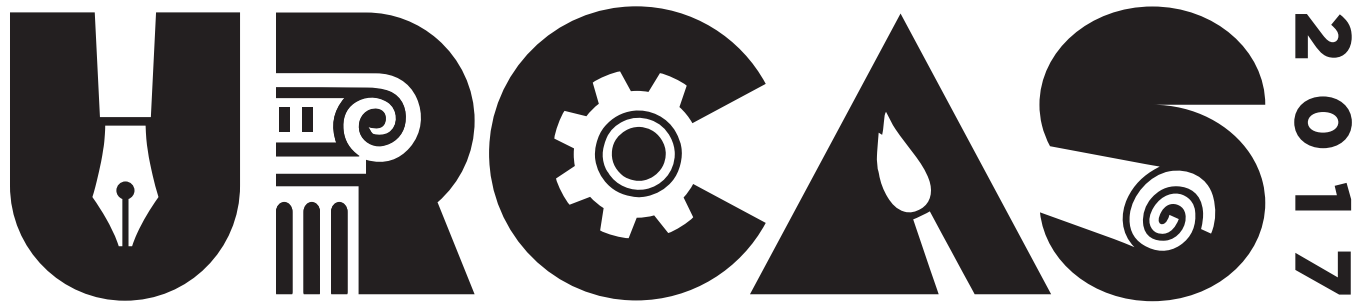




**2 2 N D   A N N U A L**



**U N D E R G R A D U A T E   R E S E A R C H  
& C R E A T I V E   A R T S   S Y M P O S I U M**

**NEW MEXICO STATE UNIVERSITY**

CORBETT CENTER

APRIL 28, 2017

**SPONSORS:**

Executive Vice President and  
Provost Office

Honors College

Discovery Scholars (DSP)

New Mexico Alliance for

Minority Participation (AMP)

Maximizing Access to Research Careers (MARC)

Howard Hughes Medical Institute Program (HMMI)

Building Research Achievement  
in Neuroscience (BRAiN)

Office of the Vice President for Research,  
Graduate Studies and International Programs

College of Business

College of Education

College of Engineering

# SYMPOSIUM

## **EXECUTIVE VICE PRESIDENT AND PROVOST OFFICE**

### **HONORS COLLEGE**

The Honors College provides qualified undergraduate students with opportunities to broaden and enrich their academic programs. In small classes taught by master teachers, honors students engage in lively discussion and collaborative investigation of interdisciplinary topics. Through the Honors Thesis, students undertake original research in humanities, science, engineering, agriculture, business, education, and the arts under close supervision by faculty mentors. Many students prepare for their thesis by doing an internship in a scientific laboratory or undertake independent research under the supervision of a faculty mentor.

### **NEW MEXICO ALLIANCE FOR MINORITY PARTICIPATION (AMP)**

The New Mexico Alliance for Minority Participation, funded by the National Science Foundation, is a partnership of New Mexico's six four-year universities and twenty public two-year community colleges. The goal of the Alliance is to increase the state's graduation rate of ethnic minority students with baccalaureate degrees in science, mathematics, engineering, and technology.

# SPONSORS

## **MAXIMIZING ACCESS TO RESEARCH CAREERS (MARC)**

The MARC Program (formerly Minority Access to Research Careers) is sponsored by the National Institute of General Medical Sciences within the National Institutes of Health. The goals of the program are: to assist selected undergraduate students who demonstrate an interest in and the potential for research in the biomedical sciences to continue their education beyond the baccalaureate degree; to provide a research experience sufficient to result in presentation of research data at professional meetings; to facilitate an 8-10 week summer research experience off-campus; to improve academic performance; to provide funds for travel to professional meetings; and to assist students in entering graduate and professional programs. All past NMSU-MARC students have received bachelor's degrees and more than 75% have gone on to graduate programs.

## **HOWARD HUGHES MEDICAL INSTITUTE PROGRAM AT NMSU (HHMI)**

The NMSU Howard Hughes Medical Institute Program (HHMI) broadens access to science by providing students with opportunities to be successful in science through outreach to high schools in under-served communities, through the enhancement of undergraduate biology courses, by providing students with undergraduate research opportunities, and by providing the next generation of faculty with training in Scientific Teaching.

## **DISCOVERY SCHOLARS (DSP)**

The Discovery Scholars Program (DSP) is a college wide interdisciplinary program which was created in Fall, 2014. DSP is a mentorship program where undergraduate students engage in research/creative activity with faculty mentors. The goal of the program is to support student research/creative activity and encourage students to apply for and successfully complete a Master's degree, perhaps even a Ph.D. Through the program students are challenged to think through research questions and or creative activities, find solutions or ways to answer questions or implement creative activities, and then write up and present the outcome(s) of their work.

The five components of the program are:

- i. Research/creative activity with Faculty mentor
- ii. Write up, creation of, and presentation of research/creative activity
- iii. Professional development (applying for graduate programs, learning about careers in student's discipline, and development of writing and presentation skills)
- iv. Service/Outreach project completion
- v. Feedback on the program

## **BUILDING RESEARCH ACHIEVEMENT IN NEUROSCIENCE (BRAiN)**

The NMSU Building Research Achievement in Neuroscience (BRAiN) Program was founded in 2010 with a grant from the NIH BP-ENDURE initiative. The BRAiN partnership between UC Denver and NMSU faculty aspires to broaden participation among the doctoral (PhD) ranks of neuroscience and biobehavior scientists by providing research and professional development opportunities for undergraduate juniors and seniors. BRAiN Scholars participate in academic year research at NMSU and a summer internship at the UC Denver Medical Campus. Enhancement activities include a yearly Honors seminar experience and attendance at national conferences such as SFN and ABRCMS.

