

*The Twenty-Eighth Annual
University of Arizona*

UNDERGRADUATE BIOLOGY RESEARCH PROGRAM CONFERENCE

*January 21, 2017
Environment & Natural Resources 2 Building*



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Support for the 28th Annual UBRP Conference has been provided by:



THE UNIVERSITY OF ARIZONA
Student/Faculty
Interaction Grants Program

WELCOME!

Welcome to the Twenty-Eighth Annual UBRP Conference!



Carol Bender
UBRP Director



Jennifer Cubeta
UBRP Assistant Director

UBRP, for 28 years, has taught students to apply the scientific method to address unanswered questions--to establish truth by developing hypotheses, testing the hypotheses and collecting data, and accepting or rejecting the hypotheses based on data. The point is to establish an accurate, reliable, consistent, and non-arbitrary representation of the world. While the scientific method is essential to advancing our scientific knowledge, it can be applied in making decisions more broadly in society. In this era of fake news, scientific method is an invaluable tool.

Today we all have an opportunity to hear from the students about what they discovered about the problem they are studying, about the conduct of science, and about themselves. The conference provides the opportunity to celebrate successes and to discuss failures. Ask any student presenting today what s/he learned by doing research and every one of them will have something to say about the things that didn't work. Perseverance is a trait that all of them cultivate. Part of the scientific process is finding a way to move forward even if the initial approach to a problem didn't yield the expected results. Research also relies on objectivity – the willingness to see things for what they are--which is not always what one hypothesized. These lessons in perseverance and objectivity are valuable in realms beyond science.

More than 130 students are presenting their work today. Some did research on the UA campus, others did research in other countries (science is an international endeavor), and still others were involved at the Barrow Neurological Institute and the University of Arizona College of Medicine in Phoenix, Northern Arizona University, and Arizona Western College. A broad range of topics is represented.

Today's presenters spent weeks designing and conducting experiments, collecting data, interpreting findings, and developing posters to explain what they have learned. The abstracts of posters being presented appear in this booklet and on the UBRP website at www.ubrp.arizona.edu. To get the complete story though, talk to the students! You will not only learn some really interesting things, but you will develop an appreciation for the value of inquiry-based learning in the education of undergraduate students!

Enjoy the conference!

Carol & Jennifer

2017 UBRP CONFERENCE AGENDA

ENVIRONMENT & NATURAL RESOURCES 2 BUILDING, 1064 E. LOWELL STREET

12:00pm – 1:00pm

CHECK IN & OPENING RECEPTION

GROUND AND SECOND FLOORS

- Check in at the Registration Table
- Enjoy refreshments in the Cafe, meet & network with UBRP students, faculty mentors, alumni, and guests
- Explore hands-on science activities (ground floor)
- Preview students' posters (ground & second floors)
- Support UBRP by purchasing a raffle ticket at the Donations Table for a chance to win a basketball autographed by the 2016-2017 UA Men's Basketball Team

1:00pm – 2:00pm

KEYNOTE ADDRESS

ROOM N120, GROUND FLOOR

- Welcome by Carol Bender, UBRP Director
- Keynote Address: Whatever It Takes by Dr. Retsina Meyer, UBRP Alumnus
- UBRP Up Close by UBRP Ambassador Jordan Barrows
- Remarks by Dr. John Enemark, UBRP External Advisory Group Chairperson
- Logistics, Jennifer Cubeta, UBRP Assistant Director

2:00pm – 4:30pm

UBRP POSTER SESSION

GROUND FLOOR, SECOND FLOOR, AND ROOMS S225 & S215

- Odd numbered posters present from 2:00pm – 3:15pm
- Even numbered posters present from 3:15pm – 4:30pm

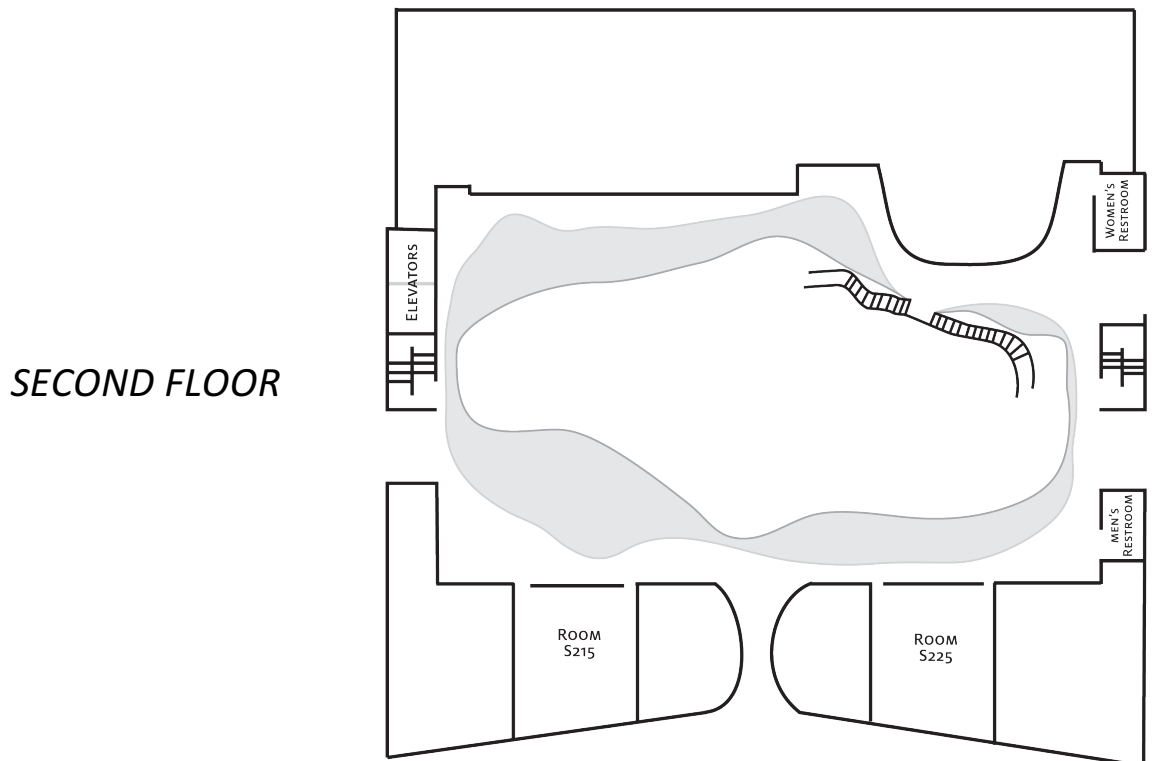
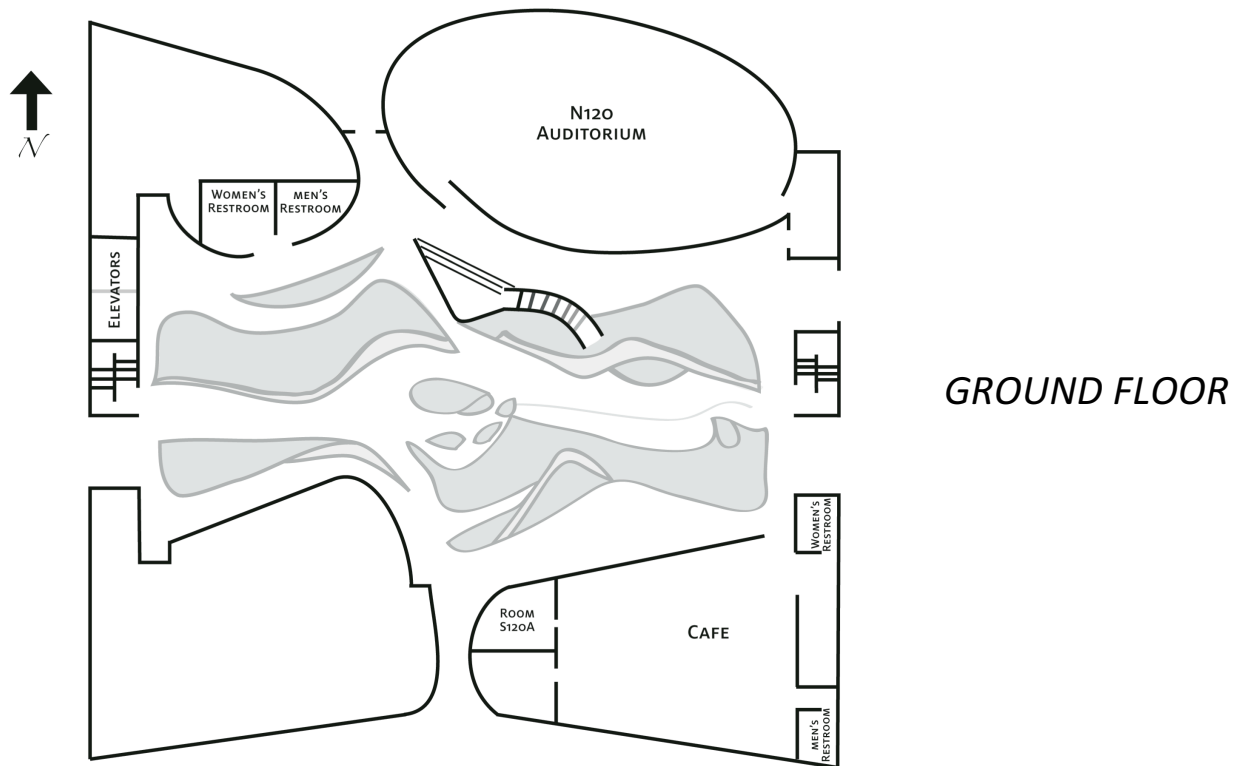
4:30pm – 5:00pm

CLOSING: PRESENTATION OF AWARDS & PRIZES

ROOM N120, GROUND FLOOR

- Outstanding Faculty Mentor Award
- Outstanding Graduate Student Mentor Award
- Student Participation Certificates
- Closing Remarks & Door Prizes

MAP OF VENUE: ENVIRONMENT AND NATURAL RESOURCES 2 BUILDING



TODAY'S ACTIVITIES

OPENING RECEPTION ACTIVITIES, 12:00pm – 1:00pm

Meet and Greet (ENR2 Café & Courtyard)

Grab a bite to eat and touch base with UBRP students, alumni, faculty, and guests!

Support UBRP and Have a Chance to Win an Autographed UA Men's Basketball!

Visit the UBRP Registration Table to support UBRP! Raffle tickets for the autographed basketball are \$5 each, or three for \$10. T-shirts are available for \$10. All proceeds will go towards UBRP student support.

Wonders of the Human Body (ENR2 Courtyard)

Activities to explore the various important processes that take place throughout our bodies.

Shark Anatomy (ENR2 Courtyard)

Learn the anatomy of sharks and how they play an important role in our oceans.

The Brain Bus! (Parking Bay, North Side of ENR2)

Learn how the brain works, how the brain is organized, how our senses work, how to protect the brain, how to make your brain work better, and how the brain develops and ages!

Arthropod Diversity (ENR2 Courtyard)

See arachnids, giant centipedes, and stinging insects! Hosted by Dr. Justin Schmidt, a 2015 winner of the IgNoble Award and 2016 author of the book *The Sting of the Wild*.

Arizona Stressbusters (Room 120A, Inside Café)

Feeling stressed? Get a free 5-minute backrub from University of Arizona volunteers!

UBRP 2016 Slide Show (Room N120)

See what UBRPers have been up to this year!

DR. RETSINA MEYER, KEYNOTE SPEAKER, 1:00pm – 2:00pm

Dr. Meyer is the Founder of Resilience Therapeutics, a startup focused on novel treatments for Post-Traumatic Stress Disorder (PTSD) and other diseases of the brain, and is a mentor and advisor to a number of startups, scientists, and entrepreneurs. As an entrepreneur, Dr. Meyer is an alumna of MassBIO's MassCONNECT Program and SpringBoard's Life Sciences Accelerator. She went on to advance Resilience through the OneStart America's competition awarded by GSK's SR One and Oxbridge Biotech Roundtable, becoming the winner of the #1 emerging life science company.

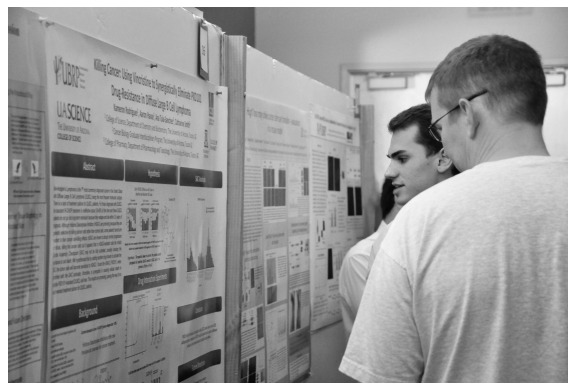


Dr. Meyer obtained a Neuroscience Ph.D. at MIT where she was a Presidential Fellow, Global Fellow, Graduate Woman of Excellence, and recipient of five named fellowships (Schoemaker, Hampton Young, Singleton, Killian, and Leventhal). She has produced more than 40 articles, abstracts and lectures. Her recent discoveries garnered international press attention and earned her a slot in the local TEDx Conference.

Dr. Meyer was a US Fulbright Scholar with the Moser Lab at the Centre for the Biology of Memory in Norway, and she serves as a science advocate with the Science Policy Initiative. She proudly served as a live-in mentor for undergraduates (GRT) at MIT Simmons Hall for 6 years. She is a 2004 graduate of the University of Arizona, where she was a UBRP and a BRAVO! student with a triple major (mathematics, biochemistry, and psychology).

THE UBRP POSTER SESSION! 2:00pm – 4:30pm

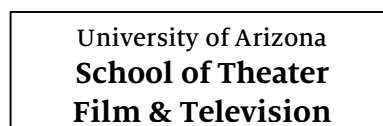
If you've never attended a poster session before, the main idea to keep in mind is that our students are here to talk to you about the research they've done. You are not expected to be an expert in science; we invite our visitors to simply be curious and to ask questions! *Can you walk me through your poster?* *How did you get involved in research?* *What excites you about doing research?* *What is the 'take home' message from your poster?* Our students will be happy to share their research experiences with you! Along with the list of abstracts located in this booklet, you can use the Topical Guide to UBRP Conference Posters handout to help you identify posters of interest.



To give our own students a chance to see each others' work, half of our students will be presenting their posters from 2:00pm to 3:15pm and the other half will be presenting from 3:15pm to 4:30pm.

DOOR PRIZES, 4:30pm – 5:00pm

UBRP thanks the following organizations and companies for donating door prizes and raffle items:



THANK-YOU TO OUR DONORS!

For 28 years, the Undergraduate Biology Program has partnered passionate undergraduates with expert UA faculty mentors to create a unique and invaluable hands-on research experience. UBRP participants continue to study everything from Type 2 diabetes effects on the heart to the ecology of Gila Monsters, from the transmission of HIV between mother and child to the genetics of potential biofuel crops, and much more.

These opportunities for students are made possible by support from external grants, funding from the University of Arizona, and the generosity of our donors, especially the 2017 Friends of UBRP!

2017 FRIENDS OF UBRP:

MESQUITE MEMBERS (\$2,000+)

Anonymous ♦ Prof. Carol Bender ♦ Drs. John Hildebrand (in memory of Dr. Michael Wells) & Gail Burd
Mr. Robert J. and Mrs. Kim A. Nelson ♦ sanofi

OCOTILLO MEMBERS (\$1,000+)

Ms. Carol A. Arakaki ♦ Drs. M.J. Demetras & John Umbreit ♦ Dr. Sarah K. Edwards ♦ Dr. Brenda S. Gardner ♦ Dr. Ronald P. Hammer ♦ Dr. Herson I. Quinones ♦ Dr. Miriam C. Ruth ♦ Dr. John A. Szivek ♦ Mr. Sheldon Trubatch & Ms. Katharina Phillips

CREOSOTE MEMBERS (\$500+)

Dr. Richard Austin ♦ Dr. Sagiv Boggavarapu ♦ Dr. Margaret Briehl ♦ Dr. A. Teresa Isaias
Mr. Cameron H. Lee ♦ Dr. Janna Mundt ♦ Dr. Lynne Oland ♦ Ms. Samantha L. Szuter ♦ Dr. Allison L. Titcomb
Drs. V.K. Viswanathan & Gayatri Vedantam

AGAVE MEMBERS (\$250+)

Dr. Craig Aspinwall ♦ Dr. Leonid Bartik ♦ Lt. Col. Dustin Boyer ♦ Mrs. Roxie Catts ♦ Mr. Richard P. Edelman
Dr. and Mrs. John Enemark ♦ Mr. Kirtland and Mrs. Nancy Gardner ♦ Dr. Paul A. Klekotka ♦ Dr. Megan O'Meara
Dr. Elena Plante ♦ Drs. Leslie Tolbert & Paul St. John ♦ Mrs. Andrea J. Wellington

And thank you to donors who have contributed to UBRP in 2016 and 2017!

Anonymous
Mr. Jordan Barrows
Mr. Fred T. Boice
Dr. Elizabeth Bushra
Mr. Richard A. Cada
Dr. Cynthia L. Carr
Ms. Sharon L. Crouse-Matlock
Mrs. Jennifer L. Cubeta
Ms. Virginia M. Edwards
Eli Lily and Company
The Fix, AZ's Mac 'N Chz
Headquarters
Ms. Jenna Franco
Dr. Jeffrey Frelinger
Mr. David A. Gonzales

Dr. Wulfia Gronenberg
Dr. Marilyn J. Halonen
Ms. Shaina H. Hasan
Dr. James T. Hazzard
Dr. Xi He
Mrs. Shari Hofstadter
Intel Foundation
Mr. Rohith Jayaram
Mr. Salil P. Kalarn
Dr. Michael S. Kuhns
Ms. Marisa Lester
Ms. Kendra E. Liu
Mama's Family Restaurants
Dr. Rebecca M. McQuade
Mr. Juan Mena Gonzales

Ms. Belen Molina
Raytheon Company
Dr. Linda L. Restifo
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Scented Leaf Tea House
Dr. Eugene G. Sander
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Dr. Jennitte L. Stevens
Dr. Daryn A. Stover
Dr. Kenneth R. Teter
Ms. Cathy Tran
Dr. Elizabeth Vierling
Dr. Josette M. Weibrecht

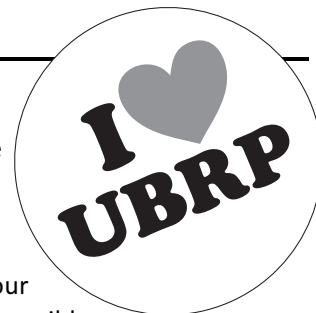
A special thank-you to our UBRP/BRAVO! External Advisory Committee:

Dr. John Enemark, Chair
Mr. Patrick Butler
Dr. Nathan Ellis

Dr. Henry Johnson
Dr. Teri Suzuki
Dr. John Szivek

Ms. Samantha Szuter
Dr. Ken Wertman

FRIENDS OF UBRP



Unfortunately, cuts in external research funding have caused UBRP to scale back on our programs at a time when college students need this kind of experience to be competitive. To offset this loss, our goal starting in February 2017 is to raise \$40,000 by the 29th Annual UBRP Conference to be held in January 2018, for UBRP student support. Our stretch goal of \$250,000 will help us reinstate the BRAVO! program, which supports international research experiences. We hope to achieve our fundraising goals to continue to offer the UBRP experience to as many students as possible and hope you will consider joining us in this endeavor!

Donors are welcome to give online at www.ubrp.arizona.edu/donate, or at the registration table during the Conference.

Those contributing \$250 or more to UBRP as a single gift or in cumulation between February 1, 2017 and January 31, 2018 will become members of our 2018 Friends of UBRP Yearly Membership Program!

Friends of UBRP Membership Levels

SAGUARO MEMBERS (~\$450/month)

\$5,500 supports one UBRP student conducting research for an entire calendar year!

Saguaro Members receive a behind-the-scenes lab tour with a UBRP student, have the opportunity to meet with students at the UBRP Annual Conference in January and enjoy reserved seating at the keynote address. They also receive a program highlight from a current student and are acknowledged on UBRP's website. Donations of \$5,000 or more also qualify donors for a 1-year membership in the College of Science's Galileo Circle.

PALO VERDE MEMBERS (~\$300/month)

\$3,500 supports one UBRP student conducting research on a part-time basis during the academic year!

Palo Verde Members receive a behind-the-scenes lab tour with a UBRP student, have the opportunity to meet with students at the UBRP Annual Conference in January and enjoy reserved seating at the keynote address. They also receive a program highlight from a current student and are acknowledged on UBRP's website.

MESQUITE MEMBERS (~\$175/month)

\$2,000 supports one UBRP student conducting research on a full-time basis during the summer!

Mesquite Members have the opportunity to meet with students at the UBRP Annual Conference in January and enjoy reserved seating at the keynote address. They also receive a program highlight from a current student and are acknowledged on UBRP's website.

OCOTILLO MEMBERS (~\$100/month)

\$1,000 enables a UBRP student to travel to an attend a scientific meeting to present his or her research!

Ocotillo Members enjoy reserved seating at the UBRP Annual Conference keynote address, receive a program highlight from a current student and are acknowledged on UBRP's website.

CREOSOTE MEMBERS (~\$50/month)

\$500 funds one month of full-time student research during the summer!

Creosote Members receive a program highlight from a current student and are acknowledged on UBRP's website.

AGAVE MEMBERS (~\$20/month)

\$250 enables a student to attend the annual UBRP ethics retreat!

Agave Members are acknowledged on UBRP's website.

Memberships for companies and organizations are also available! Please visit www.ubrp.arizona.edu/friends-of-ubrp for more information on Friends of UBRP. The University of Arizona Foundation is a tax-exempt 501(c)3 organization and your gift is tax deductible.

2016 UBRP AWARDS

Beginning in 2008, on the occasion of the 20th anniversary of UBRP, we celebrated the outstanding mentorship UBRP students enjoy by creating the first Outstanding UBRP Faculty Mentor and the first Outstanding UBRP Graduate Student, Postdoctoral Fellow, or Research Specialist Mentor Awards. Candidates are nominated by current UBRP students and UBRP alumni. A committee composed of faculty members and students reviews nominees and selects the award recipients.

2016 OUTSTANDING UBRP FACULTY MENTOR



Dr. Rajesh Khanna
Associate Professor, Pharmacology
Nominated by Lindsey Chew

2016 OUTSTANDING UBRP GRADUATE STUDENT MENTOR



Ariana Stickel
Doctoral Student, Psychology
Nominated by Nathaniel Gallegos

Nominees for the Outstanding UBRP Faculty Mentor Award are:

Dr. Scott Boitano, Professor, Physiology
Dr. Lalitha Madhavan, Assistant Professor, Neurology

Nominees for the Outstanding UBRP Graduate Student, Postdoctoral Fellow, or Research Specialist Mentor Award are:

Mandi Corenblum, Research Specialist, Neurology
Maira Hough, Doctoral Student, Ecology & Evolutionary Biology

The University of Arizona has a culture that supports undergraduate research.
This is something to be celebrated!

2016-2017 UBRP PARTICIPANTS AND FACULTY MENTORS

UNDERGRADUATE BIOLOGY RESEARCH PROGRAM (UBRP)

The Undergraduate Biology Research Program (UBRP) and the Biomedical Research Abroad: Vistas Open Program (BRAVO!) are educational programs designed to teach students science by involving them in biologically related research. Students are paid for their time doing research where they develop an understanding of scientific method and receive a realistic view of research. They also acquire the tools necessary to be successful in post-graduate studies should they choose careers related to biology or biomedical research. Funding for UBRP students comes from the Western Alliance to Expand Student Opportunities (WAESO) and internal funds from the UA Provost, Senior Vice President for Research (ORD Research Fellows), BIO5, and the deans of the Colleges of Medicine, Science, Public Health, Pharmacy, and Agriculture and Life Sciences. We gratefully acknowledge this support!

<u>Student</u>	<u>Mentor</u>
Adam Aragaki	Ron Lynch
Olivia Austin (<i>ORD Research Fellow</i>)	Jennifer Barton
Shreya Bellampalli (<i>ORD Research Fellow</i>)	Rajesh Khanna
Vedanshi Bhargava (<i>ORD Research Fellow</i>)	Lalitha Madhavan
Eunice Borunda (<i>WAESO</i>)	Frans Tax
Jordan Bridgewater	Michael Riehle
Morgan Brown	Magdalene So
Nichole Burkett (<i>ORD Research Fellow</i>)	Sally Dickinson
Alex Burton	Russell Witte
Ethan Carlson	David Baltrus
Timothy Chan	Magdalene So
Swati Chandra	Jennifer Barton
Matthew Chaung	Daniela Zarnescu
Lindsay Chew (<i>ORD Research Fellow</i>)	Rajesh Khanna
Rene Conway (<i>ORD Research Fellow</i>)	John Szivek
Jacob Copple	Matthew Cordes
Rushabh Daulat	Indraneel Ghosh
Ryan Dunn (<i>ORD Research Fellow</i>)	Michael Daines
Virginia Friedrich (<i>ORD Research Fellow</i>)	Frans Tax
Emily Galloway (<i>ORD Research Fellow</i>)	Tally Largent-Milnes
Michael Gee	Thomas Pannebecker
Lucas Harrell	Jacob Schwartz
Megan Hayes	Kristian Doyle
Paul Heaton	Mark Beilstein
Barnes Jannuzi	Mary Peterson
Pareena Kaur	Thomas Hamm & Andrew Fuglevand
Maj Krumberger	Minying Cai
Joseph Lagas	Anita Koshy
Gloria Le	Johnny Fares
Maxwell Li	Marvin Slepian
Emily Long	Mary-Frances O'Connor
Wes MacDonald (<i>ORD Research Fellow</i>)	Anita Koshy
Monica "Nikki" Mastrud (<i>ORD Research Fellow</i>)	Dominik Schenten
Jessi McMinn (<i>ORD Research Fellow</i>)	Naomi Rance
Matthew Miller	Guang Yao

<u>Student</u>	<u>Mentor</u>
Christina Morrison	Charles Gerba
Dyana Muller (<i>ORD Research Fellow</i>)	Torsten Falk
Celina Nguyen	John Jewett
Ryan Nolcheff	Jennifer Barton
Abigail O'Conner	Daniela Zarnescu
Katie Pan	David Armstrong & Marvin Slepian
Parth Patel	Carol Gregorio
Savannah Perno (<i>ORD Research Fellow</i>)	Johnny Fares
Colin Potter	Anita Koshy
Michael Ragone (<i>ORD Research Fellow</i>)	Jean Marc Fellous
Poorva Rajguru (<i>ORD Research Fellow</i>)	Mark Beilstein
Denise "Lex" Salas (<i>WAESO</i>)	Rajesh Khanna
John Santoro (<i>ORD Research Fellow</i>)	Randall Friese
Hannah Schmitz (<i>ORD Research Fellow</i>)	Russell Witte
Tala Shahin	David Armstrong
Benjamin Silashki	Torsten Falk
Caitlin Smith (<i>ORD Research Fellow</i>)	Heidi Brown
Cathy Tran (<i>ORD Research Fellow</i>)	Lynne Oland
Meagan Tran (<i>ORD Research Fellow</i>)	Yitshak Zohar
Spencer Vaughan	Daniela Zarnescu
Sarah Rose Vining	Virginia Rich
Karen Wang	Judith Bronstein
Jesse Wealing	Ralph Fregosi
Luke Wohlford	Stephen Cowen
Dana Woods (<i>ORD Research Fellow</i>)	Bernard Futscher
Meng-Han Ashley Wu (<i>ORD Research Fellow</i>)	Timothy Bolger
Golbahar Yazdanifar	Christina Laukaitis
Cristina Young (<i>ORD Research Fellow/WAESO</i>)	Ralph Fregosi
Dillon Yup	Craig Aspinwall

AMERICAN SOCIETY FOR PHARMACOLOGY AND EXPERIMENTAL THERAPEUTICS SUMMER UNDERGRADUATE RESEARCH PROGRAM (ASPET SURF)

The ASPET SURF Program, funded by a grant from the American Society for Pharmacology and Experimental Therapeutics, supports five undergraduate students per year who work under the mentorship of ASPET members. The program goal is to introduce undergraduate students to pharmacology research, using authentic, mentored research experiences to heighten student interest in careers in research and related health care disciplines.

<u>Student</u>	<u>Mentor</u>
Sri Sai Swetha Atluri	Ronald Lukas & David Armstrong
Rachel Davidson-Knapp	Todd Vanderah
Bojan Isakov	Frank Porreca
Dagoberto Robles (<i>WAESO</i>)	Frank Porreca
Trinny Tat	Rayna Gonzales & Jeong-Yeol Yoon

THE BECKMAN SCHOLARS PROGRAM

The Beckman Scholarship Program is designed to help stimulate, encourage and support research activities by exceptionally talented undergraduate students at our nation's universities and colleges; young people who ultimately will become prominent leaders in their scientific and professional pursuits (<http://www.beckman-foundation.com/bsp-statement.html>). The Beckman Scholarship at the University of Arizona provides funding for students to conduct in-depth research with one of 15 stellar research mentors in UA's College of Science. Funding for this program is provided by the Arnold and Mabel Beckman Foundation.

<u>Student</u>	<u>Mentor</u>
Jordan Barrows	Daniela Zarnescu
Ben Wu	Oliver Monti
Stephen Yao	Daniela Zarnescu
Ben Zaepfel	Daniela Zarnescu

ENVIRONMENTAL HEALTH SCIENCES: TRANSFORMATIVE RESEARCH UNDERGRADUATE EXPERIENCE (EHS-TRUE)

EHS-TRUE, funded by the National Institute of Environmental Health Sciences, provides two years of paid training and research experience in an environmental health sciences research group. The program targets students from backgrounds under-represented in the sciences. The goal of EHS-TRUE is to prepare undergraduates from under-represented backgrounds to enter graduate programs in the environmental health sciences. Eight to nine students per year receive EHS TRUE support.

<u>Student</u>	<u>Mentor</u>
Jonathan Blohm	Clark Lantz
Nathan Borrero	Scott Boitano
Alondra Harris	Raymond Runyan
Daniel Iniguez	Helena Morrison
Emily Leavitt	Paloma Beamer
Alec Perrera	Todd Cameinisch
Ben Rivera	Raina Maier
Sergio Salguero	Helena Morrison
Ruby Sierra	Scott Boitano

MINORITY ACCESS TO RESEARCH CAREERS (MARC) PROGRAM

MARC is a research, mentoring, financial and academic opportunity for undergraduates belonging to a group considered underrepresented in biomedical research and who have interest and potential to pursue a career in this broad field. The program provides scientific training, financial support, mentoring, assistance in preparing for graduate school, and networking opportunities. MARC is funded by the National Institutes of Health.

<u>Student</u>	<u>Mentor</u>
Paul Acosta	Mark Pagel
Sophia Aguirre	Gregory Rogers
Katherine Andersh	Carol Barnes
Marisa Becerra	Gene Alexander
Emanuel Bustamante	Joanna Masel
Daniel Carrera	Robert Wilson
Jose Celaya-Alcala	Timothy Secomb

Student

Olivia Gorushi
 Jeffry Granados
 Kyle Lopez
 Justin Lopez
 Elisa Munoz
 Daniel Osorio
 Eric Simental
 Daniom Tecle

Mentor

Andre-Denis Wright
 Mark Pagel
 William Montfort
 May Khanna
 Daniela Zarnescu
 Frans Tax
 Peter Cotty
 Marek Romanowski

PARTNERSHIP FOR NATIVE AMERICAN CANCER PREVENTION (NACP)

The Partnership for Native American Cancer Prevention (NACP) is a collaboration between Northern Arizona University, the University of Arizona's Cancer Center, and the Native American Research and Training Center. The mission of the NACP is to alleviate the unequal burden of cancer among Native Americans of the Southwest through research, training and community outreach programs in collaboration with the communities they serve. Funding for NACP is provided by the National Cancer Institute.

Student

Melanie Begaye
 Phillip Belone
 Roslyn Curry
 Ashlee Irving
 Leonard Seanez
 Cassidy Wartz

Mentor

Mary Koithan
 Christina Laukaitis
 Bill Montfort
 Jennifer Bea
 Ron Heimark
 Mary Koithan

NEUROSCIENCE AND COGNITIVE SCIENCE (NSCS) SUMMER RESEARCH PROGRAM

The NSCS Summer Research Program is an intensive research experience that enables pre-majors of majors in the UA NSCS program to develop a deeper understanding of neuroscience and cognitive science, to help consolidate classroom learning, and to help in deciding on a career path. The NSCS Summer Research Program is offered in conjunction with the Undergraduate Biology Research Program, but also contains additional components specific to neuroscience and cognitive science, including a 3-day boot camp that includes clinical imaging and recording, electrophysiology, genomics and large databases, and microscopy, and a summer poster session.

Student

Areen Badwal
 Garrett Baker
 Tiffany Cho
 Benjamin Davis
 James del Toro
 Kelly Edwards
 Jenna Franco (WAESO)
 Nathaniel Gallegos (WAESO)
 Erin Howard
 Konner Kirwan
 Justine Mona (WAESO)
 Faye Ortiz (WAESO)
 Genevieve Patterson
 Diana Perez (WAESO)

Mentor

Julie Miller
 Robert Wilson
 Linda Restifo
 Stephen Cowen
 Wulfila Gronenberg
 Pelagie Beeson
 William Killgore & Anita Koshy
 Lee Ryan
 Jean-Marc Fellous
 Lalitha Madhavan
 Kristian Doyle
 Lalitha Madhavan
 Shaowen Bao
 Mary Peterson

Student

Jenna Ritchie
Grace Samtani
Kianoush Soofi

Mentor

Jeffrey Lifshitz
Torsten Falk
Stephen Cowen

PROZKOUMAT! RESEARCH PROGRAM IN THE CZECH REPUBLIC

Prozkoumat! (which means explore in the Czech language) provided ten undergraduate students from groups underrepresented in the sciences with a ten-week summer research experience at the Institute of Parasitology, Czech Academy of Sciences, in Ceske Budejovice, Czech. The students prepared for their research experience by taking two spring semester courses that provided an introduction to parasitology and to Czech culture and history. Prozkoumat is funded by a Minority Health International Research Training grant to the University of Arizona.

Student

Kathryn Blevins
Daniela Gutierrez-Muñoz
Laura Hacker
Fatima Molina
Megan Montoya
Jennifer Salazar
Christian Sandoval
Micah Secor
Stacy Suarez Cham
Alejandro Varela

Mentor

Alena Zikova
Dan Sojka
Zoltan Fussy
Astrid Holzer
Zdenek Paris
Ales Horak
Astrid Holzer
Ondrej Hajdusek
Ryan Rego
Martin Kvac

LIST OF ABSTRACT TITLES AND PRESENTERS

28th ANNUAL UNDERGRADUATE BIOLOGY RESEARCH PROGRAM CONFERENCE

(in alphabetical order by presenter's last name)

MEASURING PH USING MAGNETIC RESONANCE IMAGING (MRI) AND MACHINE LEARNING

PAUL ACOSTA, MARK D. PAGEL, JULIO CARDENAS-RODRIGUEZ

Measuring the pH of a tumor is an essential part of diagnosis and treatment of cancer. The current method of measuring pH involves a complex MRI scan protocol and contains limitations on the contrast agents that can be used in the scans. Our goal was to develop a method that is more clinically accessible and allows for a more broad use of contrast agent molecules. The method will rely upon the chemical exchange of water with the agent molecule and T2 exchange. Using machine learning, we implement the data acquired through MRI to create a computer program that accurately predicts the pH of a system independent of agent concentration.



UNDERSTANDING THE FUNCTION OF DIFFERENT 3-DIMENSIONAL GENOME ORGANIZATIONS

SOPHIA AGUIRRE, GREGORY ROGERS

Recent studies identified the condensin II subunit Chromosome-associated Protein H2 (CapH2) as a master-regulator of chromosome territory (CT) formation in *Drosophila melanogaster*. Specifically, Cap-H2 overexpression or expression of non-degradable Cap-H2 in interphase cells disrupts homologous chromosome pairing, inducing chromosome individualization and the formation of distinct CTs. By manipulating this new regulatory pathway, it is now possible to investigate the function of different 3-dimensional chromosome organizations in cells by comparing the expression patterns of cells containing paired chromosomes to those with CTs. To obtain cells containing CTs we generated stable, inducible Schneider 2 (S2) cell lines that express wild-type (WT) Cap-H2. Cells were scored for the formation of normal, weak, and strong CTs over a six-day time course. We also conducted cell viability counts on CapH2-expressing cells to determine the effect of CTs on cell health. We found that strong CT formation was most prevalent after six days of Cap-H2 expression. However, cell cultures expressing WT Cap-H2 displayed a reduced number of viable cells over the six day time course. Taken together, we conclude that it requires almost a week of WT Cap-H2 induction for most stable cells to form CTs and cause reduced cell health. At present, we are making stable lines expressing non-degradable Cap-H2 in order to induce faster genomic reorganization so that we can examine CT function. This research was supported by the NIH MARC Training Grant T34 GM08718.



AGE-RELATED ATTENTIONAL CONTROL AND SET SHIFTING IMPAIRMENTS ARISE INDEPENDENTLY IN MACAQUE MONKEYS

KATHERINE ANDERSH, D.T. GRAY, A.C. SMITH, S.N. BURKE, A. GAZZALEY, C.A. BARNES

Goal-directed behaviors provide the behavioral flexibility necessary for selecting appropriate responses when similar stimuli are encountered in different contexts. The cognitive processes that provide this flexibility have been collectively described under the category of executive functions. Executive function can be segregated into at least 3 separate components: inhibition of prepotent responses, set shifting, and attentional control and monitoring. In humans, partially non-overlapping neural networks in the prefrontal cortex underlie the different components of the executive function network. For example, orbitofrontal and striatal networks have been shown to underlie set shifting, while dorsolateral prefrontal and medial prefrontal networks have been shown to underlie attentional control processes. At the behavioral level, age-related impairments in inhibition, set shifting, and attentional control arise independently of one another, suggesting that the separate neural networks that underlie these behaviors are also altered independently with age. To test whether different executive

functions are similarly affected independently in the macaque, young ($n = 6$) and aged ($n = 7$) monkeys were tested on a set shifting and attentional control task in a Wisconsin general testing apparatus. The results show that aged monkeys were deficient on both tasks, but the impairments scores between the two paradigms did not correlate, suggesting that set shifting impaired animals were not necessarily impaired on the attentional control task and *vice versa*. These results suggest that, like in humans, executive functions in aged monkeys are impacted by normative aging independently. Furthermore, these data argue against the suggestion that the age-related deficits in attentional control seen in aged humans arise due to differences in exposure to technology, relative to young, which may negatively impact their ability to perform computerized tasks. All monkeys in the current study were exposed equally to all aspects of the task environment, suggesting that the detrimental effects seen in the aged individuals are in fact due to differences in attentional control processes. This work was supported by the MARC Training Grant T34 GM 08718, NIH Grant R01 AG050548, and by the McKnight Brain Research Foundation.



INCREASING SENSITIVITY FOR KISSPEPTIN ACTIVATION OF BETA-CELL INSULIN SECRETION BY LINKING TO GLP-1

ADAM ARAGAKI, SABINE HARRINGTON, CRAIG WEBER, RON LYNCH

Kisspeptin, a neurotransmitter, has previously been implicated in reproductive signalling and energy balance. Recent evidence suggests that kisspeptin may be involved in insulin secretion from pancreatic β -cells. However, as concentrations required for effect are so high (μM), it is unlikely that it would act as an endocrine agent. GLP-1 also modulates insulin secretion from β -cells, yet requires only nanomolar concentrations. We hypothesized that by physically linking these two agents together, we could increase the local concentration of kisspeptin, bringing it into therapeutic concentrations. In these experiments, we used insulin secretion as a functional marker for agent activity on INS 832/3 β -cells. kiss-5 and kiss-10 were utilized as functional 5 and 10 amino acid fragments from the N terminus of kisspeptin, respectively. Though both exhibited similar effective concentrations, kiss-10 showed propensity for a larger maximal response. Moreover, both Kiss-5 and Kiss-10 exhibited additive activity to that of GLP-1, at both agents' maximal monomeric concentrations. Due to the clear additive relationship between Kisspeptin with GLP-1 (which implies the presence of two distinct downstream signaling pathways), we constructed a Kiss-10/GLP-1 dimer and compared this to monomeric GLP-1, and the combination of both monomers. Potentiation of glucose stimulated insulin secretion (GSIS) was observed at 10 nM with a saturation point at ~ 50 nM, and there was no significant difference in response when compared to GLP-1 alone at 100 nM. Overall, this work sets a basis for the design and testing of a unique bivalent ligand composed of a high affinity domain (GLP-1) linked to a much lower affinity domain (Kiss-10) which demonstrates an additive effect on insulin secretion and therefore may show enhanced specificity and activity for modulating β -cell function. Funded in part by BIO-5.

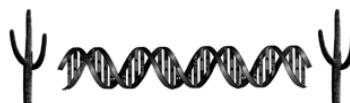


CHARACTERIZATION OF $\alpha 7$ AND $\alpha 7\beta 2$ NICOTINIC ACETYLCHOLINE RECEPTOR (nAChR) FUNCTION AND β -AMYLOID INTERACTIONS

SRI SAI SWETHA ATLURI, ANDREW A. GEORGE, RONALD J. LUKAS, PAUL WHITEAKER

Alzheimer's disease (AD), a progressive neurodegenerative disorder, is one of the most common causes of mental deterioration in the elderly. Several studies have correlated the cognitive severity of early-onset AD with a loss of basal forebrain cholinergic neurons. However, the precise mechanisms underlying cholinergic neurodegeneration and subsequent memory impairments remain unknown. Recently, a novel nAChR, containing only $\alpha 7$ and $\beta 2$ subunits, has been identified on basal forebrain cholinergic neurons. This subtype is highly sensitive to functional blockade by amyloid-beta ($A\beta$). As demonstrated in hippocampal pyramidal neurons, $A\beta/\alpha 7\beta 2$ -nAChR interactions lead to neuronal homeostatic instability and subsequent hyperexcitation (Liu et al. 2009). In an ongoing effort, this project will delineate the relationship between $A\beta/\alpha 7\beta 2$ -nAChR interactions and level of $\beta 2$ expression through a combination of neuropharmacological and electrophysiological techniques. We have used two-electrode voltage clamp recordings from *Xenopus laevis* oocytes expressing either $\alpha 7$ or $\alpha 7\beta 2$ nAChR. We tested several concatenated $\alpha 7\beta 2$ -nAChR subtypes to understand the relationship between $A\beta$ as it relates to the structural

and functional characteristics of $\alpha 7$ and $\alpha 7\beta 2$ nAChR. To characterize the differences between $\alpha 7$ -containing and $\alpha 7\beta 2$ -containing nAChRs, we tested the maximal current responses of these receptor subtypes with the endogenous $\alpha 7$ nAChR ligands acetylcholine (ACh) and choline. Using an EC_{100} concentration of ACh (10 mM), we observed open-channel block of the $\alpha 7\beta 2$ -containing nAChR. This effect was identified using an alternative depolarization protocol. Therefore, an EC_{100} concentration of choline (10 mM) was used to characterize the maximal function of these receptors without producing open-channel block. Future studies will delineate the structure/function relationship between A β isoforms (monomeric, oligomeric, and fibrillar) and concatenated $\alpha 7$ and $\alpha 7\beta 2$ nAChR. Moreover, we will characterize the stoichiometries that confer high-affinity A β interactions using choline as the primary nAChR agonist. This research is relevant to prevention or treatment of AD. For example, it will provide a set of novel therapeutic targets that may disrupt critical A β / $\alpha 7\beta 2$ -nAChR interactions and/or stabilize neuronal hyperexcitation directly. This work was supported by an ASPET SURF grant to the University of Arizona.



OPTICAL COHERENCE TOMOGRAPHY IMAGING IN EARLY DETECTION OF OVARIAN CANCER

OLIVIA AUSTIN, FAITH RICE, JEN KOEVARY, CAITLIN HOWARD, JENNIFER BARTON

Ovarian cancer is currently the fifth deadliest cancer type among women. Since it is relatively silent, presenting few or no symptoms, ovarian cancer is often not caught in patients until it has advanced significantly. This study focused on using optical coherence tomography (OCT) imaging to detect this cancer earlier than is currently possible in the clinic. The produced images are high resolution cross-sectional views of tissue that facilitate in catching smaller lesions that traditional imaging methods such as pelvic ultrasound would not catch. The OCT method was tested by first using a mouse model to mimic the development of ovarian cancer in humans. The two groups of mice tested were genetically engineered MISIR-TAg mice, which spontaneously develop bilateral epithelial ovarian cancer over time, and wild type mice, which do not. Both groups of mice were imaged at four weeks and eight weeks old. In this way, normal ovaries can be observed next to ovaries that may or may not develop cancer, giving a reliable way to track the cancer's development in various mice since the baseline for how healthy ovaries should appear is known. The mouse model also allows control over the disease, providing a definitive timeline dictating when the transgenic mice will get ovarian cancer. Thus, another aspect that can be observed using the mouse model is whether the images at the first time point are indicative of eventual disease development by the second time point or further in the future. To access and image the ovaries, they either removed and imaged ex vivo, or surgically externalized by making a small incision through the abdomen and gently holding the ovaries outside the body. Initial OCT images show enlargement of the ovaries and loss of normal follicular structure in the transgenic animals. Moving forward, a new OCT imaging system that will be capable of faster in vivo imaging is being programmed. Support for this research is provided by the National Institutes of Health/NCI R01CA195723.



AN ALPHA-SYNUCLEIN OVEREXPRESSION MODEL OF VOCAL SYMPTOMS IN PARKINSON'S DISEASE

AREEN BADWAL, CESAR A. MEDINA, STEPHANIE J. MUNGER, JULIE E. MILLER



THERMOREGULATION INFLUENCE ON BODY SIZE IN BUMBLE BEES

GILDA BARBOSA, ANNA DORNHAUS

Size variation was tested in worker bumble bees through thermal analysis of their nest. Although, members of the Hymenoptera have fixed body shape & size, size variation is present in *Bombus impatiens* leading up to a tenfold in difference. Here, we focus on their ability to thermoregulate and maintain temperatures in their nests.



INVESTIGATING EFFECTS OF TDP-43 ON METABOLIC GENE EXPRESSION IN A *DROSOPHILA* MODEL OF AMYOTROPHIC LATERAL SCLEROSIS

JORDAN BARROWS, ERNESTO MANZO, ABIGAIL O'CONNER, ARCHI JOARDAR, DANIELA C. ZARNESCU

Amyotrophic lateral sclerosis (ALS) is a neurodegenerative disease that primarily affects motor neurons, disrupting muscle function, which eventually leads to death by respiratory failure. TDP-43, a DNA/RNA binding protein that plays numerous roles in RNA processing, has been associated with RNA stress granule pathology in over 95% of ALS cases. TDP-43 has also been linked to dysregulation of specific mRNA targets at both the transcriptional and translational levels. Metabolomic analyses demonstrated that several metabolites in glycolysis and the TCA cycle are altered in *Drosophila* larvae expressing human TDP-43 compared to controls, suggesting that enzymes within these metabolic pathways are being affected in ALS. To confirm this hypothesis, we are using the GAL4-UAS system in *Drosophila* to express TDP-43 specifically in the motor neurons or glia. Indeed, transcriptional profiling shows that phosphofructokinase (PFK; Pfk in *Drosophila*) and glucose-6-phosphate dehydrogenase (G6PD; Zw in *Drosophila*) expression levels are altered in the context of TDP^{WT} or disease associated TDP^{G298S}. These findings are consistent with increased glycolysis and high levels of pyruvate identified using metabolomics in TDP-43 expressing flies. Current experiments are aimed at identifying additional transcriptional and translational alterations in metabolic pathways that control cellular energetics. Next, we will use genetic approaches to reduce (in the case of upregulation) or increase (in the case of downregulation) the expression levels of metabolic genes in the context of TDP-43. These experiments will determine whether restoring specific targets can rescue TDP-43 dependent phenotypes. This combination of molecular and genetic analyses will establish physiologically significant targets of TDP-43 that can be used for developing novel therapeutic strategies in the future. This project is supported by UBRP and the Arnold and Mabel Beckman Foundation as well as funding from NIH (5R01NS091299-02). Dr. Bhavani Siddegowda provided assistance and consultation with qPCR analysis.



USING ECHOCARDIOGRAPHY TO CONTRAST THE DIFFERENCE IN STROKE VOLUME BETWEEN A DIABETIC AND NON-DIABETIC HEART DURING EXERCISE

LYLE BECENTI, CHRIS BALDI, GENEVIEVE WILSON

There are previous studies that have utilized echocardiogram imaging tests to measure the stroke volume of a diabetic heart at rest, but few have addressed the stroke volume in a type 2 diabetic heart during exercise. We focused on the values of echocardiography and measuring the stroke volume between two groups, type 2 diabetic and nondiabetic under three conditions, 1.) at rest, 2.) 40% maximum heart rate, and 3.) 60% maximum heart rate during low- to moderate-intense cycling. We hypothesized that a type 2 diabetic heart will have a smaller increase in stroke volume during exercise in comparison to a non-diabetic heart. The ECG images were collected from ten participants, five type 2 diabetic and five non-diabetic controls. Echocardiogram images at the different conditions, were uploaded on the EchoPAC program, a clinical software that investigates ultrasound images, and analyzed to measure the stroke volume of the left ventricle. The data collected using 2DE tracings and biplane disk summation measuring, were visualized on an excel spreadsheet to exemplify the difference in stroke volume between diabetic and non-diabetic participants. There was a statistically significant difference between the non-diabetic and type 2 diabetic groups based upon their stroke volume $p=0.0122$. At rest, the diabetes group averaged 30.2 mL per

beat, while the control group averaged 51.2 mL. At 40% of maximum heart rate, the diabetes group averaged 37.6 mL, while the control group 48.6 mL. At 60% of maximum heart rate, the diabetes group averaged 45.2 mL, while the control group averaged 59.2 mL. Thus, the average stroke volume in a type 2 diabetic heart has a small increase in comparison to a non-diabetic heart. Echocardiogram imaging tests are advanced diagnostic tools that has proven to screen for serious complications and poor exercise intolerance in a diabetic heart. It has the potential to investigate a diabetic heart during low- to high-intense exercise and provide possible indications for cardiac improvement whilst the heart is under stress.



RELATION OF MEAN ARTERIAL AND PULSE PRESSURE MEASUREMENTS TO COGNITIVE PERFORMANCE IN HEALTHY OLDER ADULTS

MARISA BECERRA, GENE ALEXANDER

Understanding the factors that contribute to successful aging has long been of interest to the scientific community. Blood pressure in adults represents one factor thought to impact differences in their cognitive function as they age. This study evaluated, in 208 healthy, older (50-89) adults the potential associations between mean arterial pressure or pulse pressure and cognition. We also examined the possibility of an interaction between gender and blood pressure measurements. The subjects completed a battery of neuropsychological tests that included measures of global cognitive function, memory, processing speed, executive function, and language. After controlling for age, education, and hypertension status, mean arterial pressure showed a positive association with performance in measures of language and processing speed, but no association with memory, executive function, or global cognitive function. Though pulse pressure measurements showed no significant effects, there was a trend for higher pulse pressure resulting in poor performance on global cognitive function. In addition, we observed significant gender differences in all of the tested cognitive domains, except for language, but no interactions between gender and blood pressure measurements. Females did exhibit a significant relationship between mean arterial pressure and scores on language and processing speed tasks, whereas males showed no relationship. Overall, these findings provide preliminary support for the importance of mean arterial pressure and gender as factors that may influence observed differences in cognitive aging. Acknowledgements: This study was supported by the NIH MARC Training Grant (T34 GM08718), the NIA (AG19619, AG025526), the Advanced Research Institute for Biomedical Imaging, McKnight Brain Research Foundation, and the State of Arizona and Arizona DHS.



AN EVIDENCE BASED APPROACH TO DOMESTIC VIOLENCE WORKSHOPS FOR NAVAJO NATION

LILLIAN BEDONIE, CINDY BECKETT

Does providing the Navajo Nation law enforcement providers and community members comprehensive domestic violence prevention training as compared to current practices of incident management only impact domestic violence occurrences and outcomes within a 12-month period? Currently there are limited to no training provided for law enforcement and healthcare provider, and no refresher courses or awareness offered. After reviewing the literature, we can use the information to create workshops that would consist of:

- Creating a classroom setting with presentations: power point and videos
- Case Studies that will be role played for better practice
- Descriptive and Par T-Test Statistics
- Pre and Post tests

My hope for this project is to help providers gain a better understanding and to have empathy for victims and to not only give awareness through a job setting but also community awareness.

CREATING AND DISSEMINATING NAVIGATION MATERIALS FOR THE TOHONO O'ODHAM CANCER PROGRAM

MELANIE BEGAYE, MARY KOITHAN

In comparison to the general U.S. population, cancer mortality risks are higher in Native American populations. Primary causes of this disparity include delayed diagnosis and treatments which is a consequence of multiple factors, including health literacy. The purpose of this project was to translate introductory overviews of common cancers into the Tohono O'odham (TO) language in the form of video productions. The cancer education materials translated into TO were written evidence-based overviews created at the University of Arizona College of Nursing. Tohono O'odham translators worked in pairs to ensure standardized terminology during translations. After audio translations were recorded and edited by project staff for clarity, the audio tracks were integrated with title cards, captions, and culturally appropriate images to create video files. TO translators reviewed the video file drafts to check for accuracy and suggest changes. Once finalized, the videos were burned onto DVDs for dissemination. A final video was shown at a Tohono O'odham Cancer Partnership (TOCP) meeting for material usability evaluation by TOCP staff. The usability questionnaire used to evaluate the videos contained 11 Likert items and 5 open ended questions. Responses were analyzed using basic descriptive statistics and content analysis. Questionnaire responses were generally positive, with 100% of present TO speakers understanding the video narration. The first usability evaluation results will be used to improve future navigation material creation for patients and Community Health Representatives. Having introductory materials readily available in their native language should improve health literacy and, as a result, promote cancer prevention and early detection on the TO Nation. UA Grant # 2U54CA143924.



A NOVEL PEPTIDE APTAMER TARGETING THE CRMP2/NEUROFIBROMIN INTERACTION IN NF1

SHREYA BELLAMPALLI, AUBIN MOUTAL, WENNAN LI, XIAOFANG YANG, RAJESH KHANNA

Neurofibromatosis type 1 (NF1) is a rare genetic disease characterized by tumors in the nervous system, neurological disorders and by chronic pain. Rats with loss of neurofibromin, the protein encoded by the Nf1 gene, showed increases in voltage-gated calcium and voltage-gated sodium currents in sensory neurons, as well as behavioral hyperalgesia. Collapsin response mediator protein 2 (CRMP2) regulates activity of these channels, and also binds to the C-terminus of neurofibromin suggesting a possible mechanism driving NF1 pain. The present work describes the characterization of a novel tool – CRMP2 Neurofibromin Regulating Peptide 1 (CNRP1) – a small peptide from CRMP2 that is useful for studying the role of the CRMP2/Neurofibromin complex in sensory neurons from rats. Using constellation pharmacology, a paradigm for functional fingerprinting of neurons, we chronicle the activity of this novel peptide.

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CHARACTERIZATION OF A MOUSE ABP KNOCKOUT LINE: EXPRESSION OF THREE SALIVARY PROTEIN GENES

PHILLIP BELONE, AMANDA G. CHUNG, ROBERT C. KARN, CHRISTINA M. LAUKAITIS

Androgen Binding Protein (ABP) is thought to mediate mouse preference to mate with its own subspecies rather than with a foreign one. In this capacity, it apparently produces incipient reinforcement on the European mouse hybrid zone. We have recently created a line of knockout mice with the goal of further elucidating the function of ABP. This line has *Abpa27* and *Abpb27*, two of the three genes expressed in mouse saliva, knocked out leaving only *Abpb26* potentially expressed in that serous fluid. We have characterized this line using histology and anti-ABP immunostaining to detect ABP proteins and qPCR to

detect *Abp* transcripts. Across the three genotypes of mice (+/+, +/- and -/-, where + represents the normal alleles and – the knockout alleles), we found no differences in tissue architecture, fecundity of -/- mice, viability of offspring from +/- intercrosses, or their growth. In our studies of knockout (-/-) submandibular cDNA libraries, we found no evidence that the *a27* and *bg27* genes are transcribed. We also immunostained electrophoretically separated salivary proteins electroblotted onto PVDF membranes and found no evidence of the A27:BG27 and A27:BG26 dimeric protein products of these genes. However, we have evidence that -/- animals still express the *bg26* transcripts in the cDNA libraries, and we are currently pursuing experiments to determine whether these are translated to produce the BG26 subunit protein. If BG26 is produced, we wish to determine if it is secreted from the submaxillary glands into saliva.



LOOKING AT *TEMNOTHORAX RUGATULUS* ANTS AND THEIR RESPONSE TO SUCROSE

GABRIELA BENAVIDES, NICOLE FISCHER, ANNA DORNHAUS

Eusocial hymenoptera (e.g. ants, wasps, bees) show division of labor, which is a system in which individual ants in a colony specialize in differing tasks, and each task is completed by a specific set of individual ants. Overall the question being asked is what is the mechanism of division of labor? Are ants endowed with the capabilities of choosing their tasks? Do ants have intrinsic differences or are they all the same and choose their task after seeing it? These intrinsic differences would also be known as the Response Threshold Mechanism. Response threshold refers to the chance or likelihood of reacting to a certain task that is associated with a certain stimuli. A low threshold ants will perform a task at a lower level of stimuli than a high threshold ant. This experiment specifically tests if touching an ants antennae with a different stimuli, this being different concentrations of sucrose, will support the ants having different response thresholds. We hypothesize that either the individual ants will have differences in Response Threshold to sucrose or they will not.



DEFINING MECHANISMS OF SENSITIVITY AND RESISTANCE TO HISTONE DEACETYLASE INHIBITORS IN DIFFUSE LARGE B-CELL LYMPHOMA

ANVI BHAKTA, AARON HAVAS, CATHARINE SMITH

Diffuse large B-cell lymphoma (DLBCL) is an aggressive form of non-Hodgkin lymphoma. Histone deacetylases have a large role in cancer cell survival due to their anti-apoptotic and pro-proliferative functions and can be targeted therapeutically for cancer treatment. Histone deacetylase inhibitors (HDACi) have been recently approved as anti-cancer therapeutics. However, as monotherapy, their therapeutic efficacy against B-cell derived lymphomas, such as DLBCL, is low. As a result, research efforts have shifted to using HDACi in combination therapies. Efficient use of HDACi in combination treatments against these lymphomas is hindered by a poor understanding of their mechanisms of action. To address this, we developed a pre-clinical model system of sensitivity and resistance to the pan-HDACi, belinostat, using DLBCL cell lines. Cell lines sensitive to belinostat undergo mitotic arrest, followed by apoptosis. Cell lines resistant to belinostat are delayed in mitotic progression, but complete mitosis and arrest in G1. To force mitotic arrest in HDACi-resistant cell lines, we used a microtubule targeting agent, vincristine, in combination with belinostat and observed synergistic cytotoxicity associated with downregulated expression of anti-apoptotic factor MCL-1 and upregulated pro-apoptotic factor BIM. To understand the role of individual HDACs in DLBCL cell cycle progression, we assessed the responses of DLBCL cell lines to selective HDAC inhibitors in comparison to belinostat, which targets both class I and class II HDAC complexes. HDAC1 & 2 inhibition resulted in G1 cell cycle arrest in belinostat-resistant and sensitive cell lines, indicating that HDACs 1 and 2 promote G1 progression to S phase. HDAC3 inhibition resulted in the induction of DNA damage, increased S phase cell population, and the induction of apoptosis in belinostat-resistant cells, suggesting that HDAC3 plays a role in DNA replication and damage repair. In combination with vincristine, all selective inhibitors increased apoptosis beyond vincristine alone in a synergistic manner, although less potently than the belinostat-vincristine combination. Lastly, we tested two class I selective inhibitors, CI-994 and apicidin, that target HDACs 1-3. Our results suggest that all class I HDAC-containing complexes must be targeted to observe maximal cytotoxicity in combination with vincristine in belinostat-resistant cell lines.

ALTERATIONS IN GROWTH, MORPHOLOGY AND α -SYNUCLEIN IN HUMAN DERMAL FIBROBLASTS FROM SPORADIC PARKINSON'S DISEASE SUBJECTS

VEDANSHI BHARGAVA, J.Y. TEVES, M.J. CORENBLUM, A.J. FLORES, J. DAVIS, J.E. SLIGH, C. CURIEL-LEWANDROWSKI, S.J. SHERMAN, L. MADHAVAN

Parkinson's disease (PD) is the second most common neurodegenerative disorder that affects around 2% of the aging population worldwide. However, the molecular mechanisms involved in the development of PD are not well understood, and remain an active area of investigation. In our lab, we are using human dermal fibroblasts from persons diagnosed with late-onset sporadic PD and age-matched control (AMC) individuals as a model to study PD mechanisms. The advantage of this cell-type is that it can be relatively easily obtained, and reflects the cellular, genetic, and epigenetic modifications occurring during the age-associated progression of the PD in a patient-specific manner. In our studies, we have found differences between the PD and AMC fibroblasts in terms of their growth and morphological characteristics. More specifically, PD fibroblasts grew faster and in organized streams in culture, and were also observed to be smaller and rounder, compared to AMC fibroblasts. We have also found that the PD fibroblasts immunocytochemically express greater levels of the protein Alpha-Synuclein (α -Syn), a PD relevant protein, in comparison to AMC cells. Given that α -Syn can affect cytoskeletal dynamics, we are currently exploring its potential contribution to the growth and morphology changes observed in the PD fibroblasts in culture. First, we are systematically characterizing the actin and tubulin network structure in the patient cells. Initial results using Phalloidin, a stain for F-actin, indicate differences in actin organization between the PD and AMC cells. We are also analyzing the tubulin structure using α - and β -tubulin antibodies, and studying the localization of α -Syn as it relates to actin and tubulin. Overall, we expect these studies to shed light on cytoskeletal alterations in the context of α -Syn and its role in PD.

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BEE LEARNING

MADALENA BIRR, DAVID KIKUCHI, ANNA DORNHAUS

Bombus impatiens are a species of bumblebees known to change their behavior in situations based on past experiences- or learn. There are costs for bees to learn- either energetic or time. For example, if a bee were to visit an unfamiliar flower it could reap a higher or lower amount/quality of nectar, if it gained from the visit, it could benefit from the new knowledge of knowing this flower was better than the ones it had visited, but if the flower was worse it would have wasted energy and time that it could have spent foraging its normal flowers. Depending on the weight of these costs, bees will either learn, or not adjust their behavior. This experiment will focus on training bees to associate good and bad resources with a certain color and then testing them to see if they continue to use that knowledge when faced with ambiguous resources by training each bee with four training trials using two colored flowers for sucrose and two colored flowers for water or quinine. After the four training trials, they were out into the arena with flowers containing colors from both the good and bad flower combinations. While the bees that were tested did show a slight learning curve for the colors, what we found was that they relied more on tasting the nectar first by dipping their tongues in to decide whether or not to begin to forage. The bees used a predator behavioral adaption described by the Go Slow Hypothesis which reduced the cost it would take for the bees to fully learn the flower colors. This research was able to be done thanks to the PERT grant from the NIH.



FIBRILIN-1 EXPRESSION IN ARSENIC EXPOSURE

JONATHAN BLOHM, BINH CHAU, R. CLARK LANTZ

Arsenic, a natural occurring metalloid found in our Earth's crust and soil, has been found to be a prime suspect for the onset of pulmonary and cardiovascular diseases later on in life. We used C57BL/6 Mice exposed to arsenic through drinking water at 100 ppb or less, through development over a duration of 4 weeks. Drinking water with arsenic levels at 50 ppb or greater was studied in correlation with the EPA's old water safety standards. After exposure, lungs were harvested to identify changes in epithelial protein expression. In reference to previous studies in R. Clark Lantz PhD's lab at the University of Arizona, several genes corresponding to collagen and elastin, which are part of smooth muscle tissue in lung epithelium were found to have been irreversibly altered following exposure to arsenic in drinking water. As a continuation of these studies, using morphometric protein expression analysis, FBN1, known as fibrilin-1 gene was analyzed for relative expression in lung epithelial tissue of the mice exposed to arsenic. FBN1 gene coding for fibrilin-1 binds to form filaments known as microfibrils that specifically correlate to tissue elasticity and structural support throughout the body. Therefore, the FBN1 gene expression may further demonstrate a connection between arsenic exposure and changes in pulmonary function of the mice.

NIEHS: R25 ES025494



MORPHOLOGICAL VARIATION WITHIN *BOMBUS IMPATIENS*

KARRIANN BLUBAUM, EVAN KELEMEN, ANNA DORNHAUS

Bombus impatiens and other social insects experience size variation as a result of evolutionary selection on the colony as a combined unit. Commonly, size variation is thought to improve the efficiency of the colony through the use of division of labor but it could also improve the robustness of the colony through different individuals being adapted to different environments. When bumblebee colonies experience random starvation periods, smaller bees, who appear less efficient than larger bees but more resistant to starvation, could potentially survive and therefore keep the colony alive. We tested the hypothesis that variation improves colony efficiency or colony robustness. We manipulated the size distributions (wide and narrow) of bumblebee colonies to see the effect it had on the amount of worker biomass produced by the colony on a weekly basis. The amount of biomass was measured to determine if a wide body size distribution would increase, decrease, or not affect the ability of the colony to produce more worker biomass. The size distribution of workers didn't improve colony performance under constant or variable conditions as the amount of biomass produced by either distribution did not differ ($p=0.945$ and $p=0.378$ respectively). Thus, body size variation appears to improve neither colony efficiency nor colony robustness. If the pattern holds true after additional data collection, this would mean that there's no selection against variation, and suggest that variation in other systems should not always be assumed to be adaptive.

Funding for this research comes from the University of Arizona (Research and Funding Grant).



EFFECTS OF PERINATAL NICOTINE EXPOSURE ON CHOLINERGIC SIGNALING IN THE AIRWAY EPITHELIUM

NATHAN BORRERO, RALPH F. FREGOSI, SCOTT BOITANO

Up to 20% of pregnant women in the USA smoke or use nicotine delivery devices (e-cigarettes, water pipes, nicotine patches or gum). While addictive, many believe nicotine to be otherwise safe, causing the use of nicotine delivery devices to double between 2008-2012. However, there is growing evidence that nicotine can alter development of the lungs and airways, as well as pulmonary immune function and brainstem neurons that control breathing and heart rate. In this study, we propose to test the hypothesis that in utero exposure to nicotine leads to alterations in cholinergic signaling in the airway that are evident at

birth and persist into adulthood. Importantly, dysfunction of acetylcholine (ACh) signaling in the airway epithelium can result in compromised airway surface liquid and subsequent loss of innate immune function in the airways. This signaling is mediated primarily by muscarinic acetylcholine receptors (mAChRs) and nicotinic acetylcholine receptors (nAChRs), both of which may be affected by developmental nicotine exposure. We have used rat neonate tracheal mounts and primary cultured rodent airway epithelium in Ussing Chamber studies to evaluate airway epithelial cholinergic signaling in animals with and without developmental nicotine exposure. Initial results show that transtracheal resistance (TTR), transepithelial resistances (TER), and short circuit current (Isc) responses to apical application of ACh are not altered by nicotine exposure. However, airway epithelial signaling is dominated by mAChRs-dependent signaling. When preparations are exposed to nicotine, unexposed rat trachea and primary mouse cultures demonstrate limited, but clear responses. These responses appear to be altered in animals exposed to nicotine in utero. Our data suggest that perinatal nicotine exposure adversely affects the development of cholinergic signaling in the airway epithelium. Funding from R25 ES025494.



GENETIC TESTING WITH THE KINO HERITAGE FRUIT TREE PROJECT

EUNICE BORUNDA

The Kino Heritage Fruit Tree Project aims to recreate Spanish mission era orchards and gardens using fruit trees that can be traced back to the 17th and 18th century, possibly brought by the Spanish. My goal is to find out if current locally grown trees could potentially be related to plants brought in by the Spanish and pomegranates. The methodology of this project is to create a phylogenetic tree of fruit trees that are found within the Sonoran Region. I am using DNA sequencing of genes from pomegranates that have been grown locally for many years to try to find unique differences that distinguish these varieties. This will help us determine how related these varieties are to each other and to European and Middle Eastern varieties.



THE ROLE OF THE TYPE SIX SECRETION SYSTEM IN THE INSECT PATHOGENIC BACTERIUM

***XENORHABDUS BOVIENII* (GAMMA-PROTEOBACTERIA: ENTEROBACTERIACEAE)**

CHRISTINE BRADSHAW, S. PATRICIA STOCK, REBECCA MCQUADE, JOHN G. MCMULLEN III

The type VI secretion system (T6SS) is a one-step mechanism widely used by gram-negative bacteria to inject effector proteins and virulence factors into a target cell. T6SS has been shown to play a key role in pathogenesis of host cells and in the competition with other bacteria. *Xenorhabdus bovienii* (XB) is a gram negative bacterium that exhibits an unusual dual lifestyle, living in a symbiotic relationship with *Steinernema* nematodes and killing a wide range of insects. The T6SS in XB has not yet been studied. Therefore in this study we considered a homologous recombination approach to generate a XB mutant lacking *hcp*, a crucial structural gene of the T6SS, and conducted bioassays to assess the role of this secretion system in XB. Specifically, we evaluated insect melanization and mortality, as well as competition with other bacteria. Preliminary results show a decrease in melanization in insects infected with the T6SS mutant compared to those infected with wild-type XB, suggesting a different immune response to the mutant strain. To determine whether the T6SS plays a role in bacterial competition, we GFP labeled a XB strain naturally lacking the T6SS (prey), mixed it with the XB wild-type or T6SS mutant (predators), and observed GFP fluorescence. Both wild-type and mutant XB decrease fluorescence of the prey strain, suggesting that factors other than the T6SS allow some strains of XB to outcompete others. We are currently investigating whether the T6SS contributes to the symbiosis between XB and the nematode host. This research is supported by The University of Arizona's NIH IRACDA Grant (PERT) and The Center for Insect Science.

INHIBITION OF TLR4 ACTIVITY BLOCKS UV-INDUCED STRESS SIGNALING: *IN VITRO* AND CHRONIC *IN VIVO* RESPONSES

NICHOLE BURKETT, SALLY DICKINSON

Non-melanoma skin cancer (NMSC) is the most common cancer diagnosis in the U.S. Toll-like receptor 4 (TLR4) is a receptor found on many types of cells, including keratinocytes. Once exposed to ultraviolet radiation (UVR), TLR4 becomes activated on keratinocytes. Over-activation of this receptor and its downstream effectors such as transcription factors NF- κ B (nuclear factor kappa B) and AP-1 (Activator Protein-1), have been linked to NMSC. Previously, we explored the ability of two TLR4 pharmacological inhibitors to block LPS and UV-induced TLR4 signaling in mouse immortalized JB6+ keratinocytes. Here we add another inhibitor, Ibudilast, to the library of TLR4 pharmacological inhibitors, and examine the ability of these agents to block UV-induced TLR4 signaling. The pharmacological inhibitors Resatorvid (TAK-242), ST-2825, and Ibudilast are designed to inhibit TLR4 pathway activity, resulting in reduced activity of NF- κ B and AP-1 transcription factors, and other TLR4 pathway components. NF- κ B is linked to inflammatory responses. AP-1 is linked to apoptosis, proliferation, and differentiation. We used immortalized HaCaT human keratinocytes and immortalized NF- κ B (JB6+) mouse keratinocytes, stably transfected with AP-1 luciferase reporter or NF- κ B luciferase reporter, respectively. We show that Resatorvid effectively blocks NF- κ B and AP-1 activation after UV exposure with Luciferase Reporter Assays. ST-2825 and Ibudilast also showed inhibition of these transcription factors in both cell lines. RNA transcription levels of IRF3 (Interferon Regulatory Factor 3) in JB6+ cells showed inhibition with Resatorvid after SSL (solar-simulated light) exposure. Western blots of HaCaT cells showed inhibition of p-p38 with ST-2825 after UVB treatment. The phosphorylation of the p65 subunit of the NF- κ B transcription factor showed inhibition with Resatorvid and ST-2825. Finally, we examined the expression and activity of TLR4 in the epidermis of mice chronically treated with SSL and resatorvid (or vehicle). Epidermal samples collected after 14 weeks of SSL exposure show induction of TLR4 protein expression compared to no-SSL controls. This induction is attenuated by topical treatment with resatorvid. Together, our data indicate that TLR4 may be a good target for pharmacological chemoprevention of NMSC. Funded by the National Cancer Institute, University of Arizona Cancer Center skin cancer chemoprevention program project grants (CA23074 and CA27502) and UBRP.



MODELING AND IMAGING ACOUSTOELECTRIC SIGNALS IN A BRAIN PHANTOM

ALEX BURTON, RUSSELL S. WITTE, YEXIAN QIN, CHARLES P. INGRAM

Acoustoelectric (AE) Imaging uses a pulsed pressure wave (ultrasound) to transiently change the electrical properties in a local region. With the local change in resistivity, our goal is to map activated regions in the brain at higher spatial resolution than traditional electroencephalography (EEG). Computer simulations of a 15cm diameter brain phantom made with a 0.9% saline solution were modeled in Comsol™. Platinum electrodes were placed in different locations of the brain phantom with different orientations. In this study, patterns of current densities were observed and compared with experimental tests to determine accuracy of acoustoelectric brain imaging (ABI). Bench-top experiments were conducted in an adult human head phantom. The brain phantom was formed by filling the cavity with 1% agarose gel and 0.9% saline solution to have similar conductive properties as human brain tissue and included surface recording and imbedded electrodes for generating current. A 1-MHz transducer with a peak pressure of 3.4 MPa was used to generate an AE signal and image time-varying current flow in the brain phantom. Stimulating electrodes in the brain were connected to a function generator that produced a three-cycle, 8V sinusoidal wave at 200Hz. Both the simulation and experimental models had highest current densities at the peak of each wave. After validating the measured current densities of a simple model, we tested more complex electrode configurations, including a neuron-like polymer tube structure containing stimulating wires. The current density (60 mA/cm^2) was confined to the inside of the tube (I.D. = 0.58mm). We were able to remotely image the confined current inside the tube and as it exited through a pinhole to a reference electrode in the surrounding gel. In the simulations, a 1 cm^2 area was used to match the transducers focal area, producing a peak current densities of $\sim 3 \text{ mA/cm}^2$. Experimental tests revealed a similar current density of 2.8 mA/cm^2 . This study demonstrates potential benefits of a novel ABI system capable of high-resolution ($<3 \text{ mm}$), non-invasive brain imaging of neural currents. Such a system would have diverse applications ranging from rapid and accurate electrical brain mapping during treatment of epilepsy to early diagnosis of depression.

