synthesis of evidence to compare benefits and harms of alternative methods to prevent, diagnose, treat, and monitor the or improve the delivery of care, and to assist consumers, clinicians, purchasers, and policy makers, and all stakeholders to make informed decisions that will improve health care at both the individual and population levels.

80 Patient Targeted Biomarkers of Osteo-immune Pathologies: Microenvironment Epigenetics, ANDRÉ BARKHORDARIAN (UCLA School of Dentistry, Division of Oral Biology and Medicine, University of California at Los Angeles, 10833 Le Conte Avenue, Los Angeles, CA 90095; andreucsb@hotmail.com).

Bone metabolism consists of a complex series of finely regulated steps and events, which involve primarily the activity of bone forming osteoblasts and of bone destroying osteoclasts. The process of bone resorption is mediated through the Receptor Activator for Nuclear Factor-κ-B (RANK), its Ligand (RANKL), and Osteoprotegerin (OPG) pathway. The bone resorbing cells, osteoclasts, are large multinucleated cells that arise and derive from the myeloid common progenitors, and are essentially of a parallel lineage to that of immune monocytes/macrophages. They express sialoprotein, osteocalcin, and osteopontin (OPN), which are also produced by a variety of immune cells, including macrophages, neutrophils, dendritic cells, as well as T cells and B cells. In immune metabolism, OPN is endowed with chemotactic properties that promote cell recruitment to inflammatory sites, adhesion properties to several integrin receptors, which promote T cell activation, cytokine production, and regulation of apoptosis. OPN regulates the development of distinct subpopulations of effector T cells. Load stress upon the alveolar bone results in extensive bone remodeling. Teeth move in both vertical ("supereruption") and horizontal directions ("drift"), thus altering occlusion. The biological mechanism involves increased RANKL expression in the distal periodontal ligament, followed by OPN-induced involvement of the PI3K and MEK/ERK pathway. Our studies are designed to follow biomarkers of osteo-immune pathology of the oral cavity to better understand the microenvironmental epigenetics of temporomandibular joint disorder in order to design new and improved patient-centered interventions.

81 Individual Patient Data Analysis and Meta-Analysis, RASHI ARORA (UCLA School of Dentistry, Division of Oral Biology and Medicine, University of California at Los Angeles, 10833 Le Conte Avenue, Los Angeles, CA 90095; dr rashiarora@gmail.com).

Evidence based decisions directed at Patient Centered Care influence the process of clinical decision-making in contemporary healthcare. Meta-analyses are a hallmark of evidence-based healthcare as they succeed in showing statistically
significant results by combining the results from individual studies. However, they are limited when the individual studies are heterogeneous. Meta-regression may help investigate this heterogeneity, but its limited ability to identify which patient features are related to the size of treatment effect is answered by using an individual patient data approach. Poor reporting of individual patient data meta-analysis diminishes its value to clinicians, policy makers, and other users. We developed a 9-item tool based on the literature available in the field of individual patient data meta-analysis, and obtained its psychometric validation. We used our modification of the PRISMA for criterion validity \((r=0.957)\), and utilized three standardized readers for inter-rater reliability \((r=0.972)\). We also obtained measures of intra-rater reliability \((r=0.904)\). We discuss the implications of this N.O.V. (New, Original and Valid) tool for assessing the quality of individual patient data meta-analysis in the context of patient-centered evidence-based interventions.

82 Patient-Centered Outcomes Research in HIV and NeuroAIDS: The Role of HIV Infection in Executive Dysfunction, Depression, and Poor Decision-Making, APRIL THAMES (UCLA Department of Psychiatry and Biobehavioral Sciences, University of California, Los Angeles, 740 Westwood Plaza C8-746, Los Angeles, CA 90095; athames@mednet.ucla.edu).

Approximately 50% of individuals with HIV report cognitive impairments and psychiatric problems that can interfere with instrumental activities of daily living (IADLs) such as medication management/adherence, occupational functioning, and driving. Neuropsychiatric features associated with HIV include depression and apathy, which have been linked to cognitive impairments in attention, memory, processing speed, executive functioning, and decision-making. Given that psychiatric, substance abuse, and medical comorbidities are quite common in HIV, and have been demonstrated to contribute to cognitive impairments, teasing apart HIV disease-related effects from these other confounding factors can be challenging. This symposium will highlight the primary challenges to the study of NeuroAIDS as it relates to patient-centered outcomes. We will present tools for isolating the effects of HIV in the context of confounding factors and the use of functional neuroimaging techniques in complex cohorts. Characterizing the nature and degree of HIV-associated neurocognitive disorders (HAND) is essential to detecting outcomes and may help inform patients and healthcare providers of the specific types of psychiatric, cognitive and functional impairments that are likely to occur among HIV+ individuals.

83 Patient-Centered Diagnosis and Therapies of Systemic Sequelae of Temporomandibular Joint Disorders, GARY DEMERJIAN (Center for TMJ and Sleep Therapy, 175 N Pennsylvania Ave # 4, Glendora, CA 91740; drdemerjian@tmjsleeptherapy.com).

We present clinical observations that link a variety of neurological disorders to temporomandibular joint disorders. The mechanical realignment between the maxilla and the mandible with oral orthotics can be successful in rapidly suppressing certain debilitating neurological and neuropsychiatric symptoms characteristic of Complex Regional Pain Syndrome/ Reflex Sympathetic Dystrophy (CRPS/RSD), Tourette’s Syndrome, cervical dystonia, Blepharospasm, and Parkinson’s Disease We examined patients with TMJD, as well as patients with a variety of neurologic conditions for possible TMJD. Diagnostic criteria included jaw joint clicking or popping, jaw pain, headaches, migraines, neck and shoulder pain or tightness, limited jaw opening, and accidents or trauma to the head and neck. We confirmed the clinical diagnosis by means of MRI’s, CT scans, Tomography. If there is a pathologic mis-alignment of the temporomandibular joint where by causing neuro-inflammation of the auriculo-temporal nerve, this causes the neuro-inflammation to travel through the trigeminal system via the mandibular nerve (V-3) to the semi-lunar ganglion and onto the spinal trigeminal nucleus within the brainstem. With fabrication and delivery of an oral orthotic adjusted and titrated to the specific needs of the patient’s joint, we see a reduction of symptoms in some patients immediately and a reduction of symptoms over time as the inflammation is reduced.

84 Prognostic and Predictive Importance of MicroRNAs in Vulvar Cancer, RAFAEL MALAGOLI ROCHA (International Center of Cancer Research, A C Camargo Cancer Center, 109 Antônio Prudente St, Liberdade, São Paulo, SP, Brazil, CEP: 01509; raefal.rocha@cipe.accamargo.org.br).

Unregulated expression of microRNAs is well known and has already been demonstrated with relevance in many tumor types. However, in vulvar carcinoma this field was, until now, an uncharted territory. Since a novel microRNA characterization in vulvar tumors is needed, this talk will contain an expression profile of 754 miRNAs and its relation with clinical and anatomopathologic data, and HPV infection. 20 HPV negative and 20 HPV positive samples, genotyped for high-risk HPV's (HPV16,18,31,33) and a pool of seven normal vulvar skin were used for the identification of differentially expressed miRNAs by TLDA qRT-PCR. As main results, 25 differentially expressed microRNAs between HPV positive and HPV negative groups were obtained. A network between microRNA expression profiles and their main targets was constructed, demonstrating interactions with genes previously shown with relevance in vulvar carcinomas, such as TP53, RB, PTEN, and EGFR. Besides, downregulation of miR-223-5p and miR-19-1b-1-5p were correlated with the presence of lymph node metastasis; downregulation of miR-100-3p and, again, miR-19-1b-1-5p were correlated with presence of vascular invasion; overexpression of miR-519b and miR-133a were associated with advanced FIGO staging. In conclusion, microRNAs are clinically important in vulvar carcinomas, what makes of paramount relevance the elucidation of their roles in this tumor type. In this sense, our study may assist future analysis
Mechanisms of Tumor Progression and Cancer Therapeutics
Tuesday, 1:30 p.m., SU Room 211

85 A Function for the Inflammatory Cytokine Oncostatin M during Different Stages of Breast Cancer Metastasis, CHERYL JORCYK (Department of Biological Sciences, Boise State University, 1910 University Drive, Boise, ID 83725-1515; cjorcyk@boisestate.edu).

Oncostatin M (OSM) is an interleukin-6 (IL-6)-family cytokine that has been implicated in a number of biological processes including inflammation, hematopoiesis, immune responses, and development. It is produced by multiple cell types, including activated T cells, macrophages, neutrophils, and tumor cells such as breast. OSM was initially shown to inhibit the proliferation of breast cancer cells in vitro, and was therefore evaluated as a potential cancer therapy. Evidence in the literature and data from our laboratory, however, suggests that OSM promotes tumor invasion and metastasis. In breast cancer cells, OSM induces secretion of proteases important for breakdown of the extracellular matrix during invasion and metastasis, promotes expression of angiogenic factors such as vascular endothelial growth factor (VEGF) and hypoxia-inducible factor 1alpha (HIF1alpha), and induces expression of pro-metastatic inflammatory factors such as cyclooxygenase-2 (COX2). The results from our novel in vitro and in vivo studies will be presented and may provide evidence that OSM is an important therapeutic target for the prevention of breast cancer metastasis. ACS RSG-09-276-01-CSM, Susan G Komen KG100513, NIH/NCRR P20RR016454 and P20GM103408, NIH/NCI R15CA137510, and NASA NNX10AN29A.

86 Synthetic Aziridinomitosenes: Probing the Role of the C6/C7 Electrophilic Sites in Human Carcinoma Cytotoxicity, DON L WARNER (Department of Chemistry and Biochemistry, Boise State University, 1910 University Drive, Boise, ID 83725-1520; dwarner@boisestate.edu).

Many significant anticancer agents exhibit their biological properties through the covalent modification of DNA, and the interstrand cross-link is often the most relevant adduct. We have shown that several synthetic aziridinomitosenes (AZMs), derivatives of the antitumor antibiotic mitomycin C (MC), covalently modify DNA to form interstrand cross-links (ICLs) and DNA/protein cross-links (DPCLs). Unlike MC and related analogs, the new AZMs do not require reductive activation prior to DNA binding, suggesting that adduct formation must be occurring via a novel mechanism. Synthetic AZM analogs with alkyl substitutions at C6 and C7 have led to increased potency. The C6-methyl analog currently exhibits the lowest IC50 values of 3 nM and 12 nM in HeLa and HL-60 cell lines, respectively, which is a 300-fold enhancement over MC. Caspase-3 studies indicate AZMs induce protease activity greater than MC and HeLa nuclear morphology experiments indicate that MC produces nuclear swelling, while AZMs cause nuclear condensation. Together, these experiments suggest a different cytotoxic mechanism for the AZMs. Additional studies aim to isolate nuclear and mitochondrial DNA for detection of interstrand cross-links, and investigating reactive oxygen species levels post AZM treatment. This talk will present these and related studies that aim to ascertain cytotoxic mechanistic details.

87 Epithelial to Mesenchymal Transition in Gynecological Carcinomas, RAFAEL MALAGOLI ROCHA (Department of Pathology, Hospital AC Camargo, Rua Professor Antônio Prudente 211, Liberdade São Paulo, SP, 01509-900, Brazil; rafael.malagoli@gmail.com).

Epithelial-to-mesenchymal transition (EMT) is a process whereby epithelial cells lose cell polarity and cell–cell contact, displaying remarkable morphological alterations. These changes represent a critical early event in tumor invasion and metastasis. However, the role of EMT in vulvar squamous cell carcinoma (VSCC) has not been elucidated yet. Previous studies of our group show the HPV infection is detected in 39.1% of the cases, being HPV16 the most frequent type (35.3%). There is no difference in E-cadherin, Slug, Snail and Twist2 expression between the tumor center and the invasive front of each tumor. However, lower β-catenin and higher Vimentin expression is observed at the invasive front when compared to the tumor center. Higher expression of E-cadherin in central tumor is significantly related to absence of vascular and perineural invasion, lower invasion depth, and ≤ 2 lymph node involvement. Loss of β-catenin and high Slug, Snail and Twist2 expression at the invasive front is significantly associated with absence of HPV infection. Moreover, β-catenin lower expression associated with gain in Slug expression predicts a subgroup with worst outcome (p=0.001). Lower expression of β-catenin in both tumor center and invasive front correlate with lower overall survival. Also, β-catenin expression is independently associated with poorer outcome. We suggest the comparative analysis of β-catenin between invasive front and tumor center as a key issue for establishing prognosis of vulva cancer and that HPV-related tumors do not progress through EMT phenomenon, showing usually better prognosis and more satisfactory outcome.

88 Small Molecule Inhibition of the Inflammatory Cytokine Oncostatin M? JIM MOSELY*, CHERYL JORCYK1 and DONG XU2 (1 Department of Biological Sciences, Boise State University, 1910 University Drive, Boise, ID 83725-1515; jimmosely@boisestate.edu, cjorcyk@boisestate.edu; 2Department of Biomedical and Pharmaceutical Sciences,
Inhibition of cytokine and receptor interaction using small molecules represents an attractive alternative approach to classical antibody-mediated inhibition of signal transduction. The development of small molecule inhibitors against IL-2/IL2-Ra axis suggests other cytokine-cytokine receptor interactions may also represent viable targeted therapies for various cytokine-signaling-associated pathologies. Results of de novo computational screening of small molecule inhibitors of model cytokine-cytokine receptor interactions will be presented. The identification of lead compounds from chemical libraries is described on the basis of potential ligand binding sites optimized for shape matching structures against 3-dimensional templates of target surfaces coupled with site geometry search for cliffs and pockets. The preliminary evaluation and validation of biological activity of select small molecule inhibitors identified by in silico screen against cytokine-mediated signaling is presented. ACS RSG-09-276-01-CSM, Susan G Komen KG100513, NIH/NCRR P20RR016454 and P20GM103408, NIH/NCI R15CA137510, and NASA NNX10AN29A.

89 A Co-Evolutionary Strategy to Discovery Novel Anticancer Drugs Breast Cancer Metastasis: A Role for the Inflammatory Cytokine Oncostatin M? JENNIFER S FORBEY (Department of Biological Sciences, Boise State University, 1910 University Drive, Boise, ID 83725-1515; jenniferforbe@boisestate.edu).

The majority of current cancer-related deaths are attributed to the evolutionary response of cancer to develop resistance to anticancer drugs. Finding methods to overcome drug resistance in cancer cells represents one of the most urgent needs in the field of cancer treatment. Although natural products from plants have long been praised for their anticancer properties, random screening approaches which are both costly and inefficient have led to reduced investment in natural products by pharmaceutical companies and a deficit in effective lead chemicals in the anticancer drug pipeline. This represents a critical gap in the battle against cancer - between available anticancer drugs and the discovery of effective natural products that are cytotoxic and overcome resistance. A novel approach to bridging this gap is one that takes into consideration the evolution of plant chemical defenses, herbivore defenses that aid in resistance to chemical defenses, and plant counter-defense that overcome resistance in herbivores. The co-evolutionary “arms race” between herbivores and plants is a natural experiment occurring over millennia, selecting for natural products that overcome drug resistance. I showcase several plant-herbivore systems that are ecologically and evolutionarily predisposed to have diverse and biologically active chemicals that are cytotoxic against cancer and can overcome drug resistance.

90 Prostate Tumor Progression and Metastasis: The Cytokine Connection, STEVE R PEKOVICH1 and CHERYL L JORCYK2 (1 Department of Biology, Northwest Nazarene, 623 S. University Blvd, Nampa, ID 83686; spekovich@nnu.edu; 2 Department of Biological Sciences, Boise State University, 1910 University Drive, Boise, ID 83725-1515; cjorcyk@boisestate.edu).

Prostate cancer (PCa) is one of the most common types of cancer in American men, second only to skin cancer. For 2012, the American Cancer Society estimates that approximately 241,740 men will have been diagnosed with and 28,170 men will die of PCa in the United States. Most PCa is lethal as a result of local invasion and the metastasis of cancer cells from the primary tumor to peripheral tissues and vital organs. Patients with metastatic disease display metastasis to bone, lung, liver, pleura, and adrenals. The role of cytokines, particularly inflammatory cytokines, in PCs invasion and metastasis will be discussed. Particular attention will be focused on the inflammatory cytokine interleukin-6 (IL-6), which is well documented in PCs metastasis, especially to bone. Oncostatin M (OSM) is an IL-6 family cytokine that plays an important role in inflammation and other cellular processes such as development, hematopoiesis, liver function, neurogenesis, and bone homeostasis. OSM expression has been shown to be directly associated with metastatic potential in human prostate carcinomas, with increasing OSM and OSM receptor expression being found in higher Gleason grade tumors. Targeting inflammatory cytokines in the IL-6 family may be an important therapeutic strategy for patients with metastatic prostate cancer. NIH/NCRR P20RR016454 and P20GM103408.

Current Progress in Infectious Disease Research and Therapeutic Interventions
Wednesday, 8:00 a.m., SU Room 211

91 Multiscale Spatiotemporal Dynamics of C-type Lectins During Innate Immune Fungal Recognition, AARON K NEUMANN (Department of Pathology, University of New Mexico, Albuquerque, NM 87131-0001; akneumann@salud.unm.edu).

Candida albicans is an opportunistic human pathogen responsible for the majority of the hematogenous human fungal infections, which are associated with high mortality rates (30-40%). Primary host defenses against Candida include cells of the innate immune system, such as dendritic cells (DCs), macrophages and neutrophils, that patrol the circulation and peripheral tissues and respond to the invasive presence of pathogens in sterile tissue spaces. These cells use a network of transmembrane receptors from the C-type lectin, Toll-like and integrin receptor families to recognize conserved polysaccharide components of C. albicans cell walls. Several C-type lectins (DC-SIGN, CD206, Dectin-1) exhibit isolated and discrete nanodomain organization in the plasma membranes of human cells.
Reactivation of Latent HIV-1 in Central Memory CD4+ T Cells Through TLR-1/2 Stimulation, ALBERTO BOSQUE (Division of Microbiology and Immunology, Department of Pathology, University of Utah School of Medicine, Salt Lake City, UT; alberto.bosque@path.utah.edu).

Toll-like receptors (TLRs) are crucial for recognition of pathogen-associated molecular patterns by cells of the innate immune system. However, TLRs are present and functional in CD4+ T cells. It is established that memory CD4+ T cells, predominantly central memory cells (T_cm), constitute the main reservoir of latent HIV-1. However how TLR ligands affect the latent reservoir in central memory CD4+ T cells is poorly understood.

We have evaluated the ability of TLR agonists to reactivate latent HIV-1 in two established models of latency. First, we observed that the TLR-1/2 agonist Pam3CSK4 leads to viral reactivation from latency in cultured T_cm. Second, we observed that Zymosan, a TLR-2/Dectin-1 agonist, triggers HIV-1 reactivation in J-Lat 10.6 cells. In addition, we investigated the signaling pathway associated with Pam3CSK4 involved in HIV-1 reactivation. We show that the transcription factors NFkB, NFAT and AP-1 cooperate to induce viral reactivation downstream of TLR-1/2 stimulation. Finally, Pam3CSK4 reactivates latent HIV-1 in the absence of T cell activation or proliferation as compared with antigen stimulation.

Our findings suggest that Pam3CSK4 and/or the TLR-1/2 signaling pathway can be targeted toward future development of anti-latency strategies, either alone or in combination with others anti-latency drugs.

Hypervirulent Salmonella Derived from Natural Microbial Populations, MICHAEL J MAHAN (Molecular, Cellular, and Developmental Biology, University of California, Santa Barbara, Santa Barbara, CA 93106-9625; mahan@lifesci.ucsb.edu).

Salmonella is the greatest foodborne disease burden in the U.S., causing 1.03 million illnesses annually. This health and economic burden may continue to worsen with the potential emergence of more potent multidrug resistance strains that pose a significant risk to food safety and public health care. Insights into pathogen emergence have come from animal-passage studies wherein virulence traits are often increased during the infective process. However, these studies did not address the prospect that a select subset of strains amongst natural microbial populations may exhibit a pronounced increase in virulence following infection. By screening Salmonella clinical isolates derived from diseased livestock, we have isolated a class of hypervirulent salmonellae that are among the most virulent strains encountered of this species and more capable of killing vaccinated animals. These hypervirulent strains have evaded prior detection due to a rapid reversion to a less-virulent state accompanied by more competitive growth ex vivo. The molecular basis of hypervirulence is associated with increased microbial pathogenicity (colonization; cytotoxin production; cytotoxic activity) and the capacity to confer altered innate immune cytokine responses within infected cells (IFN-b; IL-1b; IL-6; IL-10). Gene expression analysis revealed that hypervirulent strains display altered transcription of genes within global virulence regulatory networks (PhoP/PhoQ; PhoR/PhoB; ArgR), conferring changes in the expression of classical virulence functions (SPI-1 and SPI-2 effectors) and those involved in cellular physiology/metabolism (nutrient/acid stress). The rapid and rapidly reversible switching between ‘hypervirulent’ and less-virulent ‘environmental’ states likely contributes to the evolution and maintenance of these more potent strains in nature.

Understanding Transcriptional Silencing and Anti-Silencing of Virulence Genes in Shigella, HELEN J WING (School of Life Sciences, University of Nevada, Las Vegas, NV; helen.wing@unlv.edu).

Virulence gene expression on the large 230 kb virulence plasmid of the bacterial pathogen Shigella flexneri is controlled at the level of transcription by a complex interplay between two sets of proteins. The first set is the histone-like nucleoid structuring proteins, which includes H-NS, StpA and Sfh. These proteins serve two functional roles in the bacterial cell; they aid packaging of DNA into the cell, but also silence gene expression at the transcriptional level. The second set of proteins function to antagonize the nucleoid structuring proteins, a process that ultimately leads to virulence gene expression in Shigella. Although evidence suggests that this unusual mechanism of transcriptional control is found in a number of important bacterial pathogens, the molecular details remain poorly understood. The long term goal of our research is to understand the details of this molecular antagonism and how it controls Shigella virulence. A collection of studies that elucidate the mechanistic details of this unusual transcriptional switch will be presented.
95 Structural and Biochemical Characterization of Porphyromonas gingivalis Enoyl-ACP Reductase II (FabK), a Novel Antibacterial Target, KIRK E HEVENER (College of Pharmacy, Idaho State University Meridian Health Science Center, 1311 E. Central Drive, Meridian, ID 83642; khevener@pharmacy.isu.edu).

Chronic infections are responsible for high morbidity and high cost of illness worldwide. These infections are characterized by an inability of the host immune system to clear the disease and persistence or recurrence over long periods of time. The organism, Porphyromonas gingivalis is a key, causative agent of one such disease, chronic periodontitis. Enzymes involved in bacterial fatty acid synthesis remain viable drug targets for Gram-negative pathogens and there is precedent for targeting them in treatment of diseases of the oral cavity. In these studies, we have structurally and biochemically characterized the enzyme FabK, enoyl-ACP reductase II, as a potentially selective target for the prevention and treatment of chronic periodontitis. PgFabK is a flavoenzyme, dependent on FMN and NADPH as cofactors for the enzymatic reaction. The enzyme reduces the enoyl substrate via a ‘Ping-Pong’ mechanism. Herein we report the structure of the PgFabK enzyme, solved using x-ray crystallography to 1.9Å resolution with FMN fully resolved and the NADPH cofactor partially resolved. PgFabK possesses a TIM-barrel motif, and all flexible loops are resolved. The solved structure and additional biochemical studies, including enzyme velocity measurements and analytical gel filtration, have allowed clear insight into the structural basis for the NADPH dependence seen in PgFabK and the structural role of a monovalent cation that has been observed here and in previous studies to be stringently required for FabK activity. The PgFabK structure and the insights gained from its analysis will facilitate rational drug discovery efforts toward the prevention and treatment of periodontal infection.

96 Advanced Polyfunctional Sialochimerics, PAOLO ALBERTO VERONESI (Chief Executive Officer and R&D Director, Therapicon Biopharmaceuticals, Milan, Italy; paolo.veronesi@therapicon.com).

Recent data indicate uniquely human genetic changes in comparison with our closest evolutionary relatives (great apes). Specific events include inactivation of CMAH gene, resulting in loss of synthesis of N-glycolylneuraminic acid (Neu5Gc) and increase in expression of the precursor N-acetylneuraminic acid (Neu5Ac). Among the molecular events associated with loss of synthesis of N-glycolylneuraminic acid (Neu5Gc) and increase in expression of the precursor N-acetylneuraminic acid (Neu5Ac), and multiple changes in gene encoding Siglecs, with known outcomes. Additionally, metabolic incorporation of Neu5Gc from animal-derived materials occurs into biotherapeutic molecules and cellular preparations and into human tissues from dietary sources, particularly red meat and milk products. As humans also have varying and sometime high levels of circulating anti-Neu5Gc antibodies, there are implications for biotechnology products, and for some human diseases associated with chronic inflammation of circulating anti-Neu5Gc antibodies.

Since discovery on sialic acid-binding proteins in vertebrate system about a decade ago there has been increasing interest in Siglecs (generally recognizing exocyclic C7-9 chain of Sias) and Selectins. However, twenty distinct sialyltransferases have been identified in both human and murine genomes. These enzymes catalyze transfer of sialic acid from CMPNeu5Ac to the glycan moiety of glycoconjugates. Influenza virus protein hemagglutinin binds Sias and the complex binding mechanism is triggered by low pH. Sialidases, or neuraminidases are sialic acid-releasing exoglycosidases that catalyze the removal of terminal sialic acids from sialosides and sialoglycoconjugates in nature. Many pathogens express sialidases either as receptor-destroying enzymes, e.g., the influenza virus, or to release cell surface Sias, either for nutritional purposes or to uncover underlying receptors. Other sialidase homologs are found in mammalian cells, which have a range of functions. The four known mammalian sialidases are differentially expressed in cells and tissues/organs, with particular subcellular distribution and substrate specificity: they are the lysosomal (NEU1), the cytosolic (NEU2), and plasma membrane- and intracellular-associated sialidases (NEU3 and NEU4). High levels of sialidases denote the presence of life threatening diseases, such as an associated decrease of plasmatic pH. First generation known antivirals (adamantane derivatives, ribavirin, viramidine) were followed by newer viral neuraminidase inhibitors being chemically sialic acid and DANA analogues. Renown publications evidenced limitations to their medical use sometimes due a selective activity only versus Influenza virus Type A, impossibility to be administered by oral route, high incidence of resistance of mutated strains, inhibition on human sialidases. Integrating multivalent design with biological insight, new series of advanced polyfunctional sialochimeric compounds have been designed. Different concepts have been adopted for the design of new analogues, mainly reduction of exocyclic chain of one or two carbon atoms, optional double bond link, and essentially mono- or bi-substituted moieties being portions of other antiviral substances. The new compounds have shown in vitro to elicit combined effects of their moieties, thus inhibiting Influenza/A resistant strains, Influenza/B types, and differentially also HCV. Perspective and future directions are promising, as recently published in relation to viral inhibition, control of human sialidase control, ligands for the myelin-associated glycoprotein (MAG), CD22-Antagonist, and E-selectin inhibitors. New sialic acid analogues are also at final stage of development to be used as adhesion modifiers (glyco-spacers) to fight increasing microorganism resistance.

97 Spatial and Temporal Colonization Dynamics of Giardia intestinalis Infection Exposed by In Vivo Bioluminescent Imaging, NANELLE BARASH and SCOTT DAWSON (Department of Microbiology and Molecular Genetics, University of California, Davis, CA; nanelle@gmail.com).
*Giardia intestinalis* is the most frequently identified protozoan cause of intestinal infection in the U.S. and worldwide. Despite the fact that giardiasis represents a major problem in world public health, the mechanism by which Giardia infection results in intestinal distress is unclear. Due to the difficulties in sampling the small intestine, colonization dynamics of *Giardia* within an animal host are not well resolved. A novel imaging modality, bioluminescence imaging (BLI), has been utilized to track infection non-invasively in *vivo*, revealing a previously unrecognized cyclical infection pattern and dramatic variation even between cagemates. Ex *vivo* imaging of infected animals has increased anatomical resolution, showing that during dense infection, trophozoites inhabit the proximal small intestine and exhibit localized foci of infection, whereas during infection clearance or waning parasitic density, colonization progresses distally. Various stages of Giardia’s life cycle in *vivo* can be studied in living animals and *ex vivo*, including encystation and cell division, by tagging stage-specific promoters with luciferase. Finally, preliminary data gathered using BLI has suggested a novel micro-inflammatory redox-based crosstalk between *Giardia* trophozoites, the intestinal epithelium, and the commensal microbiota. This study presents the first exploration of *Giardia* colonization dynamics and individual variation in living hosts.