## **OFFICE OF THE VICE PRESIDENT FOR RESEARCH, GRADUATE STUDIES & INTERNATIONAL PROGRAMS,**

## **COLLEGE OF BUSINESS**

## **COLLEGE OF EDUCATION**

## **COLLEGE OF ENGINEERING**



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ABSTRACTS



# P R E F A C E

The **Undergraduate Research and Creative Arts Symposium**, now in its twenty-second year, is the longest-running student symposium at New Mexico State University. Since 1996, more than 2,000 students have presented their work at the symposium. Many of these students have gone on to graduate school, law school, and medical school, and a few have returned to NMSU as professors.

URCAS is intended to recognize outstanding undergraduate research and creative projects and the faculty who have mentored them. It is also meant to show off the work of creative undergraduate students to the university and

the community. And, of course, presenting at the symposium gives our students valuable professional experience.

The symposium is an annual celebration of undergraduate creativity in all fields. Represented here are some of the most advanced and creative projects presently being undertaken at NMSU. Many of the students presenting today are completing Honors Thesis projects, while others have worked with mentors in laboratories and other research and arts settings through the MARC, AMP, HMMI, BRAiN DSP, and other mentoring programs.

*Congratulations to these outstanding students and their faculty mentors!*

Dr. Miriam Chaiken, Dean, Honors College

Dr. Michael Johnson, Director, MARC Program

Dr. Barbara Lyons, Director, BP-ENDURE (BRAiN) Program

Dr. Lakshmi Reddi, College of Engineering and Director, New Mexico Alliance for Minority Participation (AMP)

Dr. Tim Wright, Howard Hughes Medical Institute Program at NMSU (HMMI)

Dr. Nancy McMillan, Director, Discovery Scholars Program (DSP)

Dr. Luis Vasquez, Vice President for Research

Dr. Don Pope-Davis Dean, College of Education

Dr. James Hoffman, Dean, College of Business





# PROGRAM DESIGN

*THE URCAS TEAMS COLLABORATED THROUGHOUT THE PROCESS OF CONCEPTUALIZING, ORGANIZING, & DESIGNING THE UNIQUE URCAS 2017 LOGO & BRAND.*

## **TEAM 1:**

Dana Apodaca  
Audra Lamoreaux  
Hector Sarellano  
Albert Vasquez

## **TEAM 2:**

Ashley Hall  
Josue Ornelas  
Nicholas Ostella  
Jesus Zubia

## **TEAM 3:**

Randle Dominguez  
Leslie Rascon  
Eleno Rosas  
Min Tan

## **MENTIONS:**

Dana Apodaca  
Audra Lamoreaux  
Nicholas Ostella  
Min Tan  
Albert Vasquez

All three teams were each tasked to design a number of unique logo concepts. The final URCAS 2017 logo design belongs to Albert Vasquez. The logo and its colors represent the variety of student work that is present at the symposium. The three teams came together as a group to establish a cohesive aesthetic that spans across multiple mediums.

Honorable mentions are awarded to the following students: Albert Vasquez created 2 of the 3 finalist logo concepts. He is a Junior studying Graphic Design. Dana Apodaca created 1 of the 3 finalist

logo concepts and was appointed art director & team leader. She is a Senior studying Graphic Design. Audra Lamoreaux contributed a significant amount of exceptional work to the program. She is a Junior studying Graphic Design. Nicholas Ostella played a key role in establishing & creating the layout design of the program. He is a Senior studying Graphic Design and will be graduating in May 2017. And finally, Min Tan not only lead the art direction & design of the poster, but she also worked on the T-shirt design. She is a Senior studying Graphic Design and will be graduating in May 2017.