THE EVOLUTION OF EVOLVABILITY VIA HIGH ERROR RATES AND BENIGN CRYPTIC SEQUENCES

EMANUEL BUSTAMANTE, PAUL NELSON, JOANNA MASEL

Selection can act on genetic variation to increase the frequency of traits that make individuals more fit in their immediate surroundings. The ability to generate potentially adaptive genetic variation, or evolvability, is itself a heritable trait. Populations with high evolvability can adapt more rapidly to environmental change than less evolvable populations, potentially providing a selective advantage in a rapidly changing environment. We look to cryptic sequences as a source of variation affecting evolvability. An example of cryptic sequences involves sections of genes translated on the rare occasion that a ribosome reads through a stop-codon. Because cryptic sequences are rarely expressed, selection on them is fairly weak, so changes in cryptic sequences are often driven by genetic drift and mutation bias. The expression of deleterious mutations in cryptic sequences results in maladaptive variation while the expression of benign mutations in cryptic sequences results in potentially adaptive variation. As a result, benign cryptic sequences contribute to evolvability while deleterious ones do not. We seek to determine if pressure to adapt to a changing environment can drive a population toward evolving more benign cryptic sequences and therefore becoming more evolvable. To do so, we developed an agent-based model of evolution with sexual recombination. Funding was provided by the National Institutes of Health (NIH MARC Training Grant T34 GM08718) and the John Templeton Foundation.



GENETIC MUTATIONS CONFERRING RESISTANCE TO TALOCINS IN *P. SYRINGAE*

ETHAN CARLSON, DAVID BALTRUS, KEVIN HOCKETT

Pseudomonas syringae is a ubiquitous, bacterial plant pathogen, of which there exists a multitude of pathovars capable of causing disease in a variety of agricultural crops. As part of its lifestyle, *P. syringae* grows on the surface of leaves, as a saprophyte, only causing disease after entering into the leaf interior through natural openings. *Pseudomonas syringae* is known to produce bacteriocins—known as syringacins—which are proteinaceous toxins that inhibit the growth of closely related strains of bacteria and likely aid in competing for resources within the plant environment. We are interested in the dynamics of host-microbe and microbe-microbe interactions in the context of evolutionary pressures imposed through competition for resources and resistance to bacteriocins. Previous work done in the lab has allowed us to recover and characterize different isolates of *P. syringae* pv. phaseolicola (*Pph*), harboring spontaneous syringacin-resistance mutations. We are interested in determining whether such spontaneous mutants exhibit fitness trade-offs in either their growth potential in broth culture or in virulence towards their host plants, when compared to the wild type strain (WT) as well as discovering the genetic basis of these mutations and how the resistance is conferred.

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A ROLE OF BDNF IN LONG-TERM POTENTIATION AT THE MOSSY CELL TO DENTATE GRANULE CELL SYNAPSE

DANIEL CARRERA, YUKI HASHIMOTODANI, ANDRÉS CHÁVEZ, KYLE JENSEN, PABLO CASTILLO

The cellular mechanisms underlying learning and memory formation include activity-dependent changes in synaptic strength, in the form of long-term potentiation and depression (i.e. LTP and LTD). These forms of synaptic plasticity have been extensively studied in the hippocampus, a brain structure critical for learning and memory. Information enters the hippocampus via entorhinal cortex inputs that synapse onto dentate granule cells (DGCs) in the dentate gyrus (DG). DGCs in turn, project to excitatory hilar mossy cells (MCs), which then project back onto DGCs forming a positive feedback loop within the DG. Although

previous studies implicated this associative circuit in higher order pattern separation and its dysregulation linked to epilepsy, synaptic plasticity of this circuit remains unclear. Our lab recently discovered a novel form of LTP at MC-DGC synapses however, several knowledge gaps remain about the rules that governs this LTP.

Previous work revealed a high concentration of brain-derived neurotrophic factor (BDNF) and its receptor, TrkB, in the inner molecular layer (IML), the MC-DGC synaptic field in the DG. In addition, preliminary results suggest that BDNF-TrkB signaling could be involved in MC-DGC LTP. Here, we test the hypothesis that BDNF is sufficient to induce MC-DGC LTP. To this end, we performed whole cell recordings from DGCs and stimulated the MC inputs of the IML. We locally puffed BDNF (8 nM) onto the MC-DGC synapse for 5 minutes at 0.5 Hz while monitoring excitatory postsynaptic currents. Our results indicate a significant increase in EPSC amplitude after BDNF application compared to our control ($p < .011$). Although, preliminary and require more experiments, our data show that BDNF in the absence of repetitive presynaptic activity is sufficient to induce LTP. This study supports the notion that synaptic stimulation releases BDNF, which is necessary and sufficient to induce MC-DGC LTP.

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EFFECTS OF CHANGING MICHAELIS-MENTEN KINETIC PARAMETERS ON TISSUE OXYGENATION AND HYPOXIA

JOSE CELAYA-ALCALA, TIMOTHY SECOMB

The dependence of oxygen consumption in tissue on partial pressure of oxygen (PO_2) can be described by the Michaelis-Menten equation. One of the parameters in this equation, the Michaelis constant P_0 , gives the tissue PO_2 at half-maximal consumption. The literature contains disparate estimates of P_0 . Tissue that is not receiving enough oxygen is called hypoxic. In this study we used theoretical simulations to investigate the effect of varying the assumed value of P_0 on the predicted amount of hypoxia in tissue. Tissue whose PO_2 is less than P_0 was considered hypoxic. Utilizing a Green's function approach, we simulated oxygen transport in a small region of tissue in a rat tumor. The value of P_0 was varied from 1 to 10 mmHg while all other parameters were held constant, with oxygen demand set to $0.0005 \text{ cm}^3\text{O}_2/\text{cm}^3/\text{s}$. The distribution of PO_2 was computed for each P_0 value. When P_0 was increased from 1 to 10 mmHg, the computed mean PO_2 in the tissue increased from 5.4 to 11.4 mmHg, while the amount of hypoxia in the tissue increased by 13.41%. In conclusion, we found that the value of P_0 has a significant effect on the predicted amount of tissue hypoxia. Increasing the value of P_0 causes an increase in mean tissue PO_2 because oxygen consumption at a given PO_2 is decreased, but the hypoxic fraction of tissue increases because more tissue is below the level at which consumption is half-maximal.

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AN INTERMITTENT APPROACH TO TREATMENT OF COLORECTAL CANCER USING SULINDAC

SWATI CHANDRA, ARIEL C. NYMEYER, PHOTINI S. RICE, EUGENE W. GERNER, JENNIFER K. BARTON

According to the Center for Disease Control and Prevention, colorectal cancer (CRC) is the second leading cause of cancer-related deaths in the United States, and the third most common cancer in men and women. The purpose of this study was to determine the optimal dosing pattern of sulindac, a proven chemopreventive agent for CRC, in order to minimize negative side effects while maintaining efficacy. This time-series study utilized optical coherence tomography (OCT), a minimally invasive imaging tool, to quantify the tumor count and tumor burden over seven time points in four dosing groups. 58 azoxymethane (AOM) and saline treated mice were given no dose of sulindac (Sulindac-None), sulindac for 10 weeks then no dose for the

remaining 10 weeks (Sulindac-10), sulindac for 2 weeks then no dose for 2 weeks with the cycle repeated 5 times (Sulindac-2) and doses of sulindac daily for 20 weeks (Sulindac-Daily). By the final time point, 92% of all AOM-treated mice developed adenomas, with an OCT imaging sensitivity of 68%. Sulindac-2 and Sulindac-Daily had statistically significantly lower tumor counts when compared with Sulindac-None, while Sulindac-10 did not. All of the treatment groups had statistically significantly lower tumor burdens when compared with Sulindac-None, but there was a significant difference between the on and off stages of treatment within Sulindac-10. These results show that, while daily doses of sulindac provide the most optimal effects, intermittent doses of sulindac in a 50% duty cycle with an overall four-week period, as shown by the Sulindac-2 treatment model, may provide highly effective chemoprevention of colorectal cancer. However, regular treatment with sulindac appears to be necessary to show prolonged chemopreventive effects. Funding was provided in part by National Institutes of Health/National Cancer Institute R01CA109385 and P30CA023074.



A NOVEL *DROSOPHILA* MODEL OF FRONTOTEMPORAL DEMENTIA (FTD) BASED ON TAR DNA BINDING PROTEIN-43 (TDP-43)

MATTHEW CHAUNG, DANIELLE MATHIESON, ELISE MUÑOZ, ROBERT KRAFT, DANIELA C. ZARNESCU

Alzheimer's is a deadly disease that affects ~ 5 million Americans and is projected to grow in subsequent decades. The features of Alzheimer's are known including the development of neurofibrillary tau tangles and the accumulation of beta amyloid plaques, but there is currently no treatment or means of slowing down the progression of the disease. We have been working to develop a novel *Drosophila melanogaster* or fruit fly model of Frontotemporal Dementia (FTD). This is important because the *Drosophila* is a model organism for the study of genetic and neurological disorders including other forms of dementia beyond Alzheimer's that has yet to be explored further. To accomplish this we generated transgenic flies, using the GAL4-Upstream Activating Sequence (GAL4-UAS) expression system, and expressed human Tar DNA Binding Protein-43 (TDP-43) protein (wild-type or disease-associated mutant, TDP^{G298S}) in the mushroom body, the center for learning and memory in the insect brain. We then aged these transgenic flies and used courtship assays to quantify learning and memory in adult males. Our recent work has shown that the assay is fully functional and can measure learning and memory in OregonR control flies after experimental setup adjustments. From our preliminary analysis it appears that there are severe deficits in learning and memory for our transgenic flies: OK107 x TDP^{G298S} and OK107 x TDP^{WT}. An additional exciting development in our ongoing work is the fact that we have obtained and tested a fly stock from the Fly Light collection (Janelia Research Campus). This is a very precise expression system using a split GAL4 promoter that will only be activated in specific regions where the two enhancers overlap to constitute a fully functional GAL4 promoter. This allows for us to overexpress our UAS TDP-43 protein specifically in the mushroom bodies. The two lines we have obtained have been tested in our lab through ventral nerve cord (VNC) dissections and have been shown to direct expression predominantly in the mushroom bodies with very little background expression offering a mushroom body specific driver for future investigation. Funding was provided in part by NIH grant P30 AG019610.



A NOVEL PEPTIDE THERAPEUTIC FOR CHRONIC PAIN

LINDSEY CHEW, AUBIN MOUTAL, JENNIFER XIE, FRANK PORRECA, RAJESH KHANNA

N-type voltage-gated calcium channels (CaV2.2) play a key role in the transmission of pain signals, and collapsin response mediator protein 2 (CRMP2) interacts with CaV2.2 to increase cell surface trafficking and enhance its functional activity. We have previously shown that the CRMP2-derived peptide (CBD3) is antinociceptive in rodent models of inflammatory and neuropathic pain. Here, we investigated the effects of an improved mutant CBD3 peptide (R9-CBD3-A6K): a CBD3 peptide with a mutation at position 6 (A6K) fused to a nona-arginine (R9) cell penetrating sequence. R9-CBD3-A6K inhibited the CaV2.2-CRMP2 interaction in a concentration dependent manner as well as depolarization-evoked Ca²⁺ influx in acutely dissociated rat dorsal root ganglia neurons. Using constellation pharmacology, we also probed for any subpopulations of dorsal root ganglia neurons preferentially affected by treatment with R9-CBD3-A6K. Our results provide compelling evidence for R9-CBD3-A6K's selective action through inhibition of calcium influx through CaV2 channels. Complementing these in vitro studies, continuous

subcutaneous infusion of R9-CBD3-A6K to Sprague-Dawley rats with tibial nerve injury, which produces long-lasting tactile allodynia and pain when untreated, reversed both conditions without tolerance over a 24- to 72-hour period. Together, these results converge to support further exploration and targeting of the CaV-CRMP2 axis in pursuit of therapeutic alternatives for neuropathic pain.

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DEVELOPMENT OF A MOTOR-COORDINATION ASSAY FOR *DROSOPHILA MELANOGASTER*

TIFFANY CHO, LINDA L. RESTIFO



CHARACTERIZATION OF HUMAN ADIPOSE-DERIVED STROMAL/STEM CELL POPULATIONS

RENEE CONWAY, JOHN SZIVEK, KALEB GASTELO

The stromal vascular fraction (SVF) extracted from adipose tissue has become a promising source of mesenchymal stem cells (MSCs) for musculoskeletal tissue regeneration, in large part because it provides an abundance of viable MSCs that are easily accessible. However, minimal data about the expression profile of these cells exists. Better characterization and segmentation of the SVF may lead to more reproducible tissue regeneration. As such, we characterized the biomarker expression of the SVF in order to gain an understanding about what cell types remain in cell cultures after a common, published MSC isolation technique is used. We also compared those results to measurements collected after a new, secondary process was carried out to further isolate MSCs from the SVF. In order to do this, we extracted the SVF from the infrapatellar fat pad of human patient surgical discards and used RT-qPCR and flow cytometry to identify biomarkers that signify the presence of specific cell types. We showed that the common, published MSC isolation technique removes many types of leukocytes, and that MSC biomarkers are highly expressed in the extracted cell populations. Our data demonstrates that dendritic cells, fibroblasts, endothelial cells, adipocytes, and progenitor cells committed to transforming into only one specific cell type are also present. Moreover, we have shown that the secondary isolation process extracts a population of cells that express significantly fewer hematopoietic biomarkers compared to cell populations extracted only with the common, published MSC isolation technique. Although the advantage of using a purely homogenous MSC population compared to a heterogeneous cell population in regenerative medicine is still being explored, a detailed characterization of biomarker expression in SVF populations provides a prediction of how these cells may behave in regenerative applications. We are currently working towards identifying existing cells types in more detail, and are characterizing the biomarker expression in osteoblasts and chondrocytes differentiated from these stromal/stem cell populations.



MOLECULAR CHARACTERIZATION OF SGC, A KEY PROTEIN FOR NO-DEPENDENT ANGIOGENESIS

ROSLYN CURRY, ANDRZEJ WEICHSEL, WILLIAM MONTFORT

The protein soluble guanylyl cyclase (sGC) is the primary receptor for nitric oxide and plays a critical role in blood pressure regulation, wound healing, and memory formation. sGC is also an important mediator in tumor vascularization, which enables cancer growth and metastasis. Knowing the structure of the protein will help in understanding how sGC functions, and in designing compounds/drugs that control sGC activity.

sGC is a multidimensional heterodimeric protein with a single ferrous heme group, but mostly unknown structure. To elucidate the protein's structure, we experimented with truncation of several domains of sGC, since the full length protein is very unstable. Multistep protein purification and dynamic light-scattering experiments were conducted to test for homogeneity of the protein and will be followed by crystallization experiments. Screening for crystallization of several mutants and fragments of sGC should result in microcrystals under various conditions which can be further optimized to grow larger crystals suitable for X-ray crystallography.



BEE ALLOMETRY

JAZMIN DAGNINO, EVAN KELEMAN

Organisms have a finite amount of resources to allocate to the growth of different body parts, and may exhibit size specific strategies suggested by allometric growth. Allometric growth is where changes in relative proportions of body parts occur within a species with respect to size. Bumblebees exhibit a large amount of size variation, in which the size specific tradeoff in the growth strategy may suggest that the changes in size benefit the colony. We measured the length of body parts of 20 individuals from 10 different colonies and analyzed the slope of the regression line on a log x log plot. All extremities exhibited a slope less than one when there was a regression against their thorax width. By identifying a deviation from one, signified that bees do not grow isometrically (in proportions) and we have allometric growth. This relative increase in extremities in smaller bees means that smaller bees have relatively larger pollen baskets for collecting pollen if they are forced to forage with a larger relative surface area for thermoregulation. This study will allow for more understanding of size specific trade-offs within the colony and how these trade-offs may favor variation with a group.



INHIBITION OF OPIOID INDUCED REWARD VIA GENETIC AND PHARMACOLOGICAL MANIPULATIONS

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Chronic pain affects approximately 100 million Americans for which opioids are the mainstay therapy. While physicians and patients alike are apprehensive about using opioids due to their side effects including respiratory depression and addiction, 259 million opioid prescriptions were written in 2012. Although opioids are the best available analgesics, they increase both positive and negative reinforcement, ultimately leading to addiction. The pro-nociceptive or pain promoting, neurotransmitter Substance P (SP) and its corresponding receptor (NK1R) are found associated with dopamine neurons in the ventral tegmental area (VTA). Evidence exists suggesting that SP potentiates positive reinforcement of opiates leading to reward. Using *in vivo* microdialysis, we show that systemic morphine significantly increases SP release in the VTA, an effect mediated by inhibition of VTA GABAergic neurons. SP administered in the VTA significantly increases levels of dopamine in the nucleus accumbens (NAC), a reward processing center in the ventral striatum. Using CRISPR-Cas9 knockdown of NK1R in the VTA, we show this prevents the activation of opiate reward, corroborating the results from a conditioned place preference paradigm (CPP). Finally, we

developed a novel opioid agonist/NK1R antagonist, TY032, which was shown to inhibit acute and chronic pain in male rats. Importantly, our study found TY032 microinjection into the VTA did not result in an increase in extracellular dopamine release in the NAc. These data support targeting the dopamine reward circuitry and pain pathways with multifunctional opioid-NK1R compounds could be a path to developing analgesics that lack the potential for abuse. *Funding NIH/NIDA DA018717, NIH/NIDA DA013449.*



A QUALITATIVE EXAMINATION OF FACILITATORS AND BARRIERS ADDRESSING BEHAVIORAL HEALTH NEEDS AMONG NATIVE AMERICANS IN COCONINO COUNTY

COLETTE DAVIS, JULIE BALDWIN

Native American populations are at high risk for behavioral health issues, such as substance use and co-morbid mental illnesses, such as depression, anxiety and suicide ideation. To address these and other health disparities, the Health Equity Research Group at NAU is conducting a regional community needs and assets assessment. My internship focused on assisting the team in identifying behavioral health concerns and solutions for Native American populations in Coconino County. By using a qualitative research approach, such as focus groups and interviews with health care providers, community leaders, and community members, we are determining the perceived health needs and priorities of people in northern Arizona. Our visioning groups thus far have indicated that better access to mental health services and health insurance and improving linguistic and cultural approaches using a more holistic approach will help to address the gaps concerning substance abuse and mental illness. I have also identified current behavioral health programs in Coconino County that meet best practice standards. Our results highlight the importance of Native American communities taking ownership in the development of culturally relevant, community-based mental illness and substance abuse prevention programs.



INVESTIGATING THE RELATIONSHIP BETWEEN HIGH-FREQUENCY OSCILLATIONS AND NEURONAL SPIKING DUE TO SUB-ANESTHETIC KETAMINE IN A MODEL FOR DYSKINESIA

BENJAMIN DAVIS, TONY YE, STEPHEN COWEN

Parkinson's Disease (PD) is a late onset neurodegenerative disorder with no known cure. Recently, a common anesthetic, ketamine, has been found to help with depression and pain in PD patients, and help patients with Levodopa-induced dyskinesia (LID), which causes a new set of automatic involuntary movements. This study looks at how repeated sub-anesthetic ketamine injections affect local field oscillatory activity and neuronal spiking in the LID rat model. 6-hydroxydopamine (6-OHDA) lesions were used in Sprague-Dawley rats as an animal model for Parkinson's Disease. Subsequently, these animals were treated with Levodopa (L-Dopa) to develop LID symptoms. Continuous electrophysiological recordings were performed over the 11-hour period from two 32-channel electrode arrays, recording from the striatum, hippocampus, motor cortex, and somatosensory cortex. Rats were given five intraperitoneal (*i.p.*) injections of ketamine or saline (three ketamine sessions and one saline session, counterbalanced) every two hours, starting after a one-hour baseline recording. We hypothesized that high-frequency oscillations induced by sub-anesthetic ketamine injections will be phase-coupled with spiking of single units found in the dorsolateral striatum (DLS). Preliminary results suggest that neuronal spikes from interneurons in the dorsolateral striatum may be coupled with high-frequency oscillations induced by sub-anesthetic ketamine. However, spikes do not increase as high frequency power increases. Analyzing more cells from the dorsolateral striatum would be required to determine if the neurons firing are significantly coupled with high-frequency oscillations, or if the increase of high frequency power correlates with neuronal spiking.



HOW DOES SPIDER PERSONALITY INTERACT WITH WEB STRUCTURE IN BLACK WIDOW SPIDERS (*LATRODECTUS HESPERUS*)

TANNER DOLBY, ANNA DORNHAUS, NICHOLAS DIRIENZO

I believe animal personalities can have benefits or consequences that extremely affect their foraging success. The black widow spider can build structures similar to a 3D cone shaped web, constructed primarily for foraging or predation. In black widow spiders, (*L. Hesperus*) cobwebs are made up of distinctive elements serving to support foraging success (gumfooted lines) or protection (structural lines). The relationship between web constructions and behavior decide the aggression of each spider, which help to determine foraging success. We quantified the overall weight of each spider's web and the number of gumfooted/structural lines. Behavior was quantified by the number of times each spider attacked our simulated prey cue, along with the relationship to web structure and spider size. We used field caught mature female black widow spiders during this study, each spider is given an individual plastic container to live in for the remainder of the experiment. The spiders receive *Acheta domesticus* crickets once weekly to equalize satiation and keep feeding standardized. Individual's display variation in number of gumfooted lines constructed for capturing prey and web density. This data shows a relationship of higher foraging success when spiders construct less dense webs with a higher number of gumfooted lines. Although, some spiders decide to construct webs more effective at capturing prey, but suffer greatly from predation. There are trade-offs to constructing certain types of webs and this may contribute to animal personalities amongst black widow spiders. Overall, aggressive spiders produced more gumfooted lines and showed higher tendencies to attack the simulated prey cue and capture more prey. The amount of structural lines did not show as much variation in relationship to prey capture. However, spiders that build denser webs constructed with more structural lines offer greater protection for the individual, but also reduce their foraging success. In this case, there may be a stable relationship between an individual's web construction and behavior. In conclusion, the female black widow spiders display variation in types of webs built, these differences have significant implications for the individual's foraging success and predator avoidance.



EXAMINING RESPONSE TO LEXICAL RETRIEVAL TREATMENT IN INDIVIDUALS WITH LOGOPENIC AND SEMANTIC VARIANTS OF PRIMARY PROGRESSIVE APHASIA

KELLY EDWARDS, KINDLE RISING, CHELSEA BAYLEY, PELAGIE BEESON

Aphasia is a language disorder that affects a person's ability to communicate. Individuals with aphasia can have a variety of symptoms including problems speaking, reading, writing, and recalling the names of objects or people. Primary Progressive Aphasia (PPA) is a form of aphasia that develops over time and will eventually cause complete deterioration of the language centers of the brain as the syndrome progresses. At the Aphasia Research Project at the University of Arizona, thirteen PPA participants received the Boston Naming Test (BNT), a semantic picture-naming test, before and after lexical-retrieval treatment. Scores from each naming test include how many items they named spontaneously, how often they self-cued and used phonemic, semantic, and/or orthographic information to help name the object or describe the object to someone else. These methods taught to patients during treatment were quantified using a Meaningful Information Score (MIS) rating scheme. Participant's scores showed that while they are struggling with progressive anomia and their raw BNT scores are declining, their MIS scores are improving. The lexical-retrieval treatment is providing them with tools to increase their functional communication.



EVALUATION OF *GALLERIA MELLONELLA* (LEPIDOPTERA: PYRALLIDAE) AS A COMPLEMENTARY MODEL ORGANISM TO STUDY ENTEROPATHOGENIC *E. COLI*

ISABEL FORLASTRO, REBECCA MCQUADE, V. K. VISWANATHAN, S. PATRICIA STOCK

Enteropathogenic *Escherichia coli* (EPEC) is a common diarrheal pathogen that affects approximately 0.8 million children per year in developing countries. EPEC uses a complex bacterial structure called the Type III Secretion System (T3SS) to inject bacterial effector proteins directly into intestinal epithelial cells, manipulating the cells' behavior and causing disease. Rabbits are a commonly used model to study EPEC. However, rabbits have several limitations as hosts including expense, specialized handling, ethical concerns and federal regulations regarding the use of laboratory vertebrates. Insects are potential complementary models for studying bacterial pathogenesis in vivo. Benefits of using insect hosts include low-cost, ability for mass infections, and analogous immune strategies to vertebrates. We hypothesize that larvae of the greater wax moth *Galleria mellonella* (GM) can serve as an effective model in studying the EPEC T3SS. In order to determine if EPEC can infect GM we injected EPEC into the body cavity (hemocoel) of the insects. We observed that live wild-type EPEC kills GM and that heat-killed EPEC does not kill, indicating that EPEC actively infects GM. To explore the mechanism of killing, we also considered EPEC mutant strains that lack different components of the T3SS. These mutants were defective in killing GM, indicating that EPEC kills these insects in a T3SS-dependent manner. We are currently adapting this model to test potential T3SS inhibitors and to study individual T3SS effectors. We are also attempting to model oral infections in insects to more closely represent human infection. This project is being funded by the University of Arizona Center for Insect Science Seed Award.



UTILIZING STRAIN-SPECIFIC *TOXOPLASMA GONDII* INFECTION TO INVESTIGATE APP PROCESSING PATHWAYS

JENNA FRANCO, CARLA M. CABRAL, WES R. McDONALD, ANITA A. KOSHY

Alzheimer's Disease (AD) is a neurological disorder affecting millions of people worldwide. AD is characterized by progressive neurodegeneration and the presence of amyloid-beta ($A\beta$) plaques—protein aggregates that form when the amyloid precursor protein (APP) is cleaved by the β -secretase enzyme. Despite extensive research, much is still unknown about the underlying cellular mechanisms implicated in AD pathogenesis. Surprisingly, one key to elucidating mechanisms of AD pathology may lie with an intracellular, ubiquitous parasite called *Toxoplasma gondii*. Through co-evolution with the host, *Toxoplasma* has gained the unique ability to establish a chronic, asymptomatic CNS infection by modulating host pathways. Several recent studies demonstrated that in human APP (hAPP) AD mouse models, chronic infection with type II *Toxoplasma* led to a >80% reduction in $A\beta$ plaque burden compared to uninfected controls. To determine if all strains of *Toxoplasma* offered protection against $A\beta$, we infected a different hAPP mouse model with the 3 genetically distinct, canonical strains of *Toxoplasma* (type I, II, or III). We found that the type I strain (acute infection only) mirrored uninfected controls in all tested parameters. Conversely, both the type II and III strains established a chronic CNS infection and provoked changes within the CNS, but only the type II infection was protective against $A\beta$. Having established these *Toxoplasma* strain-specific effects on $A\beta$, we hypothesized that by comparing the CNS effects of type II and type III infection, we could distinguish changes linked to protection from those linked simply to infection. To establish the baseline effect of type II and III infection on proteins relevant to $A\beta$ generation and processing, we measured protein levels of APP, ADAM10, PEN2, BACE1, neprilysin, and IDE in C56BL/6 mice at 3 weeks post infection (wpi). We found that type II infection was associated with a ~2-fold increase in ADAM10, a marker for α -secretase. No other protein levels differed significantly between type II and III infection. This finding suggests that type II infection protects against $A\beta$ by increasing the activity in the non-amyloidogenic APP processing pathway. Current work is focused on confirming these results in infected hAPP mice, funded by the WAESO grant.



ANALYSIS OF HY5 PHOSPHORYLATION AND UPSTREAM SIGNALING USING PHOSPHOMIMETICS AND DOUBLE MUTANT ANALYSIS

VIRGINIA FRIEDRICH, F.E. TAX, RACHEL WELLINGTON

ELONGATED HYPOCOTYL 5 (HY5) is a transcription factor that coordinates nitrogen uptake in the roots with carbon fixation in the shoot in *Arabidopsis thaliana*. As a part of the research my lab is performing on receptor kinases that coordinate carbon and nitrogen metabolism, I will be studying two identified phosphorylation sites whose role has not been tested in order to learn how they relate to the functioning of HY5. I am using site-directed mutagenesis to replace the phosphorylated amino acid at two independent phosphorylation sites. After substituting either an amino acid that mimics phosphorylation or one that makes phosphorylation impossible I will test the resulting mutants to determine whether the change had any phenotypic effects. I have completed the first step of site-directed mutagenesis by successfully piecing together DNA of the gene with the substituted amino acid. In addition, I will determine connections between HY5 and the CLV1 and XIP1 receptors that the lab studies by analyzing double mutants of these receptors and HY5 mutants. I have crossed hy5 knockout plants with CLAVATA1 (CLV1) and XYLEM INTERMIXED WITH PHLOEM (XIP1) mutants and will observe the phenotypes of the double mutants. I have generated crosses of hy5 mutants with each of the three other genes to be studied and am analyzing the progeny. This study will reveal information about the signaling pathways that regulate HY5, a gene involved in the vital process of nitrogen uptake. This research is supported by NSF IOS 1257316.



THE IMPACT OF FAMILY HISTORY OF ALZHEIMER'S DISEASE ON WHITE MATTER TRACT HEALTH

NATHANIEL GALLEGOS, ARIANA STICKEL, LEE RYAN

Alzheimer's disease (AD) is a multifactorial disease with many risk factors that are not well understood. Having a family history (FH) of AD is a risk factor that may impact the brain even before the diagnosis of AD. The uncinate fasciculus is a white matter tract that may be sensitive to Alzheimer's-related damage: Those with AD had poorer white matter integrity than those with mild cognitive impairment. Our study sought to extend these findings to determine whether white matter integrity within the uncinate in older adults (ages 53-86 years) with no signs of dementia differed between those who have a FH of AD (n=31) and those without a FH (n=30). FH groups were matched on age, education, APOE status, and gender. DTI-tk was used to extract fractional anisotropy (FA; a measure of white matter integrity) from diffusion images in the left and right uncinate fasciculus. General linear models controlling for age and education were performed to determine if FH status predicted white matter integrity. Our results showed no significant differences between FH groups. Further analysis examined the interaction between education and FH status on uncinate white matter integrity, controlling for age. FH groups were divided based on education level-- low-moderate education (an Associate's or lower degree) and high education (more than an Associate's degree). Those with FH of AD and low-moderate education had lower FA than both education groups without a FH and even compared to those with a FH who had higher education. The latter three groups did not differ in uncinate white matter integrity. These results suggest that education has a protective effect for white matter integrity in those with a FH of AD. Our sample would benefit from adding more people to the low education groups to test the robustness of our findings. Analysis of other tracts is needed to determine if the interaction between FH and education has broad or specific impacts on white matter tracts. Our funding included the Western Alliance to Expand Student Opportunities, Neuroscience and Cognitive Summer Research Program, Undergraduate Biology Research Program, McKnight Brain Institute, and the AZ Alzheimer's Association.



EFFECT OF ESTROGEN ON EXPRESSION OF SODIUM-PROTON EXCHANGERS IN THE CONTEXT OF MIGRAINE

EMILY GALLOWAY, KARISSA COTTIER, JOHN KIM, TODD VANDERAH, THOMAS DAVIS, TALLY LARGENT-MILNES

An estimated 38 million people in the United States suffer from migraines, 28 million of whom are women. Female reproductive hormones, namely estrogen, are thought to play a crucial role in this debilitating neurological disorder. Preclinical studies have demonstrated that estrogen increases susceptibility to an electrical phenomenon in the brain called cortical spreading depression (CSD), which is theorized to be associated with migraine with aura; however, its mechanism is unknown. Dysregulation of pH in the brain is also known to occur in CSD and potentially aura, however it is unknown if estrogen influences brain pH. NHE1 is a ubiquitously expressed Na^+/H^+ exchanger involved in maintaining cellular pH. Both increases and decreases in NHE1 expression may affect neuronal excitability and meningeal nociception, which have implications in migraine. *In vivo* studies in Sprague-Dawley rats were conducted to compare NHE1 expression in male and female rat whole-brain tissue. NHE1 expression was significantly higher in male brains compared to females, approximately a four-fold difference. Additionally, whole-brain tissues from rats at different points in their estrous cycles, in which E2 levels fluctuate at regular intervals, were analyzed. Results indicate that NHE1 expression was highest at the cycle point that corresponds with the lowest estrogen level, which is consistent with our findings. To determine if these outcomes could be recapitulated *in vitro*, we administered physiologically-relevant 17- β -estradiol (E2) concentrations in multiple cell types expressed in the brain, including astrocytes, microglia, and endothelial cells. Western blotting data illustrated a strong negative relationship between E2 concentration and NHE1 expression levels. We also treated brain endothelial cells with an estrogen receptor antagonist called ICI 182,780, in addition to E2, to determine if the effect of E2 on NHE1 expression was regulated through estrogen receptors. This ICI 182,780 + E2 treatment trended toward restoring NHE1 levels to those exhibited in the control group, demonstrating that the results found in our concentration response were estrogen receptor-mediated. These studies clearly show that estrogen influences NHE1 expression *in vitro*, as well as *in vivo*, which in turn may contribute to the molecular mechanisms driving migraine susceptibility.

Departmental funding provided by University of Arizona Medical Pharmacology.



EXPRESSION OF CLAUDIN-4 TIGHT JUNCTION PROTEIN IN RENAL MEDULLA

MICHAEL GEE, THOMAS PANNABECKER

Claudins are a group of proteins that play key roles in the epithelial, paracellular pathway in the mammalian kidney. Previous studies have shown that claudins may interact with each other and with other proteins at the epithelial tight junction to form channels, which provide selective pores or act as barriers, restricting solute permeability. The goal of this study is to examine Claudin-4 localization patterns and degree of Claudin-4 expression within the inner and outer renal medulla of rats. Using immunohistochemical staining and epifluorescence microscopy, we have found the protein Claudin-4 to be weakly expressed in the aquaporin 1-positive descending thin limbs (DTLs), ascending thin limbs (ATLs), and aquaporin 1-negative DTLs of the Loop of Henle and the collecting ducts of the rat kidney. Expression appeared to be higher in the inner medulla sections than either the sections of the outer medulla or cortex. The relative concentration of Claudin-4 in the inner and outer renal medulla will be measured using western blotting to quantify any differences in protein expression between the two regions. The results can then be used to guide further studies on Claudin-4 and other claudins that may play key roles in the urine concentrating mechanism as well as renal pathology and physiology.

This study is funded by NSF Grant 1263943.



IMAGING BIOMARKERS OF AROMATASE-INHIBITOR INDUCED JOINT PAIN

BRIAN GOLDSTEIN, MIHRA TALJANOVIC, PAVANI CHALASANI, C. KENT KWOH, AMANDA HADDEN, RUSSELL WITTE, JESSICA MARTINEZ

Estrogen receptor positive (ER+) breast cancer patients undergoing treatment with aromatase inhibitors (AI) tend to discontinue the supplement when painful side effects appear. It is believed that women with AI-induced musculoskeletal syndrome (AIMSS) have specific physiological conditions that differentiate them from women with normal aging-related inflammatory processes (e.g., rheumatoid arthritis or RA). Ultrasound shear wave elastography (USWE) provides a real-time, quantitative assessment of the elastic modulus of soft tissue, which is a potential biomarker that is altered in women with AIMSS.

Because USWE is a completely noninvasive technique available on state-of-the-art clinical ultrasound scanners, it can be readily applied to study patients who undergo AI treatment and help predict adverse effects during therapy.

A Siemens s3000 clinical scanner and 9 MHz linear probe were used for USWE of the hands and wrists in postmenopausal women on AI, with RA, and healthy women. The scans included an evaluation of major wrist tendons, nerve, and joints with shear wave velocities ranging from 0.5 to 15 m/s, which are directly related to the local shear modulus -- an absolute measure of tissue stiffness. The ultrasound images and raw shear wave data were then analyzed in MATLABTM using a custom graphical user interface to calculate the distribution of velocities (or shear moduli) in a user-defined region of interest. The results were exported to Excel for further analysis among the different groups.

Initial results suggest the shear wave velocity and estimated Young's modulus (λ) were significantly higher in AI-patients (14.6 ± 0.2 m/s, $\lambda=642 \pm 17$ kPa) compared to RA (6.84 ± 1.1 m/s, $\lambda=143 \pm 43$ kPa) and healthy (7.58 ± 0.9 m/s, $\lambda=174 \pm 42$ kPa) patients. These values suggest that the mechanical properties of tendons in the wrist may change during AI-therapy and contribute to joint pain. As a potential biomarker of AIMSS and associated pain, USWE may help predict which patients are most susceptible to these side effects, promote early intervention to reduce or eliminate symptoms, and help increase adherence to AI-therapy.

This project is being funded by the University of Arizona Cancer Center and the Department of Medical Imaging.



INTERACTION OF ENDOSOMAL PROTEIN ENDOTUBIN WITH OCCLUDIN

OLIVIA GORUSHI, ISABELLA R. BLUM, CHRIS M. COX, JEAN M. WILSON

Epithelial cells play an important role in preventing disease by excluding undesirable molecules, such as pathogens and toxins, from entering the bloodstream from the lumen of the intestine. They selectively allow or deny the passage of macromolecules using specialized protein complexes called tight junctions. Occludin, one of the main components of the tight junction protein complex, has previously been shown to be vital in maintaining appropriate intercellular permeability, as well as tight junction assembly. However, the method by which occludin traffics to the cell membrane from the cytoplasm was not yet fully elucidated. Endotubin, an integral membrane protein localized to specialized endosomes, has been shown to be critical for tight junction assembly. We hypothesized that endotubin may traffic occludin from endosomes to the cell membrane via transport vesicles. To better understand how endotubin impacts tight junction assembly, we assessed the interaction between endotubin and occludin. We transfected cells with phosphorylation mutants of occludin and wildtype endotubin, followed by cell lysis and co-immunoprecipitation of occludin. We then performed a Western blot for endotubin, which allowed us to determine the affinity of endotubin for the various phosphorylation mutants of occludin. We found that phosphorylation of occludin affects the binding of endotubin, suggesting that occludin trafficking may be controlled by differential interaction with endotubin that is regulated by phosphorylation.

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EXAMINING EXTRACELLULAR MATRIX PROTEINS IN HEALTHY AND FIBROTIC KIDNEY SCAFFOLDS

JEFFRY GRANADOS, JOSEPH S. UZARSKI, CAROL A. DEATON, HEATHER H. WARD, ANGELA WANDERING-NESS, WILLIAM M. MILLER, JASON A. WERTHEIM

End stage renal disease (ESRD) has been increasing at an alarming rate. There are two options for people with ESRD: dialysis or kidney transplantation. Kidney transplantation is the preferred option because of the improved quality of life, longer post-operative survival rates, and lower long-term healthcare costs. There are 107,647 people currently on the waiting list for a kidney transplant, and in 2015, only 17,878 kidney transplants were performed. Bioengineering presents a potential solution to the growing shortage of kidneys. This study explored whether discarded, non-transplantable kidneys could be transformed into functional kidneys by decellularization and repopulation using patient-derived cells. Using perfusion of detergents through the renal vasculature, the native cells were removed to create a decellularized scaffold. We found that decellularized kidneys maintained the extracellular matrix macrostructure and retained essential proteins and growth factors that can serve as a scaffold for repopulation. Immunofluorescent staining revealed the presence of collagen I, collagen IV, fibronectin, and laminin in the healthy and normal native, decellularized, and recellularized kidneys, confirming that important parts of the extracellular matrix are preserved following decellularization. Results indicate that decellularized kidneys may serve as scaffolds that can be repopulated with patient-derived cells that may differentiate into functional kidney cells.

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EMIGRATION SPEED AND ACCURACY TRADEOFFS IN THE ANT *TEMNOTHORAX RUGATULUS*

GALEN GUDENKAUF, DANIEL CHARBONNEAU, ANNA DORNHAUS

Social animals must make decisions together both fast enough to not be subject to predation, but also accurate enough to not require splitting of the group or future risk involvement. In this study, we determine whether there are speed and accuracy tradeoffs evident in the decision making processes of ant emigrations to new nesting cavities. Here we test whether group composition in three treatments (created by removing lazy ants in one group, removing active ants in the second group and removing random ants in a third control group) affects the speed or accuracy of decisions. We predict that groups with more inactive ants might make slower but more accurate decisions and that groups with more active ants make faster but less accurate decisions. We initiate an ant emigration and give the ants a binary decision of two possible nest cavities consisting of two different entrance sizes (one that has more risk potential-a large entrance, and one that is more secure- a small entrance). We measure the speed at which first brood are transported into a new nest and the speed at which first queen is brought into a new nest, and then perform a Kruskal-Wallis Test on both measurements across treatments. We then measure the accuracy of decisions according to choice of nest entrance size by using a Fisher's Exact Test. Our results show no significant relationships between the speed of decisions and group composition, and no significant relationship between the accuracy of decisions and group composition. However, we do find that there is a significant relationship between colony size and speed of decision across groups. We would like to give thanks to NSF grant no. IOS 3014230 and members of the Dornhaus Social Insects lab for their contributions to this project.



SCAVENGER RECEPTOR PROTEASE IRSRP1 AND ITS ROLE IN TICK GUT PHYSIOLOGY

DANIELA GUTIERREZ-MUÑOZ, DAN SOJKA

Ticks are the second most common vectors for diseases that affect humans and animals. Various anti-tick interventions are being investigated in hopes of diminishing the spread of infections from ticks to their hosts. The primary objective of this study was to examine the scavenger receptor - serine protease IrSRP1 from the major European Lyme disease vector tick *Ixodes ricinus* and its role in tick gut physiology. This enzyme was shown by comparison of primary and in-silico modeled tertiary protein structures to belong to the HGF/plasminogen-like family. Antibodies prepared by the injection of rabbits with recombinant expressed partial IrSRP1 protein sequences localized the protein to hemocytes and gut-digestive cells. The investigation questioned whether IrSRP1 undertook a neural or humoral pathway to stimulate the tick's digestive system to initiate the rapid engorgement phase conditioned by female mating; leading to extensive egg production and rapid multiplication of ticks. An *in-vivo* knockdown of the IrSRP1 was prepared by the microinjection of interfering ds-RNA to the tick hemolymph and the phenotypization was tested in comparison to GFP ds-RNA off-target control. Phenotype changes were monitored as effects on the expression and activity of the individual enzymes of the multi-enzyme complex of tick digestive peptidases using qPCR, Western blotting, and fluorescent peptidyl substrate assays. Monitoring of global phenotype markers displayed a dramatic decrease in tick weight and relative survival rates. Upon completed functional characterization, this enzyme will be tested as a suitable recombinant vaccine against ticks that could find usage in medicine.



LOCALIZATION OF THE HEME SYNTHESIS PATHWAY IN *C. VELIA*

LAURA HACKER, JITKA KRUCINSKA, ZOLTAN FUSSY, MIROSLAV OBORNÍK



THE ROLE OF EWSR1 IN EWING'S SARCOMA TUMORIGENESIS

LUCAS HARRELL, NASIHA AHMED, MATT ROLLINS, JACOB SCHWARTZ

Ewing's sarcoma is a devastating pediatric cancer of the bone. The overall survival for patients with metastatic disease is rather low (30%), and only small improvements in treatment measures for Ewing's patients have been made over the last thirty years. That being said, there is a need for new, targeted treatment options for this disease. Unlike the majority of cancers, the genomes of Ewing's sarcoma cells are remarkably stable. There is only one recurrent mutational event: the EWS-FLI1 translocation. The fusion protein that results can regulate the expression of certain oncogenes and tumor suppressors and thereby promote tumorigenesis. We hypothesize that EWSR1, the wild type copy of one the genes incorporated into the fusion protein, plays a role in this regulation. In order to test this hypothesis, A673 patient-derived Ewing's sarcoma cells are transfected with small-interfering RNAs (siRNAs) targeted to *EWS-FLI1* and/or *EWSR1*. RNA is extracted from these cells after a three-day incubation period; cDNA is then synthesized from the extracted RNA samples. These cDNA samples are then used in real time RT-PCR experiments in order to determine if the expression of genes previously indicated as direct targets of *EWS-FLI1* changes after knockdown of *EWSR1* and/or *EWS-FLI1*. Surprisingly, our results indicate that there may be multiple mechanisms by which *EWS-FLI1* activates certain oncogenes. It was expected that, after *EWSR1* knockdown, the expression levels of genes activated by *EWS-FLI1* would decrease. This is not the case for all genes assayed. Surprisingly, the expression levels of two of the three genes (*NKX2-2* and *CCND1*) chosen as activated targets of *EWS-FLI1* increased after *EWSR1* knockdown. The expression level of the third gene assayed (*VRK1*) decreased after *EWSR1* knockdown. These results are encouraging not only because of the fact that they indicate that *EWSR1* likely plays a role in the function of *EWS-FLI1*, but also because they imply that there may be more than one mechanism used by *EWS-FLI1* to regulate the expression of certain genes. These results are also important to Ewing's sarcoma treatment as establishing the role of *EWSR1* in this cancer may provide a new target for therapeutic intervention.

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THE TRANSCRIPTION FACTOR HNF4A IS A CENTRAL TARGET OF TRICHLOROETHYLENE TOXICITY IN THE DEVELOPING CHICK HEART

ALONDRA HARRIS, KAREEM ISMAIL, ORNELLA SELMIN, MARTHA NUNEZ, RAYMOND RUNYAN

The industrial degreasing solvent, trichloroethylene (TCE), is commonly found at low levels in groundwater. It has been linked to the formation of congenital heart defects in humans. Studies in mice, rat, and chick models have also shown that TCE exposure at a critical window of development alters gene transcription in the embryonic heart. Microarray data of chick hearts exposed to 8 ppb of TCE, identified the transcription factor Hepatocyte Nuclear Factor 4 alpha (HNF4a) as a highly effected target of TCE. As little research has been done on the transcription factor HNF4a in the embryonic heart, we examined embryonic chick hearts for the expression of HNF4a mRNA. Additional embryos were examined for altered gene expression in the presence of TCE or the HNF4a agonist, Benfluorex, by injecting these reagents at varied doses *in ovo* during a window of heart development and TCE sensitivity. HNF4a mRNA was found to be uniquely expressed for a brief period in the embryonic heart during the developmental stages that coincide with valve formation and myocyte development. TCE and Benfluorex both altered expression of a series of developmental markers in the heart including HNF4a and Cytochrome P-450 2C45 (CYP2C45). Although Benfluorex is identified as a HNF4a agonist at higher doses, both Benfluorex and TCE were antagonistic to marker expression at low levels and similar molarity. Echocardiographic analysis of intact stage 19-20 embryos confirms an effect of TCE (10ppb) and an equivalent concentration of Benfluorex on early cardiac function as cardiac contraction was reduced by 29% and 23% respectively. The data shows the expression of HNF4a during the window of sensitivity to TCE and supports the suggestion that TCE acts on HNF4a to alter critical gene expression during both valve and myocyte development. This research was funded by the NIH grant R25-E5025494.



INVESTIGATION OF SELECT METABOLIC AND HORMONAL PREDICTORS OF WEIGHT CHANGE

KAITLYN HASKIE, PAOLO PIAGGI, MARCI E. GLUCK, JONATHAN KRAKOFF, KARYNE L. VINALES

In rats, brown adipose tissue (BAT) regulates cold-induced energy expenditure (EE) via the sympathetic nervous system (SNS). BAT ability to burn calories for thermogenesis may provide preventative and therapeutic relief for obesity-related disorders, however the role of cold-induced BAT activity (CIBA) in humans remains controversial. Few studies have looked at catecholamine stimulation of BAT activity, those of which provide conflicting information. We investigated the relationship between CIBA measurements and body composition, EE, and urinary catecholamines. We also examined if BAT activity or urinary catecholamines predicted body composition changes at six months.

16 healthy volunteers with normal glucose regulation had 24 hour EE and respiratory quotient (RQ) measured by whole-body indirect calorimetry during energy balance (EB), where 24h urine was collected. Body composition was measured by full body DXA scan. Positron emission tomography-computed tomography (PET-CT) scans were performed after cold exposure (16° C) for 2 hours to determine CIBA, defined as the average standardized uptake value (SUV) of the collection of voxels showing a SUV \geq 2.0g/mL in adipose tissue areas (Hounsfield units between -250 and -10). DXA scan was repeated at 6-month follow-up.

BAT activity was higher in healthy volunteers with lower fat-free mass and BAT volume was higher in subjects with higher fat mass. We noticed that people with higher BAT activity and volume had in general lower levels of urinary catecholamines during energy balance. At 6 months, weight, fat mass and fat free mass remained stable, but with significant variability. Lower urinary metanephrine during energy balance was associated with loss of fat mass. Although BAT measurements did not predict weight change, it did affect body composition, therefore weight change may be more evident at long-term follow ups.

Contrary to previous studies, brown fat activity was higher in healthy volunteers with lower fat-free mass and higher fat mass. In general, people with higher BAT activity and volume had lower levels of urinary catecholamines during energy balance, which may reflect a lower threshold for SNS cold-induced BAT activation. Although BAT measurements did not predict weight change, it did affect body composition; therefore weight change may be more evident at long-term follow-ups.

DEVELOPING AN AGED STROKE MOUSE MODEL OF MIXED DEMENTIA

MEGAN HAYES, THUY-VI V. NGUYEN, JENNIFER B. FRYE, KRISTIAN P. DOYLE

Mixed dementia is a condition in which abnormalities characteristic of more than one type of dementia occur simultaneously in an individual, and is more likely to develop with age. The most common form of mixed dementia is the co-existence of vascular pathology characteristic of vascular dementia (VaD) alongside neuropathology characteristic of Alzheimer's disease (AD). Yet despite the frequent co-existence of VaD and AD, little is known about how these diseases influence each other, in part due to the lack of an adequate animal model. Therefore, the goal of this study is to untangle causality in mixed dementia by determining if stroke can cause neuropathological characteristics of AD in wildtype (wt) mice. With immunostaining and behavioral tests, we present significant preliminary data showing that ischemic stroke induces the accumulation of b-amyloid (Ab_{42}), alongside overt cholinergic neurodegeneration and brain atrophy (i.e., cortical tissue loss and ventricle enlargement), but only in aged wt mice. This neuropathology is accompanied by a delayed cognitive decline that is accelerated in comparison to adult mice, and a lack or delay of motor recovery. Our findings support evidence from human studies suggesting an association between stroke and AD, and we believe that our aged stroke mice may serve as a novel model of mixed dementia. Near future studies include further validating and authenticating this model by increasing our animal sample size, using both sexes, an additional mouse strain, and an additional stroke paradigm.



AUTO-DATA COLLECTING AND AUTO-FEEDING ROBOTIC SYSTEM FOR BEHAVIORAL STUDIES

STEVEN HSU, DAVID KIKUCHI, ANNA DORNHAUS

Automation of data collection and maintenance is crucial in an era where electronics could be easily designed to satisfy such need. In my research, I attempt to design a robotic flower system that could automatically record bee's foraging duration with infrared sensor and periodically refill nectar holders with servo. The most basic units in the entire system are the robotic flowers that uses servo to refill nectar and infrared sensor to collect data. Those flowers are connected to a control unit (arduino mega 2560) that organizes data transmission, commands, and voltage. The control unit is connected to a computer that output the data into an excel spreadsheet. The specific application of such system is behavioral studies where we examine foraging decision and duration. The University of Arizona's Dornhaus lab.

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USING DUAL X-RAY ABSORPTIOMETRY SPINE SCANS TO DETERMINE TOTAL ABDOMINAL FAT

ASHLEE IRVING, ROB BLEW, VINSON LEE, SCOTT GOING, JENNIFER W. BEA

Obesity is associated with chronic diseases, including cancer. Body mass index (BMI) is typically used as a proxy for total body fat but visceral fat is presumed to be more involved in the etiology in most chronic diseases in the U.S. Analyzing the spine region using the iDXA machine to estimate total abdominal fat could be used to identify those at higher risk of heart disease, cancer, and other health problems. **Objective:** To determine if spine fat fraction can be used to estimate total abdominal fat. **Methods:** A convenience sample ranging in age and body habitus (N=50) completed total body scans and AP spine scans on the same day using the GE/Lunar iDXA machine. The typical regions of interest (ROIs) to quantify total abdominal fat are the second to the fourth lumbar vertebrae (L2-L4) and L2-Iliac Crest (IC). ROIs were manually selected using the total body DXA scan. A randomly selected subset of participants (N=20) were analyzed twice on different days to evaluate intra-rater reliability. **Results:** Study population was 84% female (n=42) and 16% male (n=8). Average age, BMI, weight and height were 38.5 ± 17.4 yrs, 23 ± 3.8 kg/m², 63.44 ± 11.4 kg, and 1.66 ± 0.4 m respectively. Intra-rater coefficients of variation (CV%), using the 20 participants that were analyzed twice were 0.5% and 0.3% for L2-L4 and L2-IC respectively. **Conclusions:** The two regions of interest for total abdominal fat on the total body scan were strongly correlated with the spine fat fraction. This study should be replicated with a larger and diverse sample.

TIME-LOCKED MESOLIMBIC DOPAMINE SIGNALS IN RESPONSE TO PAIN ONSET AND TO PAIN OFFSET

BOJAN ISAKOV, CHRISTOPHER ATCHERLEY, TAYLOR GEE, EDITA NAVRATILOVA, MICHAEL HEIEN, FRANK PORRECA

Relief of aversive states, including pain, is rewarding and associated with an increase in dopamine (DA) release in the mesolimbic reward circuit. Measurement of DA in the nucleus accumbens (NAc) is usually accomplished with microdialysis but this method does not allow determination of the temporal relationship to pain, and to its relief. In this study, we used isoflurane anesthetized rats to measure NAc DA release on a millisecond to second timescale using fast scan cyclic voltammetry (FSCV). Our approach was to standardize the depth of anesthesia by a reflexive pain response to noxious heat, the tail-flick test. The depth of anesthesia was standardized to this biological response of approximately 5.0 sec latency. FSCV involves the application of a specific triangular waveform at a high scan rate, allowing for oxidation and reduction of dopamine detected by a specialized electrode previously implanted in the NAc shell. Application of noxious heat to the tail was accompanied by a decrease in the DA signal that peaked at the time of the tail-flick. Following the tail-flick, there was a rebound increase in DA signal that peaked after 2.9 s. The data show a time-locked DA response to pain onset, and to pain offset, likely related to the negative and positive components of pain and its relief. Supported by DA034975 from the NIH.



SEMANTIC PRIMING INFLUENCES OBJECT DETECTION

BARNES JANNUZI, RACHEL M. SKOCYPEC, KIMBERLEY D. ORSTEN-HOOGHE, MARY A. PETERSON

Does having knowledge about the meaning of an object that might be present in a scene (its semantics) aid object detection? We utilized a figure-ground assignment paradigm to measure object detection. Participants viewed a 90-ms exposure of a display that was divided into two equal-area regions by a central border. One region depicted a portion of a familiar object that was either in its upright or inverted orientation. To activate semantics, we presented masked words that either denoted the basic level name of the familiar object or named an unrelated object from a different superordinate category (natural/artificial). Participants reported which region of the display appeared to have a definite shape and/or appeared closer to them in space (i.e., which side they perceived as the figure/object). Results indicate that when participants were given an upright display, they were more likely to perceive the figure on the familiar side of the border when it was preceded by a basic level prime than by an unrelated prime ($p < .01$). Critically, comparison to a control (no prime) condition revealed that this effect was driven by interference from the unrelated prime and not facilitation from the basic level prime. We posit that this interference effect stems from competition between predictions set up by the primes and a hypothesis driven by the familiar region of the display. In a second experiment, display exposure durations were increased to 120 ms. This allowed more time for the competition to be resolved. Consistent with the competition hypothesis, unrelated primes no longer reduced reports of the figure on the familiar side of the border. These results show that activating the basic level semantics of an object does not facilitate object detection, at least as measured by figure assignment. In contrast, activating the semantics of an object in another superordinate category can hinder object detection.

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TEMPORAL POLYTHEISM AND DIVISION OF LABOR IN *TEMNOTHORAX RUGATULUS*

WES JOHNSON, DANIEL CHARBONNEAU, ANNA DORNHAUS

Many social insect workers change task with age. We explore whether this characteristic is observed in the ant species *Temnothorax rugatulus*. Through video analysis of several colonies with multiple groups of younger ants with a known age, and older ants emerged sometime before we began identifying the ants by age, we observe the percent duration of the video a worker spends doing a task: foraging, broodcare, and overall activity. To analyze the results, we employ r statistics and compare

the average percent amount of time a worker of the old group or worker of the younger groups spends doing a task and identify if there is a significant difference between the groups: possibly suggesting that worker's tasks and overall activity may depend on age, as it has in other species of social insect. Preliminary results do suggest that temporal polyethism exists in the species *Temnothorax rugatulus* inasmuch that overall activity levels seem to decrease with worker age. NSF IOS 3014230.



DROSOPHILA ASTROCYTES SPAN FUNCTIONAL NEURAL DOMAINS WITH VARIABLE OVERLAP

LEAH KAPLAN, HÉCTOR D. GARCÍA, LESLIE P. TOLBERT, LYNNE A. OLAND

Glia and neurons are the two main types of cells in the brain. Recent research indicates that in both vertebrates and invertebrates, glial cells serve important roles such as helping to shape the nervous system, promoting neuronal cell death, and modulating ongoing neuronal function.

Drosophila melanogaster, with its extraordinary genetic toolkit, can be exploited to explore the contribution of astrocytes, a glial subtype, to neuronal circuit function. With the goal of determining the physical relationships between astrocytes and between astrocytes and neuronal circuits, we asked in this study how individual astrocytes interface with neighboring astrocytes and also asked whether astrocytic arbors map specifically onto functional neuronal domains (e.g., sensory, motor) or more broadly span across domains. To facilitate this analysis, we reconstructed fiducial markers in the neuropil to provide physical context when studying adjacent cells. To target astrocytes, we employed two genetic tools. Flp-out (Ito et al., 1997) and MultiColor FlpOut (Viswanathan et al., 2015) are genetic constructs that specifically label astrocytes to their distalmost tips, generating high-resolution, detailed images. MultiColor FlpOut allowed us to generate astrocytes in a variety of colors so that we could visualize the interdigitation pattern of neighboring cells.

Our examination of the processes of individual astrocytes as well as the interfaces between adjacent astrocytes revealed that (1) astrocytic branches have convoluted spatial domains, in which the finest distal branches of adjacent astrocytes interweave with a variable, but small, amount of interdigitation and (2) arbors of individual astrocytes span multiple functional neural domains. These findings suggest several functional consequences: Because astrocyte arbors span functional domains and astrocytes also can be dye-coupled (MacNamee et al., 2016), astrocytes may have the role of integrating neuronal activity across disparate neural circuits. Alternatively, there may be functional sub-compartments in astrocytes that are differentially active in response to local synaptic activity; this possibility remains to be explored. The limited overlap between astrocytes indicates that electrical coupling among astrocytes is likely to occur at the distal-most tips. Finally, any given synapse is likely to fall exclusively within the domain of a single astrocyte. This research was supported by NSF 1353739 to LAO.



BEHAVIORAL RECOVERY FOLLOWING INCOMPLETE SPINAL CORD INJURY (ISCI): MEASURING LOCOMOTOR PERFORMANCE USING A RAT MODEL

PAREENA KAUR, DEREK O'NEILL, VLADIMIR TURKIN, THOMAS M. HAMM

Spinal Cord Injury afflicts approximately 17,000 people in the U.S. each year (NSCISC, 2016). Most of these injuries are clinically incomplete as some sensorimotor function is retained. In this study, we are examining spinal cord plasticity, recovery of locomotion, and the effects of exercise following incomplete spinal cord injury in rats. To measure performance over time, we conduct weekly behavioral tests including the open field locomotion and grid walk. The combination of these tests provides a comprehensive picture of recovery of basic and skilled locomotion necessary for weight-bearing stepping and fine motor movements respectively.

Our observations show that while the injured rats improve substantially, they do not fully recover their pre-injury abilities. Exercise does not have a substantial effect on this process. In open field testing, they reach a plateau in performance at which

point they exhibit consistent weight bearing stepping, with deficits in paw placement and balance. In grid walk testing, the injured rats have deficits in fine motor control as indicated by how often the hind-paws miss the grid. Over time, the number of misses per step decreases though performance does not reach the same level as seen in the control rats. To compensate for this loss in ability, they seem to adapt their stepping pattern to prevent errors.

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NHE1 EXPRESSION IN NAIVE RATS: DIFFERENCE BETWEEN SEXES

JOHN KIM, KARISSA COTTIER, EMILY GALLOWAY, TODD VANDERAH, THOMAS DAVIS, TALLY LARGENT-MILNES

Progressive research in pharmacology and neurology has recently centered around the molecular constituents of the blood-brain barrier (BBB), a selective semipermeable barrier in the central nervous system (CNS) known for its restrictive properties as a passageway between the brain and contents of the extracellular fluid. The BBB's restrictive properties, while a novel research topic, are required information for development of effective treatments for neurological disorders such as migraine headaches - a prevalent neurological disorder affecting nearly 15% or approximately one billion people worldwide. Recent studies in migraine physiology show implication of the Na^+/H^+ exchanger (NHE), a membrane solute carrier regulating homeostasis of intracellular pH and Na^+ expressed ubiquitously throughout the central and peripheral (PNS) nervous systems. Furthermore, clinical studies have shown a tripled rate of migraine onsets in women over men in America and an approximately doubled rate worldwide, indicating sex hormones as a regulator of NHE expression and function. We carried our experiment via molecular and behavioral techniques utilizing naive rats grouped by gender. We specifically investigated the sodium/hydrogen exchanger 1 (NHE1) isoform of NHE due to its shown property of inducing CNS hyperexcitability and potential meningeal nociceptor activation when deviating from its normal expression level. Our three areas of interests were the brain and brainstem in the CNS and the trigeminal nerve - the cranial nerve involved in sensation of the head and face - in the PNS. We obtained the tissue via encephalotomy from female and male rats after monitoring their behaviors prior to and during the surgical procedures for Western blot analysis of NHE1 protein. The results showed a higher NHE1 expression in male brains than female brains overall. Follow-up experiments will utilize tissue obtained from rats with induced migraine to show differences in NHE1 expression to determine the role of NHE1 in the sex differences in migraine presentation.

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AUTOPHAGIC ALTERATIONS IN DERMAL FIBROBLASTS FROM INDIVIDUALS WITH IDIOPATHIC PARKINSON'S DISEASE

KONNER KIRWAN, J.Y. TEVES, V. BHARGAVA, M.J. CORENBLUM, R. JUSTINIANO, G.T. WONDRAK, J.S. SHERMAN, L. MADHAVAN

Parkinson's disease (PD) is a common age-related neurodegenerative disorder affecting more than 1.5 million people in the US and greater than 2% of the population worldwide. However, the etiopathological, cellular, and molecular basis of PD still remains largely unknown. In this study, we utilized human dermal fibroblasts (hDFs) isolated from skin biopsies of individuals diagnosed with late-onset idiopathic PD, as well as healthy age-matched control (AMC) subjects, as a model to study PD mechanisms. Although fibroblasts are not a neuronal cell type, they provide a unique model for PD because they encompass the biological and chronological alterations found in an aging environment, and due to their patient specificity. While idiopathic PD is thought to be multifactorial, recent studies suggest one potential cause to be the impairment of a cellular process known as autophagy: a recycling mechanism that breaks down old or damaged cytoplasmic content to maintain intracellular homeostasis. Specifically, we examined autophagy in the patient fibroblasts by assessing three particular proteins involved in the pathway: lysosomal-associated membrane protein 1 (LAMP1), microtubule-associated protein light chain 3 (LC3), and p62

to explore this mechanism in the context of PD. Experiments were conducted under both basal and stress conditions, and the proteins were measured via western blotting. Additionally, we used electron microscopy (EM) to visualize the autophagic differences between PD and AMC lines at an ultrastructural level. Our results indicate that autophagy is already upregulated under basal conditions in the PD cells with increased LC3 and p62 degradation, and dysregulated under stress as indicated by increased LC3 as well as decreased p62. EM data supported the western blotting results and showed increased autophagic vacuoles in PD cells. Our future efforts look towards further solidifying this data and also investigating another major type of autophagy, namely chaperone-mediated autophagy, to further understand the role of this process in PD.

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SYNTHESIS OF CYCLIC PEPTIDES FOR PREFERENTIAL BINDING TO MELANOCORTIN 4 RECEPTOR

MAJ KRUMBERGER, SAGHAR MOWLAZADEH, YANG ZHOU, JONATHON SAWYER, MINYING CAI, VICTOR J. HRUBY

MCR's are a family of G-coupled Protein Receptors (GPCR's) and extensive research has thus far shown 5 functionally different MCR's. The GPCR family is one of the major targets in the pharmaceutical industry, and since MCR's fall into this category developing potent ligands for them can be very advantageous. The issues that arises with most GPCR targeting pharmaceuticals is that they lack both efficacy and specificity for the receptor subtypes. The functional differences, as well as the location and possible ligand binding preferences are the differentiating characteristics for the five MCR's. The area of interest for my studies in the past couple of months, and in the future lies primarily in MC4R. In humans, this receptor – hMC4R – is expressed in virtually all brain regions, including the thalamus, hypothalamus, brainstem and the spinal cord. Guarini et. al. recently showed that activation of MC4R, in mice models with medium AD severity, counteracts cognitive decline via induced neuroprotection and improved synaptic transmission. Selective binding to hMC4R and other MCR's can be controlled by a core sequence that is present in all ligands binding to these receptors, the sequence is HFRW (Histidine, Phenylalanine, Arginine, Tryptophan). In addition, it is crucial that the melanocortin analogs are selective for the MC4R. The four natural agonists for MCR's are all linear, however they lack in selectivity, hence it is our goal to produce potent exogenous ligands that will aid either as agonist or antagonists for MC4R. The major change that we are introducing in the novel peptides is the KPV sequence which is normally found in α -MSH, the most potent of the natural ligands – we hope that this will increase the binding to the receptor. Another way to potentially increase bio-selectivity, is to constrain the linear sequence into a cyclized structure. The cyclization leads to a lower number of possible configurations that the peptide can have, hence increasing the possibility of binding to the active site of an MC4R.

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CHARACTERIZATION OF THE HOST CNS IMMUNE RESPONSE CAUSED BY *TOXOPLASMA GONDII* INFECTION

JOSEPH LAGAS, SHRADDHA TULADHAR, YARAH GHOTMI, APOORVA BHASKARA, ANITA KOSHY

Toxoplasma gondii is a ubiquitous obligate intracellular protozoan parasite that establishes an asymptomatic, chronic infection in most mammals, including humans and mice where it can persist in the brain. Though asymptomatic in most infected individuals, in developing fetuses or the immunocompromised, *Toxoplasma* infection causes a wide range of symptoms- from mild fever to symptomatic chorioretinitis to seizures and even death. It is unclear what determines this outcome variability, but recent data suggest the distinct strain of *Toxoplasma* might influence the clinical outcomes. *Toxoplasma* has three different canonical strains; type I, type II and type III. A prior study suggested that these different strains had gross differences in the CNS immune response in mice. Thus, we hypothesize that distinct *Toxoplasma* strains provoke different CNS immune responses, which may contribute to different disease severities. To better define *Toxoplasma* strain-specific immune responses, mice were

injected with 10,000 type II or III parasite and the CNS immune response was evaluated at 3 weeks post infection (wpi) using immunohistochemistry. A computer program (Simple PCI) was used to quantify two key immune cell types in stained tissue sections: macrophages/microglia (Iba-1⁺) and T (CD3⁺) cells. We observed that type III-infected mice had a stronger T cell and macrophage/microglia CNS response as compared to type II-infected mice. The brain cytokine environment was also evaluated using a Luminex assay, which showed type III-infected mice had a stronger pro-inflammatory response as compared to type II-infected mice. Finally, using flow cytometry to define the types of immune cells found in the brain and periphery (spleen) at 3wpi, we found that type II-infected mice had a higher proportion of alternatively activated macrophages (AAMs), and regulatory T cells as compared to type III-infected mice. However, during acute infection, type III-infected mice had higher AAMs as compared to type II-infected mice. Taking these data together, we propose that: 1) the CNS immune response is reflective of the peripheral immune response and 2) during acute infection, the type II strain provokes a robust pro-inflammatory response, which generates a compensatory anti-inflammatory response which will, ultimately hinder the parasite clearance. On the other hand, the type III strain infected mice provokes a less pro-inflammatory response early on which avoids the compensatory response, and thus will lead to improved parasite clearance. We are currently working on testing this model.

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IDENTIFICATION OF REGULATORS OF LYSOSOME FORMATION

GLORIA LE, N. JACKSON, N. SHAIKH, A. SHEARON, H. FARES

Lysosomes are membrane-bound organelles that serve as the major degradative compartments for endocytic, phagocytic, and autophagic materials targeted for destruction in eukaryotic cells. This degradation is critical to many physiological processes, including processing endocytosed nutrients, down-regulating signaling receptors, presenting antigens, killing pathogenic organisms, and degrading normal and abnormal cellular proteins. In addition, lysosomes mediate some cell death pathways and repair damage to the plasma membrane. Lysosomes are formed in complex eukaryotes by the budding of a small nascent lysosome from a late endosome/hybrid organelle, movement of the nascent lysosome away from the hybrid organelle while maintaining a membrane bridge, and scission of the membrane bridge to release a discrete primary lysosome. We had previously identified the Mucopolipidosis type IV protein TRPML1 as a regulator of the scission step during lysosome formation. Here, we describe the identification of additional regulators of this process, including actin that provides the force for moving nascent lysosomes away from late endosomes/hybrid organelles.



NECTAR ROBBING AND POLLINATION IN A CHANGING ALPINE POLLINATOR COMMUNITY

TREVOR LEDBETTER, SARAH RICHMAN, JUDITH BRONSTEIN

Changes in pollinator communities due to anthropogenic influences, including land use changes, climate change, and chemical use, have been characterized extensively in recent years. However, the effects of these changes on alpine and subalpine floral communities remain poorly understood.

Aquilegia caerulea is a perennial, herbaceous, flowering plant that occurs in alpine and subalpine habitats from 2,600-3,700m. Studies performed in Colorado in the 1970's listed several *Bombus* (bumble bee) species as the primary visitors to *A. caerulea*, with *Bombus occidentalis* as the most common. While most *Bombus* visitors are unable to reach the nectar of *A. caerulea* due to its long nectar spurs, opting instead only to gather pollen for use as food for larvae, *B. occidentalis* is capable of primary-robbing the flowers. In this behavior, foragers bypass the floral opening by cutting into a flower at its base to retrieve nectar, usually without transferring pollen between flowers. Robbing rates in *A. caerulea* at this time were reported to be as high as 64%, with *B. occidentalis* robbers oftentimes outnumbering those foraging for pollen.

More recent studies of *A. caerulea* have noted low overall *Bombus* visitation, with *B. occidentalis* being nearly absent, a decline that coincides with its general decline throughout the western United States. In their place, high Muscidae (fly) visitation has been observed instead, and while present in the past, their presence and abundance has increased and is now more widely observed. These changes mean that *A. caerulea* populations have lost both *Bombus* pollen collectors and a prominent nectar robber in *B. occidentalis*.

It is known that both pollen- and nectar-collecting pollinators can influence the evolution of *A. caerulea* flowers via both male and female functions. However, it is not known how flies factor into overall plant fitness for *A. caerulea*, and it is possible that they may serve as effective pollinators. This study documents current nectar robbing rates, describes the current pollinator community for *A. caerulea*, and quantifies how effective flies are as pollinators in the absence of bee visitation. These data are explicitly contrasted with those at the same site in the 1970's, capturing the changes that occurred in conjunction with anthropogenic change in the past forty years.

This study was generously funded through the Spirit of Inquiry Grant through the UA Honors College and was performed near the Rocky Mountain Biological Laboratory in Gothic, Colorado.



EXPLORATORY BEHAVIORAL AND NEURAL EFFECTS OF INFLAMMATION-INDUCED SICKNESS BEHAVIOR

EMILY LONG, R. WILSON, M.F. O'CONNOR

Last time you were sick, were you more socially withdrawn, anxious, or distracted? This sickness behavior stems from increased immune (proinflammatory cytokine) activity circulating throughout the body and crossing the blood-brain barrier, inducing widespread neurochemical changes. Sickness behaviors shift the body's energetic prioritization toward immune recovery, therefore shifting away from other motivations like curiosity or invested decision-making. Decision-making tendencies can be determined as an exploitative (directive) determination of the best option, or a more exploratory (random) selection. Adaptive gain theory mechanistically explains these different decision-making methods; modulatory locus coeruleus- norepinephrine (LC-NE) pathway activity between engagement and rest alters gain modulation in cortical processing, and could therefore be a potential mechanism for the predicted influence of inflammation on exploratory/ exploitative decision-making.

Little is known of the extent or mechanistic underpinnings of inflammation's influence on exploration. We therefore used a within-subject design, testing participants once with heightened inflammation induced by an influenza vaccination, and once without the vaccine. Tests include a novel virtual-reality adaptation of the open-field test to determine motivation to explore virtual space, the Horizon Decision-Making Task to assess exploratory versus exploitative tendencies, and pupillometric measures to identify LC-NE activity. Increased inflammation was hypothesized to correlate with less exploration of the virtual field, more random decision-making in the Horizon task, and less modulatory LC-NE activity, all due to an advantageous disengagement of cognitive resources in conjunction with immune activation.

Preliminary findings show that upon receiving the vaccine, participants reported decreased attentional and self-control impulsivity on the BIS-11 scale. Participants traversed less in the virtual-reality open-field test when vaccinated, indicating inflammation's influence on motivational/ rewards neural pathways. Participants post-vaccination were also more random in their decision-making. These findings support goals of sickness behavior: less curiosity to explore virtual-reality and more random decision-making strategies are less cognitively expensive, so energy otherwise invested in pursuing curiosities or deliberating options can focus on immune recovery instead.

Further studies on how inflammation changes behavior could improve patient quality of life through better diagnosis and management of inflammation-induced side effects such as depression. Funding has been provided by the Honors College and Undergraduate Biology Research Program.