**Innovations and Trends in K–16 STEM Education**  
**Wednesday, 8:10 a.m., SU Room 205**

98 *Reaching Nevada’s Teachers through NSF-EPSCoR Climate Change Science Institutes*, Aubrey Bonde*, Lawrence Rudd*, Paul Buck and Juan McAllister*  
(1Department of Geoscience, University of Nevada Las Vegas, 4505 S. Maryland Parkway, Las Vegas, NV 89154; 2School of Education, Nevada State College, 1125 Nevada State Drive, Henderson, NV 89002; 3School of Liberal Arts and Sciences, Nevada State College, 1125 Nevada State Drive, Henderson, NV 89002; shirka2@unlv.nevada.edu).

The education component of the NSF-EPSCoR Nevada program has held four two-week summer institutes (2009-2012) for Clark County School District teachers. The focus of the institutes was to instruct southern Nevada’s educators on climate change in the Southwest, especially in regards to water resources and sustainability, and ecological and landscape disturbances. This was accomplished through a variety of content lectures, inquiry activities, field trips, researcher presentations, reading topics, and in-class discussions.

Nineteen Clark County School District teachers have benefited from the program and were given the opportunity to participate in more than one summer institute. As a product of the institutes, the teachers developed lesson plans to incorporate in their classrooms and left equipped with the knowledge and resources to deliver the content. The teachers are from different middle and high schools in Las Vegas and Boulder City thereby maximizing climate change content distribution throughout the school district. Institute administrators observed in-class delivery of the climate change-based lessons and estimate that the information has been disseminated to over 5,000 students over the course of four years.

99 *A Multidisciplinary Approach to Integrating Climate Change Science Curriculum*, Freda Vine (Clark County School District, 8895 Canyon Saddle Street, Las Vegas, NV 89148; fvine@interact.ccsd.net).

Climate change is a complex global issue that spans many disciplines. A team of five teachers from Clark High School, Las Vegas, NV have developed an approach to implement climate change science curriculum in a way that compliments each teacher’s subject area. The subjects involved in this approach include Science, Social Studies, English, Mathematics and Technology.

The team focuses on creating lesson plans to cover one unit on climate change that spans a two week period. Lesson plans are formatted for each discipline and include the national standards for that subject area. The concepts will be taught to a rotating group of high school students so that they are all exposed to the information presented by each specific subject area.

100 *Using Online Data Sets to Teach K-12 Students and Teachers about Climate Change*, Lawrence Rudd (School of Education, Nevada State College, 1125 Nevada State Drive, Henderson, NV 89002; lawrence.rudd@nsc.edu).

Nevada NSF EPSCoR Climate Change Portal (NCCP) data was used to create lessons on climate science for use by both middle school and high school students. These lessons used this data set to teach graph-reading skills, data analysis, problem solving, and fundamental climate science topics. Feedback on these lessons was gathered from inservice secondary teachers during the 2012 EPSCoR Summer Institute in southern Nevada and from preservice elementary teachers in Nevada State College science methods classes. Adaptations of these lessons for elementary school students are in process. As more data is gathered from instruments on the data transects established as part of the Nevada NSF EPSCoR Program the lessons will be updated, making them dynamic documents. Integrating long-duration data from additional online data sources will create a robust data set for student use.

While there is a long tradition of using of climate data sets for teaching introductory climate science topics, the rapid growth of data available from online repositories provides a new opportunity to increase lesson relevance and tailor lessons to specific locations when teaching about climate science and climate change. Online sources of climate data will be presented, compared, and discussed in the context of their use for teaching K-12 students about climate science and climate change.
101 Using the Flipped Classroom to Support Learning in Chemistry and Incorporate Environmental Education, CHEMBERLE SIMONEAU-OELRICH (Clark County School District, 800 S. College Dr., Henderson, NV 89002; cwsimoneau@interact.ccsd.net).

Many students struggle to be successful in chemistry. Chemistry teachers find it difficult to cover the required content and provide relevant examples of phenomena to make the learning more meaningful for students. The flipped classroom helps both students and teachers overcome these obstacles by allowing students greater opportunities to master skills and content, increasing student-teacher interactions, and the possibility to expand learning outside the classroom.

The common understanding of what occurs in a "flipped classroom" is that students do the classwork at home (i.e. watch videos) and complete homework (i.e. worksheets) in class. While many teachers do this, many others have moved beyond this to make their classrooms more student-centered.

This presentation will include an overview of what my class looks like: benefits and challenges of the flipped classroom, how this model supports struggling and advanced students, how environmental education is incorporated into my courses, as well as resources to support flipping your class. The flipped model outlines the time and potential to implement these strategies and is a tool to aid in becoming a better teacher.

102 Integrated STEM Model-Eliciting Activities: Developing 21st Century Thinkers, MICAH STOHLMANN (Department of Teaching and Learning, University of Nevada, Las Vegas, 4505 S. Maryland Parkway Box #453005, Las Vegas, NV 89154-3005, micah.stohllmann@unlv.edu).

In real life, people are rarely faced with problems that require the use of knowledge from one subject. STEM (Science, Technology, Engineering, and Mathematics) integration allows students to have a more realistic approach to learning through drawing on varying knowledge bases and experiences. The goal of STEM integration is to be a holistic approach that builds on natural connections between subjects so that learning becomes more focused, meaningful, and relevant to students. Other benefits of STEM integration include helping students become better problem solvers, innovators, and inventors. Integrated STEM education shows how engineering can motivate students learning of the mathematics and science concepts that make technology possible.

Model-Eliciting Activities (MEAs) are being used increasingly in P-16 level classes as a method for implementing integrated STEM education. MEAs are interdisciplinary, open-ended problems set in a realistic context with a client. MEAs address higher-order thinking skills through collaborative teamwork. These activities allow researchers and teachers to observe students' development of conceptual models as they go through the cycle of express, test, and revise with their solutions. They also allow students to work through a form of the engineering design process that is the hallmark of understanding engineering. MEAs encourage multiple perspectives and help students develop valuable written and oral communication skills.

103 Camping in the Curriculum, ELIJAH BONDE* and EDWIN HOWELL (Nativity Prep Academy, 2755 55th Street, San Diego, CA 92105, ebonde@nativityprep.org).

An increase in sedentary lifestyles and usage of technology in the home can be seen as having correlations with increases in childhood obesity and a lack of understanding of our natural resources. Camping in the Curriculum is designed to give our students a chance to see, experience and learn in nature, and to see the majesty of the state and national parks. Outdoor experiences compiled with basic outdoor skills and nature appreciation are important components to understanding science in the world outside the classroom or laboratory. Our program is also aligned with the classroom content covered in our middle school science classes. In choosing to develop the camping program, we hoped to give students the ability to experience nature and see science content in state and national parks, an opportunity they might not otherwise experience. Through assessments geared both towards classroom curriculum and outdoor skills, students are constantly evaluated during the trips. The goals are that our students will be able to apply classroom content to the real-world, develop strong camping skills, and develop a high level of nature appreciation.

Dinosuors and Their Neighbors: Mesozoic Paleontology and Paleogeography of Nevada, Utah, and Adjacent States

Wednesday, 9:10 a.m., SU Room 219

104 Tracks of Synapsids and Arthropods in the Aztec Sandstone of Southern Nevada, STEPHEN M ROWLAND* and HEATHER M STOLLER (Department of Geoscience, Box 454010, University of Nevada, 4505 Maryland Parkway, Las Vegas, NV 89154; steve.rowland@unlv.edu, stollerh@unlv.nevada.edu).

Numerous sites with synapsid and/or arthropod tracks have been discovered in the Lower-Middle Jurassic Aztec Sandstone of Southern Nevada. Synapsida includes mammals and therapsids (aka ‘protomammals’ or ‘mammal-like reptiles’). The most common synapsid tracks belong to the ichnogenus Brasiliichnium. These tracks are roughly oval, ranging in width from 2.2 cm to 4.1 cm, usually with an impression of the hindfoot (pes)—but not the front foot (manus)—preserved. Based on its size, the Brasiliichnium trackmaker was a squirrel-size animal that was almost certainly a therapsid. Brasiliichnium trackways sometimes occur in multiple parallel sets, which strongly suggests that the trackmaker lived gregariously, like prairie dogs and meercats.

Two additional synapsid track types do not appear to
match any described ichnogenera. One is similar to large _Brasilichnium_ tracks, but is morphologically distinct. The other unnamed synapsid track type consists of tiny footprints the size that a mouse would make, with a stride of about 10 cm. These are our '10-cm strider' trackways, we have documented at several localities.

We have identified three types of arthropod tracks. One is a well-known Permian and Mesozoic track called _Octopodichnum_, which may be the track of a scorpion. A more common track type in the Aztec Sandstone is _Paleohelcura_, which is almost certainly the track of a scorpion. A third type of arthropod track consists of a meter-scale network of burrows, each burrow being 5-7 mm in diameter; we interpret this burrow network to be the nest of an unknown colonial insect.

105 Tracks of Dinosaurs in the Aztec Sandstone of Southern Nevada: A Progress Report, HEATHER M STOLLER* and STEPHEN M ROWLAND (Department of Geoscience, University of Nevada, Las Vegas, 4505 Maryland Parkway Las Vegas, NV 89154-4010, stollerh@unlv.nevada.edu, steve.rowland@unlv.edu).

This investigation focuses on dinosaur tracks in Aztec Sandstone exposures in Red Rock Canyon National Conservation Area and Valley of Fire State Park of southern Nevada, and the Mescal Range of southern California. These three locations preserve different examples of ichnotaxa, allowing me to specifically focus on details of each track and interpret the environment in which the track was laid. Once all details regarding the tracks in these locations are collected, the first complete list of tracks and trackways of dinosaurs, synapsids, and arthropods will be available, permitting a comparison to the tracks in the correlative Navajo Sandstone.

Preliminary observations indicate all of the dinosaur tracks appear to be undertracks, which formed on a surface some distance beneath the surface on which the dinosaur walked or ran; most are assigned to the ichnogenus _Grallator_. To date, 17 tracksites have been documented, with details of individual tracks and trackways recorded at each site as well. Using the trackway dimensions, which are proportional to the animal's hip height, it is possible to calculate the speed the trackmaker was traveling. The speed of _Grallator_ trackmakers in one location will be compared with those at other locations, which will reveal details regarding the animal's behavior in all locations. For example, of those speeds calculated to date, the dinosaur was moving approximately 3.8 mph. A more detailed paleoecology study is being prepared as well. Alongside of these data, the paleoenvironment of the Aztec Sandstone will also be reconstructed to provide information about the environment present in the Jurassic, and detailed maps have been created for each trackway at each location.

106 Nevada's Mid-Cretaceous Biota, JOSHUA BONDE (Geoscience Department, University of Nevada Las Vegas, 4505 S. Maryland Pkwy, Las Vegas, NV 89154-4010; joshua.bonde@unlv.edu).

Over the past ten years there has been a leap in our understanding of the Cretaceous biota of the state of Nevada. Vertebrate fossils are now known from a number of different sites across the state, spanning from the ?Barremian through to the Cenomanian. Deposits from east-central Nevada represent organisms preserved within a Sevier piggy-back basin. Fauna from this unit include: hybodontids, holosteans, testudines, crocodilians, armored dinosaurs, two types of ornithopods, theropods, and perhaps some sauropod material.

Cretaceous deposits from southern Nevada represent the foredeep of the Sevier retroarc foreland. Fauna preserved from this unit include: holosteans, dipnoans, testudines, crocodilians, armored dinosaur, two types of ornithopod, two types of theropods, and sauropods. These faunas are most similar in composition to contemporaneous faunas from east-central Utah, implying some ecological continuity from the more coastal deposits of Utah to the more tectonically active regions of Nevada.

107 Campanian Dinosaurs of the Southern Basin and Range Province, ROBERT McCORD (Arizona Museum of Natural History, 53 N Macdonald St., Mesa, AZ 85201; Robert.mccord@mesaaz.gov).

Although not as famous or as spectacular as Campanian Age faunas of the northern Western Interior, a remarkable, diverse, and little known record of Campanian dinosaurs is preserved in the Fort Crittenden Formation of Arizona, the Ringbone Formation of New Mexico, and the Corral de Emmedio Formation of Sonora. Study of these faunas is hampered by spotty exposures and generally disarticulated remains making even generic identifications difficult. Despite these issues, continued work is being rewarded by increasing knowledge of a surprisingly diverse fauna. Taxa known to date include: ?allosaurid, small ?dromaeosaur, large dromaeosaur, tyrannosaur, ?titanosaur, hadrosaur, chasmosaur, centrosaur, and ankylosaur _sensu stricto_. Dinosaur trackways, skin impressions, and eggshell are also known as well as pollen, wood, invertebrates, fish, turtle, lizard, and crocodilian remains. Although likely separate sedimentary basins these deposits represent similar intermontane lacustrine, deltaic and riparian systems created by early Laramide uplift with similar source areas. Geochemical evidence suggests seasonal aridity and frequent wildfires. This area represents a productive, unique snapshot of southern, upland dinosaurs of Laramidia.
Science and Feeling in the Arts
Wednesday, 10:15 a.m., SU Room 213

108 The Role of Feeling in Nature, Science, and the Arts, JESSE JAMES THOMAS (San Diego State University, 5500 Campanile Drive, San Diego, CA; you1@verizon.net; jithomas@mail.sdsu.edu).

How do bright ideas originate? A century ago C.S. Peirce described this as a spontaneous process he called abduction. Induction and deduction can “explain” an existing hypothesis but not its origin, which begins with feelings, originating of the process in which chaos organizes itself into new habits. Not only consciousness but life is forever feeling its way into the future, developing new habits as it goes.

To Stuart Kauffman, like Peirce, life swims in a sea of indeterminacy as natural selection actualizes new habits as it touches adjacent possibles within the virtually infinite world of random possibilities. These adjacent possibles provide commonalities that can self-organize to create new habits for natural selection.

To Terrence Deacon, like Peirce, constraint is the mother of invention. Creativity begins with sentience (feeling). To Deacon feeling is active, not passive, as chaos organizes itself. Both single-celled and more complex life forms that sentence is inherently goal-directed (teleonomic), culminating eventually in human subjective consciousness.

Scientists feel their way toward theories, artists toward works of art. Feelings lead from randomness to spontaneous, unpredictable guesses, which, like life, will be tested by whether they work. Both science and art create “forms” that are forever different, but where science is analogue, representational, and objective, art is metaphorical, open-ended, and immediate. Scientists determine the truth of science; unpredictable audiences determine the truth of art. Science creates ways to understand and utilize nature; art creates the dynamic norms by which human life proceeds. In short, science and art need each other.

109 Biology and Contemporary Sculpture, ALEXANDRA HART (Alexandra Hart metals artist/designer goldsmith, PO Box 15235, San Diego, CA; alexandrahart.com; info@alexandrahart.com).

In helping us to better understand ourselves and our world, scientists regularly represent their findings by means of visual models. Such models are particularly important in the context of conveying their results to the general public. However, it is rare that a scientist is also an accomplished visual artist.

Visual artists also aim to help us better understand ourselves and our world, expressing their understanding by means of paintings, sculpture, and other media. When inspired by the world revealed by contemporary science, such works of art are capable of powerfully influencing how the general public visualizes and responds to the world described by science. However, it is rare that a visual artist is also an accomplished scientist.

Often scientists and artists share a common concern for educating the general public both with respect to the facts and the practical implications of the facts, for citizens and policy makers.

Using the works of four contemporary sculptors, it is argued that scientists and artists ought to collaborate to craft more accurate and aesthetically powerful images of the world revealed by science.

110 Symbol, Feeling and Ritualization in Anthropological Praxis, CARL A MAIDA (University of California, Institute of the Environment and Sustainability, La Kretz Hall, Suite 300, Los Angeles, CA 90095-1496; cmaida@ucla.edu).

Anthropology and neuroscience view ritualization as adaptive behavior in its ability to encode cultural knowledge. Ritual symbols prompt social action because their referents call up polarities between physiological phenomena and normative values, such as reciprocity, respect, generosity, and kindness. Social dramas, or “dramas of living” in Kenneth Burke’s words, are recurrent forms of social experience that include both the more personal life crises, and larger social, political and ecological crises. Attendant with these crises is the experience of liminality, a gestation process or transitional state analogous to the “subjunctive mood” of culture, such as fantasy, hypothesis, and conjecture. Individuals will engage in performance behavior, such as singing, chanting, playing music, dancing, dressing up, feasting, drinking alcohol, and using hallucinogens, to “live through” this passage from a structural past to a structural future. Ritual, as a performance, uses these multiple sensory domains to dramatize the liminal state in order to provoke an exchange between the physiological and cultural poles, and to restore a sense of communitas among participants, especially in the wake of cultural reorientation. This presentation will focus on the later work of Susanne Langer, especially her mature conceptualization of mind, based upon the centrality of feeling. Langer’s image of mind as feeling locates symbolic transformation as the core activity of human mentation, and this conceptualization has implications for the cultural evolution of symbolic forms of art, science, language, myth and ritual.

111 Hope, Truth, and Science, MARK RICHARD WHEELER (San Diego State University, 5500 Campanile Drive, San Diego, CA; mark.wheeler@sdsu.edu).

Is the intellectual virtue of hope essential to scientific knowledge?

For Peirce, esthetics is the normative science of ideals of conduct, where ideals of conduct are deliberately developed habits of feeling with respect to some ultimate aim (CP 1.574). If one assumes that justified true belief is the ultimate aim of scientific inquiry, one can ask whether or not the virtue of hope is among the ideals of conduct necessary for achieving this ultimate aim.

Contemporary virtue epistemologists have rekindled
interest in discovering and clarifying the trait-virtues necessary for possessing scientific knowledge, whether by an individual scientist or by the scientific community. Following Zagzebski (Zagzebski, I., 1996, Virtues of the Mind, Cambridge: Cambridge University Press, 271f.), one can define an act of intellectual hope as follows:

An act of intellectual hope is an act that arises from the motivational component of hope, is something a person with the intellectual virtue of hope would (probably) do in the circumstances, is successful in achieving the end towards which the motivation of hope aims, and is such that the agent acquires a true belief (cognitive contact with reality) through these virtuous features of the act.

It is argued here that hope is among the trait-virtues that must be possessed by scientists and the scientific community in order to succeed in deliberately securing their ultimate aim. As such, hope is among the habits of feeling essential to science.

112 Ecological Restoration Art and “Post-Natural” Aesthetics, ROBERT LOUIS CHIANESE (California State University Northridge, 2465 Hall Canyon Road, Ventura CA; rlchianese@gmail.com; robert.chianese@csun.edu).

Combining environmental science, restoration ecology, engineering and art with necessary civic and governmental support, Ecological Restoration Art forces us to re-educate our emotional and intellectual sensibilities to what art is and does—a new aesthetic.

Agnes Denes builds Tree Mountain over a massive gravel pit, a patterned conical-shaped forest with 11,000 trees owned by individuals. Michael Singer designs a sculptural parking structure that processes runoff for growing things on it. Henry Prigann transforms abandoned industrial and mining areas into semi-revived art spaces, retaining reminders of their toxic past.

Such art, manifesting the human hand everywhere, evokes a new paradigm that reclaims the notion of the “artificial,” not as something “fake” but artful, benign, restorative, the “virtual-natural.” Because restored and preserved land both require ongoing interventions, eco-reclamation art helps reveal the whole planet as a “post-natural” place under our problematic management.

We could react to eco-restorations with the serenity, awe, or joy we reserve for landscape art and landscape itself. However, understanding its ecological and technological forms and functions could provoke confusion, anger, and despair over the previous damage it recalls—or, conversely, “post-natural” redemptive joy.

Eco-restoration art might therefore evoke a “techno/ecological sublime” through our assessing its artful naturalness, economic/technologic efficiency, environmental and bio-diverse appropriateness, its durability, ruggedness, power, accessibility, and utility—likely qualities shaping emotional/intellectual responses in the new aesthetic.

Eco-restoration artists can contribute to four current projects in Ventura County, CA: developing the Ventura River Parkway, removing Matilija Dam, disassembling the Chevron refinery, and planning Ventura Botanical Gardens.

113 Two Novel Views on the Rise of Complex Feelings and Aesthetic Judgments, DARREN MICHAEL IAMMARINO (San Diego State University, 5500 Campanile Drive, San Diego, CA; processstheology@yahoo.com; diammarino@mail.sdsu.edu).

This paper examines two unique ways of understanding the rise of feelings, especially the complex feelings that are involved in aesthetics. The first part looks at a few central concepts within the field of process philosophy: prehensions (a pre-conscious seizing or grasping of data), panexperientialism (all things have some degree of experience), and subjective forms (how a subject feels a datum).

The second part of the paper focuses on the science of emergence—specifically strong emergence—and the implications of this alternative view on our understanding of aesthetics. The most pertinent components arising from emergence theories, which may have a direct bearing on our understanding of aesthetics are: irreducible complexity, interconnectivity, and supervenience.

Finally, the paper provides an argument for the relevance, and at times, explanatory superiority, of both of these approaches within the wider scientific and philosophical discussions concerning the rise of the intense and nuanced feelings involved in aesthetic judgments. Put simply, the concepts of art and beauty just may be irreducibly complex. Therefore, it only seems reasonable to apply non-reductionist models—like the process and strong emergence models—in order to acquire a deeper and more profound picture of how beauty is created and appreciated.

114 Media Wisdom Concerning Science, Feeling, and the Arts, TED BAHR (MOVIEGUIDE® Annual Report to the Entertainment Industry, 1151 Avenida Acaso, Camarillo, CA; ted@movieguide.org).

While Director of the TV Center of the City of New York (1977-1980), 60 professors and I developed and tested the first media-literacy course based on research into cognitive development, feelings, and media influence on viewers. This led to a five point system to help media consumers, especially children and adolescents, understand how media communicate messages that engender feelings and emotional/psychological responses. Such awareness can help consumers make wise and informed choices without requiring further regulation and supervision. It is important, particularly with children and adolescents, to understand how they perceive and feel about entertainment at each stage of their development and how to best help them learn how to use, not abuse the media. Teachers and parents in turn need to understand how audiences are susceptible to different stimuli/feelings during each stage of development. The work at CUNY was revised and expanded while I was Chair of the Institute for the Study of Media at UCSD.
Management of Endangered Species in the American West: Policy and Practice

Wednesday, 1:25 p.m., SU Room 209

116 The Tule Springs Local Fauna – Unearthing an Ice Age Wetlands Ecosystem in Southern Nevada, ERIC SCOTT*, KATHLEEN SPRINGER and CRAIG R MANKER (Division of Geological Sciences, San Bernardino County Museum, 2024 Orange Tree Lane, Redlands, CA 92374; escott@sbcmb.org, kspringer@sbcmb.org, cmanker@sbcmb.org).

Desert wetlands are havens of biodiversity in harsh environments. In the eastern Mojave Desert of southern Nevada, this has been the case for millennia. The upper Las Vegas Wash north of Las Vegas, Nevada, encompasses the largest open-site late Pleistocene (Rancholabrean North American Land Mammal Age) vertebrate fossil assemblage in the Mojave Desert and southern Great Basin: the Tule Springs local fauna. Renewed paleontologic field investigations by the San Bernardino County Museum have resulted in the discovery of hundreds of fossil localities and thousands of fossil specimens throughout the upper Las Vegas Wash, greatly extending the geographic and temporal footprint of earlier investigations. The fauna is dominated by remains of Mammuthus, Camelops, Equus and Bison. Megafaunal carnivores including Panthera and Smilodon are also present, albeit represented by few fossils. Smaller organisms in the fauna include amphibians, lizards, snakes, birds, rabbits and rodents, with both mesic indicators (Thomomys, Microtus) and xeric taxa (Lepus, Ammospermophilus, Dipodomys) represented.

The depositional setting is a remarkably continuous, fossil-bearing sequence of ground water discharge deposits (paleowetlands) of the informally designated Las Vegas Formation. Paleoecologic proxies include freshwater molluscs, black mats, and riverine tufas. Additionally, detailed and extensive radiocarbon and luminescence dating demonstrates that the deposits span as much as the last 250 ka, preserving a hydrologic system closely tracking northern hemispheric climatic proxy data. The Las Vegas Formation therefore encompasses a rich sedimentary and faunal record of Pleistocene paleowetlands responding to multiple glacial – interglacial transitions, including the end-Pleistocene event.

117 Greater Sage-grouse: Challenges, Opportunities, and the Future of the Endangered Species Act, JOHN C TULL (Consulting conservation biologist, 1885 Alexander Hamilton Dr., Reno, NV, 89509; jctull@gmail.com).

The greater sage-grouse, Centrocercus urophasianus, is a native bird endemic to the Great Basin desert in Nevada. The bird is currently being reviewed by the United States Fish and Wildlife Service for listing under the Endangered Species Act (ESA), a decision that will have an impact on eleven states across the species’ range. The listing of a species as threatened or endangered exposes the failures of biologists,
ABSTRACTS – Symposia

Canid Diversity and Conservation Lab, One Shields Ave/Old subSpecies restricted to the highest elevations of the western QUnN and BEN SACkS

World: Challenges, Gaps, and Management Tools

1) restoration of natural habitat conditions, including protec-

species, and 3) potentially climate change. Solutions include

River system and its tributaries. Key threats include 1) habitat

, woundfin recovery, channel restorations, crayfish eradica-

low numbers of Devils Hole pupfish. Recent successes include

inventory and monitoring, and management adaptation to ame-

lations and prevention of new infestations, and 3) research,

- tion of surface flows, 2) eradication of existing exotic popu-

are currently recognized as federally endangered or threatened.

89130; lee_simons@fws.gov).

Wildlife Service, 4701 N. Torrey Pines Dr, Las Vegas, NV

Mean for the future of the ESA.

explore the potential playout of a listing and what that might

mean for the future of the ESA.

118 Fish in Hot Water: Conservation of Southern Nevada’s Imperiled Aquatic Legacy, LEE H SIMONS (U.S. Fish and

01 N. Torrey Pines Dr, Las Vegas, NV 89130; lee_simons@fws.gov).

Southern Nevada is the warmest and driest part of the dri-
est state in the Union. Surface water is rare and often isolated,
yet supports a unique legacy of fish. Many of these fish occur
only in Nevada, including three genera and one family. Fish range from the inch-long Devils Hole pupfish to the meter-

Colorado pikeminnow. Most fish are imperiled. In southern Nevada at least five taxa have gone extinct globally within the past 75 years. Two other taxa are now extinct in Nevada but survive elsewhere in the Colorado River Basin. Eighteen taxa are currently recognized as federally endangered or threatened.

Major habitats include spring systems and the Colorado River system and its tributaries. Key threats include 1) habitat alterations, including loss of surface flow, 2) exotic invasive species, and 3) potentially climate change. Solutions include 1) restoration of natural habitat conditions, including protection of surface flows, 2) eradication of existing exotic populations and prevention of new infestations, and 3) research, inventory and monitoring, and management adaptation to ameliorate or remove threats. A current setback involves continued low numbers of Devils Hole pupfish. Recent successes include woundfin recovery, channel restorations, crayfish eradica-
tions, and Moapa dace recovery. These outcomes illustrate the importance of research, management, and cooperative recovery in the ongoing battle against extinction of desert fish.

119 Conservation of the Sierra Nevada Red Fox in the Real World: Challenges, Gaps, and Management Tools, CATE

QUINN* and BEN SACKS (University of California Davis,

Canid Diversity and Conservation Lab, One Shields Ave/Old Davis Rd, Davis, CA 95616 cbquinn@ucdavis.edu).