# PREVIOUS SYMPOSIUM SPEAKERS

**2016**

**Dr. Debra Knapp &  
Prof. Frank “Paco”  
Gilpin**

Sol y Arena Dance  
Company

**2015**

**Dr. William Eamon  
Emeritus**

Professor of History

**2014**

**Dr. Sean Rogers**

Department of  
Management

**2013**

**Dr. Collin Payne**

Assistant Professor of  
Marketing

**2012**

**Dr. Paul Bosland  
Regents**

Professor  
of Horticulture and  
Director of the Chile  
Pepper Institute

**2011**

**Dr. Kenny Stevens**

Associate Professor  
of Engineering  
Technology

**2010**

**Dr. Kenneth  
Hammond**

Professor of History

**2009**

**Dr. Connie Falk**

Professor, Agricultural  
Economics and  
Business

**2008**

**Salim Bawazir,  
Ph.D. Associate  
Professor,**

Department of Civil  
Engineering

**2007**

**Dr. Elba Serrano**

Regents Professor of  
Biology

**2006**

**Dr. Mary O’Connell**

Regents Professor,  
Department of Plant  
and Environmental  
Sciences

**2005**

**Prof. David Taylor**

Department of Art

**2004**

**Dr. Robert  
Armstrong**

Regents Professor of  
Physics

**2003**

**Dr. Ann Hales  
Professor,**

Department of  
Nursing

**2002**

**Dr. Steve Stochaj**

Associate Professor,  
Klipsch School  
of Electrical and  
Computer Engineering

**2001**

**Robert Marquez**

Doctoral Student,  
Chemistry

**2000**

**Dr. Reta Beebe**

Professor, Department  
of Astronomy

**1999**

**Dr. Rudolfo Chávez  
Chávez**

Regents Professor,  
Department of  
Curriculum and  
Instruction

**1998**

**Dr. Kathleene West**

Professor, Department  
of English

**1997**

**Dr. Cookie White  
Stephan**

Professor, Department  
of Sociology

**1996**

**Dr. Champa  
Sengupta-Gopalan**

Professor, Department  
of Agronomy and  
Horticulture

# 2017 SYMPOSIUM SPEAKER

*BILL McCAMLEY, STATE REPRESENTATIVE*

*“THINKING OUT OF THE BOX:  
A CHALLENGE TO STAY IN NEW MEXICO”*

Bill McCamley is a State Representative from Las Cruces. He grew up in town, graduating from Mayfield High and then NMSU where he attained his BA in Government and served as ASNMSU President. Bill then graduated from the Kennedy School of Government at Harvard with a Masters Degree in Public Policy where he focused his education on negotiation/mediation.

After returning to Las Cruces, he served as a Dona Ana County Commissioner for four years, and has had his current post since 2013.

His successes include:

- Helping to establishing Spaceport America and growing the Santa Teresa Border Business Park to create local jobs.
- Participating in the fight to make Dona Ana County the first place in the state for marriage equality.
- Growing a startup business, ROJO Ink, that sells custom clothing and promotional goods while feeding hungry children in Africa and Haiti.
- Sponsoring the bill to tax and regulate cannabis like alcohol.



# SCHEDULE OF EVENTS

**8:30 AM REFRESHMENTS & WELCOMING REMARKS**

**Dona Ana Room**  
 Dr. Greg Fant  
 Associate Vice President and Deputy Provost

**9:00 AM - POSTER SESSIONS**

**12:00 PM West Ballroom 3rd Floor**

**9:00 AM - PAPER SESSIONS**

**10:00 AM**

**SESSION 1A**

**Otero Room 126**  
 Ecology Studies

**SESSION 1B**

**Socorro Rm. 226**  
 Cellular Biology

**SESSION 1C**

**Senate Chambers Room 302**  
 Research in the Social Sciences

**SESSION 1D**

**Col. Fountain Room 324**  
 Advances in Materials Sciences & Engineering

**10:15 AM - 11:15 AM**

**SESSION 2A**

**Otero Room 126**  
 Revolutionary Women

**SESSION 2B**

**Socorro Room 226**  
 Humanities Insights

**SESSION 2C**

**Middle Ballroom 3rd Floor**  
 Dancers Unlimited

**SESSION 2D**

**Col. Fountain Room 324**  
 Advances in Materials Sciences & Engineering

**11:30 AM - 12:30 PM**

**SESSION 3A**

**Otero Room 126**  
 Revolutionary Women

**SESSION 3B**

**Socorro Room 226**  
 Advances in Biotechnology & Biochemistry

**SESSION 3C**

**Senate Chambers Room 302**  
 Advances in STEM

**12:30 PM - 1:30 PM**

**LUNCHEON**

**Corbett Center East Ballroom**  
 Luncheon Address:  
 "Thinking Out of the Box:  
 A Challenge to Stay in New Mexico"  
 Bill McCamley, State Representative



# **P O S T E R   S E S S I O N S**



# POSTER SESSIONS

**ALI ALGHAREEB ABDULLAH  
ALHAMDAN**

**KHALED ALMESHWET  
ABDULAZIZ ALAJMI**

“Navajo Water - Solar oven”

Major: Mechanical Engineer

Faculty Advisor: Dr. Antonio Lara, Chemistry and  
Biochemistry

(USDA NIFA HSI)

**ANGELIQUE AMADO**

“X-ray Spectroscopic Studies of Cobalt Complexes for  
Applications in Energy”

Major: Chemistry

Faculty Advisor: Dr. Feifei Li, Chemistry and  
Biochemistry

(HHMI, Discovery Scholars)

**MATTHEW AMATO**

“Cloning solute binding proteins in *Parcoccus denitrificans*”

Major: Biochemistry/Genetics

Faculty Advisor: Dr. Erik Yukl, Chemistry and  
Biochemistry

(MARC)

**DANTE AVALOS**

“Mechanism of Zinc Transfer to Solute Binding Protein AztC  
from Chaperone AztD”

Major: Biochemistry

Faculty Advisor: Dr. Erik Yukl, Chemistry and  
Biochemistry

(HHMI)

**SOFIA BALI**

“Computational Analysis of Synthetic Molybdenum  
Complexes Modeling Molybdoenzymes”

Major: Biochemistry

Faculty Advisor: Dr. Feifei Li, Chemistry and  
Biochemistry

**DANIELA BARRAZA**

“A B12 receptor serves a role in membrane stability of  
*Caulobacter crescentus*”

Major: Biochemistry and Chemistry

Faculty Advisor: Dr. Paola Mera, Department of  
Chemistry and Biochemistry

(MARC)

**MICHAEL BENNETT**

“Characterization of *Escherichia coli* RecA Q300R mutant  
through RecA mediated DNA strand exchange”

Major: Biochemistry

Faculty Advisor: Dr. Shelley Lusetti, Chemistry  
and Biochemistry

(MARC)

**NUBIA BERMUDEZ**

“Ephrins and their receptors may impact placental  
development.”