INVESTIGATING THE INTERACTION OF TRANSCRIPTION-FACTOR PROTEINS INVOLVED IN EARLY ENDOSPERM DEVELOPMENT IN MAIZE

PIERCE LONGMIRE, SHANSHAN ZHANG, CHOONG-HWAN RYU, RAMIN YADEGARI

The endosperm of cereal grains has biological and economic significance. Endosperm is a tissue that provides nutrients to the developing embryo or seedling. Additionally, endosperm of cereal grains, including that of maize, rice and wheat, make up a great portion of the human diet and is a source of various industrial products. Early in maize kernel development, endosperm cells undergo two critical processes: a rapid proliferation and an associated differentiation into multiple cell types. Our preliminary studies have identified the teosinte branched 1 cycloidea proliferating cell factor (TCP) transcription-factor (TF) protein family as a potential regulator of endosperm proliferation. We set out to understand how interaction among TCP proteins and other co-expressed TFs may regulate the expression of genes involved in endosperm proliferation. Utilizing both yeast two-hybrid (Y2H) interaction and bimolecular fluorescence complementation (BiFC) assays, we identified specific TCP-TF interactions. This data will be used to further analyze how these proteins may interact in a heterologous system to regulate gene transcription using transactivation assays. Altogether, this study helps us to understand the nature of gene regulatory networks that regulate early endosperm development in flowering plants.

The NSF-Plant Genome Research Program (ISO/MCB-1444568) provided funding for this project.



DETERMINING THE EFFECT OF NANOBODIES ON THE METNI ABC TRANSPORTER

KYLE LOPEZ, PHONG NGUYEN, DOUGLAS REES

MetNI, a high affinity methionine uptake ABC importer, is highly conserved among bacteria, including pathogens such as *Salmonella typhimurium* and *Staphylococcus aureus*. This import system is necessary for cell survival and bacterial virulence, and therefore important to study. However, little is known regarding the mechanism of this transporter due to lack of biochemical and structural characterizations. Our goal is to analyze various structural changes of the MetNI transporter during the transport cycle and to use nanobodies to improve crystallization of the outward facing conformation of the MetNIQ complex. We use antibody-like proteins called nanobodies that we hypothesize stabilize either the inward or outward facing conformation. In this study, we characterize the effect of the nanobodies on the MetNI transporter using ATPase assays, size-exclusion chromatography, and crystallography. We observe several nanobodies bind to MetNI and inhibit ATPase activity ~10 fold. Inhibition of activity suggests stabilization of either the inward or outward facing conformations. Finally, we identified several conditions that grow crystals of the MetNI-nanobody complex. These conditions tend to contain mid-range molecular weight polyethylene glycols (PEG) at lower concentrations (5-15% w/v), 0.1 M salt, and pH between 4.5 and 7. Results from this study will aid future structural studies of the MetNIQ transport system.



EFFECT OF HEAVY ATOM SUBSTITUTION IN FORMATE DEHYDROGENASE

JUSTIN LOPEZ, CHETHYA RANASINGHE, AMNON KOHEN

Studies on vibrational coupling between protein motions and enzymatic bond activation are of contemporary interest in enzymology as they lead to evolutionary discoveries in drug and biomimetic catalyst design. Mass modulation of the model protein formate dehydrogenase (FDH) by isotopic enrichment enables us to study the role of femtosecond protein dynamics on enzyme catalysis. Temperature dependence of intrinsic KIEs was carried out to investigate the correlation between covalent bond activation and fast protein vibrations. Activated tunneling model was used to interpret the KIE data. According to the data that have been obtained so far, the $\Delta E_a(T-H)$ for 15N FDH lies in between those for light and half heavy FDHs done previously as

expected following the mass effect. But the interesting thing is that the average donor acceptor distance denoted by the magnitude of the KIE values suggests the largest for 15N FDH: A possible explanation might be due to significant alterations to the local electrostatics. To make more accurate predictions about the donor acceptor distance distribution at the transition state of the hydride transfer reaction, we need to further analyze the KIE data and obtain a complete KIE plot which will be comparable to the previous data.



AGE POLYETHISM IN *TEMNOTHORAX RUGATULUS*

DOMINIQUE LUND, DANIEL CHARBONNEAU, ANNA DORNHAUS

The purpose of this study is to investigate age polyethism, which is the concept that different age groups within a social group perform different tasks. We studied this form of division of labor in the ant *Temnothorax rugatulus*. Specifically, we investigated whether ant inactivity, or laziness occurs in a specific age group more often than others. We hypothesized that the young ants would be more inactive, that the older ants would be more inactive, or that there is no correlation between age and inactivity. To test this, we marked newly eclosed ants with different wire belts so that they could be identified by their age. Then, we analyzed videos of the colonies and tracked each ant's behavior. A linear regression will be performed once all data is collected to determine whether ants spend more time inactive at a certain age.



INVESTIGATING THE RELATIONSHIP BETWEEN RESPONSE THRESHOLDS AND DIVISION OF LABOR

COLIN LYNCH, NICOLE FISCHER, ANNA DORNHAUS

The ecological success of social insects is often attributed to their division of labor, wherein workers in a colony specialize in different task and each task is performed by a different set of individuals. What is the underlying mechanism controlling such task specialization? One of the leading models of division of labor proposes that specialization arises because individuals have different response thresholds to task-associated stimuli. However, there is little direct evidence to support this model.

As a first step in uncovering how task specialization arises, we test the hypothesis that variation in response thresholds underlying task specialization. To this end, we test sucrose thresholds of *Temnothorax rugatulus* ant workers and explore the relationship between worker thresholds and task specialization.

We find that response thresholds do not drive division of labor. However, sensitivity to sucrose can predict division of labor. Specifically, we find that all workers who respond to sucrose spend some amount of time taking care of the brood. Workers who do not respond to the sucrose, or only respond to a water control, spend no time taking care of the brood.



CRE RECOMBINASE SYSTEM IN A *TOXOPLASMA GONDII* BRADYZOITE MUTANT

WES MACDONALD, OSCAR MENDEZ, ANITA KOSHY

Toxoplasma gondii is an obligate, intracellular parasite that infects up to a third of the world's population. An intriguing aspect of the *Toxoplasma* life cycle is the ability of the parasite to persist for the life of the host. Its asexual cycle has two forms, the acute stage, which consists of actively replicating tachyzoites, and the chronic stage, in which bradyzoites encyst and growth

slows. Bradyzoite development is of particular interest because while acute infections of *Toxoplasma* can be treated, there are currently no treatments for chronic infection. Bradyzoites are also a major source of transmission to humans via consumption of contaminated food. A previous study focused on identifying bradyzoite development genes through the use of insertional mutagenesis discovered a bradyzoite development mutant, N28E2. This mutant exhibited incomplete and abnormal bradyzoite morphology, where only 1-2 bradyzoites were found per cyst (as opposed the usual 100-1000 bradyzoites). The aim of the current project is to introduce our previously established Cre-reporter system into the N28E2 mutant strain to track and study host-parasite interactions. Our Cre-reporter system causes the cells which have interacted with the parasites, in cell culture or in Cre reporter mice, to undergo Cre-mediated recombination and express GFP allowing us to permanently track these host cells. Parasites are also easily identified as they express RFP. Engineering N28E2-Cre parasites will allow us to study host-parasite interactions of this mutant at the level of the single interacted host cell *in vivo*.



IS LEARNING IN *BOMBUS IMPATIENS* THE RESULT OF POSITIVE OR NEGATIVE REINFORCEMENT OR BOTH?

ANDREA MASON, DAVID KIKUCHI, ANNA DORNHAUS

In foraging, the ability to differentiate between rewarding and non-rewarding food sources and accurately choose correctly can minimize cost for the individual. An individual makes decisions as to which food sources to visit through their past experiences. We investigate whether negative or positive experiences or both most drives learning using *Bombus impatiens* as a model. Bees were trained to associate different flower color combinations as rewarding with sucrose or unrewarding with quinine; some bees were trained with only positively reinforced flowers while other bees were trained with both positive and negatively reinforced flowers. How well bees learn is measured by the proportion of the flower colors visited. Preliminary data shows bees learn to discriminate between rewarding and unrewarding flowers when trained to both positive only flowers and positive and negative flowers. Supported by NSF grant IOS-1455983 and NIH PERT program at UA through the Center for Insect Science.



THE FUNCTION OF IL-1 FAMILY MEMBERS IN THE REGULATION OF TH2 IMMUNITY

MONICA "NIKKI" MASTRUD, DOMINIK SCHENTEN, NICOLE CONGROVE

Type 2 immune responses involve the differentiation of naive T cells into Th2 cells that are central for the host immune response against helminths and other extracellular parasites. The accidental generation of autoreactive Th2 cells is suppressed by regulatory T cells (Tregs). How parasite-specific Th2 cells can escape Treg-mediated suppression while autoreactive T cells remain suppressed is currently unclear. Previous work suggested that Th1 cells responding to intracellular pathogens become inert to the suppressive effects of Tregs through the activity of the cytokine IL-1 that is secreted by cells of the innate immune system. In analogy, Th2 cells may therefore also escape Treg-mediated suppression through the activity of a member of the IL-1 family of cytokines, most notably IL-33, which is known for its importance in type 2 immune responses. We are currently testing this hypothesis in protein immunizations of mice carrying a T cell-specific deletion of MyD88, the essential signaling adaptor of all receptors for the IL-1 cytokine family, using the protease papain as a Th2-inducing adjuvant. Our work will provide important insights into the regulation of Th2 responses and their pathological manifestations such as allergies and asthma.



THE RELATIONSHIP FOR BIASES BETWEEN COMPLEX FLOWERS AND UNICOLOR FLOWERS IN BUMBLE BEES

SHANNON MCLAUGHLIN, DAVID KIKUCHI, ANNA DORNHAUS

Innate biases toward a stimulus in the environment is important for initial learning when the cost of learning is high. In this study we try to determine whether bumblebee preference for single color flowers predict their preferences for two color flowers. Bees foraged in an arena with wooden colored flowers and their color preference was observed. Two different sets of colored flowers were used. One set was with 4 different solid single colored flowers lined up in a row. The other set had 2 colors on each flower in different color combinations using the same initial colors in the single colored flowers. Single color flower results showed bees having no significant preference for any single color flowers ($p=0.147$). However, bees foraged on more blue and grey flowers over green and cyan. The results of preference for combination colored flowers was also not significant ($p=0.061$).



EFFECT OF ESTROGEN ON CIRCADIAN TEMPERATURE RHYTHMS IN FEMALE MICE

JESSI MCMINN, SALLY KRAJEWSKI-HALL, NAOMI RANCE

Body temperature regulation in women is altered by changes in circulating gonadal steroids during the menstrual cycle and estrogen withdrawal in postmenopausal women. Estrogen also alters temperature regulation in the rat, an animal model that has been used to elucidate the mechanism of hot flushes. During the rat estrous cycle, there is a decrease in tail-skin temperature (T_{SKIN}) on proestrous night when circulating gonadal hormones are high. T_{SKIN} is also decreased during the night when ovariectomized (OVX) rats are treated with 17β -estradiol (E_2). In contrast to the numerous studies in the rat, there is limited information on the effects of estrogen on body temperature regulation in the mouse. The present studies were designed to measure circadian rhythms of core temperature (T_{CORE}) and T_{SKIN} in the mouse using a novel method for temperature recording in freely-moving animals. In experiment one, 10 female Hsd:ICR (CD-1) mice were implanted with an intraperitoneal temperature probe to measure T_{CORE} and a small temperature probe was attached to the tail to measure T_{SKIN} . Daily vaginal smears were taken to assess estrous cycle stage and T_{CORE} and T_{SKIN} were measured continuously for 14 days. In experiment two, the mice were OVX and temperature measurements were repeated for seven days. Fifteen and 29 days after ovariectomy, animals were implanted subcutaneously with E_2 capsules (360 $\mu\text{g/mL}$; low E_2 and 720 $\mu\text{g/mL}$; high E_2 , respectively) and the temperature measurements were repeated for seven days. We report that the circadian rhythms of T_{CORE} and T_{SKIN} were not affected by the day of the estrous cycle in cycling female mice. There was also no significant effect of estrogen replacement on T_{SKIN} during the night, regardless of the dose of E_2 . However, both low E_2 and high E_2 significantly decreased T_{CORE} in OVX mice during the day. These studies reveal a significant species difference in the way estrogen modulates temperature regulation in the rat and mouse. Future studies will use transgenic mice to elucidate the central nervous system pathways involved in the estrogen modulation of body temperature and reproduction. This research was supported by National Institutes of Health R01 AG047887.



IDENTIFYING NETWORK ELEMENTS THAT MAKE OR BREAK A BISTABLE RB-E2F CELL PROLIFERATION SWITCH

MATTHEW MILLER, GUANG YAO, HELEL HAO ZHANG

Proper control of cell proliferation is fundamental to the health of our body. A retinoblastoma (Rb)-E2F gene pathway plays a pivotal role in determining whether cell proliferation occurs. Our lab has previously created a computer model to represent this Rb-E2F pathway. The model predicted that the Rb-E2F pathway functions as a bistable switch to control the start of cell proliferation, which has been validated by our follow-up experiments. The outcome of the Rb-E2F computer model is controlled by 24 parameters, which describe the production and degradation of each protein in the pathway. We want to explore what

parameter features make or break the Rb-E2F bistable switch, which may help us understand how mutations disrupt this important switch in diseased cells. To determine this, we simulated the Rb-E2F model with 10,000,000 randomly generated parameter sets. From these 10M simulations, we acquired 7,162 good bistable switches. We are currently analyzing the corresponding good parameter sets in the 24-dimension space to identify key controlling features of the Rb-E2F cell proliferation switch.



MYXOZOA: MICROSCOPIC JELLYFISH PARASITES

FATIMA MOLINA, INGA MEYER-WACHSMUTH, IVAN FIALA, ASTRID HOLZER

A relatively new field of study, Myxozoa are identified as metazoan parasites that are located in both freshwater and marine habitats around the world. Overall, there are approximately 2,200 known species from the Cnidaria phylum and researchers have completed a total of fifty life cycles to date. Currently, the Laboratory of Fish Protistology located at the Institute of Parasitology in Ceske Budejovice, Czech Republic is researching the prevalence of Myxozoa within specific aquatic ecosystems with the goal of discovery new species from both freshwater and marine niches. In addition, the two distinct life cycles of Myxozoa that incorporates both vertebrates and invertebrates is being studied with vigor to describe additional complete life cycles. Phylogeny and taxonomy is also being addressed and reconstructed to meet the findings of new species through the new process of extraction and analysis by environmental DNA (eDNA), in regards, to soil and water samples. Designated primers are implemented to capture potential Myxozoa DNA within water, soil, and meiofauna samples. Current and future research findings will ultimately lead to the discovery of new hosts, infection mechanisms, myxozoan diversity, complete life cycles, a new taxonomic system of identification, and the possibility of detrimental effects caused by Myxozoa within ecological environments.

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POTENTIALLY NEURODEGENERATIVE FACTORS PRESENT IN THE CIRCULATION AND INFARCT LEAK INTO THE BRAIN FOR MONTHS FOLLOWING STROKE THROUGH THE GLIAL SCAR

JUSTINE MONA, JACOB C. ZBESKO, MAJ KRUMBERGER, VIVIAN NGUYEN, JENNIFER B. FRYE, KRISTIAN DOYLE

Stroke is a leading cause of long-term disability in the United States, affecting more than 795,000 people annually. Within the affected brain, the blood brain barrier (BBB), a network of tight junctions between endothelial cells, that separates the circulating blood from the extracellular brain fluid, is disrupted at the site of damage. New blood vessels form following the disruption of the BBB. Immune cells travel through these newly formed blood vessels to participate in the clearance of dead tissue. Furthermore, astrocytes proliferate and migrate to form the glial scar to separate the lesion from the remaining brain tissue. A function of the scar is to stop neurodegenerative factors from migrating from the lesion into the surviving brain tissue. We hypothesize that these newly formed blood vessels are unable to fully mature into blood vessels with full BBB competency. In addition to this, we also hypothesize that the glial scar is porous and factors present within the lesion can infiltrate into the surviving brain tissue causing continued damage. This damage could be one reason why approximately one third of stroke survivors develop dementia following stroke. Therefore, to extend our knowledge about the restoration of the BBB and the integrity of the glial scar, we experimented on C57BL/6 mice that underwent the distal hypoxic model of stroke. We assessed the integrity of the blood vessels within the lesion following stroke and the permeability of the glial scar at various time points.



PHYSICAL ACTIVITY IN NAVAJO CANCER SURVIVORS

JENILLE MONTELONGO-RODRIGUEZ, CHRIS REPKA, BRIAN KINSLOW, JENNIFER BEA, HENDRICK DEHEER

Introduction: Native Americans have the lowest five-year cancer survival rate of any group in the US. Studies have shown that physical activity can help improve the survivor's quality of life, physical functions, reduce fatigue and risk of recurrence. No studies about exercise in cancer survivors have been done with the Navajo.

Purpose: To evaluate what programs and resources Navajo cancer survivors need to improve health and quality of life and reduce recurrence risk

Methods: A literature review about Native Americans, physical activity, and cancer was conducted. Additionally, interviews and focus groups with 34 Navajo cancer survivors and 5 family members (16 males, 23 females, average age 56 years old) were done to assess current physical activity habits, barriers, and preferences.

Outcomes: The most common cancers were cancers of the colon (30%), breast (27%), gallbladder/gastric (13%), reproductive system (10%) and other (20%). The qualitative data illustrated that late diagnosis was common, challenges with access to care in rural areas and a general lack of Navajo speaking providers. Survivors reported a wide variability in activity levels, and limited knowledge about the appropriateness and intensity of physical activity during and after treatment. Walking was the most commonly reported preferred activity, and 85% reported to prefer exercise with a group (50%) or either with a group or alone (35%).

Clinical Relevance/Next Steps: A clinically appropriate and culturally sensitive physical activity program was developed based on these findings. These findings will be pilot tested among a small group of Navajo cancer survivors.



TRNA PROCESSING IN *TRYPANOSOMA BRUCEI*

MEGAN MONTOYA, Z. PARIS, S. KULKARNI, E. HEGEDÜSOVÁ

Trypanosoma brucei is a parasitic hemoflagellate that causes African Sleeping Sickness (Trypanomiasis) in humans, and Nagana in livestock. The organism is transmitted to humans and animals from the tsetse fly, the vector in which it matures. Currently, there is no vaccination for Trypanomiasis; this is due to its unique ability to evade the host immune system. The host immune system recognizes foreign invaders using the parasite's unique variant surface glycoprotein (VSG) coat. The knowledge of this protein composition is also necessary for vaccine production. However, *T. brucei* is able to change the composition of its VSG every week, which makes the parasite very infectious and a difficult target for vaccination development. A possible solution is to regulate intracellular VSG production by regulation of tRNA splicing. This experiment was an investigation into tRNA nuclear export, and in particular, splicing. The main goal was to test whether the *S. cerevisiae* Splicing Endonuclease Complex (SEN) is conserved in *T. brucei*. Since the SEN primarily targets introns, the only *T. brucei* Tyrosine intron was used in the analysis. The equivalent intron was isolated from *S. cerevisiae*, transformed into *E. coli* and electroporated into *T. brucei*. Subsequently, *T. brucei* RNA was extracted, and probed for both processed (spliced) and unprocessed radioactively labeled tRNA. Concurrently, a growth curve of six transformed *T. brucei* cell lines was plotted to test the impact of Tyr tRNA overexpression, and the incorporation into the *T. brucei* genome. A growth defect was detected, suggesting that the exogenous *S. cerevisiae* was indeed being produced. The presence of spliced *S. cerevisiae* produced from *T. brucei* cells would suggest that the two organisms have similar Splicing Endonuclease Complexes. Northern blots of the tRNA found both processed and unprocessed tRNA, showing possible conservation of the splicing mechanism.

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ASSESSING THE EFFICIENCY OF VARIOUS DISINFECTION TECHNIQUES IN COMBINATION WITH ANTIMICROBIAL TEXTILES

CHRISTINA MORRISON, CHARLES P. GERBA

Extending clothing length of use between washes is potentially beneficial in many circumstances. For instance, space travel or travel into desolate/rugged environments may demand clothing articles with extended lengths of use to avoid reliance on laundering facilities. Clothing made from antimicrobial textiles benefits from an extended length of use compared traditional textiles. This study aims to utilize various disinfection treatments in combination with antimicrobial textiles to keep personal clothing clean until washing becomes available. Silver-impregnated socks and traditional socks will be inoculated with *Staphylococcus aureus* and treated with either varying concentrations of hydrogen peroxide or varying levels of UV light intensities, to test the efficiency of each treatment. The hydrogen peroxide and UV treatments which exhibit the largest log reduction will then be implemented in a qualitative study. Human subjects will wear both silver-impregnated and traditional socks to create realistic bacterial levels. The socks will then undergo specified hydrogen peroxide or UV treatment and subsequently be assessed for perceived 'freshness' via an olfactory panel. The efficiency testing is currently underway, and future work will include the qualitative human subject based study.



RELATIONSHIP BETWEEN JOB SPECIALIZATION AND BROOD THRESHOLD IN *TEMNOTHORAX REGATULUS* ANTS

ALEXIS MORRISON, NICOLE FISCHER, COLIN LYNCH, ANNA DORNHAUS

Division of labor is a distinct trait specific to social insects, however how these insects choose their tasks is not completely known. A proposed mechanism for task specialization is that the workers in the colonies have variations in their response thresholds to different stimuli that affect what tasks they have. This mechanism proposes that the worker will only perform a task when stimuli exceeds its response threshold. However, empirical evidence for response thresholds in social insects and its association with task specialization is still lacking. In this experiment we conducted, *Temnothorax regatulus* ants were used to explore response thresholds to brood pheromones and task allocation. Each worker's job specialization and time active was determined by observing the ants in videos and documenting their tasks and connecting this to their brood thresholds. We hypothesize that if there is a correlation between the amount of time that an ant does a task and its threshold that there will be a positive relationship that the lower the ants threshold, the more often they will do that task. Preliminary results begin to show that there is not a correlation between the tasks chosen by the ants and their brood thresholds, this means that while this experiment may not provide the answer to what causes division of labor in social insects, it helps factor out what does not contribute to task specialization.



IDENTIFICATION OF CYCLIC PEPTIDES TO TARGET BETA AMYLOID (A β)-MEDIATED TOXICITY IN CELLULAR SYSTEMS

ELISE MUNOZ, AFTABUL HAQUE, SUSAN LINDQUIST

Alzheimer's disease (AD) is the most common age-related neurodegenerative disease affecting 40 million people worldwide. AD is characterized by accumulation of neuropathological conformers of amyloid-beta (A β) peptides that results in extensive neuronal loss. Exploring peptide and antibody therapeutics to target and inhibit toxic A β oligomers is gaining increasing attention. We have established cytotoxic models in yeast and neurons by expressing A β and its mutant variants. Intriguingly, both the wild-type and the familial Arctic mutation (E22G) of A β robustly increased cytotoxicity whereas expression of a different mutant was nontoxic. Remarkably, upon co-expression, the non-toxic mutant abrogates the cytotoxicity of the toxic peptides (wild-type or Arctic), indicating a protective mechanism by the non-toxic peptide. Cyclization of peptides increases the stability and bioavailability of their linear counterparts, offering improved therapeutic efficacy. In this study, we employed

sortase-mediated cyclization of peptides in a yeast model of A β -toxicity as a cellular platform to identify, characterize and validate candidate cyclic peptides in preventing A β -cytotoxicity. Sortase (SrtA), a bacterial transpeptidase, and a calcium-independent mutant sortase (SrtA-7M) were expressed in the secretory pathway of a yeast A β 42 model and shown to successfully cyclize target peptides *in vivo*. Sortase-mediated cyclization of protective peptides in A β cytotoxic models will provide an important proof of principle for delineating the mechanism of action of inhibitory cyclic peptides against A β -toxicity in a cellular system. Such candidate peptides will also provide insights in understanding the molecular mechanisms of AD pathogenesis and a complementary paradigm for drug development for treating AD.

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USING BIOORTHOGONAL CHEMISTRY TO PULL-DOWN DENGUE VIRUS PROTEIN INTERACTIONS

CELINA NGUYEN, STEPHANIE M. JENSEN, JOHN C. JEWETT

A mosquito-borne virus endemic to the tropics and subtropics, dengue (DENV) is one of the most prevalent infectious diseases in the world. Among other obstacles, an incomplete understanding of specific host-virus protein-protein interactions limits the development of anti-viral therapies for DENV. Here, we attempt to use metabolically incorporated azides, an established bioorthogonal moiety, on the surface of DENV to pull down specific host-virus protein-protein interactions with the hopes of identifying potential protein targets for anti-viral therapies. As a proof of concept, we first endeavored to pull down a known interaction between the antibody for the envelope protein of DENV and the envelope protein of DENV. The interaction between the two proteins was fixed via a photo-crosslinker, and the protein complex was then attached to magnetic NeutrAvidin beads using a phosphine-biotinylation reagent that probed for azides in the DENV envelope protein. A fluorescent secondary antibody was then employed to verify that the primary antibody-to-viral protein interaction was successfully pulled down onto the beads. Currently, we are optimizing the conditions of the bioorthogonal strategy as means of identifying protein interactions with DENV. In the future, we plan to progress to identifying protein interactions in DENV-infected mosquitoes.



CUSTOM OCT-ENDOSCOPE SYSTEM FOR *IN VIVO* MOUSE COLON IMAGING

RYAN NOLCHEFF, JENNIFER BARTON

Optical coherence tomography (OCT) is a rapidly developing method of imaging for cancer research and is significant for a couple of reasons: first, it can create high resolution (on the order of microns) 3D mapping of a tissue sample with minimal – if any – invasive cutting into the tissue. This small scale resolution is advantageous for observation of some of the earliest signs of cancer. Second, OCT can use infrared or near-infrared light, which is a marginally harmless wavelength range that minimize scattering with tissue interactions. The conjunction of a custom endoscope for mouse colon imaging and the Thorlabs OCS1050SS swept-source OCT system designed previously by a former colleague (Dr. Weston Welge) allowed for *in vivo* imaging specifically for mouse colon. The integration of both a rotational and linear motor that are programmed to respond to the electrical signals controlling the mirrors in the OCT system created a helical scanning pattern from the endoscope. The implementation and improvement of an inverting differentiator and rectifying circuit and an Arduino Uno minimized the delay between the OCT system's data acquisition period and the mechanical movement of the motors. Because the dispersion between the custom endoscope and the OCT system are not matched, a MATLAB numerical dispersion compensation algorithm developed previously in lab must be used on the initial image to improve overall resolution. The system provides images with an approximate lateral and axial resolution of 10-15 μ m and a depth of 1.5-2mm, however this is dependent on the wavelengths used and the optics in the endoscope. Funding was provided by National Institute of Health/National Cancer Institute R01CA109385 and P30CA023074.

ULTRASOUND EVALUATION OF THE MECHANICAL PROPERTIES OF THE POSTERIOR TIBIAL TENDON IN PATIENTS WITH ADVANCED TENDINOPATHY

ANDRES NUNCIO ZUNIGA, HANNAH SCHMITZ, ALEX LIM, SCOTT KLEWER, JOHN SZIVEK, MIHRA TALJANOVIC, L. DANIEL LATT, RUSSELL WITTE

Posterior tibial tendon dysfunction (PTTD), commonly observed in women above age 40, is a condition characterized by weakness in the posterior tibial tendon which leads to flatfoot deformity. PTTD is treated with either immobilization or surgery followed by physical rehabilitation. The purpose of this study is to develop a quantitative and objective method to characterize the mechanical properties of the posterior tibial tendon *in vivo*. The ongoing study is comparing properties of the PTT in patients with advanced tendinopathy (pre- and post- physical therapy) with that of healthy volunteers.

Subjects sit on an elevated platform with their foot on a platform with $\sim 30^\circ$ plantar flexion and asked to push against a force transducer by inverting their foot and keeping the heel motionless. A sonographer captures ultrasound movies (phase and amplitude) of the PTT at 50 Hz as the foot inverts. A 2D phase-sensitive cross correlation speckle tracking algorithm calculates the 2D displacement of the tendon. Based on the gradient of the displacement maps, strain images of the PTT are formed. In combination with data from the force plate, the elastic modulus of a PTT can be calculated at the vulnerable region above the malleolus.

Based on preliminary data, elastic moduli of patients with tendinopathy tend to be higher than those of healthy patients. For example, one patient had a tendinopathic left tendon with $E=0.7\pm 0.63$ and a healthy right tendon with $E=0.045\pm 0.019$ whereas a healthy patient had moduli for the left and right, respectively, $E=0.037\pm 0.013$ and $E=0.005\pm 0.014$. We have also found that the linear correlation between stress and strain used to compute these moduli is generally greater in healthy patients. The tendinopathic patient had R^2 for the left and right, respectively, $R^2=0.64\pm 0.06$ and $R^2=0.59\pm 0.28$ whereas the healthy patient had R^2 for the left and right, respectively, $R^2=0.85\pm 0.15$ and $R^2=0.54\pm 0.24$. We have seen this trend of lower elastic moduli and greater correlation between stress and strain in healthy tendons compared to tendinopathic ones across consistently across many trials.

A noninvasive and quantitative method that accurately characterizes weak tendons could help determine which PTTD should be treated with conservative immobilization therapy or surgery.

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ALTERED METABOLISM IN A TDP-43 MODEL OF ALS IN *DROSOPHILA*

ABIGAIL O'CONNER, ERNESTO MANZO, SYLVIA ZARNESCU, DANIELA ZARNESCU

ALS, or amyotrophic lateral sclerosis, is a fatal progressive neurodegenerative disease for which there is currently no cure. Several genes have been linked to ALS, including TDP-43, C9ORF72, and SOD1. While only 2-3% of ALS cases harbor mutations in the RNA binding protein TDP-43, more than 95% of patients exhibit TDP-43 positive cytoplasmic inclusions. A *Drosophila* model of ALS using both wild-type and mutant TDP-43 expression has been shown to recapitulate several pathogenic hallmarks of the disease, including motor dysfunction and decreased survival.

Because metabolic changes have been seen in ALS patients, we have investigated whether similar defects are also present in our fly model. Indeed, metabolomics studies show that, as in ALS patients, flies expressing TDP-43 in motor neurons exhibit a significant increase in pyruvate, the end product of glycolysis, and alterations in the TCA cycle. Using a larval locomotion assay which quantifies differences in locomotor function, we have tested the effects of dietary changes on larvae expressing TDP-43 in motor neurons or glia.

Increased dietary glucose appears to alleviate motor dysfunction in wild-type and mutant larvae (both in motor neuronal and glial expression), while also increasing survival time in adult flies. These phenotypic improvements were also seen in C9ORF72

and SOD1 expressing larvae. Consistent with these dietary findings, coexpression of the glucose transporters GLUT4 or GLUT3 in addition to TDP-43 shows a similar improvement in motor function, both in the TDP-43 wild-type and mutant larvae.

Additionally, the introduction of different fats into the diet of larvae expressing TDP-43 in motor neurons appears to also improve motor function at specific dosages. Taken together, these data suggest that the TDP-43 based fly model of ALS experiences specific alterations in metabolism that parallel the changes seen in patients and offer novel strategies for therapeutic and dietary intervention for ALS.

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EFFECTS OF NRF2 LOSS ON THE REGENERATIVE FUNCTION OF NEURAL STEM CELLS IN THE DEVELOPING HIPPOCAMPUS OF NEWBORN MICE

FAYE ORTIZ, S. RAY, A. RODDEY, M.J. CORENBLUM, AND L. MADHAVAN

Our recent work has examined the temporal and molecular dynamics of neural stem progenitor cell (NSPC) function in the subventricular zone (SVZ) of aging animals (Corenblum et al., 2016). These studies identified a critical time-period during middle-age (13-15 mos), when a marked reduction in NSPC survival and regenerative capacity occurred, and determined the reduced expression of the redox-sensitive transcription factor, nuclear factor (erythroid-derived 2)-like 2 (Nrf2), as an important mechanism underlying this phenomenon. Given these findings, we are currently analyzing whether Nrf2 might also play a role in regulating the regenerative capacity of NSPCs residing within the other major mammalian germinal niche, the dentate gyrus (DG) of the hippocampus. More specifically, in this study, we characterized NSPCs in the hippocampi of newborn (N) Nrf2 knockout (KO, Nrf2^{-/-}) and wild-type (WT, Nrf2^{+/+}) mice. Briefly, brains were extracted and sectioned on a cryostat and immunohistochemistry targeting specific NSPC antigens was performed. In particular we studied the expression of Ki67 (NSPC proliferation marker), Sox2 (type B and C NSPC marker), Doublecortin (DCX, newborn neuron marker), and Glial Fibrillary Acidic Protein (GFAP, type B NSPC and glial cell marker) at this developmental stage. It was observed that while we noted protein expression typical in newborn mice in WT samples, there was a decrease in expression of Ki67, Sox2, and DCX. There was no noticeable change between GFAP expression in WT and KO mice. We are currently quantifying the expression of the four NSPC antigens, and we are analyzing adult cohorts of Nrf2 KO animals to understand the influence of Nrf2 on aging DG NSPC function. So far, our results indicate that Nrf2 may be a potentially important factor influencing the proliferation and neurogenic capacity of DG NSPCs.

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REGULATION OF LATERAL ROOT GROWTH IN *ARABIDOPSIS THALIANA*

DANIEL OSORIO, FRANS E. TAX

Plants employ long-distance signaling as a mechanism of communication between the shoot and the root system. These long-distance signals convey the nutritional status of the environment, such as the availability of nitrogen in the soil, and allow plants to optimize their growth and energy expenditure under suboptimal conditions. C-terminally Encoded Peptides (CEPs) and CLAVATA3/Embryo Surrounding Region-related (CLE) peptides are two types of small-secreted peptides that participate in the two currently known pathways of peptide-mediated long-distance signaling in *Arabidopsis thaliana*. CEPs function by binding C-terminally Encoded Peptide Receptors (CEPR1 and CEPR2), whereas CLE peptides bind to the CLV1 receptor. The purpose of this study is to characterize the relationship between the CEP- and CLE-mediated pathways of lateral root regulation in *Arabidopsis*.

To accomplish this, we screened for *cepr1* (*xip1*), *cepr2*, and *clv1* double and triple mutant plant specimens and performed genetic interaction analyses. The anticipated result of this project is the categorization of the CEP- and CLE-mediated signaling mechanisms as acting in the same genetic pathway or as being part of two separate pathways. The outcome of this project may have major implications for crop yield efficiency and other agricultural aspects of plant growth. Funding was provided by the NIH through the MARC Training Grant T34 GM08718 and by the NSF grant IOS 1257316.



THE ART OF DATA VISUALIZATION FOR DIABETIC FOOT ULCER RESEARCH THROUGH FRONT AND BACK END DEVELOPMENT

KATIE PAN, JACOB GARLANT, MARVIN SLEPIAN, DAVID ARMSTRONG

Diabetes is the leading cause of non-traumatic extremity amputations in the United States and it is the seventh leading cause of death in the United States in 2010. 15% of those cases will result in a patient developing a diabetic foot ulcer. A diabetic foot ulcer is an open sore or wound that is commonly located on the bottom of the foot. Of those who develop a foot ulcer, 6 percent will be hospitalized due to infection or other ulcer-related complication. Luckily, research has shown, however, that development of a foot ulcer is preventable. With the rise of computer science and programming, research labs are now utilizing the front and back end software development to simplify data analysis and data visualization techniques.



INVESTIGATING THE NEUROLOGICAL BASIS FOR DIVISION OF LABOR IN ANTS

WESLEY PARKS, NICOLE FISCHER, ANNA DORNHAUS, WULFILA GRONENBERG, ALEXIS MORRISON

Most organisms exhibit differences in their behavior. The social hymenoptera-(ants, bees, and wasps)-have a distinct system of behavioral differences within the colony, known as division of labor. In this system, individuals tend to devote a substantial amount of time to certain tasks resulting in 'specialists' within the colony. Another type of division of labor exists in overall activity level, with some workers doing most of the work and others performing none at all. It is still largely a mystery as to how division of labor arises. Much of the research in this area focuses on polymorphic species which have behavioral castes based on differences in body morphology. In the brown rock ant *Temnothorax rugatulus*, individuals within the colony are monomorphic (i.e. have limited differences among each other in body morphology). We are interested in a neurological basis for the behavioral differences between individuals in this species. Specific areas of interest include the volume of sensory processing areas in the central nervous system of the ants, mainly the antennal lobes and mushroom bodies, and their relation to activity levels. In this study, we aim to discover if more active ants in the colony have larger volumes of sensory processing areas relative to the less active individuals. To test this, each individual is tracked to measure the proportion of time they allocate to each task. To measure relative brain volumes of the antennal lobes and mushroom bodies, the brain of each ant is then preserved, dissected, and imaged using confocal microscopy. The behavior data is compared to the volume of the sensory processing areas to examine the relation between division of labor, specifically activity level, and the central nervous system.

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EFFECT OF FXR1 EXPRESSION ON CARDIAC HYPERTROPHY

PARTH PATEL, MIENSHENG CHU, CAROL GREGORIO

Cardiac hypertrophy is the thickening of the myocardium of the heart, enlarging the heart walls. Cardiac hypertrophy can be induced by a number of pathological and non-pathological events. What distinguishes the two events is not a well-studied process. The process of cardiac hypertrophy appears to be affected by FXR1 protein expression such that lower FXR1 expression modulates the hypertrophy pathway in some way causing less cardiac hypertrophy. Alternatively, increased FXR1 expression results in increased cardiac hypertrophy. The Fragile X family of RNA binding proteins are often studied within the scope of mental retardation and autism. However according to current findings, FXR1 may serve to modulate the hypertrophy pathway. Cardiomyocytes were isolated from neonatal rat hearts and cultured. Using transduction, FXR1 was either overexpressed or knocked down in cells. Between five different cultures, FXR1 overexpressed cells displayed a significant size decrease when compared to control cells and FXR1 knockdown cells displayed a significant size increase when compared to control cells. Translational activity may also be affected by FXR1 expression. SUnSET analysis is currently in use to determine the manner in which translational activity in the cell is altered by FXR1. Further cell size and protein analysis studies are in progress to continue to elucidate specifically how FXR1 modulates cardiac hypertrophy.

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QUANTIFYING THE RELATIONSHIP BETWEEN DIVISION OF LABOR AND THE PERIPHERAL NERVOUS SYSTEM IN TEMNOTHORAX RUGATULUS ANTS

VARUSKA PATNI, NICOLE FISCHER, ANNA DORNHAUS

Eusocial hymenoptera (e.g. ants, wasps, bees) have division of labor, a system in which individual ants in a colony specialize in different tasks, and each task is completed by the same set individuals. Here, we explore how differences in the nervous system among workers drive this task specialization. A leading mechanism in studies on division of labor proposes that task specialization arises because individual workers have different response thresholds to these task-related stimuli. Currently, there is little empirical evidence for how the nervous system gives rise to response thresholds. Here, we test the hypothesis that variation in the elaboration of the sensory organs underlies response thresholds and thus task specialization. Using *Temnothorax rugatulus* ants, task specialization, response threshold to brood and sensory organ elaboration was quantified for each worker. If our hypothesis is supported we expect that ants specializing in a particular task, such as foraging, will feature more elaborate sensory organs and lower response thresholds to brood. We hypothesize that higher sensilla amount indicates higher sensory processing and thus lower response threshold and a more specialized task. Various subjects' sensilla hair will be compared in order to come to a conclusion. The source of funding for this project was NSF GRFP # DGE-1143953.



EPIGENETIC MODULATION OF SYNAPTIC PLASTICITY IN MOUSE AUDITORY CORTEX

GENEVIEVE PATTERSON, STELLA ZHANG, SHAOWEN BAO

An organism's experiences strongly shape the way that sensory information is represented in the brain, especially experiences in early development. For example, mice repeatedly exposed to sounds at a particular frequency early in development have an increased area of auditory cortex devoted to responding to sounds at that frequency. This early developmental period of heightened sensitivity to environmental stimuli is known as the critical period and is characterized by heightened synaptic plasticity. Gene expression can influence synaptic plasticity; therefore it is possible that drugs altering gene expression could influence synaptic plasticity in auditory cortex. To analyze this question adult wild type mice were exposed to 16kHz sound pips while simultaneously injecting them with saline, for 9 days. Then after a one-day rest period we mapped the auditory cortex of the mice. This process will be repeated with mice injected with HDAC inhibitors, or DNA methylation inhibitors (both of which

are drugs known to alter gene expression). Preliminary results show that the mice exposed to saline injections show normal mapping of frequencies in auditory cortex. Data collection is still in process however if the epigenetic modulators increase plasticity, we would expect to find altered frequency representations in the auditory cortex of mice injected with HDAC inhibitors and DNA methylation inhibitors.

The Neuroscience and Cognitive Science Summer Research Program supported Genevieve Patterson in this research.



ELUCIDATING THE MECHANISMS OF OBJECT PERCEPTION

DIANA PEREZ, SARAH M. COOK, MARY A. PETERSON

Can prediction of an upcoming object affect how it's perceived? In particular, can the perceived sharpness of an object's borders be increased when it is predicted? We assessed the Point of Subjective Equality (PSE), the point at which two stimuli with borders that vary in blur are perceived as equally sharp. Participants viewed two small, enclosed black silhouette objects on a gray background in a psychophysical procedure in which a Test object varied in blur, from low to high levels across trials while another object, the Standard, was held at a constant medium blur value. We manipulated predictions on each trial by presenting a briefly exposed masked word prime outside of conscious awareness before the object display; the word was related or unrelated to the Test object. The left/right location of the Test and Standard objects varied across trials; each object served as Standard and Test equally often. Participants' task was to report which object – left or right -- was blurrier. In Experiment 1, the stimuli were two familiar objects (a butterfly and a bow). In Experiment 2, one object was familiar (a table lamp); the other was a matched novel object created by rearranging the parts of the familiar object. Neither experiment revealed an effect of word prime. Thus, no effect of prediction on perceived sharpness was observed. However, in both experiments one of the objects was perceived as sharper than the other (Experiment 1 = the bow; Experiment 2 = the familiar object). In both experiments, the objects perceived as sharper had a greater intrusion from the outside, groundside, along their borders than the other object. Hence, these results may indicate that the perceived sharpness of an object's borders is a function of the amount of inhibitory competition for object status, which is greater when there is more intrusion from the groundside. A third experiment is testing this hypothesis. These findings are consistent with claims that, rather than being a winner-take-all mechanism, the amount of inhibition of the groundside depends on the amount of competition for object status. Thus, these results elucidate the competitive mechanisms underlying object perception.



EXAMINING THE CAUSE OF CELL DEATH IN MUCOLIPIDOSIS TYPE IV

SAVANNAH PERNO, HOPE DANG, HANNA FARES

Mucopolipidosis Type IV is a lysosome storage disorder in humans characterized by slowed psychomotor development, vision loss, and early death. Mucopolipidosis Type IV (ML4) is caused by mutations in the gene MCOLN1, which encodes the cation channel TRPML1. CUP-5 is the *Caenorhabditis elegans* orthologue of TRPML1. Our imaging studies have shown that loss of CUP-5 in *C. elegans* results in a strong lysosomal defect that leads to cell death and embryonic lethality. Using confocal imaging, we detected lysosomal leakage into the cytoplasm of degradative enzymes that may be the basis for the cell death. The goal of this study is to develop a biochemical assay to quantitate lysosomal leakage in wild type embryos and in the absence of CUP-5. We would then use this assay to determine whether genetic suppressors of cup-5 mutant cell death also suppress lysosomal leakage, thus establishing a correlation between lysosomal leakage and cell death. Defining the basis for the cell death in the absence of CUP-5 is an important step for developing therapies for Mucopolipidosis Type IV.

Funded by the NSF.

ARSENIC AND LINE-1 DISRUPT DEVELOPMENTAL EPITHELIAL TO MESENCHYMAL TRANSITION: IMPLICATIONS FOR CARDIAC MORPHOGENESIS

ALEC PERRERA, TIANFANG HUANG, PASANO BOJANG, MARCO TAVERA-GARCIA, ELSA M. REYES-REYES, KENNETH S. RAMOS,
TODD D. CAMENISCH

Chronic exposure to arsenic is linked to increased risk for cancers of the lung, kidney, bladder, and liver. Non-cancerous disease endpoints such as atherosclerosis, birth defects, metabolic syndrome and hypertension are also associated with arsenic exposure. Many of the organ systems impacted by arsenic require epithelial to mesenchymal cell transition (EMT) to establish and maintain tissue homeostasis. For example, developmental EMT contributes to lung, neural tube and heart morphogenesis. As such, disruption of EMT programming by arsenic can result in birth defects and predispose to diseases later in life. The mechanisms by which arsenic disrupts EMT is not known. Long interspersed element 1 (LINE-1 or L1) is a retrotransposon of the human and mouse genomes, and recently linked to conotruncal heart defects. Such defects arise from malformation of the outflow tract of the embryonic heart through altered EMT. In the present study, we discovered induction of Line-1 by arsenic and investigated whether Line-1 impacts cardiac developmental EMT. An increase in ORF-1 and ORF-2 Line-1 mRNAs was detected, starting 2 hr after exposure to arsenic and peaking at 8 hr. Line-1 protein is also increased following arsenic exposure with increased dose-dependent localization of Line-1 in the nuclear compartment. Furthermore, the transcriptional activity of Line-1 was induced by arsenic in a time and dose dependent manner. Lastly, using a unique mouse genetic model we found that ectopic Line-1 expression functionally attenuated cardiac EMT in an ex vivo collagen gel invasion assay. On the bases of these findings we conclude that arsenic and Line-1 block developmental EMT.

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SIZE MATTERS: HOW EXPOSURE TO HUMIDITY AND VARYING COLONY SIZE AFFECT *TEMNOTHORAX RUGATULUS* NESTBUILDING BEHAVIOR

JENNA PIMENTEL, ANNA DORNHAUS, NICHOLAS DIRIENZO

Previous studies have found that each ant colony possesses its own unique nest architecture, explained best by differences in colony behavior. Because these observations were given mostly by field studies, environmental factors may also play a role in nest architecture. Given the potentially drastic evolutionary consequences with both interactions, it is important to conduct an experiment to identify a significant relationship between ant intercolonial traits and nest architecture, and between environmental conditions and ant nest architecture. In this experiment we use several colonies of *Temnothorax rugatulus* ants to establish a variation in number of brood and number of workers. We followed the repeated measures design by transferring the colonies into new nest building arenas every twelve days, and controlling the experimental conditions for each nest. Colonies were transferred a total of three times so that they were forced to build four different nests. Two of these nests were covered and two were uncovered, imitating environmental humidity and good airflow, respectively. Statistical analyses of data indicate a positive correlation between worker number and wall length, nest weight, and internal area, as well as no correlation between these variables and brood number (the p-value for brood number v. internal area shows weak correlation, but this is thought to be indicative of spatial accommodation for a larger colony population rather than of certain brood behavior, so the value is determined to be insignificant for the purposes of this experiment). This may follow the general idea that ant nests are built longer and stronger because of the greater amount of worker resources available to the colonies. Furthermore, a significant difference was found between the two means for covered and uncovered arenas, indicating that there may be a tendency for ants to invest more time and energy into building longer and thicker nest walls under conditions of greater humidity as opposed to lesser humidity.



SEMI-AUTOMATED QUANTIFICATION OF *TOXOPLASMA* – CNS HOST CELL INTERACTIONS
COLIN POTTER, OSCAR A. MENDEZ, THOMAS BELLO, MICHAEL VALDEZ, ELIZABETH G. FERNANDEZ, THEODORE P. TROUARD, ANITA A. KOSHY

Toxoplasma gondii is an obligate intracellular parasite that establishes a chronic infection in the central nervous system (CNS) of many mammals, including humans and mice. While asymptomatic in most, the persistent CNS infection can be fatal in immunocompromised patients and is present in up to a third of the world's population. Despite this prevalence, *Toxoplasma* – CNS interactions are poorly understood. Recent studies have indicated that cysts localize to specific regions of the brain, and behavioral outcomes have been connected with these localizations. In an effort to further investigate the *Toxoplasma* – CNS interaction, we took advantage of our *Toxoplasma*-Cre system, which allows us to permanently mark and identify CNS cells that have directly interacted with parasites. In this system, we infect Cre reporter mice with parasites that have been engineered to secrete a *Toxoplasma*:Cre recombinase fusion protein into host cells, thus only cells that have been injected with *Toxoplasma* protein will undergo Cre-mediated recombination and express ZsGreen, a fluorescent protein. This system offers a novel method to visualize specific cells that have interacted with *Toxoplasma* and investigate behavioral outcomes of this interaction. To quantify regions of interaction, we immunohistochemically label the ZsGreen positive cells (ZsG+), then detect and map the neuroanatomic location of ZsG+ cells with a custom MATLAB-based semi-automated computer program. To verify this semi-automated method, we assessed both inter- and intra-operator error, which revealed consistency, reliability, and accuracy between trained operators and counting sessions. To date, we have analyzed infected tissue from mice infected with 2 different *Toxoplasma* strains for 3 and 8 weeks each. Our preliminary data suggest that, in CNS infection with either strain and at both time points, *Toxoplasma* parasites primarily interact with cortical and striatal neurons, which is seen both in the absolute number of ZsG+ cells and when normalized based on regional area to account for random distribution. These data indicate that *Toxoplasma* may have a higher affinity for specific brain regions and potentially for specific neuronal subtypes. Future investigation using co-localization of ZsG+ cells with neuronal subtype markers and behavioral testing will aid in elucidating the nature of *Toxoplasma* – CNS host cell interactions.

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THE ROLE OF HIPPOCAMPAL REPLAY IN A COMPUTATIONAL MODEL OF PATH LEARNING
MICHAEL RAGONE, S. GIANELLI, D. SCHWARTZ, L. SU, O.O. KOYLUOGLU, J.M. FELLOUS

This work was presented at the Society for Neuroscience Conference in San Diego, November 2016. The abstract from this conference can be found here: <http://www.abstractsonline.com/pp8/index.html#!/4071/presentation/9817>



AGING OF DENTATE GYRUS NEURAL STEM CELLS: RELEVANCE TO NRF2
SNEHA RAY, M.J. CORENBLUM, D.D. ZHANG, C.A. BARNES, L. MADHAVAN

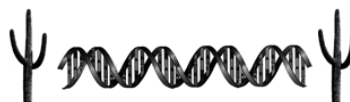


A NEW SELF-GUIDED REHABILITATION TASK DESIGNED TO REDUCE SOMATOSENSORY SENSITIVITY AND IMPROVE COGNITIVE PERFORMANCE FOLLOWING EXPERIMENTAL TBI

JENNA RITCHIE, LOREN M LAW, DANIEL R. GRIFFITHS, THERESA C. THOMAS, JONATHAN LIFSHITZ

Traumatic brain injury (TBI) is not a transient event from which all people recover; the resulting damage can evolve into neurological disease. In rats, TBI disrupts circuits, expressed as cognitive impairment and sensitivity to whisker stimulation. The current study sought to establish a rehabilitation task targeting somatosensory and cognitive functions. The task takes place in a box with a peg board floor (24X24) that allows for 3 plastic pegs to be inserted at 1 inch intervals anywhere across the board. The configuration of pegs promotes whisker stimulation as rats explore the environment. To test feasibility of this approach, a pilot study was conducted by exposing rats to navigate through increasingly denser peg configurations as rehabilitation for TBI. Rats received sham or midline fluid percussion injury. Rats explored the peg-filled arena for 12 days over 2 weeks (or served as caged controls) and then tested for whisker sensitivity and working memory. Brain-injured rats that received rehabilitation showed sensory sensitivity levels similar to sham, while injured rats without rehabilitation showed elevated sensitivity. When tested on working memory using temporal object recognition, the injured rats without rehabilitation showed significant memory impairment compared to sham rats ($t(3)=5.22, p<0.05$). Injured rats that received rehabilitation performed at similar levels to sham rats and improved performance compared to injured rats without rehabilitation ($t(3)=2.56, p=0.051$). These exploratory results indicate that following a TBI, the self-guided rehabilitation through a forest of pegs reduced whisker sensitivity and cognitive impairment. Guided by this pilot, a study is underway to determine the benefits of self-guided rehabilitation compared to open field exploration over the course of 2 weeks in sham and injured rats. Efficacy is evaluated on a battery of behavioral tests, with primary endpoints on cognitive performance evaluated in object recognition tasks. We approach rehabilitative treatments for TBI as amenable to clinical translation to improve quality of life.

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AMMONIA-OXIDATION MICROBIOTA ABUNDANCE ON AN ARID MINE SITE

BENJAMIN RIVERA, LYDIA JENNINGS, CATHERINE F. GULLO, RAINA M. MAIER, JULIA W. NEILSON

Mining is inextricably linked to the daily practices of the industrialized world as most of our modern tools and technologies contain metals which can be obtained from no other source. Notwithstanding, mining presents a host of environmental issues, including significant landscape disturbance resulting from the massive waste rock piles and tailings storage dams produced by mine operations. These waste materials are devoid of nutrients for plant growth, making ecosystem reclamation difficult. Reclamation typically requires costly revegetation strategies including the regrading of steep slopes and the installation of soil caps over waste materials. Our lab seeks to provide biogeochemical indicators which can be used to evaluate substrate quality to assist mining companies in effectively assessing different reclamation strategies.

Nitrogen (N) is one nutrient factor limiting plant establishment on mine wastes. The preferred form for plant-uptake, nitrate (NO_3^-) is obtained from ammonia (NH_4^+) through nitrification, a process mediated by microbes. Specifically, the first, rate-limiting step, ammonia-oxidation to nitrite (NO_2^-), is facilitated by chemoautotrophic ammonia-oxidizing bacteria (AOB) and archaea (AOA). The bacterial and archaeal *amoA* gene, encoding the ammonia monooxygenase enzyme (AMO), that facilitates the chemical transformation, is used as a molecular marker to quantify the populations of these organisms. We hypothesize that the relative abundance of AOB and AOA populations will indicate substrate quality for plant growth.

AOA are frequently found to be the dominant ammonia-oxidizers in nutrient poor sites. This study will construct clone libraries of archaeal *amoA* amplicons from the Carlota Copper Mine to evaluate AOA diversity. Representative plasmids will then be selected as standards to be used with existing AOB standards for quantitative PCR to determine the relative abundance of AOA and AOB populations as well as possible correlations with environmental parameters, shown to drive population dynamics. The results will be used to propose a follow-up study on activity, as the presence of the gene does not always equate to expression.

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ROLE OF OPIOID-SENSITIVE DESCENDING PAIN MODULATORY PATHWAYS IN AFFECTIVE AND SENSORY COMPONENTS OF CHRONIC PAIN IN RATS

DAGOBERTO ROBLES, LUSINE GOMTSIAN, EDITA NAVRATILOVA, FRANK PORRECA

Pain is a complex, multidimensional experience that is composed of sensory, affective and cognitive features. For unknown reasons, in some individuals, pain may become chronic. Unfortunately, there are no cures for chronic pain. Opioids remain one of the most important classes of drugs to treat pain but whether they are useful in chronic pain remains uncertain. Additionally, these drugs have significant side effects including tolerance, dependence and addiction. As a result, there is an urgent medical need to elucidate the underlining mechanisms by which relief of pain occurs. Opioids produce their effects primarily by alleviating the aversive qualities of pain. How this occurs is not known but pain aversiveness is thought to be integrated, in part, in the anterior cingulate cortex (ACC). Cortical regions in the brain likely contribute to context dependent modulation of the pain experience through projections that ultimately converge on the the rostral ventromedial medulla (RVM). Here, we determined the effects of microinjection of morphine in several regions of the rat ACC in rats with chronic experimental neuropathic pain induced by ligation of the spinal nerve (SNL model). The possible effect of ACC or RVM morphine on mechanical hypersensitivity was evaluated using von Frey filaments. Microinjection of morphine into different sites of the ACC failed to reverse mechanical hypersensitivity in nerve injured animals. In contrast, morphine injection in the RVM reversed evoked thresholds in SNL animals. These findings suggest that morphine may differentially modulate affective dimensions of pain within the ACC without altering sensory components. The primary goal of this research is to understand the nature of the neuroanatomical contributions of the ACC and its role in descending pain modulatory pathways. Further studies exploring other sites within the ACC with measures of affective qualities of pain may ultimately lead to a better understanding of opioid-sensitive circuitry.



CRMP2 EXPRESSION AND PHOSPHORYLATION CONTROLS GLIOBLASTOMA PROLIFERATION

DENISE "LEX" SALAS, AUBIN MOUTAL, RAJESH KHANNA



METHODS TO QUANTIFY DIVERSE MICROGLIA MORPHOLOGIES IN THE HEALTHY AND INJURED BRAIN

SERGIO SALGUERO, KIM YOUNG, JONATHAN LIFSHITZ, HELENA MORRISON

Microglia—the brain macrophage—are highly ramified cells in the healthy brain. This is a morphology that is necessary to maintain a variety of neuronal and glial physiologic functions. Moreover, microglia have an immediate morphologic response to injury. The level of ramification and complexity of microglial shapes change in order to accommodate a change in microglia function (from surveillance to phagocytosis). As such, microglia morphologies reflect their cell function as well as the health-status of the cells in their micro-domains. We postulate that microglia morphology could be used as a biomarker of brain physiology/pathophysiology. The objective of this study was to determine the usefulness of computer-aided methods to quantify microglia morphologies in physiologic and pathologic conditions. Adult male and female (estrus, diestrus, and accelerated ovarian failure) mice were euthanized to study microglia morphology in the physiologic brain (N=9-19/group). In addition, experimental diffuse brain injury (DBI) was delivered to adult rats using a fluid percussion method. Rats recovered for 1, 7 and 28 days post-injury (or sham) prior to tissue collection (N=3). In both studies, microglia ramified morphology and complexity of shape were quantified from photomicrographs imaged from cortical brain regions after immunohistochemistry. ImageJ plugins were used to quantify cell ramification (AnalyzeSkeleton(2D/3D)), complexity. and shape (FracLac). We reveal morphologic differences in the healthy brain according to sex, cycle, and ovarian function (skeleton analysis: $F_{(3,49)}=15.48$, $p<0.0001$ and fractal analysis: $F_{(3,49)}=5.11$, $p=0.0038$). In addition we illustrate a spatial-temporal change in microglia ramification (time: $F_{(3,24)}=33.67$, $p<0.0001$; region: $F_{(2,24)}=6.56$, $p=0.005$), complexity (time: $F_{(3,24)}=2.99$, $p=0.05$; region: $F_{(2,24)}=84.07$, $p<0.0001$) and shape (time: $F_{(3,24)}=10.43$, $p=0.0001$; region: $F_{(2,24)}=43.15$, $p<0.0001$) in the 28 days following DBI. Four clusters of microglia morphologies emerged post-injury: ramified, ramified/hyper-complex, de-ramified, and de-

ramified/rod morphologies. We present multiple, easy-to-employ, and highly sensitive computer-aided methodologies (skeleton analysis and FracLac) useful in quantifying microglia morphologies in the healthy and injured brain. We expect that such analysis methods will be valuable tools to not only link microglia form and function but also in the use of microglia morphology as a biomarker of brain physiology/pathophysiology. This research is funded in part by NIH grant R25-E5025494.



EVALUATION OF DRUG X IN PRECLINICAL MODELS OF PARKINSON'S DISEASE

GRACE SAMTANI, ANDREW J. FLORES, MITCHELL J. BARTLETT, SCOTT J. SHERMAN, FRANK PORRECA, TORSTEN FALK

Paralysis agitans, commonly referred to as Parkinson's disease (PD), is a hypokinetic, age-related movement disorder associated with chronic, progressive degeneration of dopaminergic neurons, which have cell bodies located in the substantia nigra pars compacta (SNc) and axon terminals in the striatum. Striatal depletion of the neurotransmitter dopamine (DA) gives rise to the cardinal motor symptoms of PD, which include bradykinesia, resting tremor, postural instability, and muscular rigidity. Here, we utilized a 6-hydroxydopamine (6-OHDA) animal model of PD to test the application of a preclinical drug candidate, drug X, in ameliorating and/or preventing advanced parkinsonism in two main studies. Our PD animal model was created by unilaterally administering the neurotoxin 6-OHDA into the dorsolateral striatum of Sprague-Dawley rats, which has been shown to cause selective degeneration of DAergic neurons in the SNc. The first investigated study, a neurorestoration study, sought to test the efficacy of drug X in restoring motor functionality to animals in which the 6-OHDA lesion had fully developed, while the second study, a neuroprotection study, assessed the effectiveness of drug X in preventing the initial development of the 6-OHDA lesion and the associated onset of motor impairments. Preliminary behavioral data indicate that there are no significant differences between the control and drug X groups in both studies, suggesting that this particular drug candidate does not improve established PD motor deficits nor prevent their initial development. However, we are analyzing brain tissue harvested from both studies to 1) verify the presence of a 6-OHDA lesion with stereology in the SNc, 2) to evaluate striatal dopamine levels, and 3) to investigate any neuroprotective effects of drug X on nigral DAergic neurons. Pending the results of these analyses, we may seek to evaluate the effects of drug X in a preclinical rodent model of levodopa-induced dyskinesia (LID) in future studies. Funding for this research was provided by the NSCS Summer Research Program, the Department of Neurology, and the Department of Pharmacology at the University of Arizona.



DYNAMIC MODEL TO OPTIMIZE ULTRASOUND ELASTICITY IMAGING OF HUMAN TENDON FOR ASSESSMENT OF ADVANCED TENDINOPATHIES

HANNAH SCHMITZ, LIANG GAO, ANDRES NUNCIO ZUNIGA, CINDY FASTJE, MIHRA S. TALJANOVIC, DANIEL LATT, RUSSELL S. WITTE

Tendinopathies can be debilitating and interfere with basic daily activities. To prevent such progression, there is need for better diagnostic methods to quantify severity and guide treatment decisions. Functional ultrasound elasticity imaging (fUEI) is an *in vivo* technique for estimating mechanical properties of tendon. In fUEI, ultrasound frames are collected as a subject performs a voluntary motor task to dynamically load the tendon (or muscle), while a force transducer measures force. Ultrasound speckle tracking is then applied across several ultrasound frames to estimate strain. This approach allows for calculating the linear and nonlinear elastic behavior of tendon, which may change with disease progression. We are currently evaluating fUEI in patients with posterior tibial tendon (PTT) disorder; however, in an *in vivo* setting, it is difficult to assess the method's accuracy and sources of error. The purpose of this work was to develop an ultrasound model of human tendon to study possible error sources for tracking tendon motion and estimating its mechanical properties.

A 3D ultrasound model of the human PTT was developed in FOCUS™ simulation software and Matlab™. The tendon was modeled as a cylinder with a diameter of 4.5 mm and a speckle density of 52 scatterers/mm³. A 14 MHz hockey stick linear ultrasound array with parameters similar to that implemented during *in vivo* experiments was used to produce simulated ultrasound data. The tendon was deformed according to a programmed strain profile, and ultrasound frames were generated.

A 2D phase-sensitive cross correlation speckle tracking program calculated tendon displacement and strain. We examined the effects of out-of-plane motion and strain rate on 2D tracking error as well as the programmed elastic properties of the PTT.

With no out-of-plane motion, simulations revealed that lateral strain rates between 1-5 Hz produced tracking error less than 0.5 pixels. However, with an out-of-plane motion equal to one acoustic wavelength (154 μm), tracking error dramatically increased at strain rates above 4 Hz. Out-of-plane motion of two wavelengths (308 μm) at 1% strain produced an average correlation coefficient of 0.61, whereas no out-of-plane motion had a correlation of 0.96.

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PROTEIN COMPLEX FORMATION AND C-MYC REGULATION OF PROSTATE CANCER

LEONARD SEANEZ, RONALD HEIMARK, KELSEY GUEST

Prostate cancer is one of the most prevalent cancers in men. Metastatic prostate cancer commonly shows *MYC* amplification. c-Myc is a transcription factor that contributes to the cell cycle progression, cell apoptosis and cellular transformation. MYC proteins levels are largely regulated at the level of degradation by numerous kinases which lead to ubiquitination. We have shown that c-MYC half-life is enhanced in prostate cancer cells versus in benign prostate epithelium. This stabilization of c-MYC in Du145 cells appears to be through expression of the long noncoding RNA *PVT1*. c-Myc protein plays a role in the activation of many different genes. c-Myc interacts with genes through a dimeric complex of c-Myc and Max that binds to the specific sequences of CACGTG Enhancer Box (Ebox) motifs. In addition to the known binding partners of c-Myc, Max and MYCBP, the broad association of c-Myc to chromatin is dependent on the WD40-repeat protein WDR5. WDR5 is a protein which may facilitate the formation of multiprotein complexes that are effectors of histone H3K4 methylation which is a sign of transcriptionally active chromatin. Flag-tagged WDR5 was overexpressed in Du145 cells by transfection and an anti-Flag antibody was used to co-immunoprecipitate WDR5 and associated proteins were analyzed by SDS/ PAGE and Western Blotting. The association between c-MYC and WDR5 was verified. c-Myc binds WDR5 by the MYC box IIIb motif and is an important factor in c-Myc recruitment to chromatin. We will test whether c-MYC interaction with WDR5 aids in stabilizing c-MYC from degradation by overexpression and siRNA knockdown of WDR5. This interaction between c-Myc and WDR5 could be important because it can be a target for drugs to disrupt the interaction between c-Myc and WDR5 to prevent c-Myc's downstream tumorigenic effects when it is upregulated and able to bind to DNA.



RNAI KNOCKDOWN OF *IXODES RACINUS* METABOLIC PATHWAYS

MICAH SECOR, ONDREJ HAJDUSEK



NOVEL IMPLEMENTATION OF AUTOLOGOUS FAT GRAFTING FOR IMPROVEMENTS OF GAIT, PEAK PRESSURE AND FUNCTIONALITY IN PEOPLE IN DIABETIC FOOT REMISSION: TOWARD EXTENDING ULCER-FREE DAYS

TALA SHAHIN, KAIRAVI VAISHNAV, JORDAN GARTH, ETHAN LARSON, SUBBLAN VIGNESH, DAVID G. ARMSTRONG

A major complication of diabetes, foot ulcers will affect at least one fifth of people with the disease. Half of these patients become infected and at least 20% of those infections lead to an amputation. Following often complex courses of healing, reulceration is approximately 40%, 66% and 75% at one, three and five years, respectively. Extending ulcer-free days for this population would be desirable. The use of fat grafting has been instituted by our group as a means of redistributing shear and normal stress of the foot after remission of plantar diabetic foot ulcers. The aim of this study was to determine the effectiveness of a plantar fat graft on patients with diabetic foot ulcers to assess the improvement of plantar pressure and fat pad thickness on gait, with the ultimate goal of reducing the risk of reulceration. Five feet in four patients in diabetic foot remission (ADA Foot Risk Category 3, 100% male, 55.9 ± 1.8 yr) received plantar fat grafting via abdominal liposuction to their postulcerative plantar wound. Using wearable pressure sensors (TekScan, Boston, USA), real-time plantar pressure was measured serially. Patients were instructed to walk at a self-selected speed for twenty-five meters without assistance other than their medically prescribed footwear. Changes in force and pressure were assessed preoperatively and at 2 months, postoperatively. Using a paired analysis, patients received a mean $45.4 \pm 8.0\%$ reduction in peak pressure at the site of previous ulceration following fat grafting ($p = 0.002$). A postoperative $58.0 \pm 28.3\%$ reduction in force time impulse of the site of ulceration, was also noted ($p=0.01$). Initial results of this ongoing project suggest a potential net protective effect in people undergoing plantar fat grafting/lipofilling at areas at high risk for reulceration as evidenced by plantar pressure reduction. This study was supported by a University of Arizona ACCELERATE for SUCCESS grant.



ARSENIC TOXICITY IN DUST-LADEN PARTICLES

RUBY SIERRA, SCOTT BOITANO

Arsenic is a toxic metalloid frequently found in mine tailings from Arizona. Arsenic ingestion from contaminated drinking water has been associated with increased cancer risk, lung, cardiovascular and gastrointestinal diseases. However, the effects of inhalation of arsenic laden dust are not well characterized and models predict airborne respirable dust to increase due to drier climates with increased wind. In our study, part of a larger group from the University of Arizona Superfund, we are investigating the toxicological effects of inhalation of arsenic-laden dust through cell models. The immortalized human bronchial epithelial cells used in these studies (16HBE14o- cells) originate from the epithelial lining of the human bronchi, and thus, represent the initial point of contact for inhaled dusts. Our initial experiments use an advanced high-capacity toxicity screening device, the xCELLigence real time cell analyzer (RTCA), to evaluate airway epithelial cell toxicity. We used the RTCA to compare toxicity between dust from mine tailings and control areas. 16HBE14o- cells were exposed for 24-48 hours to dusts and continually evaluated for cytotoxicity and cell-signaling toxicity. In a more targeted approach, we are now exploring the effects of mine-tailing and control dusts on tight junction proteins in the airway epithelial cells using immunocytochemistry. These proteins, allow for epithelial cells to form a sheet and thus prevent insults that enter into the airway from reaching underlying tissues. Initial findings from these two experimental approaches will be used to further in vitro and in vivo experiments that aim to develop interventions that could offset any detrimental effects of mine tailing dust. Funding was provided by UBRP, and NIH grant R25-ES025494.



AAV-MEDIATED OVER-EXPRESSION OF VEGF-B IN PINK1 GENE KNOCKOUT RATS: A BEHAVIORAL EVALUATION

BENJAMIN SILASHKI, M.J. BARTLETT, D.C.Y MULLER, C.T. TRAN, S.J. SHERMAN, T. FALK



EFFECTS ON DELTA AND THETA POWER DURING SLEEP IN LRRK2 MOUSE MODEL OF PARKINSON'S DISEASE

KIANOUSH SOOFI, JEAN-PAUL L. WIEGAND, KATHLEEN F. GIES, STEPHEN L. COWEN

The most common form of genetically-induced Parkinson's disease (PD) can be found in individuals with mutations in the leucine-rich repeat kinase 2 (LRRK2) gene. Here we used a transgenic mouse model to examine how neural activity during sleep was altered in genetic knock-ins of the LRRK2 gene. As indicated in previous work, Delta activity is increased in certain cases of idiopathic Parkinson's disease. Another previous study also indicated that Theta power was increased in idiopathic Parkinson's disease. We hypothesized that Delta power and Theta power would also be increased in the LRRK2 model. Neural signals were recorded from LRRK2 knock-in mice as they slept. They slept for two, two-hour blocks during each recording session, with recording sessions occurring in five consecutive days. Sleep was determined with position tracking, motion tracking, and in data analysis of neural signals. Preliminary data suggests that delta and theta power during sleep in LRRK2 individuals was increased when compared to controls. Delta power increased by 25.66 decibels while Theta power increased by 33.83 decibels. This increase in neural activity could provide insight into possible causes for the death of dopaminergic neurons in the substantia nigra, and may provide a potential indicator of individuals at-risk for Parkinson's Disease.



IDENTIFICATION OF *IXODES* TICK DEFENSIN ACTIVITY AGAINST *BORRELIA*

STACY SUAREZ CHAM, RYAN REGO

A live dead assay was employed to test *Ixodes* tick defensin activity against different strains of *Borrelia*. *Borrelia burgdorferi* is an obligate parasite that can infect humans with Lyme disease via an infected *Ixodes* tick. The *Ixodes ricinus* tick has been identified with many defensins (host defense peptides) which are released by the tick's innate immune response and have shown to possess antimicrobial activity. *Borrelia* may have certain plasmids and genes present on those plasmids that are crucial for protecting *Borrelia* from the action of these defensins. An infectious clone (B31-A3- *B. burgdorferi*), non-infectious clone (B31-A34 *B. burgdorferi*), *B. burgdorferi* sensu stricto (green fluorescent protein), and *B. afzelii* CB43 were tested. The defensins used from *I. ricinus* ticks include DefMT2, 3, 5, 6, and 7. The *Borrelia* strains were tested in 1 and 5 micro molar concentrations of lyophilized defensin dissolved in BSK-II media. After being incubated for 11, 15 and 16 days, *Borrelia* were counted via a live/dead assay using SYBR Green propidium iodide. *B. afzelii* and *B. burgdorferi* sensu stricto (GFP) were contaminated which may have resulted from the use of wells. The infectious strain of *Borrelia* showed the highest live percentages after being tested in *Ixodes* tick defensins. The non-infectious clone of *Borrelia* resulted in extremely low live percentages, showing that the infectious strain may have plasmids and genes present on those plasmids that are protecting it from the tick's defensins. This project was funded by the grant NIHT37MD001427.



DOXORUBICIN DOSE DEPENDENTLY ATTENUATES CYCLOOXYGENASE-2 IN FEMALE HUMAN CORONARY VASCULAR SMOOTH MUSCLE CELLS

TRINNY TAT, M. SO, N. VIJAYAVEL, P. RAMAN, J.M. DICKINSON, S. ANGADI, R. GONZALES

Doxorubicin (Dox), an anthracycline-based chemotherapeutic agent, is highly effective at reducing recurrence and mortality in breast cancer patients. However, this anti-cancer drug elicits dose-dependent cardiotoxicity. Multiple mechanisms have been implicated in its pathogenesis, one of which involves the development and progression of inflammation mediated by activation of the TLR4/NFkappaB pathway. However, we recently demonstrated that chronic in vivo Dox treatment reduced expression of the NFkappaB downstream proinflammatory mediator, cyclooxygenase-2 (COX-2), in cerebral and peripheral vasculatures isolated from ovariectomized female rats. Therefore, in the current study we tested whether Dox similarly alters vascular proinflammatory enzyme expression in the human vasculature and whether this response is dose dependent. We further investigated whether Dox alters upstream mediators of COX-2 expression by assessing levels of expression and activation of NFkappaB and an additional downstream gene product, TLR4. Primary human coronary vascular smooth muscle cells of female origin were studied at passage 6 and treated with vehicle or Dox (0.3, 1.0, and 5 μ M). Following drug treatment, cells were isolated, homogenized, and lysates (whole cell; nuclear and cytosolic) analyzed for NFkappaBp65, COX-2, and TLR4 protein levels via immunoblotting. Our results demonstrate that while total NFkappaB levels were unaffected following Dox, enhanced translocation of NFkappaB to the nucleus was observed. However, even in the presence of Dox-induced NFkappa translocation, basal expression of its downstream mediator, COX-2, was dose dependently attenuated. Similar to COX-2, a trend for a decrease in TLR4 levels was observed. Dox had no effect on cell morphology or density, as visualized via light microscopy. In conclusion, although others have suggested the involvement of NFkappaB activation during the development and progression of Dox-induced inflammation in cardiac muscle, our studies demonstrate a possible novel action for the anticancer agent targeting important downstream mediators of inflammation in the female vasculature. Future studies will evaluate the impact of Dox on COX-2 at the transcriptional or translational level to determine the mode of molecular regulation.