Montane red foxes (Vulpes vulpes) include three remnant subSpecies restricted to the highest elevations of the western U.S. mountain ranges. The Sierra Nevada red fox (V. v. necator) is the most endangered subspecies. The Sierra Nevada red fox occurred historically throughout the subalpine zones of the Sierra Nevada and Cascade mountain ranges of California and Oregon but suffered a precipitous decline and range contraction over the past century. Two isolated populations are known to remain in California, each thought to contain <20 individuals. Less is known about their distribution and abundance in the Oregon Cascades. Management of the subspecies has been hampered by a lack of information about threats and limiting factors, owing to insufficient funding. Low-budget monitoring efforts in the two California populations nevertheless have provided useful data, which suggest these populations reflect long-lived individuals with low reproduction, and highlighting genetic or habitat-quality issues as likely factors. We review findings related to the biogeography, evolution, and current conservation status of Sierra Nevada red fox and discuss how filling existing knowledge gaps would inform management and recovery goals.

120 Effective Conservation of a Rare Amphibian through Partnerships, MICHAEL BURROUGH*S and CHRIS-

TIANA MANVILLE (U.S. Fish and Wildlife Service, 4701 North Torrey Pines Drive, Las Vegas, NV 89130; michael_bur-

roughs@fws.gov).

The Amargosa toad (Anaxyrus nelsoni) is found only in the Oasis Valley, Nevada which includes the town of Beatty. Springs and other important habitat occur on residential and commercial properties as well Bureau of Land Management and The Nature Conservancy lands. The narrow distribution of the toad and its limited habitat combined with known and purported threats to the species have resulted in review of the taxon for potential listing as threatened or endangered under the Endangered Species Act. As an alternative to conservation of the species through regulatory procedures, private landowners, local governments, non-profit organizations partnered with the U.S. Fish and Wildlife Service, Nevada Department of Wild-

life, and other Federal agencies to reduce threats and improve the rangewide status of the species. This effort has proven successful and the status of the toad continues to improve. Part-

ership actions were an important factor to avoid listing the species. Since 2006, 15 projects have been completed. The projects restored 12 springs, 1.54 miles of stream habitat, and approximately 78 acres of toad foraging and breeding habitat. Active management of the species continues with emphasis on population monitoring and habitat improvements under the guidance of the Amargosa Toad Working Group and 2000 conservation agreement and strategy.

121 Measuring the Success Rate of the Endangered Species Act, KIERAN SUCKLING (Center for Biological Diversity,

PO Box 710, Tucson, AZ 85702-0710; ksuckling@biological-
diversity.org).

Critiques of the Endangered Species Act have focused on the fact that only 1% of listed species have recovered and
been delisted. This begs the questions: how many should have recovered by now? What is the standard for establishing recovery expectations? Reviewing the recovery time projection in all federal recovery plans, all downlisting, delisting and status reviews by the U.S. Fish and Wildlife Service and the National Marine Fisheries Service, and annual population trends for over 100 species, we determined that 1) the vast majority of listed species are not scheduled to have reach recovery goals yet, 2) the majority of species are progressing toward (=increased population size since listing), and 3) recovery rates generally accord with those established in recovery plans. We conclude that the Endangered Species Act is working well to both avert extinction and move species toward recovery.

122 Synthesis of (4,4′-bis[oligo(oxyethylene)]-2,2′-bipyridine) PtCl2 Complexes and Their in vitro Effects in Human Lung Cancer Cells, VAN VO*, ONTIDA TANTHMANATHAM, HAESEOK HAN, PRADIP K BHOWMIK and BRYAN L SPANGELO (Department of Chemistry, University of Nevada Las Vegas, 4505 Maryland Parkway, Las Vegas, NV 89154-4003; vanv@unlv.nevada.edu).

Cisplatin, carboplatin, and oxaliplatin are three platinum(II) complexes that are approved worldwide for the treatment of a variety of cancers. Although commonly prescribed, clinical application of platinum (Pt) drugs is limited due to intrinsic or acquired cellular resistance and toxic side effects. As a consequence of these drawbacks, the search for improved drugs continues with the goal of discovering compounds with greater efficacy and reduced toxicity.

In an effort to develop improved platinum drugs for the treatment of cancers, four platinum(II) complexes having the general formula of (4,4′-bis[R]-2,2′-bipyridine)PtCl2 (where R = -(CH2CH2O)m(CH2)nCH3, m = 1-4, n = 0-1) were synthesized and characterized by 1H NMR, 13C NMR spectroscopy, elemental analysis, and differential scanning calorimetry measurements. The in vitro anti-proliferative activities of these compounds were evaluated against A549 human lung cancer cells using the MTS cell proliferation assay. Water soluble platinum compounds having R = -(CH2CH2O)n(CH2)mCH3 and R = -(CH2CH2O)n(CH2)mCH3 inhibited the proliferation of A549 cells in a concentration and time-dependent manner. The activity of the compound with R = -(CH2CH2O)n(CH2)mCH3 was similar to cisplatin; however, the compound with R = -(CH2CH2O)n(CH2)mCH3 was more effective than cisplatin in inhibiting the proliferation of A549 cells.

123 Optimizing Extraction of Biologically Active pH Sensitive Steroidal Alkaloids from Veratrum californicum, JARED MATTOS*, PETR MALEK, CHRIS CHANDLER and OWEN M McDOUGAL (Department of Chemistry and Biochemistry, Boise State University, 1910 University Drive, Boise, ID, 83725; jaredmattos@u.boisestate.edu).

Cyclopamine is a steroidal alkaloid common to Veratrum californicum (V. californicum), a plant that grows in abundance in the mountains of Idaho. Cyclopamine inhibits the hedgehog pathway, a mechanism important in developmental biology and cancer treatment. The extraction of cyclopamine from V. californicum biomass by established methods may result in the degradation of the alkaloid into inactive, but closely related compounds. Studies have shown that cyclopamine degrades at lower pH’s. Isolation of cyclopamine in our lab is currently performed via Soxhlet extraction of the V. californicum biomass, with great care taken to maintain the pH of the solution above 7. The current investigation will characterize the impact of pH on extraction efficiency of the bioactive alkaloid, cyclopamine. An important consideration is the possibility of converting the glycosylated alkaloid, cyclopasine, into cyclopamine under acidic conditions. Thus, this investigation will encompass a range of pH’s to identify optimal extraction conditions that maintain the bioactivity of cyclopamine. The method used to quantify alkaloids from the V. californicum extracts is peak integration from high performance liquid chromatography separation, which also enables the analysis of alkaloid ratios to monitor pH effects on deglycosylation. Mass spectrometry is used to identify the isolated alkaloids and Shh light cells will be used to determine bioactivity.

124 Synthetic Peptides that Sense the Curvature of Lipid Nanovesicles, JONEL P SALUDES*, LESLIE A MORTON, SARA K COULUP, LIDA BENINSON, BRANDAN COOK, HANG YIN, MONIKA FLESHNER and EDWIN R CHAPMAN (Department of Chemistry, Washington State University, Pullman, WA 99164; 2Department of Chemistry, University of Nevada Las Vegas, Las Vegas, NV 89154-4003; vanv@unlv.nevada.edu).

Cyclopamine is a steroidal alkaloid common to Veratrum californicum (V. californicum), a plant that grows in abundance in the mountains of Idaho. Cyclopamine inhibits the hedgehog pathway, a mechanism important in developmental biology and cancer treatment. The extraction of cyclopamine from V. californicum biomass by established methods may result in the degradation of the alkaloid into inactive, but closely related compounds. Studies have shown that cyclopamine degrades at lower pH’s. Isolation of cyclopamine in our lab is currently performed via Soxhlet extraction of the V. californicum biomass, with great care taken to maintain the pH of the solution above 7. The current investigation will characterize the impact of pH on extraction efficiency of the bioactive alkaloid, cyclopamine. An important consideration is the possibility of converting the glycosylated alkaloid, cyclopasine, into cyclopamine under acidic conditions. Thus, this investigation will encompass a range of pH’s to identify optimal extraction conditions that maintain the bioactivity of cyclopamine. The method used to quantify alkaloids from the V. californicum extracts is peak integration from high performance liquid chromatography separation, which also enables the analysis of alkaloid ratios to monitor pH effects on deglycosylation. Mass spectrometry is used to identify the isolated alkaloids and Shh light cells will be used to determine bioactivity.
Chemistry and Biochemistry and BioFrontiers Institute and \(^1\)Department of Integrative Physiology, University of Colorado, Boulder, CO 80309; \(^2\)Howard Hughes Medical Institute and Department of Neuroscience, University of Wisconsin, Madison, WI 53706; jonel.saludes@wsu.edu).

Membrane curvature generation plays a crucial role in cell signaling, endo- and exocytosis, and membrane fusion. It is also a characteristic feature in the secretion of highly curved lipid nanovesicles called exosomes (diameter = 30 – 100 nm), which act as vehicles for intercellular trafficking of proteins and extracellular RNAs. Exosomes are also known to expose phosphatidylserine (PS) at their outer membrane leaflet. We hypothesized that fluorescent peptide probes that selectively bind to highly curved, PS-enriched lipid vesicles could be developed as potential tools for detecting exosomes. As a proof-of-principle, we prepared a fluorophore-labeled, azide-functionalized derivative of bradykinin, a peptide ligand for membrane protein receptors, using microwave-assisted solid phase synthesis. A multimeric construct of this peptide was also prepared by ‘Click’ chemistry using a tri-alkyne core. We prepared liposomes as well as exosomes from rat blood plasma using ‘Click’ chemistry employing a tri-alkyne core. We hypothesized that fluorescent peptide probes that selectively bind to highly curved PS-enriched lipid vesicles could be developed as potential tools for detecting exosomes. A proof-of-principle, we prepared a fluorophore-labeled, azide-functionalized derivative of bradykinin, a peptide ligand for membrane protein receptors, using microwave-assisted solid phase synthesis. A multimeric construct of this peptide was also prepared by ‘Click’ chemistry using a tri-alkyne core. We used liposomes as well as exosomes from rat blood plasma as models of lipid nanovesicles. Our results showed that the peptides selectively bound to highly curved liposomes (diameter = 58 ± 5 nm) but did not select for relatively lower curvature liposomes (diameter >100 nm). We also found that exosome-treated peptides showed fluorescence intensities that were higher than untreated peptides, which indicated binding to exosomes. Furthermore, the binding affinity of the triomer was found to be fivefold stronger than the monomer, suggesting that multivalency engendered a synergetic affinity and not just a simple additive effect. We will herein report on the details of this study and on our continuing efforts to develop synthetic peptides as new detection tools for highly curved lipid vesicles.

126 Stability Indicating HPLC Method for Determination of Pantoprazole and Its Related Substances, GAURAV SHARMA*, SAURABH PANDEY and JAMES C BIGELOW\(^3\) (\(^{1}\)Department of Biomedical and Pharmaceutical Science, Idaho State University, 970 South 5th Ave., Pocatello, Idaho 83209-8288, USA; shargaur@pharmacy.isu.edu; \(^2\)Department of Pharmacy, Pranveer Singh Institute of Technology, NH-2 Kalpi Road, Kanpur, Uttar Pradesh-209305, India; \(^3\)Department of Biomedical and Pharmaceutical Science, Idaho State University, 970 South 5th Ave., Pocatello, Idaho 83209-8288, USA; jbigelow@pharmacy.isu.edu).

A novel stability-indicating high-performance liquid chromatographic (HPLC) method was developed and validated for the assay of Pantoprazole in bulk forms. Pantoprazole was found to degrade in acidic, oxidative conditions and under photolytic stress. The drug was stable to alkaline and dry heat conditions. Resolution of drug, its potential impurities and degradation products were achieved on a Hypersil ODS column utilizing 0.01M Phosphate buffer of pH 7 and acetonitrile as eluent at the detection wavelength of 290 nm. The procedure was found to be specific, linear, precise (including intermediate precision), accurate and robust. Acceptable robustness indicates that the assay method remains unaffected by small but deliberate variations, which are described in the ICH (Q1A, Q2B) guidelines.

ORAL BIOLOGY and DENTAL MEDICINE

Monday at 3:10 p.m. in SU Room 219

127 Systemic Correlates and Local Responses to Temporomandibular Joint Disorders, ANDRE BARKHORDARIAN* and GARY DEMERJIAN\(^1\) and FRANCESCO CHIAPPPELLI\(^2\) (\(^{1}\)Evidence-based Decisions Practice-Based Research Network; \(^2\)UCLA School of Dentistry, Division of Oral Biology and Medicine. University of California at Los Angeles, 10833 Le Conte Avenue, Los Angeles, CA 90095; \(^{1}\)Center for TMJ & Sleep Therapy, Glendora, CA; andreueb@gmail.com).
The patient centered outcomes research protocol in our evidence-based decision practice-based research network (EBD-PBRN) addressed the urgent need to identify new diagnostic tools for the diagnosis and prognosis of temporomandibular joint disorders (TMJD). In a translational research study, we validated osteo-immune, pain and tissue destruction proteomic signature biomarkers in saliva and synovial fluid from patients with TMJD by immunoassays (e.g., ELISA). We studied patients with TMJD and putative co-morbid neurological conditions. Diagnostic criteria included jaw joint clicking, jaw pain, ear pain, headaches, neck and shoulder pain or stiffness, limited jaw opening, deviation or deflection of the jaw on opening, as well as imaging (e.g., MRI, CT scan).

Patients with TMJD were treated in appropriately calibrated dental orthotics. Data were analyzed by descriptive and inferential statistics (i.e., ANOVA, multiple regression). In the context of translational effectiveness, we performed in parallel a research synthesis protocol of the bibliome specific to the identified proteomic signature, evaluated the level of the evidence, and the quality of reporting by the Risk of Bias analysis (AHRQ) (n=10; reliability r=0.924), and analyzed those data by acceptable sampling and meta-analysis. Taken together, our findings show that certain neurological pathologies and symptoms (i.e., cervical dystonia, Parkinson’s disease, Tourette syndrome, Blepharospasm and Complex Regional Pain Syndrome) may be linked to TMJD in a large proportion of patients, and that the appropriate bibliometric literature can yield the best available evidence for effective treatment interventions.

In conclusion, TMJD provides a satisfactory model of effective translational research-effectiveness transaction for evidence-based health care.

ECOLOGY, ORGANISMAL BIOLOGY, and ENVIRONMENTAL SCIENCES
Monday, starting at 1:20 p.m. in SU Room 218

128 Identifying Areas with a High Risk of Human Infection with the Avian Influenza A(H7N9) Virus in East Asia, TREVON FULLER1*, THOMAS B. SMITH1, XIANG-MING XIAO1, PARVIEZ HOSSEINI1, YOUN-JEONG LEE1 and PETER DASZAK1 (1Center for Tropical Research, Institute of the Environment and Sustainability, University of California, Los Angeles, 619 Charles E. Young Drive East, Los Angeles, CA 90095; 2Earth Observation and Modeling Facility, University of Oklahoma, 101 David L. Boren Blvd, Norman, OK 73019; 3EcoHealth Alliance, 460 West 34th Street, New York, NY 10001; 4Avian Influenza Lab, Avian Disease Division, The Animal, Plant and Fisheries Quarantine and Inspection Agency, 175 Anyangro, Anyang City, Gyeonggi-do, 430-757 Republic of Korea; fuller1t@ucla.edu).

In February 2013, a new influenza A virus of subtype H7N9 had been reported in eight provinces, Beijing, Shanghai, and Taiwan, infecting 131 people and causing 35 fatalities, a 27% mortality rate. By comparison, the Spanish influenza pandemic of 1918 that killed 50 million and only had a 1% fatality rate. Due to its significant mortality, it is crucial to detect H7N9 in birds to limit transmission to humans. However, H7N9 may be asymptomatic in poultry, which complicates detection. Thus, there is an urgent need for better methods to predict the location of H7N9 outbreaks. To address this, we developed spatial models to identify sites with high ecological suitability for H7N9 in East Asia. The novel H7N9 virus arose through reassortment (exchange of genes) among influenza strains that circulated in birds including H9N2 and an ancestral strain of H7N9. We predicted ecological suitability for H9N2 and ancestral H7N9 using chicken, duck, and human population density and the percent land and water per site. We then calculated the probability that both H9N2 and ancestral H7N9 would occur at a site, which could lead to reassortment in birds. Results indicate that sites that are ecologically suitable for reassortment between ancestral H7N9 and H9N2 in birds overlap significantly with human cases of novel H7N9. Our model identifies Chinese provinces with a high risk of future H7N9 emergence such as Chongqing, Guangdong, Hebei, and Liaoning, which can be prioritized for surveillance.
130 ZomBee Watch: Citizen Scientists Make Important Discoveries about the Range of Zombie Honey Bees, JOHN E HAFERNIK1,3, ASIM UTKU ZIHNOGLU2,3, CHRISTOPHER D QUOCK1,3, JONATHAN IVERS1,3, JEAN-BAPTISTE SOUVESTRE2,3, ROBERT D MACKIMMIE1,3, ANDREW G ZINK1,3 and DRAGUTIN PETKOVIC2,3

('Department of Biology, 2Department of Computer Science, 3Center for Computing for Life Sciences, San Francisco State University, 1600 Holloway Ave, San Francisco, CA 94132; hafernik@sfsu.edu).

This research aimed to investigate the chemically-mediated remains a significant portion of their diet throughout the year. Pygmy rabbits (Brachylagus) is a sagebrush specialist and relies on sagebrush-dominated steppe habitat. Pygmy rabbit intake preferences were largely driven by volatile oil (monoterpene) concentrations, although other classes of defensive compounds (total phenolics) and plant nutrients (crude protein) may also play an important role in diet selection. The chemically-mediated interactions we explored directly contribute to our understanding of rabbit feeding preferences at the individual plant, patch and habitat scales. This information is important for the management of a native herbivore which is also a species of concern.

131 How Does a Hungry Herbivore Subsist on a Poisonous Plant? NATASHA L WIGGINS* and JENNIFER SORENSSEN FORBEY (Department of Biological Sciences, Boise State University, 1910 University Drive, Boise, ID 83725; wigginsn@utas.edu.au).

Big sagebrush (Artemisia tridentata) is considered to be a toxic plant that most mammalian herbivores avoid eating due to the high concentrations of chemical defenses it contains. The types and concentrations of chemical defenses can vary within an individual plant, among individuals, and between populations and subspecies. The pygmy rabbit (Brachylagus idahoensis) is a sagebrush specialist and relies on sagebrush-steppe habitat dominated by big sagebrush. Pygmy rabbits subsist on big sagebrush exclusively during winter, and it remains a significant portion of their diet throughout the year. This research aimed to investigate the chemically-mediated interactions between pygmy rabbits and their diet, and identify the influence of plant chemical defenses on rabbit feeding preferences. We conducted a series of captive- and field-based feeding trials and quantified the chemical composition of the sagebrush subspecies and species that rabbits consumed. Pygmy rabbit intake preferences were largely driven by volatile oil (monoterpene) concentrations, although other classes of defensive compounds (total phenolics) and plant nutrients (crude protein) may also play an important role in diet selection. The chemically-mediated interactions we explored directly contribute to our understanding of rabbit feeding preferences at the individual plant, patch and habitat scales. This information is important for the management of a native herbivore which is also a species of concern.

132 Environmental Impact of the Three Kids Mine Tailings, Henderson, NV, JI HYE PARK*, VERNON HODGE, SHAWN GERSTENBERGER and KRYSYNA STAVE (University of Nevada Las Vegas, 4505 S. Maryland Pkwy, Las Vegas, NV, 89154; parkj37@unlv.nevada.edu).

This research focused on the distribution of the Three Kids Mine (TKM) tailings in surface soils in and around the mine in Henderson, Nevada. It is situated next to the communities of Calico Ridge and Lake Las Vegas Resort, and, just west of the Lake Mead Recreation area. Even though the mine has been inactive for almost 50 years (1917-1961), tailings piles and other sources of contamination on the mine are currently exposed to the atmosphere. In this study, surface soil samples were collected along eight transects emanating from the center of the TKM tailing piles, in one mile increments. The soil samples were analyzed for lead, manganese, arsenic, and 12 other elements using r-x florescence spectroscopy (XRF). The results of this study show that there is transport of mine tailings to surface soils offsite. The mining wastes are transported the farthest from the center of the waste piles along Transects 1 and 2, up to three miles to the northern east and east from the site. The concentrations of manganese, arsenic, and lead in Transects 1 and 2, at one mile from the mine, are found to be significantly higher than the U.S. Environmental Protection Agency (EPA) Regional Screening Level (RSL). The topography (altitude) of these transects is initially increasing, with mountains in the path of Transect 2, and subsequently decreasing toward the Las Vegas Wash and Lake Mead.

133 A Model for Soil-Plant-Surface Water Relationships in Arid Flat Environments, BONNI J KEALY and DAVID J WOLLKIND* (Department of Mathematics, Washington State University, Pullman, WA 99164-3113; dwollkind@wsu.edu).

A classification scheme for stationary vegetative patterned states along a rainfall gradient in an arid flat environment is developed by applying weakly nonlinear diffusive instability analyses to an interaction-diffusion plant-surface water model system. The main results of these analyses can be represented
by closed-form plots in the rate of precipitation versus the specific rate of plant loss parameter space. From these plots regions corresponding to bare ground and vegetative patterns consisting of tiger bush, labyrinth-like mazes, pearled bush, irregular mosaics, and homogeneous distributions of vegetation, respectively, may be identified in this parameter space. Then that predicted sequence of stable states along a rainfall gradient is both compared with observational evidence and used to motivate an aridity classification scheme which sheds new light on desertification phenomena while suggesting potential recovery operations by human intervention.

134 Assessing Interannual Variation in Great Basin Big Sagebrush Growth Response to Climate, LORENZO APODACA1*, DALE A DEVITT1 and L F FENSTERMAKER2 (1School of Life Sciences, University of Nevada Las Vegas, 4505 S. Maryland Pkwy, Las Vegas, NV 89154; 2Division of Earth and Ecosystem Sciences, Desert Research Institute, 755 E. Flamingo Rd., Las Vegas, NV 89119; apodaca@unlv.nevada.edu).

An assessment of the growth response of key vegetative species to climatic variability is vital to identifying possible local impacts on ecosystems faced with climate change. This study utilized annual growth ring indices constructed from big sagebrush (Artemisia tridentata) stems collected in Spring Valley, NV as a measure of vegetative growth. Growth ring indices had a strong positive correlation with growth year precipitation (Oct-Sep; r=0.82) and similar correlations with winter (Oct-Feb) and growing season (Mar-Sep) precipitation (r=0.67 and r=0.68, respectively). Historical NDVIs (Normalized Difference Vegetation Index), an indicator of plant canopy status and photosynthetic activity, were regressed against sagebrush ring indices during the common interval of 1986-2010 in order to examine growth response through time at both the site (30x30m) and valley-wide scales. Growth ring indices showed significant positive correlations at both scales with coefficients ranging from 0.16-0.56 at the single site-pixel level and a coefficient of 0.68 at the multiple site-pixel level. Percent vegetative cover showed a slight but significant (p=0.05) positive effect on the correlations between ring growth and NDVI. Results so far indicate that sagebrush in Spring Valley appear less reliant on seasonal winter precipitation than expected from previous studies and are more susceptible to changes in total annual precipitation. Growth ring-NDVI comparisons were able to resolve these relationships at scales not typically seen in the literature and could allow for more accurate assessment of vegetative response to regional climate change. Cross-species ring index comparisons and more extensive meteorological data are currently being analyzed in order to place Spring Valley sagebrush ring indices in context with surrounding areas.

135 Cold Air Drainage Flow Along a Narrow Wash Within a Montane to Pinyon Juniper Ecotone, BRIAN M BIRD* and DALE A DEVITT (School of Life Sciences, University of Nevada Las Vegas, 4505 S. Maryland Pkwy, Las Vegas, NV 89154; brian@unlv.nevada.edu).

Cold air drainage (CAD) flows are a naturally occurring physical process of mountain systems. Plant communities that exist in cold air drainage basins respond to these localized cold air trends, and have been shown to be decoupled from larger global climate weather systems. The assumption that air temperature decreases with altitude is violated within these systems and climate model results based on this assumption would ultimately be inaccurate. This study is being conducted in the Mojave desert on Sheep Mountain located between two NSF EPSCoR network sites. Monitoring of CAD was initiated in September of 2011 within a narrow ravine located between the 2164 and 2350 meter elevation. A total of 25 towers were installed at equal distances up the sides and center of the ravine on both the N and S facing slopes to assess air temperatures from 0.1 meters to a height of 3 meters. Our goal is to better understand the connection between cold air movement and plant physiological response. The species monitored in this study include: Pinus ponderosa (common name: Ponderosa Pine), Pinus pinyon (Pinyon Pine), Juniperus osteosperma (Utah juniper), Cercocarpus intricatus (Mountain Mahogany) and Symphoricarpos (snowberry). Hourly air temperature measurements within the wash are being captured from 100 ibuttons placed within PVC solar radiation shields. We are also developing a modeling approach to assess the three dimensional movement of cold air over time by incorporating wind vectors captured from 5 2D sonic anemometers. Wind velocities will be paired with air temperatures to better understand the thermal dynamics of CAD. Granier probes were installed in the five test species to monitor transpirational flow relative to cold air movement. Mid day soil – plant water measurements are also being taken on a monthly basis during the growing season at all locations. Measurements include: leaf xylem water potential, stomatal conductance, chlorophyll index readings, canopy minus ambient temperatures and surface soil moisture contents. To date, the systems reveal cold air drainage is occurring at all sites and during both winter and summer seasons. Night time average temperature increased with elevation demonstrating cold air movement and pooling at lower elevations. Also, 3D modeling using the Slicer Dicer 5.1 program confirmed night time pooling was occurring. March and October CAD led to below freezing conditions at lower elevations that reduced the active growing season. PRISM minimum air temperature for the pixel containing the 10 m EPSCoR towers tracked the min. tower air temperature but over estimated 3m CAD sites (> 4 °C) in winter months and by 2 °C in the summer. Localized air temperature within the CAD suggests a decoupling is occurring from the larger tower and PRISM prediction.
ABSTRACTS – Contributed Oral Papers

Monday, starting at 4:00 p.m. in SU Room 218

136 Testing the Assumptions Implicit in the Use of Stalagmites as Paleoclimate Proxies at Juxtlahuaca Cave, Mexico, LAURA ROSALES-LAGARDE*, MATTHEW LACHNIET1 and JUAN PABLO BERNAL-URUCHURTU2 (1Geoscience Department, University of Nevada Las Vegas, 4505 S Maryland Pkwy, SEB 4022, Las Vegas, NV 89154-4022; 2Centro de Geociencias, UNAM Campus Juriquilla, Boulevard Juriquilla 3001, Juriquilla, Querétaro 76230, Mexico; laura.rosales@unlv.edu).

Speleothems are one of the most useful paleoclimate proxies due to their ability to capture the rain water isotopic signature which is related mainly to the amount of rainfall in tropical regions and the temperature at which rain formed. The combined study of rain, spring and cave waters is required to test the assumptions implicit in the use of speleothems, by constraining whether drip waters are accurate representations of rain water, and by estimating the lag time between surface infiltration and arrival to the cave. Juxtlahuaca Cave, near Colotlipa, Guerrero, Mexico, contains stalagmites spanning several hundred thousand years (Lachniet et al. 2012). The cave is ~5 kilometers long and formed as two main nearly-horizontal levels beneath ~200 m of Cretaceous limestone. To study the regional and cave isotopic hydrology, rain water was collected in Colotlipa during the 2011 wet season. Further, stalactite drip and pool waters were collected mostly in June and October of 2012, the beginning and the end of the wet season, respectively. Rain water δ18O values follow closely the Global Meteoric Water Line, and show an inverse relationship between the monthly weighted average δ18O and the precipitation amount. Consistent with the amount effect, cave waters collected in October are 1.5‰ lower in δ18O compared to those collected in June. This isotopic difference suggests cave waters, and as a consequence stalagmites, may record the amount effect. The cave waters average δ18O is in the range measured for the rain water δ18O confirming the speleothems utility as paleotemperature proxies.