Major: Biology

Faculty Advisor: Dr. Ryan Ashley, Animal and  
Range Sciences

(HHMI)

**KRISTY BURCHELL**

“Pause Duration and Suprasegmental Characteristics of  
Cochlear Implant Users Speech”

Major: Communication Disorders

Faculty Advisor: Dr. Heike Lehnert-Lehouillier,  
Special Education & Communication Disorders

Honors Thesis

**PASCUAL CAMACHO**

“Sustainable Concrete Structures using Recycled Concrete  
Aggregate: Short-Term and Long-Term Behavior Considering  
Material Variability”

Major: Civil Engineering

Faculty Advisor: Dr. Brad Weldon, Civil  
Engineering

(AMP)

**BRENT CARRILLO**

“Target Synthesis of LeptoA”

Major: Chemical Engineering ‘

Faculty Advisor: Dr. William Maio, Chemistry (MARC)

**SAMANTHA CEBALLES**

“Modeling of Carbon Nanotubes as Dynamical Systems and their Applications”

Major: Mechanical Engineering and Aerospace Engineering

Faculty Advisor: Dr. Abdessattar Abdekfeji, Mechanical and Aerospace Engineering (AMP)

**MELISSA CHAVEZ**

“Elucidating the Impact of Protein Phosphatases in the Replication Stress Response”

Major: Biology

Faculty Advisor: Dr. Amanda Ashley, Chemistry and Biochemistry (MARC)

**GABRIEL CLARK**

“Overexpression of sucrose phosphate synthase, the key enzyme in sucrose synthesis, improves performance of alfalfa plants”

Major: General Horticulture

Faculty Advisor: Dr. Champa Gopalan, Plant and Environmental Sciences (HHMI)

**JESUS DE LA CRUZ**

“Spray Drying of Glandless Cottonseed Meal Protein”

Major: Nutrition and Dietetic Science Faculty

Advisor: Dr. Efren Delgado, Food Science and Technology (AMP)

**JOHN DESGEORGES**

““Help me Google?: A complete failure to replicate a prominent Science article””

Major: Psychology

Faculty Advisor: Dr. Michael Hout, Psychology (Discovery Scholars)

**VIRGINIA FUENTES**

“Review for Biological and Bio-Inspired Aquatic Systems”

Major: Mechanical Engineering

Faculty Advisor: Dr. Abdessattar Abdekfeji, Mechanical & Aerospace Engineering (AMP)

**STEPHANIE FULLAM**

“Periplasmic Zinc Transfer Reduction By Site Directed Mutagenesis”

Major: Biochemistry

Faculty Advisor: Dr. Erik Yukl, Chemistry & Biochemistry

**JOSI GABALDON**

“Medication Status And Gait Mechanics In Older Adults: A Multivariate Analysis”

Major: Kinesiology

Faculty Advisor: Dr. Robert Wood, Kinesiology BP-ENDURE (BRAiN)

**CLARA HANSEN****GREGORY M. KOHN,****TIMOTHY F. WRIGHT**

“Social networks and call sharing in female Budgerigar flocks”

Major: Biology

Faculty Advisor: Mr. Timothy Wright, Biology (HHMI)

# POSTER SESSIONS

## **ALYSSA HENDREN**

“Biochar for Desalination Concentrate Management”

Major: Chemical Engineering

Faculty Advisor: Dr. Catherine Brewer, Chemical and Materials Engineering (AMP)

## **CARLOS HERRERA NASER ALMERRI**

### **SALEH ALMARRI**

### **HAMAD AL QABANDI**

### **NASHER ALAJMI**

“Navajo Water - Rotating Device”

Major: Mechanical Engineer

Faculty Advisor: Dr. Antonio Lara, Chemistry and Biochemistry (USDA NIFA HSI)

## **GRACE HOOKS**

“Targeting ERBB3 in Triple Negative Breast Cancer”

Major: Biology

Faculty Advisor: Dr. Amanda Ashley, Chemistry and Biochemistry (HHMI)

## **YESENIA IBARRA**

“Ergonomic Analysis for Portable Urban Mobility Access (PUMA) Device”

Major: Industrial Engineering

Faculty Advisor: Dr. Delia Valles, Industrial Engineering (AMP)

## **SABRINA JAMISON**

### **YVETTE SALCEDO**

“2016 New Mexico Educator Vacancy Report”

Major: Secondary Education-Life Sciences

Faculty Advisor: Dr. Karen Trujillo (STEM Outreach Alliance Research Lab)

## **BELKIS JACQUEZ**

### **JORDAN COLMANT**

“Interprofessional collaboration between disciplines in a health care environment”

Major: Anthropology

Faculty Advisor: Mary Alice Scott, Department of Anthropology (BP-ENDURE (BRAiN))

## **JACQUELINE KIELTYKA**

“IGF-1R expression influences tamoxifen sensitivity of triple negative breast cancer (TNBC) cells”

Major: Biochemistry, Biology, and Genetics and Biotechnology

Faculty Advisor: Dr. Kevin Houston, Chemistry and Biochemistry (HHMI)