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OPTIMIZING THE PROPERTIES OF CELL-LADEN GELMA HYDROGELS FOR A PREVASCULARIZED BONE GRAFT TISSUE

DANIOM TECLÉ, SUNGWO KIM, CHI-CHUN PAN, YUNZHI YANG

Rapid blood perfusion is critical for post implantation survival of bioartificial tissues. Prevascularization of these bioartificial tissues with a built-in connectable vasculature holds great promise in addressing this problem. Here we aim to design and engineer a model of prevascularized bone graft using biodegradable, biocompatible materials; polycaprolactone (PCL), polyethylene glycol (PEG), and gelatin methacrylate (GelMA). PCL was used for mechanical support and structure integrity. GelMA was used to accelerate vasculature formation while PEG was used to maintain a channel for perfusion and diffusion. In order to construct a prevascularized bone graft in this project, PEG based channels were covered by high density of Human Umbilical Vein Endothelial Cells (HUVECs) that can form prevascular networks through GelMA hydrogels. GelMA hydrogels were evaluated for angiogenic activity of HUVECs including degradation, mechanical stiffness, cell viability and vessel formation. We tested two groups consisting of 5% and 10% GelMA concentration. Using a built-in-house 3D hybprinter with photopolymerization capabilities, GelMA was crosslinked under visible light. The degradation and mechanical properties of GelMA were demonstrated to be tunable through concentration modifications to the hydrogels. Higher concentrated GelMA solutions formed hydrogels with higher modulus values. The degradation rate was found to be inversely proportional to the concentration of GelMA. It is well known that GelMA possesses excellent biocompatibility and low toxicity. HUVECs readily adhered, elongated, proliferated, and went through the process of angiogenesis when seeded on GelMA substrates. The accomplishment of a fully developed, prevascularized bone graft is anticipated to help solve the arguably greatest obstacle, vascularization in tissue engineering and regenerative medicine by improving on engraftment of the bioartificial tissue and accelerate tissue healing and remodeling.

ASSESSING CAPPING MATERIALS USED FOR MINE RECLAMATION USING BIOGEOCHEMICAL INDICATORS

MIRA THEILMANN, JULIANNA G. LOAIZA, RAINA M. MAIER, JULIA W. NEILSON

Uncapped mine tailing sites with mine waste materials from legacy mining activities are major health concerns across Arizona. Sites without management or reclamation can result in heavy metal exposure to nearby residents. Revegetation is a low cost method of containing waste to reduce exposure to mine tailings and remediating the substrate for future use. Mining operations require removal of large amounts of overburden rock in order to reach valuable ore resources. Currently, Resolution Copper Mine is experimenting with the use of such waste rock as a capping material for mine tailings prior to revegetation. The mine is comparing the success of this capping strategy to the use of Gila Conglomerate material harvested from uncontaminated areas of the mine property. The objective of this research is to use biogeochemical indicators to evaluate the development of the capping materials as substrates for sustaining plant growth during reclamation. The following biogeochemical indicators were utilized in this research in order to gauge the comparative revegetation potential of the two capping materials: pH, electrical conductivity, particle size distribution, and neutrophilic bacterial plate counts. Bacterial plate counts are included because successful plant establishment creates subsequent development of diverse microbial communities. These include plant growth promoting microbes that improve the potential for future plant species to grow and survive. In this study, a total of 50 samples are taken annually from reclamation areas of dense and sparse vegetation under both capping scenarios. These locations vary in slope, soil characteristics, and vegetation types. The types of vegetation covering the various transects will also be compared along with the specific biogeochemical indicators in order to predict the long term revegetation potential. Resolution Copper Mine intends to apply the results of this research to inform reclamation strategies for future mining operations on this property.

This work was made possible by funding from the University of Arizona Center for Environmentally Sustainable Mining Academic Industry Research Cooperative funded by KGHM Carlota Copper, Rio Tinto Resolution Copper, and Asarco Mission Mine.



SHEAR STRESS EFFECTS ON ENDOTHELIAL CELLS IN A MICROCHANNEL

MEAGAN TRAN, YITSHAK ZOHAR, LINAN JIANG, TIM FROST

A microfluidic lung-on-a-chip is a biomimetic microsystem that reconstitutes the important functions of the alveolar-capillary interface of the human lung, which cannot be achieved using standard in vitro mono-layered cell cultures or in vivo animal testing models. The microfluidic system features two microchannels bonded on top of each other with a thin membrane separating them. Each microchannel has a dedicated inlet and outlet to independently control its fluid flow. The microchannels are constructed using a clear, flexible, inert polydimethylsiloxane (PDMS) polymer allowing real-time video monitoring and recording. The porous polyester membrane serves as a substrate for culturing on either side epithelial (A549) and endothelial (HUVEC) cell monolayers. In order to resemble the alveolar function, with an air-liquid interface, air flow is established along the epithelium and media (liquid) flow along the endothelium. The cells under such conditions are continuously exposed to shear stress exerted by the fluid (air or liquid) flow.

In this project, we investigated the effect of the flow-induced shear stress on the endothelial cells morphology and adhesion. HUVEC cells were cultured in media on the separation membrane in the top microchannel. Upon the establishment of a confluent endothelial monolayer, the HUVEC cells were exposed to varying level of shear stress in the range of 0.1-6.92 dynes/cm² over a period of 5 hours. Using a MATLAB program, we quantified the rate of cell detachment and found that the detachment rate increased proportionally to the level of the applied wall shear stress. In addition, we observed changes in the morphology of the endothelial cells due to the varying shear stresses over time. These results demonstrate that the microfluidic lung-on-a-chip enables fine control of the in vitro micro-environment in order to reproduce in vivo conditions and, therefore, has the potential to expand the capabilities of cell culture models and provide low-cost alternatives to animal and clinical studies for drug screening and toxicology applications.

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IDENTIFYING MICRORNA-27 POLYMORPHISMS IN NATIVE AMERICANS

JOSHELLE TSINNIJINNIE, JASON WILDER, KATHELENE FREEL, KRISTI MASCARENAS

Prostate cancer affects the prostate gland of the male reproductive system. It is the second leading cancer in men, and the mortality rate is higher in Native American populations compared to other ethnicities. There are many factors that contribute to prostate cancer risk such as genetic factors, age, ethnicity, cultural diet, lifestyle, and the distance from the nearest hospital. Knowing about these disparities helps to understand the progression and treatment of prostate cancer. The relative importance of these disparities is not well understood, and this research will focus on the genetic differences of the oncomir microRNA-27 (miR-27) between ethnic groups to help elucidate the role of genetics as a risk factor for prostate cancer. Specifically, we are screening a total of 40 Native American samples to identify polymorphisms of miR-27, which may affect its processing and function, and therefore risk of prostate cancer. Genetic variation of miR-27 has not been examined previously in Native American populations. With the primers that we have designed, we will amplify the region of the gene, and perform Sanger sequencing. Finally, we will test whether observed variants affect miR-27 using bioinformatic tools. Results are pending however, we have successfully amplified other oncogenes and the miR-27 cluster. Discovery of population-specific miR-27 polymorphisms may elucidate the disparity in prostate cancer mortality within Native Americans.



THE ANTIMICROBIAL EFFECTS OF ESSENTIAL OILS

DEIONNA VIGIL, FERNANDO MONROY

Some natural oils extracted from plants and herbs known as essential oils (EO) demonstrate antimicrobial properties. We tested the EO's (garlic, basil, peppermint, and tea tree) [The Lebermuth Company, IN] against *Staphylococcus aureus*, Methicillin-resistant *Staphylococcus aureus* (MRSA), *Burkholderia thailandensis*, and *Pseudomonas aeruginosa*. Cytotoxic effect of these oils on eukaryotic cells was also investigated. Bacteria were grown in LB media and adjusted to inoculate 10^5 CFU/well. In a 96 well plate, bacteria were incubated in dilutions of EO mix (LB media, 10% DMSO) and spot plated at three time points (1, 3, and 6 hours) to assess growth. Eukaryotic cells were incubated in a similar EO mix (DMEM media, DMSO) and cytotoxic effect was calculated using the LDH Cytotoxicity Assay Kit (Thermo Scientific) after 1 and 3 hours exposure to EO's. At a 2.5% concentration, peppermint and tea tree oil killed 100% of MRSA, *S. aureus*, and *Burkholderia thailandensis*, while tea tree also killed 100% of *P. aeruginosa*. Garlic oil demonstrated bacteriostatic properties against MRSA and *B. thailandensis*, while basil oil killed *B. thailandensis*, but was ineffective against the other bacteria at all time points. When EO's were tested at a 2.5% concentration on eukaryotic cells for three hours; garlic showed 40%, basil 24%, peppermint 12%, and tea tree 17% cytotoxic effect on skin cells. These results suggest that EO's are effective in slowing or killing a wide variety of bacteria and their potential as active ingredients in antimicrobial preparations warrants further examination. **Acknowledgments:** NACP Supplement U54CA143925-06 and NACP NAU Grant U54CA143925.



PERMAFROST THAW SUCCESSION IN ARCTIC PEATLANDS LEADS TO SHIFTS IN VEGETATION COMPOSITION AND BIOMASS TURNOVER RATES

SARAH ROSE VINING, MOIRA HOUGH, AMELIA MCCLURE, SCOTT SALESKA, VIRGINIA RICH

As permafrost thaws over the next century due to a rapidly changing climate, the shifting nature and amount of bioavailable soil organic matter (SOM) are causing ecosystem-level changes in carbon dioxide (CO₂) and methane (CH₄) fluxes. These greenhouse gases could drive a positive feedback to climate change, increasing the rate of global warming. Two key drivers of the change in SOM are (a) liberation of previously frozen old permafrost carbon (C), and (b) shifting plant communities that change the production rate of new carbon. Appreciable study has focused on the former; we focus here on the latter, at a 'natural' permafrost thaw gradient in an Arctic mire near Abisko, Sweden. As previously frozen soil destabilizes and collapses into a waterlogged habitat at this site, dominant vegetation type shifts from smaller, woodier plants in permafrost palsas to moss-dominated bogs, then to taller, leafier sedges in fens. This plant community succession is associated with increased CO₂

uptake, which could partially offset the thaw-associated C release from soils if it resulted in greater C storage. We tested the hypothesis that C stored in plant biomass increases across the thaw gradient by sampling both above and belowground biomass in palsas, bogs, and fens. Surprisingly, we found that total above and belowground biomass together do not significantly change from the intact to the fully-thawed habitats, despite previous research showing that net ecosystem productivity (NEP) appears to be higher in the fully water-logged fen. The lack of observed biomass increase despite the increase in NEP observed in other studies could be explained if the higher productivity sedges in fen sites have higher turnover, and transfer that productivity to SOM through high root exudation and/or litter deposition. Since the shift in plant community composition is also associated with loss of plant biodiversity across the gradient, these results suggest that plant community succession alters the quantity, type, and diversity of plant litter inputs to the soil. Such changes in litter quantity and type are important drivers of decomposition rates and therefore the status of the ecosystem as a source versus sink for atmospheric carbon.

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COMPARING POLLEN COLLECTION OF BUMBLEBEE NECTAR-ROBBERS AND LEGITIMATE VISITORS

KAREN WANG, JUDITH BRONSTEIN

Bumblebees collect two resources from plants: they consume nectar for energy, and feed pollen to the colony's young. Bumblebees access nectar either by legitimately feeding through the floral opening or by nectar-robbing through a cut in the flower's corolla. When bumblebees brush against anthers, pollen is deposited on the hairs covering their bodies. This loose pollen is groomed together into a ball that bumblebees carry on their back legs.

In many bumblebee species, individuals can feed on nectar using both of these behaviors. However, the few studies of how bees choose between robbery and legitimate visitation consider these behaviors purely in the context of nectar foraging. They neglect if and how this choice impacts pollen collection behaviors. This is a major oversight since pollination is a key ecosystem service.

Our study asks if pollen collection differs between individuals foraging as nectar-robbers and as legitimate visitors. Robbing may allow contact with the anthers, as legitimate visitation does. Individuals may also collect pollen from the anthers of the same flower they rob. In these cases, robbing individuals will carry the pollen of the plant species they rob. Alternatively, individuals might only obtain nectar from robbing behaviors, and must switch to legitimately visiting flowers in order to obtain pollen. Robbers that switch to visiting may collect pollen from the same source as legitimate visitors or from different sources. In the either case, individuals will carry pollen from sources except for the species they rob.

During July 2016, we observed 34 *Bombus mixtus* individuals and immediately collected their pollen loads at our field site in Kebler Pass near Gothic, Colorado. We then made slides of the pollen carried on each individual. We will identify pollen grains on each slide. Finally, we will test our hypotheses by comparing pollen compositions carried by robbers and legitimate visitors. Our study is the first to look at the implications of nectar-foraging strategies for pollen collection in bees. If we find a relationship between bees' foraging behavior and pollen source, it could fill a significant gap in our current understanding of pollination ecology in natural ecosystems.

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CANCER KNOWLEDGE AND SELF-EFFICACY IN TOHONO O'ODHAM CANCER NAVIGATORS

KASSIDY WARTZ, MARY KOITHAN

Cancer mortality rates are higher in Native American communities when compared to the general population. The lack of funding for robust early detection screening programs, a reduction in quality of life, and an increase in the number of patients that discontinue treatment contributes to poor cancer outcomes in these communities. Patient navigation aids cancer patients in traversing the healthcare system after diagnosis of cancer through advocacy, support and health education. When patient navigation is successful, cancer disparities between populations reduce. Patient navigators address barriers that keep cancer patients from accessing treatment and follow-up care. The Tohono O'odham Cancer Partnership conducted a 10-week, in-person patient navigation course to train 11 Community Health Representatives on how to provide patient navigation services in the areas of prevention, early detection, treatment, survivorship and end-of-life care. Evaluation of the effectiveness of the navigation educational program was conducted through a 38-question self-efficacy questionnaire and a 15-question knowledge test. Descriptive statistics were used to analyze the data. Overall, the outcomes demonstrate that the course was effective in increasing self-efficacy and knowledge necessary to assume the role of cancer navigator. It is expected that patient navigators with increased knowledge and confidence will result in increased early detection rates, treatment retention and an improvement in quality of life in cancer patients. The outcomes of this program suggest a need to provide more education and stronger emphasis on screening recommendations in future cancer navigation courses. UA Grant: 2U54CA143924.



FUNCTIONAL SPECIALIZATIONS OF HYPOGLOSSAL MOTONEURONS INNERVATING INTRINSIC AND EXTRINSIC TONGUE MUSCLES

JESSE WEALING, M. CHOLANIAN, R.F. FREGOSI

The mammalian tongue contains eight muscles that collaborate to ensure that breathing, swallowing, suckling and other important behaviors are robust and reliable. Seven of these muscles are innervated by hypoglossal motoneurons (XIIMNs). Most studies of XIIMNs have considered them to be a homogenous population, however a given tongue movement requires precisely allocated contributions from all tongue muscles. Thus, XIIMNs may have unique functional properties that reflect the usage pattern of the muscle that they innervate. To better understand the functional specializations of muscle-specific XIIMNs, intrinsic (superior longitudinalis) and extrinsic (genioglossus) muscles were injected with dextran-rhodamine to illuminate the XIIMNs innervating those muscles. The labeled XIIMNs were anatomically and electrophysiologically differentiable. Intrinsic XIIMNs were located more medial and proximal and extrinsic were more lateral and distal to the fourth ventricle. Whole-cell patch-clamp experiments showed that resting membrane potential was on average 10 millivolts more depolarized in intrinsic compared to extrinsic XIIMNs, and that the firing rate response to current injection was lower in extrinsic compared to intrinsic XIIMNs. These observations show muscle-specific functional specializations in XIIMNs, and this information lays the foundation for the development of neuron-specific therapeutic approaches for tongue-related respiratory disorders. Funded by National Institutes of Health grant R01 HD071302.



AUTOMATING VIDEO ANALYSIS: THE ABCTRACKER

NICOLE WHITTINGTON, A. DORNHAUS, D. CHARBONNEAU, D. GHAGHARA, L. RICE, M. SHIN

Studying the behavior of social insects is both interesting and time consuming. Often researchers must film these behaviors in order to analyze them at greater length and in more detail then watching them in the moment, or live. However, analyzing film is time consuming, especially when tracking individual insects in a colony. It can take up to ten hours to track and analyze a video manually when there are 80 members in the colony. Introducing the ABCTracker. The ABCTracker is software that allows the user to mark individual insects or objects over multiple screens of a video, and then the ABCTracker will track these insects or objects for the user over the entire length of the video. This makes video analysis of any kind in the study of social insects much more efficient.

FAST-SCAN CONTROLLED ADSORPTION VOLTAMMETRY AS A METHOD TO MEASURE ABSOLUTE LEVELS OF DOPAMINE *IN VIVO*

LUKE WOHLFORD, LINDSEY CROWN, KATE PARENT, MITCHELL BARTLETT, STEPHEN COWEN, TORSTEN FALK, MICHAEL HEIEN

Dopamine (DA) is an important neurotransmitter in the brain linked to a variety of functions such as decision-making, reward signaling, and motor control. Parkinson's Disease, a neurodegenerative disease affecting millions of people world-wide, involves the death of dopamine neurons in the deep brain leading to shaking, rigidity, and dyskinetic movement. Because of DA's broad functionality and its importance in Parkinson's disease, the ability to quantify and measure it in awake and behaving animals would be highly beneficial to research programs. Fast-Scan Cyclic Voltammetry (FSCV) has been used for decades to measure relative amounts of DA *in vivo*, however FSCV is limited to measuring short, phasic DA release. Thus far, measurements of absolute, tonic levels of DA have been limited by using techniques with very low time resolution, unsuitable for behavioral studies of decision-making or drugs that may have quick effects on DA concentrations. Fast-Scan Controlled Adsorption Voltammetry (FSCAV) uses instrumentation similar to FSCV but allows for measurement of tonic levels of DA every 30 seconds. This method is currently being tested for reliability by measuring tonic DA levels in the rat dorsal striatum after administering drugs known to either increase or decrease tonic dopamine levels. While this project is still underway, results so far seem to support the ability of FSCAV to measure tonic DA levels. Work on this project has been sponsored by the Brain Eager Initiative and Undergraduate Biology Research Program.



ADDITION OF DOXORUBICIN CAUSES DISRUPTION OF CELL CYCLE IN MUTANT P53 HUMAN MAMMARY EPITHELIAL CELLS

DANA WOODS, BERNARD FUTSCHER

Human mammary epithelial cells can be immortalized by overcoming two major proliferation barriers. The stasis barrier is overcome by inactivating the RB pathway by knocking down p16 via shRNA. The replicative senescence barrier is crossed by reactivating telomerase through the dysregulation of MYC. Despite being immortal, these cells do not form tumors when injected into immunocompromised mice. Our goal was to determine if overexpression of mutant p53 could malignantly transform wild-type p53 cells. Because mutations in p53 are responsible for over half of human carcinomas, we hypothesized that mutant p53 transduction would cause changes in the cells' response to stress. Mutant p53 was transduced into the cells using a viral vector. These cells were grown alongside non-transduced wild-type cells and cells that were transduced with an eGFP viral vector, both used as controls. Western blots confirmed that the mutant p53 cells had much greater expression levels of the p53 protein compared to that of the wild-type and eGFP cells. We are currently measuring how the topoisomerase II-directed drug doxorubicin affects the mutant p53 cells compared to the wild-type p53 cells. Cells were exposed to varying doses of doxorubicin for 24 hours. Cell cycle analysis revealed that doxorubicin treatment caused G2 cell cycle arrest. In the higher concentrations, greater percentages of the cells were in G2 arrest. By comparing the wild-type cells with the mutant p53 cells, we observed that overexpression of p53 intensifies the G2 arrest effect. At 100nM for example, 82.4% of the mutant p53 cells were in G2 phase compared to 57.7% for that of the wild-type cells. These findings indicate that the addition of a mutant p53 can disrupt cell cycle checkpoints and may make them more prone to malignant transformation. This data allows us to plan future experiments, such as a colony forming assay or injection of these mutant p53 cells into immunocompromised mice, to determine if mutant p53 is sufficient to malignantly transform immortalized human mammary epithelial cells. (Funding provided by Maynard Endowment for Breast Cancer Epigenomics.)



IDENTIFYING THE GENES THAT INTERACT WITH THE DEAD-BOX RNA HELICASE DBP1 THROUGH A SYNTHETIC LETHAL SCREEN

MENG-HAN WU, KATE LI, BRANDON BURGMAN, MILES QUIGG, TIMOTHY BOLGER

Regulation of gene expression is critical for the cellular responses to many stimuli and enables the survival of the organism. DEAD-box proteins are a highly conserved family of proteins that serves an important role in gene expression. DEAD-box proteins regulate RNA and the proteins associated with RNA, the RNA protein complex (RNP), during gene expression, thereby ensuring proper processing of the mRNA. Dbp1, one of the DEAD-box proteins in budding yeast, is considered to be a homolog of DDX3X, a gene that is highly mutated in the brain cancer medulloblastoma as well as other cancers types. Nevertheless, the function of the gene still remains unknown, and further research is needed to determine the cellular mechanism of Dbp1, which may have application to cancer pathology. Previously, our laboratory had performed a synthetic lethal screen in yeast with a *dbp1-null* mutant in order to identify genes related to Dbp1 function. Six candidate hits were isolated from the initial screen. We previously identified one of these as *SHM2*, which is synthetic lethal with a marker gene *ade3* rather than *dbp1*; thus this candidate is an artifact of the screen. In my research, I have been attempting to identify the genes for the other candidate hits. Through plasmid complementation, I identified another candidate as *SHM2* in addition to the first hit. Further, the synthetic lethal phenotype of one other candidate was not robust, thus making it difficult to continue to study. Currently, I am attempting to identify two other candidates from the screen using plasmid library complementation. Identification and validation of these hits should help elucidate the function of Dbp1. The work is funded by the American Cancer Society and the Arizona Biochemical Research Commission.



TRANSLATION DYSREGULATION IN ALS

STEPHEN YAO, A. COYNE, D. ZARNESCU

Amotrophic Lateral Sclerosis (ALS) is a neurodegenerative disease that affects the lives of at least 30,000 people in the United States, annually. It is often categorized by the progressive neurodegeneration of motor neurons. TAR DNA Binding Protein (TDP-43) is normally found within the nucleus having known roles in RNA splicing as well as DNA-binding. Mislocalization of TDP-43 to the cytoplasm, either due to mutations or to environmental stressors leads to accumulation of TDP-43 in cytoplasmic inclusions. Notably, in the cytoplasm, TDP-43 associates with RNA stress granules and also affects mRNA translation, both of which are thought to contribute to disease pathology. In order to study the effects that cytoplasmic TDP-43 mutations have on translation, a technique called polysome fractionation is utilized. This technique uses sucrose gradients to effectively separate different ribosomal populations. The mRNAs that are bound to multiple ribosomes, or polysomes, are separated from the mRNAs bound to single ribosomes. This allows the pinpointing of specific defects in protein production as well as potential explanations to how it may affect cellular metabolism. Furthermore, this technique is able to provide information about the halting of protein production in response to stress which is a potential factor that contributes to ALS. Western blotting and quantitative PCR (qPCR) allow us to observe the protein and transcript distribution within the polyribosome fractions, respectively. Using these approaches we found that TDP-43 associates with both translating polyribosomes as well and untranslated fractions (RNP and the ribosomal subunits). qPCR of *futsch*, an mRNA target of TDP-43 showed a shift in transcript levels from actively translated to untranslated fractions in the context of TDP-43, indicating that *futsch* mRNA is being repressed by TDP-43 in motor neurons. Taken together, these findings indicate that TDP-43 regulates the translation of specific mRNAs and defects in translation may contribute to ALS. Experiments will focus on additional candidate mRNA targets that will be tested for their distribution within polysome fractionations to determine their translational status in disease. Candidate mRNAs that are identified by Translating Ribosome Affinity Purification (TRAP) that also associate with TDP-43 in complex will be tested. Specifically, qPCR will used to distinguish shifts in translational targets in polysomes. Targets that are downtranslated should exhibit a shift into the RNP fractions while uptranslated targets will exhibit a shift into the polysomes.

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PRENATAL NICOTINE EXPOSURE AND THE 5HT α -7 RECEPTOR

CRISTINA YOUNG, RALPH FREGOSI

Prenatal nicotine exposure is a known risk factor for Sudden Infant Death Syndrome (SIDS). This increase in risk is thought to be the result of the nicotine exposure affecting the development of the brainstem neurons that control breathing, as well as the serotonin neurons that project to these cells. This experiment was executed to determine what affect, if any, this type of nicotine exposure would have on the serotonin (5HT) system, specifically the 5HT α -7 receptor. Prenatal rat pups were exposed to nicotine with osmotic minipumps during pregnancy, with continued exposure through breast milk after birth (developmental nicotine exposure, DNE). Brainstem-spinal cord preparations from 1-5 day old pups that were either DNE or unexposed (control group) were studied *in vitro*. Using a split-bath configuration, drugs can be applied to either the brainstem or the spinal cord without affecting the other side of the preparation. For this experiment, drugs were applied to the brainstem side of the preparation. The frequency and amplitude of action potential bursts were measured from cervical ventral roots from C2-C4, which contains the axons of phrenic motor neurons, which, in turn, innervate the diaphragm muscle in intact animals. A baseline of ten minutes was established, followed by fifteen minutes of 5HT α -7 antagonist application, followed by thirty minutes of 5HT α -7 antagonist + 5HT application, followed by washout for twenty minutes. There was no significant difference between the responses of the DNE and control group. These results indicate that DNE does not influence the activity of brainstem respiratory neurons by the 5HT α -7 serotonin receptor subtype. This research was funded by NIH, UBRP, and WAESO.



DEVELOPMENT OF A FRET-BASED APTAMER SENSOR FOR INTRACELLULAR ATP DETECTION

DILLON YUP, ISEN A. CALDERON, CRAIG A. ASPINWALL

ATP is the common source of energy for nearly all life on Earth. Because of this, monitoring intracellular ATP concentrations may provide insight into diverse signaling roles of ATP. The focus of this research is the development of a FRET-based sensor for intracellular detection of ATP using ATP-responsive aptamers. Aptamers are single strands of DNA/RNA that selectively bind analytes due to the unique, sequence-specific secondary structure. Many aptamers undergo conformational changes upon analyte binding that can be exploited in sensor design. Here, ATP-responsive aptamer sequences were functionalized with two fluorescent dyes, such that analyte binding leads to a conformational change allowing Fluorescent Resonance Energy Transfer (FRET) to occur. Three DNA aptamer sensors were prepared and evaluated for detection of ATP using different sequences and different donor-acceptor pairs. These sensors demonstrated a K_d of approximately 1 mM in free buffer solution, within the physiological concentration range for ATP measurements. The binding of the aptamer is specific to the adenosine and ribose groups of ATP and does not bind GTP at the same extent. The sensors were also stable under physiological conditions, though *in vivo* conditions have proven problematic for aptamer-based sensors, due to degradation. To protect the sensors from degradation, we will integrate aptamer sensors into phospholipid nanoshell particles previously developed by our group and evaluate the utility for intracellular measurement of ATP. This study was supported by the NIH under grant number GM 116946.



RESCUE OF NEUROTOXICITY IN A TDP-43-BASED *DROSOPHILA* MODEL OF ALS BY A 4-AMINOQUINOLINE ANALOG

BENJAMIN ZAEPFEL, ALYSSA COYNE, ALLEN B. REITZ, DANIELA C. ZARNESCU

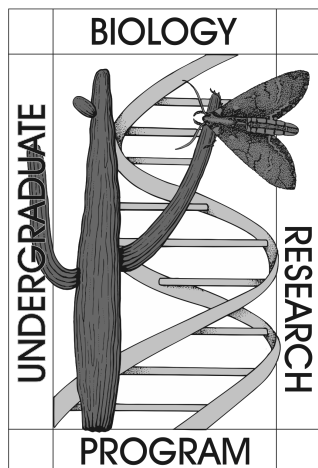
Amyotrophic Lateral Sclerosis (ALS) is a neurodegenerative disease affecting upper and lower motor neurons. TAR DNA-binding protein (TDP-43) is an RNA and DNA binding protein that has been implicated in ALS, both as a causative factor and at the level of pathology. Although TDP-43 has been shown to play a key role in RNA metabolism, its mechanism is not fully understood. Specifically, evidence has shown that TDP-43 binds TG-rich sequences within RNA targets. In the context of disease, this binding can lead to alterations in splicing and/or proper regulation of its targets, and is partially responsible for the neurotoxicity that is associated with ALS. A 4-aminoquinoline analog (i.e. AAQ-1) has been shown to inhibit the binding of TDP-43 to TG oligonucleotides. To evaluate the effect of this small molecule *in vivo*, we administered AAQ probes to larvae expressing wild-

type or mutant TDP-43 in motor neurons (D42 GAL4>TDP-43). Our experiments show that feeding of AAQ-1, but not a structurally similar negative control (AAQ-9), rescues the lethality caused by overexpression of TDP-43 in motor neurons. Additionally, AAQ-1 feeding also leads to improved locomotor function of larvae, as well as increased lifespan of flies overexpressing both wild-type and mutant TDP-43. In exploring the role of TDP-43-associated proteins in mediating the protective effect of AAQ-1 in motor neurons, we find that rescue of TDP-43-induced neurotoxicity by AAQ-1 is dependent in Fragile X Mental Retardation Protein (FMRP) in a TDP-43 variant-dependent manner. Currently, experiments are being performed to determine the effect of AAQ-1 on the solubility of full-length TDP-43 and its cleaved C-terminal fragment within motor neurons. These results provide insight into the role of TDP-43 in RNA metabolism, as well as suggest a possible therapeutic strategy for TDP-43-based ALS and related neurodegenerative diseases.

Experiments funded by the Undergraduate Biology Research Program, Arnold and Mabel Beckman Foundation, MDA255293 to DCZ, and NIH NS091299 to DCZ.

**SUMMARY OF 2016-2017
UNDERGRADUATE BIOLOGY RESEARCH PROGRAM
ACTIVITIES AND ACCOMPLISHMENTS**

INTRODUCTION



When Mike Wells conceived of the Undergraduate Biology Research Program (UBRP) in 1988, he knew it was a concept worth pursuing. Twenty-eight years later, even Wells would be surprised at the impact this program has had on individual students, on the University of Arizona (UA), and on science.

Wells, a biochemist and long time faculty member, claimed that it was his student Teri Suzuki's question, What do you guys do around here? that led him to create UBRP. As a scientist, he was concerned that few biochemistry majors were choosing to pursue careers in science. Suzuki's question led him to believe that if students were involved in research, they would develop the passion for inquiry and problem solving that attracted him to his profession. Wells recognized the power of hands-on learning. He also

believed in inclusiveness. From its inception, UBRP has embraced students from any major, any year in college, any ethnicity or nationality, and both genders. Any faculty member who can define his/her work as biologically related can participate which allowed UBRP to span campus and to include off-campus scientists as well.

In 1992, the Biomedical Research Abroad: Vistas Open (BRAVO!) program was launched. BRAVO! is the international extension of UBRP. The program enables research-experienced undergraduates to travel to other countries to work on projects related to the work they do at UA. The perspective students acquire through becoming part of the international scientific community is of tremendous value to participants and advances science.

UBRP was embraced by UA faculty and quickly became one of the largest undergraduate research programs in the country. In 1997 the National Science Foundation awarded the University of Arizona a Recognition Grant for the Integration of Research and Teaching (RAIRE) largely on the strength of the UBRP and BRAVO! Programs. Nationally, only ten RAIRE awards were made. In addition, Project Kaleidoscope designated UBRP and BRAVO! as exemplary programs. The campus culture values and embraces undergraduate researchers.

To date, more than 2,400 students have had a UBRP experience and even more UA undergraduate students became involved in research through programs inspired by UBRP. In the pages that follow are awards, activities, and special programs sponsored by UBRP, as well as the amazing accomplishments of our current students and alumni.

UBRP alumni have used the skills developed through their research experience in a variety of ways. Roughly a third are now physicians; a third are involved in research in academia, government, or the private sector; and the remainder are allied health professionals, teachers, science writers, entrepreneurs, attorneys, and policy makers.

In short, for 28 years, UBRP and BRAVO! have enhanced the learning experience of hundreds of students. Our goal is to grow the program to reach even more students in the future!

SUMMER 2016 SMALL GROUP LEADERS

UBRP students meet in small groups every other week during the summer to discuss their research with their peers. Faculty, postdocs, graduate students, and research-experienced undergraduates volunteer their time to facilitate these groups and to mentor undergraduate researchers.

We feel incredibly fortunate that these individuals volunteered their time and talents to serving as small group leaders in summer 2016! We deeply appreciate their contributions to enriching UBRP students' experiences.

Jordan Barrows

Beckman Scholar

Rebecca McQuade

Graduate Student, Microbiology

Tiffani Begay

Program Coordinator, Cancer Center Division

Tatiana Pelc

Postdoctoral Research Associate

Alison Bockoven

Postdoctoral Research Associate

Stephen Yao

Beckman Scholar

Margaret Briehl

Professor, Pathology

Keaton Wilson

Postdoctoral Research Associate

Nicolette Brown

Graduate Student, Molecular & Cellular Biology

Ben Wu

Beckman Scholar

Rebekah Keating

Graduate Student, Neuroscience

Benjamin Zaepfel

Beckman Scholar

Oscar Mendez

Graduate Student, Neuroscience

2016-2017 UBRP AMBASSADORS

UBRP Ambassadors, the reincarnation of the UBRP Undergraduate Student Advisory Group (USAG), is charged with the responsibility of helping to create community among undergraduate researchers by organizing social activities, providing feedback to the program director, and representing UBRP in speaking to on- and off-campus groups. This year's officers and members of UBRP Ambassadors are:

Cathy Tran

President

Benjamin Zaepfel

Vice President & Volunteer Chair

Jordan Barrows

Secretary

Poorva Rajguru

Treasurer

Members:

Maryam Al-Dabbaugh

Adam Aragaki

Areen Badwal

Shreya Bellampalli

Jonathan Blohm

Brandon Burgman

Matthew Chaung

Tiffany Cho

Alison Comrie

Roslyn Curry

Emily Galloway

Lucas Harrell

John Kim

Emily Leavitt

Maria Love

Nikki Mastrud

Dyana Muller

Faye Ortiz

Alec Perkins

John Santoro

Micah Secor

Tala Shahin

Rose Vining

Ashley Wu

Stephen Yao

2016-2017 UBRP PEN PALS

During the 2008-2009 academic year, UBRPer Misha Pangasa, in conjunction with sixth grade teacher Patricia Robles-Medina at Mansfeld Middle School, initiated the Pen Pals Project. UBRPers volunteer to correspond with sixth grade students during the course of the year. Every May and in December, UBRP students host their sixth grade Pen Pals in a morning of science activities on campus.

The 2016-2017 Pen Pals are:

*Kai Aragaki
Olivia Austin
Nathan Borrero
Eunice Borunda
Morgan Brown
Nichole Burkett
Swati Chandra
Matthew Chaung
Tiffany Cho
Jenna Franco
Nathaniel Gallegos
Lucas Harrell
Ernesto Hernandez
Dylan Hutchison
Pareena Kaur
John Kim
Gloria Le
Maxwell Li
Nikki Mastrud
Justine Mona*

*Celina Nguyen
Faye Ortiz
Diana Perez
Savannah Perno
Michael Ragone
Benjamin Rivera
Dagoberto Robles
Lex Salas
Grace Samtani
Tala Shahin
Kia Soofi
Cathy Tran
Meagan Tran
Suhitha Veeravelli
Rose Vining
Jesse Wealing
Cristina Young
Dillon Yup
Ben Zaepfel*

2016 UBRP ACTIVITIES

LECTURES

January 25	Parasite Aspartic Peptidases and Their Potential as Therapeutic Targets by Dr. Daniel Sojka
January 25	Behind the Wall: Growing Up In a Communistic Country by Dr. Daniel Sojka
February 24 & 25	Conversations with Faculty
March 7	Lyme in Europe – Adapting Animal Models and Genetic Tools to Understand the <i>Borrelia</i> Genospecies Complex by Dr. Ryan Rego
April 10	The Current European Refugee Crisis and Czech Media by Dr. Salim Murad
April 10	Culture in Czech Advertising by Dr. Salim Murad
May 25	Brain Oscillations, Aging, and Parkinson's, by Stephen Cowen, PhD
June 8	The Career Trajectory of a Physician-Scientist: A Story of LINEs, by Kenneth Ramos, MD, PhD
June 22	Physical Activity in Cancer Survivorship, by Jennifer Bea, PhD
July 6	Novel Mu Opioid Receptor Regulators as New Targets for Pain Drug Discovery by John Streicher, PhD
July 20	Writing a Press Release by La Monica Everett-Haynes
August 3	Nationally Competitive Scholarships and Graduate Fellowships by Georgia Ehlers, Emily Kotay, and Shelly Hawthorne-Smith
October 7	Myxozoa: Microscopic Jellyfish Parasite by Fatima Molina; Parasite of the Ancients: Deciphering the Origins of Myxozoa from Sharks and Rays by Christian Sandoval; Searching for Heme by Laura Hacker
October 19	RNAi Knockdown of Metabolic Pathways by Micah Secor
October 21	Which Came First: The Chicken or the Parasite? Cultivation of <i>Cryptosporidium</i> in Fertilized Egg by Alejandro Varela
October 28	A Conversation with Linda Mobula, MD, MPH by Linda Mobula, UBRP Alumna
November 16	tRNA Processing in <i>Trypanosoma brucei</i> by Megan Montoya; The Role of p18 in Trypanosomes: a Perspective on the Research and Culture of Czechia by Kathryn Blevins
November 18	Scavenger Receptor Protease IrSRP1 and Its Role in Tick Gut Physiology: Adventures in Science and Culture in Czech by Daniela Gutierrez-Muñoz

PROFESSIONAL DEVELOPMENT

January 23	27 th Annual UBRP Conference
April 19	Cancer, Tumors, and Flies... Oh My! A Discussion on Navigating a Career in Research, by Dr. Ross Cagan
May 16	UBRP Orientation
May 23 & 24	UBRP Ethics Retreat
June 1	Small Group Workshop: The Elevator Speech
June 15	Small Group Workshop: CVs, Resumes, and Personal Statements
July 13	Small Group Workshops (Various Topics)
July 20	UBRP Science Café! Topic: CRISPR

July 27	Small Group Workshop: Writing a Scientific Abstract
August 4	UBRP Science Café Returns! Topic: Biological Computers

FIELD TRIPS

January 25	Hike to King's Canyon
April 2	Hike to Madera Canyon
April 9	UBRP Border Trip
April 19	Supper and Hike to Gate's Pass with Dr. Ross Cagan and the Beckman Scholars
June 4	Reid Park Zoo
June 25	Sabino Canyon Sunrise Hike
July 9	Kitt Peak National Observatory
July 18, 22 & 28	Tour of Arizona Laboratory for Immersive Visualization Environments (AZ-LIVE)
July 23	Mt. Lemmon Hike
August 7	Tucson Botanical Gardens
October 15	Sabino Canyon Sunset Hike
October 22	Flandrau Science Center

SOCIAL ACTIVITIES

March 22	Welcome to UBRP Party
June 8	Movie Night
June 22	Sundae Night
June 6	Art Night
June 20	Bowling Night
August 3	End of Summer Picnic
October 10	Get Air
November 6	All Souls Parade
December 7	Holiday Party

STUDENT GOVERNANCE

Year Long	UBRP Ambassador Meetings
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OUTREACH AND VOLUNTEERISM

February 13	Alitas House Volunteer Day
May 25	Percentage Night at The Fix
June 19	Ronald McDonald House Volunteer Day
July 30	Community Food Bank of Southern Arizona Volunteer Day
September 17	Hunger Walk (benefitting the Community Food Bank of Southern Arizona)
September 18	Beads of Courage Volunteer Day
October 30	Science Outreach at Flandrau Science Center's Science Spooktacular
Year Long	Pen Pals

RECIPIENTS OF UBRP TRAVEL AWARDS FOR PRESENTATIONS AT PROFESSIONAL CONFERENCES

This is a list of students to which UBRP has contributed travel funds, but this is not a comprehensive list of UBRP students who presented have at scientific conferences.

1989

Laurel Johnstone Dil Labeled, Nervus Terminalis Afferents Distribute to Many Brain Regions
in *Xenopus laevis*
Society for Neuroscience Conference
Phoenix, Arizona
November, 1989

1990

Mai Duong Characterization of a New Iodinated Peptide Radioligand for Delta Opioid Receptors
Annual Meeting of the Federation of American Societies for Experimental Biology
Washington, D.C.
April, 1990

Carol Arakaki Mapping Flight Motor Neurons Involved in Optomotor Responses
Society for Neuroscience Conference
St. Louis, Missouri
November, 1990

1991

Alicia Acevedo Analysis of an Evolutionarily-Conserved Function-Associated Molecule (FAM) on Murine
Natural Killer (NK) Cells
International Symposium on Developmental and Comparative Immunology
Portland, Oregon
August 4-9, 1991

Dan DeMerell Long Term Reproductive Organ and Gonadotropin Changes in Mice Following
Administration of the Ovotoxin 4-Vinylcyclohexene
24th Annual Meeting of the Society for the Study of Reproduction
Vancouver, British Columbia
July 29-31, 1991

John Forage Bioavailability of Carotenoids and Retinoids in Human Colostrum and Milk
75th Annual Meeting of the Federation of American Societies for Experimental Biology
Atlanta, Georgia
April 21-25, 1991

Jeff Lo Cascio The Developmental Potential and Analysis of Human Fetal Cord Blood
The Vth Congress of the International Society of Developmental and Comparative
Immunology (ISDCI)
Portland, Oregon
August 4-9, 1991

John Pritchard Analysis of a Group of Spermatogenesis Deficient Mutations to Identify Genes Under
the Deficiency EDF19 of the Nematode *Caenorhabditis elegans*
Eighth Annual C. elegans Conference
Madison, Wisconsin
June 1-5, 1991

Joyce Schroeder Isolation of a Putative Protoimmunoglobulin in *Pyera hausteria*

The Vth Congress International Society of Developmental and Comparative Immunology (ISDCI)
Portland, Oregon
August 4-9, 1991

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|-------------------|--|
| Jesus Valenzuela | Beta-Carotene Inhibits Soybean Lipoxygenase Activity and Is Oxidatively Cleaved to Polar Products
75th Annual Meeting of the Federation of American Societies for Experimental Biology (FASEB)
Atlanta, Georgia
April 21-15, 1991 |
| Diana L. Greene | In Vivo Mouse Brain Localization of [3H]DPDPE to Delta Opioid Receptors
Society for Neuroscience Conference
New Orleans, Louisiana
November 10-15, 1991 |
| Barbara Hurley | Structure of Output Neurons of the Mushroom Bodies in Honeybee Brains
Society for Neuroscience Conference
New Orleans, Louisiana
November 10-15, 1991 |
| Denice Warren | Discourse Production in Normal Aging and Dementia
American Speech-Language Hearing Association (ASHA)
Atlanta, Georgia
November 22-25, 1991 |
| Josette Weibrecht | The Mushroom Body of Cockroach Brain Participates in Spatial Memory Processing
Society for Neuroscience Conference
New Orleans, Louisiana
November 10-15, 1991 |

1992

- | | |
|----------------|--|
| Dan DeMerell | Reproductive Toxicity of 4-Vinylcyclohexene and Its Epoxides in Male Mice
25th Annual Meeting of the Society for the Study of Reproduction
Raleigh, North Carolina
July 12-15, 1992 |
| Russ Ingersoll | Choroid Plexus Sequesters Manganese and Controls Its Movement From Blood to CSF
1992 Annual Meeting of the Society of Toxicology
Seattle, Washington
February 23-27, 1992 |
| Scott Kitchen | Genetic Analysis of a Bacterial Regulatory Protein: Isolation of Mutations Affecting the Proteolysis of LexA Repressor
Sixth National Conference on Undergraduate Research
Minneapolis, Minnesota
March 26-28, 1992 |
| Brad Montierth | Local Measurement of Tissue Metabolism During Altered Microcirculatory Flow Conditions
The Federation of American Societies for Experimental Biology Meeting
Anaheim, California
April 5-9, 1992 |
| Irene DeLeon | Effects of Amitriptyline on GABA Stimulated 36C1-uptake in Brain Membrane Vesicles of Dominant and Submissive Rats
Society for Neuroscience Annual Meeting
Anaheim, California |

October 25-30, 1992

- Brad Merrill Processing of Cholecystokinin in the SK-N-MCIXC Cell Line
Society for Neuroscience Annual Meeting
Anaheim, California
October 25-30, 1992
- Chad Smelser Parvalbumin Immunocytochemistry Delineates Primary Auditory Neocortex
Society for Neuroscience Annual Meeting
Anaheim, California
October 25-30, 1992

1993

- Sean Garcia Mirror Image Stimulation and Mirror-Mediated Object Discrimination in Juvenile African Grey Parrots, *Psittacus erithacus*
30th Annual Meeting of the Animal Behavior Society
Davis, California
July 24-29, 1993
- Clark McDonough Oxidation of Reduced yeast Flavocytochrome b2 by Triplet State Free Flavins and Subsequent Intramolecular Electron Transfer
37th Annual Biophysical Society Meeting
Washington, D.C.
February 14-18, 1993
- Cathryn Sadler Cloning of spe-27, A Gene Involved in the Initiation of Spermiogenesis
Ninth International C. elegans Meeting
Madison, Wisconsin
June 2-6, 1993
- Anthony Stazzone Frequency of Giardia and Cryptosporidium Infections as Detected by Conventional and MERIFLUORTM Methods
American Society for Microbiology 93rd General Meeting
Atlanta, Georgia
May 16-20, 1993
- Susan Turney Functional Lateralization of African Grey Parrots, *Psittacus erithacus*
30th Annual Meeting of the Animal Behavior Society
Davis, California
July 24-29, 1993
- Denice Warren Cineradiographic Analysis of the Speech Mechanisms of an African Grey Parrot, *Psittacus erithacus*
30th Annual Meeting of the Animal Behavior Society
Davis, California
July 24-29, 1993
- Josette Weibrecht The Mushroom Body of Cockroach Brain Participates in Spatial Memory Processing
Western Nerve Net
Seattle, Washington
April 24-25, 1993
- Joshua Wright The Effects of Ortho-phenyl Substituents on the ¹H NMR Spectra and Stability of Low-Spin Bis-N-Methylimidazole Complexes of Iron (III)
205th American Chemical Society National Meeting and Exposition Program
Denver, Colorado
March 28 - April 2, 1993
- Chad Smelser A Stereological Analysis of Parvalbumin-Containing Neurons in Auditory Neocortex
Society for Neuroscience Annual Meeting

Washington, D.C.
November 7-12, 1993

1994

Robert Gomez The Arthropod Mushroom Body: Its Functional Roles, Evolutionary Enigmas, and Mistaken Identities
Society for the Advancement of Chicanos and Native Americans in Science
Chicago, Illinois
March 24-28, 1994

Anthony Rhorer Precision Cut Rat Liver Slices to Assess the Relative Toxicities of Halogenated Hydrocarbons
33rd Annual Society of Toxicology Meeting
Dallas, Texas
March 13-17, 1994

James Callegary Investigation of Leaching Behavior of Salts and Trace Elements in Saline Flue Gas Desulfurisation Sludge
American Society of Agronomy Annual Meeting
Seattle, Washington
November 12-17, 1994

Patricia Bauman The Effect of Reduction in Glial Number on Neuronal Branching Patterns in the Developing Insect Brain
Annual Meeting of the Society for Neuroscience
Miami, Florida
November 13-18, 1994

Shane Uswandi Luteinizing Hormone-Releasing Hormone (LHRH) Gene Expression is Increased in the Hypothalamus of Postmenopausal Women
Annual Meeting of the Society for Neuroscience
Miami, Florida
November 13-18, 1994

1995

Huy Phan Location of cappuccino, a Maternal Effect Locus in *D. melanogaster*, and Its Presumptive Function in Cytoskeletal Organization During Oogenesis
36th Annual National Student Research Forum
Galveston, Texas
April 5-9, 1995

Jennifer Gilmartin Low Ethanol Concentrations Reduce Schwann Cell Numbers in Cultures of Sympathetic Neurons
National Institute on Alcohol Abuse and Alcoholism 25th Anniversary Celebration
Bethesda, Maryland
May 3, 1995

Ellen Hollis Ovotoxicity of 1,3-butadiene Epoxides in B6C3F1 Mice and Sprague Dawley Rats
International Symposium for the Evaluation of Butadiene and Isoprene Health Risks
Blaine, Washington
June 27-29, 1995

George Aaron Battraw Symmetry of Biomechanical Properties in Rodent Femora
Eleventh Annual Scientific Session of the Academy of Surgical Research
Albuquerque, New Mexico
October 5-7, 1995

David Rivers The Cloning and Localization of Various Forms of Guanylyl Cyclase in *Manduca sexta*.

Society for Neuroscience Annual Meeting
San Diego, California
November 11-16, 1995

Erica Kratz Regulation of bFGF Gene Promoter Activity in Human Astrocytes and Glioma Cells
Society for Neuroscience Annual Meeting
San Diego, California
November 11-16, 1995

1996

Robert Chavez Preservation of Rat Livers for Transplantation Using a New Cold Preservation Solution
Bhargavi Joshi with Pulsatile Perfusion
Thuy Le Society of Toxicology Annual Meeting
Anaheim, California
March 10-14, 1996

Joel Zupicich Expression of Pax-6 and Neurogenic Genes in the Xenopus Olfactory System During
Metamorphosis
Association for Chemoreception Sciences Annual Meeting
Sarasota, Florida
April 16-21, 1996

Paul Gause Molecular Characterization of DMBA Induced Melanoma from TP-RAS Transgenic Mice
Experimental Skin Carcinogenesis Conference
Bastrop, Texas
October 28-31, 1996

1997

Julie Boles Hepatotoxicity of Chaparral in Fisher 344 Rats
Robert Chavez 36th Annual Meeting of the Society of Toxicology
Thuy Le Cincinnati, Ohio
Maziar Maveddat March 9-13, 1997

Ellen Hollis In Vitro Effect of 4-Vinylcyclohexene Diepoxide on Viability of Isolated Mouse Pre-
Antral Follicles
36th Annual Meeting of the Society of Toxicology
Cincinnati, Ohio
March 9-13, 1997

Kimberly Suedkamp Effects of Stratification on Viability and Germination of Two Oak Species in
Southeastern Arizona
9th Conference on Research and Resource Management in Parks and on Public Lands
Albuquerque, New Mexico
March 17-21, 1997

Christina Martinez Regulation of Intracellular pH(pHi) in Proximal Tubules of Avian Loopless Reptilian-Type
Nephrons
Experimental Biology '97
New Orleans, Louisiana
April 5-8, 1997
Paid by a minority travel grant from APS

Rachel Keller Changes in Abdominal Aorta Wall Area in Rats After 14 Days 45o Hind Limb
Unweighting
Experimental Biology '97
New Orleans, Louisiana
April 5-8, 1997

Paul Gause	Molecular Characterization of DMBA Induced Melanoma from TP-RAS Transgenic Mice American Association for Cancer Research Annual Meeting San Diego, California April 12-16, 1997
William Wehbi	Computational Analysis of Pterin Derivatives with Applications to Metalloenzymes The American Chemical Society San Francisco, California April 13-17, 1997
Kimberly Suedkamp	Effects of Stratification on Germination of <i>Quercus emoryi</i> (Emory oak). Eleventh Annual National Conference on Undergraduate Research Austin, Texas April 24-26, 1997
Kirstin Grahm	In vitro Growth of <i>Encephalitozoon hellum</i> Spores in Rabbit Kidney Cells with Various Concentrations of FBS in Cell Culture Media 97th General Meeting of the American Society for Microbiology Miami, Florida May 4-8, 1997
Robert Chavez	Hepatotoxicity of Chaparral in Fisher 344 Rats Annual Meeting of the Society for Advancement of Chicanos and Native Americans in Science (SACNAS) Houston, Texas October 9-12, 1997 Paid for by a SACNAS Travel Grant
Mellisa Benally	Sylvian Fissure Asymmetry in Relation to Gender and Handedness Annual Meeting of the Society for Advancement of Chicanos and Native Americans in Science (SACNAS) Houston, Texas October 9-12, 1997
Brandy Feagan	Determination of Uracil Dimers by High-Performance Liquid Chromatography with Electron Capture Detection and APCI-MS Annual Meeting of the Society for Advancement of Chicanos and Native Americans in Science (SACNAS) Houston, Texas October 9-12, 1997
Tommy Seaton	Nerve Extract Injection Slows Atrophy in Denervated Rat Soleus Annual Meeting of the Society for Advancement of Chicanos and Native Americans in Science (SACNAS) Houston, Texas October 9-12, 1997
Thomasita Roanhorse-Woody	Behavioral Correlates of the Inferior Parietal Lobe Annual Meeting of the Society for Advancement of Chicanos and Native Americans in Science (SACNAS) Houston, Texas October 9-12, 1997
Patricia Eckholdt	Does Fasciclin II Play a Role in Guiding Olfactory Receptor Axons to Their Targets? Society for Neuroscience 27th Annual Meeting New Orleans, Louisiana October 25-30, 1997
Robin Price	Steroid Hormones Modulate the Size and Gene Expression of Neurokinin B Neurons in the Rat Arcuate Nucleus

Society for Neuroscience 27th Annual Meeting
New Orleans, Louisiana
October 25-30, 1997

1998

Julie Takeuchi	Lysosomal Proteolysis in Distally or Proximally Denervated Rat Soleus Muscle Society for Integrative and Comparative Biology Boston, Massachusetts January 3-7, 1998
Kimberly Suedkamp	Can Prescribed Burning be Used to Restore Sonoran Desert Grasslands in Southeastern Arizona? 1998 Society for Range Management (SRM) Annual Meeting Guadalajara, Mexico February 8-12 1998
Jack Strom	A Dynamic Trapping Model of Post-Synaptic Aggregation 1998 Keystone Symposia Park City, Utah March 7-13, 1998
Julie Boles	Nephrotoxicity and Hepatotoxicity of Chaparral (<i>Larrea tridentata</i>) in Rats and Humans 37th Annual Meeting of the Society of Toxicology Seattle, Washington March 1-5, 1998
Maziar Maveddat	Dimethyl Sulfoxide Protects Kidneys from Damage Caused by Warm Ischemia in Non-Heart-Beating Donor F344 Rats 37th Annual Meeting of the Society of Toxicology Seattle, Washington March 1-5, 1998
Anthony Nuara	HLA Class I Peptide Binding Motif Obtained by Screening a Synthetic Peptide Library with Recombinant Class I Proteins. Experimental Biology '98 San Francisco, California April 18-22, 1998
David Solkoff	Dehydroepiandrosterone (DHEA) and Melatonin (MLT) Replacement in the Aged Experimental Biology '98 San Francisco, California April 18-22, 1998
David Solkoff	Antioxidant Supplementation in Treatment of Immune Dysfunction and Oxidation Induced by Murine AIDS in Old Mice Council On Undergraduate Research Second Undergraduate Research Poster Session on Capitol Hill Washington, DC April 21, 1998
Amy Miller	A Potential Treatment for Anemia in Premature Infants: Enteral Absorption of Erythropoietin in the Neonate Council On Undergraduate Research Second Undergraduate Research Poster Session on Capitol Hill Washington, DC April 21, 1998
Pragyna Shankar	Cytokine Expression in Antisense-IL-3 Mice Council On Undergraduate Research

Second Undergraduate Research Poster Session on Capitol Hill
Washington, DC
April 21, 1998

- Leslie Gee Pax-6 Expression in the Olfactory Bulb of *Xenopus laevis* Following Olfactory Nerve Lesions
Association for Chemoreception Sciences (AChemS) Annual Meeting
Sarasota, Florida
April 22-26, 1998
- George Stickney Identification of Intracellular Ca²⁺ Stores in Single Vascular Smooth Muscle Cells
National Conference on Undergraduate Research
Salisbury, Maryland
April 22-25, 1998
- Omid Bendavid The Lipid Binding Activity of the Exchangeable Apolipoprotein, Apolipoprotein-111, Correlates with the Formation of a Molten Globule
74th Annual Meeting of the Southwestern and Rocky Mountain Division of the American Association for the Advancement of Science
Grand Junction, Colorado
May 17-21, 1998
- Carolyn Bentley Food Selection by Grey Parrots in Cameroon
74th Annual Meeting of the Southwestern and Rocky Mountain Division of the American Association for the Advancement of Science
Grand Junction, Colorado
May 17-21, 1998
- Matthew Flowers The Role of cAMP and Calcium in the Adipokinetic Hormone-Induced Lipolytic Pathway of the Tobacco Hornworm, *Manduca sexta*.
74th Annual Meeting of the Southwestern and Rocky Mountain Division of the American Association for the Advancement of Science
Grand Junction, Colorado
May 17-21, 1998
- Justin Gazard Lipid Transfer Particle and Lipid Delivery to *Bombyx mori* oocytes.
74th Annual Meeting of the Southwestern and Rocky Mountain Division of the American Association for the Advancement of Science
Grand Junction, Colorado
May 17-21, 1998
- Nathan Hartvigsen Immunology and the Internet: Teaching Through Technology
74th Annual Meeting of the Southwestern and Rocky Mountain Division of the American Association for the Advancement of Science
Grand Junction, Colorado
May 17-21, 1998
- Gretchen Heinze Studies Toward the Total Synthesis of Gymnodimine
74th Annual Meeting of the Southwestern and Rocky Mountain Division of the American Association for the Advancement of Science
Grand Junction, Colorado
May 17-21, 1998
- Lisa Levy Sex-Linked Inheritance of a Cuticular Pigmentation Marker in a Marine Isopod (*Paracerceis sculpta*)
74th Annual Meeting of the Southwestern and Rocky Mountain Division of the American Association for the Advancement of Science
Grand Junction, Colorado
May 17-21, 1998

Mika Mayer	<p>The Role of <i>S. marcescens</i> in Biotransforming High Energy Explosives in the Presence of Heavy Metals</p> <p>74th Annual Meeting of the Southwestern and Rocky Mountain Division of the American Association for the Advancement of Science Grand Junction, Colorado May 17-21, 1998</p>
Harminder Singh	<p>The Role of the Intermediate Cerebellum in the Control of Movements that Involve Hand Use</p> <p>74th Annual Meeting of the Southwestern and Rocky Mountain Division of the American Association for the Advancement of Science Grand Junction, Colorado May 17-21, 1998</p>
Matthew Flowers	<p>Adipokinetic-Hormone Induced Lipolysis in the Fat Body of <i>Manduca sexta</i>: cAMP and Calcium are two Relevant Messengers in the Signal Transduction Pathway</p> <p>Third International Symposium on Molecular Insect Science Snowbird, Utah June 5-10, 1998</p>
Justin Gazard	<p>Lipid Transfer Particle and Lipid Delivery to <i>Bombyx mori</i> oocytes.</p> <p>Third International Symposium on Molecular Insect Science Snowbird, Utah June 5-10, 1998</p>
April Stonehouse	<p>Elucidation of the Role of Convertases in the Regulation and Processing of Peptide Hormones Secreted by the Midgut Endocrine Cells of the Mosquito, <i>Aedes aegypti</i></p> <p>Third International Symposium on Molecular Insect Science Snowbird, Utah June 5-10, 1998</p>
Amanda Ross	<p>Arabidopsis dwarf Mutants Define Eight Genes Involved in Brassinosteroid Biosynthesis and Signal Transduction</p> <p>American Society of Plant Physiologists Annual Meeting Madison, Wisconsin June 24-29, 1998</p>
Mitesh Patel	<p>Dimethyl Sulfoxide Protects Organs from Loss of Viability Induced by Warm Ischemia</p> <p>8th International Congress of Toxicology Paris, France July 5-10, 1998</p>
Nicole Washington	<p>Adding a New Checkpoint to the Budding Yeast G2/M Checkpoint Pathway</p> <p>FASEB Summer Research Conference on Yeast Chromosome Structure & Replication.</p> <p>Snowmass Village, Colorado August 8-13, 1998</p>
Ronald G.W. Teed	<p>Left Hippocampal Inactivation Differentially Affects Aged vs. Young Rats in a Spatial Memory Task</p> <p>Society for Neuroscience 28th Annual Meeting Los Angeles, California November 7-12, 1998</p>
<u>1999</u>	
Jonathan Shackman	<p>Monitoring Reactions of Importance to the Pharmaceutical Industry by Raman Spectroscopy</p> <p>Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy Orlando, Florida</p>

March 6-12, 1999

Paul W. Johnson Rupali Roy John Whitehead	Cytochrome P450 2E1 Content of Ischemic Liver is Maintained at Pre-Ischemic Levels by Dimethyl Sulfoxide (DMSO) 38th Annual Meeting of the Society of Toxicology New Orleans, Louisiana March 14-18, 1999
Olivia Oehrle-Steele	Use of a Novel ELISA to Investigate pH Dependent Interactions Between Antibodies to N. meningitidis and Membrane-Bound Colominic Acid 217th National Meeting of the American Chemical Society Anaheim, California March 21-25, 1999
Michael Thompson	Computational and Synthetic Studies of Structural Induction on Sialic Acid Peptides 217th National Meeting of the American Chemical Society Anaheim, California March 21-25, 1999
Herson Quinones	The Antizyme -Dependent Polyamine Transporter Mediates Radioprotection by the Amifostine Derivative WR-1065 Annual Meeting of the American Association for Cancer Research Philadelphia, Pennsylvania April 10-14, 1999
Jennifer Eugster	Synthetic Peptide Libraries Used for Detecting HLS Class I Allele-Specific Peptide Binding Motifs 75th Annual Meeting of the Southwestern and Rocky Mountain Division of the American Association for the Advancement of Science Santa Fe, New Mexico April 11-15, 1999
Cindy Takeuchi	New Gene Therapy Vectors to Produce Very High Levels of Therapeutic Gene Product 75th Annual Meeting of the Southwestern and Rocky Mountain Division of the American Association for the Advancement of Science Santa Fe, New Mexico April 11-15, 1999
Bridget Watts	Study of Prey Capture by the Desert Shrew, Notiosorex Crawfordi 75th Annual Meeting of the Southwestern and Rocky Mountain Division of the American Association for the Advancement of Science Santa Fe, New Mexico April 11-15, 1999
Jeremy Logan	The Effects of Platelet Activating Factor on Polymorphonuclear Leukocyte Activation in Diabetics and Non-Diabetics Experimental Biology 1999 Washington, DC April 17-21, 1999
Parmis Rad	Influence of Labor on Cytokine Production by Activated Cord Blood Mononuclear Cells American Thoracic Society International Conference San Diego, California April 25-28, 1999
Frederick T. Fell	Genetic and Phenotypic Analysis of spe-32, a Gene Required for Spermatogenesis with an Associated Larval Lethal Phenotype 12th International C. elegans Meeting Madison, Wisconsin June 2-6, 1999

James Falsey	Development of a Chemical Microarray Technology 16th American Peptide Symposium Minneapolis, Minnesota June 26-July 1, 1999
Noura Eleid	Potency of Insulin Analogs for in situ Stimulation of Glucose Uptake in Rat Soleus Muscle Fifth International Congress of Comparative Physiology and Biochemistry Calgary, Alberta, Canada August 23-28, 1999
Andrea Johnston	The Effect of Africanized Honey Bees on Tucson's Pet Population The Entomological Society of America Annual Meeting Atlanta, Georgia December 12-16, 1999
<u>2000</u>	
Cassandra Jones	Influence of Pulmonary Stretch Receptor Feedback and CO ₂ on Upper Airway and Respiratory Pump Muscle Activities AAAS Annual Meeting and Science Innovation Exposition Washington, DC February 17-22, 2000
Amy Lai	Behavior of Human Medial Collateral Ligament in Unconfined Compression 46th Annual Meeting of the Orthopaedic Research Society and International Symposium on Ligaments and Tendons Orlando, Florida
Jonathan Shackman	Determination of Enantiomeric Purity Using a Dispersive Raman Spectrometer Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy New Orleans, Louisiana March 12-17, 2000
Richard Slotkin	Transposition Frequency of Rescue Mu 42nd Annual Maize Genetics Conference Coeur d'Alene, Idaho March 16-19, 2000
Paul Johnson Rupali Roy John Talley John Whitehead	Hepatic Ischemia/Reperfusion Injury Reduced by Dimethyl Sulfoxide Society of Toxicology Meeting Philadelphia, Pennsylvania March 19-23, 2000
Shahnaz Kazi	A Study of HOX Gene Function in <i>Ilyanassa Obsoleta</i> Undergraduate Research Poster Session on Capitol Hill 2000 Washington, DC April 6, 2000
Regina Benton	The Impairment of Retention Induced by L-Name is Associated with a Cholinergic Hypofunction 76th Annual Meeting of the Southwestern and Rocky Mountain Division of the American Association for the Advancement of Science Las Cruces, New Mexico April 9-13, 2000
Cassandra Jones	Influence of Pulmonary Stretch Receptor Feedback and CO ₂ on Upper Airway and Respiratory Pump Muscle Activities 76th Annual Meeting of the Southwestern and Rocky Mountain Division of the American Association for the Advancement of Science

Las Cruces, New Mexico
April 9-13, 2000

Francisco Villa	Cooperative DNA Binding by the CI Regulatory Protein in HK022 Bacteriophage 76th Annual Meeting of the Southwestern and Rocky Mountain Division of the American Association for the Advancement of Science Las Cruces, New Mexico April 9-13, 2000
Cindy Takeuchi	High Yield Gene Therapy Vectors in In Vitro Transfection Tenovus Conference on Gene Expression and Disease Glasgow, Scotland April 10-12, 2000
Nicole Buan	Synechocystis PCC 6803 as a Model Organism for Investigating sHSP Function In Vivo Molecular Chaperones and the Heat Shock Response Conference Cold Spring Harbor Laboratories Cold Spring Harbor, New York May 3-7, 2000
Nicole Jarrett	Flavin-Induced Aggregation of the α Subunit of Bacterial Luciferase Biochemistry and Molecular and Cellular Biology Departmental Retreat Portal, Arizona October 6-8, 2000
Andrea Johnston	Impact of Africanized Honey Bees on the Pet Population in Tucson, AZ, A Model Urban Area 32nd Annual Conference of the Society for Vector Ecology Berkeley, California October 15-18, 2000
Lauren Hall-Lew	Prosodic Prominence on Negation in Various 'Registers' of US English Meeting of the Acoustical Society of America Newport Beach, California December 3-8, 2000

2001

Lauren Hall-Lew	Situational Variation in Prosodic Strategies: It's not as Simple as You Think 2001 Annual Meeting of the Linguistic Society of America Washington, DC January 4-7, 2001
Michael Wierzbza	Identification of Proteins Involved in Zein mRNA Trafficking in Zea mays. Maize Genetics Conference Lake Geneva, Wisconsin March 15-18, 2001
Joann Chang	Characterization of Angiogenesis In a 3D Matrix Southwestern and Rocky Mountain Regional Meeting of the AAAS Denton, Texas March 25-28, 2001
Asako Uchiyama	Detection of Reovirus Type 3 by a Fluorogenic 5' Nuclease Assay Southwestern and Rocky Mountain Regional Meeting of the AAAS Denton, Texas March 25-28, 2001
David Caretto Chandon Kundavaram Naomi Young	Hepatoprotection During Ischemia/Reperfusion in the Fischer 344 Rat: Comparison of Dimethyl Sulfoxide and Insulin Herbal Remedies Protect Against Chloroform Hepatotoxicity in Precision-Cut Tissue

	<p>Slices</p> <p>40th Annual Meeting of the Society of Toxicology San Francisco, California. March 26-28, 2001</p>
Shameema Sikder	<p>Synthesis of Amphiphilic Photoresponsive Dendrons</p> <p>221st American Chemistry Society National Meeting San Diego, California April 1-3, 2001</p>
Rohit Kedia	<p>Effect of Viscosity on Intramolecular Electron Transfer in Sulfite Oxidase</p> <p>221st American Chemistry Society National Meeting San Diego, California April 1-3, 2001</p>
Jeffrey Jensen	<p>Nucleotide Variability with and around G6pd, a Locus Under Balancing Selection in Humans</p> <p>Human Genome Meeting 2001 Edinburgh, Scotland April 19-22, 2001</p>
Jonathan Cox	<p>Functional Analysis of XdlI3 in Olfactory System Development</p> <p>Association for Chemoreception Sciences Sarasota, Florida April 25-29, 2001</p>
<u>2002</u>	
Lauren Hall-Lew	<p>To What Extent Do Authors Appear to Have an Accurate Ear for Regional Contraction Strategies?</p> <p>American Dialect Society San Francisco, California January 3-6, 2002</p>
Ada Dieke	<p>A Search for a Correlation Between Frontal Lobe Gyri and Behavior in Adults Afflicted with Developmental Language Disorders</p> <p>8th Biennial Symposium for Minorities, the Medically Underserved, and Cancer Washington, D.C. February 6-10, 2002</p>
Viet Huynh	<p>Upregulation of Renal Calcium Channels by Thiazide in Mice</p> <p>American Federation for Medical Research, Western Regional Meeting Carmel, California February 6-9, 2002</p>
Michael Wierzba	<p>Identification of Proteins Involved in Zein mRNA Trafficking in <i>Zea mays</i></p> <p>2002 Maize Genetics Conference Kissimmee, Florida March 14-17, 2002</p>
David Caretto Chandan Kundavaram	<p>The Herbal Product Schizandra Chinensis Protects Against Lipopolysaccharide (LPS)-Induced Hepatotoxicity in Fischer 344 Rats</p> <p>41st Annual Meeting of the Society of Toxicology Nashville, Tennessee March 16-18, 2002</p>
Ryan Falsey	<p>Growth Inhibition and Radiosensitization of Glioblastoma Multiforme by the Tyrosine Kinase Inhibitor ZD1839 (Iressa)</p> <p>93rd Annual Meeting of the American Association for Cancer Research San Francisco, California</p>

April 6-10, 2002

- Lauren Hall-Lew Prosodic and Syntactic Prominence on Negatives Used by US Presidents
Symposium About Language and Society
Austin, Texas
April 12-14, 2002
- Kristen Drumm Evidence for Positive Selection at Mc1r, a Gene Underlying Adaptive Color Variation in
Pocket Mice
Annual Evolution Meeting
Urbana-Champaign, Illinois
June 28-July 2, 2002
- Cynthia Wolf Cladogenesis Without Sex
Annual Evolution Meeting
Urbana-Champaign, Illinois
June 28-July 2, 2002
- Brian Lew Bifunctional Peptides: CCK Antagonist/Opioid Agonist for the Treatment of Neuropathic
Pain
XIVth World Congress of Pharmacology
San Francisco, California
July 7-12, 2002
- Lisa Ngo Iron Deficiency During Lactation or Pregnancy-What Makes the Greatest Impact Upon
Erythropoiesis and Iron Status in the Murine Offspring?
Neonatology and Immunology Conference
Orlando, Florida
November 14-16, 2002
- 2003**
- Luisa Gronenberg Efficient Synthesis of Heterocyclic Compounds
AAAS Annual Meeting
Denver, Colorado
February 13-18, 2003
- Wyatt Ho Dimethyl Sulfoxide and Ethanol, Organic Solvents Most Commonly Used as Vehicles in
Vitro, Affect Precision-Cut Liver Slice Viability
42nd Annual Meeting of the Society of Toxicology
Salt Lake City, Utah
March 9-13, 2003
- Pablo Bernardson Synthesis and Characterization of (Tp*) MoO₂ (thiolate) Compounds
225th American Chemical Society National Meeting
New Orleans, Louisiana
March 23-27, 2003
- Hung Tran Influence of Calcium on Manduca sexta Plasmotocyte Spreading and Network
Formation
225th American Chemical Society National Meeting
New Orleans, Louisiana
March 23-27, 2003
- Dana Gilmore Cloning the Oxytocin Receptor for Multimeric Ligand Binding Studies
78th Annual Meeting of the Southwest and Rocky Mountain Division of the AAAS
Tulsa, Oklahoma
April 8-11, 2003
- Mark Fernandez Evaluation of a New CPC-to-Gauge Bonding Technique Using In Vitro Fluid Flow
29th Annual Society for Biomaterials Meeting

Reno, Nevada
April 30-May 3, 2003

- Cynthia Perry The Interaction Between the Contractile Proteins Tropomodulin (E-TMOD/TMOD1) and Tropomyosin Stabilizes Thin Filaments
Weinstein Cardiovascular Development Conference
Cambridge, Massachusetts
May 15-17, 2003
- Sadie Taylor Nest Site Characteristics of Mount Graham Red Squirrels (*Tamiasciurus hudsonicus grahamensis*) in Mixed Conifer Habitat
3rd International Tree Squirrel Colloquium
Northumberland, England
May 26-30, 2003
- Amanda Farnsworth Targeting a Protein Tyrosine Phosphatase, PRL-1, for the Treatment of Pancreatic Cancer
94th Annual American Association for Cancer Research
Washington, DC
July 11-14, 2003
- Ehren Nelson Increased Antioxidant Defense Alters Cellular Redox Environment and Protects Against Glucocorticoid-Induced Apoptosis
94th Annual American Association for Cancer Research
Washington, DC
July 11-14, 2003
- Salma Kaochar Expression of Adherens Proteins in Human Schlemm's Canal Cells
Annual Biomedical Research Conference for Minority Students (ABRCMS)
San Diego, California
October 15-18, 2003
- Kirsten Metz
Jennifer Roberts Developmental Differences in Estimates of Sexual Risk and Benefits Among Adolescents: A Fuzzy-Trace Theory Analysis
Biennial Meeting of the Cognitive Development Society
Park City, Utah
October 24-25, 2003
- Michelle LaGioia The Cyclo-Oxygenase 2-Selective Inhibitor, Celecoxib, Mediates Growth Inhibition in Breast Cancer Cell Lines via Diverse Pathways
The AACR 2nd International Conference on Frontiers in Cancer Prevention Research
Phoenix, Arizona
October 26-30, 2003
- Christina Megli Velcade Induces Cell Death by Inducing Endoplasmic Reticulum Stress and Calcium-Mediated Mitochondrial Perturbation
2003 Annual Meeting of the American Society of Hematology
San Diego, California
December 6-10, 2003

2004

- Sarah Knuth Genome-Based RNA Interference Screen Identifies Regulators of Endocytosis in *Caenorhabditis elegans*
Annual Meeting of the American Association for the Advancement of Science
Seattle, Washington
February 12-16, 2004