137 Paleontology of an Assemblage of Late Holocene Bison from Cathedral Gorge State Park, Lincoln County, Nevada, ALEXANDRA KOSMIDES* and STEPHEN M ROWLAND (Department of Geoscience, University of Nevada Las Vegas, Las Vegas, Nevada; Kosmide3@unlv.nevada.edu).

Between 1996 and 2003 the remains of several Bison bison individuals were excavated within Cathedral Gorge State Park by a team led by William Johnson of the Desert Research Institute. Radiocarbon dating determined that the animals died between 400 and 850 years ago, in the late Holocene. These are the only known prehistoric bison from the Holocene of Southern Nevada. We are restudying this assemblage, with particular attention to taphonomy, age distribution, gender distribution, and possible indications of human interaction.

This research is not yet complete, but preliminary results indicate that the assemblage consists of adult females and immature animals. The limb bones of the juveniles do not have fused epiphyses, which indicates that they were very young animals. We are using the taphonomic data, together with aspects of the topography of Cathedral Gorge State Park, and isotopic analyses of tooth enamel to test hypotheses concerning the behavior and occurrence of Bison bison in the southern Great Basin.

138 Petrology and Geochemistry of the Upper Oligocene to Lower Miocene Volcanic Rocks of the Wasson Formation, Western Cascades Volcanic Series, Southwest Oregon, JAD A D’ALLURA (Department of Chemistry, Physics, Materials, and Engineering, Southern Oregon University, 1250 Siskiyou Boulevard, Ashland, OR 97520; rockit@dishmail.net).

The upper Oligocene to lower Miocene Wasson Formation in southern Oregon is comprised of bimodal silicic tuff and flows concomitant with basaltic-andesite volcanic centers erupted over a landscape of partially-eroded mafic to intermediate volcanoes. Dacite and rhyodacite air-fall and ash-flow tuffs, to include an eruptive caldera complex north of 42°15’, are distinct from southerly rhyolitic tuffs. The southern tuffs contain 4-5% phenocrysts of plagioclase, rare augite, and rare to absent quartz in a devitrified microfelsic groundmass. They record higher K2O and SiO2 but lower Na2O and TiO2. Zeolites, celadonite, calcite, and iron hydroxides are common diagenetic products. Associated basaltic-andesite lavas contain an abundance of phenocrysts (25-40%) dominated by plagioclase. The lavas are magnetic, augite is more abundant than hypersthene (intermittently mantling hypersthene), and may contain olivine or its iddingsite pseudomorph. Early-crystallized plagioclase crystals show plentiful inclusions of glass, opaques, dust, and pyroxene while inclusions are sparse in plagioclase that crystallized later.

 Petrographic evidence in the lavas, including abundance of phenocrysts, two generations of plagioclase, zoning, and reaction rims, indicates a long residence time in magma chambers allowing for not only fractional crystallization but assimilation of crustal material. Trace elements in the southern tuff indicate strong fractional crystallization trends. A weak to moderate positive Eu anomaly suggests the tuffs, and a few lavas, are the products of plagioclase accumulation although modest assimilation is possible. The bimodal chemistry of basaltic-andesite lavas and silicic tuffs suggest periodic intrusion of mafic magma into highly-evolved magma chambers and concomitant volcanism to produce abundant tuffs and localized basaltic-andesite volcanoes.
ABSTRACTS – Contributed Oral Papers

CELL and MOLECULAR BIOLOGY
Tuesday, starting at 8:20 a.m. in SU Room 211

139 Aryl Hydrocarbon Receptor Signaling in Liver Regeneration and Fibrosis, KRISTEN A MITCHELL (Department of Biological Sciences, Boise State University, 1910 University Dr., Boise, ID 83725-1515; kristenmitchell@boisestate.edu).

The aryl hydrocarbon receptor (AhR) is a soluble, DNA-binding protein that regulates the expression of numerous genes involved in development, apoptosis, cell cycle regulation, and immune system activation. While widely recognized for its role in mediating the toxicity of environmental pollutants, such as 2,3,7,8-tetrachlorodibenzop-dioxin (TCDD), the molecular mechanisms that underpin AhR-mediated toxicity are unclear. Furthermore, little is known about the physiological role of this receptor in the absence of exogenous ligand. Current research in our laboratory is focused on determining how AhR signaling regulates liver homeostasis and mediates the hepatotoxic consequences of TCDD exposure. Results from studies in a murine model of liver regeneration indicate that the AhR becomes activated in dividing parenchymal hepatocytes and that TCDD treatment dysregulates cell cycle progression, leading to impaired regeneration. While results from these studies suggest that hepatocytes may be direct targets of TCDD action in the liver, our data also support the notion that non-parenchymal liver cells can also be impacted by AhR signaling. For instance, we recently found that hepatic stellate cells are directly activated by TCDD in culture, and that the activation of these cells is enhanced by TCDD in two different murine models of experimental liver fibrosis. Future studies will include transcriptome-wide profiling to identify how AhR signaling regulates gene expression in the presence and absence of exogenous agonist and to determine the consequences of depleting AhR signaling altogether during liver regeneration and fibrosis. Results from this work could provide a rationale for therapeutically targeting AhR signaling to enhance recovery from liver disease.

140 Altered Gene Expression in Pimephales promelas Fish Brains Exposed to Psychoactive Pharmaceuticals is Associated with Autism Spectrum Disorders, GAURAV KAUSHIK*, KEN AHO and MICHAEL A THOMAS (Department of Biology, Idaho State University, 921 S 8th Ave STOP-8007, Pocatello, ID 83209; kaugsaur@isu.edu).

With the prevalence in US as 1 in 88 children, a majority of cases with idiopathic autism likely result from an unknown environmental trigger in genetically susceptible individuals. Environmental maternal exposure of a fetus to minute concentrations of pharmaceuticals and personal care products (PPCPs) and other compounds is an interesting possibility. Un-metabolized psychoactive pharmaceuticals reach drinking water through a variety of routes, including ineffectively processed sewage. Previous studies in our laboratory examined the extent to which gene sets associated with neuronal development were up- and down-regulated (enriched) in brains of fathead minnows treated with PPCPs at environmental concentrations. Here, we tested the hypothesis that these same gene sets were associated with ASD by analyzing the extent to which their protein products interacted with other proteins in a protein-protein interaction network, composed of known ASD-associated gene products and their interaction partners. A network of 7212 nodes (proteins) and 33,461 edges (interactions) was generated and visualized by using the bioinformatics software package Cytoscape. We then analyzed previously enriched and non-enriched gene sets in the network based on average degrees. Using non-parametric Wilcoxon exact method, we found 24 significant gene sets (p-values <0.05) among 30 gene sets in total. Within the significant gene sets, we listed key proteins that had higher degrees than other proteins. This study signifies the inter-connection of key proteins with other proteins, and any perturbation in their expression may potentially disturb the network, subsequently contributing to or, potentially, causing neurological disorders like ASD.

141 Analysis of Volutin Formation in Saccharomyces cerevisiae, PAMELA A MARSHALL*, DAVID B De LA ROSA, LORENZO G SANCHEZ and MATTHEW L STARR (School of Mathematical and Natural Sciences, Arizona State University, PO BOX 37100, Phoenix, AZ 85069-7100; Pamela.Marshall@ASU.edu).

The budding yeast Saccharomyces cerevisiae serves as an effective model organism for many cellular pathways including phosphate transport, accumulation, and storage. In S. cerevisiae, phosphate is actively transported across the plasma membrane via several phosphate carriers and is then transported into the acidic vacuole (roughly equivalent to the mammalian lysosome with degradative functions but with additional storage functions, such as calcium) where it is synthesized into volutin, a storage form of polyphosphate, found in many organisms. We have been studying volutin granule formation in wild type cells to determine the physiological requirements for formation and in mutants to determine the pathway by which the volutin biosynthetic proteins are transported to the vacuole. Undertaking an analysis of volutin formation in yeast vacuoles by blocking vacuole function with pharmacological agents, such as ionomycin and CCCP, we see that vacuole pH as well as vacuolar calcium seem critical for volutin formation. Different blocks in vacuolar protein sorting have differential effects on volutin granule accumulation, with volutin granule formation seen in all mutant strains thus far tested, except for vps33, a mutant cell strain lacking all vacuolar structure. Our data are consistent with trafficking of the volutin biosynthetic enzymes through either the cytoplasm to vacuole trafficking pathway (CVT) or through the direct Golgi to vacuole vesicle-mediated pathway that sorts alkaline phosphatase to the vacuole (ALP pathway). Our work to determine physiological requirements for volutin granule formation will continue in the future with a new fluorometric method for quantification of volutin in yeast.
142 Characterizing Pluripotency of Primary Cells Derived from Elasmoid Scales of Zebrafish (Danio rerio), KENNETH WEEKES*, LINDSEY CAITLIN, JONATHEN REECK and JULIA OXFORD (Department of Biological Sciences, Boise State University, 1910 University Drive, Boise, ID 83725; kenweekes@boisestate.edu).

Recently, an in-vitro tooth organ culture system was developed using pluripotent stem cells from mouse incisors. This model system recapitulates the reciprocal epithelial-mesenchymal interactions exhibited by all organs during embryogenesis. Remarkably, the tooth organ culture system gave rise to a tooth, that when transplanted, regained most of the necessary attributes of ontogenic mouse incisors. However, noticeable decreases in dental type protein expression levels were identified in the in-vitro tooth organ. The issue with the protein levels will need resolved in order to develop an accurate tooth replacement organ.

It has been suggested that elasmoid scales are derived from odontodal tissues covering ancestral osteichthyan rhombic scales. Elasmoid scales of Zebrafish express nearly all the same genes known for contributing to tooth patterning in mammals. These scales also exhibit similar developmental phases including induction through reciprocal epithelial-mesenchymal interactions. Developing an in-vitro elasmoid scale organ culture system would be beneficial for studying processes to up-regulate protein expression during the induction of reciprocal epithelial-mesenchymal interactions. Therefore, the aim of this research was to isolate mesenchymal type cells from Zebrafish scales and characterize their pluripotency as potential candidates for use in a scale organ culture system. Thus, isolated cells were exposed to a variety of growth mediums to influence differentiation. This primary cell line was also analyzed by RT-PCR for stem cell markers and tested for migratory abilities.

143 Interaction of Anthracyclines and Topoisomerase II Isozymes, NICOLE FRANK1,2*, RICHARD D OLSON2, GERALD M WALSH1, DONG XU2, TODD TALLEY2 and BARRY J CUSACK1,2 (1Research Service, Department of Veterans Affairs Medical Center, Boise ID 83702; 2Department of Biomedical and Pharmaceutical Sciences, College of Pharmacy and ISU Biomedical Institute, Idaho State University, Pocatello, ID 83209, USA; Gem Pharmaceuticals, LLC, 941 Lake Forest Circle, Birmingham, AL 35244; Franniej2@pharmacy.isu.edu).

Anthracyclines, such as doxorubicin, are widely used to treat solid tumors and leukemias. However, they have the potential to cause life-threatening, chronic cardiotoxicity, which limits their potential use. The cause of cardiotoxicity is not thoroughly understood, with previous research indicating the generation of reactive oxygen species and dysregulation of calcium and iron metabolism as possible causes. Recent publications have shown the interaction between doxorubicin and Topoisomerase IIβ plays a key role in anthracycline-induced cardiotoxicity. Topoisomerase enzymes are utilized during the coiling and uncoiling of DNA within the cell and are active targets of anthracyclines, not only in tumoricidal action (Topoisomerase IIα) but also in the pathogenesis of cardiotoxicity (Topoisomerase IIβ). In this research we seek to further evaluate the effect on Topoisomerases of a doxorubicin analog 5-imino,13-deoxydoxorubicin, which has shown promising clinical data suggesting antineoplastic effect without significant cardiotoxicity. Doxorubicin and the analogue were incubated in the presence of catenated DNA at 37°C and exposed to Topoisomerase IIα and β enzymes. The reaction was allowed to proceed for 30 minutes at 37°C and analyzed for decatenation of the DNA by the Topoisomerase enzymes. Comparison of the inhibition by doxorubicin and 5-imino,13-deoxydoxorubicin of decatenation of kDNA by Topoisomerase IIα and β enzymes showed a differential enzyme poisoning between drugs. Ligand docking modeling of these anthracycline compounds to Topoisomerases is also presented, showing a differential binding between anthracyclines. The differences in Topoisomerase inhibition and binding by doxorubicin and 5-imino,13-deoxydoxorubicin suggest that the 5-imino,13-deoxydoxorubicin analog may be less cardiotoxic.

144 Inhibition of the Saccharomyces cerevisiae Low Affinity Calcium Channel, LORENZO G SANCHEZ*, JENNIFER MUIR, JENNIFER L KEPLER* and PAMELA A MARSHALL (School of Mathematical and Natural Sciences, Arizona State University, PO BOX 37100, Phoenix, AZ 85069-7100; Pamela.Marshall@ASU.edu).

The budding yeast, Saccharomyces cerevisiae, has at least two inwardly rectifying plasma membrane calcium channel systems: the high affinity calcium channel (HACS), the heterodimer of Cch1p/Mid1p, and the uncloned low affinity calcium channel (LACS). To assay the LACS channel activity, we assessed the amount of cytosolic calcium after a 100mM (final concentration) calcium pulse in untreated wildtype cells (BY4742) or cells treated with potential inhibitors of the channel. We treated S. cerevisiae cells expressing a cytosolic aequorin with potential inhibitors or a media only control and then placed the cells in a luminometer. Cells were then pulsed with 100mM calcium chloride and cytosolic calcium was assessed by following luminosity given off by the aequorin protein. In the absence of treatment, cells responded to this extracellular pulse with a single peak of aequorin luminosity, corresponding to a cytosolic calcium peak of about 25μM, lasting approximately 2 seconds. After this peak, cytosolic calcium returned to approximately baseline. We treated the cells singly with 100mM magnesium chloride and cytosolic calcium was assessed by following luminosity given off by the aequorin protein. In the absence of treatment, cells responded to this extracellular pulse with a single peak of aequorin luminosity, corresponding to a cytosolic calcium peak of about 25μM, lasting approximately 2 seconds. After this peak, cytosolic calcium returned to approximately baseline. We treated the cells with 100mM magnesium sulfate, 100mM nickel chloride, 100mM cadmium chloride, or 10mM gadolinium chloride. Only the magnesium treatments partially inhibit the LACS channel, as indicated by a decrease of the cytosolic calcium spike to about 5μM after the calcium pulse in cells treated with magnesium chloride or magnesium sulfate. These data indicate that the LACS channel is potentially a
novel type channel, as most calcium channels are either inhibited by nickel (L, N, P, Q, and R) or by cadmium (T and Q).

145 Aryl Hydrocarbon Receptor Regulates Activation of Hepatic Stellate Cells during Experimental Liver Fibrosis, CHERI L LAMB* and KRISTEN A MITCHELL (Department of Biological Sciences, Boise State University, 1910 University Dr., Boise, ID 83725; cherilamb@u.boisestate.edu).

Hepatic stellate cells (HSCs) are central to the development of liver fibrosis, which is a reversible, wound healing response characterized by the deposition of excessive or abnormal extracellular matrix components. During chronic liver injury, activated HSCs assume a myofibroblast-like phenotype, which is characterized by proliferation, contractility, and extracellular deposition of collagen type I. The aryl hydrocarbon receptor (AhR) is a soluble, ligand-activated transcription factor that was recently found to enhance liver damage during experimental liver fibrosis. The goal of this study was to test the hypothesis that AhR signaling influences HSC activation and collagen type I production during experimental liver fibrosis. Mice were treated with the potent exogenous AhR agonist, 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) or with vehicle (peanut oil), and liver fibrosis was induced by either surgical bile duct ligation (BDL) or by six-week exposure to carbon tetrachloride (CCl4). Immunofluorescence staining of paraffin-embedded liver tissue revealed that TCDD treatment increased expression of the HSC activation marker alpha-smooth muscle actin expression. Furthermore, exposure to TCDD enhanced collagen production, based on Sirius red staining and quantification of collagen type I mRNA levels. Results from this study indicate that AhR signaling may regulate HSC activation and the subsequent deposition of collagen during liver fibrosis.

146 High Dimensional Data Analysis in Oncology, AKASH SINGH (IBM Corporation, 840 Stillwater Rd., Sacramento, CA 95835; akashs@us.ibm.com).

Single nucleotide polymorphisms (SNP) play a vital role in genome analysis and have potential benefit in study of carcinogenesis and cancer drug therapy. As the dimension of data is extremely large and shows large numbers of SNPs, representation as feature elements with respect to cancer subject dataset (this sentence is incomplete, please fix). This research shows SNPs associations with cancer growth. Single nucleotide polymorphisms (SNPs) along with DNA microarrays provide the genetic variability in the study. As the data acquisition collects millions of data elements within genome and provides voluminous genetic information, arrays are best in the exploration of molecular medicine. Thus there is a major requirement of efficient mathematical modeling to conduct genome-wide pattern searches for SNPs associations with phenotype. Objective: To analyze high dimensional datasets of oncology to detect cancer, cancer prognosis, identifying gene expression that is responsible for tumor formation and assess the potential of these machine learning algorithms in identifying cancer. Methods: Oncology high dimensional data sets were fed into the database. Subjects investigated were primarily from the brain tumor family, such as • Acoustic Neuroma, Astrocytoma • Grade I - Pilocytic Astrocytoma • Grade II - Low-grade Astrocytoma • Grade III - Anaplastic Astrocytoma • Grade IV - Glioblastoma (GBM) • Chordoma • CNS Lymphoma • Craniosphengegioma • Other Gliomas: • Brain Stem Glioma • Ependymoma • Mixed Glioma • Optic Nerve Glioma • Subependymoma • Medulloblastoma • Meningioma • Metastatic Brain Tumors • Oligodendrogioma • Pituitary Tumors • Primitive Neuroectodermal (PNET) • Other Brain-Related Conditions • Schwannoma • Brain Stem Glioma • Craniosphengegioma • Ependymoma • Juvenile Pilocytic Astrocytoma (JPA) • Medulloblastoma • Optic Nerve Glioma • Pineal Tumor • Primitive Neuroectodermal Tumors (PNET) • Rhabdoid Tumor. A mathematical framework is proposed that runs machine-learning algorithms to predict and forecast disease and assess the gene profiling. Proposed Wavelet Transform is able to hold a large amount of data and reduce data dimensions. Feature selection and feature extraction provides the relevant information that is required for the cancer detection and mapping with SNPs. Results: Identified were the following: TP53 mutations, PDGF/PDGFR expression, EGFR/MDM2 amplification, CDKN2A and PTEN mutation and deletion for precursor cells to Glioblastoma IV and anaplastic oligodendrogiomas shows allelic losses on chromosome arms 1p and 19q. Conclusions: Proposed mathematical framework and machine learning algorithm is extremely fast for the computation of large volume of data and provides an approximation of cancer recurrence.

ENGINEERING, TECHNOLOGY and APPLIED SCIENCES
Tuesday, starting at 8:40 a.m. in SU Room 218

147 Fluctuating Helicity in Homogeneous Turbulence, FRANK G JACOBITZ*, KAI SCHNEIDER2, WOUTER J T BOS3 and MARIE FARGE4 (1Mechanical Engineering Program, University of San Diego, 5998 Alacalá Park, San Diego, CA 92110, USA, jacobitz@sandiego.edu; 2Laboratoire de Mécanique, Modélisation, et Procédés Propres du Centre National de la Recherche Scientifique, Aix-Marseille Université, 38 rue Joliot-Curie, 13451 Marseille Cedex 20, France, kschnedi@cmi.univ-mrs.fr; 3Laboratoire de Mécanique des Fluides et d’Acoustique du Centre National de la Recherche Scientifique, Ecole Centrale de Lyon, Université de Lyon, 69134 Ecully Cedex, France, wouter.bos@ec-lyon.fr; 4Laboratoire de Météorologie Dynamique du Centre National de la Recherche Scientifique, École Normale Supérieure, 24 rue Lhomond, 75231 Paris Cedex 5, France, farge@lmd.ens.fr).

The properties of fluctuating helicity are studied in a variety of prototypical turbulent flows using direct numerical simulation results. The flows considered include forced isotropic turbulence, decaying isotropic turbulence, sheared turbulence,
rotating sheared turbulence, and rotating turbulence. Distributions of fluctuating velocity helicity show a preference for local two-dimensionalization for flows with growing turbulence and a trend to helical motion for decaying turbulence. A scale-dependent analysis shows a trend to local two-dimensionalization for large scales of motion and a preference for helical motion at small scales. These results are consistent for all flows considered in this study. Joint probability distribution functions show a strong correlation of the signs of velocity helicity and vorticity helicity for all cases. This correlation supports the conjecture that the vorticity helicity diminishes velocity helicity.

148 Research Exploiting Parallelism and Scalability (XPS), AKASH SINGH (IBM Corporation, 840 Stillwater Rd., Sacramento CA 95835; akashs@us.ibm.com).

This talk is about parallel computing platform and elastic scalable for the year 2020. The demand for increased parallelism in computing systems is partially due to the need for high-performance, highly reactive systems that interact with other environments (audio/video systems, control systems, networked applications, etc. One of the major goals of concurrent computing systems is to support heterogeneity.

New heterogeneous architectures continue to provide increases in achievable performance, but programming these devices to reach maximum performance levels is not straightforward. All computing systems, from mobile to supercomputers, are becoming heterogeneous parallel computers using both multi-core CPUs and many-thread GPUs for higher power efficiency and computation throughput. While the computing community is racing to build tools and libraries to ease the use of these heterogeneous parallel computing systems, effective and confident use of these systems will always require knowledge about the low-level programming interfaces in these systems.

The goal of the research talk is to make heterogeneous parallelism accessible to average software developers through domain-specific languages (DSLs)- like built-in parallel execution patterns, Optimizers for parallel code generators for Scala, C++ and CUDA and a heterogeneous runtime for executing DSLs, allowing the domain expert to develop parallel software without becoming an expert in parallel programming.

GENERAL and INTERDISCIPLINARY STUDIES

Tuesday, starting at 9:20 a.m. in SU Room 218

149 Journeying through Zen and the Art of Motorcycle Maintenance, JESSICA BUCKLEY*, FRANK JACOBITZ1 and BARTON THURBER2 (1Engineering Department, University of San Diego, 5998 Alcala Park, San Diego, CA 92110; 2English Department, University of San Diego, 5998 Alcala Park, San Diego, CA 92110; jbuckley-12@sandiego.edu).

Robert Pirsig’s loosely autobiographical novel Zen and the Art of Motorcycle Maintenance outlines the importance of bringing together arts and sciences through the analysis of rational or classical thinking and emotional or romantic thinking. While different fields, aspects of life, and even people tend to reinforce these divisions, the most innovative, applicable, and inspirational ideas and answers integrate them. Pirsig argues that “Quality” is the missing link between them; people instinctively know what is good when they are in tune with and care about what they are studying, be it creating art, solving complicated mathematical problems, or repairing a motorcycle engine. Despite the objectivity that forms a major premise of logical contemplation and scientific thought, we cannot be wholly objective in anything we study in this world because we are also in this world and therefore related in some way to the subject.

This project uses Pirsig’s example to incorporate greater fields of study, drawing connections between the technical field of mechanical engineering and cultural disciplines such as philosophy, religion, visual arts, and literature to form as holistic a worldview as possible. The journey to attain this worldview often flourishes in college and continues throughout life and mirrors the philosophical, physical, and personal journeys that take place in the book, ultimately proving the value and importance of integrating all aspects of life to attain personal integrity.

150 Spiny Science: Multi-Media Explorations on the Collaborations Between Scientists and Fishermen; A Case Study of the California Commercial Spiny Lobster Fishery, VICTORIA MINNICH (PO Box 84251, San Diego, CA 92138; accidentalanthropologist@gmail.com).

“Fisheries co-management” has been extensively discussed in the academic literature, but largely exists as a “nice idea” rather than an observable reality; only a handful of projects have been executed in the California region that involved scientists and fishermen positively interacting with each other in various steps of the scientific process.

An inaugural 3-year California spiny lobster sampling-at-sea program involving Collaborative Fisheries Research West, the Ocean Protection Council, and Seagrant initiated this past year. Lead scientists asked a hand-picked assemblage of established commercial fishermen across the Southern California Bight to go “forage” for specific spiny lobster data while simultaneously harvesting this resource during the regular fishing season (from October 2012 to March 2013).

As an independent participant observer of this project, I was recruited to serve as the “data recording deckhand” aboard the Wild West commercial fishing vessel, docked at Mission Bay, San Diego. Not only did I record the numbers as requested by the scientists, but I also collected various forms of qualitative observations, or ethnographic data, drawing notes on the social aspects of the venture.

The collaboration and data sharing between the Wild
West crew and the scientists were overall positive, though there remains lingering tensions and perceived trade-offs in exchanging such information. So far, the fishermen were able to provide extensive, rigorous data to the scientists, have a degree of say in the interpretation of this data, and be modestly compensated for their additional scientific efforts that imposed inefficiencies in the lobster harvesting process. The scientists have gained a large volume of data without incurring high costs if separate research teams were hired to collect the same data on separate boats. Efforts are on-going by both groups to fine-tune the sampling protocols of this project.

151 DesignBuildBLUFF: Coyote Architecture on the Colorado Plateau, JOHN MURRAY*, RICK SOMMERFELD, GLEN LONGHURST¹, CINDY BITHELL², CORTLAND WILSON³, ATSUSHI YAMAMOTO⁴, HIROKO OGISO⁵, ANJEE BRADSHAW⁶ and HANK LOUIS⁷ (¹Integrated Engineering Department, Southern Utah University, Cedar City, Utah, 84720; ²College of Architecture and Planning, 1250 14th Street, Suite 330, Denver, Colorado, 80202; ³DesignBuildBLUFF, 1255 Ironhorse Drive, Upper Level, Park City, Utah 84060; murrayjm@suu.edu).

The Four Corners region in the heart of the Colorado Plateau is a land of little rain, sparse vegetation, extreme weather, and vivid landscapes. It is considered by the Diné (Navajo) to be a sacred place. Intimate connections between earth, water, and sky are revealed to plateau dwellers with open hearts and seeing eyes. In this setting, DesignBuildBLUFF (DBB), a non-profit organization, provides sustainable, pro bono homes for Navajo families living on the reservation near Bluff, Utah. Architecture students from the University of Utah, the University of Colorado, Denver, and engineering students from Southern Utah University design the experimental homes during the summer or fall semester, and build the homes the following semester, blending qualities of the artist, the jester, and the sage with a fierce work ethic and a passionate desire to design and build something real. Glimpsed fleetingly at dawn or dusk, the roughy clad, inventive students might readily be mistaken for coyotes pursuing prey. This paper describes how students participating in DesignBuildBLUFF 2012 created Rain House, a 1200 square foot, passive solar home for Navajo client Lorraine Toney and her five children. EnergyPlus and OpenStudio software from the National Renewable Energy Laboratory (NREL) were used in optimizing the design, connecting contemporary science to the ancient architectural triad of firmness, commodity, and delight. The paper also considers the hands-on, adaptive learning process experienced by the students, a process which may help them meet the grand challenges of the future.

152 A Love Affair With Pidgin, AMY E TILLMAN (795 Hammond Drive. Unit #1208 Sandy Springs, GA 30328; amy.e.tillman@gmail.com).

A married US couple, Mary and Pierre, developed a pidgin-like patois, for their own use, out of three languages that one or the other knew well but both did not share. Their individual languages were so dissimilar that, for effective communication, the two had to resort to a shared self-created medium: Wolof-English (WE). This account looks at how such a private “language” might impact negatively on a non-native learner like Pierre, with his English Second-Language Acquisition (SLA). Presented is a pedagogical look at the effects of this situation on a learner like Pierre, whose aim is to acquire a range of the English language. While he and Mary have created a language style that suits their daily needs, their pidgin’s very success may be preventing Pierre from moving into conventional English. The implications vary: Is a learner who speaks a pidgin as apt to learn a second language? What sorts of barriers are built up by the pidgin? How does the pidgin meet communicative needs and how does using the pidgin translate into second-language learning achievements beyond communicating with his Anglophone wife in a medium they have created together? After working with Pierre, it is clear: he has fossilized in his SLA. My direction, then, has been to look closely at Mary and Pierre, noting language shift and vocabulary used. I explore the line between the bounds of fossilization and the boundlessness of potentiality.