## **SARA KUSSEROW**

### **KELCIE GERRY**

### **PAIGE RAMSEY**

“Residency As Bootcamp”

Major: Anthropology

Faculty Advisor: Dr. Mary Alice Scott, Anthropology (Honors Thesis, BP-ENDURE (BRAiN))

## **TRAVIS LEDOUX**

“Hydrothermal Liquefaction Optimization for High and Low-Lipid Algae”

Major: ChME

Faculty Advisor: Mrs. Dr. Catherine Brewer, ChME (AMP)

**SICILEE MACKLIN**

“Adsorption onto Pecan Shell Biochar for Removal of N-Nitrosodimethylamine from Water”

Major: Chemical and Materials Engineering  
Faculty Advisor: Dr. Catherine Brewer, Chemical and Materials Engineering  
(AMP)

**SARA MANSHAD**

“The Auditory System Knowledge Space in Public Domain Internet Sources”

Major: Biology  
Faculty Advisor: Dr. Elba Serrano, Biology  
(Serrano Neurolab)

**LIZET MARTINEZ**

“Temperature adaptation influences symbiont specificity in an experimentally evolved bobtail squid-luminous bacterium association”

Major: Microbiology  
Faculty Advisor: Dr. Michele Nish, Head of Department of Biology  
(AMP)

**MANUEL MARTINEZ**

“Preparation of Water Purification Membranes via Polymerization Induced Microphase Separation”

Major: Chemical Engineering  
Faculty Advisor: Dr. Reza Foudazi, Dr. David A. Rockstraw  
(AMP)

**MATTHEW MENA**

“Contrasting mitochondrial metabolism with glycolysis in cancer cells with time-resolved flow cytometry”

Major: Chemistry  
Faculty Advisor: Dr. Jessica Houston, Chemical Engineering  
(MARC)

**LESLIE MOSSO**

“Screen to Save: Colorectal Cancer Awareness Month”

Major: Public Health  
Faculty Advisor: Dr. Rebecca Palacios, Public Health Sciences  
(NCI U54 CA132381)

**ADDI MOYA**

“Characterization of protein methyl transferases in *Caulobacter crescentus*”

Major: Biology  
Faculty Advisor: Dr. Paola Mera, Chemistry and Biochemistry  
(HHMI)

**NHAT NGUYEN**

“Clay Dehydroxylation Analysis with TGA/DSC to Enhance Pellet Fabrication”

Major: Biochemistry  
Faculty Advisor: Dr. Antonio Lara, Chemistry and Biochemistry  
(FY 17 NM WRRRI Student Water Research Grant)

**FRANCESCA ORTEGA**

“In silico Identification of Pentatricopeptide Repeats in Capsicum”

Major: Genetics  
Faculty Advisor: Dr. Paul Bosland, Plant and Environmental Sciences  
(HHMI)

**SEALTIEL ORTEGA-RODRIGUEZ**

“Reference-Seeded Iterative Long-Reads Assembler”

Major: Independent Studies  
Faculty Advisor: Donovan Bailey, Biology  
(MARC)

# POSTER SESSIONS

**WILLIAM PECK  
LINDSEY SKOWLUND,  
ABDULAZIZ ALAZEMI**

“Apache Point Observatory Scheduling Optimization”  
Major: Industrial Engineering  
Faculty Advisor: Dr. Hansuk Sohn, Industrial Engineering  
(Capstone: IE and ASTR Departments)

**MIKAYLA PULLIAM AMUDHU GOPALAN,  
HOLLIE JACOBS**

“A new approach to the synthesis of hydroxamic acids linked by sulfonamide bonds”  
Major: Biology  
Faculty Advisor: Prof. Amudhu Gopalan, Chemistry & Biochemistry

**ANTHONY QUINTANA**

“Conceptual design and performance improvement of growing micro unmanned air vehicle”  
Major: Mechanical Engineering  
Faculty Advisor: Dr. Abdessattar Abdelkefi, Mechanical Engineering  
(AMP)

**FELICIA RODRIGUEZ**

“Synthesis of Molybdenum Complexes from Thiosemicarbazone Ligands”  
Major: Chemical Engineering  
Faculty Advisor: Dr. Feifei Li, Chemistry  
(AMP)

**JORDAN SALAS**

“Effect of Confinement on the Acidity of Organic Acids”  
Major: Biochemistry  
Faculty Advisor: Dr. Michael Johnson, Chemistry and Biochemistry  
(MARC)

**SYDNEY SALAS**

“Implications of Microbial communication between the Sepiola squid and their bioluminescent symbionts: *V.logei* and *V.fisheri*”  
Major: Biology  
Faculty Advisor: Dr. Michele Nishiguchi, Biology  
(HHMI)

**MICHELLE SILBER**

“Reflections on Multicultural Competencies While Volunteering Internationally for Children with Disabilities”  
Major: Communication Disorders/Linguistics  
Faculty Advisor: Dr. Amelia Rau, Special Education & Communication Disorders Honors Thesis

**SIERRA STREBE**

“Functional characterization of a highly transcriptional regulated gene in *Caulobacter crescentus*”  
Major: Genetics & Biotechnology  
Faculty Advisor: Dr. Paola Mera, Chemistry & Biochemistry  
(MARC)

**CASSANDRA SUTHER**

“Isotherm of *Ziziphus Jujuba*”  
Major: Food Science & Technology  
Faculty Advisor: Dr. Efren Delgado, Food Science & Technology  
(Steinman Endowed Fellowship)