Sebastian Treusch	CUP-5/h-mucolipin-1 is Required for Lysosome Biogenesis Annual Meeting of the American Association for the Advancement of Science Seattle, Washington February 12-16, 2004
Amanda Valles	Precision-cut Rat Liver Slice Technology: Effects of Carbon Dioxide vs. 'Rat Mix' Anesthesia Society of Toxicology Conference Baltimore, Maryland March 21-25, 2004
Charles Shanahan	Regioselective Synthesis of Benzyl Aryl Amine Disassembling Dendrons 227th Annual Meeting of the American Chemical Society Anaheim, California March 26-29, 2004
Hung Tran	Effects of Bacteria and TLCK on Hemocyte Morphology of <i>Manduca sexta</i> 227th Annual Meeting of the American Chemical Society Anaheim, California March 26-29, 2004
Jane Davis Angela Romanoski	The Immunosuppressive Effects of Biochemistry of Tumor Expressed Albumin (TEA) 95th Annual Conference of the American Association of Cancer Research Orlando, Florida March 27-31, 2004
Amanda Brown	Influence of Prenatal Nicotine Exposure on Postnatal Development of Breathing Pattern Experimental Biology Meeting Washington, DC April 17-21, 2004
David Johnson	Downregulated Antioxidant Defense Enzyme Expression is Correlated with Poor Survival in DLBCL Experimental Biology Meeting Washington, DC April 17-21, 2004
Michael French Wyatt Ho	Lack of Immunogenicity of PEG-Based Hydrogel Used as a Tissue Sealant in Laparoscopic Porcine Partial Nephrectomy The Society For Biomaterials - 7th World Biomaterials Congress Sydney, Australia May 15-21, 2004
Aluvia Escalante	Role of NF- κ B in UVB-Irradiated Immortalized Keratinocytes Post-Treated with Epigallocatechin-3-gallate 3rd Annual Frontiers in Cancer Prevention Research Seattle, Washington October 16-20, 2004
<u>2005</u>	
Nicole Rasmussen	Iterative Root-Finding Approach for Determination of Anisotropic Optical Constants and Surface Coverage of Cytochrome c Films. American Chemical Society National Meeting San Diego, California March 13-17, 2005
Mikhail Gold	Vitamin E Analogue as a Novel Treatment for Cancer 2005 Posters on the Hill, Council on Undergraduate Research

Washington, DC
April 18-20, 2005

Megan Wilson Colonic Bacteria Enhance the Development of Apoptosis Resistance, Which May Increase the Risk of Colon Cancer.
American Association for Cancer Research Annual Meeting
Anaheim, California
April 18-20, 2005

Lenka Stankova Mechanism of PNA Transport to the Nuclear Compartment.
First Meeting of the Oligonucleotide Therapeutics Society
New York, New York
September 15-18, 2005

2006

Heidi Hofer Flow-Induced Intimal Thickening of Blood Vessel Mimics
International Society for Applied Cardiovascular Biology
La Jolla, California
March 8-11, 2006

Rae Ana Snyder Coupled Proton-Electron Processes at Oxo-Molybdenum Centers
231st American Chemical Society National Meeting
Atlanta, Georgia
March 26-30, 2006

James Cherwa Genetic and Biochemical Analyses of the phiX174 External Scaffolding Protein
CUR Posters on the Hill
Washington, DC
April 2006

Tyler Brown Experimental Determination of Porohyperlastic Material Properties for Porcine Scleral Tissue
Bioengineering Conference
Amelia Island, Florida
June 21-25, 2006

Andrea Aguirre Phenotypic Analysis of the toadstool receptor-like kinase genes in *Arabidopsis thaliana*
American Society of Plant Biologists
Boston, Massachusetts
August 5-9, 2006

Clayton Mosher Enhanced Skin Conductance Responses Elicited by Facial Expressions With Averted Gaze in Rhesus Macaques
Annual Meeting of the Society of Neuroscience
Atlanta, Georgia
October 13-18, 2006

Mohammed Abdelwahab Neural Circuits Regulating Pelvic Vasodilation
American Chemical Society Meeting
Tucson, Arizona
October 14-18, 2006

Kevin Chandler Design, Synthesis, and Evaluation of Novel Peptidomimetics
American Chemical Society Meeting
Tucson, Arizona
October 14-18, 2006

James Cherwa Genetic and Biochemical Analyses of the phiX174 External Scaffolding Protein

	American Chemical Society Meeting Tucson, Arizona October 14-18, 2006
Jill Craven	Absorption Spectroscopy of Molecular Monolayers Using Single-Mode Optical Waveguides American Chemical Society Meeting Tucson, Arizona October 14-18, 2006
Safia Emesh	Effects of Loop Mutations on the Kinetics of Human Sulfite Oxidase American Chemical Society Meeting Tucson, Arizona October 14-18, 2006
Thomas Gaj	Highly Selective Cyclic-Hexapeptide Ligands for NeutrAvidin and Avidin Identified by Phage Display American Chemical Society Meeting Tucson, Arizona October 14-18, 2006
Christina Jelly Patrick Vinck	Protein S-Nitrosation in a Fibrosarcoma Cell Line American Chemical Society Meeting Tucson, Arizona October 14-18, 2006
Rae Ana Synder	Coupled Ptocon-Electron processes at Oxo-Molybdenum Centers American Chemical Society Meeting Tucson, Arizona October 14-18, 2006
Laura Goodman	Gender Differences in Smoking-Induced DNA Damage Frontiers in Cancer Prevention Research Conference Boston, Massachusetts November 12-15, 2006
<u>2007</u>	
Mohammed Abdelwahab	Neural Circuits Producing Pelvic Vasodilation American Association for the Advancement of Science Annual Meeting San Francisco, California February 15-19, 2007
Patrick Vinck	Protein S-Nitrosation in a Fibrosarcoma Cell Line American Association for the Advancement of Science Annual Meeting San Francisco, California February 15-19, 2007
Kathryn Plichta	A Worm and A Microbe: A New Model System for Understanding Symbiotic Interactions between Unicellular and Multicellular Organisms Council on Undergraduate Research 11th Annual 2007 Posters on the Hill Washington, DC April 25, 2007
John Biebelhausen	Development of the Glial Investment of Glomeruli in the <i>Drosophila</i> Olfactory Lobe Annual Meeting of the Association for Chemoreception Sciences Sarasota, Florida April 25-29, 2007
Corrine Walker	Complement Gene Expression is Upregulated in the Type 2 Diabetic Heart Following

Myocardial Ischemia and Reperfusion
Experimental Biology Conference
Washington, DC
April 28-May 2, 2007

Michelle Brandon Translational Regulation of Early Trypsin Synthesis by Target of Rapamycin in the Mosquito *Aedes aegypti*
American Society of Tropical Medicine and Hygiene (ASTMH) Annual Meeting,
Philadelphia, Pennsylvania
November 4-8, 2007

2008

Alice Ferng Inducing Cartilage Regeneration with Stem Cells for Treatment of Osteoarthritis Patients
Experimental Biology 2008
San Diego, California
April 5-9, 2008

Sarah Nelson Long-term Vasopressin Regulation of Renal Aquaporins and Urea Transporters in Mice with a Reduced Urinary Concentration Ability.
Experimental Biology 2008
San Diego, California
April 5-9, 2008

Lisette Velasquez Transferrin Expression Profile During Bacteria Infection in *Aedes aegypti* Mosquitoes.
Experimental Biology 2008
San Diego, California
April 5-9, 2008

Megan Craighead Paul Investigating the Role of the Eukaryotic Elongation Factors 1B-alpha (1,2) and eEF1B-beta (1,2) from *Arabidopsis thaliana* in Plant Thermotolerance.
Experimental Biology 2008
San Diego, California
April 5-9, 2008

Derek Hollman The Aqueous Autoxidation of Nitric Oxide.
Beckman Symposium
Irvine, California
July 2008

Wendy Ingram Loss of Protein Function *In Vivo* Resulting from the Introduction of Short Aggregation Prone Nonpolar Amino Acid Sequences.
Beckman Symposium
Irvine, California
July 2008

Anandani Nellan Predictor of Adherence to PMTCT Methods in Rural Tamil Nadu, India.
19th European Students' Conference
Berlin, Germany
September 29-October 3, 2008

Mark Leick Fabrication and Cellular Characterization of Supercritical Fluid-Derived Porous BioglassR Polymer Composite Scaffolds.
Biointerface 2008 Conference
Minneapolis, Minnesota
October 27-29, 2008

Robert Gibboni	Spatiotemporal analysis of scanpaths in monkeys viewing images of conspecific facial expressions Annual Meeting of the Society for Neuroscience Washington, DC November 15-19, 2008
Clayton Mosher	State-Dependent Modulation of Neural Activity in the Monkey Amygdala; Single Unit and EEG Activity During Social Stimulation and Sleep-883.1. Annual Meeting of the Society for Neuroscience Washington, DC November 15-19, 2008
Brianna Kolody	Regulation and Function of Midgut Protease Genes in <i>Aedes aegypti</i> Mosquitoes American Society of Tropical Medicine and Hygiene (ASTMH) Annual Meeting, New Orleans, Louisiana December 7-11, 2008
Laurel Watkins de Jong	The Aging Mosquito: Increased Insulin Signaling in the Midgut of <i>An. stephensi</i> Reduces Lifespan American Society of Tropical Medicine and Hygiene (ASTMH) Annual Meeting, New Orleans, Louisiana December 7-11, 2008
Talya Lepow	Identificaton of Interactors of Mucolipins. American Society for Cell Biology San Francisco, California December 13-17, 2008
<u>2009</u>	
Wujie Zhang	Cloning and Localization of Four Putative Serotonin Receptors in the Primary Olfactory Pathway of the Moth <i>Manduca sexta</i> . Association for Chemoreception Sciences Annual Meeting Sarasota, Florida April 22-26, 2009
John Dohyung Kwon	Occurence of Non-01/Non-0139 <i>Vibrio cholerae</i> and <i>Aeromonas spp.</i> in Arizona American Society for Microbiology Philadelphia, Pennsylvania May 17-21-2009
Kyle Almryde	Neural Substrates for Retrieval of Attended and Unattended Words Encoded During Attentive Listening Organization for Human Brain Mapping Annual Meeting San Francisco, California June 18-23, 2009
Jasmin Uribe	Modeling Transcriptional Regulation International Conference on Mathematical Biology , and Annual Meeting of the Society of Mathematical Biology Vancouver, British Columbia, Canada July 27-30, 2009
Rousel Orozco	Characterization and phylogenetic relationships of <i>Photorhabdus sp.</i> (Gamma-Proteobacteria: Enterobacteriaceae) the bacterial symbiont of <i>Heterorhabditis sonorensis</i> (Nemadotoda: Heterorhabditidae). International Symbiosis Society Congress Madison, Wisconsin

August 9-15, 2009

Wujie Zhang Serotonin Receptors in the Primary Olfactory Pathway of the Moth *Manduca sexta*.
Neuroscience 2009
Chicago, Illinois
October 17-21, 2009

2010

Gina Mason The Role of Catechol-o-Methyltransferase and Dopamine Receptor D4 in ADHD
Symptom Variation Among Individuals with Down Syndrome
AAAS Annual Meeting
San Diego, California
February 18-22, 2010

Kim Tham cAMP-Dependent Pathways(s) Directs the B-Raf MAPK-Mediated Cystolic
Mislocalization of p27kip-Cyclin D1 in Renal Cancer.
Experimental Biology 2010
Anaheim, California
April 24-28, 2010

Janki Bhakta The Effect of Targeted Silencing of Ferritin in the Yellow Fever Mosquito, *Aedes*
aegypti
Experimental Biology 2010
Anaheim, California
April 24-28, 2010

Aram Cholanians Microglial Response to 3,4-(±)-Methylenedioxymethamphetamine in Sprague-Dawley
Rats
Society for Neuroscience Annual Meeting
San Diego, California
November 13-17, 2010

2011

Heather Waters Biological Tissue Growth on Allograft Surfaces Using Adipose Derived Stromal Cells
Orthopaedic Research Society (ORS) Annual Conference
Long Beach, California
January 13-16, 2011

Jessie Brown Runx2 is an Early Mediator of EMT in the Embryonic Heart
Keystone Symposia on Epithelial Plasticity and Epithelial to
Mesenchymal Transition
Vancouver, British Columbia, Canada
January 21-25, 2011

Mounir Koussa Glial Calcium Currents and the Formation of the Glial Networks in the Developing
Olfactory Nerve.
American Biophysical Society 55th Annual Meeting
Baltimore, Maryland
March 5-9, 2011

Kim Tham cAMP-dependent Pathway(s) Increase the CyclinD1/p27-kip through Rap-GTP/B-raf
MAPK Signaling Pathway in Renal Cancer
Society of Toxicology Annual Conference
Washington, DC
March 6-11, 2011

Amanda Davis Investigating the Role of Histidine 304 in the Enzymatic Function and Active Site

	Structure of Human Sulfite Oxidase Amercian Chemical Society Conference Anaheim, California March 27-29, 2011
Kimberly Meyers	Investigating the Amino Acids in Close Proximity to the Heme of Human Sulfite Oxidase Amercian Chemical Society Conference Anaheim, California March 27-29, 2011
Vinoo Urity	Three-dimensional Architecture of Nephrons and Vessels in the Human Renal Medulla 2011 Experimental Biology Conference Washington, DC April 9-13, 2011
Ersilia Anghel	Novel Treatment Regimen Using Europium Nanorods for Diabetic Foot Wounds 6th International Symposium on the Diabetic Foot Noordwijkerhout, The Netherlands May 11-14, 2011
Ella Starobinska	ETS1/2 Regulatory Network in Heart Development of <i>Ciona intestinalis</i> 6th International Tunicate Meeting Montreal, Quebec, Canada July 3-7, 2011
Xingyan Yu	Desmoplakin and Talin2 Are Novel mRNA Targets of Fragile X Related Protein-1 in Cardiac Muscle Amercian Society of Cell Biology Annual Meeting Denver, Colorado December 3-7, 2011

2012

Jessica Regan	Reduced Length-Dependent Activation in Human Cardiomyocytes Harboursing the Cardiac Troponin I Mutation R145W Biophysical Society 56th Annual Meeting San Diego, California February 25-28, 2012
Shiana Ferng	Development of a Parkinson's Disease Model in Medaka Fish Experimental Biology 2012 San Diego, California April 20-24, 2012
Jonathan Ferng	The Influence of Advanced Age on Novelty Detection Experimental Biology 2012 San Diego, California April 20-24, 2012
Martin Faridian	Inhibition of Neuropathic Pain via Dynorphin Analog LYS 1044 Experimental Biology 2012 San Diego, California April 20-24, 2012

2013

Wesley Cai	Pentoxifylline initiated GSK-3b induced proteasomal degradation of cyclin D1 and arrests renal cancer cells in the G1 phase
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Experimental Biology 2013
Boston, Massachusetts
April 2013

Sumana Veeravelli MRI of the Neurological Effects in a Rat Model of Hypertension
International Society for Magnetic Resonance in Medicine Conference
Salt Lake City, Utah
April 2013

Sophie Hapak Biochemical competition between a PKC isoforms establishes neuronal polarity
International School of Biological Magnetic Resonance
Erice, Sicily
July 2013

Julie Huynh ESCRT-associated protein involvement in lysosomal dysfunction and cell death in
Mucopolipidosis type IV
American Society for Cell Biology
New Orleans, Louisiana
December 2013

2014

Amanda Chung Preliminary Characterization of an Abp Knockout Mouse
Workshop on Wild Mice
Plön, Germany
May 23 – 25, 2014

Jordan Brock Evolutionary History of the Genus *Camelina* (Brassicaceae)
22nd National Biology Conference
Eskisehir, Turkey
June 23 - 27, 2014

Darya Anderson Mapping microbial carbon substrate utilization across permafrost thaw
American Geophysical Union (AGU)
San Francisco, CA
December 15 – 19, 2014

2015

Cheryl Cheah Proinflammatory Environmental Exposures in Asthma
2015 Experimental Biology Meeting
Boston, MA
March 28 – April 1, 2015

Shaina Hasan Use of Antagonistic Peptide Technology to Determine the CLE Peptides that Regulate
Root Growth in Arabidopsis
2015 Experimental Biology Meeting
Boston, MA
March 28 – April 1, 2015

2016

Alison Comrie Different monkey models of human cognitive aging exhibit disparities in learning and
performance of memory tasks
Council on Undergraduate Research (CUR) Posters on the Hill
Washington, D.C.
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POSTERS AND PRESENTATIONS AT SCIENTIFIC MEETINGS

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- 4 Abdelwahab, M.G., Vilimas, P., and Morris, J. L. (2007). Neural circuits producing pelvic vasodilation. AAAS Annual Meeting, San Francisco, California. **[Mohammed Abdelwahab]**
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- 18 Ali, A., Angel, D., Tsosie, M., and Shorty, L. (2012). Native Health Research Conference, Seattle, WA. **[Lyle Shorty]**
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- 24 Andersen, E., Hackett, J., Molnar, I. (2012). Sequencing and de novo annotation of the transcriptomes of Botryococcus braunii races A and L for creating biofuels. McNair Symposium, University of California, Berkeley, CA.

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- 27 Andersen, J.F., Stevens, J.L., Walding, J.K., and Feyereisen, R. (1995). Catalytic activity and active site topology of a house fly cytochrome P450, CYP6A1. Third International Symposium: Cytochrome P450 Biodiversity, Woods Hole, Massachusetts. **[Jennitte Stevens]**
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- 31 Anderson, D, McCalley, C, Hodgkins, S, Tfaity, M, Crill, P, Saleska, S, Chanton, J, Rich, V (2014). Mapping microbial substrate utilization across a thaw gradient. AGU, San Francisco Presented: December 2014 [Anderson, Darya] **[Darya Anderson]**
- 32 Anderson, D, Sederholm, M, Jones, R, Kim,E-H, Hodgkins,S, Chanton, J, Rich, V (2014). Microbial responses to thawing permafrost: Will they accelerate climate change? ANAS, Flagstaff Presented: April 12, 2014 [Anderson, Darya] **[Darya Anderson]**
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- 34 Anghel, E., Heimark, R., Bharara, M., Rilo, H.L., Raza, O., and Armstrong, D.G. (2011). Novel treatment regime using Europium nanoparticles to stimulate Angiogenesis. Diabetic Foot Global Conference, Los Angeles, CA. **[Ersilia Anghel]**
- 35 Anghel, E., Shi, J., and Pun, S. (2011). Internalization pathways of non-viral vectors for gene therapy. University of Washington Undergraduate Research Symposium, Seattle, WA. **[Ersilia Anghel]**
- 36 Arakaki, C. and Strausfeld, N.J. (1990). Flight motor neurons in the blowfly *Sarcophaga bullata* and *Calliphora erythrocephala*. 20th Annual Meeting of the Society for Neuroscience, St. Louis, Missouri. **[Carol Arakaki]**
- 37 Arora, A., Willhite, C.A., and Liebler, D.C. (1998). Interactions of b-carotene and cigarette smoke. Mountain West Society of Toxicology, Tucson, Arizona. **[Celeste Willhite]**
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- 39 Arrese, E., Flowers, M., Gazzard, J., and Wells, M. (1998). Adipokinetic hormone-induced lipolysis in the fat body of *Manduca sexta*: cAMP and calcium are two relevant messengers in the signal transduction pathway. Third International Symposium on Molecular Insect Science, Snowbird, Utah. **[Matthew Flowers]**
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- 43 Azizeh, Y., Trivedi, D., David, C., Dandrea, N., Van Tine, B., Sturm, N.S., Li, G., and Hruby, V.J. (1994). Asymmetric amino acid substitution at Tyr10 position of glucagon leads to greater receptor binding differences. European Peptide Symposium. **[Clinton David]**
- 44 Badran, A.H. (2009). Seeing DNA: A new approach for the direct detection of dsDNA and its chemical modifications. Eleventh Annual Beckman Symposium, Irvine, California. **[Ahmed Badran]**
- 45 Baggett, B., Lien, A., Roy, R., Robey, I.F., and Gillies, R.J. (2003). Characterization of hypoxia inducible luciferase reporters for non-invasive in vivo imaging. Society of Molecular Imaging Annual Meeting, San Francisco, California. **[Rupali Roy]**
- 46 Baggett, B., Roy, R., Momen, S., and Gillies, R.J. (2002). In vivo imaging using heat-stable luciferase as a reporter. First Annual Meeting of the Society for Molecular Imaging, Boston, Massachusetts. **[Rupali Roy]**
- 47 Bahe, A.E., Lee, K., Briehl, M. (2012). Effect of ATN-224 Treatment on BCL-2 Family Member Proteins Associated with Apoptosis in Lymphoma Cells. NAU NACP, Northern Arizona University Presented: 8/2/2012 [Bahe, Amanda] **[Amanda Bahe]**

- 48 Bahureksa, L., Schwenk, M., Saleh, A., Sabbagh, M., Coon, D., Mohler, J., Najafi, B. (2014). Impact of Mild Cognitive Impairment on Gait and Balance: a systematic review. 2014 Flinn Summer Research Presentation - Arizona Aging and Cognitive Collaborative, Conference Room 442, College of Nursing and Health Innovation, Arizona State University Presented: 08/01/2014 [Bahureksa, Lindsay] **[Lindsay Bahureksa]**
- 49 Balaji, A, Schneider, H, Emund, A, Svensson, F, Hansson, GC (2015). Analyzing Muc2 Release in a Primary Cell Culture Model of Cystic Fibrosis. Poster presented at the Mucins in Health and Disease Conference, Cambridge, England, July 18 - 22. **[Aanika Balaji]**
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- 55 Bartik, L., Whitfield, G.K., Kaczmarek, M.J., Haussler, C.A., Haussler, M.R., and Jurutka, P.W (2007). Curcumin: A Novel Nutritionally-Derived Ligand of the Vitamin D Receptor with Implications for Colon Cancer Chemoprevention and Bone Health. 29th Annual Meeting of the American Society for Bone and Mineral Research, Honolulu, Hawaii. **[Leonid Bartik] [Magdalena Kaczmarek]**
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- 57 Bartnek, F., Van Antwerpen, R., Gilkey, J.C., Yepiz, P., and Zeigler, R. (1993). Isolation and characterization of an unusual yolk protein from the cochineal insect, *Dactylopius confusus*. Second International Symposium on Molecular Insect Sciences, Flagstaff, Arizona. **[Jon (Flash) Bartnek]**
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- 62 Battraw, G.A., Miera, V., Szivek, J.A., and Anderson, P.L. (1995). Symmetry in the biomechanical properties of rat femora. 11th Annual Academy of Surgical Research Conference, Albuquerque, New Mexico. **[George Battraw] [Verma Miera Clark]**
- 63 Battraw, G.A., Szivek, J.A., Anderson, P.L., and Atcity, E. (1997). Interface strength studies of calcium phosphate ceramic-coated strain gauges. The 23rd Annual Meeting of the Society of Biomaterials, New Orleans, Louisiana. **[George Battraw]**
- 64 Baumann, P. (1993). The effect of reduction in glial number on neuronal branching patterns in the developing insect brain. Arizona Society for Electron Microscopy and Microbeam Analysis Annual Meeting, Phoenix, Arizona. **[Patricia Baumann-Burroughs]**
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- 71 Beeson, P.M., Rapcsak, S.Z., Ramage, A.E., Plante, E., Chargualaf, J., Chung, A., and Trouard, T. (2001). The neural substrates for writing: A functional imaging study. Annual Meeting of the International Neuropsychological Society. Chicago, Illinois. **[Anne Chung]**
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- 78 Benally, M. and Plante, E. (1997). Sylvian fissure asymmetry in relation to gender and handedness. Annual Meeting of the Society for Advancement of Chicanos and Native Americans in Science, Houston, Texas. **[Mellisa Lee Benally]**
- 79 Bendavid, O.J. and Soulages, J.L. (1998). The lipid binding activity of the exchangeable Apolipoprotein, Apolipoprotein-111, correlates with the formation of a molten globule. 74th Annual Meeting of the Southwestern and Rocky Mountain Division of the American Association for the Advancement of Science, Grand Junction, Colorado. **[Omid Bendavid]**
- 80 Bentley, C.S., May, D.L., and Pepperberg, I.M. (1998). Food selection by African Grey parrots in Cameroon. The SWARM Division of AAAS Annual Meeting, Grand Junction, Colorado. **[Carolyn Bentley Wells]**
- 81 Benton, R., Pepeu, G., Kopf, S.R., and Kalfin, R. (2000). The impairment of retention induced by L-name is associated with a cholinergic hypofunction. SWARM AAAS Meeting, Las Cruces, New Mexico. **[Regina Benton Bower]**
- 82 Bernardson, P., Inscore, F.E., Joshi, H.K., Carducci, M.D., and Enemark, J.H. (2003). Synthesis and characterization of (Tp*) MoO₂ (thiolate) compounds. 225th American Chemical Society National Meeting, New Orleans, Louisiana. **[Pablo Bernardson]**
- 83 Bernstein, A., Veeravelli, S., Alvarez, A., Fitzhugh, M., Yoshimaru, E., Valdez, M., Totenhagen, J., Chen, K., Moeller, J., Coleman, P., Mitchell, K., Huentelman, M., Barnes, C., Alexander, G., Trouard, T. (2013). MRI of the neurological effects in a rat model of hypertension. International Society for Magnetic Resonance in Medicine Conference, Salt Lake City, UT. **[Sumana Veeravelli]**
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- 86 Birky, C. W., Wolf, C., Gemmel, M., Henry, E., and Perry, J. (2004). Defining species in an asexual lineage. Evolution 2004, Fort Collins, Colorado. **[Marlea Gemmel] [Cynthia Wolf Trotter]**
- 87 Birky, C.W. and Gemmel, M. (2004). Using the conserved secondary structure of 5.8s and its RNA to study speciation and natural selection in bdelloid rotifers. University of Arizona Graduate Student Recruitment Fair, Tucson, Arizona. **[Marlea Gemmel]**
- 88 Blackwater, T., Bowen, M.E., Fisher, A., Lau, S. (2006). Identification of the post-translation modifications of proteins by metabolites of benzoquinone. Association of American Indian Physicians Annual Conference, St. Paul, Minnesota. **[Thomasina Blackwater]**
- 89 Blair, J.L. and Levine, R.B. (1992). Neural-muscle interactions in *Manduca* limb development. The SWARM Division of AAAS Annual Meeting, Tucson, Arizona. **[James Blair]**
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- 91 Blumenfeld, M.L., Tyler, J.M., and Monti, O.L.A. (2007). Interfacial structure and dynamics in organic photovoltaics from solar cells to single molecules. American Chemical Society 233rd National Meeting & Exposition, Chicago, Illinois. **[Jason Tyler]**
- 92 Blumenfeld, M.L., Tyler, J.M., Tackett, B.S. and Monti, O.L.A. (2007). Charge transfer dynamics and interfacial electronic structure in organic photovoltaics and dye sensitized solar cells. 3M Center, St. Paul, Minnesota. **[Jason Tyler]**
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- 94 Boles, J. (1997). Hepatotoxicity of chaparral in rats and humans. The Fifth Annual Student Research & Community Service Expo, Tucson, Arizona. **[Julie Boles]**
- 95 Bonner, M.R., Olson, K.M., and Olson, G.B. (1991). Evaluation of Ethanol Treated HL-60 Cells Using Fluorescent DNA Stains and Digital Image Processing (DIP). The Annual Meeting of the Arizona Branch of the American Society of Microbiologists, Tempe, Arizona. **[Roxane (Mary) Bonner]**
- 96 Borrego, S.L., Mayo, J.J., Geiser, D.L., and Winzerling, J.J. (2008). Characterization of mosquito iron regulatory protein 1 in *Aedes aegypti* mosquito. Experimental Biology 2008, San Diego, CA. **[Stacey Borrego]**
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- 100 Bracha, V., Danielek, K.A., Irwin, K.B., and Bloedel, J.R. (2000). Motor programs during adaptation to rotated visual feedback: Rote learning or generalized maps? Society for Neuroscience Meeting, New Orleans, Louisiana. **[Kathryn Danielek Waldo]**
- 101 Brandon, M.C., Pennington, J.E., Schillinger, A-S, and Miesfeld, R.L. (2007). Translation regulation of early trypsin synthesis by target of rapamycin in the mosquito *Aedes aegypti*. ASTMH Conference, Philadelphia, Pennsylvania. **[James Pennington]**
- 102 Brandon, M.C., Pennington, J.E., Schillinger, A-S., and Miesfeld, R.L. (2007). Translational regulation of early trypsin synthesis by target of rapamycin in the mosquito *Aedes aegypti*. American Society of Tropical Medicine and Hygiene (ASTMH) Annual Meeting, Philadelphia, Pennsylvania. **[Michelle Brandon Hines]**
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- 104 Breslin, J.H., Mason, G.M., Edgin, J.O., Bootzin, R.R., Goodwin, J.L., and Nadel, L. (2010). Sleep characteristics in older children with Down syndrome. 24th Annual Meeting of the Associated Professional Sleep Societies, San Antonio, Texas. **[Gina Mason]**
- 105 Brettner, L. and Masel, J. (2011). Homo-oligomerization is used to mitigate the effects of expression noise. Annual meeting of the Society for the Study of Evolution, Norman, Oklahoma. **[Leandra Brettner]**
- 106 Briggs, D.B., Sarkar, D., Johnson, R.M., Mauser, J.A., Nunez, M., and Tsao, T.S. (2010). Inhibition of adiponectin oligomerization under oxidizing conditions and induction of an oxidizing redox environment in endoplasmic reticulum of 3T3-L1 adipocytes exposed to high concentrations of palmitate. Keystone Symposia on Diabetes, Whistler, British Columbia, Canada. **[Justin Mauser]**
- 107 Bright, K.L. and Bernays, E.A. (1991). Dietary mixing in grasshoppers: Switching induced by nutritional imbalances in foods. The Center for Insect Science Conference at Biosphere II, Oracle, Arizona. **[Kerry Bright Emlen]**
- 108 Brock, JR, Donmez, AA, Beilstein, MA (2014). Evolutionary history of the genus *Camelina* (Brassicaceae). 22nd National Biology Congress, Eskisehir, Turkey. **[Jordan Brock]**
- 109 Broersma, B.M., Schimanski, L.A., Harley, C.W., Fisher, G.M., Bohanick, J.D., McNaughton, B.L., and Barnes, C.A. (2008). Aging reduces performance on a spatial version of classical eyeblink conditioning in the rat. Arizona Alzheimer's Consortium Annual Meeting, Glendale, Arizona. **[Brittanie Broersma Hagen]**
- 110 Brokl, O.H., Shuprisha, A., Martinez, C.L., Abbott, D.E., and Dantzer, W.H. (1997). Regulation of intracellular pH(pHi) in proximal tubules of avian long-looped nephrons. Experimental Biology 97, New Orleans, Louisiana. **[Christina Martinez Klein]**
- 111 Bronnimann, M.P., Campos, S.K. (2011). A predicted transmembrane domain in HPV 16 Minor Capsid Protein L2 is Important for Late stages of HPV 16 Cell Invasion. Sixth Annual Frontiers in Immunobiology/Immunopathogenesis Symposium, University of Arizona Presented: 3/11/11 [Bronnimann, Matthew] **[Matthew Bronnimann]**
- 112 Brooks, H.L., McReynolds, M.R., Garcia Taylor, K.M., Greer, K.A., and Hoying, J.B. (2004). Decrease of mitochondrial function in renal medulla of AQP1 null mice? American Society of Nephrology, St. Louis, Missouri. **[Katherine Taylor]**
- 113 Brosh L, Abril E, Amit A, Meek W, McDaniel K, Dexter E, Dalkin B, Nagle R (2011). Investigation of the Correlation Between Up-Regulated ERG Expression and Capsular Penetration in Prostate Cancer . Ventana Tuscon Symposium, Presented: [Brosh, Laura] **[Laura Brosh]**
- 114 Brown, A. (2014). Multi-unit recordings from the bumblebee, *Bombus terrestris*. (American) Students' Progress Report, Biozentrum, Universität Würzburg, DE Presented: 25/07/2014 [Brown, Austin] **[Austin Brown]**

- 115 Brown, AD, Carroll, MJ, DeGrandi-Hoffman, G (2014). The Sublethal Effects of a Fungicide, Pristine, on Queen and Colony Health. SWESx, Student Union Southern Ballroom, UofA Presented: April 11th [Brown, Austin] **[Austin Brown]**
- 116 Brown, AD, Carroll, MJ, DeGrandi-Hoffman, GDG (2013). Sublethal effects of pristine, a fungicide, on honeybee health. 6th Annual Arizona Mass Spectrometry Discussion Group, University of Arizona, BIO 5, Tucson, AZ **[Austin Brown]**
- 117 Brown, C., and Kandel, R. (2011). Regulation of transcription factor SOX9 and 6 during in vitro cartilage formation is mediated by insulin receptor. Samuel Lunenfeld Research Institute Summer Student Poster Session, Mount Sinai Hospital, Toronto, Ontario, Canada, **[Chelsea Brown]**
- 118 Brown, JA, Tavares, ALP, Rusche, J, Runyan, RB (2011). Runx2 is an Early Mediator of EMT in the Embryonic Heart . Keystone Symposia Conference: Epithelial Plasticity and Epithelial to Mesenchymal Transition, Vancouver, Canada Presented: Jan 21-26 [Brown, Jessie] **[Jessie Brown]**
- 119 Brown, M.A., Gustafson, M.R., Saldana, S., Ehteshami, S., and Miller, H.S. (2002). Maternal smoking and allergy are associated with increased decidual IL-4 production. Society for Gynecological Research, Los Angeles, California. **[Samira Ehteshami]**
- 120 Brown, O., Silvers, A.L., Bachelor, M.A., and Bowden, G.T. (2005). UVA-induced modulation of Bcl-XL by C-Jun N-terminal kinase (JNK) in human keratinocytes. UBRP Conference, University of Arizona, Tucson, Arizona. **[Olivia Brown]**
- 121 Buan, N., Giese, K., and Vierling, E. (2000). Synechocystis PCC 6803 as a model organism for investigating sHSP function in vivo. Molecular Chaperones and the Heat Shock Response, Cold Spring Harbor Laboratories, Cold Spring Harbor, New York. **[Nicole Buan Murphy]**
- 122 Buck, D (March 2009). Stronger, Better, Faster, Greener: Chemistry Outreach at the University of Arizona. Poster presented at the American Chemical Society National Conference, Salt Lake City, UT. **[Danielle Buck]**
- 123 Bultman, E (2005). Structural and functional studies of sulfite oxidizing enzymes using pulsed EPR. Severnth Annual Beckman Scholars Symposium, Irvine, CA. **[Eric Bultman]**
- 124 Bultman, E., Astashkin, A., Feng, C., Raitsimring, A.M., Cooney, J.J.A., and Enemark, J.H. (2005). Pulsed EPR studies of 17O-labeled sulfite oxidase and model compounds. 12th International Conference for Bioinorganic Chemistry (ICBIC-12), Ann Arbor, Michigan. **[Eric Bultman]**
- 125 Burke, S., Hartzell, A.L., Hoang, L.T., Wallace, J.L., Maurer, A.P., Chawla, M.K., and Barnes, C.A. (2010). Transcription of the immediate-early gene Arc in the perirhinal cortex does not show a response decrement following repeated exposures to novel objects. 40th Annual Society for Neuroscience Meeting, San Diego, CA. **[Andrea Hartzell]**
- 126 Burke, S.N., Chawla, M.K., Penner, M.R., Schaner, M.J., Worley, P.F., McNaughton, B.L., and Barnes, C.A (2004). Differential distribution of activity-induced ARC RNA in deep and superficial lamina of the posterior parietal cortex. Society for Neuroscience Meeting, San Diego, California. **[Michael Schaner]**
- 127 Burke, S.N., Chawla, M.K., Penner, M.R., Schaner, M.J., Worley, P.F., McNaughton, B.L., and Barnes, C.A. (2004). Differential distribution of activity-induced ARC RNA in deep and superficial lamina of the posterior parietal cortex. Society for Neuroscience, Washington D.C. **[Michael Schaner]**
- 128 Burke, S.N., Maurer, A.P., Insel, N., Navratilova, Z., McNaughton, B.L., Wenk, G.L., and Barnes, C.A (2005). Effects of memantine on experience-dependent place field expansion in aged rats. Society for Neuroscience Meeting, Washington D.C. **[Zaneta Navratilova]**
- 129 Cabello, C. (2003). Synthesis of novel a -MSH analogues for melanocortin receptor bioactivity studies. Minority Access to Research Careers Seminar, Tucson, Arizona. **[Chris Cabello]**
- 130 Cabello, C., Beigi, F., and Wainer, I. (2003). Biotin-Streptavidin immobilization of m-opioid receptor for on-line chromatographic binding studies. National Institutes of Health Intramural Research Program, Bethesda, Maryland. **[Chris Cabello]**
- 131 Cabello, C., Cai, M., Trivedi, D., and Hruby, V.J. (2002). Biological activity of cyclic alpha-MSH analogues at different human melanocortin receptors. Pfizer Diversity Initiative Poster Presentation, Ann Arbor, Michigan. **[Chris Cabello]**
- 132 Cabello, C., Korff, E., Cai, M., Trivedi, D., and Hruby, V.J. (2001). Development of potent and selective a-MSH analogues for controlling human feeding behavior. University of Arizona Graduate Student Association, Student Showcase Poster Presentation, Tucson, Arizona. **[Chris Cabello]**
- 133 Cabello, C., Moaddel, R., and Wainer, I. (2003). Nicotinic receptor immobilization for chromatographic ligand binding studies. Annual Biomedical Research Conference for Minority Students, San Diego, California. **[Chris Cabello]**
- 134 Cabello, C., Stankova, M., Cai, M., Vagner, J., and Hruby, V.J. (2002). Synthesis of novel gamma-MSH analogues for melanocortin receptor bioactivity studies. Diversity Fellowship Symposium, Ann Arbor, Michigan. **[Chris Cabello]**
- 135 Cabello, C., Swift, J., Cai, M., Trivedi, D., and Hruby, V.J. (2001). Novel a-MSH analogues for regulation of feeding behavior. Summer Research Institute Summer Poster Presentation, Tucson, Arizona. **[Chris Cabello]**
- 136 Cabello, C., Wainer, I., and Moaddel, R. (2003). Nicotinic receptor immobilizations for chromatographic ligand binding studies. National Institutes of Health, Institute on Aging, Baltimore, Maryland. **[Chris Cabello]**
- 137 Cai, A., Bannister, K., Rankin, D., Dickenson, T., Lai, J. (2012). The Pronociceptive Activity of Spinal Dynorphin A is not due to Sensitization of Wide Dynamic Range Neurons. Experimental Biology, San Diego Presented: April 20-25th [Cai, Alice] **[Alice Cai]**
- 138 Cai, M., Cain, J.P., Bao, J.M., Muthu, D., Trivedi, D., and Hurby, V.J. (2011). Novel designed melanotropins lead to selective cell signaling. 22nd American Peptide Symposium, San Diego, California. **[Jennifer Bao]**

- 139 Cai, M., Qu, H., Mayorov, A.V., Dedek, M.M., Palmer, E.S., Trivedi, D., Tsapralis, G., and Hruby, V.J. (2006). Study of Peptide vs. Non-peptide Agonists Effects on Posttranslational Modifications of the Human Melanocortin 4 Receptor. Chemistry at the Border, 19th Rocky Mountain Regional Meeting, Tucson, Arizona. **[Erin Palmer]**
- 140 Cai, W., Mastrandrea, N.J., Tham, K.Y., Monks, T.J., Lau, S.S. (2013). Pentoxifylline initiates GSK-3 β -induced proteasomal degradation of cyclin D1 and arrests renal cancer cells in the G1 phase. Experimental Biology, Boston, MA. **[Wesley Cai]**
- 141 Cai, W.L., Mastrandrea, N.J., Tham, K.J., Monks, T.J., Lau, S.S. (2013). The varying effects of Pentoxifylline on cyclin D1 levels and G1 phase arrest in different renal cell carcinoma cell models. Frontiers in Biomedical Research Poster Forum, Tucson, AZ Presented: 10/23/13 [Cai, Wesley] **[Wesley Cai]**
- 142 Cai, W.L., Mastrandrea, N.J., Tham, K.J., Monks, T.J., Lau, S.S. (2014). Pentoxifylline induces GSK-3 β -independent proteasomal degradation of cyclin D1 and arrests renal cancer cells in the G1 phase. Experimental Biology, San Diego, CA. **[Wesley Cai]**
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- 144 Cain, J.P., Mayorov, A.V., Cai, M., Palmer, E.S., Tan, B., Chandler, K., Wang, H., Wallace, S., Ortiz, G.N., Lee, Y-S, Petrov, R.R., Trivedi, D., Hruby, V.J. (2006). Design, synthesis, and evaluation of novel peptidomimetics. Chemistry at the Border, 19th Rocky Mountain Regional Meeting, Tucson, Arizona. **[Kevin Chandler] [Erin Palmer]**
- 145 Cain, J.P., Mayorov, A.V., Cai, M., Palmer, E.S., Tan, B., Chandler, K.B., Yamamoto, T., Nair, P., Wallace, S., Ortiz, G.N., Wang, H., Santarelli, G., Lee, Y. S., Petrov, R.R., Ndungu, J.M., Trivedi, D., and Hruby, V.J. (2007). Design, synthesis, and evaluation of novel peptidomimetics. 233rd ACS National Meeting, Chicago, Illinois. **[Erin Palmer] [Kevin Chandler]**
- 146 Calderon, K., Redd, A.J., Merchant, N., and Hammer, M.F. (2005). USA core loci online: Y-chromosomal short tandem repeat (USAster) haplotype reference database. UBRP Conference, University of Arizona, Tucson, Arizona. **[Karl Calderon]**
- 147 Callan, M.C., Cabernard, C., Heck, J., Luois, S., Doe, C.Q., and Zarnescu, D.C. (2010). Fragile X protein controls neural stem cell proliferation in the Drosophila brain. Hum Mol Genet 19(15):3068-3079. **[Samantha Luois]**
- 148 Camarillo, J.M., Medeiros, M.K., Gandolfi, A.J. (2009). Human Bladder Epithelial Cells: Acute Exposure to Arsenite and Monomethylarsonous Acid. ABRCMS, Phoenix, AZ Presented: Nov 2009 [Camarillo, Jeannie] **[Jeannie Camarillo]**
- 149 Campbell, R., Cummins, T., Ahmad, S., and Collins, J. (2005). Transcriptional regulation of human divalent metal ion transporter 1 (DMT1). UBRP Conference, University of Arizona, Tucson, Arizona. **[Rowena Campbell Grainger] [Shahid Ahmad]**
- 150 Canfield, L.M. and Valenzuela, J.G. (1991). Metabolism of b-carotene by soybean lipoxygenase. Fifth Biennial Meeting of the International Society for Free Radical Research, Pasadena, California. **[Jesus Valenzuela]**
- 151 Canfield, L.M., Valenzuela, J.G., and Forage, J.W. (1991). Metabolism of carotenoids by enzymes of oxygen metabolism. UNESCO/COSTAM Conference, Malaysia. **[Jesus Valenzuela]**
- 152 Carlson, K.J. (2014). Investigations of the Specificity and Promiscuity of Receptors within the Bcl-2 Protein Family. ASBMB Undergraduate Poster Competition, San Diego Convention Center Presented: 4/14 [Carlson, Kevin] **[Kevin Carlson]**
- 153 Carper, S.W., Willis, D., Manning, K., and Gerner, E.W. (1990). Stress-induced polyamine acetylation in E. coli. UCLA Symposium on Polyamines in Growth and Development, Taos, New Mexico. **[Kristin Manning]**
- 154 Carvajal, J. and Martinez, J. (1993). Characterization of cells transformed with a temperature sensitive p53 mutant. Society for the Advancement of Chicanos and Native Americans in Science, Albuquerque, New Mexico. **[Jane Carvajal Matias]**
- 155 Casanova, L. (1999). Evaluation of a screening method for antibiotic resistant bacteria. The University of Arizona Seventh Annual Student Showcase, Tucson, Arizona. **[Lisa Casanova]**
- 156 Casanova, L.M., Gerba, C.P., and Karpiscak, M. (1999). Chemical and microbial characterization of household graywater. SWARM Conference, Santa Fe, New Mexico; and Arizona Water and Pollution Control Association Meeting, Tucson, Arizona; and Annual Meeting of the American Society of Microbiology, Chicago, Illinois. **[Lisa Casanova]**
- 157 Cavanaugh, S., and Machado, C. (2007). A survey of allelic gene expression in Drosophila hybrids. Drosophila Symposium, Tucson, Arizona. **[Sarah Cavanaugh]**
- 158 Cetas, J.S., Price, R.O., Crowe, J., Velenovsky, D.S., Sinex, D.G., and McMullen, N.T. (1999). Dendritic orientation and response properties of two types of relay neurons in the rabbit auditory thalamus. Annual Meeting of the Society for Neuroscience, Miami, Florida. **[Robin Price] [Jennifer Crowe]**
- 159 Cetas, J.S., Price, R.O., Sinex, D.G., and McMullen, N.T. (1999). Morphological evidence for two types of relay neurons in the ventral division of the medial geniculate body (MGV) of the rabbit. Annual Meeting of the Association for Research in Otolaryngology, St. Petersburg, Florida. **[Robin Price]**
- 160 Cetas, J.S., Velenovsky, D., Velez, M.M., Price, R.O., Sinex, D., and McMullen, N.T. (1998). Physiological characterization and juxtacellular labeling of medial geniculate neurons in the rabbit. Annual Meeting of the Society for Neuroscience, Los Angeles, California. **[Robin Price] [Marel Velez]**
- 161 Cetas, J.S., Velenovsky, D.S., Price, R.O., Sinex, D.G., and McMullen, N.T. (2000). Frequency organization and cellular laminae in the rabbit medial geniculate body. Annual Meeting of the Association for Research in Otolaryngology, St. Petersburg, Florida. **[Robin Price]**

- 162 Chamupathi, V.G., Moezzi, D.M., and Tollin, G.T. (1990). Redox proteins as electron acceptors from chlorophyll triplet state in lipid bilayer vesicles: Kinetics of reduction of membrane bound cytochrome c oxidase mediated by 2,5-di-t-butyl benzoquinone and cytochrome c. 14th DOE Solar Photochemistry Research Conference Brookhaven National Laboratory, Lake Harmony, Pennsylvania; and the Annual Meeting of the American Society for Photobiology, Vancouver, British Columbia. **[Darius Moezzi]**
- 163 Chang, J., Hoying, J., and Williams, S. (2001). Characterization of angiogenesis in a 3D matrix. Annual Meeting of the Southwestern and Rocky Mountain Division American Association for the Advancement of Science, Denton, Texas. **[Joann Chang]**
- 164 Chapman, A. and Johnson, E.W. (2001). Febrile seizures: Apoe haplotype and increased risk of epilepsy in adults. Sixth Annual Student Scientific Enrichment Program BNI, Phoenix, Arizona. **[Alistair Chapman]**
- 165 Charlton, J., Tran, C., MacNamee, S., Tolbert, L., Oland, L. (2015). Modulation of neural activity affects astrocyte morphology in Drosophila. Neuroscience 2015, Chicago, IL Presented: October 2015 [Charlton, Julie] **[Julie Charlton]**
- 166 Chaung, M., Kraft, R., Zarnescu, D.C., 2016, The Characterization of A Novel Drosophila Model of Alzheimer's Disease based on TDP-43, 2016 Arizona Alzheimer's Consortium Conference, University of Arizona College of Medicine Phoenix, May 19, 2016 **[Matthew Chaung]**
- 167 Chavez, R.A. and Forkert, P.G. (1998). Temporal effects of fresh garlic on hepatic CYP2E1 para-nitrophenol hydroxylase activity. 25th Annual Meeting of the Society for Chicanos and Native Americans in Science, Washington, D.C. **[Robert Chavez]**
- 168 Chavez, R.A., Ulreich, J.B., Stringer, S.K., Le, T., Joshi, B.D., Dicken, R.J., Haveman, T.M., Spofford, C.M., Young, C.J., and Nakazato, P.Z. (1996). Use of precision-cut organ slice technology to evaluate cold preservation of livers for transplantation. Fourth Annual National Science Foundation AMP Student Research Conference, Tallahassee, Florida. **[Robert Chavez]**
- 169 Chawla, M.K., Bello Medina, P.C., Sandoval, C.J., Ramirez-Amaya, V., Barnes, C.A. (2010). Location of Arc mRNA expressing granule cells following spatial exploration in the rat dentate gyrus. 40th Annual Society for Neuroscience Meeting, San Diego, CA. **[Cynthia Sandoval]**
- 170 Cheah, C, Daines, M, Morgan, W (2015). Proinflammatory Environmental Exposures in Asthma. Experimental Biology, Boston, MA **[Cheryl Cheah]**
- 171 Cheah, C, Phan, AV, Cai, W, Seto, NL, Hazard, JT (2014). The University of Arizona UAN Chapter Outreach Activities. Experimental Biology, San Diego, CA **[Cheryl Cheah]**
- 172 Cheah, C, Phan, AV, Cai, W, Seto, NL, Hazard, JT (2014). The University of Arizona UAN Chapter Outreach Activities. Experimental Biology, San Diego, CA. **[Andy Phan] [Nickie Seto] [Wesley Cai]**
- 173 Cherwa, J. and Fane, B. (2006). Genetic and Biochemical Analyses of the phiX174 External Scaffolding Protein. Chemistry at the Border, 19th Rocky Mountain Regional Meeting, Tucson, Arizona. **[James Cherwa]**
- 174 Cherwa, J., and Fane, B.A. (2006). Genetic and biochemical analyses of phiX174 external scaffolding protein. CUR Posters on the Hill, Washington D.C. **[James Cherwa]**
- 175 Cherwa, J., and Fane, B.A. (2006). Genetic and biochemical analyses of phiX174 external scaffolding protein. FASEB Virus Assembly Conference, Saxtons River, Vermont. **[James Cherwa]**
- 176 Cherwa, J.E., and Fane, B.A. (2005). Structure-function analysis of phiX174 external scaffolding protein. McNair National Symposium, UC Berkeley, California. **[James Cherwa]**
- 177 Choe, S., Fujioka, S., Dilkes, B.P., Ross, A.S., Noguchi, T., Takatsuto, S., Yoshida, S., Tanaka, A., Tax, F.E., and Feldmann, K.A. (1998). Arabidopsis dwarf mutants define eight genes involved in brassinosteroid biosynthesis and signal transduction. American Society of Plant Physiologists Annual Meeting, Madison, Wisconsin. **[Amanda Ross]**
- 178 Choe, S., Fujioka, S., Tanaka, A., Tissian, C., Ross, A.S., Noguchi, T., Takatsuto, S., Yoshida, S., Tax, F., and Feldmann, K.A. (1998). Molecular cloning of Arabidopsis brassinosteroid biosynthetic genes DWF4, DWF5 and DWF7. American Society of Plant Physiologists Annual Meeting, Madison, Wisconsin. **[Amanda Ross]**
- 179 Cholanians, A.B., Herndon, J.M., Li, X., Bai, F., Lau, S.S., Lai, J.Y., Monks, T.J. (2010). Microglial response to 3,4(+)-methylenedioxymethamphetamine in sprague-dawley rats. 40th Annual Society for Neuroscience Meeting, San Diego, CA. **[Aram Cholanians]**
- 180 Chong J, Atkinson PB, Nguyen JD, Ouellette E, & Labiner DM (2009). Relationships between depression, epilepsy self efficacy, and stigma in Hispanics. 2009 Annual Meeting of the American Epilepsy Society, Boston, MA Presented: 12/6/2009 [Ouellette, Ellen] **[Ellen Ouellette]**
- 181 Chopra, H., Gard, J.M., Nagle, R.B., Cress, A.E., and Sroka, I.C. (2011). Schwann cell dependent regulation of the laminin receptor {alpha}6{beta}1 during prostate cancer nerve invasion. UA Physiology Student Research Presentations, Tucson, Arizona. **[Harsharon Chopra]**
- 182 Christensen, T.A., Mustaparta, H., Geoffrion, S.C., and Hildebrand, J.G. (1989). Peripheral and central coding of interspecific chemical messages in Heliothis moths. Second International Congress of Neuroethology, Berlin, FRG. **[Sabrina Geoffrion]**
- 183 Chun, H., Williams, C.S., McWilliam, D.L., Dominguez, J.A., Koldovsky, O., Philipps, A.F., and Dvorak, B. (1999). Effect of milk-borne EGF on IGF-I mRNA production in the small intestine of suckling rats. DDW, Hiroshima, Japan. **[Jessica Dominguez Reig Clark]**

- 184 Cicchini L, Knepler P, Petrucelli A, Rak M, Umashankar M, Grainger L, Bughio F, Ouellette E, Srivastava S, Zhou R, and Goodrum F (2010). Viral and Cellular Mechanisms Contributing to Viral Coexistence. Kavli Frontiers of Science Symposium of the National Academy of Sciences, Arnold and Mabel Beckman Center, Irvine, CA Presented: 11/12-14/2010 [Ouellette, Ellen] **[Ellen Ouellette]**
- 185 Clark, J.A., Saunders, T.A., Doelle, S.M., Holubec, H., Burger, L.C., Dvorakova, K., Halpern, M.D., and Dvorak, B. (2005). The role of epidermal growth factor in tight junction formation in a neonatal rat model of necrotizing enterocolitis. Pediatric Academic Society, Washington D.C. **[Jessica Dominguez Reig Clark] [Sarah Doelle] [Lori Burger Cole]**
- 186 Clark, J.A., Saunders, T.A., Doelle, S.M., Holubec, H., Burger, L.C., Dvorakova, K., Halpern, M.D., and Dvorak, B. (2005). Effect of EGF on intestinal tight junction barrier in experimental necrotizing enterocolitis. 46th Annual Meeting of the European Society for Pediatric Research, Siena, Italy. **[Jessica Dominguez Reig Clark] [Sarah Doelle]**
- 187 Clark, J.A., Saunders, T.A., Doelle, S.M., Holubec, H., Burger, L.C., Dvorakova, K., Halpern, M.D., and Dvorak, B. (2005). Epidermal growth factor reduces intestinal apoptosis in experimental model of necrotizing enterocolitis. Digestive Disease Week, Chicago, Illinois. **[Jessica Dominguez Reig Clark] [Sarah Doelle]**
- 188 Clark, J.B., Maddison, W.P., Altheide, T.K., and Kidwell, M.G. (1993). Molecular phylogenetic analysis of P. transposable elements in Drosophila. International Congress of Genetics, Birmingham, United Kingdom; and International Symposium of Insect Molecular Science, Flagstaff, Arizona. **[Tasha Altheide Aannestad]**
- 189 Coe, M., DeRosa, D.L., Musgraves, J.D., Blaine, J., Leick, M., Lee Montiel, F., Potter Jr., B.G., and Riley, M.R. (2008). Cellular adhesion and response to thermally modified, sol-gel derived TiO₂ thin films. Institute of Biological Engineering IBE Conference, Chapel Hill, North Carolina. **[Mark Leick]**
- 190 Cohen, J.D., Tham, K.Y., Monks, T.J., Lau, S.S. (2010). cAMP-Dependent Pathway(s) Directs the Rap-GTP/B-Raf MAPK-Mediated Cytosolic Mislocalization of p27kip-cyclin D1 in Renal Cancer. Society of Toxicology, Salt Lake City, UT Presented: 3/7-3/11/10 [Tham, Kimberly] **[Kimberly Tham]**
- 191 Cohen, Z., Gonzales, R.F., Fernandez, F.V., Davis-Gorman, G.F., Copeland, J.G., and McDonagh, P.F. (2002). A-Tocopherol attenuates platelet microparticle formation during reperfusion following ischemia in Type 2 diabetic heart. Experimental Biology, New Orleans, Louisiana. **[Frances Verdelle Fernando]**
- 192 Comi, T.J., Heinz, B.A., Roberts, D.L., Muhandiramlage, T.P., and Aspinwall, C.A. (2009). Porous phospholipids nanoshells as enzyme delivery agents. Beckman Scholar Symposium, Irvine, California. **[Troy Comi]**
- 193 Comi, T.J., Muhandiramlage, T.P., and Aspinwall, C.A. (2011). Generation and characterization of glucokinase-containing porous phospholipid nanoshells as enzyme delivery agents. Experimental Biology Conference, Washington, DC. **[Troy Comi]**
- 194 Conley, Z.R., Geiser, D.L., and Winzerling, J.J. (2012). Visualization of ferritin in Anopheles gambiae 4a3b cells. Experimental Biology Meeting 2012, San Diego, California **[Zachary Conley]**
- 195 Contreras, O., Coyle, D.L., and Jacobson, M.K. (2005). Development of a new method to quantitatively measure ADP-ribose polymers. UBRP Conference, University of Arizona, Tucson, Arizona. **[Omar Contreras]**
- 196 Cook, T, Simons-Liguori, A, Vanderah, TW (2013). CXCL12 Expression in a Model of Breast Cancer-Induced Bone Pain. NACP, FlagStaff, AZ Presented: 7/28/13 - 8/1/13 [Cook, Tanner] **[Tanner Cook]**
- 197 Cooper, J.B., and Gillies, R.J. (2006). In vitro Characterization of DRONPA: A Fluorescent Protein with Unique Properties. Sixth Arizona Biosciences Leadership Symposium, Phoenix, Arizona. **[Jonathan Cooper]**
- 198 Covey, R.D., Thompson, M., and Johnson, M.I. (1993). Ethanol reduces Schwann cell numbers by inhibition of mitosis in cultures or rat sympathetic neurons. Child Neurology Society Meeting, New York, New York. **[Richard Covey]**
- 199 Cox, J.T., Sander, B.M., and Burd, G.D. (2001). Functional analysis of XDLL3 in olfactory system development. XXIIIrd Annual Meeting of the Association for Chemoreception Sciences, Sarasota, Florida. **[Jonathan Cox]**
- 200 Crago, M., Majuta, L., Osipov, M., Porreca, F., and Vanderah, T. (2001). Chronic opiates produce enhanced neurotransmitter release and abnormal pain. Annual Meeting of the American Association for the Advancement of Science, San Francisco, California. **[Melissa Crago]**
- 201 Craven, J. and Mendes, B. (2006). Absorption Spectroscopy of Molecular Monolayers Using Single-Mode Optical Waveguides. Chemistry at the Border, 19th Rocky Mountain Regional Meeting, Tucson, Arizona. **[Jill Craven]**
- 202 Dacks, A.M., Riffell, J, Martin, J, Teter, K, Gage, S., Nighorn, A (2010). The neuromodulatory effects of dopamine in the antennal lobes of manduca sexta. 40th Annual Society for Neuroscience Meeting, San Diego, CA. **[Katherine Teter]**
- 203 Dahl, N., and Bustamante, Sara. (2007). Profile of Alternaria allergens. National American Chemical Society Meeting, Chicago, Illinois. **[Nikolai Dahl] [Sara Bustamante Centuori]**
- 204 Dantzler, W.H., Serrano, O.K., Abbott, D.E., and Brokl, O.H. (1998). Regulation of intracellular pH (pHi) in snake renal proximal tubules. Experimental Biology, San Francisco, California. **[Oscar Serrano]**
- 205 Danzer, S.C., Price, R.O., McMullen, N.T., and Rance, N.E. (1997). Steroid hormone modulation of neuronal size and gene expression of neurokinin B neurons in the rat arcuate nucleus. Annual Meeting of the Society for Neuroscience, New Orleans, Louisiana. **[Robin Price]**
- 206 Danzer, S.C., Price, R.O., McMullen, N.T., and Rance, N.E. (1998). Steroid hormones modulate Neurokinin B and Galanin mRNA containing neurons in the rat arcuate nucleus. Annual Meeting of the Society for Neuroscience, Los Angeles, California. **[Robin Price]**

- 207 Davies, K., Aguirre, A., Nodine, M., and Tax, F.E. (2006). Phenotypic Analysis of the TOADSTOOL Receptor-like kinase genes in *Arabidopsis thaliana*. Plant Biology 2006, Boston, Massachusetts. **[Andrea Aguirre]**
- 208 Davies, Kelli, Aguirre, Andrea, Nodine, Michael, Tax, Frans E. (2006). Phenotypic Analysis of the TOADSTOOL Receptor-like kinase genes in *Arabidopsis thaliana*. Plant Biology 2006, Boston, MA **[Kelli Davies]**
- 209 Davis, A.C., Rajapakshe, A., Johnson-Winters, K., Astashkin, A.V., Gollin, G., and Enemark, J.H. (2011). Investigating the role of histidine 304 in the enzymatic function and active site structure of human sulfite oxidase. 241st National Meeting of the American Chemical Society, Anaheim, CA and UA BECUR Conference, Tucson, Arizona. **[Amanda Davis]**
- 210 Davis, J., Romanoski, A., Graner, M.W., Likhacheva, A., Raymond, A., Brandenburger, J., and Katsanis, E. (2004). The immunosuppressive effects and biochemistry of Tumor Expressed Albumin (TEA). American Association for Cancer Research Conference, Orlando, Florida. **[Mary Angela Romanoski] [Jane Davis] [Anna Likhacheva]**
- 211 Davis, N. (1999). Glycosylated calreticulin may elicit a more effective CTL response than unglycosylated calreticulin. The University of Arizona Seventh Annual Student Showcase, Tucson, Arizona. **[Nicole Davis]**
- 212 De Leon, I.A., Malatynska, E., Allen, D.C., and Yamamura, H.I. (1992). Effects of amitriptyline on GABA stimulated 36C1-uptake in brain membrane vesicles of dominant and submissive rats. Society for Neuroscience, Anaheim, California. **[Irene De Leon-Dudas] [Irene De Leon-Dudas]**
- 213 Dedek, M.M., Cai, M., Palmer, E.S., Mayorov, A.V., Trivedi, D., Kessler, H., and Hruby, V.J. (2006). N-Methylation of MT-II leads to selective agonist and antagonist of Human Melanocortin 3 Receptor. Chemistry at the Border, 19th Rocky Mountain Regional Meeting, Tucson, Arizona. **[Erin Palmer]**
- 214 Dees, J.A., Terrazas, A., Bohne, K.M., Krause, M., McNaughton, B.L., and Barnes, C.A. (2001). Presence of hippocampal theta during navigation without actual movement. Society for Neuroscience Meeting, San Diego, California. **[Jennifer Dees]**
- 215 Deever, D.B., Young, R.S., Griffith, K., Wang, S., Bradshaw, B., Miles, J., Pettis, C., Gross, C., and Witten, M.L. (1999). Changes in organ perfusion and organ/body weight ratios in a simulated microgravity model. Experimental Biology, Washington, D.C. **[Daniel Deever]**
- 216 DelloRusso, C., Sullivan, J., Essif, E., and Fregosi, R.F. (1994). The EMG-force relationship during fatiguing contractions in a human upper airway muscle. Southwest American College of Sports Medicine (SWACSM) Conference, San Diego, California. **[Christiana DelloRusso]**
- 217 Delp, S., Frisby, X., Gunnala, R., Schmier, C., Vaziri, M., Burke, K., Luc, Q., and Weber, J. (1999). Science Connection: Getting children excited about science! The University of Arizona 7th Annual Student Showcase, Tucson, Arizona. **[Hiram Albino]**
- 218 Delp, S., Park, J.A., Chu, R., and Akporiaye, E.T. (1998). Transforming growth factor-beta1 identified as a mediator in suppression of T-cell tumor lysis. American Society for Microbiology, Flagstaff, Arizona. **[Sheri Delp Pierce]**
- 219 deVenecia, R.K., Smelser, C.B., and McMullen, N.T. (1991). Prenatal and early postnatal development of auditory thalamocortical axons. Annual Meeting of the Society for Neuroscience, New Orleans, Louisiana. **[Chad Smelser]**
- 220 deVenecia, R.K., Smelser, C.B., and McMullen, N.T. (1995). Parvalbumin is expressed in a reciprocal circuit linking auditory neocortex and medial geniculate body in the rabbit. Annual Meeting of the Society for Neuroscience, San Diego, California. **[Chad Smelser]**
- 221 deVenecia, R.K., Smelser, C.B., and McMullen, N.T. (1996). Correspondence between thalamocortical and parvalbumin patches in AI: Evidence for a modular organization within auditory neocortex. Annual Meeting of the Association for Research in Otolaryngology, St. Petersburg, Florida. **[Chad Smelser]**
- 222 Diamond-Stanic M.K., Romero-Aleshire, M.J., Smith, A., Cai, Q., Hoyer, P.B., and Brooks, H.L. (2008). Early diabetic kidney damage in the mouse VCD model of menopause. Experimental Biology 2008 Meeting, San Diego, California. **[Alexis Smith]**
- 223 Diamond-Stanic, M. K., E. M. Marchionne, D. E. Durazo, E. Diamond-Stanic, M.K., Marchionne, E.M., Durazo, D.E., Schoolmaster, J., Teachey, M.K., Kim, J.S., and Henriksen, E.J. (2010). Critical role of transient activation of p38 MAPK in the etiology of skeletal muscle insulin resistance caused by low-level in vitro oxidant stress. 70th Scientific Session of the American Diabetes Association, Orlando, Florida. **[Elizabeth Marchionne]**
- 224 Diamond-Stanic, M.K., Marchionne, E.M, Durazo, D. E., E. . J. Schoolmaster, M. K. Teachey, J. S. Kim, and E. J. Henriksen. (2010). Activation of p38 MAPK and JNK in the etiology of skeletal muscle insulin resistance caused by low-level in vitro oxidant stress. Annual Meeting of the Arizona Chapter of the American Physiological Society, Glendale, Arizona. **[Elizabeth Marchionne]**
- 225 Diamond-Stanic, M.K., Marchionne, E.M., Durazo, D.E., Schoolmaster, E.J., Teachey, M.K., Kim, J.S., and Henriksen, E.J. (2010). Activation of p38 MAPK and JNK in the etiology of oxidant-induced skeletal muscle insulin resistance. Frontiers in Biomedical Research Forum, University of Arizona College of Medicine, Tucson, Arizona. **[Elizabeth Marchionne]**
- 226 Diaz, R., and Gandolfi, A.J. (2006). § characterization of gene expression in jurkat cells in response to low-concentration arsenite exposure. Spring 2006 AGEF Colloquium, University of California, San Francisco, California. **[Rachel Diaz Starks]**
- 227 Dietrich, M.A., Lin, H., Rohwer, J.S., Salus, S.S., Shao, A., and Schumaker, K.S. (1995). Calcium-mediated events during moss development. Frontiers of Plant Morphogenesis Keystone Conference, Hilton Head, South Carolina. **[Howard Lin]**
- 228 Diggins NH, Safir O, Grynpas MD, Willett TL (2011). Design of a Novel Mechanical Testing Fixture to Assess Superior Acetabulum Defects. Samuel Lunenfeld Research Institute Summer Student Poster Session, Mount Sinai Hospital Presented: July 27, 2011 [Diggins, Nicklaus] **[Nicklaus Diggins]**