153 Gen Y-ers as Consumers of Good Causes: Examining Student Attitudes, Knowledge, and Behaviors Regarding Cause Marketing, Company-Nonprofit Partnerships, and Cause-Linked Products, ANNIE PAUL (University of Utah, 255 Central Campus Dr., Rm. 3700, Salt Lake City, UT 84112; Annie.Paul@utah.edu).

Many companies are increasingly engaging in corporate social responsibility (CSR) efforts to both enhance their reputation among consumers and grow sales and revenues. These corporations often seek to promote their commitment to charitable causes through cause marketing (CM). Although the literature shows CM to be gaining ground as a promotional tool, little is known about undergraduate students’ perceptions toward it. This study compared undergraduate Business students’ attitudes, knowledge, and behaviors regarding CM, company-nonprofit partnerships, and cause-linked products to those of other undergraduate students at a large public university. Results show that Business students responded less positively toward CM as a business tactic compared to other students, but they still viewed it favorably. Since today’s Business undergraduates might become “tomorrow’s Business managers,” this study aims to show the importance of training undergraduate Business students in CM and CSR so that they can more effectively address the current and future purchasing needs of their Millennial counterparts.
THE LAST OF THE HOMINIDAE

LAWRENCE H WOOD

(Physicist, Retired, 8433 Camano Loop NE, Lacey, WA 98516).

This paper demonstrates that three attributes of our species explain why we are the last surviving species of the Genus Homo: 1) “The very unusual way in which our brains handle information” articulated by paleoanthropologist Ian Tattersall in his recent magnum opus, Masters of the Planet. This paper explains that “very unusual” relates to modern Genetic Synthesis extensions such as increases in alternative splicing frequency in recent (evolutionary) times, detailed in a recent Science Mag. article; 2) Our innate propensity to form groups that are internally cohesive and externally pugnacious which facilitate our often violent acquisition and retention of territory - our “Territorial Imperative” elaborated in Anthropologist-playwright Robert Audrey’s seminal 1971 book, The Territorial Imperative, which explains our propensity as something that Audrey had found to be our “Amity/Enmity complex”; 3) the potential conflict between individual and species survival requirements, resolved by Evolution via this compromise - an occasional irresistible need for sex. After explaining how these attributes led to us, the paper illustrates how these attributes explain long standing imponderables such as our seemingly irrational proclivity for conflict with some members of our species while simultaneously sacrificing our lives for other members; or our possible involvement in the extinction of our closest relatives, Homo Neanderthalensis and Homo Erectus, or the megafauna of North America and Australia. Finally, and perhaps of greatest import, attribute 3 is shown to be the cause of our seemingly unending population growth, which might eventually open the way for the next highest primate.

CONTRIBUTED POSTER PRESENTATIONS

SECTIONS with POSTER PRESENTATIONS

Cell and Molecular Biology .................... page 96
Chemistry and Biochemistry ..................... page 100
Earth Sciences ................................ page 93
Ecology, Organismal Biology, and Environmental Sciences .................... page 95
Education ........................................ page 107
Engineering, Technology, and Applied Sciences
Health Sciences ................................. page 103
Oral Biology and Dental Medicine .............. page 101
Physics and Materials Science ................ page 105
Psychology ....................................... page 107

EARTH SCIENCES

Monday, 9:00 a.m. – Noon in Ballroom A

156 Carbon Isotope Variations Associated with a Late Ordovician Karstic Unconformity, P SUZY WILLIAMS* and GANQING JIANG (Department of Geoscience, University of Nevada Las Vegas, 4505 S Maryland Pkwy, Las Vegas, NV 89119; willi189@unlv.nevada.edu).

Large negative carbon isotope (δ¹³C) excursions have been documented from late Neoproterozoic stratigraphic successions. These δ¹³C excursions have been widely used for regional and global stratigraphic correlation, particularly in strata with limited paleontological and radiometric age controls. Recent studies, however, suggested that some negative δ¹³C excursions from stratigraphic record may have been resulted from meteoric diagenesis, which commonly shifts both carbon and oxygen isotopes toward lower values. Testing the diagenetic origin of δ¹³C excursions in late Neoproterozoic successions has been difficult due to poor age constrains and low stratigraphic resolution. For my thesis research, I propose an integrated sequence and chemostratigraphic study on a well-known karstic unconformity below the late Ordovician Eureka Quartzzite in the southern Great Basin. Carbonate isotope analyses will be conducted in closely spaced sections across the karstic unconformity in eastern California, southern
STEPHEN M. ROWLAND
AMBéR CIRA

Are They from the Super-Eruption of Toba?

ABSTRACTS – Contributed Posters

The Aztec/Navajo/Nugget lithosome of western North America represents an extensive Early Jurassic dunefield desert inhabited by a diverse fauna of theropod dinosaurs, therapsids, and arthropods. A comparable desert existed in Gondwana during the Jurassic and Early Cretaceous, but it is much less studied. It is represented by the Botucatu Formation of Brazil and the Twyfenfontein Formation of South Africa. The objective of this study is to review the published literature in Portuguese, Spanish and English concerning the paleogeography, sedimentology, and paleontology of Early Jurassic to Early Cretaceous dunefield deserts of Gondwana, and compare these with the Aztec/Navajo/Nugget desert of western North America.

Of particular interest are trackways of Brasilichnium, which are found within the Botucatu Formation, and also in the Navajo/Aztec/Nugget sandstones. The published reports on these trackways show that similar trackmakers existed in different regions of Gondwana. These trackways were produced by a therapsid, although the species of the trackmaker has not been identified.

Preliminary results suggest that the Botucatu Formation covers a region of 1.5 million km² and around 100 m thick, whereas the Aztec/Navajo/Nugget Sandstone covers a region of 350,000 km² and up to 670 m thick. The Botucatu Formation expands over what are currently southern Brazil, Paraguay, Uruguay, and Argentina. The Navajo/Aztec/Nugget Sandstone covers what are now parts of western and midwest United States. The Botucatu Formation covers more area regionally, but is much thinner, and the Aztec/Navajo/Nugget Sandstone covers less area, but is much thicker than the Botucatu Formation.

157 A Review of the Paleogeography, Sedimentology and Paleontology of the Jurassic and Cretaceous Eolian Sandstones of Gondwana, MARTIN COBOS-NUNEZ* and STEPHEN M ROWLAND (Department of Geosciences, University of Nevada, Las Vegas, 4505 South Maryland Parkway, Las Vegas, NV 89154; cobosnum@unlv.nevada.edu).

The latest Toba eruption (73.88 ka +/- 0.32 ka) on the Indonesian archipelago was the largest volcanic eruption in the past 2 million years. It had a VEI of 8 and produced a large caldera (100 x 32 km). This eruption occurred during a critical point in human evolution known as the human bottleneck. Around this time, the population of humans drastically decreased to only a few thousand and genetic variation was greatly reduced. However, there is still debate about whether the effects of the Toba eruption were widespread enough to have influenced this bottleneck. Ash from Toba has been found several thousand kilometers from the caldera and may continue to southern Africa, 7500 km away. If ash shards can be found in Africa, they may provide substantial evidence for the widespread effects of the Toba eruption and would imply that the eruption was large enough to affect humans. To date, no visible ash layers have been documented in Africa. Toba ash may have been recognized in borings from Lake Malawi in central Africa but results are not conclusive. However, recently, micron-sized shards were identified in cave floor sediment in an early human archaeological site at Pinnacle Point, South Africa. The sediment horizon with the shards has been dated by Optically Stimulated Luminescence (OSL) techniques at 70.6 +/- 2.3 ka, suggesting a correlation to the Toba eruption. Preliminary major element analyses of the Pinnacle Point shards suggest that they are similar in composition to ash from the latest Toba eruption.

159 Study of Therapsid Trackways in the Jurassic Aztec Sandstone, CHRISTOPHER C. CHESSER*, HEATHER M STOLLER and STEPHEN M. ROWLAND (Department of Geosciences, University of Nevada Las Vegas. 4505 S Maryland Parkway, Las Vegas, NV 89119; chesser4@unlv.nevada.edu).

Therapsids, also known as proto-mammals, are the direct ancestors, and lived alongside mammals in the late Triassic into the Jurassic. Little information is known about Therapsid growth behavior, and this study will use trackways to give better understanding. The project analyzes Brasilichnium trackways in the Jurassic Aztec Sandstone, located in Gold Butte range of Southern Nevada. The tracks are in a single location on various bedding planes. The site contains approximately 400 Brasilichnium tracks, along with tridactyl tracks and other yet unidentified tracks. Brasilichnium has rarely been studied on this large of a scale, with specific emphasis on the relationship of track size and growth patterns.

The site shows groups of therapsid tracks, all heading northward up the dune slip face at approximately 40° (current orientation). The tracks vary in size, giving a diverse group of samples to compare. Measurements have been recorded (width x length) on hundreds of individual tracks ranging from 2.4 x 1.9 cm to 3.8 x 2.8 cm. The stride and width of each trackway has also been documented. Preliminary results show stride steadily increasing from 9 cm to 15 cm as well as width of the trackways ranging from 3.2 cm to 7.1 cm. Further study of this information will allow me to compare the individual track size,
stride and trackway width, and how it relates to the therapsid’s growth. The datasets will be compiled using various graphing techniques to create a visible depiction of track characteristics vs. the early proto-mammal’s size.

160 Synthesis of a Mars Dust Analog, ROSENDO BORJAS1*, PAUL FORSTER1 and ELISABETH HAUSRATH2
(1Department of Chemistry, 2Department of Geoscience, University of Nevada Las Vegas, 4505 S Maryland Pkwy, Las Vegas, NV 89154; borjasr@unlv.nevada.edu).

Establishing the presence of liquid water during Mars past represents a major focus in Mars research for the past decade. A number of recent missions have now convincingly established the presence of liquid water long ago, and tantalizing evidence suggests occasional surface alteration by liquid water now. This project is part of a larger effort to determine if recent liquid water would alter Mars dust in ways that could be detected. Since we do not have access to Mars dust, an important first step is to simulate such dust with materials we can prepare in the lab. These first experiments consist on the synthesis and characterization of a Mars dust analog. As pulverized basalt appears to represent the bulk of the dust on Mars, we have initially selected a basalt sample from Iceland to make our analog. We have selected the technique of ball milling to break down the sample down to the micrometer level that corresponds to Mars dust particles. An average size of the synthetic dust particles was confirmed by gas sorption analysis and SEM imaging. After running these experiments, it will be possible to produce an analog with particles of the desired size. As we improve our ability to better simulate Mars dust, the next steps in this project will be to study the alteration of their surface by liquid water, and the impact on the interaction of CO2 with altered and unaltered surfaces.

ECOLOGY, ORGANISMAL BIOLOGY, and ENVIRONMENTAL SCIENCES
Monday, 9:00 a.m. – Noon in Ballroom A

161 Environmental Microscopy: Metallic-Oxide Surface Films from Wetland Environments and Biological Habitat at the Air-Water Interface, a Study in Structure, RANDALL W SMITH1,2* and ERIK J SÁNCHEZ1 (1Department of Physics, Portland State University, P.O. Box 751-PHY, Portland, OR 97207; 2School of the Environment, Environmental Sciences and Resources Program, Portland State University, P.O. Box 751-ESM, Portland, OR 97207; smithran@pdx.edu; esanchez@pdx.edu).

A curious but ubiquitous feature of wetland environments is the occasional mixed-valent, metallic-oxide surface film, a reflective, often silvery, patch often mistaken for oil or other surface film. While most of these films are mixed-valent iron-oxide films (Fe2O3/Fe3O4), our research shows that other transition metals may appear as surface film components. Previous reports show little biological activity and none discuss these films as habitat. We show that not only do these films have bacterial and other living organisms as community members, but also have characteristics of structure that enhance our understanding of habitability in aquatic environments.

The structure of these films was examined by several microscopical methods including Scanning electron microscopy (SEM), high-resolution transmission electron microscopy (HRTEM) with analysis by Energy Dispersive Spectroscopy (EDS) and Electron Energy Loss Spectroscopy (EELS). A comparison of surface films demonstrates the complex nature of the films themselves and the dynamic nature of life at the air-water interface, as we develop a new model for aquatic surface films as habitat.

Metallic-oxide surface films present new information on the question of habitat and habitability as a feature of the air-water interface. These may be minor components of wetland environments at present, but an important feature of the origin of life for any habitable planet with surface water. The structural features of these films give additional means of comparison for the analysis of early biogeochemical cycling for the development of aquatic life. Besides our own planet, the air-water interface features prominently in the ordering of biological systems.

162 Improving Management Practices of a Faster Osmia lignaria (Hymenoptera: Megachilidae), RUBEN ALARCON and ALINA MITINA* (Biology Program, California State University Channel Islands, One University Drive Camarillo, CA 93012; alina.mitina326@myci.csuci.edu, rubenalarcon@csuci.edu).

The continual decline of honey bee populations and the projected expansion of land devoted to almond production in California, sets an urgent need to develop alternative pollinators. The blue orchard bee, Osmia lignaria (Hymenoptera: Megachilidae) has been successfully used to pollinate orchard crops in the Western US; however management practices still need to evolve to ensure the establishment of self-sustaining O. lignaria populations. To reduce the time females spend in nesting-related activities, nesting conditions were manipulated and the behavior of the female bees was recorded. Nesting blocks that were scorched provided bees with visual cues and decreased the number of nest probes compared to bees using unmarked control nesting blocks. This reduction in unnecessary nest probes also saved female bees time on their return trips. O. lignaria females will spend less time on nest construction and thus increase the time they spend actively provisioning their offspring.

163 Distribution, Thermal Limit, and Biogeography of Nitrite-Oxidizing Bacteria in Geothermal Springs throughout the US West, NAMRITHA MANOHARAN1*, NICOLE A CALICA1, ERIC S BOYD2 and BRIAN P HEDLUND1 (1School of Life Sciences, University of Nevada Las Vegas, 4505 S Maryland Pkwy, Las Vegas, NV 89154; calica.namritha@unr.nevada.edu, boyd.eric@unr.nevada.edu, hedlund.brian@unr.nevada.edu).
Bldg. Bozeman, MT 59717; eboyd@montana.edu).

Montana State University, 224 Chemistry and Biochemistry

The effect of high temperature on the nitrogen biogeochemical cycle has yet to be thoroughly explored. The objectives of the current study were to examine the distribution, thermal limit, and biogeography of nitrite-oxidizing bacteria (NOB) in geothermal springs throughout the US West, including fault-driven systems in the Great Basin (CA, NV), Mojave (NV) and volcanic systems associated with the Valles Caldera (NM) and the Yellowstone Caldera (WY). Enrichment cultures revealed the ubiquitous distribution of moderately thermophilic NOB capable of oxidizing nitrite at 50°C. NOB enrichments from the Great Basin, Mojave, and Valles Caldera were capable of oxidizing nitrite up to 60 to 65°C; however, no evidence of nitrite oxidation activity over 50°C was evident in some enrichments from Yellowstone. The difference in upper temperature limits may be due to divergent evolution of geographically isolated NOB or to the absence of a particular species of NOB in Yellowstone. This study demonstrates the wide distribution of thermophilic NOB in the US West and establishes a new upper temperature limit for chemolithotrophic nitrite oxidation. Future experiments are aimed at identifying the NOB in enrichment cultures by 16S rRNA gene phylogenetic analysis and more thoroughly characterizing their physiological properties.

164 Analysis of Mosquito (Culex quinquefasciatus) Host Volatiles by Gas Chromatography-Electroantennographic Detection (GC-EAD) System, ALYSSA DE LA ROSA* and WALTER S LEAL (Agricultural and Environmental Chemistry Graduate Group, University of California, Davis, One Shields Avenue, Davis, California 95616; amde@ucdavis.edu).

Mosquitoes pose serious health risks to vulnerable populations around the world due to their ability to transmit deadly diseases such as malaria, encephalitis, dengue fever, West Nile virus, and many others. Major efforts have been undertaken to understand chemical olfaction, or the major process by which mosquitoes find their hosts. Volatiles, such as pheromones and human emanations, elicit specific behavioral and physiological responses from mosquitoes allowing them to continue in their role as vectors of diseases.

While human emanations have previously been studied to identify key volatiles that attract mosquitoes, less is known about the differences in the chemical composition that results in why certain people are more attractive to mosquitoes than others. This study aims to assess this phenomena of preferential “mosquito magnetism” by examining human emanations using Gas Chromatography- Mass Spectroscopy (GC-MS) and Gas Chromatography Electroantennographic Detection (GC-EAD) systems coupled with statistical surveys of participants’ perceived attractiveness to mosquitoes. The GC-EAD system uses two detectors, a Flame Ionization Detector (FID) and a live mounted mosquito, to detect volatiles via electrical depolarizations of olfactory neurons. Volatile samples from participants’ forearms were collected with solid phase microextraction (SPME) fibers and analyzed by GC-MS to determine the chemical composition, while using the GC-EAD system to determine the physiological relevance of the volatiles. Results to be presented include correlation between active volatiles and perceived attractiveness and “volatile signatures” that can modulate mosquito attraction.

By determining the volatiles responsible for preferential “mosquito magnetism” we can finally shed light on this long debated phenomena.

CELL and MOLECULAR BIOLOGY

Monday, 9:00 a.m. – Noon in Ballroom A

165 The Putative Role of Resveratrol in SIRT-1-mediated Modulation of the Vitamin D Pathway, ANGELIKA DAMPF STONE1*, SHANE F BATIE1, G KERR WHITFIELD2, MARK R HAUSSLER3 and PETER W JURUTKA12 (1Mathematical and Natural Sciences, Arizona State University, 4701 W. Thunderbird Road, Glendale, AZ 85306; 2Basic Medical Sciences, University of Arizona College of Medicine, 550 E. Van Buren Street, Phoenix, Arizona 85004; Angelika. Dampfstone@asu.edu).

The nuclear vitamin D receptor (VDR) modulates gene transcription in 1,25-dihydroxyvitamin D (1,25D) target tissues such as kidney, colon, and bone. The 1,25D hormone is derived from vitamin D in the skin or from the diet, and binds to and activates the VDR. We have previously shown that resveratrol, an antioxidant found in the skin of red grapes, activates the VDR signaling pathway. Cells treated with resveratrol and 1,25D showed synergistic stimulation of VDR-mediated transcription. When hormone treatments were applied to wild-type and single-point VDR mutants, 1,25D displayed a significant drop in activity caused by these ligand-binding pocket mutations, while the ability of resveratrol to activate VDR was only modestly attenuated. These results suggest that resveratrol affects VDR activity indirectly, perhaps by activating SIRT1, an enzyme known to deacetylate other nuclear receptors. Radiolabeled 1,25D displacement assays supported this hypothesis, suggesting that direct binding of resveratrol to the VDR is unlikely. Additionally, we observed increased transactivation in response to resveratrol in other nuclear receptors, including the liver X receptor, which is closely related to the VDR and is known to be deacetylated by SIRT1. We tested receptor-mediated transactivation in a system containing VDR in the absence and presence of overexpressed SIRT1. VDR activity was higher in cells expressing SIRT1, and synergistic activity of 1,25D combined with resveratrol was observed. We are currently employing this VDR/SIRT1 assay in multiple cellular contexts. In conclusion, this study
elucidates a potential novel pathway for “crosstalk” between two nutritionally derived lipids, vitamin D and resveratrol.

166 Evaluation of Resveratrol as a Novel Modulator of the FOXO and Vitamin D Pathways in Colon Cancer, MARYA S SABIR*1, ANGELIKA DAMPF STONE1, SHANE F BATIE1, G KERR WHITFIELD2, MARK R HAUSSSLER2 and PETER W JURUTKA12 (1Mathematical and Natural Sciences, Arizona State University, 4701 W. Thunderbird Rd., Glendale, AZ 85306; 2Basic Medical Sciences, University of Arizona College of Medicine, 550 E. Van Buren Street, Phoenix, AZ 85004; msabir@asu.edu).

Acquired from dietary sources or synthesized via sun exposure, vitamin D is converted to the active metabolite, 1,25-dihydroxyvitamin D (1,25D) which functions as the primary ligand for the nuclear vitamin D receptor (VDR). The activated hormone-receptor complex mediates a myriad of bioactivities (i.e, cell proliferation/differentiation and chemoprevention of epithelial cancers) by modulating gene transcription in VDR target tissues, including colon and kidney. Resveratrol, a plant-derived polyphenol, functions as a chemopreventative agent and potent activator of NAD-dependent deacetylase sirtuin-1 (SIRT1). The current study employed mammalian-two-hybrid (M2H) and VDRE-based transcriptional assays to probe effects of resveratrol on VDR signaling. Resveratrol potentiated 1,25D-dependent heterodimerization between VDR and RXR, as well as VDRE-driven transcription. 1,25D displacement assays revealed an increase in VDR-bound radiolabeled 1,25D only in the presence of resveratrol, suggesting that resveratrol may indirectly increase VDR trans-activation by stimulating SIRT1 (a deacetylase protein and known target of resveratrol) and FOXO3, a transcription factor which has been shown to regulate common VDR target genes. Initial studies reveal that FOXO3 activity diminishes when at least one component of a putative trimeric complex of VDR, SIRT1, and FOXO3 is eliminated. Additionally, the upregulation of p21, a human tumor suppressor gene, was induced by FOXO3 and VDR in colon cancer cells when treated with both 1,25D and resveratrol. We propose that 1,25D-VDR associates directly with resveratrol-activated SIRT1 and FOXO3 to form a trimeric complex resulting in SIRT1 deacetylation of FOXO3 and VDR, thus leading to enhanced transactivation of tumor suppressor genes by VDR/FOXO3 to attenuate colonocyte proliferation.

167 Profiling Cryptic Splice Sites in the Breast Cancer Type 1 (BRCA1) Gene, ANTHONY BORTOLAZZO*2 and SAMI KHURI1 (1Department of Biological Sciences, San Jose State University, One Washington Square, San Jose, CA 95192; 2Department of Computer Science, San Jose State University, One Washington Square, San Jose, CA 95192; anthony.bortolazzo@gmail.com, sami.khuri@sjsu.edu).

Recently, it has been recognized that many mutations are pathogenic because they impact the mRNA rather than the protein itself. Point mutations in the DNA or errors during transcription can activate a “cryptic splice site” in regions of the transcript that are not usually spliced. The activation of cryptic splice sites is often related to human hereditary diseases, such as familial breast cancer. Researchers are constantly aiming to improve upon existing screening methods for such deleterious alleles, but often these sequence variants can be ambiguous and difficult to screen for.

Mutations within BRCA1 are often implicated in the development of familial breast cancer. Some of these mutational events have been shown to activate cryptic splice sites, leading to aberrant protein expression or abolishment of expression, the latter due to nonsense-mediated mRNA decay. We have chosen BRCA1 as a test case for our computational approach to putative splice site prediction.

In this work, we utilize experimentally verified splice site sequence data in the training of position weight matrices for both the 5' and 3' splice sites. We then use these position weight matrices to score the known BRCA1 authentic and cryptic splice sites. The sensitivity and specificity of our models are assessed using 10-fold cross validation and a receiver operating characteristic curve (ROC).

168 YAP Overexpression in Immortal Oral Keratinocytes, KAYLA RAYFORD*1, DAVID BAE2 and CUN'YU WANG2 (1Howard Hughes Medical Institute Pre-College Science Education Program, UCLA School of Dentistry, 10833 Le Conte Avenue, 63-007 CHS, Los Angeles, CA 90095; 2UCLA School of Dentistry, 10833 Le Conte Avenue 33-030A CHS, Los Angeles, CA 90095; Kayla.rayford@gmail.com).

Head and neck squamous cell carcinomas (HNSCCs) are the most common cancers formed in the lining of the head and neck cavity. The five year survival rate is considerably low due to the highly aggressive and metastatic properties of HNSCCs. Therefore, understanding how these cancers metastasize is of significant and immediate importance to better the quality of life and longevity of HNSCC patients. Yes-associated-protein (YAP) is an oncogene and transcription co-activator found unregulated and activated in numerous solid tumors including that of HNSCCs. Objective: Determine whether the overexpression of constitutively active YAP protein (YAP-5SA) can induce transformation in the immortalized but nontransformed oral keratinocyte cell line OKF6. Methods: We have created a YAP-5SA expressing OKF6 stable cell line by retroviral infection. In vitro biological assays were performed to test for proliferation and invasion. Additional western blots were performed to determine the occurrence of epithelial-mesenchymal transition (EMT). Results: YAP-5SA expressing OKF6 stable cell lines were confirmed by western blot analysis. In addition YAP-5SA OKF6 cells displayed an elongated fibroblast like morphology indicative of EMT. In vitro biological experiments revealed that YAP-5SA OKF6 cells had greater proliferative advantage, as well as greater saturation density,
169 The Effect of Stress-Enhanced Fear Learning on a Glutamatergic Receptor Sub-unit in the Cerebellum of Male Long Evans Rats, CAMERON STEVENSON MONROE1*, EDWARD MEYER2, JAMES MAKSMTETY2 and IGOR SPIGELMAN2 (1Howard Hughes Medical Institute Pre-College Science Education Program, UCLA School of Dentistry, 10833 Le Conte Avenue, CHS 43-009, Los Angeles, CA 90095; 2UCLA School of Dentistry, 10833 Le Conte Avenue, CHS 63-078, Los Angeles, CA 90095; C.StevensonMonroe@gmail.com).

Stress-Enhanced Fear Learning (SEFL) is an animal model used to mimic anxiety disorders such as post-traumatic stress disorder (PTSD). Metyrapone, as a cortisone synthesis inhibitor, has potential as a therapeutic for anxiety disorders. The cerebellum coordinates movement as well as participates in motor learning. Alterations in the expression of the α-amino-3-hydroxy-5-methyl-4-isoxazolepropionic acid receptor (AMPARe) subunit, GluA1, are linked to changes in synaptic activity and are directly correlated to changes in learning and memory. Objective: To identify biochemical changes to the cerebellum, with and without metyrapone treatment, in order to better understand the mechanisms involved with SEFL, characterize the model and its response to potential therapeutics.

Methods: Cerebellar tissue samples from 4 treatment groups of male Long Evans rats (control and SEFL for untreated and metyrapone treated groups) were homogenized, and protein assays were done to quantify protein concentration. Western blots were done using SDS-PAGE, and PVDF membranes. Blots were probed using anti-GluA1 and anti-GAPDH primary antibodies. Digitally captured images were analyzed. GluA1 optical density (OD) values were normalized to GAPDH ODs. Results: There was a trend of increased GluA1 after Metyrapone treatment. However, there were no statistically significant differences across either treatment group. Discussion: The GluA1 expression was higher in metyrapone treated groups than the untreated groups, and this shows metyrapone might potentially affects synaptic activity in the cerebellum. Conclusion: Research with larger sample sizes should tell us if metyrapone alters GluA1 expression in the cerebellum, and will help to understand how potential pharmacotherapeutics alter brain physiology.

170 Unique Localization and Role of the Transient Receptor Potential, Melastatin-2 (TRPM2) Cation Channel in Breast Cancer Cells, MENGWEI LIU*, XIAOXING FENG, MANDI M HOPKINS and DAVID W KOH (Department of Pharmaceutical Sciences, Washington State University, Wilson Road, Pullman, WA 99164; mengwei.liu@email.wsu.edu).

The transient receptor potential, melastatin-2 (TRPM2) channel mediates Ca2+ influx and plays a key role in oxidative stress-induced cell death. TRPM2 has been associated with a wide spectrum of diseases including cancer. The objective of this study was to determine the effect of TRPM2 inhibition in breast cancer cells after chemotherapy.