**ANNELIESE TRUJILLO**

“A Genetic Engineering Approach in Developing Resistance Against *Phytophthora capsici* in Chile Pepper (*Capsicum annuum*)”  
Major: Chemical Engineering  
Faculty Advisor: Dr. Champa Sengupta-Gopalan, Department of Plant and Environmental Sciences  
(AMP)

### **CHRISTIANE TSO**

“Characterizing the ERBB family members in triple negative breast cancer cell lines”

Major: Biology

Faculty Advisor: Mrs. Amanda Ashley, Chemistry and Biochemistry  
(MARC)

### **KRYSTAL VARGAS**

“In Search of “Nutri-Chemicals” in: Yellow Capsicum species”

Major: Horticulture

Faculty Advisor: Dr. Ivette Guzman, Plant and Environmental Sciences  
(Plant and Environmental Sciences)

### **MOTICHA YELLOWMAN**

“Uranium Abatement Requires Robust Pellets - Fabrication Depends on Clay: Water Ratios”

Major: Chemistry

Faculty Advisor: Dr. Antonio Lara, Chemistry & Biochemistry  
(AMP)



# **P A P E R   S E S S I O N S**



# PAPER SESSIONS

## SESSION 1: 9:00am - 10:00am

### 1A: ECOLOGY STUDIES – OTERO ROOM 126

Moderator: Dr. Timothy Ketelaar,  
Honors College

#### Justin Apodaca

“Effects of corticosterone-induced stress on vocal learning in the budgerigar”

Major: Biology

Faculty Advisor: Dr. Timothy Wright, Biology (NIH)

#### Quintin Dean

“Effects of nonnative brown trout, *Salmo trutta*, on the foraging ecology of Rio Grande cutthroat trout, *Onchorhynchus clarkii viriginialis*”

Major: Wildlife Science

Faculty Advisor: Dr. Colleen Caldwell, (FWCE)

#### Aldo Ramirez

“Lower intra-specific levels of aggression found between neighboring urban *Pogonomyrmex rugosus* ant colonies than that of rural colonies”

Major: Biology

Faculty Advisor: Dr. Timothy Wright, Biology (HHMI)

### 1B: CELLULAR BIOLOGY – SOCORRO ROOM 226

Moderator: Dr. Anne Hubbell,  
Communication Studies

#### Alejandra Enriquez

“Experimental Evolution in *Vibrio fischeri*”

Major: Biology

Faculty Advisor: Dr. Michele Nishiguchi, Biology (MARC)

#### Taylor Nunn

“Mining Genome Expression Omnibus (GEO) datasets for analysis of TRP channels in glioma cell lines”

Major: Genetics/Biology

Faculty Advisor: Dr. Elba Serrano, Biology  
Discovery Scholars

#### Crystal Hernandez

“Constitutively active Rap1 drives non-photoreceptor cell fate in the *Drosophila* eye”

Major: Biology

Faculty Advisor: Dr. Jennifer Curtiss, Biology (AMP)

**1C: RESEARCH IN THE  
SOCIAL SCIENCES –  
SENATE CHAMBERS 302**

**Moderator: Dr. Miriam Chaiken, Honors College**

**Tylan Tapley**

“Islamism in Bangladesh”

Major: Government

Faculty Advisor: Dr. Gregory Butler, Government

**Arielle Gonzales**

“Discourse Analysis”

Major: Spanish Language

Faculty Advisor: Dr. Mark Waltemire, Linguistics

Honors Thesis

**Ismael Torres**

“Forward Guidance Philosophies: The Bank of Japan versus the Federal Reserve”

Major: Economics

Faculty Advisor: Dr. Miriam Chaiken, Honors

Honors Thesis

**1D: ADVANCES IN MATERIALS  
SCIENCE & ENGINEERING –  
COL. FOUNTAIN ROOM 324**

**Moderator: Fr. Gabriel Rochelle, Honors College**

**Adam Sanchez**

“Dynamic Characterization of Ultra High Performance Concrete”

Major: Civil Engineering

Faculty Advisor: Dr. Brad Weldon,

Civil Engineering

(AMP)

**Glen Throneberry**

“Kinematic and wing shape optimization of bio-inspired nano air vehicles for hovering”

Major: Mechanical Engineering

Faculty Advisor: Dr. Abdessattar Abdelkefi,

Mechanical and Aerospace Engineering

(AMP)

**Tristan Tyson**

“Heaving/Plunging Motion”

Major: Aerospace Engineer

Faculty Advisor: Mr. Andreas Gross, MAE

(AMP)

# PAPER SESSIONS

## SESSION 2: 10:15am - 11:15am

### 2A: REVOLUTIONARY WOMEN – OTERO ROOM 126

Moderator: Dr. Manal Hamzeh,  
Women Studies

#### **Morgan Beasley**

“Revolutionary Women: Virginia Johnson’s  
Contribution to STEM Research”

Major: Psychology

Faculty Advisor: Dr. Manal Hamzeh, Gender and  
Sexuality Studies

NMSU Department of Gender & Sexuality Studies

#### **Makenna Caballer**

“Women Revolutionizing the Sport of Roller Derby”