- 229 Diggins, N.H., Rojas, J.R., Szivek, J.A. (2012). A Medial Condyle Surface Replacement Scaffold Utilizing Biomimetic Trabeculated Pegs to Accelerate Bone Ingrowth. Emerging Researchers National Conference, Atlanta, Georgia Presented: 2-23-2012 [Diggins, Nicklaus] **[Nicklaus Diggins]**
- 230 Diggins, NH, Rojas, J, Ouellette, J, Szivek, JA (2013). Assessment of axial load error present within an in vivo shear load sensor. ERN Conference, Washington, DC. **[Nicklaus Diggins]**
- 231 Diggins, NH, Rojas, J, Ouellette, J, Szivek, JA (2013). Increasing accuracy of a femoral medial condyle surface replacement scaffold. MGE@MSA/WAESO Conference, Tempe, AZ. **[Nicklaus Diggins]**
- 232 Doelle, S. (2003). Inhibition of hepatic TNF- α decreases the severity of experimental necrotizing enterocolitis. Society for Pediatric Research Conference, Seattle, Washington. **[Sarah Doelle]**
- 233 Doerr, J.K., Hollis, E.A., and Sipes, I.G. (1995). Ovotoxicity of 1,3-butadiene epoxides in B6C3F1 mice and Sprague Dawley rats. International Symposium for the Evaluation of Butadiene and Isoprene Health Risks, Blaine, Washington. **[Ellen Hollis Cannady]**
- 234 Doig, C., Ledvina, H., Buntzman, A., Frelinger, J. (2014). Host Resistance to RSV. Fronteir in Immunology Conference, University of Arizona Presented: [Doig, Cassandra] **[Cassandra Doig]**
- 235 Dominguez, J.A., Philipps, A.F., and Dvorak, B. (2000). Relation between expression of insulin-like growth factor-I (IGF-I) and growth hormone receptor (Ghr) synthesis in livers of fed and fasted suckling rats. SPR/APS Annual Meeting, Boston, Massachusetts. **[Jessica Dominguez Reig Clark]**
- 236 Donald, C., and Runyan, R. (2002). Regulation of the transcription factor slug in the embryonic heart. Annual Meeting of the Association of American Indian Physicians, Anchorage, Alaska. **[Candice Donald Keyes]**
- 237 Doty, D., Stein, H., and Christensen, T. (2002). Mapping neural activation patterns to specific brain structures. The Center for Insect Science Ninth Annual Poster Hexapodium, Tucson, Arizona. **[Daniel Doty]**
- 238 Douds, D.P., Hooser, S.B., DeMerell, D.G., and Sipes, I.G. (1990). Reproductive toxicology: An important negative study. Annual Meeting of the Mountain West Chapter of the Society of Toxicology, Tucson, Arizona. **[Daniel Demerell]**
- 239 Doyle, M.P., and Gronenberg, L.S. (2003). Efficient syntheses of heterocyclic compounds. AAAS Annual Meeting, Denver, Colorado.(1st place student poster competition, physical sciences) **[Luisa Gronenberg]**
- 240 Doyle, M.P., and Gronenberg, L.S. (2003). Efficient syntheses of heterocyclic compounds. American Chemical Society National Meeting, New Orleans, Louisiana. **[Luisa Gronenberg]**
- 241 Dumas S, Moses S, Du-Cuny L, Powis G, Mash E, Zhang S, Meuillet E. (2010). Targeting the PH domain of IRS-1/IRS-2 for the treatment of Triple Negative Breast Cancer: ID and characterization of a novel IRS-1/IRS-2 inhibitor. Annual Biomedical Research Conference for Minority Students, Charlotte, NC Presented: 11/15/11 [Dumas, Sabrina] **[Sabrina Dumas]**
- 242 Duong, M.T., Knapp, R.J., Sharma, S.D., Toth, G., Hruby, V.J., and Yamamura, H.I. (1990). Characterization of a new iodinated peptide radioligand for delta opioid receptors. Annual Meeting of FASEB, Washington, D.C. **[Mai Duong]**
- 243 Durand, C., Machtley, S., Figuli, P., Hagler, J., and Naranjo, S. (1992). Bridging the gap between molecular biology and applied entomology. University of Arizona, College of Agriculture, Cotton Field Day, Maricopa, Arizona. **[Christine Durand Johnson]**
- 244 Dvorak, B., Chun, H., Dominguez, J.A., Williams, C.S., McWilliam, D.L., and Philipps, A.F. (2000). Enteral epidermal growth factor reduces insulin-like growth factor-I mRNA in duodenum of developing rats. DDW Meeting, San Diego, California. **[Jessica Dominguez Reig Clark]**
- 245 Dvorak, B., Clark, J., Doelle, S., Saunders, T., Meza, Y., and Halpern, M. (2004). HB-EGF decreases the incidence of necrotizing enterocolitis in a rat model. Society of Pediatric Research Meeting, San Francisco, California. **[Jessica Dominguez Reig Clark] [Sarah Doelle]**
- 246 Dvorak, B., Halpern, M. and Ruth, M. (2002). Production of hepatic inflammatory mediators are correlated with intestinal damage during necrotizing enterocolitis. Digestive Disease Week Conference, Atlanta, Georgia. **[Miriam Ruth]**
- 247 Dvorak, B., Halpern, M. and Ruth, M. (2003). Inhibition of hepatic TNF- α decreases the severity of experimental necrotizing enterocolitis. Society for Pediatric Research Conference, Seattle, Washington. **[Miriam Ruth]**
- 248 Dvorak, B., McWilliam, D.L., Williams, C.S., Dominguez, J.A., Holubec, H., and Payne, C.M. (2000). Milk-borne EGF reduces the incidence of necrotizing enterocolitis in neonatal rat model. 10th International Conference of ISRHML, Tucson, Arizona. **[Jessica Dominguez Reig Clark]**
- 249 Dvorak, B., McWilliam, D.L., Williams, C.S., Dominguez, J.A., Machen, N.W., McCuskey, R.S., and Philipps, A.F. (1999). Artificial formula induces precocious maturation of the small intestine of artificially reared suckling rats. Ninth International Conference of ISRHML, Munich, Germany. **[Jessica Dominguez Reig Clark]**
- 250 Dvorak, B., Williams, C.S., McWilliam, D.L., Shinohara, H., Dominguez, J.A., McCuskey, R.S., Philipps, A.F., and Koldovsky, O. (1999). Milk-borne epidermal growth factor modulates intestinal transforming growth factor- α levels in suckling rats. Ninth International Conference of ISRHML, Munich, Germany. **[Jessica Dominguez Reig Clark]**
- 251 Dvorak, B., Williams, C.S., McWilliam, D.L., Shinohara, H., Dominguez, J.A., McCuskey, R.S., Philipps, A.F., and Koldovsky, O. (1999). Role of epidermal growth factor on the development of the small intestine in artificially reared rats. DDW Meeting, Orlando, Florida. **[Jessica Dominguez Reig Clark]**
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- 255 Eckholdt, P.E., Higgins, M.H., Oland, L.A., Nardi, J., and Tolbert, L.P. (1997). Anti-fasciclin antibody as a marker for olfactory axon ingrowth and specialization during the development of the moth *Manduca sexta*. Microscopy Society of America, Tucson, Arizona. **[Patricia Eckholdt]**
- 256 Edelman-Vogelsang, K., LaHood, R., Corral-Frias, French, E.D., and Fellous, J.M. (2011). Sex differences in a rat model of PTSD. Society for Neuroscience Annual Meeting, Washington, D.C. **[Kimberly Vogelsang]**
- 257 Edjin, JO, Breslin, J, Spano, G, Tooley, UA, Bootzin, D, Nadel, L (2013). Sleep and learning in Down Syndrome. Society for Research in Child Development. Seattle, WA. **[Ursula Tooley]**
- 258 Eigenbrode, S.D., Castagnola, T., Moodie, S. and Roux, M.B. (1994). Generalist predators contribute to resistance to Diamondback moth in glossy Brassica oleracea. National Meeting of the Entomological Society of America. **[Susan Moodie]**
- 259 Eigenbrode, S.D., Castagnola, T., Moodie, S., and Roux, M.B. (1994). Generalist predators contribute to resistance to Diamondback moth in glossy Brassica oleracea. National Meeting of the Entomological Society of America. **[Thomas Castagnola]**
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- 262 Eleid, N.L., Weinstein, R.B., Brodsky, I.B., Heffner, M.A., O'Keefe, M.P., Takeuchi, J.A., and Tischler, M.E. (1999). Potency of insulin analogs for in situ stimulation of glucose uptake in rat soleus muscle. Fifth International Congress of Comparative Physiology and Biochemistry. Calgary, Alberta, Canada. **[Julie Takeuchi Crawford] [Michelle Heffner Lally]**
- 263 Elias, D. and Behmer, S. (1996). Phytosterol use in the grasshopper *Taewopoda equis* and *Melanoplus* differentialis. Southwestern Association for Biologists, Camp Tontazona, Arizona. **[Damian Elias]**
- 264 Elkanich, G.M. and Sinclair, N.A. (1993). MnO₂ reduction by *Bacillus Polymyxa*. American Society of Microbiology Meeting, Tucson, Arizona. **[Michael (George) Elkanich]**
- 265 Ellsworth, E., Bower, M., and McNaughton, B. (1998). A start for every map and a map for every start. Arizona State Capitol, Phoenix, Arizona. **[Erik Ellsworth]**
- 266 Ellsworth, E., Bower, M., and McNaughton, B. (1998). Watching a rat change it's mind. Undergraduate Research Grant Forum, University of Arizona, Tucson, Arizona. **[Erik Ellsworth]**
- 267 Ellsworth, P.Z., and Williams, D.G. (2001). Water use by velvet mesquite *Prosopis velutina*. Beckman Foundation Conference of the Chemical and Biological Sciences, Irvine, California. **[Patrick Ellsworth]**
- 268 Emesh, S., Yang, J., Hazzard, J.T., Rajagopalan, K.V., Tollin, G., and Enemark, J.H. (2006). Effects of loop mutations on the kinetics of human sulfite oxidase. Chemistry at the Border, 19th Rocky Mountain Regional Meeting, Tucson, Arizona. **[Safia Emesh Cheeney]**
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- 270 Enemark, J.H., Rajapakshe, A., Meyers, K.T., Berry, R.E., Tollin, G. and Astashkin, A.V. (2011). Electron transfer between the molybdenum and heme centers of sulfite oxidase: the role of aromatic amino acids. 241st National Meeting, American Chemical Society, Anaheim, California. **[Kimberly Meyers]**
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- 273 Enriquez, F.J., Ditrich, O., Palting, J.D., and Smith, K. (1996). Diagnosis of microsporidial infections using a pan-specific monoclonal antibody. American Society of Tropical Medicine and Hygiene - Opportunistic Protozoa Diagnosis Meeting, Baltimore, Maryland. **[Kimberly Smith Blackwood]**
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- 277 Escobar, C.M., Krajewski, S.J., and Rance, N.E. (2001). Neuropeptide Y gene expression is increased in the hypothalamus of postmenopausal women. Society for Neuroscience Meeting, San Diego, California. **[Carla Escobar Stalcup]**
- 278 Espinoza, J., and Lai, L.-W. (2007). Role of polycystic kidney disease gene in cell cycle regulation. ABRCMS, Austin, Texas. **[Jason Espinoza]**
- 279 Essien, C.S., Knowles, L.L., and Markow, T.A. (2001). Postmating-prezygotic variation among cactophilic desert drosophila: male manipulation of female oviposition behavior. Society for the Study of Evolution, Knoxville, Tennessee. **[Carmella Essien]**
- 280 Estes, P.S., Ho, G., Narayanan, R., Sandstrom, D.J., and Ramaswami, M. (1997). Development of GFP as an in vivo marker for Drosophila synapses. Society for Neuroscience Conference, New Orleans, Louisiana. **[Grace Ho]**
- 281 Estrada, TE, Frisk, HA, Mistler, KJ, Halpern, MD (2013). Fibroblast Growth Factor 15 is Down-Regulated in Experimental Necrotizing Enterocolitis. Digestive Disease Week, Orlando, FL Presented: May 18-21 [Mistler, Kevin] **[Kevin Mistler]**
- 282 Eugster, J.L., Munch, E.A., Nuara, A.A., Smith, M.H., Lam, K.S., and Grimes, W.J. (1999). Synthetic peptide libraries used for detecting HLS class I allele-specific peptide binding motifs. 75th Annual Meeting of the Southwestern and Rocky Mountain Division of the American Association for the Advancement of Science, Santa Fe, New Mexico. **[Jennifer Eugster Denenny] [Anthony Nuara]**
- 283 Falsey, R. and Martinez, J. (2000). P53's ability to function as a transcription factor may or may not be required for cooperation with E2F. University of Arizona Student Showcase, Tucson, Arizona. **[Ryan Falsey]**
- 284 Falsey, J.R., Li, S., and Lam, K.S. (1999). Development of a chemical microarray technology. 16th American Peptide Symposium. Minneapolis. Minnesota. **[James Falsey]**
- 285 Faridian, M.K., Sandweiss, J.J., Podolsky, A., Lee, Y.S., and Vanderah, T.W. (2012). Inhibition of neuropathic pain via dynorphin analog LYS 1044. Experimental Biology 2012, San Diego, California. **[Martin Faridian]**
- 286 Farnsworth, A., Warner, S., Bearss, D., Han, H., and Von Hoff, D. (2003). Targeting PRL-1, a PTPase for the treatment of pancreatic cancer. Annual Meeting of the American Association for Cancer Research, Washington, D.C. **[Amanda Farnsworth Swaim]**
- 287 Feagan, B. and Liebler, D. (1997). Determination of uracil dimers by high-performance liquid chromatography with electron capture detection and APCI-MS. Annual Meeting of the Society for Advancement of Chicanos and Native Americans in Science, Houston, Texas. **[Brandy Feagan]**
- 288 Fell, F., Halperin, D., Downing, D., and Ward, S. (1999). Genetic and phenotypic analysis of spe-32, a gene required for spermatogenesis with an associated larval lethal phenotype. 12th International C. elegans Meeting, Madison, Wisconsin. **[Frederick Fell]**
- 289 Fellah, A.M., Gillespie, T.J., Philipps, A.F., Galo, J.R., and Dvorak, B. (2000). Degradation of insulin-like growth factors (IGF-I and IGF-II) in the small intestine of suckling rats. Experimental Biology 2000, San Diego, California. **[Jaclyn Galo Cho]**
- 290 Fellah, A.M., Gillespie, T.J., Philipps, A.F., Galo, J.R., and Dvorak, B. (2000). The inhibition of pancreatic proteases by rat milk. DDW Meeting 2000, San Diego, California. **[Jaclyn Galo Cho]**
- 291 Feng, H., Zeng, Y., Graner, M., Likhacheva, A., and Katsanis, E. (2002). Danger signals provided by multiple chaperone complexes stimulate tumor immunity. 13th Annual AACR Meeting. **[Anna Likhacheva]**
- 292 Feng, H., Zeng, Y., Ramaiya, K., Whitesell, L., and Katsanis, E. (2001). Stressed apoptotic tumor cells express membrane heat shock proteins and elicit tumor specific immunity. American Association for Cancer Research Annual Meeting, New Orleans, Louisiana. **[Kamalesh Ramaiya]**
- 293 Fens, H., Zeng, Y., Graner, M.W., Likhacheva, A., and Katsanis, E. (2002). Exogenous stress proteins enhance the immunogenicity of apoptotic tumor cells and stimulate anti-tumor immunity. 17th Meeting of the Society for Biologic Therapy, La Jolla, California. **[Anna Likhacheva]**
- 294 Ferguson, CW, Ferng, AS, Szivek, JA, Margolis, DA, Grana, WA (2008). Articular Cartilage Engineering: A comparison of canine and human cells. Society for Biomaterials Translational Research Symposium, Atlanta, GA Presented: [Ferng, Alice] **[Alice Ferng]**
- 295 Fernandez, M.M., Szivek, J.A., Grana, W.A., Margolis, D.S., Blumenkron, F., Calvert, P.D., Bourque, P.P., and Vaidyanathan, R. (2002). Preliminary tissue engineering studies of cartilage/bone composites for joint resurfacing. Surfaces in Biomaterials, Scottsdale, Arizona. **[Mark Fernandez]**
- 296 Fernando, F.V., Cohen, Z., Gonzales, R.F., Davis-Gorman, G.F., and McDonough, P.F. (2002). Platelet microparticle formation is increased in Type 2 diabetic blood. Experimental Biology, New Orleans, Louisiana. **[Frances Verdelle Fernando]**
- 297 Ferng, A.S., Ferguson, C.W., and Szivek, J.A. (2008). Inducing cartilage regeneration with stem cells for treatment of osteoarthritis patients. Experimental Biology 2008, San Diego, CA. **[Alice Ferng]**
- 298 Ferng, J.J., Burke, S.N., Hartzell, A.L., Friel, J.M., and Barnes, C.A. (2012). The influence of advanced age on novelty detection. Experimental Biology 2012, San Diego, California. **[Jonathan Ferng] [Jacqueline Friel] [Andrea Hartzell]**
- 299 Ferng, JJ, Maurer, AP, Burke, SN, Lester, AW, Barnes, CA (2013). Hippocampal place field activity in rats trained to walk forward and backwards. ASBMB Conference, Boston, MA Presented: 4/21 [Ferng, Jonathan] **[Jonathan Ferng]**

- 300 Ferng, S.J., Gonzalez, D.E., Falk, T., Rilo, H.L., and Sherman, S.J. (2012). Development of a Parkinson's Disease model in Medaka fish. Experimental Biology 2012, San Diego, California. **[Shiana Ferng]**
- 301 Ferng, SJ, Gonzalez, DE, Nguyen, MN, Sherman, SJ, Falk, T, Rilo, HL (2013). Evaluation of a Parkinson's disease model in medaka fish. American Society for Biochemistry and Molecular Biology Meeting, Boston, MA. **[Shiana Ferng]**
- 302 Filip, Z.A., Speer, D.P., Demeure, M.J., Valles, A.V., Ledesma, J.B., Rabussay, D.P., Dev, N.B., Goldfarb, P.M. and Ulreich, J.B. (2006) Wound Healing Following Electroporation Therapy in a Porcine Model. WFMR, Carmel, California **[Amanda Valles Bisla] [Justin Ledesma]**
- 303 Fiser, S.M., Tome, M.E., and Gerner, E.W. (1992). Mechanism of polyamine-induced cell death. The SWARM Division of the AAAS Annual Meeting, Tucson, Arizona. **[Steven Fiser]**
- 304 Fisher, R.L., Hasal, S.J., Ulreich, J.B., Nakazato, P.Z., Bhattacharyya, A.K., Le, T., Gandolfi, A.J., and Brendel, K. (1996). Rat and dog liver slice viability in surface and submersion culture. 35th Annual Meeting of the Society for Toxicology, Los Angeles, California. **[Thuy Le]**
- 305 Flint, H., Trautwein, A.X., Winkler, H., Grodzicki, M., Wright, J.L., Polam, J.R., and Walker, F.A. (1995). Electronic structure and fluctional distortion of bis-ligated synthetic porphyrins. ICAME-95 International Mossbauer Meeting, Rimini, Italy. **[Joshua Wright]**
- 306 Flint, H., Trautwein, A.X., Winkler, H., Grodzicki, M., Wright, J.L., Polam, J.R., and Walker, F.A. (1995). Electronic structure and fluctional distortion of bis-ligated synthetic porphyrins. Sixth International Conference on Bioinorganic Chemistry, Lubeck, Germany. **[Joshua Wright]**
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- 308 Flores-Lara, Y. Rivera, B, Plichta, K, Stock, P (2006). Effect of Fusarium oxysporum F sp. asparagi in the Infection and Reproduction of the Entomopathogenic Nematode Heterorhabditis sp. Caborcastrain (Nematoda: Heterorhabditidae).. Organization of Nematologists of Tropical America, Annual Conference, Costa Rica Presented: June [Plichta, Kathryn] **[Kathryn Plichta]**
- 309 Flowers, M.T., Gazard, J.L., Arrese, E.L., and Wells, M.A. (1998). The role of cAMP and calcium in the adipokinetic hormone-induced lipolytic pathway of the tobacco hornworm, Manduca sexta. The SWARM Division of AAAS Annual Meeting, Grand Junction, Colorado. **[Matthew Flowers]**
- 310 Forage, J.W., Margaritov, E., and Canfield, L.M. (1990). Bioavailability of carotenoids and retinoids in human colostrum and milk. FASEB Conference, Atlanta, Georgia. **[John Forage]**
- 311 Forsman, Z. and Kimura, K. (1996). The distribution of mariner-like transposable elements in flower bees. Animal Genetics Department Seminar, National Institute of Animal Industry, Tsukuba, Japan. **[Zac Forsman]**
- 312 Forsman, Z., Yoshiyama, M., Amano, K., and Kimura, K. (1996). The distribution of mariner-like transposable elements in flower bees (Apoidea). Annual Meeting of the Genetic Society of Japan, Nagoya, Japan. **[Zac Forsman]**
- 313 Forsman, Z.H. and Bronstein, J. (1994). Growth cohorts of Yucca Schottii. Center for Insect Science Hexapodium, Tucson, Arizona. **[Zac Forsman]**
- 314 Forsman, Z.H. and Papaj, D.R. (1995). Shared preferences and resource partitioning in two species of walnut flies Rhagoletis boycei and R. juglandis. Center for Insect Science Hexapodium, Tucson, Arizona. **[Zac Forsman]**
- 315 Franco, J, Stenglien, M, Derisi, J (2011). Viral Discovery in Snake Inclusion Body Disease (IBD) and an Outbreak of Hemorrhagic Hydrocephalus in Mice at Janelia Farms. SRTP, San Francisco Presented: 08/03/11 [Franco, Jessica] **[Jessica Franco]**
- 316 Fregosi, R.F., DelloRusso, C., Sullivan, J., and Essif, E. (1995). The EMG-force relationship during fatiguing contractions in a human upper airway muscle. American Thoracic Society International Conference, Seattle, Washington. **[Christiana DelloRusso]**
- 317 Fregosi, R.F., Quan, S.F., Enright, P.L., Kaemingk, K.L., Rosen, G.M., Morgan, W.J., Tapia, M.V., Winer, J., Stoker, D., and Cherry, C. (2001). Respiratory drive during chemoreceptor stimulation correlates with the respiratory disturbance index (RDI) in children aged 6 to 12 years. Federation of American Societies of Experimental Biology, Ona, Florida. **[Daniel Stoker]**
- 318 French, M.H., Ho, W.Y., Singh, J.S., Valles, A.V. and Ulreich, J.B. (2004). Precision-cut Rat Liver Slice Technology: Effects of Carbon Dioxide vs. Rat Mix Anesthesia. Society for Toxicology Annual Meeting, Baltimore, Maryland. **[Michael French] [Wyatt Ho] [Amanda Valles Bisla]**
- 319 French, M.H., Park, E.L., Ho, W.Y., Talley, J.R., White, M.J.N., Ramakumar, S., Ullrich, N., Linehan, J. and Ulreich, J.B. (2004). Immunogenicity of Polyethylene Glycol (PEG)-Based Hydrogel Sealant in Laparoscopic Porcine Partial Nephrectomy. Society for Toxicology Annual Meeting, Baltimore, Maryland. **[Michael French] [Wyatt Ho] [John Talley]**
- 320 Friel, J.M., Ferng, J.J., Hartzell, A.L., Burke, S.N., and Barnes, C.A. (2012) The influence of advanced age on noradrenergic-dependent novelty detection. Society for Neuroscience, Washington, DC. **[Jacqueline Friel] [Jonathan Ferng]**
- 321 Friel, J.M., Ferng, J.J., Hartzell, A.L., Burke, S.N., and Barnes, C.A. (2012) The influence of advanced age on noradrenergic-dependent novelty detection. Program No. 919.08. 2012 Neuroscience Meeting Planner. New Orleans, LA: Society for Neuroscience, Online. **[Jonathan Ferng] [Jacqueline Friel]**
- 322 Fritz, A., Gorlich, D.L., and Burd, G.D. (1995). Neurogenesis in the olfactory bulb of the African clawed frog, Xenopus laevis. Association for Chemoreception Sciences, Sarasota, Florida. **[Anne Fritz]**

- 323 Fuller, D.J.M., Woolridge, D., Shassetz, L.R., McGovern, K.A., Stringer, D.E., and Gerner, E.W. (1991). Mechanisms of stress-induced polyamine acetylation in pro-and eukaryotes. Hyperthermic Oncology Conference, Tucson, Arizona. **[Lawrence Shassetz]**
- 324 Fuller, D.J.M., Shassetz, L.R., and Gerner, E.W. (1991). Stress-induced polyamine acetylation in E. coli. International Congress for Radiation Research. **[Lawrence Shassetz]**
- 325 Funk, J.L., Stafford, G., and Davee, S.M. (2000). PTHrP expression in rat thymus. American Society for Bone and Mineral Research, Toronto, Canada. **[Gregory Stafford]**
- 326 Gaj, T., Meyer, S.C., Ghosh, I. (2006). Highly Selective Cyclic Peptide Ligands for NeutrAvidin and Avidin Identified by Phage Display. 19th Rocky Mountain Regional Meeting of The American Chemical Society, Tucson, Arizona. **[Thomas Gaj]**
- 327 Gaj, T., Meyer, S.C., Ghosh, I. (2006). Highly Selective Cyclic-Hexapeptide Ligands for NeutrAvidin and Avidin Identified by Phage Display. Chemistry at the Border, 19th Rocky Mountain Regional Meeting, Tucson, Arizona. **[Thomas Gaj]**
- 328 Gamboa, J.R., Mohandes, S., Tran, P.L., Slepian, M.J., Yoon, J-Y. (2012). Linear fibroblast alignment on sinusoidal wave micropatterns. The 16th International Conference on Miniaturized Systems for Chemistry and Life Sciences (MicroTAS 2012), Okinawa, Japan. **[Samir Mohandes]**
- 329 Gamboa, P.M., Park, D.L., Mantiega, R., and King, K. (1993). Ciguatetect-H, a clinical diagnostic tool for ciguatera poisoning. 107th Annual AOAC International Meeting, Washington, D.C. **[Kimberly King]**
- 330 Garcia, J.M., Alonso-Pimentel, H., and Papaj, D.R. (1996). Marking of host fruit by male *Rhagoletis boycei* flies: Evidence for a sex pheromone in a species where copulation is forced. Annual Conference of the Society for Advancement of Chicanos and Native Americans in Science, Los Angeles, California. **[Jesus Garcia]**
- 331 Garcia, S.E., Jackson, E., and Pepperberg, I.M. (1993). Mirror image stimulation and mirror mediated object discrimination in juvenile African Grey parrots. Animal Behavior Society Conference, U.C. Davis, Davis, California. **[Sean Garcia]**
- 332 Gardner, D.B. (1992). Biosystematic study of two cicada species in southern Arizona. The SWARM Division of the AAAS Annual Meeting, Tucson, Arizona. **[Douglas Gardner]**
- 333 Garrison, N., Yi, Z., Cohen-Barak, O., and Brilliant, M.H. (2002). A 122.5kb deletion of the P gene underlies the high prevalence of oculocutaneous albinism type 2 (OCA2) in the Navajo population. SACNAS National Conference, Anaheim, California. **[Nanibaa Garrison]**
- 334 Garrison, N.A., Newton, J., Zanhua, Y., and Brilliant, M. (2001). Determination of the genetic cause of human oculocutaneous albinism (OCA). Society for the Advancement of Chicanos and Native Americans in Science (SACNAS), Phoenix, Arizona and The UA Student Showcase, Tucson, Arizona. **[Nanibaa Garrison]**
- 335 Gause, P.R., Lloria-Prevatt, M., Keith, W.N., Balmain, A., Linardopolous, S., and Powell, M.B. (1997). Molecular characterization of DMBA induced melanoma from TP-Ras transgenic mice. Annual American Association for Cancer Research Meeting, San Diego, California. **[Paul Gause]**
- 336 Gazard, J.L., Wells, M.A., and Tsuchida, K. (1998). Lipid transfer particle and lipid delivery to *Bombyx mori* oocytes. The SWARM Division of AAAS Annual Meeting, Grand Junction, Colorado. **[Justin Gazard]**
- 337 Gee, E. and Willis, M.A. (1998). Anatomical organization of projections of the mechanosensory hairs from the base of the *Manduca sexta* antennae. Annual Spring Meeting of the Arizona Imaging & Microanalysis Society, Tucson, Arizona. **[Eric Gee]**
- 338 Gee, L. and Burd, G.D. (1998). Pax-6 expression in the olfactory bulb of *Xenopus laevis* following olfactory nerve lesions. Association for Chemoreception Sciences Meeting, Sarasota, Florida. **[Leslie Gee]**
- 339 Geffre, C.P., Margolis, D.S., Gonzales, D.A., DeYoung, D.W., Ruth, J.T. and Szivek, J.A. (2010). In Vivo Shear Load Monitoring of the Tibiofemoral Joint. Orthopaedic Res Soc, New Orleans Louisiana. **[David Gonzales]**
- 340 Geffre, C.P., Szivek, J.A., and Bliss, C.L. (2006). In vivo load monitoring of the knee during gait. Physiology Research Conference, University of Arizona, Tucson, Arizona. **[Christopher Geffre]**
- 341 Gentry, C., Huey, K., and van Antwerpen, R. (1994). Ultrastructure of an insect's ovariole. UA Student Research Expo, Tucson, Arizona. **[Cynthia Gentry Carr]**
- 342 Gerba, C.P. and Finley, R.O. (1990). Inactivation of microorganisms by copper, silver and low levels of free chlorine. International Conference on Germicides, Atlanta, Georgia. **[Rose Finley]**
- 343 Gereke, B.J., Compton, R.J., and Fellous, J.M. (2011). Sex differences in rodent optimal spatial navigation: Influences of estrous cycle and object cues in the traveling salesperson problem. Society for Neuroscience Annual Meeting, Washington, D.C. **[Brian Gereke]**
- 344 Gerner, E.W., Fish, J., Shassetz, L.R., Kurtts, T., and Fuller, D.J. M. (1991). Differences in stress-induced polyamine acetylation in pro-and eukaryotes. Hyperthermic Oncology Conference. Tucson, Arizona. **[Lawrence Shassetz]**
- 345 Gerner, E.W., Fish, J., Shassetz, R., Kurtts, T., and Fuller, D.J.M. (1991). Differences in stress-induced polyamine acetylation in pro-and eukaryotes. Hyperthermic Oncology Conference, Tucson, Arizona. **[Jennifer Fish]**
- 346 Ghosh, S, Uribe, D, Watson, A, Hasan, S (2012). The role of aPKC in the growth and progression of Colon Cancer. Frontiers in Biomedical Research, AHSC Plaza Presented: October [Hasan, Shaina] **[Shaina Hasan]**
- 347 Gibboni, R.R., Laine, C.M., Zimmerman, P.E., and Gothard, K.M. (2008). Spatiotemporal analysis of scanpaths in monkeys viewing images of conspecific facial expressions. Neuroscience 2008, Washington, DC. **[Robert Gibboni]**

- 348 Gibson, A.R., Horn, K.M., Van Kan, P.L.E., Pong, M., and Singh, H. (1998). The role of the intermediate cerebellum in the control of movements that involve hand use. 74th Annual Meeting of the Southwestern and Rocky Mountain Division of the American Association for the Advancement of Science, Grand Junction, Colorado. **[Harminder Singh]**
- 349 Giedinghagen, L.N. and Christensen, T. (1997). Is olfactory information mapped topographically in the male Sphinx moth *Manduca sexta*? Annual Meeting of the Arizona Imaging and Microanalysis Society, Tucson, Arizona. Winner of Student Award for Best Poster. **[Lori Nicole Giedinghagen Teed]**
- 350 Giles, J.H., Shackman, J.G., and Denton, M.B. (1998). Nondestructive, quantitative analysis of analgesic tablets by Raman spectroscopy. International Conference on Scientific Optical Imaging, Cayman Islands. **[Jonathan Shackman]**
- 351 Giles, J.H., Shackman, J.G., and Denton, M.B. (1999). Quantitative analysis of analgesic tablet formulations using Raman Spectroscopy. The Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Orlando, Florida. **[Jonathan Shackman]**
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- 353 Gizinski, M., Salus, S., and Shumaker, K. (1994). The role of a voltage-dependent calcium channel in moss vegetative development. Annual Meeting of the Society of Plant Physiologists, Portland, Oregon. **[Sandra Salus]**
- 354 Gold, M., Hahn, T., and Akporiaye, E.T. (2005). Vitamin E analogue as a novel treatment for cancer. Posters on the Hill, Council on Undergraduate Research, Washington, D.C. **[Mikhal Gold]**
- 355 Gold, M., Hahn, T. and Akporiaye, E.T. (2005). Vitamin E analogue as a novel treatment for cancer. Association for Women Facultys Women in Research Conference, Tucson, Arizona **[Mikhal Gold]**
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- 366 Gothard, K.M., Zimmerman, P.E., Stib, M.T., Farshad, K.M., and Mosher, C.P. (2010). Gaze following and anticipation of monkeys viewing videos with social content. Society for Neuroscience, San Diego, CA. **[Kayven Farshad]**
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- 376 Gray, S.I., Vance, R., Plante, E., and Dieke, A. (2000). Oral and written language scales performance by children with SLI. Annual Convention of the American Speech-Language-Hearing Association, Washington, D.C. **[Ada Dieke]**
- 377 Gregston, L., Nyiawung, T. and So, M. (2010) Characterization and genome sequencing of Neisseria species isolated from Rhesus macaques. International Pathogenic Neisseria Conference, Banff, Alberta, Canada. **[Lindsay Gregston]**
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- 394 Hamm, T.M., McCurdy, M.L., and Phillips, C.A. (1993). Determination by impedance measurements of conductance changes produced by recurrent inhibition in spinal mononeurons. XXXII Congress International Union of Physiological Sciences, Glasgow, Scotland. **[Carrie Phillips]**
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- 397 Hanke, N., and Bowden, G.T. (2007). Loss of catalase elevates stress activated MAPK pathways in mouse keratinocyte tumor progression. American Association for Cancer Research (AACR) annual meeting, Los Angeles, California. **[Neale Hanke]**
- 398 Hapak, SM, Mandell, EK, Parker, SS, Maskaykina I, and Ghosh, S (2013). Biochemical competition between aPKC isoforms establishes neuronal polarity. International School of Biological Magnetic Resonance, Erice, Sicily Presented: June 13 [Hapak, Sophie] **[Sophie Hapak]**
- 399 Harari, P.M., Carper, S.W., Clay, L., Fuller, D.J.M., and Gerner, E.W. (1989). Stress-induced polyamine catabolism in rodent and human cells. Radiation Research Society Meeting, Seattle, Washington. **[Lisa Clay Strobel]**
- 400 Hardesty, K., Fuglevand, A., and McNaughton, B. (2001). Can facial expressions be differentiated through the analysis of ensemble facial EMGs. Annual Meeting of the Southwestern and Rocky Mountain Division American Association for the Advancement of Science, Denton, Texas. **[Kimmey Hardesty]**
- 401 Hardie, J., Storer, R., Chung, K., Elias, D., Harrington, R., and Wadhams, L. (1998). Interactions between aphid sex pheromones and plant volatiles. Second International Symposium on Insect Pheromones, Wageningen, The Netherlands. **[Damian Elias]**
- 402 Hardy, K., Yatskevych, T.A., Greenhut, S., Antin, P.B., and Baker, R.K. (2003). Regulation of epithelial-mesenchymal transitions during avian gastrulation by EphA9 and EphrinB1. Weinstein Cardiovascular Development Conference, Leiden, Netherlands. **[Susan Greenhut]**
- 403 Harper, JN, and Wright, SH (2012). Competitive Exchange Diffusion (CED) to determine transport of hOCT2 inhibitors. Experimental Biology, San Diego, CA Presented: April 22-24 [Harper, Jaclyn] **[Jaclyn Harper]**
- 404 Harper, J, Belzer, M, Morales, M, and Wright, SH (2013). Substrate-dependent and mixed mechanisms of ligand interaction with the human organic cation transporter, OCT2. AAPS Workshop on Drug Transporters in ADME: From the Bench to the Bedside; Bethesda, MD. **[Jaclyn Harper]**
- 405 Harris, D.T., Kapur, R., Acevedo, A., Friedmann, L., and Evans, D. (1991). Analysis of a novel function-associated molecule on murine natural killer cells. FASEB, Atlanta, Georgia. **[Alicia Acevedo-Urcuyo]**
- 406 Harris, R.B., Roberge J.L., Abalos, A.T., and Gerace, J.M. (2006). Exploring potential associations between arsenic exposures and cancer. Epidemiology in Arizona Forum, University of Arizona, Tucson, Arizona. **[Julia Gerace Skinner]**
- 407 Hartvigsen, N.E. and White, D. (1998). Immunology and the internet: Teaching through technology. 74th Annual Meeting of the Southwestern and Rocky Mountain Division of the American Association for the Advancement of Science, Grand Junction, Colorado. **[Nathan Hartvigsen]**
- 408 Hartzell, A., Wallace, J.L., Nematollahi, S., Burke, S.N., and Barnes, C.A. (2010). The effect of perceptual difficulty and age on spontaneous object recognition. 40th Annual Society for Neuroscience Meeting. San Diego, CA. **[Andrea Hartzell]**
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- 410 Hartzell, A.L., Burke, S.N., Hoang, L.T., Lister, J.P., Rodriguez, C. and Barnes, C.A. (2011) Transcription of the immediate-early gene Arc in the hippocampus reveals activity differences along the transverse axis of the CA1 subregion. Society for Neuroscience 2011, Washington, DC. **[Andrea Hartzell]**
- 411 Hasan, S, Perry, AS, Watson, A, Ghosh, S, and Uribe, DJ (2012). Expression and Function of aPKC Kinase in Colon Cancer. Frontiers in Biomedical Research, AHSC Plaza Presented: November [Hasan, Shaina] **[Shaina Hasan]**
- 412 Hasan, S, Racolta, A, Wierzb, M, Tax, FE (2015). Use of Antagonistic Peptide Technology to Determine the CLE Peptides that Regulate Root Growth in Arabidopsis. Experimental Biology Conference, Boston, MA Presented: March 28-April 1 [Hasan, Shaina] **[Shaina Hasan]**
- 413 Hattan, J., McDonough, W., Mariani, L., Russ, K., and Berens, M.E. (2000). Death associated protein-3 and survival of migrating glioma cells. The Fifth Annual Student Scientific Presentation Day, Barrow Neurological Institute, Phoenix, Arizona. **[Jessica Hattan Christensen]**
- 414 Haveman, T.M., Ulreich, J.B., Spofford, C.M., Rhorer, A.S., Brendel, K., and Nakazato, P.Z. (1994). Comparison of incubation systems for volatile and nonvolatile test agents in precision-cut liver slice cultures. Mountain West Society for Toxicology, Albuquerque, New Mexico. **[Anthony Rhorer]**

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- 416 Hays, A.M., Keller, R.L., Gmitro, A., Alpbach, M., Padilla, M.T., Balagtas, M., O'Donnell, M., and Witten, M.L. (1997). Quantitative phase contrast images of flow within the rat vena cava in a 45° rat head down tilt (HDT) model of simulated microgravity. Experimental Biology Meeting, New Orleans, Louisiana. **[Rachel Keller]**
- 417 Hazzard, J., Goretski, W., Bartsch, R., and Cusanovich, M.A. (1990). Cytochrome c3 flash photolysis. Biophysical Society Meeting, Baltimore, Maryland. **[Winifred Goretski]**
- 418 Heap, JC, Luna, M, Waters, HA, Penick, KJ, Szivek, JA (2013). Co-culture of adipose derived stem cells and chondrocytes with surface modifying proteins on cartilage and bone scaffolds (2013). Western Medical Student Research Forum, Carmel, CA. **[Heather Waters Rogan]**
- 419 Heden, G.J., Geffre, C.P., Diggins, N.H., Ruth, J.T., Farrow, L.D., and Szivek, J.A. (2011). Implantable Sensate medial condyle surface replacement allows shear and axial load sensing. Orthopaedic Res Soc, Long Beach CA **[Nicklaus Diggins]**
- 420 Heden, G.J., Geffre, C.P., Diggins, N.H., Ruth, J.T., DeYoung, D.W., and Szivek, J.A. (2011). A Novel Medial Condyle Surface Replacement Scaffold Facilitates Cartilage Regeneration. TERMIS, Houston TX. **[Nicklaus Diggins]**
- 421 Heinze, G.L., Kennedy, A., and Rainier, J.D. (1998). Studies toward the total synthesis of gymnodimine. 74th Annual Meeting of the Southwestern and Rocky Mountain Division of the American Association for the Advancement of Science, Grand Junction, Colorado. **[Gretchen Heinze Mannelly]**
- 422 Helm, K.W., Schmeits, J., and Vierling, E. (1991). Endomembrane-localized small heat shock proteins in pea and Arabidopsis. Third International Congress for Plant Molecular Biology, Tucson, Arizona. **[James Schmeits]**
- 423 Helmers, M, Porter, J, Wang, P, Ghosh, I (2010). A split-luciferase reassembly approach for interrogating small molecule effects on protein-protein interactions, Beckman Symposium, Irvine, CA. **[Mark Helmers]**
- 424 Helmers, M, Porter, J, Wang, P, Ghosh, I (2010). Interrogating protein-protein interactions involved in cancer. Institute for Biomedical Engineering Regional Conference, Tucson, AZ. **[Mark Helmers]**
- 425 Helmers, M, Porter, J, Wang, P, Ghosh, I (2010). Interrogating small molecule effects on protein-protein interactions involved in cancer. Biological, Engineering, and Chemical Undergraduate Research Conference (BECUR). Tucson, AZ **[Mark Helmers]**
- 426 Henderson, CA, Namdarian, EJ, Pappas, CT, and Gregorio, CC (2013). A POTENTIAL NOVEL MECHANISM FOR THE REMODELING ASSOCIATED WITH DILATED CARDIOMYOPATHY, San Diego, California Presented: [Namdarian, Elisa] **[Elisa Namdarian]**
- 427 Henderson, M., and Brilliant, M.H. (2003). The human P gene is associated with variations in constitutive pigmentation. Minority Biomedical Research Program Colloquium, Tucson, Arizona. **[Miquia Henderson]**
- 428 Henderson, M., Garrison, N., Kelch, J., Kim, M., Metelits, B., and Brilliant, M.H. (2003). The human P gene is associated with variations in constitutive pigmentation. MARC/Minority Health Disparities, Tucson, Arizona. **[Miquia Henderson] [Nanibaa Garrison] [Benjamin Metelits]**
- 429 Henriksen, E.J., Marchionne, E.M. and Diamond-Stanic, M.K. (2011). Chronic renin inhibition by aliskiren improves glucose tolerance, insulin sensitivity, and skeletal muscle glucose transport activity in obese Zucker rats. 71st Scientific Session of the American Diabetes Association, San Diego, California. **[Elizabeth Marchionne]**
- 430 Henriksen, E.J., Munoz, K.A., Aannestad, A., and Tischler, M.E. (1993). Effects of unweighting on protein content and in vivo protein synthesis in skeletal muscles of trained vs. sedentary rats. ASGSB Annual Meeting. **[Anders Aannestad]**
- 431 Henriksen, E.J., Munoz, K.A., Aannestad, A., and Tischler, M.E. (1993). Increases in protein content and protein synthesis in heart and plantaris of voluntary running rats. ACSN Annual Meeting, Salt Lake City, Utah. **[Anders Aannestad]**
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- 435 Henriksen, E.J., Teachey, M.K., Taylor, Z.C., Jacob, S., Saengsirisuwan, V., Kramer, K., Klatt, M.J., Ptock, A., and Hasselwander, O. (2002). Metabolic actions of conjugated linoleic acid on insulin-resistant rat skeletal muscle glucose transport are isomer-specific. 62nd Scientific Session of the American Diabetes Association, San Francisco, California. **[Zack Taylor]**
- 436 Henriksen, E.J., Teachey, M.K., Taylor, Z.C., Jacob, S., Saengsirisuwan, V., Kramer, K., Klatt, M.J., Ptock, A., and Hasselwander, O. (2002). The trans-10, cis-12 isomer of conjugated linoleic acid enhances glucose transport in insulin-resistant rat skeletal muscle. Annual Meeting of the European Association for the Study of Diabetes, Budapest, Hungary. **[Zack Taylor]**

- 437 Hernandez, K, Ware, V, Wilder, JA, Heimark, RL (2014). Genetic variation in the pre-MiR-367/302d sequence decreases mature MiR expression; AiChe (American Institute of Chemical Engineers Spring Meeting), New Orleans, LA. **[Kari Hernandez]**
- 438 Herndon, J.M., Cholanians, A.B., Erives, G.V., Lau, S.S., Miller, G.W., Monks, T.J. (2010). Role of metabolism in 3,4-(+)-methylenedioxymethamphetamine-induced neurotoxicity: Contribution of cytochrome p450 2d6 and catechol-o-methyl transferase. 40th Annual Society for Neuroscience Meeting, San Diego, CA **[Aram Cholanians]**
- 439 Herndon, J.M., Cholanians, A.B., Erives, G.V., Lau, S.S., Miller, G.W., Monks, T.J. (2010). Role of metabolism in 3,4-(+)-methylenedioxymethamphetamine-induced neurotoxicity: Contribution of cytochrome p450 2d6 and catechol-o-methyl transferase. 40th Annual Society for Neuroscience Meeting, San Diego, CA. **[Aram Cholanians]**
- 440 Heuser, H., Gelsey, G., Cohen, A., Palacios, M., Tanner, B., Msaky, E., Dettman, D., Alin, S., and McKee, B. (1999). A paleolimnological study of lacustrine-deltaic sediments at Lake Tanganyika, Africa: Implications for the effects of human habitation. Geodaze Geosciences Symposium, Tucson, Arizona. **[Heather Heuser Kokorowski]**
- 441 Higgins, M.R., Eckholdt, P., Nardi, J., and Tolbert, L.P. (1997). Does fasciclin II play a role in guiding olfactory receptor axons to their targets? Society for Neuroscience, New Orleans, Louisiana, and (1998) Western Nerve Net, Tucson, Arizona. **[Patricia Eckholdt]**
- 442 Higgins, M.R., Nighorn, A., Abdelwahab, M., Oland, L.A., and Tolbert, L.P. (2004). Testing roles of fasciclin II in the developing olfactory pathway in *Manduca sexta*. 34th annual meeting of the Society for Neuroscience. **[Kevin Chandler] [Mohammed Abdelwahab]**
- 443 Hillis, N., Charbonneau, D., Dornhaus A. (2013). Are lazy ants selfish? Testing whether inactive ant workers invest more in their own reproduction. The 50th Annual Conference of the Animal Behavior Society, University of Colorado, Boulder Presented: 7/28/2013-8/1/2013 [Hillis, Neil] **[Neil Hillis]**
- 444 Ho, G., Estes, P., and Ramaswami, M. (1997). Development of an in vivo marker for the *Drosophila* neuromuscular synapse. Annual Meeting of the Society of Neurobiology, New Orleans, Louisiana. **[Grace Ho]**
- 445 Hoang, L.T., Egurrola, A.M., Wann, E.G., Uprety, A.R., Fellous, J-M. (2010). Characterization of Arc-expression in BABAergic neurons of the ventral tegmental area during aging. 40th Annual Meeting of the Society for Neuroscience, San Diego, CA. **[Ajay Uprety]**
- 446 Hoang, L.T., Egurrola, A.M., Wann, E.G., Uprety, A.R., Fellous, J-M. (2010). Characterization of Arc-expression in GABAergic neurons of the ventral tegmental area during aging. 40th Annual Meeting of the Society for Neuroscience, San Diego, CA. **[Ana Egurrola]**
- 447 Hodge, D. and Ward, S. (1995). Inhibiting the function of carnitine provides clues about *Caenorhabditis elegans* sperm motility. International *Caenorhabditis elegans* Meeting, Madison, Wisconsin. **[David Hodge]**
- 448 Hoekstra, H.E., Drumm, K.E., Kimm, J.A., and Nachman, M.W. (2001). Ecological genetics of coat-color in pocket mice: changes in allele frequency across a habitat gradient. Evolution 2001, annual joint meeting of the Society for Molecular Biology and Evolution Society for the Study of Evolution, and Society for Systematic Biology, Knoxville Tennessee, and Mammalian Diversification Symposium, Berkeley, California. **[Kristen Drumm]**
- 449 Hofer, H.R., Cardinal, K.O., Stone, A.L., and Williams, S.K. (2006). Flow-induced intimal thickening of blood vessel mimics. International Society for Applied Cardiovascular Biology, La Jolla, California. **[Heidi Hofer]**
- 450 Hollis, E.A., Sipes, I.G., and Hoyer, P.B. (1997). In vitro effect of 4-vinylcyclohexene diepoxide on viability of isolated mouse pre-antral follicles. 36th Annual Meeting of the Society of Toxicology, Cincinnati, Ohio. **[Ellen Hollis Cannady]**
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- 452 Hollman, D.J., Shoemaker, S., Lytwak, L., Miranda, K.M. (2006). The aqueous autoxidation of nitric oxide. Rocky Mountain ACS, Tucson, Arizona. **[Derek Hollman]**
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- 458 Hsieh, J.C., Sheedy, C.A., Mathern, D.R., Slater, S.A., Whitfield, G.K., Haussler, C.A., and Haussler, M.R. (2007). Molecular Analysis of Two Novel Mutations in the Vitamin D Receptor Corepressor, Hairless, and Expression of Rat Hairless in *E. coli*. 29th Annual Meeting of the American Society for Bone and Mineral Research, Honolulu, Hawaii. **[Craig Sheedy] [Douglas Mathern] [Stephanie Slater]**

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- 460 Huang, J., Brown, A., Costy-Bennett, S., Luo, Z., and Fregosi, R.F. (2004). Influence of Prenatal Nicotine Exposure on Postnatal Development of Breathing Pattern. Experimental Biology Meeting, Washington D.C. **[Amanda Brown Marquis]**
- 461 Hultine, K.R., Cable, W.L., Williams, D.G., Ellsworth, P.Z., and Scott, R.L. (2002). Transpiration by mesquite on a desert river floodplain. The American Geophysical Union Chapman Conference on Eco-Hydrology of Semiarid Landscapes: Interactions and Processes, Taos, New Mexico. **[Patrick Ellsworth]**
- 462 Hummell E., Lee U., and Vierling E. (2007). Genetic analysis of an enzyme involved in nitric oxide metabolism. American Society for Cell Biology, Washington, D.C. **[Erica Hummell Luiten]**
- 463 Hurley, B.A. and Strausfeld, N.J. (1991). Structure of output neurons of the mushroom bodies in honeybee brains. Society for Neuroscience Conference, New Orleans, Louisiana. **[Barbara Hurley]**
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- 466 Ikner, L., Gerba, C., and Karpiscak, M. (2000). Effects of temperature on pathogen removal efficiency in a small-scale, surface flow constructed wetland. McNair Scholars Summer Research Conference, Pennsylvania State University, State College, Pennsylvania. **[Luisa Ikner]**
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- 469 Ingram, W.M., and Cordes, M.H.J. (2007). Loss of protein function in vivo resulting from the introduction of short aggregation-prone nonpolar amino-acid sequences. Colorado Protein Stability Conference, Breckenridge, CO. **[Wendy Ingram]**
- 470 Ingram, W.M., and Cordes, M.H.J. (2008). Loss of protein function in vivo resulting from the introduction of short aggregation-prone nonpolar amino-acid sequences. American Chemical Society National Meeting, New Orleans, LA. **[Wendy Ingram]**
- 471 Ingram, W.M., and Cordes, M.H.J. (2008). Loss of protein function in vivo resulting from the introduction of short aggregation-prone nonpolar amino-acid sequences. Protein Society Meeting, San Diego, CA. **[Wendy Ingram]**
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- 477 Johnson, D.B., Tome, M.E., Rimza, L.M., Roberts, R.A., Browne, L.W., Grogan, T.M., Miller, T.P., and Briehl, M.M. (2004). Downregulated antioxidant defense enzyme expression is correlated with poor survival in diffuse large B-cell lymphoma. Experimental Biology Conference, Washington D.C. **[David Johnson]**
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- 479 Johnson, M.I., Gilmartin, J., Collier, M., and Thompson, M. (1995). Ethanol induces apoptotic cell death in Schwann cells cocultured with sympathetic neurons. Society for Neuroscience Annual Meeting, San Diego, California. **[Jennifer Gilmartin Garnand]**
- 480 Johnson, M.I., Gilmartin, J.M., and Patel, T. (1994). Stimulation of axonal elongation by alcohol is dependent upon the developmental stage of rat sympathetic neurons. Research Society on Alcoholism Annual Scientific Meeting, Maui, Hawaii. **[Jennifer Gilmartin Garnand]**
- 481 Johnson, M.I., Gilmartin, J.M., and Thompson, M. (1995). Low ethanol concentrations reduce Schwann cell numbers in cultures of sympathetic neurons. National Institute on Alcohol Abuse and Alcoholism 25th Anniversary Celebration, Bethesda, Maryland. **[Jennifer Gilmartin Garnand]**
- 482 Johnston, A.N. and Schmidt, J.O. (1999). The effect of Africanized honey bees on Tucson's pet population. The Entomological Society of America Annual Meeting, Atlanta, Georgia. **[Andrea Johnston]**

- 483 Johnston, A.N. and Schmidt, J.O. (2000). Africanized bees in the urban environment: Risk to domestic animals. Second International Conference on Africanized Bees and Bee Mites, Tucson, Arizona. **[Andrea Johnston]**
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- 485 Johnston, A.N. and Schmidt, J.O. (2000). Clash of Africanized bees and wildlife and domestic pets: Are perceptions correct? Creative Cooperation in Resource Management: Third Conference on Research and Resource Management in the Southwestern Deserts, Tucson, Arizona. **[Andrea Johnston]**
- 486 Jones, C.L., Bailey, E.F., Fuller, D.D., Reeder, J.C., and Fregosi, R.F. (2000). Influence of pulmonary stretch receptor feedback and CO₂ on upper airway and respiratory pump muscle activities. AAAS Annual Meeting and Science Innovation Exposition, Washington, D.C. **[Cassandra Jones]**
- 487 Jones, C.L., Bailey, E.F., Fuller, D.D., Reeder, J.C., and Fregosi, R.F. (2000). Influence of pulmonary stretch receptor feedback and CO₂ on upper airway and respiratory pump muscle activities. FASEB, San Diego, California. **[Cassandra Jones]**
- 488 Jones, C.L., Bailey, E.F., Fuller, D.D., Reeder, J.C., and Fregosi, R.F. (2000). Influence of pulmonary stretch receptor feedback and CO₂ on upper airway and respiratory pump muscle activities. SWARM AAAS Meeting. Las Cruces. New Mexico. **[Cassandra Jones]**
- 489 Jones, D. and Bhoola, K.D. (1998). The role of tissue kallikrein and kinin receptors in neoplasms of the human kidney. Microscopy Society of South Africa Conference, Johannesburg, South Africa. **[Deborah Jones]**
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- 491 Ju, X., Arnold, R., Betterton, E., Ela, W., Berry, L., Barbaris, B., and Kerr, K. (2000). Photochemical dehalogenation of perchloroethylene in acetone-isopropanol mixtures. Chemical and Environmental Engineering Department, University of Arizona, Tucson, Arizona. **[Laura Berry]**
- 492 Jurutka, P.W., Lamb, T.L., Encinas-Dominguez, C., Whitfield, G.K., Hsieh, J.C., Thompson, P.D., Galligan, M.A., Haussler, C.A., and Haussler, M.R. (2001). Molecular analysis of helix-1 and helix-3 in the human vitamin D receptor reveals functional subdomains mediating hormone binding, protein stabilization, heterodimerization and interaction with coactivators. American Society for Bone and Mineral Research, Phoenix, Arizona. **[Tiffany Blake Lamb]**
- 493 Jurutka, P.W., Thompson, P.D., Eichhorst, K.R., Hall, N., Encinas Dominguez, C., Whitfield, G.K., Hsieh, J.C., Haussler, C.A., and Haussler, M.R. (2003). Lithocholic acid is a new vitamin D receptor ligand that stimulates transcription via novel VDRE motifs and a unique pattern of coregulator recruitment. American Society for Bone and Mineral Research, Minneapolis, Minnesota. **[Kristina Eichhorst Smith]**
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- 495 Kanost, M.R. and Ladendorff, N.E. (1990). An insect hemolymph protein induced by bacteria contains immunoglobulin-like domains. American Society for Biochemistry and Molecular Biology and the American Association of Immunologists, New Orleans, Louisiana. **[Norma Ladendorff Collins]**
- 496 Kaochar, S., Stamer, W.D., and Heimark, R.L. (2003). Expression of adherens proteins in human Schlemm's canal cells. Annual Biomedical Research Conference for Minority Students, San Diego, California. **[Salma Kaochar]**
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- 498 Karnas, K.J., Hazell, K., and Wells, M.A. (1998). Using Saccharomyces cerevisiae to study the role that apolipophorin II plays in lipophorin biosynthesis. Third International Symposium on Molecular Insect Science, Snowbird, Utah. **[Kellie Hazell]**
- 499 Karnas, K.J., Hazell, K., and Wells, M.A. (1999). Using Saccharomyces cerevisiae to study the role that apolipophorin II plays in lipophorin biosynthesis. The Center for Insect Science Sixth Hexapodium, Tucson, Arizona. **[Kellie Hazell]**
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- 501 Karunanithi, S., Lin, Y-Q., Gonzalez, J.M., Day, W.A. (2010). Presynaptic scaling: A novel homeostatic scaling plasticity. 40th Annual Society for Neuroscience Meeting, San Diego, CA. **[Juan Mena Gonzalez]**
- 502 Kawamoto, Y., Luo, M.C., Vanderah, T.W., Wang, Z., Porreca, F., and Lai, J. (2002). Mechanisms for the Pronociceptive actions of spinal dynorphin. XIVth World Congress of Pharmacology, San Francisco, California. **[Yukari Kawamoto Wei]**
- 503 Kazi, S., Lambert, D., and Nagy, L. (2000). A study of HOX gene function in Ilyanassa obsoleta. Undergraduate Research Poster Session on Capitol Hill, Washington, D.C. **[Shahnaz Kazi]**
- 504 Kedia, R., Feng, C., Hazzard, J.T., Tollin, G., and Enemark, J.H. (2001). Effect of viscosity on intramolecular electron transfer in sulfite oxidase. 221st National Meeting of the American Chemical Society, San Diego, California. **[Rohit Kedia]**

- 505 Kehring, A., Patrick, S.M., Estrada, T., Gephart, S. Martin, N., Bedrick, A. and Halpern, M.D. (2011). Increased Variability of Fecal Bile Acid Levels in Infants that Develop Necrotizing Enterocolitis. Pediatric Academic Societies, Denver, Colorado. **[Nina Martin]**
- 506 Kellar, R., Tolbert, L., and Willis, M. (1995). Behavioral consequences of abnormal glomerular architecture of the antennal lobe of the moth *Manduca sexta*. Center for Insect Science Hexapodium, Tucson, Arizona. **[Robert Kellar]**
- 507 Kellar, R.S., Tolbert, L.P., and Willis, M.A. (1996). Labeling of axons projecting to the brain from single antennal segments of the moth *Manduca sexta*. Annual Meeting of the Arizona Imaging and Micro Analysis Society, Tucson, Arizona. **[Robert Kellar]**
- 508 Keller, R.L., Hays, A.M., Lantz, R.C., and Witten, M.L. (1997). Changes in abdominal aorta wall area in rats after 14 days 450 hind limb unweighting. Experimental Biology, New Orleans, Louisiana. **[Rachel Keller]**
- 509 Kersey, R.C., Szivek, J.A., and Sacoman, D. (1993). Symmetry of biomechanical properties in canine femora. 19th Annual Meeting of the Society for Biomaterials, Birmingham, Alabama. **[Damen Sacoman]**
- 510 Kessinger, T., Slepicka, J., Talenfeld, A., Matthew, J., and Masel, J. (2008). Backup stop codons in *Saccharomyces cerevisiae*: selection on leaky readthrough translation and its implication for preadaptation. Evolution, University of Minnesota, Minneapolis. **[Taylor Kessinger] [Aron Talenfeld]**
- 511 Keys, K., Norquest, P., Watkins, J., and Hammer, M. (2008). A model for the peopling of Indonesia. CUR Posters on the Hill, Washington, DC. **[Kevin Keys]**
- 512 Keys, K.L., Norquest, P., Watkins, J., Hammer, M.F. (2007). Languages and genes: Population dynamics of southern Indonesia. SACNAS Conference, Kansas City, Missouri. **[Kevin Keys]**
- 513 Kiela, P.R., LeSueur, J., Collins, J.F., and Ghishan, F. (2002). Rat NHE-3 promoter is TATA-less and regulated by Spl and GATA transcription factors. American Gastroenterological Association, San Francisco, California. **[Jeffrey LeSueur]**
- 514 Kitchen, S. and Little, J.W. (1992). Genetic analysis of a bacterial regulatory protein: Isolation of mutations affecting the proteolysis of LexA repressor. National Conference on Undergraduate Research, Minneapolis, Minnesota; and The SWARM Division of the AAFS Annual Meeting, Tucson, Arizona. **[Scott Kitchen]**
- 515 Kittleson, M.M., Aguilar J.M., Tokerud, G., Plante, E., and Asbjornsen, A. (2008). Implicit Language Learning: Adult's ability to statistically segment words in Norwegian. SRCLD, University of Madison, Wisconsin. **[Megan Kittleson] [Jessica Aguilar]**
- 516 Klein, R.D., Boyd, J.L., and Bowden, G.T. (1995). Co-culture of LNCaP prostate carcinoma cells with human prostate fibroblasts result in the induction of the metalloprotease, matrilysin. 86th Annual Meeting of the American Association for Cancer Research, Toronto, Ontario, Canada. **[Jeff Boyd]**
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- 520 Knuth, S. and Fares, H. (2004). Genome-based RNA interference screen identifies regulators of endocytosis in *Caenorhabditis elegans*. Annual Meeting of the American Association for the Advancement of Science, Seattle, Washington. **[Sarah Knuth]**
- 521 Knuth, S.A. and Fares, J. (2004). Genome based RNA interference screen identifies CUP-2, a protein that regulates endocytosis in *Caenorhabditis elegans*. American Association for the Advancement of Science Student Poster Session, Seattle, Washington. **[Sarah Knuth]**
- 522 Koepke, D.F., Weltzin, J.F., Abbott, L.B., Snyder, K.A., Suedkamp, K.S., Germaine, H.L., Schaeffer, S., Olander, A., Angell, D., McPherson, G.R., and Ford, P.L. (1997). Global change and precipitation redistribution: Effects on herb composition and diversity. Ecological Society of America Annual Meeting, Albuquerque, New Mexico. **[Kimberly Suedkamp Wells]**
- 523 Kolody, B., Kunz, S., Isoe, J., and Miesfeld, R.L. (2008). Regulation and function of midgut protease genes in *Aedes aegypti* mosquitoes. American Society of Tropical Medicine and Hygiene, New Orleans, Louisiana. **[Brianna Kolody]**
- 524 Konings, P.N.M., Benfield, M.C., Hendrix, M.J.C., Day, R., Seidah, N.G., Merrill, B.J., and Davis, T.P. (1992). Processing of cholecystokinin in the SKN-MCIXC cell line. Society for Neuroscience, Anaheim, California. **[Bradley Merrill]**
- 525 Koprowski, J. and Wood, D. (2003). How small is too small: Minimum viable population size in tree squirrels. International Tree Squirrel Colloquium, Northumberland, United Kingdom. **[David Wood]**
- 526 Koussa, M., Hayashi, J.H., and Oland, L.A. (2009). Morphological and electrophysiological development of peripheral glial cells in the olfactory nerve of the moth *Manduca sexta*. Society for Neuroscience Annual Meeting, Chicago, IL. **[Mounir Koussa]**
- 527 Koussa, M., Tolbert, L.P., and Oland, L.A. (2011). Glia-neuron interactions in the formation of the glial networks investing the olfactory nerve of the moth. Association for Chemoreception Sciences Annual Meeting, St. Pete Beach, Florida. **[Mounir Koussa]**
- 528 Koussa, M., Tolbert, L.P., and Oland, L.A. (2011). Glial calcium currents and the formation of the glial networks in the developing olfactory nerve. The American 55th Annual Biophysical Society Meeting, Baltimore, MD. **[Mounir Koussa]**
- 529 Koussa, M.A., Tolbert, L.P., and Oland, L.A. (2010) Calcium currents in the formation of glial networks investing the olfactory nerve of the moth. Society for Neuroscience, San Diego, CA. **[Mounir Koussa]**

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- 531 Kriederman, B., Bernas, M., Lee-Donaldson, L., Witte, M., Witte, C., Travis, F., Myloyde, T., Whitehair, O., Ortiz, L., Summers, P., and Stea, B. (2000). Effect of physical treatment (PT) modalities in a rat lymphedema model. FASEB, San Diego, California. **[Orlantha Whitehair]**
- 532 Krotova, Y., Boros, M., Memmott, R., Ziemba, A., Hurley, L., and Ebbinghaus, S. (2005). Transcriptional control of the HER-2/NEU promoter by DNA secondary structure. Era of Hope: Department of Defense Breast Cancer Research Program Meeting, Philadelphia, Pennsylvania. **[Yulia Krotova Khan] [Meghan Boros] [Regan Memmott]**
- 533 Kundavaram, C.R., Ulreich, J.B., Levy, M.A., Imrie, D.A., Young, N.J., Caretto, D.C., and Nakazato, P.Z. (2001). Hepatoprotection during ischemia/reperfusion in the Fischer 344 rat: Comparison of dimethyl sulfoxide and insulin. 40th Annual Meeting of the Society of Toxicology, San Francisco, California, and the Southwest Environmental Health Science Center Science Fair, Tucson, Arizona. **[Chandan Kundavaram]**
- 534 Kundavaram, C.R., Ulreich, J.B., Levy, M.A., Imrie, D.A., Young, N.J., Caretto, D.C., and Nakazato, P.Z. (2001). Hepatoprotection during ischemia/reperfusion in the Fischer 344 rat: Comparison of dimethyl sulfoxide and insulin. 40th Annual Meeting of the Society of Toxicology, San Francisco, California, and the Southwest Environmental Health Science Center Science Fair, Tucson, Arizona. **[Naomi Young]**
- 535 Kurosaki, Alana, Payseur, Bret, Nachman, Michael (2003). Prezygotic and postzygotic barriers to gene flow between two species of house mice (*Mus musculus* and *Mus domesticus*). Beckman Symposium, Irvine, CA. **[Alana Kurosaki Anderson]**
- 536 Kurth, M.C., Kurth, J.H., Hubble, J.P., Sliger, L., Eggers, B., Lieberman, A.N., and Koller, W.C. (1995). Genetic evidence of differences in Parkinson's disease susceptibility by CYP2D6 and MAOB genotypes. American Society of Human Genetics, Minneapolis, Minnesota. **[Lauren Sliger]**
- 537 Kwon, J., Sifuentes, L., Gerba, C., and Bright, K. (2009). Occurrence of Non-01/Non-0139 *Vibrio cholerae* and *Aeromonas* spp. in Arizona. American Society for Microbiology, Philadelphia, Pennsylvania. **[John Kwon]**
- 538 Lai, L-W., Whitehair, O., Cai, X., Kim, D., and Lien, Y-H. (2003). Osmoregulation of Paracellin-1 mRNA in vivo and in vitro. The University of Arizona, Tucson, Arizona. **[Xuemei Cai] [Orlantha Whitehair] [Devin Kim]**
- 539 Lai, L-W., Whitehair, O., Cai, X., Kim, D., and Lien, Y.H. (2003). Osmoregulation of paracellin-1 mRNA in vivo and in vitro. World Congress of Nephrology, Berlin, Germany. **[Orlantha Whitehair] [Xuemei Cai]**
- 540 Lai, L., Doty, D., Khan, R., O'Meara, M., and Lien, Y.H. (2001). Conversion of a single base pair mutation in newborn carbonic anhydrase (CA) II deficient mice by chimeric RNA/DNA oligonucleotides. Fourth Annual Meeting of the American Society of Gene Therapy, Seattle, Washington. **[Daniel Doty]**
- 541 Lai, L.W., Whitehair, O., Yong, K.C., Kim, D., and Lien, Y.H. (2003). Osmoregulation of paracellin-1 mRNA in vivo and in vitro. World Congress of Nephrology Meeting, Berlin, Germany. **[Devin Kim]**
- 542 Lai, J., Rankin, D., Cai, A., Lee, Y.-S., Hruby, V., and Porreca, F. (2011). Dynorphin A is a competitive, partial agonist at the bradykinin receptors. Experimental Biology Conference, Washington, DC. **[Alice Cai]**
- 543 Lampignano, D.W. and Peterson, M.A. (2001). Memories for novel shapes seen as grounds? Eighth Annual Meeting of the Cognitive Neuroscience Society, New York City, New York. **[Daniel Lampignano]**
- 544 Lance, K, Hernandez, E, Charlton, J, MacNamee, S, Oland, L, Tolbert, L (2015). Morphological Analysis of Astrocyte-Like Glial Cells in the Drosophila Ventral Nerve Cord. Neuroscience 2015, Chicago, IL Presented: October 2015 [Charlton, Julie] **[Ernesto Hernandez]**
- 545 Landowski, T.H., Dorr, R.T., Adams, J., Dalton, W.S., and Megli, C.J. (2004). Calcium-mediated mitochondrial perturbation is a critical determinant of velcade (PS-341/bortezomib) cytotoxicity in myeloma cell lines. ACCR Conference, Tampa, Florida. **[Christina Megli]**
- 546 Lantz, R.C., Sarihan, M., Chen, G., and Timmermann, B. (2004). Sites of action of compounds isolated from ginger. EXBIO, Washington D.C. **[Mansi Sarihan] [Genevieve Cheng]**
- 547 LaStayo, P.C., Lindstedt, S.L., Lipovic, D., Fernando, F., Johns, R., and McDonagh, P. (2002). A chronic, progressively increasing high force eccentric exercise protocol in the elderly: No evidence of muscle damage or injury. Meeting of the American Physical Therapy Association, Boston, Massachusetts. **[Frances Verdelle Fernando]**
- 548 Lawson, K.R., Thompson, V.F., and Goll, D.E. (1992). Effects of trypsin and chymotrypsin on the calpains. Ninth International ICOP Conference on Proteolysis and Protein Turnover, Williamsburg, Virginia. **[Kathryn Lawson]**
- 549 Le, G., Mastrandrea, N.J., Cai, W., Tham, K.Y., Monks, T.J., Lau, S.S. (2012). Pentoxifylline initiates proteasomal degradation of dyclin D1 and arrests renal cancer cells in the G1 phase. KEYS Conference, Tucson, AZ. **[Kimberly Tham] [Wesley Cai]**
- 550 Le, Gloria, Canatsey, RD, Tran, K, Monks, TJ, Lau, SS (2016). PTK Modulates AKT Motor and AMPK Pathways: Potential Role as an adjunct Therapy in Prostate Cancer. Poster presented at the Experimental Biology Meeting in San Diego, CA (won first place in ASPET Cancer Pharmacology undergraduate student poster competition). **[Gloria Le]**
- 551 Le, T., Stringer, S.K., Ulreich, J.B., Joshi, B.D., Dicken, R.J., Chavez, R.A., Brendel, K., Fisher, R.L., Young, C.J., and Nakazato, P.Z. (1996). Precision-cut liver slices as a tool in liver transplantation research. Second Annual Science Fair, Center for Toxicology/Southwest Environmental Health Sciences Center, University of Arizona, Tucson, Arizona. **[Thuy Le]**

- 552 Lee, C., Racolta, A., Bryan, A., Tax, F.E. (2009). Embryonic cellular signaling in Arabidopsis thaliana. Western American Society of Plant Biologists Meeting, Tucson, Arizona. **[Cameron Lee]**
- 553 Lee, C., Racolta, A., Tax FE (2010). A Genetic Approach to Determining Components of RPK1/TOAD2-mediated Embryonic Cellular Signaling. Keystone Symposia: Receptors and Signaling in Plant Development and Biotic Interactions, Lake Tahoe, California Presented: March 14-March 19 [Lee, Cameron] **[Cameron Lee]**
- 554 Lee, G., Osteryoung, K., Suzuki, T., Wehmeyer, N., Krawitz, D., and Vierling, E. (1995). Structure and molecular chaperone activity of small heat shock proteins. Keystone Meeting on Plant Cell Biology. **[Denise Krawitz]**
- 555 Lee, M., Hernandez, M., Blew, R., Lee, V., Lohman, T., Going, S., Bea, J., (2014). Novel use of dual energy X-ray absorptiometry spine scans to determine abdominal fat in postmenopausal women. NACP Conference, Window Rock, Arizona Presented: 08-08-2014 [Lee, Mark] **[Mark Lee]**
- 556 Lee, M., Stokols, S., Banks, G.K., Yohem, K., Rosell, R., and Brown, J.K. (1995). Quantitative and temporal evaluation of squash leaf curl geminivirus in planta and in the whitefly vector by polymerase chain reaction. Center for Insect Science Hexapodium, Tucson, Arizona. **[Meredith Lee Schneider]**
- 557 LeGendre-McGee, S., Rice, F., Wall, A., Klein, J., Luttmann, A., Sprute, K., Gerner, E., and Jennifer Barton. (2012). Evaluating chemoprevention and chemotherapeutic effectiveness in colon cancer using optical coherence tomography. Poster for the Arizona Research Institute for Biomedical Imaging Spring seminar. **[Amber Luttmann]**
- 558 LeGendre-McGhee, S., Photini, F.S. Rice, J.K., Luttmann, A., and Barton, J.K. (2012). Endoscopic spectral domain optical coherence tomography of murine colonic morphology to determine effectiveness of chemopreventive and chemotherapeutic agents in colorectal cancer. SPIE Photonics West Conference, San Francisco, California. **[Amber Luttmann]**
- 559 Leija, S.C., Wang, D., Skaggs, M., and Yadegari, R. (2005). The role of COP9 signalosome subunits 5a and 5b (CSN5a/b) during early plant development. UBRP Conference, University of Arizona, Tucson, Arizona. **[Salomon Leija]**
- 560 Lent, D. (2001). Associative visual and aversive food odor learning in the American cockroach, *Periplaneta americana*. Center for Insect Science Eighth Annual Poster Hexapodium, Tucson, Arizona. **[David Lent]**
- 561 Lepow, T., Durns, T., McCarthy Campbell, E., Dang, H., and Fares, H. (2008). Identification of interactors of mucolipins. American Society for Cell Biology, San Francisco, CA. **[Talya Lepow Miller]** **[Tyler Durns]**
- 562 Levy, L., McDonough, W., and Berens, M.E. (1998). Glioma response to cytotoxic treatment under different migratory conditions. Third Annual Student Scientific Presentation Day, Barrow Neurological Institute, Phoenix, Arizona. **[Lisa Levy Staimez]**
- 563 Lew, B., Agnes, R., Lee, Y.S., Ma, S., Hruby, V., Porreca, F., and Lai, J. (2002). Bifunctional peptides: CCK antagonist/opioid agonist for the treatment of neuropathic pain. XIVth World Congress of Pharmacology, San Francisco, California. **[Brian On Ock Lew]**
- 564 Li, S., Sikder, S., and McGrath, D.V. (1999). Synthesis of amphiphilic photoresponsive dendrons. 218th National Meeting of the American Chemical Society, New Orleans, Louisiana. **[Shameema Sikder]**
- 565 Lieck, M., Riley, M., Di Silvio, L., Grigoriadis, A., Thompson, I. (2008). Fabrication and cellular characterization of supercritical fluid-derived porous bioglassR polymer composite scaffolds. Biointerface 2008 Conference, Minneapolis, MN. **[Mark Leick]**
- 566 Lien, Y.H., Shang, S., Yong, K.C., Kim, D., and Lai, L-W. (2003). Upregulation of renal apical calcium channel TRPV5, by thiazides is dependent on Calbindin-D28k. 37th Annual Meeting of the American Society of Nephrology, San Diego, California. **[Devin Kim]**
- 567 Likhacheva, A., Brandenberger, J., Graner, M., Raymond, A., Akporiaye, E., and Katsanis, E. (2000). A 'Trojan Horse' in the anti-tumor vaccine: Is serum albumin transporting TGF- β ? Arizona Cancer Center Faculty Science Expo, Tucson, Arizona.
- 568 Link, M.A., Jost, B.H., Songer, J.G., and Billington, S.J. (2001). The role of an *Arcanobacterium pyogenes* extracellular matrix binding protein in adhesion to host epithelial cells. Arizona-Nevada Branch American Society for Microbiology Annual Meeting, Tempe, Arizona. **[Malen Link]**
- 569 Lister, J.P., Clasen, S.J., Barnes, C.A. (2010). Changing object encountered during track running alters expression patterns of the immediate early gene *Arc* in the lateral entorhinal cortex of the rat. 40th Annual Meeting of the Society for Neuroscience, San Diego, CA. **[Sara Clasen]**
- 570 Lister, J.P., Clasen, S.J., Hartzell, A.L., Burke, S.N. and Barnes, C.A. (2011). Aging affects the pattern of *Arc* expression in lateral entorhinal cortex during object exploration. Society for Neuroscience 2011, Washington, DC. **[Andrea Hartzell]**
- 571 Littleton, A.J., Sukhina, A.S., Estes, P., Zarnescu, D.C. (2009). The role of the tumor suppressor lethal giant larvae during neural development. The 50th Annual Drosophila Research Conference, Chicago, Illinois. **[Aimee Littleton]**
- 572 Liu, E., He, X., and Restifo, L.L. (1996). Identification of an enhancer element regulated by broad-complex transcription factors in the central nervous system of *Drosophila*. Annual Society for Cell Biology Meeting, San Francisco, California. **[Xi Sylvia He]**
- 573 Lo Cascio, J. (1993). Dwarf mutants of *Arabidopsis thaliana*. The Fifth International Conference on Arabidopsis, Columbus, Ohio. **[Jeffrey LoCascio]**
- 574 Lo Cascio, J., Besencon, F., Boyse, E., Bard, J., and Harris, D. (1992). The developmental potential and characterization of human fetal cord blood: Applications for transplantation. The SWARM Division of the AAAS Annual Meeting, Tucson, Arizona. **[Jeffrey LoCascio]**

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- 576 Logan, J., Hokama, J., Goldman, S., Copeland, J., and McDonagh, P. (1999). The effects of platelet activating factor on polymorphonuclear leukocyte activation in diabetics and non-diabetics. Experimental Biology, Washington, D.C. **[Jeremy Logan]**
- 577 Lopez, M.C., Stazzone, A.M., and Watson, R.R. (1992). Alterations in T-cell differentiation in retrovirus infected mice with murine AIDS. International Conference on Immunology, Budapest, Hungary. **[Anthony Stazzone]**
- 578 Lopez, V.M., Velenovsky, D.S., Cetas, J.C., Price, R.O., and McMullen, N.T. (2002). Frequency organization, cellular laminae and dendritic growth in the auditory thalamus. WAESO National Poster Conference, Tempe, Arizona. **[Robin Price] [Vanessa Lopez]**
- 579 Lou, Q., Wu, J., Leftwich, M.E., McKay, R., Rychetsky, L., Phan, H., Joo, J., Salmon, S.E., and Lam, K.S. (1996). Identification of novel peptide substrates and development of potent and specific pseudosubstrate-based inhibitors for p60c-src protein tyrosine kinase. American Association for Cancer Research, Washington. D.C. **[Robert McKay]**
- 580 Lu, S.J., Pennington, J.E., and Wells, M.A. (2002). Exploration of peptide factors that regulate late trypsin synthesis in *Aedes aegypti*. National Science Foundation/Research Experience for Undergraduates, Tucson, Arizona. **[Stephen Lu]**
- 581 Lu, S.Q., Chavez, R.A., Harris, D.T., and Ulreich, J.B. (1996). Immunotoxicology of halogenated hydrocarbons. Second Annual Science Fair, Center for Toxicology/Southwest Environmental Health Sciences Center, University of Arizona, Tucson, Arizona. **[Robert Chavez]**
- 582 Luna, E., Solis, P., and Yazzie, O. (1998). The development and implementation of programs to address violence against women in American Indian and Australian indigenous communities: A focus on self-determination. Seminar for Faculty of Law, University of New South Wales, Australia, Sydney, Australia. **[Peggy Solis]**
- 583 Luna, E., Solis, P., and Yazzie, O. (1998). The issue of domestic violence in indigenous communities. International Federation for Research in Women's History, University of Melbourne, Melbourne, Australia. **[Peggy Solis]**
- 584 Luo, P., Dekker, J., Thompson, J., Tsang, T., and Harris, D.T. (2002). Construction and characterization of two gene expression vectors for improved efficiency of gene therapy. American Society of Gene Therapy, Boston, Massachusetts. **[Joseph Dekker]**
- 585 Luo, P., Kusano, K., Silver, M., Tsang, T., Harris, D., He, H., Jaramillo, M., and Losordo, D. (2004). Novel two gene plasmid vector co-expressing high levels of human VEGF and bFGF genes induces superior therapeutic angiogenesis in murine hindlimb ischemia. American Heart Association 180th Annual Meeting, New Orleans, Louisiana. **[Melba Jaramillo]**
- 586 Luo, P., Kusano, K., Tsang, T., Harris, D., Jaramillo, M., and Losordo, D. (2004). Therapeutic angiogenesis in mouse ischemic heart after intramyocardial injection of a model two gene plasmid vector co-expressing high levels of human VEGF and bFGF genes. 7th Annual Meeting of the American Society of Gene Therapy, Minneapolis, Minnesota. **[Melba Jaramillo]**
- 587 Luttmann, A (2010). Optical Coherence Tomography. IBE Regional Student Conference, University of Arizona Presented: 1-15-10 [Luttmann, Amber] **[Amber Luttmann]**
- 588 Luttmann, A, Rice, P, Winkler, A, Barton, J. (2009). OCT Imaging of Ex Vivo Kidney. ASLMS Conference, Phoenix, AZ Presented: April 2010 [Luttmann, Amber] **[Amber Luttmann]**
- 589 Lynch, R.M., Stickney, G., Parnami, G., and Mejia, R. (1997). Modulation of ion sequestration into subcellular compartments by metabolic micodomains. International Congress Physiol. Sci., St. Petersburg, Russia. **[George Stickney]**
- 590 Ma, AS, Mok, PW, Badran, AH, Riemen,AJ, and Ghosh, I (2012). Direct Detection of DNA Methylation Using Split-Protein Sensors. Beckman Conference, Irvine, CA Presented: 8/3/12 [Ma, Andrew] **[Andrew Ma]**
- 591 Maas, E., Mailend, M.-L., and Swanson, L.T. (2012). Anticipatory coarticulation in typically developing children and in children with speech disorders. 16th Biennial Conference on Motor Speech, Santa Rosa, CA, **[Leah Swanson]**
- 592 Maas, E., Tellez, A.-A., and Mailend, M.-L. (2012). Phonological planning in children with and without speech sound disorders. Symposium on Research in Child Language Disorders, Madison, WI. **[Anna-Alyse Tellez Thomas]**
- 593 Maisel, S., Balaji, A., Horm, T., Pompachalli, M., Woglemuth, C., & Schroeder, J. (2014). Differential EGFR trafficking in transfected MCF12A cell lines. Gordon Conference, Bently, MA Presented: June 2-6 [Balaji, Aanika] **[Aanika Balaji]**
- 594 Majda, J.A., Cress, A.E., Vanlandingham, B.D., and Gerner, E.W. (1990). Alteration of cellular attachment in human tumor cell lines by heat shock: The role of integrins. American Society for Cell Biology. **[Benjamin Vanlandingham]**
- 595 Mania-Farnell, B.L., Merrill, B.J., Yamamura, H.I., and Davis, T.P. (1993). Regulation of CCK mRNA in the human neuroepithelioma cell line SK-n-MCIXC in response to second messenger activators. Proc. CCK Int. Symposium, Chatham, Massachusetts. **[Bradley Merrill]**
- 596 Manning, K., Carper, S.W., and Gerner, E.W. (1989). Stress-induced changes in polyamine acetylation in *E. coli*. Radiation Research Society Meeting, Seattle, Washington. **[Kristin Manning]**
- 597 Manseau, L., Phan, H. and Baradaran, A. (1994). GAL4 enhancer trap patterns in the ovary. Drosophila Meeting. Chicago, Illinois. **[Ali Baradaran]**
- 598 Manseau, L., Phan, H., and Baradaran, A. (1994). GAL4 enhancer trap patterns in the ovary. Drosophila Meeting, Chicago, Illinois. **[Huy Phan]**