We demonstrated that TRPM2 inhibition increased estrogen receptor-positive (ER+) MCF-7 and triple-negative (TN) MDA-MB-231 breast cancer cell death after chemotherapy. Decreased noncancerous MCF-10A and HMEC breast cell death was observed after similar treatments. As TRPM2 is normally localized to the plasma membrane, subcellular localization analyses demonstrated a nuclear localization of TRPM2 in TN/ER+ cells. Analysis of poly(ADP-ribose) levels, a key indicator of genomic stability, demonstrated decreased poly(ADP-ribose) levels after TRPM2 silencing, which suggests that TRPM2 inhibition may decrease genomic stability in breast cancer cells, thereby decreasing proliferation and increasing cell death after chemotherapy in breast cancer cells.

Taken together, the results demonstrate the ability of TRPM2 inhibition to selectively increase breast cancer cell death after chemotherapy. Further, the results suggest that TRPM2 has a novel role in breast cancer cells, which is unique from its role in non-cancerous cells. Therefore, the results provide a potential paradigm shift, where TRPM2 protein functions independently of its role as a cation channel in cancerous cells. Thus, the pharmacologic inhibition of TRPM2 is a promising target for successfully treating breast tumors, while minimizing harmful effects in noncancerous tissues.
minimal effects of TRPM2 inhibition on intracellular calcium levels in cancer cells. Further, analysis of genomic integrity demonstrated increased DNA damage after TRPM2 inhibition or RNAi silencing, which indicates a significant role for TRPM2 in promoting genomic integrity in breast cancer cells.

In summary, we demonstrate that TRPM2 has a role in promoting the genomic integrity of breast adenocarcinoma cells. Further, our studies show that TRPM2 has a novel role in breast cancer cells that is unique from its role in non-cancerous breast cells. Taken together, we have potentially identified a novel target in breast cancer cells that may be pharmacologically inhibited to selectively induce breast cancer cells death, with minimal deleterious effects in normal cells. The results could significantly improve the treatment of human breast cancer patients in the future.

Identification of Differentially Expressed Genes as Biomarkers for Diagnosis of Irritable Bowel Syndrome (IBS): A Pilot Gene Discovery Hypothesis Generating Study

MARYAM M HOCKLEY**, MICHAEL A GALLIGAN1, LIN ZHANG1, TODD R SANDRIN1 and PETER W JURUTKA1,2

(1) School of Mathematical and Natural Sciences, New College of Interdisciplinary Arts and Sciences, Arizona State University, 4701 W Thunderbird Rd., Glendale, AZ 85306; (2) Department of Basic Medical Sciences, University of Arizona College of Medicine, 550 E Van Buren St, Phoenix, AZ 85004; mhockley@asu.edu).

The diagnosis of irritable bowel syndrome (IBS) is currently based on symptomatic criteria that exclude other conditions affecting the gastrointestinal tract, such as celiac disease, food allergies, and infections. The absence of appropriate diagnostic and therapeutic approaches for IBS places a significant burden on the patient and the health care system due to direct and indirect costs of care. Limitations associated with the application of symptomatic criteria include inappropriate use and/or intrinsic restrictions such as the population to which these criteria are applied. The lack of biomarkers specific for IBS, non-specific abdominal symptoms, and considerable variability in the disease course creates additional uncertainty during diagnosis. This project involves screening colonic tissue samples from patients with verified IBS to identify gene expression-based biomarkers associated with the disease.

The current results obtained from two gene chip microarray analyses from a total of 16 tissue biopsy samples have revealed a number of up-regulated and/or down-regulated genes when compared to the genetic profile of matched control non-IBS tissue samples. A select number of genes were further analyzed using bioinformatics to determine their function in biological pathways in the body. This analysis suggested that some of the genes could not only be participants in pathways leading to the inflammatory symptoms that are characteristic of IBS, but that multiple genes working in tandem may create a genetic “fingerprint” responsible for IBS, and that these gene-expression patterns could serve as a reliable diagnostic tool for IBS.

Role of TNF-alpha In the Promotion of Stem Cell Differentiation and Prevention of NK Cell Mediated Lysis

JARRETT DAVIS1*, DERRIAN DRISCOL1*, HELEN TSENG1 and ANAHID JEWETT2

(1) Howard Hughes Medical Institute Pre-College Science Education Program, UCLA School of Dentistry, 10833 Le Conte Avenue, 63-007 CHS, Los Angeles, CA 90095; 2 UCLA School of Dentistry, 10833 Le Conte Avenue 33-030A CHS, Los Angeles, CA 90095; jarrett.davis888@gmail.com).

Natural killer (NK) cells provide rapid responses to virally infected cells and respond to tumor formation. Stem cells are more sensitive to NK cell directed cell death as compared to differentiated cells. Cell differentiation is promoted through the secretion of the cytokine TNF-alpha, which is a cytokine that inhibits tumorigenesis. Objective: To compare levels of TNF-alpha secretion in Oral Squamous Cell Carcinoma (OSCCs) and Oral Squamous Carcinoma Stem Cells (OSCSCs) after various treatment regimens, containing antibodies such as anti-CD-16 which codes for the CD-16 receptor on NK cells and cytokines such as IL-2 which is used for immune signaling, using ELISA. Methods: The OSCCs and OSCSCs were resected from patients’ tongue tumors and the blood was drawn from healthy blood donors and NK cells were purified from blood. The OSCCs and OSCSCs were then treated with seven treatment regimens: NK-IL2, NK + anti-CD16 + IL2, NK + anti-CD16 + IL2 + LPS, NK + anti-CD16 + IL2 + LPS + VSL3, Media + LPS, Media + VSL3, and Media alone. Following this experiment an Enzyme–Linked Immunosorbent Assay (ELISA) was run to measure the concentration of the cytokine tumor necrosis factor-alpha (TNF-alpha) secretion in the supernatant samples. Results: Our ELISA showed high levels of TNF-alpha secretion by NK cells treated with NK + anti-CD16 + IL2 + LPS but low levels by cells placed within Media, which is used to promote cell growth. Discussion: Research on techniques that utilize this treatment combination may help fight cancer. However, this requires further research. Conclusions: Through the high levels of TNF-alpha secretion we will have a better chance in fighting tumorigenesis.

Patterned Spontaneous Activity in the Retina is Necessary for the Normal Functional Development of Visual Neurons in the Lateral Geniculate Nucleus

ZACHARY DA VIS*, BARBARA CHAPMAN and HWAI-JONG CHENG (Center for Neuroscience, University of California, Davis, 1544 Newton Court, Davis, CA 95616; zwdavis@ucdavis.edu).

The development of neural circuits has long been understood as an activity dependent process. However the mechanism by which activity plays a role, and the extent to which activity is instructive to the process, remains a topic of debate. Spontaneous activity is thought to instruct early anatomical targeting of neural circuits while stimulus driven activity drives functional refinement. To study these processes, we use the visual system as a model for circuit development. Recent work has suggested that the patterns in the spontaneous activity of
the retina that occur before the retina is photo-active are sufficient for the proper segregation of separate channels of visual information. This segregation would be essential for the later functional development of the system through light evoked activity. To test this hypothesis we chronically disrupted the patterns of spontaneous retinal activity in vivo through intraventricular injections of inhibitory antagonists in ferrets (Mustela furo) during a time preceding the experience of light evoked activity. Our data suggests that patterned spontaneous activity is necessary for the proper functional development of light evoked responses that later occurs as a result of vision after eye opening.

CHEMISTRY and BIOCHEMISTRY
Monday, 9:00 a.m. – Noon in Ballroom A

175 Novel (4,4'-di[alkoxy]-2,2'-bipyridine)Pt(II)Cl2 Complexes Induce Apoptosis in Breast Cancer Cells, VAN VO*, HAESOOK HAN, PRADIP K BHOWMIK and BRYAN L SPANGELO (Department of Chemistry, University of Nevada Las Vegas, 4505 Maryland Parkway, Las Vegas, NV 89154-4003; vanv@unlv.nevada.edu).

Platinum-based drugs are used in about 50% of cancer chemotherapeutic regimens to treat various cancers; however, they are not generally used for breast cancer. Recently, platinum-based drugs are being introduced into clinical settings as an emerging new treatment method for breast cancer. The three platinum drugs that are currently approved for use worldwide are cisplatin, carboplatin, and oxaliplatin. Although commonly prescribed, clinical application of these drugs is limited due to cellular resistance and toxic side effects.

In an effort to develop improved platinum drugs for the treatment of breast cancer, a series of platinum-complexes having the general formula (4,4'-di[R]-2,2'-bipyridine)PtCl2 (where R = -(CH2)n-1CH3, n = 2-6) were synthesized. In vitro MTS cell proliferation assay demonstrated that these compounds inhibited the proliferation of various human breast cancer cells in a concentration and time-dependent manner, and are much more potent than cisplatin. Additionally, a structure-activity relationship was observed, that is, the activity increases as the carbon chain length of the alkyl group increases. Fluorescence microscopy and flow cytometry data indicated that these complexes induce cell death through apoptosis.

176 Oxyhalogen-Sulfur Chemistry: Kinetics and Mechanism of Oxidation of N-(2-Mercaptopropionyl) Glycine (MPG) by Acidified Chlorite and Aqueous Chlorine Dioxide, THAI TRAN, WILBES MBIYA and REUBEN SIMOYI (Chemistry Department, Portland State University, 1825 SW Broad- way, Portland, OR 97207; tranthai@pdx.edu, wmbiya@pdx.edu, rsimoyi@pdx.edu).

The key to understanding the physiological role of N-(2-Mercaptopropionyl) glycine (MPG; a.k.a. thiola), a drug used for the treatment of cystine kidney stone, is through studying the oxidation pathway, including reactive intermediates and oxidation products. The current study was carried out under the condition of excess acidified chlorite and aqueous chlorine dioxide and was followed spectrophotometrically using a stopped flow instrument. The stoichiometry of the reaction between MPG and acidified chlorite is a ratio of two to three, according to equation 1: 2MPGSO3H+ + 3ClO2- → 2MPGSO3H+ + 6Cl- (Eq. 1). It was confirmed by H NMR that the carbon backbone of MPG was not altered in the reaction, and that oxidation occurred only at the sulfur center. The oxidation product for the reaction between MPG, acidified chlorite and aqueous chlorine dioxide was detected by electrospray ionization mass spectrometry (ESI-MS) to be a sulfonic acid. There was no evidence for sulfinic or sulfenic acid as reaction intermediates.

177 Green Chemistry Approach: Syntheses of 4,4'-Poly(oxyethylene) Aromatic Diamines via Reduction of the Respective Aromatic Dinitro Compounds using Sodium Sulfide in Water, ONTIDA TANTHMANATHAM*, HAESOOK HAN and PRADIP K BHOWMIK (Department of Chemistry, University of Nevada Las Vegas, 4505 Maryland Pkwy, Las Vegas, NV 89154-4003; tanthman@unlv.nevada.edu).

Aromatic amines are an important class of organic compounds due to their numerous usages in pharmaceuticals and industrials. They are obtained by the reduction reactions of nitro compounds with various reducing reagents, many of which are toxic and/or known to produce harmful waste. Green chemistry is an innovative approach which not only aims to reduce health risk of workers, but also to minimize detrimental effects to the environment. Sodium sulfide is an attractive reducing reagent for the reasons of low cost, experimental safety, and nitro selective for compounds potentially prone to a strong reducing reagent and/or compounds that are sensitive to decomposition. In the present, a series of 4,4'-poly(oxyethylene) aromatic dinitro compounds (O,N-Ar-(O-CH2-CH2)n-O-Ar-NO2; n = 1-6) were successfully reduced into the corresponding amines in a water medium. Reactions were completed within 24 to 48 hours on heat to reflux with moderate to high yields. The chemical structures of these amines were characterized by nuclear magnetic resonance spectroscopy (1H NMR and 13C NMR), differential scanning calorimetry (DSC), and elemental analysis.

178 Synthesis and Characterization of Polypyridinium Salts Containing Dioxynylene Units in the Main-Chain and their Sensing Performance toward Acids in Organic Solvents, TAE SOO JO1, JUNG JAE KOH1*, ALEXI K NEDELTCHEV1, HAESOOK HAN2, PRADIP K BHOWMIK1 and HARI MANDAL3 (1Department of Chemistry, University of Nevada Las Vegas, 4505 Maryland Parkway, Las Vegas, NV 89154; 2Department of Biology and Chemistry, Texas A&M International University, 5201 University Boulevard, Laredo, TX 89154-4003; 3Department of Chemistry, University of Nevada Las Vegas, 4505 Maryland Parkway, Las Vegas, NV 89154; 4Department of Chemistry, University of Nevada Las Vegas, 4505 Maryland Parkway, Las Vegas, NV 89154; vanv@unlv.nevada.edu).

There was no evidence for sulfinic or sulfenic acid as reaction intermediates.
The π-conjugated polymers have emerged as potential candidates for many optical devices. Due to their facile preparation methods, unique properties, and stability in air, they have been applied to energy storage, memory devices, chemical sensors, organic light emitting diodes (OLEDs), organic field-effect transistors (OFETs), and organic photovoltaic cells (OPVs). Among many ionic polymers, poly(pyridinium salt)s are an important class of macromolecules that contain ionic groups in their backbones, since they are suitable polymers for the construction of multilayer assemblies via electrostatic interactions. Here, a series of poly(pyridinium salt)s with dioxyethylene units were synthesized through the ring-transmutation polymerization reaction of bispyrylium ditosylate salt and the dioxyethylene containing diamine; and its counterions were exchanged to different organic anions via the metathesis reactions. Their chemical structures were confirmed by 1H and 13C NMR spectroscopic techniques and elemental analysis. They showed high thermal stability in the range of 284–406 °C depending on the nature of anions and also had good solubility in various organic solvents. There were no significant changes in spectral features in their absorption spectra, however, their emission properties were dependent on the polarity of solvents. In the thin films cast from acetonitrile, the λem peaks of light emission were shifted hypsochromically because of the less ordered structures in the solid state. Some of polymers exhibited the lyotropic liquid-crystal properties in various organic solvents above their critical concentrations (C*). The presence of methyl orange counterion in the ionic polymer enabled it to be used as pH sensors in organic solvents.

**ORAL BIOLOGY and DENTAL MEDICINE**

Monday, 1:00 p.m. – 4:00 p.m. in Ballroom A

179 **Effect of Grainy Head Like-2 Knockdown on Carcinogenesis of Squamous Cell Carcinoma 4,** CHRISTOPHER WILSON*, ANDY MARQUEZ*, RICHARD LEE, WEICHEN and MO KANG† (†Howard Hughes Medical Institute Pre-College Science Education Program, UCLA School of Dentistry, 10833 Le Conte Avenue, 43-009 CHS, Los Angeles, CA 90095; †LA School of Dentistry, 10833 Le Conte Avenue, 43-009 CHS, Los Angeles, CA 90095).

Oral cancer causes over 8,000 deaths in the United States every year. Grainy head like 2 (GRHL2) is a protein that inhibits cell differentiation and increases the lifespan of cells via gene regulation and might play crucial role in carcinogenesis. **Objective:** Investigate the role of GRHL2 in carcinogenesis, and its effect on cancer stem cell populations. **Methods:** Western blots were performed to compare GRHL2 expression in normal and cancer cell lines: SCC4, BapT, HOK16B-serum, HOK16B-KGM, and NHOK. Tumor sphere forming assays were done to simulate non-adherent cancer stem cell growth. Control wells were plated with SCC4 cells treated with empty vector. Experimental wells were plated with GRHL2-siRNA treated SCC4 cells to knockdown GRHL2 expression. The number, size and shape of tumor spheres resulting from the two treatment groups were analyzed and compared. **Results:** Western blots showed the greatest expression of GRHL2 was in SCC4 cells over the other cell lines. When GRHL2 was knocked-down in SCC4 cells there were significantly fewer spheres compared to control treated cells. **Discussion:** The GRHL2-silenced SCC4 cells exhibited slower cell growth in comparison to the control cells. **Conclusion:** Knockdown of GRHL2 can possibly prevent proliferation of oral cancer by inhibiting the growth of cancer stem cells. Future research will evaluate the role of GRHL2 in other cancer cell lines, and translate to *in vivo* studies with mice.

180 **Psychometric Validation of a Tool for the Assessment of Quality Individual Patient Data Meta Analysis,** PAULINA NGUYEN, MOLLY UYEDA*, RASHI ARORA and FRANCESCO CHIAPPPELLI (UCLA School of Dentistry, CHS 63-090, 10833 Le Conte Avenue, Los Angeles, CA 90095-1668; paulina92@ucla.edu, mkuyceda@ucla.edu, drrashiarora@gmail.com, and fchiappelli@dentistry.ucla.edu).

Meta-analyses are important in the research synthesis process to obtain the best available evidence for well-informed clinical decisions in Evidence-Based Dentistry. Individual Patient Data Meta-Analysis (IPDMA) analyzes data of individual patients, rather than aggregate group data. This enables thorough data exploration, and patient-centered outcome inferences. For this reason, IPDMA is gaining increasing relevance, compared to standard group data meta-analysis. IPDMA has weaknesses and limitations, which diminish its value to clinicians and policy makers. To address this specific concern, we developed a tool to quantify the quality of IPDMA based on criteria extensively discussed in the literature (e.g., Cochrane, AHRQ). Here, we show the psychometric validation of this tool with a sample bibliome (n=12) in oral and maxillofacial medicine. Through a process of construct and content analysis and validation, we refined the instrument to a 9-item tool, which has a total score range of 9 to 36. Criterion validity (r=0.957, p<0.05) was obtained with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist, modified in such a manner as to yield a quantification of the PRISMA outcome. Three raters were trained and standardized to use the PRISMA and our novel tool. Inter-rater (r=0.972, p<0.05) and intra-rater reliability (0.904, p<0.05) of the IPDMA assessment instrument were obtained. This new, original and valid (N.O.V.) tool to quantify the quality of IPDMA is a significant contribution to the field of dental science, because it ensures high quality systematic reviews for evidence-based revisions of clinical practice guidelines.
181 The Effect of Ultraviolet Photofunctionalization of Titanium Alloy Grade 5 on Bone Bioactivity, Katherine Torres1, Diana Rosales1, Masako Tabuchi2, Koari Nakagawa2 and Takahiro Ogawa1 (1Howard Hughes Medical Institute Pre-College Science Education Program, 2The Weintraub Center forReconstructive Biotechnology, UCLA School of Dentistry, Los Angeles, CA 90095; katzt64torres@yahoo.com and r.diana2695@yahoo.com).

Despite its biocompatible properties, many dental titanium implants fail due to incomplete establishment of osseointegration. We hypothesized that UV treatment would improve titanium alloy grade 5’s bioactivity. **Objective:** Examine the affects of UV photofunctionalization on titanium alloy grade 5 disks through increases in cell attachment, cell proliferation, and cell function. **Methods:** Bone marrow cells were extracted from the femurs of rats and purified. Titanium alloy grade 5 disks were treated with UV light. After proliferation, the cells were plated on UV treated and non-UV treated titanium alloy grade 5 disks. A cell proliferation WST-1 reagent assay was then performed to measure the amount of cell attachment to treated and non-treated titanium disks. A BrdU binding assay was also used to test the cell proliferation. Lastly, an alkaline phosphate (ALP) quantification was run to examine the function of cells plated on the titanium disks. **Results:** There was a significant increase in cell attachment, cell function, and calcium deposits on the disks treated with UV compared to those not treated with UV light. There was not a significant increase in the number of the cells proliferated on the surface of the UV treated disks compared to the non-UV treated disks. **Conclusion:** The UV-treatment on titanium alloy disks proved to increase its bone bioactivity. **Discussion:** Future studies are needed to confirm that UV-treatment on titanium alloy grade 5 increases its bioactivity. It is expected that the failure rate of orthodontic implants will lessen with further studies.

182 The Role of miR-22 as a Potential Inhibitor of Cancer Stem Cells Proliferation, Monica Rangel1, Martha Secundino1, Justin Lee2 and Ki-Hyuk Shin2 (1Howard Hughes Medical Institute Pre-College Science Education Program, UCLA School of Dentistry, 10833 Le Conte Avenue, 63-007 CHS, Los Angeles, CA 90095; 2Jonsson Comprehensive Cancer Center, David Geffen School of Medicine, UCLA School of Dentistry, 10833 Le Conte Avenue, 63-007 CHS, Los Angeles, CA 90095; monicarangel28@yahoo.com, marthasecundino@yahoo.com).

Cancer stem cells (CSCs), a small subpopulation of cells with stem cell-like properties, are found in cancer. MicroRNA (miRNA), a class of post-transcriptional regulators, is a short RNA molecule that binds to complementary sequences of its target genes and block their translation to proteins. miRNA-22 (miR-22) is known to function as a tumor suppressor in various human cancers. However, the effect of miR-22 on CSCs has not been investigated and is able to identify the level of sphere forming ability (shows the malignancy of cancer stem cells).

**Objective:** This study was undertaken to investigate the effect of miR-22 in CSCs. **Methods:** Quantitative real-time PCR (qPCR) was used to evaluate expression of miR-22 in cells. Tumor sphere formation assay was performed to evaluate CSC property of cells. Transient transfection of miR-22 into cells was carried out to over express miR-22. **Results:** Expression of miR-22 is reversely correlated with sphere forming ability. Sphere forming oral cancer cells have lower miR-22 expression than non-sphere forming cells. Over-expression of miR-22 suppresses sphere-forming ability of CSCs. **Conclusion:** miR-22 may function as a novel CSC-inhibitory miRNA and have potential therapeutic value. **Discussion:** Over-expression of miR-22 within normal cells, cancer cells, and CSCs shows low level of sphere formation.

183 Revision of the Risk of Bias Instrument (R-Risk of Bias) for Cytokine Inhibition in the Treatment of Arthritis, Peter a Pellionisz*, André Barkhordarian, Vivian Lam, Lauren Gleason, Mahsa Dousti, Mona Dousti and Francesco Chiappelli (Evidence-Based Dentistry Practice-Based Research Network and Oral Biology and Medicine, UCLA School of Dentistry, CHS 63-090, 10833 Le Conte Avenue, Los Angeles, CA 90095-1668; peterpellionisz@mac.com, andreucsb@hotmail.com; lam.vivian@yahoo.com; laur62388@hotmail.com; mahsa.dousti@yahoo.com; mona.dousti@yahoo.com; and fcchiappelli@dentistry.ucla.edu).

In effort to aid clinicians and patients in making effective healthcare related decisions, the Agency for Healthcare Research and Quality (AHRQ) developed the Risk of Bias instrument to enable systematical grading of evidence reporting (AHRQ, 2012; Report 12-EHC047-EF). The Risk of Bias instrument exhibits two chief limitations: 1) lack of formal psychometric validation, and 2) providing no quantifiable measurement of risk of bias. We revised the Risk of Bias instrument rendering questions in primary domains quantifiable (scaled 1-4). We then completed stringent psychometric validation of the revised instrument (R-Risk of Bias) for inter-rater reliability and criterion validity. The R-Risk of Bias instrument quantifies assessments from primary domains (risk of bias, consistency, directness, precision). Scoring of questions was based on fulfillment of criteria obtained from the literature (e.g., Cochrane, AHRQ). Readers were trained to use the original and revised instruments ensuring complete understanding of scoring criteria. For inter-rater reliability of the R-Risk of Bias instrument ($r=0.94$, $p<0.05$), standardized readers independently scored reports of cytokine inhibitors in arthritis. For criterion validity ($r=0.96$, $p<0.05$), readers rated the papers with the previously validated R-Wong instrument. We discuss construct and content validity of the R-Risk of Bias tool. We also discuss intra-rater reliability and coefficient of agreement. The validated R-Risk of Bias instrument enables statistical ranking of evidence regarding bias, improving efficiency in utilization of evidence in healthcare. Considering
Implications of Translational Effectiveness for the Treatment of Diabetic Patients with Periodontal Disease: An Evidence-based decision Practice Based Research Network (EBD-PBRN) Study, NAZANIN S OLYAEI1, OLIVIA S CAJULIS2 and FRANCESCO CHIAPELLI1 (1University of California, Riverside, 900 University Ave, Riverside, CA 92521; nolya001@uvc.edu; 2Dental Group of Sherman Oaks, 4910 Van Nuys Blvd., Suite 210, Los Angeles, CA 91403; drcajulis@oliviacajulisdds.com; 3UCLA School of Dentistry, CHS 63-090, 10833 Le Conte Avenue, Los Angeles, CA 90095-1668; fchiappelli@dentistry.ucla.edu).

Periodontal disease (PD), a destructive form of dental disease, is a national epidemic in the US. Research suggests that there is a high prevalence of PD in patients with type-II diabetes (T2DM). In the context of the evidence-based decision Practice Based Research Network (EBD-PBRN), this study aimed to integrate the best available evidence about PD and T2DM in clinical decisions for dental treatment. We evaluated systematic reviews (n=9) that reported stringent analyses of the relationship between PD and T2DM. In parallel, we performed a retrospective repeated measures (last 2 visits, 6 month apart) observational study of the periodontal health of adult dental patients (n=60). We compared a patient cohort with established diagnosis of T2DM to control dental patients with no T2DM. Patient-centered research outcomes of interest included the number of bleeding pockets (> 4mm) as a measure of PD severity. The compiled evidence from the systematic reviews indicates a bidirectional relationship between PD and T2DM, and reiterates the findings of our clinical retrospective study, which showed that patients with a known diagnosis of T2DM had higher severity PD. Taken together, our findings confirm that PD is more severe in patients with T2DM. Our data also suggest sexual dimorphism, since female control patients had lower success rate of PD treatment in the dental clinic, compared to male cohorts. This patient-centered EBD-PBRN investigation demonstrates that PD is an important risk factor of T2DM, and proposes important evidence-based revisions of clinical practice guidelines for oral hygiene recommendations for patients with T2DM.

Role of SOX9 in Oral Cancer Cell Invasion, VICTOR DAVID1,2*, MARTHA GARCIA1,2*, RAMIN RABI1, FENG SI ZHE1 and SHEN HU1,2 (1Howard Hughes Medical Institute Pre-College Science Education Program, 2UCLA School of Dentistry, 10833 Le Conte Avenue, 63-007 CHS, Los Angeles, CA 90095; vmadavid7@aol.com, marthag1295@yahoo.com).

Sex determining region Y-related HMG-box gene 9 (SOX9) is encoded by the gene Sox9. A transcription factor, SOX9 is important to skeletal development by regulating genes involved in chondrogenesis. The role of SOX9 in oral cancer has not been reported. Objective: Determine whether SOX9 has a functional role in oral cancer cell invasion. Methods: Western blot analysis was performed to compare SOX9 expression among different oral cancer cell lines. SOX9 expression was knocked-down using small interfering RNA (siRNA) in UM1 oral cancer cells. UM1 is an invasive cell line, which works well with transwell invasion assays. UM1 was established from locally advanced oral cancer tumor. Trans-well invasion assays were performed to investigate effects of SOX9 knockdown on the invasive properties of UM1. Results: Oral cancer cell lines of primary tumor origin display high endogenous SOX9 expression compared to metastatic oral cancer lines. Invasion assays revealed knockdown of SOX9 in UM1 led to a 1.8-fold increase of invasive potential when compared to control siRNA transfected cells. Cell lines from primary carcinoma did not invade through the transwell membrane at all, therefore they are difficult to test with an invasion assay. Conclusion: SOX9 is differentially expressed between oral cancer cell lines of primary and metastatic origin. Knockdown of SOX9 expression in oral cancer cells causes increased invasive potential. These data show SOX9 is able to alter the invasive properties of oral cancer cell lines in vitro, and may conversely regulate invasion of oral cancer cells in vivo.

HEALTH SCIENCES
Monday, 1:00 p.m. – 4:00 p.m. in Ballroom A

Super Resolution Microscopy Reveals the Microstructure of β-Glucan on Candida albicans Cell Walls, JIA LIN1,2, AARON K NEUMANN1 and KEITH A LIDKE2 (1Department of Pathology, University of New Mexico, 1 University of New Mexico MSC08 4640, Albuquerque, NM 87131; 2Department of Physics and Astronomy, University of New Mexico, 800 Yale Blve. N.E., MSC 07 4220, Albuquerque, NM 87131; jialin20@salud.unm.edu).