Major: Gender and Sexuality Studies

Faculty Advisor: Dr. Manal Hamzeh, Gender and  
Sexuality Studies

Gender and Sexuality Studies

#### **Marlene Chairez**

“Emma Goldman an Anarchist Revolutionary Women”

Major: Engineering Physics- Mechanical  
Engineering

Faculty Advisor: Dr. Manal Hamzeh, Gender and  
Sexuality Studies

Gender and Sexuality Studies

#### **Caitlin Gear**

“The Revolutionary Life of Congress Woman Shirley  
Chisholm”

Major: Gender & Sexuality Studies

Faculty Advisor: Dr. Manal Hamzeh, Gender and  
Sexuality Studies

Gender & Sexuality Studies

### 2B: HUMANITIES INSIGHTS – SOCORRO ROOM 226

Moderator: Professor Julie Fitzsimmons,  
Department of Art

#### **Ryan Scribner**

“A Rhetoric of Transformation: Empowering  
Esoteric Writing and Writers with an Augustinian  
Application of the dissoi logoi”

Major: English

Faculty Advisor: Dr. Justine Wells, English (Rhetoric)

NMSU English Department

#### **Brandon Gass**

“On the ‘Live’ Theories of Time”

Major: Philosophy

Faculty Advisor: Jean-Paul Vessel, Philosophy  
Honors Thesis

#### **Angeline Taylor**

“Outward Appearance vs. Inner Being: Dissecting  
Hamlet’s Identity”

Major: English/Creative Writing

Faculty Advisor: Ms. Tracy Miller-Tomlinson, English  
English Department

#### **Natalia Ankiewicz**

“Medieval Magical Plants and their Uses Today”

Major: Kinesiology and Psychology

Faculty Advisor: Dr. William Eamon, History  
Honors College

#### **Casey McKim**

“Carving Out a Niche: The Effects of Windsor and Obergefell”

Major: English

Faculty Advisor: Dr. Elizabeth Schirmer, English  
Honors Thesis

**2C: DANCERS UNLIMITED -  
MIDDLE BALLROOM  
3<sup>RD</sup> FLOOR**

**Moderator: Dr. Miriam Chaiken, Honors College**

**Hannah Nichols Lilian Calhoun,  
Lakken Medina, Noelia de la Rosa**

“Body Stories: The Trinity of Body, Mind, and Soul”

Major: Dance

Faculty Advisor: Prof. Ann Gavit, Kinesiology and  
Dance

NMSU Kinesiology and Dance Program

**Lakken Medina**

“Adiona”

Major: Dance

Faculty Advisor: Prof. Ann Gavit, Kinesiology and Dance  
NMSU Kinesiology and Dance Program

**Carley Casey, Stephanie Clark, Brianna  
Dever, Laura Mae Dille, Alexis Puente**

“Quid Sit Versu Tibi?”

Major: Dance

Faculty Advisor: Prof. Ann Gavit, Kinesiology and  
Dance

NMSU Kinesiology and Dance Program

**Lillian Calhoun**

“Simplified Perception”

Major: Dance

Faculty Advisor: Prof. Jermy Edmonson, Kinesiology  
and Dance

NMSU Kinesiology and Dance Program

**2D: ADVANCES IN MATERIALS  
SCIENCE & ENGINEERING –  
COL. FOUNTAIN ROOM 324**

**Moderator: Dr. Elba Serrano, NIH-RISE Program**

**Jordan Ulibarri-Sanchez Yael Mata,  
Michelle Frybarger, Jair Arciniega,  
Adriel Herrera, Jesus Castanon,  
Isaiah Ramos**

“Optimization of a Cotton De-Huller Machine”

Major: Mechanical Engineering

Faculty Advisor: Dr. Young Ho Park, Mechanical  
and Aerospace

(USDA, NIFA, HSI)

**Cyrena Ridgeway**

“Chemical Reactivity of Polymer Bonded Sands”

Major: Civil Engineering

Faculty Advisor: Dr. Douglas Cortes, Civil Engineering  
(AMP)

**Michael Kaemingk**

“Development of a Prototype Slow Control System”

Major: Engineering Physics

Faculty Advisor: Dr. Robert Cooper, Physics  
(AMP)

**Courtney Alston, Steven Liaw**

Development of nanoparticle-based essays  
for flow cytometry

Major: Chemical and Materials Engineering

Faculty Advisor(s): Hongmei Luo, Nancy Flores,  
and Jessica P. Houston,

Chemical and Materials Engineering Dept.

# PAPER SESSIONS

## SESSION 3: 11:30am - 12:30pm

### **3A: REVOLUTIONARY WOMEN – OTERO ROOM 126**

**Moderator: Dr. Manal Hamzeh,  
Women Studies**

#### **Alejandra Lerma**

“Today’s Revolutionary Women: The Black Lives Matter Movement”

Major: Animal Science, Biology, Gender and Sexuality Studies

Faculty Advisor: Dr. Manal Hamzeh, Gender and Sexuality Studies

Gender and Sexuality Studies

#### **Diana Lopez**

“The Revolution of the Borderlands through the Work of Gloria Anzaldúa”

Major: Psychology, Spanish, Gender and Sexuality Studies

Faculty Advisor: Dr. Manal Hamzeh, Gender and Sexuality Studies

Gender and Sexuality Studies

#### **Casey McKim**

“Themis: Performance Poetry on the Female SCOTUS Justices”