- 599 Marchionne, E.M., Diamond-Stanic, M.K., and E. J. Henriksen. (2010). Chronic renin inhibition enhances glucose tolerance and insulin-stimulated glucose transport in skeletal muscle of lean Zucker rats. Annual Meeting of the Arizona Chapter of the American Physiological Society, Glendale, Arizona. **[Elizabeth Marchionne]**
- 600 Mark C. Lee, Michael E. Hernandez, Rob M. Blew, Vinson R. Lee, Timothy G. Lohman, Scott B. Going Jennifer W. Bea (2014). Novel use of dual energy X-ray absorptiometry spine scans to determine abdominal fat in postmenopausal women. NACP Conference, Window Rock, AZ Presented: 8-5-14 [Lee, Mark] **[Mark Lee]**
- 601 Marriott, L.K., Hauss-Wegrzyniak, B., Benton, R.S., Vraniak, P.D., and Wenk, G.L. (2001). Estrogen alters the behavioral and neuropathological consequences of chronic brain inflammation. 31st Annual Meeting of the Society for Neuroscience, San Diego, California. **[Regina Benton Bower]**
- 602 Marriott, L.K., Hauss-Wegrzyniak, B., Benton, R.S., Vraniak, P.D., and Wenk, G.L. (2001). The role of estrogen and chronic brain inflammation in Alzheimer's Disease. Society for Behavioral Neuroendocrinology Meeting, Scottsdale, Arizona. **[Regina Benton Bower]**
- 603 Marron, M.T., Markow, T.A., and Gibbs, A.G. (2001). Metabolic reserves and stress resistance in desert endemic and mesic *Drosophila*. Physiological Ecology Meeting, Bishop, California and Center for Insect Science Eighth Annual Poster Hexapodium, Tucson, Arizona. **[Marilyn Marron]**
- 604 Marrone, D.F., Chawla, M.K., Penner, M.R., Schaner, M.J., Lanahan, A., Worley, P.F., and Barnes, C.A. (2005). Behaviorally induced expression of neuropeptide Y and ARC in young and aged rodents. Society of Neuroscience Meeting, Washington D.C. **[Michael Schaner]**
- 605 Marrone, D.F., Sandoval, C.J., Schaner, M.J., Ramirez-Amaya, V., Barnes, C.A. (2010). Functional neurogenesis in the senescent fascia dentata. 40th Annual Society for Neuroscience Meeting, San Diego, CA. **[Michael Schaner]**
- 606 Martin, B., Wondrak, G., and Jacobson, E. (2005). Induction of apoptosis in G-361 human melanoma cells. UBRP Conference, University of Arizona, Tucson, Arizona. **[Brittany Martin - Murphy]**
- 607 Martin, C., Witte, M., Suri, C., Witte, C., Kriederman, B., Ammouri, L., Myloyde, T., Whitehair, O., and Yancopoulos, G. (2000). Imaging documentation of arrested lymphatic development in angio-pietin-2 knockout mice. NIH Think Tank Conference (Conquering Lymphatic Disease: Setting the Research Agenda), Bethesda, Maryland. **[Orlantha Whitehair]**
- 608 Martin, J., Lei, H., Riffell, J., Constantopoulos, E., and Hildebrand, J. (2010). A precise population code for attractive pheromone mixtures. 9th International Congress of Neuroethology, Salamanca, Spain. **[Eleni Constantopoulos]**
- 609 Martin, N., Patrick, S.M., Dobrenen, H., Kehring, A., and Halpern, M.D. (2010). Active transport of bile acids is not required for bile acid-induced reduction of mucin 2. Digestive Disease Week Meeting, New Orleans, Louisiana. **[Nina Martin]**
- 610 Martin, N., Patrick, S.M., Estrada, T., Coursodon, C., Dvorak, B., and Halpern, M.D. (2011). IL-1 and TNF do not decrease protein levels of the apical sodium-dependent bile acid transporter in IEC-6 cells. Digestive Disease Week Meeting, Chicago, Illinois. **[Nina Martin]**
- 611 Martinez, C. and Adam R. (2005). Looking for change? Check your genes! Antigenic variation of *Giardia lamblia*. UBRP Conference, University of Arizona, Tucson, Arizona. **[Charles Martinez III] [Robert Adams]**
- 612 Martinez, C.L., Brokl, O.H., Shuprisha, A., Abbott, D.E., and Dantzer, W.H. (1997). Regulation of intracellular pH(pHi) in proximal tubules of avian loopless reptilian-type nephrons. Experimental Biology, New Orleans, Louisiana. **[Christina Martinez Klein]**
- 613 Martinez, J., Craven, M., Pennington, M., and Linden, H. (1993). Cell cycle control by the tumor suppressor p53. Arizona Cancer Center Faculty Science Fair, Tucson, Arizona. **[Michael Pennington]**
- 614 Mash, E. and Kaczynski, M. (1990). Diastereoselective reactions of Bicyclo [m.l. 0.] alkan-2-ones. 200th ACS National Meeting, Washington, D.C. **[Michelle Kaczynski]**
- 615 Mashalidis, H., Ellsworth, R., Tsao, T.-S. (2008). Oligomerization states of high molecular weight adiponectin. AAAS-Southwest Rocky Mountain Division 82nd Annual Conference, University of Houston, Houston, Texas. **[Ellene (Helen) Mashalidis]**
- 616 Mason, G.M., Edgin, J.O., Nadel, L. (2010). Genetic contributions to executive function and ADHD symptom variation among individuals with Down syndrome. 40th Annual Society for Neuroscience Meeting, San Diego, CA. **[Gina Mason]**
- 617 Mason, G.M., Nadel, L., Edgin, E. (2010). The role of catechol-o-methyltransferase and dopamine receptor D4 in ADHD symptom variation among individuals with Down Syndrome. 2010 American Association for the Advancement of Science Meeting, San Francisco, CA. **[Gina Mason]**
- 618 Mastradrea, NJ, Tham, KY, Monks, TJ, Lau, SS (2013). Pentoxifylline initiates GSK-3 β -induced proteasomal degradation of cyclin D1 and arrests renal cancer cells in the G1 phase. Experimental Biology, Boston, MA. **[Kimberly Tham]**
- 619 Mastrandrea, N.J., Cai, W.L., Tham, K.Y., Monks, T.J., and Lau, S.L. (2012). Pentoxifylline Initiates GSK-3 β -Induced Proteasomal Degradation of Cyclin D1 and Arrests Renal Cancer Cells in the G1 Phase. Experimental Biology, San Diego, CA.
- 620 Mastrandrea, N.J., Cai, W.L., Tham, K.Y., Monks, T.J., and Lau, S.L. (2012). Pentoxifylline Initiates GSK-3 β -Induced Proteasomal Degradation of Cyclin D1 and Arrests Renal Cancer Cells in the G1 Phase. Society of Toxicology, San Francisco, CA.
- 621 Mastrandrea, N.J., Tham, K.Y., Cohen, J.D., Gallegos, A.C., Monks, T.J., and Lau, S.S. (2011). cAMP-dependent pathway(s) increase p27kip-cyclin D1 through the Rap-GTP/B-Raf MAPK signaling pathway in renal cancer. Society of Toxicology, Washington DC. **[Kimberly Tham]**

- 622 Mayer, M. and Ogden, K. (1998). The role of *S. marcescens* in biotransforming high energy explosives in the presence of heavy metals. 74th Annual Meeting of the Southwestern and Rocky Mountain Division of the American Association for the Advancement of Science, Grand Junction, Colorado. **[Mika Mayer]**
- 623 Mayorov, A.V., Cai, M., Palmer, E.S., Vagner, J., Trivedi, D., and Hruby, V.J. (2006). Development of Novel Cyclic Hybrid Analogues of alpha-MSH and Agouti-Related Protein (AgRP) as High-Affinity hMC3R Ligands. Chemistry at the Border, 19th Rocky Mountain Regional Meeting, Tucson, Arizona. **[Erin Palmer]**
- 624 McCracken, K.E., Tran, P.L., Slepian, M.J., and Yoon, J-Y. (2012). Nanoscale patterning under shear stress for guided endothelial cell growth. 2012 Annual Conference of Institute of Biological Engineering, Indianapolis, IN. **[Katherine McCracken]**
- 625 McDade, L.A. and Moody, M.L. (1997). Phylogenetic relationships among Acanthaceae: Evidence from nuclear and chloroplast genomes. American Society of Plant Taxonomists, Montreal, Canada. **[Michael Moody]**
- 626 McDade, L.A., Daniel, T.F., and Riley, K.M. (2000). Phylogenetic relationships within the enigmatic tribe Justicieae (Acanthaceae). Botany, Portland, Oregon. **[Katherine Riley Weiland]**
- 627 McDade, L.A., Moody, M.L., and Waters, E.R. (1996). Phylogenetic relationships among Acanthaceae: Evidence from molecular and morphological data. American Society of Plant Taxonomists, Seattle, Washington. **[Michael Moody]**
- 628 McDonough, C.A., Hazzard, J.T., and Tollin, G. (1993). Oxidation of reduced yeast flavocytochrome b2 by triplet state tree flavins of subsequent intramolecular electron transfer. Biophysical Society Meeting, Washington D.C.; and American Chemical Society Meetin, Denver, Colorado. **[Clark McDonough]**
- 629 McElhinny, A.S., Perry, C.N., Witt, C., Labeit, S., and Gregorio, C.C. (2003). Muscle specific ring finger -2 (MURF-2_ has multiple subcellular localizations and is required for microtubule, intermediate filament, and sarcomeric M-line structure in striated muscle. American Society for Cell Biology 43rd Annual Conference, San Francisco, California. **[Cynthia Perry]**
- 630 McElhinny, A.S., Schwach, C., Valichnac, M., Mount Patrick, S., Labeit, S., Gregorio, C. (2005). The giant myofibril protein, nebulin, is required for thin filament assembly and length regulation in cardiac muscle: Evidence for its role as a molecular ruler. The 12th Annual Weinstein Cardiovascular Development Conference, Tucson, Arizona. **[Melinda Valichnac]**
- 631 McGrath, D.V., Shanahan, C.S., and Ortiz, A. (2004). Regioselective synthesis of benzyl arylamine disassembling dendrons. 227th Annual Meeting of the American Chemical Society, Anaheim, California. **[Charles Shanahan] [Jose Armando Ortiz]**
- 632 McKee, L., Regan, J., Walker, J. Konhilas, J.P. (2010). Sex Dimorphic Myofilament Function and AMPK Expression in R403Q Hearts. American Heart Association Scientific Sessions, Chicago, Illinois Presented: 11/14-11/17/10 [Regan, Jessica] **[Jessica Regan]**
- 633 McKee, L., Regan, J., Walker, J., Leinwand, L.A., and Konhilas, J.P. (2010). Sex dimorphic myofilament function and AMPK expression in R403Q hearts. American Heart Association, BCVS Conference, Rancho Mirage, California. **[Jessica Regan]**
- 634 McMullen II, J.G. and Stock, S.P. (2013). *Steinernema* chemotaxis to cognate and non-cognate symbionts. Society of Invertebrate Pathology, Pittsburgh, PA Presented: August 11 -16 [McMullen, John] **[John McMullen]**
- 635 McMullen II, J.G., Ogier, J-C, Pagés, S., Bisch, G., Gaudriault, S., and Stock, S.P. (2014). INSECT PATHOGENIC FACTORS OF *XENORHABDUS BOVIENII* (ENTEROBACTERIACEAE) REVEALED BY COMPARATIVE GENOMIC ANALYSIS AND VIRULENCE ASSAYS. Pacific Branch of the Entomological Society of America, Tucson, AZ Presented: April 6 - 9 [McMullen, John] **[John McMullen]**
- 636 McMullen, N.T., Cetas, J.S., Price, R.O., Velez, M.M., and Rance, N.R. (1998). Calcium-binding protein expression in the human auditory system. Annual Meeting of the Association for Research in Otolaryngology, St. Petersburg, Florida. **[Robin Price] [Robin Price] [Mariel Velez]**
- 637 McMullen, N.T., deVenecia, R., Smelser, C.B., and Lossman, S. (1994). Calcium binding protein expression delineates subdivisions of rabbit medial geniculate complex. Annual Meeting of the Society for Neuroscience, Miami, Florida. **[Chad Smelser]**
- 638 McMullen, N.T., Velenovsky, D.S., and Holmes, M.G. (2004). A model of auditory thalamalamic orgaization: cellular slabs, dendritic arbors and tectothalamic axons underlying the frequency map. Annual Meeting of the Society for Neuroscience, San Diego, California. **[Michael Holmes]**
- 639 McReynolds, M.R., Taylor-Garcia, K., Greer, K.A., Hoying, J.B., and Brooks, H.L. (2004). Analysis of renal inner medullary collecting duct gene expression in aquaporin knockout mice. FASEB, Washington D.C. **[Katherine Taylor]**
- 640 McWilliam, D.L., Williams, C.S., Dominguez, J.A., Holubec, H., and Dvorak, B. (2001). Milk-borne EGF reduces the incidence of necrotizing enterocolitis in neonatal rat model. Pediatric Academic Societies Annual Meeting, Baltimore, Maryland. **[Jessica Dominguez Reig Clark]**
- 641 Meade-Tollin, L.C., Bowen, C., Fusenig, N., and Bowden, G.T. (1992). Matrix metalloproteinase in RNA expression in c-Ha-ras-transfected human keratinocytes. NOBCCHE 20th Annual Meeting. **[Carol Bowen-Wells]**
- 642 Meade-Tollin, L.C., Gunatilaka, L., and Odeh, A. (2002). Visualization of angiogenesis in vitro. Sixth joint meeting of the Japanese Society for Histochemistry and Cytochemistry and the Histochemical Society, University of Washington, Seattle, Washington. **[Annetta Odeh-Quirion]**
- 643 Medeiros, M, Le, TM, Troup, D, Novak, P, Gandolfi, AJ (2013). Gene expression changes associated with chronic low-level monomethylarsonous acide exposure in human urothelial cells. Society for Toxicology, San Antonio, TX. **[Daniel Troup] [Matthew Medeiros] [Tam Le]**

- 644 Medeiros, M. (1997). Structural and functional analysis of synthetic glucagon fragments. The Fifth Annual Student Research & Community Service Expo, Tucson, Arizona. **[Matthew Medeiros]**
- 645 Medeiros, M. (1999). Glucagon antagonist: A new therapeutic approach to diabetic ketoacidosis. The University of Arizona Seventh Annual Student Showcase, Tucson, Arizona. **[Matthew Medeiros]**
- 646 Medeiros, M., Zheng, X., Novak, P., Wnek, S., Chyan, V., Escudero-Lordes, C., Troup, D., Le, T.M., and Gandolfi, A.J. (2012). Chronic exposure to monomethylarsonous acid leads to substantial changes in gene expression after 12 weeks. Society of Toxicology Annual Meeting, San Francisco, CA. **[Daniel Troup]**
- 647 Medeiros, M., Zheng, X., Novak, P., Wnek, S., Chyan, V., Escudero-Lordes, C., Troup, D., Minh Le, T., Gandolfi, A.J. (2012). Chronic exposure to monomethylarsonous acid leads to substantial changes in gene expression after 12 weeks. Society of Toxicology Annual Meetings, San Francisco, CA. **[Daniel Troup]**
- 648 Megli, C.J., Landowski, T.H., Heaton, R., Dorr, R.T., Adams, J., and Dalton, W.S. (2003). Velcade induces cell death by inducing endoplasmic reticulum stress and calcium-mediated mitochondrial perturbation. The Annual Meeting of the American Society of Hematology, San Diego, California. **[Christina Megli]**
- 649 Megli, C.J., Nullmeyer, K.D., Lynch, R.M., Dorr, R.T., and Landowski, T.H. (2005). Disregulation of calcium is a critical determinant of bortezomid (PPS-341/Velcade) cytotoxicity in myeloma cell lines. American Association for Cancer Research Annual Meeting, Anaheim, California. **[Christina Megli]**
- 650 Meiering, C. and Akporiaye, E. (1993). Effect of tumor age on host anti-tumor activity. Arizona Branch ASM, Tucson, Arizona. **[Christopher Meiering]**
- 651 Melemedjian, O.K, Hartz, S.E., King, T., Porreca, F. and Lai, J. (2007). Rapid induction of sensory neuron necrosis by conditioned medium from sarcoma cells. Experimental Biology 2007, Washington D.C. **[Stephanie Hartz Cone]**
- 652 Melemedjian, O.K., Hartz, S.E., Porreca, F., Lai, J. (2006). Opiate-Receptor independent upregulation of CGRP content and release in dorsal root ganglion cells following prolonged opiate treatment. American Pain Society, San Antonio, Texas. **[Stephanie Hartz Cone]**
- 653 Mermelstein, J., Arnold, R., Betterton, E., and Liu, J. (1997). Electrolytic reduction of chlorinated ethanes and ethenes by a porous nickel electrode. 1997 AIChE Conference, Los Angeles, California. **[Joshua Mermelstein]**
- 654 Merrill, S.A., Hagedorn, H.H., and Ramberg, F.B. (2002). Tucson area flaviviridae risk assessment: identification of blood sources using sandwich enzyme linked immunosorbent assay (ELISA). The Center for Insect Science Ninth Annual Poster Hexapodium, Tucson, Arizona. **[Samuel Merrill]**
- 655 Merrill, S.A., Ramberg, F.B., Bala, A., and Hagedorn, H.H. (2004). Phylogeography and population structure of *Aedes aegypti* in Arizona. Fourth Annual Arizona Department of Health Services Joint Bioterrorism and Vector-Borne/Zoonotic Disease Conference, Mesa, Arizona. **[Samuel Merrill]**
- 656 Meyer, S.C., Gaj, T., Ghosh, I. (2006). Targeting Kinases via Bivalent In Vitro Selection Utilizing Peptide Self-Assembly. The 20th Symposium of The Protein Society and 20th Anniversary Celebration, San Diego, California. **[Thomas Gaj]**
- 657 Meyers, K.T., Enemark, J.H., and Rajapakshe, A. (2011). Investigating the amino acids in close proximity to the heme of human sulfite oxidase. 241st National Meeting American Chemical Society, Anaheim, California. **[Kimberly Meyers]**
- 658 Midura-Kiela, M., Jones, D.D., and Jenkins, A.A. (1998). Overexpression in *E. coli* and purification of functionally active recombinant rat cysteine dioxygenase. Experimental Biology 1998, San Francisco, California. **[Deborah Jones]**
- 659 Miera, V., Battraw, G.A., Anderson, P.L., and Szivek, J.A. (1995). Symmetry of biomechanical properties in rodent femora. Eleventh Annual Scientific Session of the Academy of Surgical Research. Albuquerque, New Mexico. **[George Battraw]**
- 660 Miller, A. (1997). A potential treatment for the anemia of prematurity: Enteral absorption of erythropoietin in the neonate. The Fifth Annual Student Research & Community Service Expo, Tucson, Arizona. **[Amy Miller Gilbert]**
- 661 Miller, A., Kling, P.J., Williams, C.S., Roberts, R.A., and Koldovsky, O. (1998). A potential treatment for anemia in premature infants: Enteral absorption of erythropoietin in the neonate. CUR Second Undergraduate Poster Session, Washington, D.C. **[Amy Miller Gilbert]**
- 662 Miller, L.J., Davis-Gorman, G., Pacheco, G.S., Finnerty, K., Seaver, N., Skroback, D., Nolan, P., and McDonagh, P.A. (2005). Type 2 diabetic rat model of inflammation and platelet activation. Experimental Biology and XXXV International Congress of Physiological Sciences Meeting, San Diego, California. **[Garrett Pacheco]**
- 663 Minniti, A., Sadler, C., and Ward, S. (1993). Cloning of spe-27, a gene involved in the initiation of spermiogenesis. Ninth International *C. elegans* Meeting, Madison, Wisconsin. **[Cathryn Sadler]**
- 664 Mittelmeier, T.M., Lamb, M., Sund, D.T., and Dieckmann, C.L. (2007). Cytoskeletal asymmetry influences eyespot localization in *Chlamydomonas reinhardtii*. The American Society for Cell Biology 47th Annual Meeting, Washington, DC. **[Derrick Sund]**
- 665 Mizunami, M., Weibrecht, J.M., and Strausfeld, N.J. (1991). Neural activities of the mushroom bodies of the cockroach during locomotory activity. Society for Neuroscience Annual Meeting, New Orleans, Louisiana. **[Josette Weibrecht]**
- 666 Mizunami, M., Weibrecht, J.M., and Strausfeld, N.J. (1991). The mushroom body of cockroach brain participates in spatial memory processing. Third IBRO World Congress of Neuroscience, Montreal, Canada; The Second European Symposium of Insect Taste and Olfaction, Ringberg Schloss, Germany; and the Society for Neuroscience Annual Meeting, New Orleans, Louisiana (1992). **[Josette Weibrecht]**

- 667 Mobula, L., Leitch, V., and King, L.S. (2002). Osmotic regulation of AQP-5 in mouse lung epithelial cells. UCSF Health Sciences Colloquium, San Francisco, California; The Leadership Alliance, Stonemountain, Georgia; SACNAS National Conference, Anaheim, California; ABRCMS, New Orleans, Louisiana; and The University of Arizona Student Showcase, Tucson, Arizona. **[Meta Mana (Linda) Mobula]**
- 668 Mobula, L., Stiner, D., Sengupta, T., and Boskey, A. (2001). Identification of phosphoproteins with mineralization in chick limb-bud mesenchymal cells. SACNAS, Phoenix, Arizona. **[Meta Mana (Linda) Mobula]**
- 669 Mobula, L., Stiner, D., Sengupta, T., and Boskey, A. (2002). Identification of phosphoproteins with mineralization in chick limb-bud mesenchymal cells. Minority Trainee Research Forum, San Diego, California. **[Meta Mana (Linda) Mobula]**
- 670 Moeckel, G.W., Lai, G., and Lien, Y.H. (1995). Suppression of medullary betaine content in vivo is compensated by increase in several organic osmolytes. 13th International Congress of Nephrology, Madrid, Spain. **[George Lai]**
- 671 Moffett, J., Kratz, E., Shetter, A., Shapiro, J., and Stachowiak, M.K. (1995). Regulation of bFGF gene promoter activity in human astrocytes and glioma cells. Society for Neuroscience Annual Meeting, San Diego, California. **[Erica Kratz]**
- 672 Monihan, SM, Yen, TC, Magness, CA, Schumaker, KA (2013). The arabidopsis calcineurin B-like10 protein mediates flower development during plant growth in saline conditions. Keystone Symposium. **[Tzu Chuan (Annie) Yen]**
- 673 Montano, C., Robbins, A., and McNamara, D.J. (1995). Interactive effects of Vitamin C and dietary fat on guinea pig lipoprotein metabolism. Experimental Biology Conference, Atlanta, Georgia. **[Amy Robbins Rampley] [Amy Robbins Rampley]**
- 674 Moore, W., Ho, W., and Ellis, T. (2002). Seasonal fluctuation of beetle diversity. WAESO Conference, Tempe, Arizona. **[Wyatt Ho]**
- 675 Morse, D., Gray, H., Job, C., and Gillies, R.J. (2002). Phosphocholine response to nanomolar doses of taxotene in human breast cancer cells are quantified and correlated with other cellular responses. International Society of Magnetic Resonance in Medicine, Hawaii. **[Heather Gray Edwards]**
- 676 Mosher, C.P., Brooks, K.N., Spitler, K.M., Zimmerman, P.E., Wilder, T., and Gothard, K.M. (2006). Enhanced skin conductance responses elicited by facial expressions with averted gaze in Rhesus macaques. Society for Neuroscience, Atlanta, Georgia. **[Clayton Mosher]**
- 677 Mosher, C.P., Zimmerman, P.E., and Gothard, K.M. (2008). State-dependent modulation of neural activity in the monkey amygdala; single unit and EEG activity during social stimulation and sleep-883.1. Annual Meeting of the Society for Neuroscience, Washington, DC. **[Clayton Mosher]**
- 678 Mosher, C.P., Zimmerman, P.E., Gothard, K.M. (2010). Dissociation of attention and emotion-related neural activity in the nuclei of the primate amygdala. 40th Annual Meeting of the Society for Neuroscience, San Diego, CA. **[Clayton Mosher]**
- 679 Mudry, R.E., Perry, C.N., Richards, M., Fowler, V.M., and Gregorio, C.C. (2003). The interaction of tropomodulin with tropomyosin stabilizes thin filaments in cardiac myocytes. American Society for Cell Biology 42nd Annual Conference, San Francisco, California. **[Ryan Mudry] [Cynthia Perry]**
- 680 Mudry, R.E., Perry, C.N., Richards, M., Fowler, V.M., and Gregorio, C.C. (2003). The interaction of tropomodulin with tropomyosin stabilizes thin filaments in cardiac myocytes. Weinstein Cardiovascular Development Conference, Boston, Massachusetts. **[Ryan Mudry] [Cynthia Perry]**
- 681 Muthu, R., Soto, R., Cai, M., Lim, Y.S., Trivedi, D., and Hruby, V.J. (2011). Design strategies to produce receptor subtype selective peptide agonists and antagonists for melanocortin receptor system. 22nd American Peptide Symposium, Harbor Island, San Diego, California. **[Robert Soto]**
- 682 Nakato, H., Budhu, A., Selleck, S., Philip, A., Glover, D., and Kaiser, K. (1994). Identification of GAL4 enhancer trap lines expressed in different populations of dividing cells in the larval nervous system. 35th Annual Drosophila Research Conference, Chicago, Illinois. **[Anuradha Budhu]**
- 683 Nakazato, P.Z., Ulreich, J.B., Boles, J.L., Patel, M.R., Rorie, C.J., Fisher, R.L., Brendel, K., and Maveddat, M. (1998). Nephrotoxicity and hepatotoxicity of chaparral (*Larrea tridentata*) in rats and humans. 37th Annual Meeting of the Society of Toxicology, Seattle, Washington. **[Julie Boles]**
- 684 Naughton, J.N., McLaughlin, M., Pepperberg, I.M., and Zarezaadeh, Z. (1995). Extent of social interaction affects vocal learning in Grey parrots (*Psittacus erithacus*). Entry for Founder's Poster Award, Animal Behavior Society Meeting, Lincoln, Nebraska. **[Mary McLaughlin]**
- 685 Navratilova, Z., Hoang, L.T., Valdes, J.L., Tatsuno, M., Mcnaughton, B.L. (2010). CA1 place cells show a gradual firing rate remapping in opposite running directions with repeated traversals of a track, leading to increased directional asymmetry of place fields. 40th Annual Meeting of the Society for Neuroscience, San Diego, CA. **[Zaneta Navratilova]**
- 686 Neilson, J.W., Pierce, S.A., and Miller-Maier, R.M. (1998). Factors influencing the expression of lux CDABE and NAH7 genes in *Psuedomonas putida* RB1353. 98th General American Society for Microbiology Meeting, Atlanta, Georgia. **[Shelley Pierce Murphey]**
- 687 Nellan, A., and Johnson, L. (2008). Predictor of adherence to PMTCT methods in rural Tamil Nadu, India. 19th European Students' Conference, Berlin, Germany. **[Anandani Nellan]**
- 688 Nelson, E. and Szivek, J.A. (2002). TGF-b1 affects bone bonding to a blended CPC coating: A dose response study. Orthopedic Research Society Conference, Dallas, Texas. **[Ehren Nelson]**

- 689 Nelson, E.R., Dvorakova, K., Briehl, M.M., and Tome, M.E. (2003). Increased antioxidant defense alters cellular redox environment and protects against glucocorticoid-induced apoptosis. The Annual Meeting of the American Association for Cancer Research, Washington D.C. **[Ehren Nelson]**
- 690 Nelson, MR, Olsen, K, Cordes, MHJ (2012). The role of local sequence and global conformation on DNA binding characteristics of member of the Cro Family. ASBMB, San Diego, CA. **[Michael Nelson]**
- 691 Nelson, S., Cai, Q., Keck, M., Tse, J., and Brooks, H.L. (2008). Long-term vasopressin regulation of renal aquaporins and urea transporters in mice with a reduced urinary concentration ability. Experimental Biology 2008, San Diego, California. **[Sarah Nelson]**
- 692 Nematollahi, S., Burke, S.N., Uprety, A., Wallace, J.L., Barnes, C.A. (2008). The effect of age and context on spontaneous object recognition. Society for Neuroscience, Washington D.C. **[Saman Nematollahi]**
- 693 Nasset, M., Wright, J.L., Jacobson, S.E., and Walker, F.A. (1993). Cyclic voltammetric measurement of reduction potentials and formation constants for complexes of substituted pyridines with iron (III) and iron (II) hindered porphyrins. The Sixth International Conference on Brainorganic Chemistry, San Diego, California. **[Joshua Wright]**
- 694 Netting, J., Forsman, Z., and Papaj, D. (1996). Host size preference by males and females in *Rhagoletis juglandis*. The Center for Insect Science Fifth Annual Poster Hexapodium, Tucson, Arizona. **[Zac Forsman]**
- 695 Nguyen, Minhkhoei, Chawla, MK, Barnes, CA (2015). Visualization of neurokinin B neurons in cleared whole brains. 2015 Annual Meeting of the American Society for Cell Biology Meeting, San Diego, CA. **[Minhkhoei Nguyen]**
- 696 Nguyen, TV, Frye, J, Stepanovic, KN, Doyle, KP (2014). Characterization of inflammation in acute and non-acute ischemic infarcts in human brain tissue. Annual Society for Neuroscience Meeting, Washington, DC. **[Kristina Stepanovic]**
- 697 Nichols, C, Lien, M, Yong, K-C, Lai, L-W (2013). IQGAP1 plays a critical role in cell repair after acute kidney injury. 11th MGE@MSA/WAESO Student Research Conference, Arizona State University, Phoenix, AZ. **[Eva Nichols]**
- 698 Nichols, C, Lien, M, Yong, K-C, Lai, L-W (2013). IQGAP1 plays a critical role in cell repair after acute kidney injury. Arizona Imaging and Microanalysis Society (AIMS) Conference, Tucson, AZ. **[Eva Nichols]**
- 699 Nicoll, S.M., Brigham, L.A., and Hawes, M.C. (1991). *Agrobacterium rhizogenes* as a transformation system for studying gene expression in root border cells of pea. International Society for Plant Molecular Biology, Tucson, Arizona. **[Monique (Sharmon) Nicoll]**
- 700 Nighorn, A., Rivers, D., and Morton, D.B. (1995). The cloning and localization of various forms of guanylyl cyclase in *Manduca sexta*. Society for Neuroscience Meeting, San Diego, California. **[David Rivers]**
- 701 Niwa, M., Sinakevitch, I., and Strausfeld, N.J. (2002). Homologous protocerebral regions in honeybee and cockroach brains revealed by octopamine immunoreactivity. The Center for Insect Science Ninth Annual Poster Hexapodium, Tucson, Arizona and the 31st Annual Meeting of the Society for Neuroscience, San Diego, California. **[Mamiko Niwa]**
- 702 Niwa, M., Strausfeld, N., and Sinakevitch, I. (2001). Distribution and significance of octopaminergic neurons in honey bee brain. Center for Insect Science Eighth Annual Poster Hexapodium, Tucson, Arizona. **[Mamiko Niwa]**
- 703 Nodine, M., Davies, K., Yadegari, R., and Tax, F. (2005). Two receptor-like kinases are mutually required for *Arabidopsis* embryo development. Society for Developmental Biology, San Francisco, California. **[Kelli Davies]**
- 704 Noriega, F.G., Colonna, A., Shah, D., and Wells, M. (1996). Regulation of early trypsin synthesis in *Aedes aegypti*. The Center for Insect Science Fifth Annual Poster Hexapodium, Tucson, Arizona. **[Deepa Shah]**
- 705 Noriega, F.G., Shah, D.K., and Wells, M. (1996). Juvenile hormone induces transcription of a trypsin gene in *Aedes aegypti* midgut. XX International Congress of Entomology, Florence, Italy. **[Deepa Shah]**
- 706 Noriega, F.G., Shah, D.K., and Wells, M. (1996). Juvenile hormone regulates early trypsin gene expression in *Aedes aegypti*. International Conference Regulation of Insect Reproduction, Ceske Budejovice, The Czech Republic. **[Deepa Shah]**
- 707 Ochoa, M., Webster-McElvogue, K., O'Connor, D., Peterson, E., and Tischler, M.E. (1996). Altered gravity orientation and microgravity affect *Manduca sexta* adult development. The Center for Insect Science Fifth Annual Poster Hexapodium, Tucson, Arizona. **[Dawn O'Connor Regner]**
- 708 Oehrle-Steele, O. and Gervay, J. (1999). Use of a novel ELISA to investigate pH-dependent interactions between antibodies to N. meningitidis and membrane-bound colominic acid. American Chemical Society 217th National Meeting, Anaheim, California. **[Olivia Oehrle-Steele Marbutt]**
- 709 Oland, L., Biebelhausen, J., and Tolbert, L. (2007). Development of the glial investment of glomeruli in the *Drosophila* olfactory lobe. Annual Meeting of the Association for Chemoreception Sciences, Sarasota, Florida. **[John Biebelhausen]**
- 710 Orbe, C., Romero, D.R., Calderon, K., and Panjwani, A. (2005). An epidemiological approach to the spread of minor political parties. SACNAS National Conference, Denver, Colorado. **[Karl Calderon]**
- 711 Orozco, R., and Stock, S.P. (2009). Characterization and phylogenetic relationships of *Photobacterium* sp. (Gamma-Proteobacteria: Enterobacteriaceae) the bacterial symbiont of *Heterohabditis sonorensis* (Nemadoda: Heterohabditidae). International Symbiosis Society Congress, Madison, Wisconsin. **[Rousel Orozco]**
- 712 Ortega, Y.R., Roxas, C.R., and Sterling, C.R. (1995). Evaluation of three purification methods for *Cyclospora cayatanensis*. American Society of Microbiology 95th Annual Meeting, C-406, Washington, D.C. **[Concepcion Roxas]**

- 713 Ortiz, M., Legatzki, A., Byrne, A., Nelson, W., Neilson, J.W., Casavant, R.R., Wing, R.A., Soderlund, C., Pryor, B.M., Pierson III, L.S. and Maier, R.M. (2010). Pyrosequencing reveals the diversity and variability of bacterial communities on speleothem surfaces in Karchner Caverns. International Society of Microbial Ecology Meeting, Seattle, Washington. **[Andrea Byrne]**
- 714 Pacheco, G.S., Davis-Gorman, G., Davidson, L., Miller, L., Finnerty, K., James, R., Skroback, D., Ritter, L., Nolan, P., and McDonagh, P. (2005). Whole blood platelet aggregation in an animal model of type 2 diabetes. Experimental Biology and XXXV International Congress of Physiological Sciences Meeting, San Diego, California. **[Garrett Pacheco] [Racheal James]**
- 715 Padilla, M.T., Keller, R.L., and Witten, M.L. (1997). Changes in organ/weight body ratios in rats after 450 hind limb unweighting. Experimental Biology, Meeting, New Orleans, Louisiana. **[Rachel Keller]**
- 716 Page, R. and Restifo, L.L. (1992). Developmental requirements for Deformed activity in the Drosophila CNS. The SWARM Division of the AAAS Annual Meeting, Tucson, Arizona. **[Rebecca Page]**
- 717 Palmer, E.S., Cai, M., Stankova, M., Cabello, C., Dedek, M., Trivedi, D., and Hruby, V.J. (2006). Thio-ether bridged melanotropin peptides: discovery of selective ligands for hMC1R and hMC3R. Chemistry at the Border, 19th Rocky Mountain Regional Meeting, Tucson, Arizona. **[Erin Palmer]**
- 718 Park, D.L., Gamboa, P.M., King, K.M., Goldsmith, C.H., Dominguez, K.L., Santiago, A., and Martin, J. (1994). Detection of ciguatera food poisoning in human serum and possible link with chronic fatigue syndrome. International Meeting on Chronic Fatigue Syndrome, Dublin, Ireland. **[Kimberly King]**
- 719 Park, D.L., King, K.M., Gamboa, P.M., and Manteiga, R. (1993). Ciguatera-H, a clinical diagnostic tool for Ciguatera poisoning. AOAC International, Washington, D.C. **[Kimberly King]**
- 720 Parkinson, L.B. and Johnson, M.I. (1995). The effect of alcohol on sympathetic axonal elongation in vitro comparing male and female neurons. Annual Conference of the Society for the Advancement of Chicanos and Native Americans in Science, El Paso, Texas. **[Leslie Parkinson]**
- 721 Patel, N., Castro, N., Gundy, P., Gerba C.P., and Pepper I.L. (2008). Comparison of PLC/PRF/5 and BGM cell lines for the detection of adenoviruses and enteroviruses in biosolids. American Society of Microbiology, Boston, Massachusetts. **[Nikita Patel]**
- 722 Paul, M.C., Basha, E. and Vierling, E (2008). Investigating the role of the eukaryotic elongation factors 1B-alpha (1,2) and eEF1B-beta (1,2) from Arabidopsis thaliana in plant thermotolerance. Experimental Biology, San Diego, California. **[Megan Craighead Paul]**
- 723 Pearson, A, Estes, P, Boerhinger, A, Zarnescu, D (2013). The Role of TDP-43 in Translation. Beckman Symposium, The Beckman Center at UC Irvine Presented: 1/19/2013 [Pearson, Antony] **[Antony Pearson]**
- 724 Peck, K, Masel, J (2011). The effect of translational errors on the evolvability of a protein. Evolution Conference, Norman, OK Presented: 6/2011 [Peck, Kayla] **[Kayla Peck]**
- 725 Penner, M.R., Chawla, M.K, Burke, S.N., Milliken, H.L., Schaner, M.J., Xiao, B., Worley, P.F., and Barnes, C.A (2004). Levels of IEGS responsible for receptor trafficking are unchanged in the aged hippocampus. Society for Neuroscience Meeting, San Diego, California. **[Heather Milliken] [Michael Schaner]**
- 726 Penner, M.R., Chawla, M.K., Burke, S.N., Milliken, H.L., Schaner, M.J., Xiao, B., Worley, P.F., and Barnes, C.A. (2004). Levels of IEGS Responsible for receptor trafficking are unchanged in the aged Hippocampus. Society for Neuroscience, Washington D.C. **[Michael Schaner]**
- 727 Pennington, M., Martinez, J., and Craven, M. (1993). Conformational changes in a temperature sensitive mutant p53 protein. Arizona Cancer Center Faculty Science Fair, Tucson, Arizona. **[Michael Pennington]**
- 728 Pepperberg, I.M., Banta, P.A., and Naughton, J.R. (1997). Allospecific vocal learning by Grey parrots: A failure of video taped instruction under certain conditions. Psychonomic Society Meeting, Philadelphia, Pennsylvania. (Cherry Sriben is acknowledged for her contributions to this work.) **[Cherry Sriben]**
- 729 Peralta, L.A., Guyon, J., Howell, M., Steffe, L., Pusack, T., Goswami, J., Jacques, L., and Kunkel, L. (2006). Monitoring the progression of muscular dystrophy using dystrophin null zebrafish. Summer Intern Poster Session, The Bauer Center for Genomics Research, Harvard University, Boston, Massachusetts. University **[Lourdes Peralta Lizarraga]**
- 730 Perkins, A, Skoch, S (2013). Feasibility of Conducting Multi-Family Group Interventions for Parents with Cancer and their Children. NACP Summer Conference, Flagstaff, AZ Presented: July 31st 2013 [Perkins, Alec] **[Alec Perkins]**
- 731 Perrera, AB, Hoffman, KM, Camenisch, TD (2016). Developmental factors create a niche for cardiac regeneration. Experimental Biology, San Diego, CA. **[Alec Perrera]**
- 732 Perry, C., Mudry, R.E., and Gregorio, C.C. (2002). The role of the interaction between the contractile proteins tropomodulin and tropomyosin is to prevent thin filament depolymerization in cardiac myocytes. WAESO National Poster Conference, Tempe, Arizona. **[Cynthia Perry]**
- 733 Perry, C., Mudry, R.E., Gregorio, C.C., and Fowler, V. (2003). The interaction between the contractile proteins E Tmod and TM stabilizes thin filaments. American Society for Cell Biology 42nd Annual Meeting, San Francisco, California, and 3rd Annual Minority Graduate Educational Mountain States Alliance Conference, Tempe, Arizona. **[Cynthia Perry]**
- 734 Perry, C.N., Mudry, R.E., Fowler, V.M., and Gregorio, C.C. (2003). The interaction between the contractile proteins tropomodulin (E-TMOD/TMOD1) and Tropomyosin stabilizes thin filaments. Weinstein Cardiovascular Development Conference, Cambridge, Massachusetts. **[Cynthia Perry]**

- 735 Pessarakli, M., Morgan, P.V., and Kattnig, R.M. (1996). Digestion kinetics of steam-flaked and dry-rolled sorghum grains and cows. Annual Meeting of the American Dairy Science Association, Oregon State University, Corvallis, Oregon. **[Parham Morgan]**
- 736 Pessarakli, M., Morgan, P.V., and Kattnig, R.M. (1996). Dry matter and nitrogen disappearance kinetics in the rumen of lactating cows and camels. AALAS District 8 Meeting, Tucson, Arizona. **[Parham Morgan]**
- 737 Pham, M., Edwards, S.K., Holmes, B., and Tsao, T.S. (2008). A metabolic and energetic role for erythropoietin in support of cell proliferation through mitochondrial biogenesis regulators PGC-1 α and AMPK. American Society for Cell Biology Annual Meeting, San Francisco, CA. **[Sarah Edwards]**
- 738 Phan, H. and Bellsey, R. (1994). Analysis of Romex Orthoneurus. An endangered species in Arizona using RAPD markers and polymorphisms in rbcL. American Association for the Advancement of Science, San Francisco, California. **[Huy Phan]**
- 739 Phan, H., Emmons, S., Chen, W., and Manseau, L. (1995). Location of cappuccino, a maternal effect locus in *D. melanogaster*, and its presumptive function in cytoskeletal organization during oogenesis. 36th Annual National Student Research Forum, Galveston, Texas. **[Huy Phan]**
- 740 Pinter, M., Lent, D., Kwon, H.W., and Strausfeld, N.J. (2002). Enriched and suppressed gene transcripts in the brain of *Periplaneta americana* after learning. Fourth International Symposium on Molecular Insect Science, Tucson, Arizona. **[David Lent]**
- 741 Plange, K., Burke, S.N., Nematollahi, S., Huerta, D., Gazzaley, A., and Barnes, C.A. (2009) The effects of distraction and interruption forms of interference on delayed-nonmatching to sample task performance. Annual Society for Neuroscience Meeting, Washington, DC. **[Danah Huerta] [Saman Nematollahi]**
- 742 Plange, K., Burke, S.N., Nematollahi, S., Huerta, D., Lind, K., Barnes, C.A. (2010). Use of lego objects to create perceptual ambiguity on the object discrimination task: Testing for perceptual changes across the life span of bonnet macaques. 40th Annual Society for Neuroscience Meeting, San Diego, CA. **[Danah Huerta]**
- 743 Plichta, K. L., and Stock, S. P. (2007). The bacterial receptacle in steinernematid nematodes, interspecific diversity and evolutionary patterns. 46th Annual Meeting of the Society of Nematologists, San Diego, California. **[Kathryn Plichta]**
- 744 Plichta, K., and Stock, S.P. (2007). A worm and a microbe: A new model system for understanding symbiotic interactions between unicellular and multicellular organisms. Council on Undergraduate Research, Posters on the Hill, Washington, DC. **[Kathryn Plichta]**
- 745 Plichta, K.L., and Stock, S.P. (2006). Entomopathogenic nematodes: A tool for understanding bacterial symbiosis. University of Arizona Graduate and Professional Student Council 2006 Student Showcase, Tucson, Arizona. **[Kathryn Plichta]**
- 746 Poe, G.R., White, R.D., Teed, R.W., Dodge, E., Insel, N., and Barnes, C.A. (1998). Left hippocampal inactivation differentially affects aged vs. young rats in a spatial memory task. 28th Annual Meeting of the Society for Neuroscience, Los Angeles, California. **[Ronald Teed]**
- 747 Polam, J.R., Wright, J.L., Christensen, K.A., Walker, F.A., Flint, H., Winkler, H., Grodzicki, M., and Trautwein, A.X. (1995). A correlation between Mossbauer quadrupole splittings and 57Fe NMR chemical shifts of diamagnetic iron(II) porphyrinates. Western Biotech Conference, San Diego, California. **[Joshua Wright]**
- 748 Polt, R., DeYoung, L., and Peterson, M. (1992). Synthesis of statine via mono-silyl acetals. American Chemical Society, San Francisco, California; and The SWARM Division of the AAAS Annual Meeting, Tucson, Arizona. **[Lynn DeYoung Helseth]**
- 749 Polt, R., Peterson, M., and De Young, L. (1991). Glycosphingolipids via aluminioxy-acetals. Gordon Research Conference on Natural Products, New Hampton, New Hampshire. **[Lynn DeYoung Helseth]**
- 750 Powell, K.R. (1992). Computerized document entry and browsing. The SWARM Division of the AAAS Annual Meeting, Tucson, Arizona. **[Kevin Powell]**
- 751 Powell, M.B., Gregus, J., Gause, P., Bowden, G.T., and Alberts, D. (1995). Transgenic mice expressing human T24 Ha-ras in pigmented cells: A model for melanoma development. Molecular Biology of Cancer: Implications for Prevention and Therapy. The Third Joint Conference of the American Association for Cancer Research and the Japanese Cancer Association, Maui, Hawaii. **[Paul Gause]**
- 752 Powell, M.F., Calsoyas, I.M., Dorr, R.T., and Stratton, S.P. (2000). The effects of epigallocatechin gallate on human epidermal cells in vitro and induction of liver toxicity in vivo. University of Arizona Student Showcase, Tucson, Arizona. **[Isis Calsoyas Sroka]**
- 753 Prasannarong, M., Santos, F.R. and Henriksen, E.J. (2011). ANG (1-7) attenuates ANG II-induced insulin resistance in rat skeletal muscle in vitro. Annual Meeting of the Arizona Chapter of the American Physiological Society, Tucson, AZ. **[Fernando Santos]**
- 754 Prasannarong, M., Santos, F.R., and Henriksen, E.J. (2011). ANG (1-7) attenuates ANG II-induced insulin resistance by inducing Akt phosphorylation via a Mas receptor-dependent mechanism in rat skeletal muscle in vitro. Frontiers in Biomedical Research Forum, University of Arizona College of Medicine, Tucson, Arizona. **[Fernando Santos]**
- 755 Pritchard, J., Varkey, J., and Ward, S. (1991). Analysis of a group of spermatogenesis deficient mutations to identify genes under the deficiency EDF19 of the nematode *Caenorhabditis elegans*. Eighth Annual *Caenorhabditis elegans* Conference, Madison, Wisconsin. **[John Pritchard]**
- 756 Putnam, C., Washington, N., and Weinert, T. (1998). Adding a new checkpoint to the budding yeast G2/M checkpoint pathway. FASEB Summer Research Conference on Yeast Chromosome Structure & Replication, Snowmass Village, Colorado. **[Nicole Washington]**

- 757 Quinones, H. (1997). Manipulation of uptake of the radioprotector WR-33278 in human prostate cancer cells. The Fifth Annual Student Research & Community Service Expo, University of Arizona, Tucson, Arizona, and (1998) Student Showcase at the State Legislature, Phoenix, Arizona. **[Herson Quinones]**
- 758 Quinones, H. (1999). Antizyme-dependent polyamine transporter mediates radioprotection. The University of Arizona Seventh Annual Student Showcase, Tucson, Arizona. **[Herson Quinones]**
- 759 Quinones, H.I., Marek, S., and Gerner, E.W. (1999). The antizyme-dependent polyamine transporter mediates radioprotection by the amifostine derivative WR-1065. American Association for Cancer Research Annual Meeting, Philadelphia, Pennsylvania. **[Herson Quinones]**
- 760 Quiroz J. and Dokken, B. (2012). Environmental toxin Bisphenol A induces insulin resistance. Graduate and Professional Student Council (GPSC): Placed 2nd in category, Tucson, AZ; Annual Bio-medical Research Conference for Minority Students (ABRCMS), St. Louis, MO; Biochemistry Engineering Chemistry Undergraduate Research Conference (BECUR), Tucson, AZ. **[Jose Quiroz]**
- 761 Rad, P.Y., Chunn, A., Halonen, M., and Brown, M.A. (1999) Influence of labor on cytokine production by activated cord blood mononuclear cells. American Thoracic Society International Conference, San Diego, California. **[Parmis Rad]**
- 762 Radabaugh, T.R., Shi, J., Monks, T., and Lau, S.S. (2012). Apoferritin inhibits the formation of arsenic induced reactive oxygen species in J774 murine macrophages. 51st Annual Meeting of the Society of Toxicology, San Francisco, CA. **[Audrey Shi]**
- 763 Radhakrishnan, V.M., Kojs, P., Fritz, A., Ghishan, F.K., and Kiela, P.R. (2012). Curcumin Reduces Migration of Human Colon Cancer Cells via Modulation of Cortactin Expression. Digestive Disease Week Meeting/113th Annual Meeting of the American Gastroenterological Association, San Diego, CA. **[Pawel Kojs]**
- 764 Radhakrishnan, MV, Kojs, P, Fritz, A, Ghishan, FK, Kiela, PP (2012). Curcumin reduces migration of human colon cancer cells via modulation of cortactin expression . DDW 2012, San Diego Convention Center Presented: 5.19.2012-5.21.2012 [Kojs, Pawel] **[Pawel Kojs]**
- 765 Raghunand, N., He, X., van Sluis, R., Bhujwalla, Z.M., and Gillies, R.J. (1998). 31P MRS measurements of intracellular and extracellular pH in MCF-7 human breast carcinoma xenografts in SCID mice subjected to dietary alkaline loads. Sixth Annual Meeting of ISMRM, Sydney, Australia. **[Xi Sylvia He]**
- 766 Raghunand, N., He, X., van Sluis, R., Bhujwalla, Z.M., and Gillies, R.J. (1998). Plasmalemmal pH-gradient in drug-sensitive and drug-resistant MCF-7 human breast carcinoma tumors measured by 31P MRS. Sixth Annual Meeting of ISMRM, Sydney, Australia. **[Xi Sylvia He]**
- 767 Ragone M., Gianelli S., Schwartz D., Su L., Koyluoglu O.O., Fellous JM. The role of hippocampal replay in a computational model of path learning. Poster session presented at: Society for Neuroscience 2016 Conference; 2016 Nov 12-16; San Diego, CA. **[Michael Ragone]**
- 768 Rajapakshe, A., Johnson-Winters, K., Nordstrom, A.R., Meyers, K.T., Emesh, S., Astashkin, A.V. and Enemark, J.H. (2010). Characterization of Chloride-Depleted Human Sulfite Oxidase by EPR Spectroscopy: Experimental Evidence for the Role of Anions in Product Release. Gordon Research Conference, Metals in Biology, Ventura, CA, **[Kimberly Meyers]**
- 769 Rajapakshe, A., Johnson-Winters, K., Nordstrom, A.R., Meyers, K.T., Emesh, S., Astashkin, A.V. and Enemark, J.H. (2010). Characterization of Chloride-Depleted Human Sulfite Oxidase by EPR Spectroscopy: Experimental Evidence for the Role of Anions in Product Release. Gordon Research Conference, Metals in Biology, Ventura, CA, **[Safia Emesh Cheeney]**
- 770 Ramirez-Amaya, V., Vazdarjanova, A., Mikhael, D.M., Rosi, S., Houston, F.P., Olson, K., Worley, P.F., and Barnes, C.A. (2004). Time course of arc protein expression in the hippocampus after spatial exploration. Neuroscience Meeting, Baltimore, Maryland. **[Dalia Mikhael]**
- 771 Ramirez-Amaya, V., Vazdarjanova, A., Mikhael, D.M., Worley, P.F., and Barnes, C.A. (2004). Molecular reactivation of ARC protein after spatial exploration. Society for Neuroscience Meeting, San Diego, California. **[Dalia Mikhael]**
- 772 Ramsey, P., Yau, J., and Zeiher, C. (1996). Is MEP carboxylase stimulated by hormones in cotton ovuli culture. Annual Meeting of the American Society of Plant Physiologists, San Antonio, Texas. **[John Yau]**
- 773 Rance, N.E. and Uswandi, S.V. (1994). Luteinizing hormone-releasing hormone (LHRH) gene expression is increased in the hypothalmi of post menopausal woman. Society for Neuroscience, Miami, Florida. **[Shane Uswandi Sheu]**
- 774 Rashotte, A., Hoffer, U., Jenks, M.A., Tuttle, H.A., Lemieux, B., and Feldmann, K. (1994). Characterization and analysis of epicuticular waxes in arabidopsis. American Society of Plant Physiologists, Portland, Oregon. **[Hillary Tuttle Nicholson]**
- 775 Rasmussen, N.C., Runge, A., Saavedra, S.S., and Mendes, S.B. (2005). Iterative root-finding approach for determination of anisotropic optical constants and surface coverage of Cytochrome c films. American Chemical Society National Meeting, San Diego, California. **[Nicole Rasmussen Brazier]**
- 776 Ravindranath, M. and Taylor, K. (1993). Macrophylla decline: A newly described disorder in citrus. American Society of Plant Physiologists Conference, Minneapolis, Minnesota; American Society for Horticultural Scientists Conference, Nashville, Tennessee. **[Manasa Ravindranath Hull]**
- 777 Raz, D.G., Gerken, L. and Peterson, M. (2008). Visual perception and infant development: Can infants use convexity as a cue for figure/ground segregation. Western Region Honors Conference in Flagstaff, Arizona. **[Dannah Raz]**
- 778 Reed, L.K., LaFlamme, B.A., and Markow, T.A. (2006). Genetic architecture of hybrid male sterility. 47th Annual Drosophila Research Conference, Houston, Texas. **[Brooke LaFlamme]**

- 779 Regan, J. and Konhilas, J.P. (2009). Cardiac myosin expression and its relationship to sex and hypertrophy. Undergraduate Physiology Poster Session, Tucson, Arizona. **[Jessica Regan]**
- 780 Regan, J. and Konhilas, J.P. (2010). Expression of passive and active proteins in hypertrophic cardiomyopathy. Undergraduate Physiology Poster Session, Tucson, Arizona. **[Jessica Regan]**
- 781 Regan, J.A., Sequeira, V., Stienen, G.J.M., Michels, M., ten Cate, F.J., Konhilas, J., and van der Velden, J. (2012). Reduced length-dependent activation in human cardiomyocytes harbouring the cardiac troponin I mutation R145W. Biophysical Society 56th Annual Meeting, San Diego, California. **[Jessica Regan]**
- 782 Renn, W., Robinson, J., Stumvoll, M., Fritsche, A., Wahl, H.G., Haring, H.U., and Jacob, S. (2000). A minimal model for the insulin-mediated regulation of lipolysis. CID 2000 Conference, Madrid, Spain. **[Jennifer Robinson Diamond]**
- 783 Restifo, L., Estes, P.S., and DelloRusso, C. (1994). Genetics of ecdysteroid-regulated CNS metamorphosis. XIth Ecdysone Workshop, The Czech Republic. **[Christiana DelloRusso]**
- 784 Reyna, V.F., Metz, K.C., Roberts, J.L., Adam, M.B., LeCroy, C., and Poirier, K.L. (2003). Developmental differences in estimates of sexual risk and benefits among adolescents: A fuzzy-trace theory analysis. Biennial Meeting of the Cognitive Development Society, Park City, Utah. **[Kirsten Metz]**
- 785 Rice, F.L., Smelser, C.B., and McMullen, N.T. (1993). Expression of parvalbumin in the indistinct barrels of the rabbit SI cortex. Annual Meeting of the Society for Neuroscience, Washington, D.C. **[Chad Smelser]**
- 786 Riffell, J.A., Constantopoulos, E., and Hildebrand, J.G. (2010). Innate olfactory preferences and learning in *Manduca sexta* moths. Annual Meeting of the Society of Neuroscience, San Diego, CA. **[Eleni Constantopoulos]**
- 787 Rivera, B.D., Jennings, L.L., Maier, R.M., Neilson, J.W. (2015). Biogeochemical Indicators for Assessing Plant Establishment during Mine Reclamation. SWES X, Student Union South Grand Ballroom Presented: 4/10/2015 [Rivera, Benjamin] **[Benjamin Rivera]**
- 788 Roanhorse-Woody, T. and Plante, E. (1997). Behavioral correlates of the inferior parietal lobe. Annual Meeting of the Society for Advancement of Chicanos and Native Americans in Science, Houston, Texas. **[Thomasita Roanhorse]**
- 789 Robbins, A., Greaves, K., and Fernandez, M.L. (1996). Freezing does not effect the susceptibility of low density lipoproteins in oxidation. FASEB Conference, Washington, D.C. **[Amy Robbins Rampley]**
- 790 Roberts, J.L., Metz, K.C., Reyna, V.F., Poirier, K.L., Adam, M.B., and LeCroy, C. (2003). Qualitative gist versus quantitative estimates of sexual risk among adolescents: A fuzzy-trace theory analysis. Society for Judgment and Decision Making, Vancouver, Canada. **[Jennifer Roberts]** **[Kirsten Metz]**
- 791 Robles D, Laude ND, Kramer CL, Meske DS, Lemister E, Navratilova E, Heien ML, Porreca F. Measurements of Endogenous Opioid Peptides in the Rat Brain Using Online-Preservation Microdialysis with Mass Spectrometry. Experimental Biology; 2016, April 2-6; San Diego, CA. **[Dagoberto Robles]**
- 792 Rogers, T., Neilson, J.W., and Maier, R.M. (2000). Effect of rhamnolipid on the sensitivity of *Pseudomonas aeruginosa* to hydrophobic antibiotics. Arizona-Nevada Branch of the American Society for Microbiology Meeting, Tucson, Arizona. **[Thomas Rogers]**
- 793 Rowe, D.C., Stever, C., Cleveland, H.H., Sanders, M.L., Abramowitz, A., Kozel, S., Mohr, J., Sherman, S.L., and Waldman, I.D. (1996). Genetic markers in childhood behavior disorders. Behavior Genetics Association, Pittsburgh, Pennsylvania. **[Craig Stever]**
- 794 Roxas, C.R., Ortega, Y.R., and Sterling, C.R. (1996). Vegetables as a potential transmission route for *Cyclospora* and *Cryptosporidium*. American Society of Microbiology 96th Annual Meeting, New Orleans, Louisiana. **[Concepcion Roxas]**
- 795 Roy, R. (1999). Hepatic ischemia/reperfusion injury reduced by dimethyl sulfoxide. The University of Arizona Seventh Annual Student Showcase, Tucson, Arizona. **[Rupali Roy]**
- 796 Ruppel, R., Bronstein, J., Huxman, T., and Davidowitz, G. (2004). Seasonal Changes in herbivory: Does the monsoon cause plants to go missing? University of Arizona Student Showcase, Tucson, Arizona. **[Rebecca Ruppel]**
- 797 Ruppel, R., Bronstein, J., Huxman, T., and Davidowitz, G. (2005). Is more always better? The effect of *Datura wrightii* leaf size on *Manduca sexta*. Undergraduate Biology Research Program Annual Conference, Tucson, Arizona. **[Rebecca Ruppel]**
- 798 Ruppel, R., Bronstein, J., Huxman, T., and Davidowitz, G. (2005). Seasonal Changes in herbivory: Does the monsoon cause plants to go missing? Undergraduate Biology Research Program Annual Conference, Tucson, Arizona. **[Rebecca Ruppel]**
- 799 Russell, K.C., Kazmierski, W., Nicolas, E., Ferguson, R.D., Knollenberg, J., Wegner, K., and Hruby, V.J. (1992). Asymmetric synthesis of unusual amino acids designed for topographical control of peptide conformation. 12th American Peptide Symposium, Boston, Massachusetts. **[Ronald Ferguson]**
- 800 Rykowski, M., Grounds, T., Heddle, L., Gunawardena, S., and Madasz, R. (1993). Fine-structure analysis of polytene and diploid chromosomes. 34th Annual *Drosophila* Research Conference, San Diego, California. **[Richelle Madasz]**
- 801 Salt, I, Lister, JP, Barnes, CA (2012). Expression of immediate early gene ARC while running on a wheel is similar to when exploring a spatial environment. NACP Poster Conference, Flagstaff, AZ **[Ingriquet Salt]**
- 802 Salus, S., Lin, H. and Schumaker, K. (1994). The role of H⁺-ATPases in regulation of intracellular sodium levels in cotton. Annual Meeting of the American Society of Plant Physiologists. Portland, Oregon. **[Howard Lin]**
- 803 Salus, S., Lin, H., and Schumaker, K. (1994). The role of H⁺-ATPases in regulation of intracellular sodium levels in cotton. Annual Meeting of the American Society of Plant Physiologists, Portland, Oregon. **[Sandra Salus]**

- 804 Salvador, K., Gentry, C., Heuser, H., and Van Antwerpen, R. (1996). Uptake of lipids by *Manduca sexta* oocytes: Possible roles of lipoprotein lipase and glycosaminoglycans. The Center for Insect Science Fifth Annual Poster Hexapodium, Tucson, Arizona. **[Kirk Salvador]**
- 805 Salywon, A. and Champagne, A. (1991). Effect of maternal foodplant on growth of *Heliothis virescens* larvae. The Center for Insect Science Conference at Biosphere II, Oracle, Arizona. **[Andrew Salywon]**
- 806 Sanders, S.J., Patterson, B.R., Tsuchida, K., and Wells, M.A. (1989). Lipid regulation in starving and feeding fifth instar larvae of *Manduca sexta*. International Symposium on Molecular Insect Science, Tucson, Arizona. **[Scott Sanders]**
- 807 Sandoval, J, Vasquez, M, and Ogden, K (2013). Racing Media. Society of Hispanic Professional Engineers National Conference, Indianapolis, Indiana Presented: 09/30/2013 [Sandoval, Juan] **[Juan Sandoval]**
- 808 Sandoval-Guzman, T., Escobar, C.M., Krawjewski, S.J., and Rance, N.E. (2000). Intraventricular administration of a neurokinin B (NKB) antisense oligodeoxynucleotide reduces LH secretion in the gonadectomized male rat. Society for Neuroscience, New Orleans, Louisiana. **[Carla Escobar Stalcup]**
- 809 Sandoval-Guzman, T., Stalcup, S.T., Krajewski, S.J., Voytko, M.L., and Rance, N.E. (2002). Characterization of the neuroendocrine axis regulating reproduction and body weight in intact and ovariectomized cynomolgus macaques. Neuroscience Convention, Orlando, Florida. **[Seth Stalcup]**
- 810 Santoro Jr., J., Ibrahim-zada, I., Sirakis, G.D., Friese*, R.S. (2013). SLEEP ENHANCEMENT PROGRAMS IN THE SURGICAL ICU : A PILOT CLINICAL TRIAL. AHSC 2013 Frontiers in Biomedical Research Poster Forum, Arizona Health Sciences Plaza, University of Arizona Presented: Wednesday, October 30, 2013 [Santoro, John] **[John Santoro]**
- 811 Santos, F.R., Diamond-Stanic, M.K., Prasannarong, M. and Henriksen, E.J. (2011) The serine kinase c-Jun N-terminal kinase (JNK) contributes to oxidant-induced insulin resistance in rat skeletal muscle. Annual Meeting of the Arizona Chapter of the American Physiological Society, Tucson, AZ. (First place award for undergraduate abstracts) **[Fernando Santos]**
- 812 Sarkar, D.D., Nunez, M., Mauser, J., Briggs, D., and Tsao, T.S. (2010). Changes in adipocyte endoplasmic reticulum (ER) redox state and redox control of adiponectin oligomerization. American Diabetes Association Annual Scientific Sessions, Orlando, FL. **[Justin Mauser]**
- 813 Saunders, K. Brabez, N., and Hruby, V.J. (2012). Synthesis of multivalent ligands for in vitro and in vivo studies - targeting melanoma. Department of Chemistry and Biochemistry Poster Fair, Tucson, Arizona. **[Kara Saunders]**
- 814 Saunders, M.A., Jensen, J.D., Hammer, M.F., and Nachman, M.W. (2001). Nucleotide variability within and around G6pd, a locus under balancing selection in humans. Human Genome Meeting, Edinburgh, Scotland. **[Jeffrey Jensen]**
- 815 Saunders, T.A., Halpern, M.D., Clark, J.A., Doelle, S.M., Burger, L.C., and Dvorak, B. (2005). Anti-TNF-alpha treatment reduces the severity of experimental necrotizing enterocolitis. Pediatric Academic Society, Washington D.C. **[Jessica Dominguez Reig Clark] [Sarah Doelle]**
- 816 Saunders, T.A., Halpern, M.D., Clark, J.A., Doelle, S.M., Burger, L.C., and Dvorak, B. (2005). Effect of anti-TNF-alpha treatment on the incidence of experimental necrotizing enterocolitis. 46th Annual Meeting of the European Society for Pediatric Research, Siena, Italy. **[Jessica Dominguez Reig Clark] [Sarah Doelle]**
- 817 Savaiano, D.A., Solomons, N.W., Martini, M.C., Valenzuela, J.G., and Canfield, L.M. (1990). Yogurt enhances b-carotene bioavailability in humans. 23rd International Dairy Council, Canada. **[Jesus Valenzuela]**
- 818 Schatz, B., Grossman, E., Friedman, T., Powell, K., Calley, J., Chen, H., Hudson, S., and Ward, S. (1993). The worm community system, release 2. Ninth International C. elegans Meeting, Madison, Wisconsin. **[Kevin Powell]**
- 819 Schatz, B., Ward, S., Yeatts, A., Powell, K., and Hudson, S. (1991). The worm community system. Eighth International C. elegans Meeting, Madison, Wisconsin. **[Kevin Powell]**
- 820 Schimanski, L.A., Broersma, B.M., Lipa, P., Barnes, C.A. (2010). Hippocampal CA1 firing rates vary with spatial training and place field stability in young and old rats. 40th Annual Society for Neuroscience Meeting, San Diego, CA. **[Brittanie Broersma Hagen]**
- 821 Schlecht, J., Barnard, K., Spriggs, E., and Pryor, B. (2007) Inferring Grammar-based Structure Models in 3D Microscopy Data, IEEE Computer Society Conference on Computer Vision and Pattern Recognition, Minneapolis, Minnesota. **[Ekaterina Taralova Spriggs]**
- 822 Schlegel, A, Chapman, JA, Campos, SK (2013). Possible role for adaptor protein complexes in sorting of human papillomavirus. Frontiers in Immunobiology and Immunopathogenesis, Tucson, AZ. **[Angela Schlegel]**
- 823 Schlegel, A.M., Chapman, J.A., Campos, S.K. (2012). A Yeast-Two Hybrid Screen Against HPV16 Capsid Proteins Indicates Dynactin 6 is a Potential Cellular Factor Involved in HPV16 Infection . Experimental Biology (ASBMB) 2012, San Diego, CA Presented: April 2012 [Schlegel, Angela] **[Angela Schlegel]**
- 824 Schmitz, H, Gao, L, Zuniga, AN, Fastje, C, Taljanovic, M, Latt, D, Witte, R (2016). Dynamic Model to Optimize Ultrasound Elasticity Imaging. Biomedical Engineering Society Annual Conference, Minneapolis, MN. **[Hannah Schmitz]**
- 825 Schroeder, J., Schluter, S.F., and Marchalonis, J.J. (1991). Isolation of a putative protoimmunoglobulin in *Pyura haustoria*. Fifth ISDCI Congress, Portland, Oregon. **[Joyce Schroeder]**
- 826 Schultheis, L., McCount, R.M., and Hoshaw, R.W. (1992). Use of RFLP analysis for identifying polyploid species complexes of *Spirogyra*. The SWARM Division of the AAAS Annual Meeting, Tucson, Arizona. **[Lisa Schultheis Got]**
- 827 Schulz, B., Azpiroz, R., Dilkes, B., LoCascio, J., Wu, Y., and Feldmann, K. (1993). Dwarf mutants of *Arabidopsis thaliana*. Fifth International Conference on Arabidopsis Research, Columbus, Ohio. **[Jeffrey LoCascio]**

- 828 Schumaker, K.S., Gizinski, M.J., Dietrich, M.A., Fetveit, D.L., Lin, H., Rohwer, J.S., Salus, S.S., and Shao, A. (1995). The regulation and role of calcium in cytokinin-induced bud formation in moss. 15th International Conference on Plant Growth Substances, Minneapolis, Minnesota. **[Howard Lin]**
- 829 Schwenck, S.M., Brum, J.R., Stewart, F.J., and Sullivan, M. B. (2014). When the Oxygen Minimum Zone and Euphotic Zone Collide, Viral Communities are Altered. Ocean Sciences, Honolulu, Hawaii Presented: February 25, 2014 [Schwenck, Sarah] **[Sarah Schwenck]**
- 830 Schwenck, S.M., Brum, J.R., Stewart, F.J., and Sullivan, M. B. (2014). When the Oxygen Minimum Zone and Euphotic Zone Collide, Viral Communities are Altered. SWESx Earth Week Poster Session, University of Arizona Presented: April 11, 2014 [Schwenck, Sarah] **[Sarah Schwenck]**
- 831 Scobie, E. and Szivek, J. (2011). The subterranean life of an aboreal squirrel: burrow use by endangered Mt. Graham red squirrels. The American Society of Mammalogists Annual Meeting, Portland, Oregon. Won the American Society of Mammalogists Undergraduate Travel Award to attend. **[Emily Scobie Hewitt]**
- 832 Seanez, C, Wondrak, G (2013). Identification of Novel Sonoran Desert Derived Biofactors for Antioxidant Intervention Targeting Melanoma Cells. NACP, NAU Presented: July 30th [Seanez, Carol] **[Carol Seanez]**
- 833 Seaton, T. and Tischler, M. (1997). Nerve extract injection slows atrophy in denervated rat soleus. Annual Meeting of the Society for Advancement of Chicanos and Native Americans in Science, Houston, Texas. **[Tommy Seaton]**
- 834 Sen, G. and Joy, A. (1998). Box localizes in regions of the cell that would indicate association with RNA during the induction of programmed cell death. The Third Annual Student Scientific Presentation Day, Barrow Neurological Institute, Phoenix, Arizona. **[George Sen]**
- 835 Sepulveda, J., Rhoads, D.M. (2011). A Putative ATPase Assembly Protein Targeted by Mitochondrial Retrograde Regulation. SACNAS National Conference, San Jose, CA Presented: [Sepulveda Noble, Jennifer] **[Jennifer Sepulveda Noble]**
- 836 Sequeira, V, Regan, JA, Michels, M, ten Cate, FJ, van Slegtenhorst, MA, Stienen, GJM, dos Remedios, C, van der Velden, J (2011). Perturbed length-dependent activation in human HCM with sarcomere mutations in thin and thick filament proteins. BIG Heat FP7 project, Balliol College, Oxford, UK Presented: October [Regan, Jessica] **[Jessica Regan]**
- 837 Serrano, O.K., Brokl, O.H., Abbott, D.E., and Dantzler, W.H. (1998). Regulation of intracellular pH in snake renal proximal tubules. 25th Annual Meeting of the Society for Chicanos and Native Americans in Science, Washington, D.C. **[Oscar Serrano]**
- 838 Shackman, J.G. and Denton, M.B. (2000). Determination of enantiomeric purity using a dispersive Raman spectrometer. Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, New Orleans, Louisiana. **[Jonathan Shackman]**
- 839 Shackman, J.G., Giles, J.H., and Denton, M.B. (1999). Monitoring reactions of importance to the pharmaceutical industry by Raman spectroscopy. The Pittsburgh Conference on Analytical Chemistry and Applied Spectroscopy, Orlando, Florida. **[Jonathan Shackman]**
- 840 Shackman, J.G., Giles, J.H., and Denton, M.B. (2000). Pharmaceutical reaction monitoring by Raman spectroscopy. Further Developments in Scientific Optical Imaging. Royal Society of Chemistry. **[Jonathan Shackman]**
- 841 Shahbazian, M., Stazzone, A., Darban, H., Hebert, A., and Watson, R. (1992). Effect of thymosin alpha-1 on immune responses of CS7B1/6 mice fed on ethanol diet and challenged with streptococcus pneumoniae. International Conference on Alcohol, Drugs of Abuse, and Immunomodulation, Tucson, Arizona. **[Anthony Stazzone]**
- 842 Shankar, P. and Berens, M.E. (1996). Interaction of growth factors and extracellular matrix on glioma migration. Neurology Research: Advances from Student Investigations sponsored by the Barrow Neurological Institute, Gilbert, Arizona. **[Pragyna Shankar Seetharam]**
- 843 Shankar, P., Zhao, B., and Swartz, J. (1998). Cytokine expression in antisense-IL-3 mice with a neurological syndrome. Western Nerve Net Conference, Tucson, Arizona, and CUR Second Undergraduate Poster Session, Washington, D.C. **[Pragyna Shankar Seetharam]**
- 844 Sheeran, P.S., Wong, V.P., Luois, S. McFarland, R.J., Ross, W.D, Feingold, S., Matsunaga, T.O., and Dayton, P.A. (2010). Low Energy Acoustic Vaporization of Novel Decafluorobutane Nanometer and Micrometer Droplets. Contrast Agents: Erasmus Conference , Rotterdam, Netherlands Presented: October 2010 [Luo, Samantha] **[Samantha Luois]**
- 845 Shen, E. and Ward, S. (2001). How big a problem is gene cross-hybridization for interpreting microarray results. 13th International C. elegans Meeting, Los Angeles, California. **[Eric Shen]**
- 846 Sherman, S, Falk, T, Yee, B, Zhang, S (2008). PEDF is Neuroprotective in In Vitro models in Parkinson's Disease. , Chicago, Presented: July [Yee, Brandon] **[Brandon Yee]**
- 847 Shi, A and Cordes M (2013). Structural consequences of a frameshift that extends the length of a yeast protein. Beckman Symposium, Irvine Presented: July 25, 2013 [Shi, Aishan] **[Aishan Shi]**
- 848 Shi, A and Cordes, M (2013). Structural consequences of a frameshift that extends the length of a yeast protein. Experimental Biology, Boston Presented: April 22, 2013 [Shi, Aishan] **[Aishan Shi]**
- 849 Shi, A, Masel, J, Cordes, M (2013). Characterization of the yeast de novo protein YNR034W-A, ASBMB, Boston, MA. **[Aishan Shi]**
- 850 Shorty, M. and Garrison, E.R. (1998). Become educated and live a healthier life. 25th Annual Meeting of the Society for Chicanos and Native Americans in Science, Washington, D.C. **[Marvin Shorty]**