Candida albicans is a commensal and opportunistic pathogen that resides on multiple human mucocutaneous tissues. Innate immune cells, such as Dendritic Cells (DCs), play a primary role in host defense against invasive Candidiasis in these tissues. Dectin-1, a transmembrane C-type lectin (CTL), is expressed on DCs. Dectin-1 recognizes β-glucan exposed on the C. albicans cell wall resulting in tyrosine phosphorylation of its hemITAM motif that initiates signaling via Syk. C. albicans is thought to limit cell wall β-glucan exposure to mitigate inflammatory responses. Indeed, we observe with conventional confocal microscopy that soluble, fluorescently labeled Dectin-1 only detects β-glucan in patches on the cell walls of C. albicans yeasts. These patches range from apparently diffraction limited structures to several mm length scales. The structure of β-glucan exposure has not been explored with sub-optical diffraction imaging techniques. However, the geometry of ligand presentation is likely to influence generation of...
inflammatory responses by DCs because previous work has demonstrated that Dectin-1 responds differently to soluble β-glucan (non-activating) and the same ligand immobilized on a particle (activating). We report initial results from Direct Stochastic Optical Reconstruction Microscopy (dSTORM) imaging studies of the microstructure of β-glucan exposed on yeast cell walls. These results provide a more accurate understanding of the sequential presentation geometry for the β-glucan/ Dectin-1 system that is a key step in elucidating how the physical state of fungal ligand influences immune signaling for host defense against Candidiasis.

187 Imaging Maturing Candida Biofilms Under Flow Conditions Reveals Structural Changes Due To Dynamic Hyphal Growth, LAURA GORHAM1*, ANITA RAY1, AARON NEUMANN1, RUSSELL M TAYLOR II1, LISA DAVIDSON1, XIAOJIE ZHAO2, JOE PING-LIN HSIAO2 and EVELYN DIAL1 (Department of Pathology, University of New Mexico, 1 University Blvd NE, Albuquerque, NM 87131; 2Center for Computer Integrated Systems for Microscopy and Manipulation (CISMM), Department of Computer Science, University of North Carolina, 209 South Rd., Chapel Hill, NC 27599; lgorham@salud.unm.edu).

The opportunistic pathogen Candida albicans forms biofilms on medical devices and mucosal surfaces. These complex and dynamic microbial communities challenge our ability to observe and quantify the evolution of biofilm structures important for tissue colonization, invasion and drug resistance. Additionally, growth under physiologically relevant fluid flow conditions influences biofilm structure. We present a microfluidic system that facilitates live fluorescent imaging of C. albicans biofilm growth under physiological temperature and flow conditions. Qualitatively, these biofilms exhibit several properties suggestive of dynamic and coordinated hyphal growth behavior. First, as previously observed, we find mound-like colonies at early stages of biofilm development, despite an initial random seeding. This pattern implies growth anisotropy that may be important for organizing nutrient/waste exchange in the biofilm. Second, at ~10 hours, a coordinated pattern of downward growth became evident, which may represent a coordinated invasion mechanism. To quantify this data, we are coupling our ability to continuously observe biofilm growth with novel image analysis algorithms that permit morphology-based 3D tracking of hyphal tips in dense biofilm structures. For this purpose, we developed a computational network extraction method based on the Imagesurfer analysis package. This algorithm identifies fibrous structures and allows us to segment fungal hyphae using a tubeness filter and image skeletonization. We then quantify the spatial connectedness of each hypha-associated voxel, allowing us to identify and track individual hyphal tips for 3D growth analysis of C. albicans biofilms. Initial proof-of-principle experiments confirm the utility of this approach for quantitative investigations of biofilm growth.

188 A Propotypical Multimodal Perceptual Analysis of Hospice Patient Reports of Transcendence Experiences: Developing Mixed-Methodology to Extend Clinical Applications of Metaphors for Effective Communication in Palliative Care, BRUCE LARNOLD1,2* and LINDA LLOYD1 (1Department of Sociology, University of Calgary, 2500 University Drive, N.W. Calgary, Alberta Canada; 2San Diego Hospice and The Institute for Palliative Medicine, 4311 Third Ave., San Diego, CA 92013; barnold@ucalgary.ca. NOTE: The San Diego Hospice and The Institute for Palliative Medicine has this past March been forced to close after many years of pioneering palliative medicine).

Patients at the end-of-life can have unexpected, unusual, and profound cognitive shifts that significantly alters their perception of themselves and even eliminates their fear of death and dying. There are no other systematic studies into this phenomenon, so very little is known about these experiences, nor which is the best methodology for investigating these ineffable end-of-life patient experiences.

This is the first study to preliminarily identify, using a multidisciplinary model, the prevalence and properties of transcendence experiences among the dying through a systematic qualitative study of the metaphors they use to cognitively organize and communicate this phenomenon and to suggest how we can extend palliative communication goals through increased understanding and use of metaphors used for expressing unfamiliar experiences associated with dying.

Challenges associated with studying this phenomenon dictated designing a prototypical mixed multi-modal method to analyze 84 patients receiving palliative care in a large US hospice who were interviewed between 2009 and 2011 to record their overall end-of-life experiences. A phenomenological-existential interviewing method was used to reduce forms of selection bias and allow patients unfettered access to these experiences to attempt to verbally report a phenomenon that is not readily communicated through common usages of language. Perception integrates various sensory apparatus, and since transcendence experiences cannot be readily identified by just transcribed interviews, we designed a multimodal (audio-visual) analytic technique to increase validity and reliability for identifying and coding complex metaphor components.

Transcendence experiences among our sample are not rare anomalies as 15.5% patients report these experiences and tend to use specific complex kinetic metaphors to organize their ineffable qualities. This suggests that a subpopulation of the dying are having important experiences that are overlooked and that we might otherwise include in their goals of care and learn from to enhance palliative care among the dying.

189 A Global Perspective on Translational Effectiveness: Dissemination of Evidence Based Dentistry to the Maasai Population of Kenya, AMY GIROUX, MOLLY UYEDA* and FRANCESCO CHIAPPPELLI (UCLA School of Dentistry, CHS 63-090, 10833 Le Conte Avenue, Los Angeles, CA...
Improved oral health and hygiene is reliant upon the judicious integration of the best available evidence and a patient-centered care approach. Our collective efforts of examining the oral health and hygiene of the Maasai Mara population in Kenya via Evidence-Based Dentistry (EBD) methods led to the development of an educational program tailored to a collection of Maasai patients, dentists, and stakeholders. A systematic search strategy was conducted to obtain the best available evidence that holistically represented the oral health of the Maasai and other relevant demographics. Conducted evidence indicated a high prevalence of cultural extraction of lower incisors; however, tooth loss was primarily due to caries.

In general, dentition of the Maasai population is less susceptible to caries due to a unique pastoral high-protein diet and the use of “mswaki,” a natural chewing stick. Lack of educational programs and oral health plans, few oral health care personnel, and poor access to sanitary facilities were among the leading contributing causes to poor oral hygiene. Therefore, we sought to integrate Western services with traditional practices to address health concerns. In order to disseminate health literacy, we constructed an educational handout in Swahili addressing oral hygiene and extraction post- operatory care. Oral hygiene modules were instructed to Maasai students and handouts were distributed at the Maasai Mara Dental Clinic. Through disseminating evidence-based dentistry into comprehensive educational programs, sustained oral health and hygiene literacy can be achieved and implicated in other future projects to increase health literacy across cultures and on a global scale.

190 Assigning Causality to Anti-Cancer Agents: Decision Making in Early Phase Oncology Clinical Trials, JACQUELINE M I TORTI1*, JOHN GOSBY2 and ANDREW ARNOLD1

1 School of Public Health, University of Alberta, 4086 RTF, 8308-114 St. Edmonton, AB, Canada T6G 2E1; 2 Department of Kinesiology, Brock University, 350 Glenridge Ave, St. Catharines, ON Canada L2S 3A1; jcosby@brocku.ca; Department of Oncology, McMaster University, Juravinski Cancer Centre, 3rd Floor, 699 Concession St., Hamilton, ON, L8V 5C2; andrew.arnold@jcc.hhsc.ca.

Causality assessment takes place in early phase oncology clinical trials, whereby a physician determines whether an adverse event is attributable to the agent under development or due to an external cause. This is the first qualitative study to explore causality assessment in early phase oncology clinical trials. Thirty-two interviews were conducted and analyzed. Participants included experienced medical oncologists, hematologists and clinical trials coordinators, from academic cancer centres across Canada. A phenomenological research design was utilized. The process of assigning causality is extremely subjective and complex. This complexity is exacerbated by a lack of formal training on how to assign causality, communication issues between physicians and trial sponsors as well as between physicians and patients, along with high stakes for misattribution including risks to patient safety and impeding the drug development process, all while feeling pressured by patients to attribute causality in a certain way. There are many problem areas for physicians when attributing causality. Although clinicians used a variety of methods to cope with these problem areas there is room for improving this decision making process. Participants felt that developing a standardized causality assessment tool along with formal training would help improve causality attribution.

191 Effects of Teriparatide on Calcium Signaling in Bone Cells During Parabolic Flight, with Implications for Astronauts’ Health in Space, NIC BAUGHMAN1,2,3, TRAVIS BAKER2, KELLEN MATHER3, LANDON NYE3,4, DAN LAMBERT3, TARA SMITH4, JIM PELTON3,4, MATT DOLAN3,4 and LINDSEY CATLIN3

1 Department of Business, 2 Department of Biological Sciences, 3 Department of Engineering, 4 Department of Education, Boise State University, 1910 University Dr, Boise, ID 83725; nicbaughman@u.boisestate.edu, landonnye@u.boisestate.edu, jimpelton@u.boisestate.edu, matthewdolan@u.boisestate.edu.

Astronauts in prolonged space flight and bedridden patients experience bone density loss due to a lack of mechanical stimuli. The mechanisms by which cells transduce physical stimuli to chemical signals are poorly understood. The goal of this experiment is to investigate the molecular mechanisms of calcium flux in response to hyper- and microgravity. Thus, the “Weightless Wonder” is an ideal environment in which to conduct the experiment.

The primary focus of this experiment is to determine if the pharmaceutical teriparatide will alter calcium fluctuation in response to hyper- and microgravity. The FDA approved pharmaceutical teriparatide is known to induce bone formation in bedridden and osteoporotic patients. During the team’s research, no references to the testing of teriparatide in hyper- and microgravity conditions were found. Research proposed by the 2012-2013 Boise State Microgravity Team will be the initial real-time exploration of teriparatide at the cellular level in hyper- and microgravity.

PHYSICS

Monday, 1:00 p.m. – 4:00 p.m. in Ballroom A

192 Quantifying Corrosion Using a Non-Contact Visual Method, RUKMINI A RAVI1,2*, VILUPANUR A RAVI1,2* and THUAN K NGUYEN1,2

1 Claremont High School, 1601 N. Indian Hill Blvd., Claremont, CA 91711; 2 Department of Chemical and Materials Engineering, 3801 W. Temple Ave., Pomona, CA 91768; garuda01@att.net.

Economic losses stemming from the corrosion of structural metallic components are a significant part of the world’s economic losses. The effects of an electrochemical corrosion process can be observed in a non-contact visual method. This method is useful in determining the rate of weight loss and the rate of mass loss over a period of time. The non-contact visual method helps to determine the changes in the corrosion of structural metallic components from the outside environment.
ABSTRACTS – Contributed Posters

demands substantial creativity. Thus, we looked into how creativity does not require much creativity, the engineering process is used as a non-destructive technique to determine the initiation of corrosion in various metallic materials. The corrosion of metallic samples in different corrosive solutions was investigated. Transmitted light intensities for various sample-solution combinations were measured. The results were plotted as a function of time and fitted to relevant equations. The effects of sample and the corrosive on corrosion rates will be discussed.

ENGINEERING, TECHNOLOGY, and APPLIED SCIENCES

Monday, 1:00 p.m. – 4:00 p.m. in Ballroom A

193 Free Your Mind—Unlocking Your Inner Creativity, ALYSSA BLACK, WILLIAM DOW, STEPHANIE HARRISON*, ADAM KREBS, KATHLEEN McGUIRE, PHILIPP STORCH, JESSICA URBANO, BRADLEY CHASE, FRANK JACOBITZ and THOMAS SCHUBERT (Department of Engineering, University of San Diego, 5998 Alcalá Park, San Diego, CA 92110, sharrison@sandiego.edu).

While many people assume engineering is a field of study that does not require much creativity, the engineering process demands substantial creativity. Thus, we looked into how creativity is used in the engineering design process and how it can be improved. We surveyed ENGR 102 (Introduction to Engineering Design) students to determine how they view themselves and creativity in relation to engineering. We then researched what creativity means to different people, various theories on improving creativity, and creative processes used in past engineering projects. We presented this information to sections of ENGR 102 classes and surveyed the students before and after the lecture to see how their views changed. Students showed an increased awareness of the importance of creativity in engineering and how often it is used. Many did not change their opinion of themselves in regards to creativity but some actually ranked themselves as less creative after the presentation, presumably because they realized how creative some people are. The other data we analyzed was not a ranking system, but a short answer question. We asked students what qualities they associate with creative people and the most commonly used words were “thinks outside of the box,” “innovative,” “confident,” and “open minded.” We also asked what the best techniques for improving creativity within a group are. The most common answers were “different backgrounds,” “different ideas,” “being comfortable,” and “diversity.” These answers mirrored the overall message we attempted to portray throughout our presentation to a fair degree.

194 Producing Electric Power from the Wind: A Study of Windmill Blade Flow Mechanics, ELEANOR O FROST (Chaminade College Preparatory, 7500 Chaminade Avenue, Los Angeles, CA 91304; frost_owen@yahoo.com; Professor Karthik Duraisamy, Mentor, Stanford Center for Turbulence Research, Stanford University, Stanford CA 94305).

Electric power generated from the wind can help our society become less dependent upon the production of foreign oil. Windmill rotor blades have airfoil cross-sections which reduce drag and increase the performance but vary in cost and durability. (Hansen, 2000) This study evaluates the output from a symmetric airfoil and a flat bottom airfoil. My hypothesis is that the symmetrical airfoil will outperform the others and the control blades. To test my hypothesis, I created a wind tunnel and wind mill to measure the different blades’ power output. The blades were readily available from Flying Foam, Colorado Springs, Colorado, in both 2 and 5 inches from front to back. The windmill was made out of PVC pipe inspired by a 2009 US DOE Report. (Tymos, 2009) (US DOE, 2009) The airflow speed was 11.2 feet per second and 5.8 feet per second. I set the Static Angle of the blades before each test. I recorded power data and measured the rotational speed of the rotor. I calculated the net Dynamic Angle of attack for points along the leading edge of the rotors and graphed the Ratio of the Coefficients for each point along the leading edge to evaluate the flow mechanics. (Duraisamy 2010) The 2” symmetric blade produced 28% more power than the 2” flat blade and twice the power of the 5” symmetrical blade at 11.2 ft/sec windspeed. At 5.8 ft/sec windspeed, the 2” symmetric blade produced the most power and results show the contribution of the vortex on the geometric angle of attack.

195 Knife-edge Scanning Microscopy for High Throughput 3D Imaging, TODD HUFFMAN*, MEGAN KLIMEN, MATTHEW GOODMAN, CODY DANIEL and KATY PELTON (3Scan, 1087 Mission St, San Francisco, CA 94103, Megan@3Scan.com).

Knife-edge scanning, introduced in the KESM instrument, not only preserves image registration throughout the depth of the specimen block but also isolates the tissue above the knife from that below to eliminate undesirable events (back-scattering of light and bleaching of fluorescent-stained tissue below the knife). Knife-edge scanning supports all known forms of microscopy (absorption imaging using transmitted light, and reflected light imaging using bright-field, dark-field, DIC, and GFP fluorescence). Using the KESM, 3Scan is able to scan a one cc3 block of tissue (for example, a whole mouse brain) at submicron resolution in under 100 hours. With this resolution (a voxel size of 0.6 um x 0.7 um x 1.0 um) 3Scan is able to show cell scale phenomena in the context of a complete organ. In the KESM system, a modified diamond microtome knife is held fixed with an illumination source shining through the blade. The sample is then moved into the knife, cutting off 1 micron thick sections. As each slice is made, it is illuminated
by the light exiting the knife and simultaneously scanned by our scanning objective. The process is repeated across the face of the cube, and after many thousands of slices are made the tissue being examined is completely scanned into the system.

What makes our microscope truly unique is the capability to do a relatively large volume of tissue with incredibly high throughput and great resolution. Such capacity greatly fills the gap in the field which exists between high resolution, low volume, 3d techniques such as confocal microscopy or STED microscopy (maximum depth of ~3 microns) and the low resolution, high volume techniques of ultrasound, CT, or MRI scans.

PSYCHOLOGY
Monday, 1:00 p.m. – 4:00 p.m. in Ballroom A

196 Oculomotor Performance Indicates Adult Male Fragile X Premutation Carriers Asymptomatic for FXTAS Exhibit Impaired Inhibitory Control, LING M WONG1,2*, TONY J SIMON1,2, NAOMI J GOODRICH-HUNSAKER1, FLORA TASSONE1,2 and MELODY ZHANG4 (1MIND Institute, University of California Davis Medical Center, 2315 Stockton Boulevard, Sacramento, CA 95817; 2Department of Psychiatry and Behavioral Sciences, 3Department of Biochemistry and Molecular Medicine, 4Department of Neurobiology, Physiology, and Behavior, University of California Davis, One Shields Avenue, Davis, CA 95616; lmewong@ucdavis.edu, tjsimon@ucdavis.edu, naomihunsaker@me.com, ftassone@ucdavis.edu, myzhang@ucdavis.edu).

OBJECTIVE: Fragile X premutation carriers (fXPCs) have an expansion of 55 —200 CGG repeats in the FMR1 gene. Male fXPCs are at risk for developing a neurodegenerative motor disorder (FXTAS) often accompanied by inhibitory control impairments, even in fXPCs without motor symptoms. Inhibitory control impairments might precede, and thus indicate elevated risk for motor impairment associated with FXTAS. We tested whether inhibitory impairments are observable in fXPCs by assessing oculomotor performance.

METHOD: Participants were males aged 18-47 years asymptomatic for FXTAS. FXPCs (n = 21) and healthyagematched controls (n = 22) performed four oculomotor tasks. In a Fixation task, participants fixated on a central cross and maintained gaze position when a peripheral stimulus appeared. In a Pursuit task, participants maintained gaze on a square moving at constant velocity. In a Prosaccade task, participants fixated on a central cross, then looked at a peripheral stimulus. An Antisaccade task was identical to the Prosaccade task, except participants looked in the direction opposite the stimulus. Inhibitory cost was the difference in saccade latency between the Antisaccade and Prosaccade tasks.

RESULTS: Relative to controls, fXPCs had longer saccade latency in the Antisaccade task. Increased inhibitory cost correlated with decreased vermis area in lobe VI-VII.

CONCLUSION: Antisaccades require inhibitory control to inhibit reflexive eye movements. We found that eye movements are sensitive to impaired inhibitory control in fXPCs asymptomatic for FXTAS. Thus, eye movements may be useful in assessing FXTAS risk or disease progression.

197 The Effects of Cell Phone Conversations on the Attention and Memory of Bystander, VERONICA V GALVÁN1, ROSA S VESSAL1, MATTHEW T GOLLEY2, SARAH JENSEN1* and NEESHA DAULAT1* (1Department of Psychological Sciences, College of Arts and Sciences, University of San Diego, San Diego, California 92110 USA; 2Department of Liberal Arts, D’Youville College, Buffalo, NY 14201 (currently in the Clinical Psychology Program, Palo Alto University, Palo Alto, CA 94304); jensens@sandiego.edu, neeshadaulat@sandiego.edu).

The pervasive use of cell phones impacts many people—both cell phone users and bystanders exposed to conversations. This study examined the effects of overhearing a one-sided conversation versus a two-sided conversation on attention and memory. Participants were led to believe they were participating in a study examining the relationship between anagrams and reading comprehension. While the participant was completing an anagram task, the researcher left the room and participant overheard a scripted conversation. Then the participant took a recognition memory task with words from the conversation, and completed a questionnaire measuring the distracting nature of the conversation. Participants who overheard the one-sided conversation rated the conversation as significantly higher in distractibility. Participants in the one-sided condition scored higher on the recognition task showing that people are more attentive to one-sided conversations than two-sided conversations. Therefore, cell phone conversations may be a common source of distraction causing negative consequences.

EDUCATION
Monday, 1:00 p.m. – 4:00 p.m. in Ballroom A

198 Challenges and Successes in Exposing Community College Students to Field Work and Undergraduate Research in a New Introductory Field Biology Course at the College of Southern Nevada, BRIAN C WAINESCOTT (Department of Biological Sciences, College of Southern Nevada, 6375 W. Charleston Blvd. - W20H, Las Vegas, NV 89146-1164; brian.wainscott@csn.edu).

Southern Nevada offers many opportunities to study biology in diverse habitats including riparian, desert scrub, pine woodland, and alpine meadow habitats. With such diversity in landscape and species, it is surprising that few biology majors at the College of Southern Nevada (CSN) have considered field biology as a potential vocation. When asked about their careers goals, students enrolled in our second semester biology
majors-track course (Principles of Modern Biology II, BIOL 197) rarely state a desire to pursue a career in field biology. When asked why not, an unexpected number of students indicate a lack of understanding about what field biologists do, a likely result of the lack of opportunity to participate in biology courses with field activities in the past. Considering the lack of understanding about field biology, the dearth of field-oriented biology courses at our college, and the need to provide community college students with undergraduate research experiences, I devised a new course at CSN called Introduction to Field Biology (BIOL 211). Students enrolled in BIOL 211 are taught a variety of topics and skills used in field projects including small animal surveys, an invasive grasses research project, and a tree mapping project. In the following sections, I explore the topics, skills, and projects addressed in BIOL 211, challenges in establishing and managing the course at a two-year college, student successes in and perceptions about the course, and whether or not students’ perceptions about field biology have changed upon completion of the course.

199 Spectrum: Building Pathways to Biomedical Research Careers for Girls and Women of Color, SALLY G PASION*, AUDREY G PARANGAN-SMITH, KIMBERLY D TANNER (Department of Biology, San Francisco State University, 1600 Holloway Avenue, San Francisco, CA 94132; pasion@sfsu.edu).

Women of color are still largely absent from the biomedical research community and few materials or models exist that are designed specifically to attract girls of color to these careers. The Science Education Partnership and Assessment Laboratory (SEPAL) in the San Francisco State Department of Biology has developed the Spectrum effort to address the dearth of women of color in biology. Through Spectrum, SFSU biomedical scientists who are women of color (undergraduate and Masters students, alumni in local doctoral and biotechnology positions, and biology faculty) collaborate with middle and high school students and teachers to: 1) co-sponsor after-school science clubs targeted at girls of color, 2) develop a mentoring community of women of color trainees in biomedical research, 3) develop video biographies highlighting the research programs of women of color biomedical researchers and scientific trainees, and 4) partner with Expanding Your Horizons organizations to disseminate Spectrum activities. Spectrum has engaged 456 middle and high school girls (45% Latina, 13% African American, 22% Asian, 11% Unknown, 7% White) across nine club sites providing ~20 hours of academic enrichment in biomedical science for each girl. Additionally, Spectrum has developed two video resources highlighting women of color. 1) Women of Color Doing Biomedical Science: Inspiring Stories from Women of Color Biomedical Researchers, highlight Spectrum Biology Faculty, and 2) From Us to Us: Advice on Careers in Biomedical Sciences for Girls & Women of Color, featuring advice from Spectrum scientific trainees. Spectrum is supported by NIH through #1R25RR024307, Supplement #3R25RR024307-05S, and Supplement #3R25RR024307-03S1.

HISTORY and PHILOSOPHY of SCIENCE
Monday, 1:00 p.m. – 4:00 p.m. in Ballroom A

200 Pacific History and the Littoral Truth: Edward F. Ricketts and Joel W. Hedgpeth on Estuaries and the Ocean Shores, RANDALL W SMITH1,2,3* and GRETTA SIEGEL2 (1Department of Physics, Portland State University, P.O. Box 751-PHY, Portland, OR 97207; 2School of the Environment, Environmental Sciences and Resources Program, Portland State University, P.O. Box 751-ESM, Portland, OR 97207; 3Portland State University, Science Librarian, The Joel Hedgpeth Papers Project, P.O. Box 751-LIB, Portland, OR 97207; smithran@pdx.edu; bvsg@pdx.edu).

From the Pacific Coast of the United States to intertidal areas and the oceans of the world, the legacies of Edward F. Ricketts (1897-1948) and Joel W. Hedgpeth (1911-2006) helped to form our concepts of intertidal biology, the littoral zone. In our Pacific history of taxonomy, invasive species and coastal ecology, the littoral environment and the divisions of benthic ecology developed in part by the contributions of not only these two scientists, but also their mutual friends and colleagues, which included Joseph Campbell, John Steinbeck and W. C. Allee.

We owe much of this to the development of the book, Between Pacific Tides (Stanford University Press, 1939 onward) originally authored by Edward F. Ricketts and subsequently edited and revised by Joel W. Hedgpeth. This is one of the first ecologically oriented books for coastal, littoral or intertidal environments. In particular, this writing and editing represents one of the early attempts to integrate developing ecological or environmental philosophy to the practical aspects of coastal environments, estuaries and the Nearshore Ocean.

The presentation of taxonomy by ecological zones was a unique approach at the time, (first edition, 1939), which was subsequently enhanced following the death of Ed Ricketts by his colleague, Joel W. Hedgpeth. In this intersection, we see a literary approach to Pacific shores that opened new windows into the scientific and systematic evaluation of ecological study. As both scientist and editor, Joel Hedgpeth brought a precise literary mind to the application of environmental awareness of the day, achievements worth remembering.
## INDEX OF NAMES

Numbers less than 49 refer to the page(s) where a name appears in the program. Numbers 49 and greater refer to the page(s) on which an author’s abstract may be found.