- 851 Shultz, C, Badowski, M, Harris, DT (2011). Kinetics of the Immune Response in Inbred and Outbred Mice Before and After Bone Marrow Transplantation. Immunobiology Symposium, Tucson Presented: March [Shultz, Christopher] **[Christopher Shultz]**
- 852 Shumway, KR, Porfirio, DJ, Bailey, EF (2014). Motor Unit (MU) recruitment patterns in genioglossus (GG) and first dorsal interosseous (FDI) muscles. Experimental Biology Conference, San Diego Presented: 4-26-14 [Porfirio, David] **[David Porfirio]**
- 853 Shuster, S.M. and Levy, L.R. (1998). Sex-linked inheritance of a cuticular pigmentation marker in a marine isopod (Paracerceis Sculpita). 74th Annual Meeting of the Southwestern and Rocky Mountain Division of the American Association for the Advancement of Science, Grand Junction, Colorado. **[Roger Levy]**
- 854 Sikder, S. and McGrath, D.V. (1999). Synthesis of amphiphilic photoresponsive dendrimers. University of Arizona Department of Chemistry Undergraduate Majors Fair, Tucson, Arizona. **[Shameema Sikder]**
- 855 Sikder, S. and McGrath, D.V. (2000). Synthesis of amphiphilic photoresponsive dendrons. University of Arizona Department of Chemistry Undergraduate Majors Fair, Tucson, Arizona. **[Shameema Sikder]**
- 856 Sikder, S. and McGrath, D.V. (2001). Synthesis of amphiphilic photoresponsive dendrons. Marvel Symposium, Tucson, Arizona, and National American Chemical Society Meeting, San Diego, California **[Shameema Sikder]**
- 857 Sikder, S. and McGrath, D.V. (2001). Synthesis and characterization of new amphiphilic photoresponsive dendron. Undergraduate Research Symposium American Chemical Society: Central and Southern Arizona Sections, Tempe, Arizona. **[Shameema Sikder]**
- 858 Silva, A, Bellsey, R, Martinez, P, Elgueta, M, Martinez, EA (2000). Genetic polymorphism of two insects specific to an euphorbiaceous shrub. Society for the Study of Evolution. Indianapolis, Indiana. **[Robert Bellsey]**
- 859 Simonson, C, Wang, J, Ablin, R, Harris, D (2010). Stem Cell Therapy in the Wound Healing Response in Epithelial Injuries . Frontiers in Immunobiology Symposium, University of Arizona Presented: March 2010 [Simonson, Caitlin] **[Caitlin Simonson Dirvonas]**
- 860 Singh, H., Gibson, A.R., Horn, K.M., and Pong, M. (1998). The role of the intermediate cerebellum in the control of movements that involve hand use. 74th Annual Meeting of the Southwestern and Rocky Mountain Division of the American Association for the Advancement of Science, Grand Junction, Colorado. **[Harinder Singh]**
- 861 Sipes, I.G., Gunawardhana, L., Doolan, L., and Eskelson, C.D. (1993). Differential lipid peroxidation induced by 1,2-Dichlorobenzene in Fischer-344 and Sprague-Dawley rats. Society of Toxicology Annual Meeting, New Orleans, Louisiana. **[Luke Doolan]**
- 862 Sipes, I.G., Gunawardhana, L., Jolley, C.S., Gupta, P., Earnest, D.L., and Lantz, R.C. (1994). Correlation of the time course of liver injury and infiltration of inflammatory cells into rat liver following administration of the potent; hepatotoxicant 1,2-dichlorobenzene. Japan. **[Priti Gupta Patel]**
- 863 Slosky, L., Machtley, S., and Hagler, J.R. (2010). Leaving a mark: A comparison of arthropod protein marking protocols. 2010 Entomological Society of America Conference, San Diego, CA. **[Lauren Slosky]**
- 864 Slotkin, R.K., Lennerts, P., Traut, A., Napoli, C.A., and Chandler, V.L. (2000). Transposition frequency of Rescue Mu. 42nd Annual Maize Genetics Conference, Coeur d'Alene, Idaho. **[Richard Slotkin]**
- 865 Smelser, C.B. and McMullen, N.T. (1992). Parvalbumin immunocytochemistry delineates primary auditory neocortex. Annual Meeting of the Society for Neuroscience, Anaheim, California. **[Chad Smelser]**
- 866 Smelser, C.B. and McMullen, N.T. (1993). A stereological analysis of parvalbumin-containing neurons in auditory neocortex. Annual Meeting of the Society for Neuroscience, Washington, D.C. **[Chad Smelser]**
- 867 Smith, C.L., Kadiyala, V., Mathieu, W., Patrick, N., Gilpatrick, M. and An, L. (2012) Histone deacetylases as glucocorticoid receptor coactivators. Endocrine Society Annual Meeting, Houston, TX. **[Maryam Gilpatrick]**
- 868 Smith, M.H., Nuara, A.A., Egen, J., Lam, K.S., and Grimes, W.J. (1998). HLA class I peptide binding motif obtained by screening a synthetic peptide library with recombinant class I proteins. Experimental Biology, San Francisco, California. **[Anthony Nuara]**
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- 870 Snyder, M.J., Andersen, J.F., Stevens, J.L., and Feyereisen, R. (1995). A PCR-based approach to the identification of new invertebrate cytochromes P450. Third International Symposium: Cytochrome P450 Biodiversity, Woods Hole, Massachusetts. **[Jennitte Stevens]**
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- 872 Snyder, R., Ashstashkin, A., Bernardson, P., Evans, D., and Enemark, J. (2006). Coupled Proton-Electron Processes at Oxo-Molybdenum. The 231st ACS National Meeting. Atlanta, Georgia. **[Rae Ana Snyder] [Pablo Bernardson]**
- 873 Snyder, R., Ashstashkin, A., Bernardson, P., Evans, D., and Enemark, J. (2006). Coupled Proton-Electron Processes at Oxo-Molybdenum. The 8th Annual Beckman Scholars Symposium, Irvine, California. **[Rae Ana Snyder] [Pablo Bernardson]**
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- 877 Song, M., Cook, S.J., Corral-Frias, N., Fellous, J-M. (2010). The role of the ventral tegmental area in the extinction of probabilistic events. 40th Annual Society for Neuroscience Meeting, San Diego, CA. **[Sarah Cook Natale]**
- 878 Sorooshian, A. and Wendt, J.O.L. (2001). Mercury capture by activated carbon and CDEM sorbent. American Institute of Chemical Engineers Annual Meeting, Reno, Nevada. **[Armin Sorooshian]**
- 879 Soto, R., Dhanasekaran, M., Cai, M., and Hruby, V.J. (2011). Design, synthesis and biological evaluation of novel chimeric antagonist ligands for the Melanocortin-3 Receptor. BECUR Conference, University of Arizona, Tucson, Arizona. **[Robert Soto]**
- 880 Soulages, J.L. and Bendavid, O.J. (1998). The lipid binding activity of the exchangeable apolipoprotein, apolipoprotein-III, correlates with the formation of a molten globular state. 42nd Annual Meeting of the Biophysical Society, Kansas City, Missouri. **[Omid Bendavid]**
- 881 Spano, G., Edgin, J., Mason, G., Nadel, L. (2010). Executive function in Down Syndrome: Cognitive and genetic correlates. 40th Annual Society for Neuroscience Meeting, San Diego, CA. **[Gina Mason]**
- 882 Spano, G., Nadel, L., Mason, G., and Edgin, J. (2010). Set-Shifting in Down Syndrome: Cognitive and Genetic Correlates. AAAS Annual Meeting, San Diego, CA. **[Gina Mason]**
- 883 Speer, D.P., Ulreich, J.B., Filip, Z.A., Valles, A.V., Ledesma, J.B., Chen, H-C., Yuen, D., and Li S-T. (2006). A collagen-anorganic bone composite for bone repair: Part II: In vivo study in a rabbit radius defect model. 31st Annual Meeting, Society for Biomaterials, San Diego, California. **[Amanda Valles Bisla]**
- 884 Speer, D.P., Ulreich, J.B., Filip, Z.A., Valles, A.V., Ledesma, J.B., Chen, H-C., Yuen, D., and Li, S-T. (2006). A collagen-anorganic bone composite for bone repair: Part II: In vivo study in a rabbit radius defect model. 31st Annual Meeting, Society for Biomaterials, San Diego, California. **[Justin Ledesma]**
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- 886 Spofford, C.M., Ulreich, J.B., Rhorer, A.S., Brendel, K., Goldberg, S.J., and Dawson, B.V. (1994). Precision-cut rat liver slices to assess the relative toxicities of halogenated hydrocarbons. 33rd Annual Meeting, Society of Toxicology, Dallas, Texas. **[Anthony Rhorer]**
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- 889 Spofford, C.M., Ulreich, J.B., Rhorer, A.S., Le, T., Brendel, K., Goldberg, S.J., and Guerrero-Tucker, G. (1994). Differential hepatotoxicity of tetrachloroethylene in the presence or absence of chromium compounds. Mountain West Society of Toxicology, Albuquerque, New Mexico. **[Anthony Rhorer]**
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- 891 Spriggs, E., Schlect, J., Barnard, K., and Pryor, B. (2007). Modeling complex 3-dimensional structure in Alternaria and applications to morphometric analysis. The Annual Meeting of the Mycological Society of America, Baton Rouge, Louisiana. **[Ekaterina Taralova Spriggs]**
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- 894 Starobinska, E., Sweeney, S., and Davidson, B. (2010). Identification of novel genes involved in heart formation. Society for Integrative and Comparative Biology Annual Meeting, Seattle, WA. **[Ella Starobinska]**
- 895 Starobinska, E., Sweeney, S., Woznica, A., and Davidson, B. (2011). Identification of ETS 1/2 target genes. UA BECUR Conference, Tucson, Arizona. **[Ella Starobinska]**
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- 900 Stevens, J.L., Anderson, J., Uthermohlen, J., and Feyereisen, R. (1994). Expression of housefly P450 in *E. coli*. Center for Insect Science Hexapodium, Tucson, Arizona. **[Jennitte Stevens]**
- 901 Stickney, G., Langrey, L., and Lynch, R. (1995). Diabetes: Glucose and Ca²⁺ homeostasis in vascular muscle cells. UA Student Research Expo, Tucson, Arizona. **[George Stickney]**
- 902 Stickney, G., Langrey, L., and Lynch, R. (1996). Diabetes: Glucose and Ca²⁺ homeostasis in vascular muscle cells. UA Department of Physiology Poster Session, Tucson, Arizona. **[George Stickney]**
- 903 Stickney, G., Langrey, L., and Lynch, R. (1998). Identification of intracellular Ca²⁺ stores in single vascular smooth muscle cells. National Conference on Undergraduate Research, Salisbury, Maryland. **[George Stickney]**
- 904 Stonehouse, A.R., Pennington, J.E., and Wells, M.A. (1998). Elucidation of the role of convertases in the regulation and processing of peptide hormones secreted by midgut endocrine cells of the mosquito *Aedes aegypti*. Third International Symposium on Molecular Insect Science, Snowbird, Utah. **[April Stonehouse Zeiger]**
- 905 Stratton, S.P., Danzl, N.M., Calsoyas, I.M., Powell, M.F., Stratton, M.S., and Dorr, R.T. (2003). Effects of epigallocatechin gallate (EGCG) on signaling pathways in human skin cancer cell lines. American Association for Cancer Research, Washington D.C. **[Isis Calsoyas Sroka]**
- 906 Strautman, SR, Gard, J, Sroka, IC, Cress, AE (2011). Novel Coordination of Laminin Cell Adhesion Receptors in Human Prostate Cancer. Frontiers in Biomedical Research, University of Arizona Presented: Nov. 2, 2011 [Strautman, Stephanie] **[Stephanie Strautman]**
- 907 Stringer, S.K., Ulreich, J.B., Young, C.J., Le, T., Chavez, R.A., Boles, J.L., Maveddat, M., Zavala, J.L., and Nakazato, P.Z. (1997). Protective effect of dimethyl sulfoxide on the viability of livers from non-heart-beating donor Fischer 344 rats. 36th Annual Meeting of the Society of Toxicology, Cincinnati, Ohio. **[Thuy Le]**
- 908 Stringham, M., Sterling, C.R., Gilman, R., Cabrera, L., and Taqiri, C. (2004). Giardia in a Peruvian shantytown. 79th Annual Meeting of the American Society of Parasitologists, Philadelphia, Pennsylvania. **[Margarethe Stringham Cooper]**
- 909 Strom, J. and Gordon, H. (1998). A dynamic trapping model of post-synaptic aggregation. Keystone Symposia on Molecular and Cellular Biology, Park City, Utah. **[Jack Strom]**
- 910 Suedkamp, K.M. (1997). What role does human disturbance have on nest success of Acadian flycatchers in southeast Missouri? The Fifth Annual Student Research & Community Service Expo, The University of Arizona, Tucson, Arizona. **[Kimberly Suedkamp Wells]**
- 911 Suedkamp, K.M. and McPherson, G.R. (1997). Effects of stratification and water immersion on germination of *Quercus emoryi* (Emory oak). Ecological Society of America Annual Meeting, Albuquerque, New Mexico. **[Kimberly Suedkamp Wells]**
- 912 Suedkamp, K.M. and McPherson, G.R. (1997). Effects of stratification on germination of *Quercus emoryi* (Emory oak). Eleventh National Conference on Undergraduate Research, University of Texas, Austin, Texas. **[Kimberly Suedkamp Wells]**
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- 914 Suedkamp, K.M. and McPherson, G.R. (1997). Native biodiversity and non-native species. 10th Annual Undergraduate Research Forum, The University of Arizona, Tucson, Arizona. **[Kimberly Suedkamp Wells]**
- 915 Suedkamp, K.M. and McPherson, G.R. (1998). Can prescribed burning be used to restore Sonoran desert grasslands in southeastern Arizona? Annual Meeting of the Society for Range Management (SRM), Guadalajara, Mexico. **[Kimberly Suedkamp Wells]**
- 916 Suedkamp, K.M., Mattsson, B.J., Clawson, R., and Faaborg, J. (1997). Comparisons between nest site characteristics and nest fate of Acadian flycatchers (*Empidonax virescens*). Undergraduate Research Science Symposium, University of Missouri-Columbia, Columbia, Missouri. **[Kimberly Suedkamp Wells]**
- 917 Sukhina, A., Pugh, J.L., Smithey, M.J., Sammader, P. and Nikolich-Zugich, J. (2012). 7th Annual Symposium Frontiers in Immunobiology and Immunopathogenesis Tucson, AZ. **[Alona Sukhina]**
- 918 Sukhina, AS, Pugh, JL, Smithey, MJ, Samadder, PP, Nikolich-Zugich, Y (2013). Investigating MCMV latency in primary mouse tissues. Frontiers in Immunobiology and Immunopathogenesis Symposium, Tucson, AZ. **[Alona Sukhina]**
- 919 Sundareshan, P., Koster, J.J., Nagle, R.B., and Bowden, G.T. (1995). Expression of matrilysin during TPA-induced apoptosis in a human prostate cancer cell line. Annual Meeting of the American Association for Cancer Research, Toronto, Canada. **[James Koster]**
- 920 Sword, G.A. and Chapman, R.F. (1992). Do North American species of *Schistocerca* exhibit gregarious behavior similar to that of African locusts? Center for Insect Science Conference at Biosphere II, Oracle, Arizona; and The SWARM Division of the AAAS Annual Meeting, Tucson, Arizona. **[Gregory Sword]**
- 921 Szivek, J.A. and Fernandez, M.M. (2002). Evaluation of a new CPC-to-gauge bonding technique using in vitro fluid flow. Surfaces in Biomaterials, Scottsdale, Arizona. **[Mark Fernandez]**

- 922 Szivek, J.A. and Fernandez, M.M. (2003). Evaluation of a new CPC-to-gauge bonding technique using in vitro fluid flow. 29th Annual Society for Biomaterials Meeting, Reno, Nevada. **[Mark Fernandez]**
- 923 Szivek, J.A., Cutignola, L., Sacoman, D., and Volz, R.G. (1992). Tibio-femoral contact stress distribution evaluation of total knee replacements. Second International Knee Symposium, Tucson, Arizona. **[Damen Sacoman]**
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- 925 Szivek, J.A., Wiley, D., Cox, L., Harris, D., Margolis, D.S., and Grana, W.A. (2007). Stem cells grown in dynamic culture on micropatterned surfaces can be used to engineer cartilage-like tissue. Orthopaedic Research Society, San Diego, California. **[Devin Wiley] [Laurel Cox]**
- 926 Szivek, J.A., Wilson, D.L., Anderson, P.L., DeYoung, D.W., Smith, K.M., and Miera, V.L. (1994). Development of a model for the study of in vivo bone strains in normal and microgravity simulated environments. Academy of Surgical Research, Orlando, Florida. **[Verma Miera Clark]**
- 927 Takehara-Nishiuchi, K., Wagner, Z., Insel, N., Chawla, M.K., Olson, K., Burke, S.N., Barnes, C.A., and McNaughton, B.L. (2009). Spatial context sensitivity partially explains differences in episodic encoding between deep and superficial neocortical layers. Society for Neuroscience, Washington, DC. **[Zachary Wagner]**
- 928 Takeuchi, C. (1999). High yield gene therapy vectors in in vitro transfection. The University of Arizona Seventh Annual Student Showcase, Tucson, Arizona. **[Cindy Takeuchi Dickerson]**
- 929 Takeuchi, C.A., Tsang, T.C., Pipes, B.L., and Harris, D.T. (1999). New gene therapy vectors to produce very high levels of therapeutic gene product. 75th Annual Meeting of the Southwestern and Rocky Mountain Division of the American Association for the Advancement of Science, Santa Fe, New Mexico. **[Cindy Takeuchi Dickerson]**
- 930 Takeuchi, C.A., Tsang, T.C., Vasanwala, F., Luo, P., Pipes, B.L., Zhang, T., and Harris, D.T. (2000). High yield gene therapy vectors in in vitro transfection. Tenovus Conference on Gene Expression and Disease, Glasgow, Scotland. **[Cindy Takeuchi Dickerson]**
- 931 Tamimi, E., MacIsaac, C. (2014). Electrospun Non-synthetic Biopolymer Vascular Grafts: Biomechanical Characterization and Comparison to Porcine Coronary Arteries. World Congress of Biomechanics, Boston, MA Presented: July 6-11, 2014 [MacIsaac, Corina] **[Corina MacIsaac]**
- 932 Tamini, E., Ardilla, C., Doetschman, T., Uhlorn, J., Vande Geest, J. (2014). Electrospun non-synthetic biopolymer vascular grafts: Biomechanical characterization and comparison to a porcine coronary artery. World Congress of Biomechanics, Boston, Massachusetts Presented: July 6-11 [Uhlorn, Joshua] **[Joshua Uhlorn]**
- 933 Tanaka, A., Choe, S., Ross, A.S., Ma, J., Gregory, B., Tax, F. and Feldmann, K.A. (1998). Isolation of novel bassinosteroid dwarf mutants using forward and reverse genetics. Ninth International Conference on Arabidopsis Research. Madison, Wisconsin. **[Brian Gregory]**
- 934 Tanaka, A., Choe, S., Ross, A.S., Ma, J., Gregory, B., Tax, F., and Feldmann, K.A. (1998). Isolation of novel bassinosteroid dwarf mutants using forward and reverse genetics. Ninth International Conference on Arabidopsis Research, Madison, Wisconsin. **[Amanda Ross]**
- 935 Taylor, K.C., Meiners, M.S., Ravindraneth, M., and Gallegos, J. (1993). Macrophylla decline: A newly described disorder in citrus. American Society of Plant Physiologists Conference, Minneapolis, Minnesota. **[Manasa Ravindranath Hull]**
- 936 Taylor, M., Pace, C., and Gerner, E. (2001). K-ras mediated signaling of COX-2 in human colon cancer cells. American Association for Cancer Research Meeting, New Orleans, Louisiana. **[Cristina Pace Modak]**
- 937 Taylor, S.R., and Koprowski, J.L. (2003). Nest site characteristics of Mount Graham Red Squirrels (*Tamiasciurus hudsonicus grahamensis*) in mixed conifer habitat. (2003). The 3rd International Tree Squirrel Colloquium and 7th European Squirrel Workshop, Northumberland, UK. **[Sadie Taylor Bertelsen]**
- 938 Tellez, A., and Maas, E. (2011). Phonological representations in speech planning in children with speech disorders. 51st Annual Convention of the Arizona Speech-Language-Hearing Association. **[Anna-Alyse Tellez Thomas]**
- 939 Terrazas, A., Krause, M., Bohne, K.M., Poneta, K.M., Dees, J.A., McNaughton, B.L., and Barnes, C.A. (2001). The contributions of vestibular and optic flow information to location specific firing of rat hippocampal pyramidal cells. Society for Neuroscience Meeting, San Diego, California. **[Jennifer Dees]**
- 940 Thai, TN, Geiser, DL, Winzerling, JJ (2014). Iron deposition and ferritin accretion in the ovaries of the Yellow Fever mosquito, *Aedes aegypti*. Experimental Biology, San Diego, CA. **[Theresa Thai]**
- 941 Tham, K.Y., Cohen, J.D., Monks, J.J., and Lau, S.S. (2010). cAMP-dependent pathways directs the B-Raf MAPK-Mediated cytosolic mislocalization of p27kip-cyclin D1 in renal cancer. 2010 Experimental Biology Meeting, San Diego, CA. **[Kimberly Tham]**
- 942 Thomas, J.C., Adams, D.G., Nessler, C., Bohnert, H.J., and Brown, J.K. (1994). Reduced reproduction of whitefly (*Bemisia tabaci*) on transgenic tobacco expressing tryptophan decarboxylase. Fourth International Congress of Plant Molecular Biologists, Amsterdam, Netherlands. **[Deanna Adams]**
- 943 Thomas, J.C., De Armond, R., and Bohnert, H.J. (1991). Mesembryanthemum crystallinum suspension cultures - the cellular response to salt stress. American Society of Plant Pathology Annual Meeting, Albuquerque, New Mexico. **[Richard De Armond]**

- 944 Thomas, J.C., Wilfond, T.L., Adams, D.G., Brown, J.K., and Breiteneder, H. (1993). Recombinant antibodies against tobacco mosaic virus expressed in transgenic plants. First Annual PCR, Applications and Alternative Technologies, Boston, Massachusetts. **[Deanna Adams]**
- 945 Thompson, J., Dekker, J., Tsang, T., and Harris, D. (2003). Construction and characterization of two novel PZ-MCS vectors for simultaneous expression of two foreign genes. 3rd Annual Minority Graduate Education at Mountain States Alliance Conference, Tempe, Arizona. **[Jennifer Thompson]**
- 946 Thompson, J., St. Amand, T., and Chien, K. (2002). Identification of KCR-1 as a potassium channel regulator within the conduction system. University of California at San Diego Student Showcase, San Diego, California. **[Jennifer Thompson]**
- 947 Thompson, M.T. and Gervay, J. (1999). Computational and synthetic studies of structural induction on sialic acid peptides. American Chemical Society 217th National Meeting, Anaheim, California. **[Michael Thompson]**
- 948 Tischler, M.E., Cook, P., Hodsden, S., Wu, M., and McCready, S. (1989). Effect of ecdysone on in vivo protein metabolism of developing flight muscle of the tobacco hornworm, *Manduca sexta*. International Symposium on Molecular Insect Science, Tucson, Arizona. **[Shirley Hodsden Schindel]**
- 949 Titone, D., Lowenthal, J.W., and Bean, A.G.D. (2000). Identifying novel chicken T cell subsets for new vaccination strategies. Vaccines and Therapeutics Conference, Lorne, Victoria, Australia. **[Dominic Titone]**
- 950 Titone, D., Lowenthal, J.W., and Bean, A.G.D. (2000). Identifying abTCR+CD4-CD8- T cells in chicken thymus. ThymOZ International Workshop on T Lymphocytes, Heron Island, Queensland, Australia. **[Dominic Titone]**
- 951 Tome, M.E., Fiser, S.M., and Gerner, E.W. (1992). Polyamine-induced cell death in a hepatoma mutant cell line expressing a stable ornithine decarboxylase. International Symposium on Polyamines in Cancer, Houston, Texas. **[Steven Fiser]**
- 952 Tompkins, L.S., McLain, E.M., Dunn-Meynell, A., Brooks, H.L., Levin, B.E., and Lynch, R.M. (2000). Glucokinase gene expression in hypothalamic nuclei of rat during development. FASEB Meeting, San Diego, California. **[Erin McLain]**
- 953 Tooley, UA, Edgin, JO, Casanova, LI (2013). Sleep and learning in Down Syndrome: Actigraphic analysis of pediatric subjects. Emory STEM Research and Career Symposium, Atlanta, GA. **[Ursula Tooley]**
- 954 Tran, H. (2002). Zinc and *Manduca sexta* hemocyte functions. The Center for Insect Science 9th Annual Poster Hexapodium, Tucson, Arizona. **[Hung Tran]**
- 955 Tran, P.L., Gamboa, J.R., McCracken, K.E., Riley, M.R., Slepian, M., and Yoon, J-Y (2011). Confluent and aligned growth of endothelial cells on nanoparticle arrays through focal adhesion and endocytic mechanisms. Society for Biomaterials 2011 Annual Meeting and Exposition, Orlando, Florida. **[Katherine McCracken]**
- 956 Tran, P.L., Gamboa, J.R., McCracken, K.E., Riley, M.R., Slepian, M., and Yoon, J-Y (2011). Nanowell-trapped charged ligand-bearing nanoparticles surfaces - a novel method of enhancing flow resistant cell adhesion. Biointerface 2011 Workshop & Symposium, Minneapolis, MN. 2011 **[Katherine McCracken]**
- 957 Treusch, S. and Fares, H. (2004). CUP-5/h-mucolin-1 is required for lysosome biogenesis. Annual Meeting of the American Association for the Advancement of Science, Seattle, Washington. **[Sebastian Treusch]**
- 958 Treusch, S., Knuth, S., and Fares, H. (2004). CUP-5/hmucolin-1 is required for lysosome biogenesis. AAAS meeting, Seattle, Washington. **[Sebastian Treusch]** **[Sarah Knuth]**
- 959 Trivedi, D., Krstenansky, J., Azizek, B., VanTine, B., and Hruby, V.J. (1993). Glucagon agonistic partial agonistic and antagonists: A tool to investigate lipid signalling pathway. 13th American Peptide Symposium. **[Brian Van Tine]**
- 960 Trotter, M., Peterson, G., Peck, K., Masel, J. (2010). Crossing adaptive valleys when genetic variation can be cryptic. Evolution 2010, Portland, Oregon Presented: 6/25--29 [Peck, Kayla] **[Kayla Peck]**
- 961 Truesch, S. (2004). CUP-5/h-mucolin-1 is required for lysosome biogenesis. Annual AAAS Conference, Seattle, Washington. **[Sebastian Treusch]**
- 962 Tsig, Y.L.T., Aikens, N.R., Myers, D., Weibel, J., and Gillies, R.J. (1996). Phospholipid metabolism in human breast epithelial cell lines as a function of oncogenic transformation and growth status: ³¹P/¹³C NMR studies. Fourth Scientific Meeting of the International Society of Magnetic Resonance in Medicine, New York, New York. **[Danielle Myers Carroll]**
- 963 Tsuchida, K., Gardetto, J.S., Kobayashi, Y., Jouni, F., and Maekawa, H. (2002). Carotenoid Binding Protein in midgut of *Bombyx mori* may be involved in absorption of carotenoid. Annual Meeting of the Entomological Society of America, Ft. Lauderdale, Florida. **[Jennifer Gardetto]**
- 964 Tuttle, H.A., Jenks, M.A., Rashotte, A.M., and Feldmann, K.A. (1996). Epicuticular wax mutants in *Arabidopsis* with altered leaf morphology. 21st Annual West Coast Biological Sciences Undergraduate Research Conference, Point Loma Nazarene College, San Diego, California. **[Hillary Tuttle Nicholson]**
- 965 Twarog, J., Krull, C., and Tolbert, L. (1992). Patterns of lectin- and antibody-binding in the developing insect olfactory system. The SWARM Division of the AAAS Annual Meeting, Tucson, Arizona. **[Joseph Twarog]**
- 966 Tyler, J.M. and Monti, O.L.A. (2006). Self-assembled monolayers on rutile TiO₂. Chemistry at the Border, 19th Rocky Mountain Regional Meeting, Tucson, Arizona. **[Jason Tyler]**
- 967 Tyler, J.M., Blumenfeld, M.L., Oliver L.A., Monti, O.L.A. (2007). Investigation of single molecule charge transfer using a confocal scanning optical microscope (CSOM). American Chemical Society 234th National Meeting & Exposition, Boston, Massachusetts. **[Jason Tyler]**

- 968 Tyson, M., Wang, D., and Yadegari, R. (2005). Study of conserved protein domains in polycomb-group interactions. 80th Annual AAAS, Southwest and Regional Meeting (SWARM), Tucson, Arizona. **[Mark Tyson]**
- 969 Uchiyama, A. and Besselsen, D.G. (2001). Detection of reovirus type 3 by a fluorogenic 5' nuclease assay. Southwest and Rocky Mountain Regional Meeting of the AAAS, Denton, Texas. **[Asako Uchiyama]**
- 970 Uhlorn J.A., Tamimi E., Ardila D.C., Acuna A., MacIsaac C., Hernandez J., Vande Geest J.P. (2015). Tropoelastin, Along with Fibrinogen and Gelatin, Prove to be Integral Components in Constructing Biopolymer Vascular Grafts. AZBio Expo, Sheraton Phoenix Downtown, 340 North 3rd Street, Phoenix, AZ 85004 Presented: April 29, 2015 [Uhlorn, Joshua] **[Joshua Uhlorn]**
- 971 Ulreich JB, French MH, Demeure MJ, White MJN, Valles AV, Singh J, Ho WY, Caretto DC, Singh C, Nelson A, Pierson, DP, Shishido, N, Yuen D and Li S-Ulreich JB, French MH, Demeure MJ, White MJN, Valles AV, Singh J, Ho WY, Caretto DC, Singh C, Nelson A, Piers (2005). MedStat-F, A Novel Fibrillar Collagen Hemostat. Society for Biomaterials, Memphis Presented: April 23 [Valles Bisla, Amanda] **[Amanda Valles Bisla]**
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- 977 Ulreich, J.B., French, M.H., Demeure, M.J., White, M.J.N., Valles, A.V., Singh, J., Ho, W.Y., Caretto, D.C., Singh, C., Nelson, A., Pierson, D.P., Shishido, N., Yuen, D. and Li, S-T. (2005). MedStat-F, A Novel Fibrillar Collagen Hemostat: Comparison with Avitene in a Rabbit Model of Splenic Laceration. Frontiers in Biomedical Research, Tucson, Arizona. **[Amanda Valles Bisla] [Michael French] [Wyatt Ho] [David Caretto]**
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- 979 Ulreich, J.B., Hansen, P., White, M.J.N., Way, D., French, M.H., Ho, W.Y., Fryburg, K., Hamilton, A.J., Yuen, D., and Li, S-T. (2004). A new collagen dura substitute for us as an onlay or a suturable graft. 7th World Biomaterials Congress, Sydney, Australia. **[Michael French] [Wyatt Ho]**
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- 992 Uprety, A.R., Hoang, L.T., Lipa, P., Egurrola, A.E., Thome, A., and Barnes, C.A. (2009) Electrophysiological responses of rostral versus caudal ventral tegmental neurons. Society for Neuroscience, Washington, DC. **[Ajay Uprety] [Ana Egurrola]**
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- 994 Urbina, A.M., Cory, E., Chang, N., Sah R.L. (2011). Structural and Functional Deterioration of Human Articular Cartilage of the Medial Femoral Condyle with Aging. EXROP Conference, Bethesda, MD Presented: 5/18-20/2011 [Urbina, Amanda] **[Amanda Urbina]**
- 995 Uribe, J., Lancaster, A., Peterson, G., Siegal, M., and Masel, J. (2009) Modeling Transcriptional Regulation. International Conference on Mathematical Biology , and Annual Meeting of the Society of Mathematical Biology, Vancouver, British Columbia, Canada. **[Jasmin Uribe]**
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- 997 Urity, V.B., Nichols, A.J., Issaian, T., Braun, E.J., Dantzer, W.H., and Pannabecker, T.L. (2011). Three-dimensional architecture of the renal inner medulla of the desert rodent *Dipodomys merriami*: Potential impact on the urinary concentrating mechanism. Experimental Biology 2011, Anaheim, CA. **[Vinoos Urity]**
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- 1001 Van Heusden, M.C., Pennington, J.E., and Erickson, B. (1996). A triacylglycerol-rich lipophorin in the yellow fever mosquito, *Aedes aegypti*. XX International Conference of Entomology, Florence, Italy. **[James Pennington]**
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- 1004 Vasquez, M, Pilyugina, T, Uehara, H, Stefan, E, Moquist, P, Dandapani, S, Schreiber, S (2013). Diazetidines for Fragment Based Drug Discovery. EXROP Symposium, Northwest Science Building at Harvard University Presented: 8/15/2013 [Vasquez, Manuel] **[Manuel Vasquez]**
- 1005 Vazdarjanova, A., Ramirez-Amaya, V., Insel, N., Mikhael, D., Rosi, S., Sutherland, V., Chawla, M.K., Worley, P.F., Barnes, C.A., and Guzowski, J.F. (2004). Behavior induces expression of the plasticity-related immediate-early gene arc in excitatory hippocampal and cortical neurons, but not in astrocytes or inhibitory neurons. Neuroscience Meeting, Baltimore, Maryland; and Neuroscience Meeting, University of New Mexico, Albuquerque, New Mexico. **[Dalia Mikhael]**
- 1006 Veeravelli, S, Yoshimaru, E, Hoang, L, Valdez, M, Alvarez, A, Barnes, C, Trouard, T (2012). Magnetic resonance imaging of the neurological effects of hypertension. Biomedical Engineering Design Day, Tucson, AZ **[Sumana Veeravelli]**
- 1007 Veeravelli, Suhitha (2015). Exploring the effectiveness of sensor-based balance training in patients with HIV. AZBio Awards Conference, Phoenix, AZ. **[Suhitha Veeravelli]**
- 1008 Velasquez, L.S., Zhou, G., Geiser, D.L., and Winzerling, J.J. (2008). Transferrin expression profile during bacteria infection in *Aedes aegypti* mosquitoes. Experimental Biology 2008, San Diego, CA. **[Lissette Velasquez]**

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- 1010 Velenovsky, D.S., Holmes, M.G., Sinex, D.G., and McMullen, N.T. (2004). Laminar organization of tectothalamic bands and synaptic nests in the rabbit auditory thalamus. Association for Research in Otolaryngology Annual Meeting, Daytona Beach, Florida. **[Michael Holmes]**
- 1011 Venisnik, K.M., Abbruscato, T.J., Hawkins, B.T., and Davis, T.J. (2000). Nicotine and cotinine modulate in vitro and in situ blood-brain barrier permeability. 43rd Annual Meeting of the Western Pharmacology Society, Westward Look Resort and Spa, Tucson, Arizona. **[Katy Venisnik Sorenson]**
- 1012 Viator, S., Gomez, R., Peterson, M.A., Bishop, K. (2012). Infants Can Use A Newly Learned Object For Scene Segregation. International Society on Infant Studies, Minneapolis, MN Presented: 6/7/12 [Viator Frye, Sara] **[Sara Viator Frye]**
- 1013 Vierling, E., Sundberg, H., Helm, J., and Lauvon, L. (1989). Major chloroplast and cytoplasmic heat shock proteins of Arabidopsis. The Genetics and Molecular Biology of Arabidopsis Conference, Bloomington, Indiana. **[Holly Sundberg]**
- 1014 Vilinsky, I. and Strausfeld, N.S. (1994). A new method for identical orientation of Golgi impregnated mushroom bodies in Drosophila melanogaster. Center for Insect Science Hexapodium, Tucson, Arizona. **[Ilya Vilinsky]**
- 1015 Villa, F., Little, J., Mao, C., and Quelland, D. (2001). Cooperative DNA binding by the cl regulatory protein in HK022 bacteriophage. Annual Meeting of the Southwestern and Rocky Mountain Division American Association for the Advancement of Science, Denton, Texas. **[Francisco Villa]**
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- 1018 Vinck, P.W., Fritz, B., Jelly, C., Brailey, J., Kunz, S., Hu, X., Miranda, K., Miesfeld, R., and Montfort, W.R. (2006). Protein S-nitrosation in a fibrosarcoma cell line. Chemistry at the Border, 19th Rocky Mountain Regional Meeting, Tucson, Arizona. **[Christina Jelly]**
- 1019 Vinck, P.W., Fritz, B., Jelly, C., Brailey, J., Kunz, S., Hu, X., Miranda, K., Miesfeld, R., and Montfort, W.R. (2007). Protein S-nitrosation in a fibrosarcoma cell line. American Association for the Advancement of Science Annual Meeting, San Francisco, California. **[Patrick Vinck]**
- 1020 Vinck, P.W., Fritz, B., Jelly, C., Brailey, J., Kunz, S., Hu, X., Miranda, K., Miesfeld, R., and Montfort, W.R. (2007). Protein S-nitrosation in a fibrosarcoma cell line. Chemistry at the Border, 19th Rocky Mountain Regional Meeting, Tucson, Arizona. **[Patrick Vinck]**
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- 1025 Waldman, I.D., Wolff, M., Stever, C., Giedinghagen, L.N., Chase, D., Sherman, S., Abramowitz, A., and Rowe, D.C. (2000). Sex differences in association and linkage between COMT and symptoms of OCD and tics in children. Eighth World Congress on Psychiatric Genetics, Versailles, France. **[Lori Nicole Giedinghagen Teed]**
- 1026 Walker, C.E., Pacheco G.S., La Bonte, L.R., Davis-Gorman, G., Stahl, G.L., and McDonagh, P.F. (2007). Complement gene expression is upregulated in the type 2 diabetic heart following myocardial ischemia and reperfusion. Experimental Biology Conference, Washington, DC. **[Corrine Walker] [Garrett Pacheco]**
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- 1028 Wallace, K., Van Sluis, R., and Gillies, R.J. (1998). Non-invasive monitoring of Niemann-Pick type C using magnetization transfer contrast imaging. 25th Annual Meeting of the Society for Chicanos and Native Americans in Science, Washington, D.C. **[Koranda Wallace]**
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- 1030 Wallon, U.M., Shassetz, L.R., and Gerner, E.W. (1992). Effects of polyamine depletion on the expression of metalloproteinases in a colon-tumor derived cell line. Fourth International Conference on Prevention of Human Cancers: Nutrition and Chemoprevention Controversies, Tucson, Arizona; and International Symposium and Polyamines in Cancer, Houston, Texas. **[Lawrence Shassetz]**

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- 1033 Wanderley, R.C., Aquino-Ramos, J.L., Huber, J.T., Nussio, C.M.B., Pessarakli, M., and Morgan, P.V. (1996). Digestion kinetics of steam-flaked and dry rolled sorghum grains and of diets made of 35% processed sorghum in the rumen of lactating cows. Annual Meeting of the American Dairy Science Association, Oregon State University, Corvallis, Oregon. **[Parham Morgan]**
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- 1035 Wang, D., Jackson, S., Tyson, M., and Yadegari, R. (2005). Overlapping roles of SET-domain polycomb-group proteins in suppressing autonomous endosperm development in Arabidopsis. 16th International Conference on Arabidopsis Research, Madison, Wisconsin. **[Mark Tyson] [Shawn Jackson]**
- 1036 Wang, Y., Huang, D.S., Giger, P.T., and Watson, R.R. (1992). The influence of cocaine in vivo and in vitro on production of cytokines by Th1 and Th2 cells. International Conference on Alcoholism and Drugs of Abuse, Tucson, Arizona. **[Paul Giger]**
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- 1038 Warren, D., Patterson, D., and Pepperberg, I.H. (1993). Careradiographic analysis of the speech mechanisms of an African Grey Parrot. Animal Behavior Society Meeting, Davis, California. **[Denice Warren Ross]**
- 1039 Warren, D.K. (1990). Longitudinal effects of Alzheimer's Disease on discourse production and critique of discourse analytic techniques. Department of Speech and Hearing Sciences Colloquium Series, University of Arizona, Tucson, Arizona. **[Denice Warren Ross]**
- 1040 Waters, H.A., Ferng, A.S., Geffre, C.P., Brown, C.E., and Szivek, J.A. (2011). Biological tissue growth on allograft bone surfaces using adipose derived stromal cells. Orthopaedic Research Society Annual Conference, Long Beach, California. **[Heather Waters Rogan] [Alice Ferng] [Christopher Geffre]**
- 1041 Waters, H.A., Szivek, J.A. (2011). Focal cartilage defect repair: A co-culture study with adipose derived stem cells and chondrocytes. TERMIS, Houston, TX. **[Heather Waters Rogan]**
- 1042 Watkins de Jong, L., Gereke, B., Corral-Frias, N.S., Scott, K., Martin, G.M., Fellous, J-M.(2010). The traveling sales-rat: Learning efficient spatial navigation. 40th Annual Society for Neuroscience Meeting, San Diego, CA. **[Laurel Watkins de Jong]**
- 1043 Watkins de Jong, L., Gereke, B., Corral-Frias, N.S., Scott, K., Martin, G., Fellous, J.M. (2010). The role of the dopaminergic system in optimal spatial navigation.. Society for Neuroscience, San Diego CA Presented: November [Gereke, Brian] **[Brian Gereke]**
- 1044 Watkins, L., and Riehle, M. (2008). The aging mosquito: Increased insulin signaling in the midgut of *An. stephensi* reduces lifespan. American Society of Tropical Medicine and Hygiene, New Orleans, Louisiana. **[Laurel Watkins de Jong]**
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- 1047 Weber, S.J., Greene, D.L., Hruby, V.J., Yamamura, H.I., and Davis, T.P. (1991). In vivo mouse brain localization of [3H] DPDPE to delta opioid receptors. Society for Neuroscience Conference, New Orleans, Louisiana. **[Diana Greene Chandos]**
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- 1049 Webster-McElvogue, K., Bayomi, S., Ochoa, M., O'Connor, D., Peterson, E., Polanco, R., and Tischler, M.E. (1996). Use of BRIC hardware to study adult development of the tobacco hornworm (*Manduca sexta*). Amer Soc Grav Space Biology, Charlotte, North Carolina. **[Heather O'Connor]**
- 1050 Wehbi, W.A., Shokhirev, N.V., Fischer, B., Basu, P., and Enemark, J.H. (1997). Computational analysis of pterin derivatives with application to metalloenzymes. National Meeting of the American Chemical Society, San Francisco, California. **[William Wehbi]**
- 1051 Weibrecht, J.M., Mizunami, M., and Strausfeld, N.J. (1991). The mushroom body of cockroach brain participates in spatial memory processing. Society for Neuroscience Conference, New Orleans, Louisiana. **[Josette Weibrecht]**
- 1052 Weinstein, R.B., Brodsky, I.B., Heffner, M.A., Eleid, N.L., and Tischler, M.E. (1999). In situ measurement of insulin-stimulated glucose and amino acid uptake by rat soleus muscle. Society for Integrative and Comparative Biology, Denver, Colorado. **[Michelle Heffner Lally]**

- 1053 Weinstein, R.B., Slentz, M.J., Webster, K., Takeuchi, J., and Tischler, M.E. (1998). Lysosomal proteolysis in distally or proximally denervated rat soleus muscle. Society for Integrative and Comparative Biology, Boston, Massachusetts. **[Julie Takeuchi Crawford]**
- 1054 Weinstein, R.B., Takeuchi, J.A., and Tischler, M.E. (1998). Intramuscular injection of nerve extract attenuates atrophy in denervated rat soleus muscle. Society for Integrative and Comparative Biology, Boston, Massachusetts. **[Julie Takeuchi Crawford]**
- 1055 Weiss, J., Lai, A., Loui, S., and Nisbet, J. (2000). Behavior of human medial collateral ligament in unconfined compression. Orthopaedic Research Society 46th Annual Meeting and International Symposium on Ligaments and Tendons, Orlando, Florida. **[Amy Lai] [Stuart Loui]**
- 1056 Weyand, N., Brown, M., So, M. How Neisseria gonorrhoeae Evades Killing by the Complement Cascade. Poster session presented at: ASM Regional Conference; 2016 March; Tempe, AZ. **[Morgan Brown]**
- 1057 Weyand, N.J., Wertheimer, A.M., Hobb, T.R., Gregston, L.D., Taku, N. Clary, S. Higashi, D.L., Axthelm, M.K., Wong, S.W., and So, M. (2012). The rhesus macaque as a model to study Neisseria colonization, transmission, persistence and horizontal gene transfer. International Pathogenic Neisseria Meeting, Wuerzburg, Germany. **[Nyiaung Taku]**
- 1058 Whited, H., Cama, V., and Sterling, C. (1993). Purification and quantitation of hen yolk immunoglobulins. American Society Microbiologists Annual Meeting, Tucson, Arizona. **[Mary Whited]**
- 1059 Wierzbza, M., Gibbon, B.C., and Larkins, B.A. (2001). Identification of proteins involved in zein mRNA trafficking in Zea mays. Maize Genetics Conference, Lake Geneva, Wisconsin. **[Michael Wierzbza]**
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- 1062 Wilcox, E., Badowski, M., Harris, D (2012). Humanized Mouse Model Aids in Understanding of Human Immune System and the Affects of Aging, NACP Conference, Northern Arizona University Presented: August 2, 2012 [Wilcox, Ella] **[Ella Wilcox]**
- 1063 Williams, D.G., Scott, R., Lin, G., Martens, D., Watts, C., Goodrich, D., Garatuza, J., Rodriguez, J., Edwards, E., Hultine, K., Yopez, E., Ellsworth, P., Cable, W., VanHaren, J., and Pierce, D. (2001). Seasonal dynamics of water, carbon, and energy fluxes in mesquite woodland: project overview and preliminary results. American Geophysical Union, San Francisco, California. **[Patrick Ellsworth]**
- 1064 Williams, C.S., McWilliam, D.L., Dominguez, J.A., Galo, J.R., and Dvorak, B. (2001). EGF-receptor mRNA expression is upregulated in necrotizing enterocolitis. DDW 2001. Atlanta, Georgia. **[Jessica Dominguez Reig Clark]**
- 1065 Willott, E., Tran, H., and Nguyen, Y.T. (2004). Effects of bacteria and TLCK on hemocyte morphology of Manduca sexta. 227th Annual Meeting of the American Chemical Society, Anaheim, California. **[Hung Tran]**
- 1066 Willott, E. and Tran, H.Q. (2002). Zinc and Manduca sexta hemocyte. The Center for Insect Science Ninth Annual Poster Hexapodium, Tucson, Arizona, and the Fourth International Symposium on Insect Molecular Science, Tucson, Arizona. **[Hung Tran]**
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- 1070 Wilson, D.L., Szivek, J.A., Anderson, P.L., DeYoung, D.W., Miera, V.L., and Smith, K.M. (1994). A preliminary study of hydroxyapatite for bonding of subminiature strain gages for in vivo strain measurements. Biomedical Engineering Society, Tempe, Arizona. **[Verma Miera Clark]**
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- 1074 Woznica, A., Sweeney, S., and Davidson, B. (2010). Characterization of an ankyrin repeat socs box gene in the early heart development of the basal chordate, Ciona intestinalis. Society of Developmental Biology, Albuquerque, New Mexico. **[Sarah Woznica]**
- 1075 Woznica, S.A., Ragkousi, K., Sweeney, S., Zhen, Y., Davidson, B. (2009). Analysis of FGF/Ets target genes in the basal chordate Ciona intestinalis. Society of Integrative and Comparative Biology, Boston, Massachusetts. **[Sarah Woznica]**

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- 1078 Yaeger Dror, M., Hall-Lew, L., Deckert, S., and Bell, A. (2000). Contraction in American English: Evidence from the LDC and other megacorpora. The Second North American Symposium on Corpus Linguistics and Language Teaching, Flagstaff, Arizona. **[Lauren Hall-Lew]**
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- 1081 Yaeger-Dror, M. and Hall-Lew, L. (2002). Prosodic and syntactic prominence on negatives used by U.S. Presidents. Symposium About Language and Society, Austin, Texas. **[Lauren Hall-Lew]**
- 1082 Yaeger-Dror, M., Deckert, S., and Hall-Lew, L. (2000). Prosodic prominence on negation in various registers of US English. Meeting of the Acoustical Society of America, Newport Beach, California. **[Lauren Hall-Lew]**
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- 1087 Yamaguchi, J., Mandal, N., DeCook, T., Tran, P., Bluestein, D., Slepian, M. (2014). Desensitization of Platelets to Biochemical Agonists via DMSO-Mediated Membrane Modulation. Experimental Biology, San Diego, CA Presented: 04/26-27/2014 [Yamaguchi, Jonathan] **[Jonathan Yamaguchi]**
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- 1089 Yang, J.M., Kwee, Y.M., Taetle, R., Wymer, J.A., Alberts, D.S., Guan, X.Y., Trent, J.M., Miki, T., and Nelson, M.A. (1997). The human ECT2 (Epithelial Cell Transforming Clone 2) gene mapping on chromosome 3q26.1-3q26.2 is amplified in ovarian cancer cells. Sixth International Workshop on Chromosomes in Solid Tumors, Tucson, Arizona. **[Yvette Kwee]**
- 1090 Yao, S., Coyne, A., Zarnescu, D. Translational Dysregulation in ALS. Poster presented at: 57th Annual Genetics Society of America Drosophila Conference; 2016 July 13-17; Orlando, FL. **[Stephen Yao]**
- 1091 Yepez, E., Hultine, K., Ellsworth, P., Lin, G., and Williams, D.G. (2001). Plant functional type variation and hydrologic processes in riparian ecosystems. SAHRA Annual Meeting, Tucson, Arizona. **[Patrick Ellsworth]**
- 1092 Yepez-Gonzalez, E.A., Ellsworth, P.Z., Cable, W.L., Hultine, K.R., and Williams, D.G. (2002). Partitioning evapotranspiration fluxes and sources in desert floodplain ecosystems. Ecological Society of America annual meeting, Tucson, Arizona. **[Patrick Ellsworth]**
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- 1094 Youngblood, E.B., Henriksen, E.J., Jacob, S., Fogt, D.L., and Goediche, J. (1997). Dose-dependent effect of moxonidine on glucose transport in insulin-resistant rat skeletal muscle. 16th International Diabetic Federation Congress, Helsinki, Finland. **[Erik Youngblood]**
- 1095 Yu, X., Whitman, S.A., Cover, C., Zarnescu, D., and Gregorio, C. (2011). Desmoplakin and Talin2 are novel mRNA targets of Fragile X related protein-1 in cardiac muscle. Annual Meeting of the American Society for Cell Biology, Denver, CO. **[Lily (Xingyuan) Yu]**
- 1096 Zaepfel, B., Coyne, A., Reitz, A., Zarnescu, D.C. Rescue of neurotoxicity in a TDP-43-based Drosophila model of Amyotrophic Lateral Sclerosis (ALS) by a 4-aminoquinoline analog. The Allied Genetics Conference; 2016 July 13-17; Orlando, FL **[Benjamin Zaepfel]**
- 1097 Zamora, J., Pennington, J.E., and Wells, M.A. (2002). New technique for cloning membrane-bound lipid transporters. The Center for Insect Science Ninth Annual Poster Hexapodium, Tucson, Arizona. **[Jorge Zamora]**
- 1098 Zavala, J.L., Ulreich, J.B., Le, T., Chavez, R.A., Boles, J.L., Maveddat, M., and Nakazato, P.Z. (1997). Hepatoprotective effects of dimethyl sulfoxide on livers from non-heart-beating donor rats. Fifth Annual National Science Foundation AMP Student Research Conference, Las Cruces, New Mexico. **[Thuy Le]**

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- 1100 Zhang, W., Miller, M.A., Lewis, S.A., Muralidhar, A., Dacks, J.B, Dacks, A.M., Nighorn, A.J. (2009). Serotonin receptors in the primary olfactory pathway of the moth *Manduca sexta*. Neuroscience 2009, Chicago, Illinois. **[Wujie Zhang]**
- 1101 Zhang, W., Miller, M.A., Muralidhar, A., Dacks, J.B., Dacks, A.M., and Nighorn, A.J. (2009). Cloning and localization of four putative serotonin receptors in the primary olfactory pathway of the moth *Manduca sexta*. Association for Chemoreception Sciences Annual Meeting, Sarasota, Florida. **[Wujie Zhang]**
- 1102 Zhang, Y., Tang, L., and Gonzalez, V. (2002). Anti-leukemic activity and mechanisms of action of Isothiocyanates. The University of Arizona Student Showcase, Tucson, Arizona. **[Veronica Gonzalez-Pena]**
- 1103 Zhilina, Z.V., Ziemba, A.J., Stankova, L., Boros, M.C., Nielsen, P.E., and Ebbinghaus, S.W. (2005). Synthesis of PNA-Alkylator conjugates to target the HER-2/NEU promoter. American Association for Cancer Research Annual Meeting, Anaheim, California. **[Meghan Boros]**
- 1104 Ziegler, R., Bartnek, F., and van Antwerpen, R. (1992). Characterization of an unusual yolk protein from the cochineal insect, *Dactylopius confusus*. ESA Annual Meeting, Baltimore, Maryland. **[Jon (Flash) Bartnek]**
- 1105 Ziegler, R., Bluestein, H.A., and Poole, J.L. (1995). How do lipids get into mosquito oocytes. Annual Meeting of the Entomology Society America, Las Vegas, Nevada. **[Jennifer Poole]**
- 1106 Ziegler, R., Lyons, H.A., Ibrahim, M., and Law, J.H. (1998). How do lipids get into the oocytes of the mosquito *Aedes aegypti*? Third International Symposium on Molecular Insect Science, Snowbird, Utah. **[Mohab Ibrahim]**
- 1107 Ziegler, R., Lyons, H.A., Poole, J. and Ibrahim, M. (1996). The source of lipids in mosquito oocytes. The Center for Insect Science Fifth Annual Poster Hexapodium. Tucson, Arizona. **[Mohab Ibrahim]**
- 1108 Ziegler, R., Lyons, H.A., Poole, J., and Ibrahim, M. (1996). The source of lipids in mosquito oocytes. The Center for Insect Science Fifth Annual Poster Hexapodium, Tucson, Arizona. **[Jennifer Poole]**
- 1109 Ziegler, R., Willingham, F., Bartnek, F., van Antwerpen, R., and Yepiz, G. (1992). Unusual hemolymph proteins in the cochineal insect *Dactylopius confusus*. The Society of Experimental Biology, American Physiological Society, American Society for Zoology Joint International Meeting, Cambridge, England. **[Jon (Flash) Bartnek]**
- 1110 Ziegler, R., Willingham, L., Engler, D.L., and Yepiz-Plascencia, G. (1993). Isolation and partial characterization of an unusual lipoprotein from the cochineal insect, *Dactylopius Confusus*. Second International Symposium on Molecular Insect Science, Flagstaff, Arizona. **[Diane Engler]**
- 1111 Zimmerman, P.E., Mosher, C.P., Farshad, K.M., Stib, M.T., and Gothard, K.M. (2010). Individual differences in habituation of visual exploration and facial expression reciprocation in monkeys looking at videos with social content. Society for Neuroscience, San Diego, CA. **[Kayven Farshad]**
- 1112 Zimmerman, P.E., Mosher, C.P., Farshad, K.M., Stib, M.T., Gothard, K.M. (2010). Individual differences in habituation of visual exploration and facial expression reciprocation in monkeys looking at videos with social content. 40th Annual Society for Neuroscience Meeting, San Diego, CA. **[Clayton Mosher]**
- 1113 Zupicich, J., Grille, M.A., Evans, K.P., Pape, M., and Burd, G. (1996). Expression of Pax-6 and neurogenic genes in the *Xenopus* olfactory system during metamorphosis. Arizona Neuroscience Conference, Tucson, Arizona. **[Joel Zupicich]**

ALUMNI OF THE UNDERGRADUATE BIOLOGY RESEARCH PROGRAM

Listed below are the students who have participated in the Undergraduate Biology Research Program (UBRP) since 1988. If you have more current information on these UBRP alumni, or if someone is missing, please let us know!

Anders Aannestad, JD	Partner, Morrison & Foerster, San Diego, CA
Thomas Abbruscato, PhD	Associate Dean for Graduate School of Biomedical Sciences, Professor and Department Head of School of Pharmacy, Texas Tech University, Amarillo, TX
Mohammed Abdelwahab	Research Associate, Ventana Medical Systems, Oro Valley, AZ
Andrew Abrams, MD	General Surgeon, Anaheim, CA
Alicia Acevedo-Urcuyo, MD	Internist, Specialty Care, Phoenix, AZ
Deanna Adams, PhD	Assistant Scientific Investigator, Department of Cellular & Molecular Medicine, University of Arizona, Tucson, AZ
Robert Adams, PharmD	Clinical Pharmacist, Gila River Healthcare, Phoenix, AZ
Charlie Addison	Owner of Visteric, LLC, New York City, NY
Eseoghene Adun	Medical Student, Meharry College of Medicine, Nashville, TN
Charity Adusei, MD/MPH	Pediatrics Resident, Phoenix Children's Hospital, Phoenix, AZ
Gautam Aggarwal, MD	Family Medicine Physician, John C. Lincoln Health Network, Phoenix, AZ
James Aguilar, MD	Anesthesiologist, Southern Arizona Anesthesia, Tucson, AZ
Jessica Aguilar, MS, PhD	Postdoctoral Fellow in Speech and Hearing Sciences
Andrea Aguirre, MD	Medical Resident in Obstetrics and Gynecology, Banner Good Samaritan Medical Center, Phoenix, AZ
Iram Nafees Ahmad, MD	Otolaryngologist, Iowa City, IA
Iram Shahid Ahmad, MD	Endocrinology Fellow, Department of Medicine, Division of Metabolism, Endocrinology, & Nutrition, University of Washington
Shahid Ahmad	Unknown
Shair Ahmed	Fellow of Cardiothoracic Surgery, Administrative Chief Fellow, School of Medicine, Emory University, Atlanta, GA
Fang-yu Cathy Ai, DDS	Dentist, Oakland, CA
Olufunke Ajayi	Unknown
Kaitlin Akif	Unknown
Jonathan Akins, MS, PhD	Director of Regulatory Affairs, NovaSource (Terressenderlo Kerley Inc.), Phoenix, AZ
Andikan Akpan	Deceased
Maryam Al-dabbagh	Doctoral Student in Pharmacy, University of Arizona, Tucson, AZ
Arshed Al-Obeidi, PhD	Postdoctoral Fellow, NYU School of Medicine, NYC, NY
Amy Alabaster, MS, MPH	Consulting Data Analyst, Kaiser Permanente, Oakland, CA
Arlet Alarcon, MD, MBA	Medical Affairs Manager, Paradigm, Phoenix, AZ
Hiram Albino, MS, MD	Emergency Medicine Physician, Tucson, AZ
Lori Aleksic, DDS	Dentist, Twin Cranes Dental Group, Missoula, MT
Lacey Alhandy Frey	Au Pair, London, England
Leila Ali-akbarian, MPH, MD	Clinical Assistant Professor, Department of Family and Community Medicine, University of Arizona, Tucson, AZ
Douglas Allen	Unknown
Michelle Allen, MD	Physician of Internal Medicine, Kaiser Permanente Medical Group, San Francisco, CA
Lance Allgower, DO	Emergency Department Site Director, St. Rose Dominican Hospitals, Henderson, NV
Kyle Almryde	Doctoral Student in Computer Science, University of Illinois at Chicago, Chicago, IL
Deborah Alongi, MS	Teacher, Mountain View High School, Tucson, AZ
Robert Alsborg	Research Technician, Dine College, Shiprock, NM

Tasha Altheide Aannestad, PhD	Research Associate, Department of Cellular and Molecular Medicine, University of California, San Diego, CA
David Alvarado	Whitewater Rafting and Rock Climbing Guide, Rock n Row, Colorado Springs, CO
Jorge Alvarez	Scribe, Hospital in Phoenix, Phoenix, AZ
Irene Alvarez Mendoza Parra, MS	Unknown
Kurt Amann, PhD	Associate Professor, Department of Zoology, Laboratory of Cell and Molecular Biology, University of Wisconsin, Madison, WI
Rupesh Amin, PhD	Scientist, Juno Therapeutics, Seattle, WA
Leila Amini	Medical Student, School of Medicine, University of California, Irvine, CA
Kaitlyn Ammann	Doctoral Student in Biomedical Engineering, University of Arizona, Tucson, AZ
Andrew Ancharski, MSPH	Doctoral Student in Epidemiology, University of Colorado, Denver, CO
Erik Andersen	Doctoral Student in Computational Biology, University of Illinois, Urbana-Champaign, IL
Darya Anderson	Doctoral Student in Geography, McGill University, Montreal, CA
Deborah Anderson, MS	Principal Biostatistician, PRA Health Sciences, Victoria, BC, CAN
Lori Anderson Obal, DDS	Dentist, Anderson Smile Studio, Phoenix, AZ
Meredith Anderson Wesolowski, MS, PhD	Assistant Professor, Department of Chemistry & Biochemistry, University of Delaware, Newark, DE
Cassandra Andrade Altamirano, MPAS	Physician Assistant, Maricopa Integrated Health System, Phoenix, AZ
Lara Andren	Unknown
John Andrews	Unknown
Patrick Andrews	Small Business Owner, PC Andrew Group, LLC, Sells, AZ
Ersilia Anghel	Medical Student, College of Medicine, University of Arizona, Tucson, AZ
Raja Antoine	Cell Biology Tutor, Simi Valley, CA
Elena Antonio	Teacher, Sunnyside School District, Tucson, AZ
Farhan Anwar	Doctoral Student in Microbiology, School of Animal and Comparative Biomedical Sciences, University of Arizona, Tucson, AZ
Catalina Apostol, MD	Freelance Medical Editor and Writer, Miami Beach, FL
Christopher Apostol	Doctoral Student in Chemistry, University of Arizona, Tucson, AZ
Carol Arakaki, MBA	Project Manager, Intel Corporation, San Francisco, CA
Tara Archuleta, PhD	Postdoctoral Fellow, Department of Biological Sciences, Vanderbilt University, Nashville, TN
Virgil Archuleta	Unknown
Kimberly Arem	Recording Artist and Sound Therapist, Gaeearth, Boulder, CO
Kelly Arganbright Jeffery	Teacher, Exploration Academy Charter High School, Madison, Wisconsin
Leta Arteaga, MD	Obstetrician and Gynecologist, Fort Defiance Obstetrics and Gynecology, Fort Defiance, AZ
Katashia Arthur, AAS	Farmer and Payroll Supervisor, Chinle Unified School District, Chinle, AZ
Kelly Arwari, MD	Assistant Professor, Department of Anesthesiology, University of Arizona, Tucson, AZ
Mostafa (Aeen) Asghar, MD	Urology Resident, Temple University, Philadelphia, PA
Lesley Ash, DVM	Assistant Veterinarian, Beach Veterinary Clinic, North Grafton, MA
John Ashal	Owner, Big Rig Alignment Company, Tucson, AZ
Robert Ashley, JD	Partner, Lewis Brisbois Bisgaard & Smith, Phoenix, AZ
Haroon Ashraf, DDS	Dentist, Aurora, CO
Shaharyar Ashraf, DDS	Dentist, Tangerine Dental Group, Tucson, AZ
Terry Ashton	Unknown
Byron Aspaas	Master's of Fine Arts student in Creative Writing, Institute of American Indian Arts, Santa Fe, NM
Elton Atcitty	Deceased
Ravi Atreya	MD/PhD Student in Biomedical Informatics, Vanderbilt University, Nashville, TN
Katherine Audetat	Doctoral Student in Molecular, Cellular, and Developmental Biology, University of Colorado, Boulder, CO
Marisa Avalos Tackett	Nurse, US Army, Tucson, AZ

Jennifer Avila, MS,DO	Medical Resident, St. Peter Family Medicine, Olympia, WA
Richard (Julian) Azar, PhD	Research Scientist, College of Chemistry, University of California, Berkeley, CA
Jacqueline Baca LeGendre, PhD	Technical Support Scientist, NuGEN Technologies, San Francisco, CA
Karen Bachar, MA,MPH	Senior Policy Advisor, Office of Juvenile Justice and Delinquency Prevention, U.S. Department of Justice, Washington, D.C.
Ahmed Badran, PhD	Postdoctoral Fellow, Harvard University, Cambridge, MA
Amr Badran	Unknown
Amanda Bahe	Research Technician, Southwest Institute for Research on Women, Tucson, AZ
Lindsay Bahureksa	Doctoral Student in Neural Engineering, Carnegie Mellon, Pittsburgh, PA
William Bahureksa	Doctoral Student, Colorado State University, Ft. Collins, CO
Kate Baicy, PhD,MD	Assistant Professor, Department of Obstetrics and Gynecology, New York University, New York City, NY
Emma Bailey	Registered Nurse
Heather Bailey	Unknown
Ravi Bajpai	Unknown
Claudia Baker	Unknown
Cynthia Baker	Staff, Arizona Sonoran Desert Museum, Tucson, AZ
Elizabeth Baker, MSc	Director of Research, Southern Arizona Research, Science and Engineering Foundation, Tucson, AZ
Leah Baker, MA	Division Chief, Bureau of Land Management, Washington, D.C.
Meredith Baker	unknown
Theodore Baker, JD	Attorney, Independence, OR
Dana Baker Levine, MSE	Unknown
Ronald Balajadia, MS	Chief of Immunization Branch, Hawaii Department of Health, Honolulu, HI
Aanika Balaji	Medical Student, Johns Hopkins University, Baltimore, MD
Anne Baldwin Martin, PhD	Postdoctoral Research Associate, Neuroscience Institute, Princeton University
Jenna Balentine Hansen, MS,MD	Anesthesiologist, Anesthesia Care Associates Medical Group, Burlingame, CA
Neha Bandekar, MS	Medical Resident
Yamini Banerjee	Internal Medicine Physician, Hospital Internists of Austin, Austin, TX
Anne Bannister-Gilbertson, MD	Hospice and Palliative Medicine Physician, Hospice of the Valley, Glendale, AZ
Jennifer Bao	Medical Student, University of Arizona, Tucson, AZ
Nicole Bara	Unknown
Ali Baradaran, MD	Obstetrician and Gynecologist, Contemporary Women's Care, Mesa, AZ
Davud Baradaran Sirjani, MD	Clinical Assistant Professor, Department of Otolaryngology (Head and Neck Surgery), Stanford University, Stanford, CA
Nafisseh Baradaran Sirjani, MD	Medical Resident, Mayo Clinic, Rochester, MN
Bianca Barcelo, MD	Neurology Resident, University of Arizona, Tucson, AZ
Alexandrina Barela	Post-Baccalaureate Fellow, NIH-IRTA, Phoenix, AZ
Jennifer Barker Given	Science Teacher, Sheboygan High School, Sheboygan, WI
James Barlow, MD	Dermatologist and Founder, Arizona Dermatology Specialist, Surprise, AZ
Dawn Barnes, PhD	Biomedical Scientist, Atlanta, GA
Luis Barraza	Research Technician, Sloan-Kettering Institute, New York City, NY
Michael Barrett, MD	Podiatrist and Founder, Barrett Podiatry, San Antonio, TX
Trace Bartels	Doctoral Student in Pharmacy, University of Arizona, Tucson, AZ
Leonid Bartik, MD	Anesthesiologist, Sinai Hospital of Baltimore, Baltimore, MD
Jon (Flash) Bartnek	Staff Scientist, BP Bio Fuels Global Technology Center, San Diego, CA
Sutopa Barua	Preschool Teacher
Tracy Baser-Decker, MD	Pediatrician, Orange Grove Pediatrics, Tucson, AZ
Adam Bastidas, PhD	Medical Writer, Carling Communications, San Diego, CA
Michael Bastidas	recording Artist and Sound Therapist, Gaeearth, Boulder, CO
Sweta Batni, MHS,MA	Doctoral Student in Global Infectious Diseases, Georgetown University, Washington, DC
George Battraw, MBA	Logistics Engineer, Department of Defense
Patricia Baumann-Burroughs, MS	Full Time Parent, Dublin, CA

Virginia Baygents	Basebuild Mechanical Project Engineer, Intel Corporation, Hillsboro, OR
Cayla Baynes	Doctoral Student in Biomedical Engineering, University of Arizona, Tucson, AZ
Marla Bazzanella Mrazik	Unknown
Soaring Bear, PhD	Retired; Former Technical Information Specialist, National Library of Medicine, Washington, DC
Anthony Beas, PhD	Postdoctoral Fellow, Fred Hutchinson Cancer Research Center, Seattle, WA
Sean Beaty, MD	Radiologist, Mountainview Hospital, Las Vegas, NV
Liese Beenken-Rothkopf, PhD	Biopharmaceutical Associate, GlaxoSmithKline, King of Prussia, PA
Cassandra Begay	Unknown
Cheryl Begay	Unknown
Pamela Begay	Unknown
Rene Begay, MS	Professional Research Assistant, Center for American Indians/Alaska Natives, Nighthorse Campbell Building, Aurora, Colorado
Keithetta Begay-Curley	Registered Nurse, Chinle Comprehensive Health Care Facility, Chinle, AZ
Adrian Begaye, MD	Resident, Stanford University, Stanford, CA
Adrienne Begaye Figueroa, PharmD	Staff Pharmacist, Indian Health Service, Sells, AZ
Roxanna Behnejad	Research Assistant, Arizona Cancer Center, University of Arizona, Tucson, AZ
Gabriel Bejarano	Unknown
David Bellovin, PhD	Senior Scientist, Pharmacology/Oncology, Five Prime Therapeutics, San Francisco, CA
David Bellows, PhD	Assistant Winemaker, Alloro Vineyard, Sherwood, OR
Robert Bellsey, PhD	Postdoctoral Fellow
Mellisa Lee Benally	Instructor, Dine College, Shiprock, NM
Omid Bendavid, MD	Radiologist, Encino Breast Care Center, Encino, CA
Erica Beneze	Unknown
Gayle Bentley, MPH	Doctoral Student in Microbiology, Washington University, St. Louis, MO
Carolyn Bentley Wells	Freelance Web Designer, Coach, and Entrepreneur and Master's Student in Communication Management, University of South California, Phoenix, AZ
Deon Benton	Doctoral Student in Psychology, Carnegie Mellon University, Pittsburgh, PA
Regina Benton Bower, MD	Neurosurgery Resident, Mayo Clinic, Rochester, MN
Heidi Benyamin Sutanto, MD	Internal Medicine Physician and Pediatrician, Saguaro Physicians, Tucson, AZ
Peter Bergman	Instructor, Pima Community College, Tucson, AZ
Matthew Berkman, MS	Clinical Associate Professor, Department of Emergency Medicine, and Medical Director, Banner-University Medical Center South, University of Arizona, Tucson, AZ
Justin Berkompas, PhD	Environmental Scientist, Conestoga-Rovers & Associates, Tucson, AZ
Pablo Bernardson, PharmD	Clinical Pharmacist, Veterans Affairs Medical Center, Long Beach, CA
Jessica Bernier	Medical Devices Professional, Tucson, AZ
Caitlin Berry	Mathematics Teacher, Hyde Leadership Charter School, New York, NY
Cristine Berry, MD,MHS	Assistant Professor, School of Medicine, Section of Pulmonary, Allergy, Critical Care, and Sleep Medicine, University of Arizona, Tucson, AZ
Donovan Berry	Research Technician, Albuquerque, NM
Laura Berry, JD	Regulatory Attorney, Environmental Protection Agency, Boston, MA
Devon Best, MA	Medical Student, Trinity College of Medicine, St. Vincent, The Grenadines
Valerie Best Svob	Unknown
Janki Bhakta, PharmD	Pharmacist, Walgreens, Thornton, CO
Natasha Bhuyan, MD	Chief Family Medicine Resident, Banner Good Samaritan Medical Center, Phoenix, AZ
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