### A

<table>
<thead>
<tr>
<th>Author</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdul, Ata Ur Rahman Mohammed</td>
<td>39, 83</td>
</tr>
<tr>
<td>Ahmad, Sajjad</td>
<td>5, 28, 61, 62, 63</td>
</tr>
<tr>
<td>Ahmed, Shehzad</td>
<td>24, 55</td>
</tr>
<tr>
<td>Aho, Ken</td>
<td>41, 88</td>
</tr>
<tr>
<td>Alarcon, Ruben</td>
<td>44, 95</td>
</tr>
<tr>
<td>Albin-Stone, Kristine</td>
<td>5</td>
</tr>
<tr>
<td>Aldape, Michael J</td>
<td>5, 33</td>
</tr>
<tr>
<td>Alderson, Nazilla</td>
<td>23, 51</td>
</tr>
<tr>
<td>Aldrich, Mark</td>
<td>42, 93</td>
</tr>
<tr>
<td>Amaro, Rommie E</td>
<td>23, 24, 51, 54</td>
</tr>
<tr>
<td>Anderson, Tim</td>
<td>29, 63</td>
</tr>
<tr>
<td>Apodaca, Lorenzo</td>
<td>40, 86</td>
</tr>
<tr>
<td>Arnold, Andrew</td>
<td>46, 105</td>
</tr>
<tr>
<td>Arnold, Bruce L</td>
<td>46, 104</td>
</tr>
<tr>
<td>Arora, Rashi</td>
<td>31, 45, 69, 101</td>
</tr>
</tbody>
</table>

### B

<table>
<thead>
<tr>
<th>Author</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Babinkostova, Liljana</td>
<td>5, 24, 29</td>
</tr>
<tr>
<td>Baca, Mauricia M M</td>
<td>31, 68</td>
</tr>
<tr>
<td>Bae, David</td>
<td>44, 97</td>
</tr>
<tr>
<td>Baehr, Ted</td>
<td>35, 79</td>
</tr>
<tr>
<td>Baker, Travis</td>
<td>46, 105</td>
</tr>
<tr>
<td>Barash, Nanele</td>
<td>33, 74</td>
</tr>
<tr>
<td>Barkhordarian, André</td>
<td>31, 39, 45, 69, 83, 102</td>
</tr>
<tr>
<td>Baron, Riccardo</td>
<td>24, 53</td>
</tr>
<tr>
<td>Barrie, Elizabeth</td>
<td>31, 68</td>
</tr>
<tr>
<td>Bashford, Donald</td>
<td>24, 53</td>
</tr>
<tr>
<td>Batie, Shane F</td>
<td>44, 96, 97</td>
</tr>
<tr>
<td>Baughman, Nic</td>
<td>46, 105</td>
</tr>
<tr>
<td>Bella, Angelo</td>
<td>30, 66</td>
</tr>
<tr>
<td>Beninson, Lika</td>
<td>39, 82</td>
</tr>
<tr>
<td>Beros, Konstantinos A</td>
<td>24, 55</td>
</tr>
<tr>
<td>Besnoy, Amy</td>
<td>25, 26, 57, 58</td>
</tr>
<tr>
<td>Bharadwaj, Vivek S</td>
<td>29, 63</td>
</tr>
<tr>
<td>Bhownik, Pradip K</td>
<td>39, 45, 82, 100</td>
</tr>
<tr>
<td>Bigelow, James C</td>
<td>39, 83</td>
</tr>
<tr>
<td>Bird, Brian M</td>
<td>40, 86</td>
</tr>
<tr>
<td>Bithell, Cindy</td>
<td>42, 92</td>
</tr>
<tr>
<td>Black, Alyssa</td>
<td>46, 106</td>
</tr>
<tr>
<td>Blaney, Carol L</td>
<td>31, 68</td>
</tr>
<tr>
<td>Bonde, Aubrey</td>
<td>33, 75</td>
</tr>
<tr>
<td>Bonde, Elijah</td>
<td>34, 76</td>
</tr>
<tr>
<td>Bonde, Joshua A</td>
<td>5, 34, 77</td>
</tr>
<tr>
<td>Borjas, Rosendo</td>
<td>43, 95</td>
</tr>
<tr>
<td>Borodulin-Nadzieja, Piotr</td>
<td>24, 55</td>
</tr>
<tr>
<td>Bortolazzo, Anthony</td>
<td>44, 97</td>
</tr>
<tr>
<td>Bosque, Alberto</td>
<td>33, 73</td>
</tr>
<tr>
<td>Bos, Wouter J T</td>
<td>41, 90</td>
</tr>
<tr>
<td>Boyd, Eric S</td>
<td>44, 95</td>
</tr>
<tr>
<td>Bradshaw, Anjee</td>
<td>42, 92</td>
</tr>
<tr>
<td>Brody, Allison</td>
<td>5, 30</td>
</tr>
<tr>
<td>Buckley, Jessica</td>
<td>42, 91</td>
</tr>
<tr>
<td>Buck, Paul</td>
<td>33, 75</td>
</tr>
<tr>
<td>Buehler, Marianne A</td>
<td>15, 21</td>
</tr>
<tr>
<td>Burkhart, Hugh</td>
<td>25, 57</td>
</tr>
<tr>
<td>Bernal-Uruchurtu, Juan Pablo</td>
<td>40, 87</td>
</tr>
<tr>
<td>Burroughs, Michael</td>
<td>35, 81</td>
</tr>
</tbody>
</table>

### C

<table>
<thead>
<tr>
<th>Author</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caicedo, Andre</td>
<td>5, 24</td>
</tr>
<tr>
<td>Caitlin, Lindsey</td>
<td>41, 89</td>
</tr>
<tr>
<td>Cajulis, Olivia S</td>
<td>46, 103</td>
</tr>
<tr>
<td>Calica, Nicole A</td>
<td>44, 95</td>
</tr>
<tr>
<td>Callahan, Elizabeth</td>
<td>26, 58</td>
</tr>
<tr>
<td>Cardullo, Richard A</td>
<td>5</td>
</tr>
<tr>
<td>Carroll, John J</td>
<td>46, 105</td>
</tr>
<tr>
<td>Catlin, Lindsey</td>
<td>46, 105</td>
</tr>
<tr>
<td>Chandler, Chris</td>
<td>39, 82</td>
</tr>
<tr>
<td>Chan, Emily</td>
<td>26, 57</td>
</tr>
<tr>
<td>Chang, Chia-En</td>
<td>24, 53</td>
</tr>
<tr>
<td>Chapman, Barbara</td>
<td>44, 99</td>
</tr>
<tr>
<td>Chapman, Edwin R</td>
<td>39, 82</td>
</tr>
<tr>
<td>Chase, Bradley</td>
<td>46, 106</td>
</tr>
<tr>
<td>Chen, Eric</td>
<td>23, 51</td>
</tr>
<tr>
<td>Cheng, Hwai-Jong</td>
<td>44, 99</td>
</tr>
<tr>
<td>Chen, Wei</td>
<td>45, 101</td>
</tr>
<tr>
<td>Chesser, Christopher C</td>
<td>43, 94</td>
</tr>
<tr>
<td>Chianese, Robert L</td>
<td>5, 34, 35, 41, 79</td>
</tr>
<tr>
<td>Chiappelli, Francesco</td>
<td>5, 31, 39, 45, 46, 69, 83, 101, 102, 103, 104</td>
</tr>
<tr>
<td>Chodounski, David</td>
<td>24, 55</td>
</tr>
<tr>
<td>Choi, H K</td>
<td>5</td>
</tr>
<tr>
<td>Christianson, Roger G</td>
<td>5</td>
</tr>
<tr>
<td>Ciravolo, Amber</td>
<td>43, 94</td>
</tr>
<tr>
<td>Coble, Theresa G</td>
<td>31, 68</td>
</tr>
<tr>
<td>Cobos-Nunez, Martin</td>
<td>43, 94</td>
</tr>
<tr>
<td>Cook, Brandon</td>
<td>39, 82</td>
</tr>
<tr>
<td>Cornia, Nic</td>
<td>29, 63</td>
</tr>
<tr>
<td>Coskey, Jarold L</td>
<td>46, 105</td>
</tr>
<tr>
<td>Coskey, Samuel</td>
<td>5, 24</td>
</tr>
<tr>
<td>Coulup, Sara K</td>
<td>39, 82</td>
</tr>
<tr>
<td>Cusack, Barry J</td>
<td>41, 89</td>
</tr>
</tbody>
</table>

### D

<table>
<thead>
<tr>
<th>Author</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dai, Hao</td>
<td>23, 50</td>
</tr>
<tr>
<td>D’Allura, Jad A</td>
<td>5, 40, 87</td>
</tr>
<tr>
<td>Daniel, Cody</td>
<td>46, 106</td>
</tr>
<tr>
<td>Das, Debashish</td>
<td>28, 61</td>
</tr>
<tr>
<td>Daszak, Peter</td>
<td>40, 84</td>
</tr>
<tr>
<td>Daulat, Neesha</td>
<td>47, 107</td>
</tr>
<tr>
<td>Davidson, Lisa</td>
<td>46, 104</td>
</tr>
<tr>
<td>Davidson, Michal</td>
<td>5, 25</td>
</tr>
<tr>
<td>David, Victor</td>
<td>46, 103</td>
</tr>
<tr>
<td>Davis, Jarrett</td>
<td>44, 99</td>
</tr>
<tr>
<td>Davis, Lynn</td>
<td>30, 67</td>
</tr>
<tr>
<td>Davis, Zachary</td>
<td>44, 99</td>
</tr>
<tr>
<td>Dawson, Scott</td>
<td>33, 74</td>
</tr>
<tr>
<td>De La Rosa, Alyssa</td>
<td>44, 96</td>
</tr>
<tr>
<td>De La Rosa, David B</td>
<td>41, 88</td>
</tr>
<tr>
<td>Demerjian, Gary</td>
<td>31, 39, 70, 83</td>
</tr>
<tr>
<td>Demir, Ozlem</td>
<td>24, 54</td>
</tr>
<tr>
<td>Devitt, Dale A</td>
<td>40, 86</td>
</tr>
<tr>
<td>Dial, Evelyn</td>
<td>46, 104</td>
</tr>
<tr>
<td>Dolan, Matt</td>
<td>46, 105</td>
</tr>
<tr>
<td>Dormian, Clive</td>
<td>5</td>
</tr>
<tr>
<td>Dousti, Mahsa</td>
<td>45, 102</td>
</tr>
<tr>
<td>Dousti, Mona</td>
<td>45, 102</td>
</tr>
<tr>
<td>Dow, William</td>
<td>46, 106</td>
</tr>
<tr>
<td>Driscoll, Derrian</td>
<td>44, 99</td>
</tr>
<tr>
<td>Dutcher, Tricia</td>
<td>31, 68</td>
</tr>
<tr>
<td>Eisworth, Todd</td>
<td>25, 55</td>
</tr>
<tr>
<td>Erdemli, Gül</td>
<td>23, 52</td>
</tr>
<tr>
<td>Farge, Marie</td>
<td>41, 90</td>
</tr>
<tr>
<td>Feng, Gen-Sheng</td>
<td>23, 51</td>
</tr>
<tr>
<td>Feng, Xiaoxing</td>
<td>44, 98</td>
</tr>
<tr>
<td>Fenstemaker, L F</td>
<td>40, 86</td>
</tr>
<tr>
<td>Ferrer, Romelia Salomon</td>
<td>23, 51</td>
</tr>
<tr>
<td>Fessler, Andi</td>
<td>27, 60</td>
</tr>
<tr>
<td>Fink, Gerald</td>
<td>5</td>
</tr>
<tr>
<td>Fleissner, William G</td>
<td>24, 54</td>
</tr>
<tr>
<td>Fleschner, Monika</td>
<td>39, 82</td>
</tr>
<tr>
<td>Forbey, Jennifer S</td>
<td>32, 40, 72, 85</td>
</tr>
<tr>
<td>Forster, Paul</td>
<td>43, 95</td>
</tr>
<tr>
<td>Frank, Nicole</td>
<td>41, 89</td>
</tr>
<tr>
<td>Frost, Eleanor O</td>
<td>46, 106</td>
</tr>
<tr>
<td>Fuller, Trevoron</td>
<td>40, 84</td>
</tr>
</tbody>
</table>
INDEX of Names

G
Galindo, Armando J. .................................. 5
Galligan, Michael A. .................................. 44, 99
Galván, Veronica V. .................................. 26, 47, 58, 107
Ganguly, Aurop R ........................................ 28, 61, 62
Garcia, Angelica ..................................... 27, 59, 60
Garcia, Martha ........................................ 46, 103
Gary, Ronald K ........................................ 39, 83
Gebraile, Matthew ..................................... 23, 50
Gerstenberger, Shawn ................................ 40, 85
Giacomini, Kathleen M. .................................. 29, 64
Giammona, D Ann ..................................... 24, 53
Gerstenberger, Shawn ................................ 40, 85

H
Hafenrik, John E ........................................ 5, 40, 85
Han, Hae suk ......................................... 39, 45, 82, 100
Han, Sook ............................................. 45, 100
Han, Wen-Ge........................................ 24, 53
Harrison, Stephanie .................................... 46, 106
Harry, Karen G ......................................... 30, 67
Hart, Alexandra ........................................ 35, 78
Hausrath, Elisabeth .................................... 43, 95
Haussler, Mark R ....................................... 44, 96, 97
Hedlund, Brian P ........................................ 44, 95
Hevener, Kirk E ......................................... 23, 33, 52, 74
Higgins, Silke .......................................... 5, 25
Hockley, Maryam M .................................... 44, 99
Hodge, Vernon .......................................... 40, 85
Ho, Kwok-Yiu .......................................... 23, 49
Hopkins, Mandi M ..................................... 44, 98
Hosseini, Parvizia ...................................... 40, 84
Howell, Edwin ......................................... 34, 76
Hsiao, Joe Ping-Lin ..................................... 46, 104
Huang, Yong ........................................... 29, 64
Huffman, Todd ......................................... 46, 106
Hurley, Nate C ......................................... 24, 53
Hu, Shen .............................................. 46, 103
Huston, Carolc ......................................... 25, 57

I
Iammarino, Darren Michael ............................. 35, 79
Ivers, Jonathan ........................................ 40, 85

J
Jacobitz, Frank G ........................................ 5, 25, 26, 41, 42, 46, 57, 58, 90, 91, 106
James, Matthew J ...................................... 5
Jensen, Sarah ........................................... 47, 107
Jewett, Anahid ......................................... 44, 99
Jiang, Gaoting ......................................... 43, 93
Johnson, Ronni ....................................... 5, 26, 27, 58, 59, 60
Jones, Patricia ......................................... 26, 58, 59
Jorey, Cheryl L ......................................... 5, 32, 71, 72
Jo, Tae Soo ........................................... 45, 100
Jurutka, Peter W ....................................... 44, 96, 97, 99

K
Kada, Masaru ........................................... 29, 65
Kalra, Ajay ............................................ 28, 61, 62
Kang, Mo .............................................. 45, 101
Kaushik, Gaurav ....................................... 41, 88
Kealy, Bonni J ......................................... 40, 85
Kendall, Susan ......................................... 5, 25
Kepler, Jennifer L ..................................... 41, 89
Khurfi, Sami ........................................... 44, 97
Khuri, Natalia .......................................... 29, 64
Kido, Yasuto ........................................... 29, 64
Klimes, Megan ......................................... 46, 100
Kodra, Evan ........................................... 28, 62
Koh, David W .......................................... 44, 98
Koh, Jung Jae .......................................... 45, 100
Kosaka, C Alan ......................................... 29, 64
Kosmides, Alexandra ................................... 40, 87
Kraus, Peter L ......................................... 5, 25, 26, 37, 56, 58
Krebs, Adam ............................................ 46, 106
Kris, Paula ............................................. 26, 57
Kumar, Devashish ...................................... 28, 61
Kuo, Bonnie ........................................... 27, 59, 60

L
Lachniet, Matthew ...................................... 40, 87
Lamb, Cheri L .......................................... 41, 90
Lambert, Dan .......................................... 46, 105
Lam, Vivian ............................................ 45, 102
Lang, Robert E .......................................... 16, 21, 49
Leal, Walter S .......................................... 44, 96
Lee, Jojo ............................................... 26, 58
Lee, Justin ............................................. 45, 102
Lee, Richard .......................................... 45, 101
Lee, Yoon-Jeong ....................................... 40, 84
Le Grand, Scott ....................................... 23, 51
Leshner, Alan I ......................................... 5
Leviton, Alan E ......................................... 5
Lidke, Keith A .......................................... 46, 103
Li, Li .................................................. 23, 50
Lin, Jia .................................................. 46, 103
Liu, Mengwei ........................................... 44, 98
Lloyd, Linda ............................................ 46, 104
Longhurst, Glen ....................................... 42, 92
Louis, Hank ............................................ 42, 92

M
Mackimmie, Robert D .................................. 40, 85
MacNeil, Michael D .................................... 5
Mahan, Michael J ....................................... 33, 73
Maida, Carl A ........................................... 5, 35, 41, 78
Maksymetz, James ..................................... 44, 98
Malek, Petr ............................................ 39, 82
Mallory, Chris ......................................... 29, 63
Mandal, Hari ............................................ 45, 100
Mankler, Craig R ...................................... 35, 80
Manno, Theodore G ................................... 40, 84
Manoharan, Namitha .................................. 44, 95
Manville, Christiana .................................. 35, 81
Marquez, Andy ......................................... 45, 101
Marshall, Pamela A .................................... 41, 88, 89
Mather, Kellen ......................................... 46, 105
Mattevi, Andrea ....................................... 24, 53
Matts, Jared ............................................ 39, 82
Maupin, C Mark ........................................ 5, 28, 29, 37, 63, 64, 65
Mawalagedara, Rachindra ............................ 28, 61
McAlister, Juan ........................................ 33, 75
McCord, Robert ....................................... 34, 77
McDougal, Owen M .................................... 5, 16, 21, 28, 29, 37, 39, 63, 64, 82
McGraw, Donald J ....................................
McGuire, Kathleen ..................................... 46, 106
Meyer, Edward ......................................... 44, 98
Miller, Jennell M ....................................... 30, 67
Minnic, Victoria ....................................... 42, 91
Mitchell, Kristen A ....................................
Mitina, Alina .......................................... 44, 95
Mohan, Nishant ........................................ 29, 65
Molteni, Valeria E ...................................... 26, 57
Monroe, Cameron Stevenson ........................ 44, 98
Morrissey, Kari M ..................................... 29, 64
Morton, Leslie A ....................................... 39, 82
Moselhy, Jim .......................................... 32, 71
Moumouni, Yacouba ................................ 16, 21
Mrowka, Rob .......................................... 5, 35
Mudireddy, Swapna ................................... 39, 83

110
Numbers less than 49 refer to the page(s) where a name appears in the program.
Numbers 49 and greater refer to the page(s) on which an author’s abstract may be found.
<table>
<thead>
<tr>
<th>Name</th>
<th>Page Numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ravi, Vilupanur A</td>
<td>46, 105</td>
</tr>
<tr>
<td>Ravi, Rukmini A</td>
<td>46, 105</td>
</tr>
<tr>
<td>Ravi, Vilupanur A</td>
<td>46, 105</td>
</tr>
<tr>
<td>Ray, Anita</td>
<td>46, 104</td>
</tr>
<tr>
<td>Rayford, Kayla</td>
<td>44, 97</td>
</tr>
<tr>
<td>Rearden, Deborah</td>
<td>31, 68</td>
</tr>
<tr>
<td>Rebeck, Jonathon</td>
<td>41, 89</td>
</tr>
<tr>
<td>Rees, Margaret N</td>
<td>5, 30</td>
</tr>
<tr>
<td>Robertson, James C</td>
<td>24, 53</td>
</tr>
<tr>
<td>Rocha, Rafael Malagoli</td>
<td>16, 22, 31, 32, 70, 71</td>
</tr>
<tr>
<td>Rohleder, Conrad</td>
<td>29, 63, 64</td>
</tr>
<tr>
<td>Rosales, Diana</td>
<td>45, 102</td>
</tr>
<tr>
<td>Rosales-Lagarde, Laura</td>
<td>40, 87</td>
</tr>
<tr>
<td>Rowland, Stephen M</td>
<td>5, 19, 34, 40, 43, 76, 77, 87, 94</td>
</tr>
<tr>
<td>Rudd, Lawrence</td>
<td>5, 33, 75</td>
</tr>
<tr>
<td>Sabir, Marya S</td>
<td>44, 97</td>
</tr>
<tr>
<td>Sacks, Ben</td>
<td>35, 81</td>
</tr>
<tr>
<td>Sagarika, Soumya</td>
<td>28, 62</td>
</tr>
<tr>
<td>Saines, Nick</td>
<td>18</td>
</tr>
<tr>
<td>Salic, Andrej</td>
<td>29, 64</td>
</tr>
<tr>
<td>Saludes, Jonel P</td>
<td>39, 82</td>
</tr>
<tr>
<td>Sambasivarao, Somisetti V</td>
<td>29, 63</td>
</tr>
<tr>
<td>Sanchez, Erik J</td>
<td>43, 95</td>
</tr>
<tr>
<td>Sanchez, Lorenzo G</td>
<td>41, 88, 89</td>
</tr>
<tr>
<td>Sandrin, Todd R</td>
<td>44, 99</td>
</tr>
<tr>
<td>Sankaran, Namathu</td>
<td>23, 49</td>
</tr>
<tr>
<td>Sargsyan, Grigor</td>
<td>30</td>
</tr>
<tr>
<td>Schatz, Bob</td>
<td>16, 21</td>
</tr>
<tr>
<td>Scheepers, Marion</td>
<td>5, 24, 25, 56</td>
</tr>
<tr>
<td>Schneider, Kai</td>
<td>41, 90</td>
</tr>
<tr>
<td>Schneider, Scott</td>
<td>29, 66</td>
</tr>
<tr>
<td>Schubert, Thomas</td>
<td>46, 106</td>
</tr>
<tr>
<td>Scott, Eric</td>
<td>35, 80</td>
</tr>
<tr>
<td>Secundino, Martha</td>
<td>45, 102</td>
</tr>
<tr>
<td>Seiler, Gretchen</td>
<td>5</td>
</tr>
<tr>
<td>Seward, Brandon</td>
<td>29, 66</td>
</tr>
<tr>
<td>Sharma, Gaurav</td>
<td>39, 83</td>
</tr>
<tr>
<td>Sharp, Philip A</td>
<td>5</td>
</tr>
<tr>
<td>Shaw, David E</td>
<td>5</td>
</tr>
<tr>
<td>Shin, Ki-Hyuk</td>
<td>45, 102</td>
</tr>
<tr>
<td>Siegel, Greta</td>
<td>47, 108</td>
</tr>
<tr>
<td>Simon, Lee H</td>
<td>35, 38</td>
</tr>
<tr>
<td>Simon, Tony J</td>
<td>47, 107</td>
</tr>
<tr>
<td>Simonyi, Reuben</td>
<td>45, 100</td>
</tr>
<tr>
<td>Singh, Akash</td>
<td>41, 42, 90, 91</td>
</tr>
<tr>
<td>Sizhe, Feng</td>
<td>46, 103</td>
</tr>
<tr>
<td>Slingsby, Jason G</td>
<td>29, 63, 64, 65</td>
</tr>
<tr>
<td>Smartrek, Neal</td>
<td>17, 21</td>
</tr>
<tr>
<td>Smith, Gene</td>
<td>43, 94</td>
</tr>
<tr>
<td>Smith, Randall W</td>
<td>43, 47, 95, 108</td>
</tr>
<tr>
<td>Smith, Stan</td>
<td>15, 21</td>
</tr>
<tr>
<td>Smith, Tara</td>
<td>46, 105</td>
</tr>
<tr>
<td>Smith, Thomas B</td>
<td>40, 84</td>
</tr>
<tr>
<td>Sommerfeld, Rick</td>
<td>42, 92</td>
</tr>
<tr>
<td>Souvestre, Jean-baptiste</td>
<td>40, 85</td>
</tr>
<tr>
<td>Spadaro, Santino</td>
<td>30, 66</td>
</tr>
<tr>
<td>Spangelo, Bryan L</td>
<td>39, 45, 82, 100</td>
</tr>
<tr>
<td>Spigelman, Igor</td>
<td>44, 98</td>
</tr>
<tr>
<td>Springer, Kathleen</td>
<td>35, 80</td>
</tr>
<tr>
<td>Starkweather, Peter</td>
<td>18</td>
</tr>
<tr>
<td>Storf, Mathew L</td>
<td>41, 88</td>
</tr>
<tr>
<td>Stave, Krystyna</td>
<td>40, 85</td>
</tr>
<tr>
<td>Stephensk, Alejandra</td>
<td>26, 58, 59</td>
</tr>
<tr>
<td>Stephen, Haroon</td>
<td>28, 61</td>
</tr>
<tr>
<td>Stohlmann, Micah</td>
<td>34, 76</td>
</tr>
<tr>
<td>Stokes, Sheridon</td>
<td>35, 80</td>
</tr>
<tr>
<td>Stoller, Heather M</td>
<td>34, 43, 76, 77, 94</td>
</tr>
<tr>
<td>Stone, Angelika Dampf</td>
<td>44, 96, 97</td>
</tr>
<tr>
<td>Storch, Philipp</td>
<td>46, 106</td>
</tr>
<tr>
<td>Stowers, Eva</td>
<td>5, 25</td>
</tr>
<tr>
<td>Suckling, Kieran</td>
<td>35, 81</td>
</tr>
<tr>
<td>Swartz, Mark</td>
<td>29, 64</td>
</tr>
<tr>
<td>Swift, Robert V</td>
<td>23, 24, 51, 54</td>
</tr>
<tr>
<td>Tabuchi, Masako</td>
<td>45, 102</td>
</tr>
<tr>
<td>Talley, Todd</td>
<td>5, 23, 24, 41, 49, 54, 89</td>
</tr>
<tr>
<td>Tanner, Kimberly D</td>
<td>5, 47, 108</td>
</tr>
<tr>
<td>Tanthmanatham, Ontida</td>
<td>39, 45, 82, 100</td>
</tr>
<tr>
<td>Tassone, Flora</td>
<td>47, 107</td>
</tr>
<tr>
<td>Taylor II, Russell M</td>
<td>46, 104</td>
</tr>
<tr>
<td>Taylor, Palmer</td>
<td>23, 49</td>
</tr>
<tr>
<td>Thames, April</td>
<td>31, 70</td>
</tr>
<tr>
<td>Thaw, Melissa</td>
<td>30, 67</td>
</tr>
<tr>
<td>Thomas, Jesse James</td>
<td>5, 34, 35, 78</td>
</tr>
<tr>
<td>Thomas, Michael A</td>
<td>41, 88</td>
</tr>
<tr>
<td>Thomas, Simon</td>
<td>29, 65</td>
</tr>
<tr>
<td>Thuber, Barton</td>
<td>42, 91</td>
</tr>
<tr>
<td>Tillman, Amy E</td>
<td>42, 92</td>
</tr>
<tr>
<td>Torres, Katherine</td>
<td>45, 102</td>
</tr>
<tr>
<td>Torti, Jacqueline M I</td>
<td>46, 105</td>
</tr>
<tr>
<td>Tran, Que-Tien</td>
<td>23, 52</td>
</tr>
<tr>
<td>Tran, Thai</td>
<td>45, 100</td>
</tr>
<tr>
<td>Trujillo, Timothy O</td>
<td>29, 66</td>
</tr>
<tr>
<td>Tseng, Helen</td>
<td>44, 99</td>
</tr>
<tr>
<td>Tucker, Cory</td>
<td>15, 21</td>
</tr>
<tr>
<td>Tull, John C</td>
<td>35, 80</td>
</tr>
<tr>
<td>Turner, Kent</td>
<td>30, 67</td>
</tr>
<tr>
<td>Twarakavi, Navin K</td>
<td>28, 61</td>
</tr>
<tr>
<td>Urbano, Jessica</td>
<td>46, 106</td>
</tr>
<tr>
<td>Uyeda, Molly</td>
<td>45, 46, 101, 104</td>
</tr>
</tbody>
</table>
INDEX of Names

V
Van Buskirk, Richard W ............. 5, 40
Velllore, Nadeem A .................. 24, 53
Veronesi, Paolo Alberto ............ 33, 74
Vessal, Rosa S ....................... 47, 107
Vine, Freda ......................... 33, 75
Vo, Van ................................ 39, 82

W
Wainscott, Brian C ................... 47, 107
Wainscott, Susan ..................... 26, 57
Walker, Ross C ....................... 24, 53
Walsh, Gerald M ..................... 41, 89
Wang, Cun’yu ......................... 44, 97
Warner, Don L ....................... 32, 71
Weerle, Christopher ............... 26, 27, 58, 60
Wei, Dong-Qing ..................... 23, 50
Wereszczynski, Jeff ................ 24, 52
Wheeler, Mark Richard ......... 35, 78
Whitfield, G Kerr ................... 44, 96, 97
Wiggins, Natasha L ................. 40, 85
Wilbes, Mbiya ....................... 45, 100
Wilhelmsen, Meggie ............... 27, 60
Williams, Jay ....................... 29, 65
Williams, Cameryn J ............... 25, 55
Williams, P Suzy ................... 43, 93
Williams, Sarah ..................... 23, 52
Wilson, Christopher ............... 45, 101
Wilson, Cortland .................... 42, 92
Wing, Helen J ....................... 33, 73
Winston, Vern ....................... 29, 65
Wolkind, Matthias B ............... 29, 64
Wood, Lawrence H ................. 42, 93
Wu, Joshua ......................... 23, 49

X
Xiao, Xiangming ..................... 40, 84
Xu, Dong ............................. 5, 23, 24, 32, 33, 41, 54, 71, 89

Y
Yamamoto, Atsushi .................... 42, 92
Yengulalp, Lynne .................... 24, 54
Yin, Hang ............................. 39, 82

Z
Zhang, Melody ....................... 47, 107
Zhang, Xuexiang .................... 29, 64
Zhao, Xiaojie ......................... 46, 104

Numbers less than 49 refer to the page(s) where a name appears in the program.
Numbers 49 and greater refer to the page(s) on which an author’s abstract may be found.