Major: English

Faculty Advisor: Dr. Manal Hamzeh, Gender and Sexuality Studies

Gender and Sexuality Studies

#### **Lydia Quintana**

“Dolores Huerta “La Pasionaria””

Major: Independent Studies

Faculty Advisor: Dr. Manal Hamzeth, Gender & Sexuality Studies

Gender and Sexuality Studies

### **3B: ADVANCES IN BIO-TECHNOLOGY & BIOCHEMISTRY – SOCORRO ROOM 226**

**Moderator: Dr. Timothy Kelelaar,  
Honors College**

#### **Jaime Moya Gage Blair, John Jacues**

“Water Purification System for Pumps in Rural Communities”

Major: Engineering Physics

Faculty Advisor: Dr. Delia Valles-Rosales, Industrial Engineering

Aerospace engineering Capstone

#### **Marvin Jojola**

“Allelopathy Under Various Temperatures”

Major: Wildlife Science

Faculty Advisor: Dr. Wiebke Boeing, Department of Fish, Wildlife, and Conservation Ecology (MARC, NRCT)

#### **Kimberly Apodaca**

“Conferring resistance to Phytophthora capsici in Capsicum annum using biotechnology”

Major: Genetics & Biotechnology

Faculty Advisor: Dr. Champa Gopalan, PES (HHMI)

### **3C: ADVANCES IN STEM – SENATE CHAMBERS 302**

**Moderator: Dr. William Eamon, Honor College**

#### **Jacqueline Figueroa**

“Don’t Breath if You Want to Live: Activation of Neuronal Protective Mechanisms in the *Trichoplusia ni*. Model”

Major: Biochemistry

Faculty Advisor: Dr. Giancarlo Lopez-Martinez,  
Biology

Honors Thesis, BP-ENDURE (BRAiN)

#### **Rachel Ridgeway**

“Review of Ptychography in Real and Fourier Space”

Major: Physics

Faculty Advisor: Dr. Edwin Fohtung, Physics  
(AMP)

#### **Mary Stofan**

“Analysis of the bile acid synthetic pathway in the absence of enzymes, CYP7A1 and CYP27A1”

Major: Chemistry

Faculty Advisor: Dr. Kevin Houston, Chemistry &  
Biochemistry  
(MARC)

#### **Torey Salgado Andrea Ellis, Leslie Toledo and Charles B. Shuster**

“Evolving roles of Arp2/3 actin networks during early development”

Major: Applied Biology

Faculty Advisor: Prof. Charles Shuster, Biology  
(MARC)



# **A B S T R A C T S**



# ABSTRACTS

## **COURTNEY ALSTON STEVEN LIAW**

“Development of nanoparticle-based assays for flow cytometry”

Major: Chemical and Materials Engineering

Faculty Advisor(s): Hongmei Luo, Nancy Flores, and Jessica P. Houston,  
Chemical and Materials Engineering Dept.

Flow cytometry is a field that interfaces engineering and medicine. A flow cytometer rapidly measures a multitude of features of individual cells. We are focusing on exploratory research where we determine if flow cytometry can detect interactions of bacterial and mammalian cells with nanospheres, namely carbon-dots (Cdots). Our methods involve measurement of both cell types with cytometry and detection of fluorescence labels. Our ongoing results collection indicate the need for controlled dosing of the Cdots with the cells, determination of the Cdot fluorescence, and evaluation of biochemical alterations. We work toward optimizing cytometry to be able to measure cell-nanoparticle interaction.

## **ALI ALGHAREEB ABDULLAH ALHAMDAN KHALED ALMESHWET ABDULAZIZ ALAJMI**

“Navajo Water - Solar oven”

Major: Mechanical Engineer

Faculty Advisor: Dr. Antonio Lara,  
Chemistry and Biochemistry  
(USDA NIFA HSI)

Not all humans have access to clean drinking water. For this is necessary build a device to clean their own water using pellets to absorb the uranium contained in the water. The first task is to build pellets and for this is necessary

build a Solar oven reaching 750C for at least 4-6 hr to dry the pellets. The design is a wood box with two kinds of heat resistance, foam, and sand. The main idea is making a lens focus the sun rays inside the box. The change of temperature will be taken with thermocouples.

## **ANGELIQUE AMADO**

“X-ray Spectroscopic Studies of Cobalt Complexes for Applications in Energy”

Major: Chemistry

Faculty Advisor: Dr. Feifei Li, Chemistry and Biochemistry  
HHMI, Discovery Scholars

Using primarily spectroscopic methods of characterization, we are progressing our understanding of the role differing ligand environments play in the absorption and emission character of transition-metal complexes. Both Valence-to-Core (V2C) X-ray emission spectra (XES) and metal K-edge X-ray absorption spectra (XAS) are being used to assess various cobalt and nickel pre-catalytic systems. These results will provide a new mechanistic understanding of metal systems, while simultaneously providing a deeper insight to benefits and limitations of these emerging techniques.

## **MATTHEW AMATO**

“Cloning solute binding proteins in *Paracoccus denitrificans*”

Major: Biochemistry/Genetics

Faculty Advisor: Dr. Erik Yukl, Chemistry and Biochemistry  
(MARC)

Transition metal homeostasis is related to virulence in pathogenic gram negative bacteria. Gram negative bacteria maintain their levels of transition metals by ABC transporters thus making such systems appealing antibiotic targets. Data from RNA-seq in *Paracoccus denitrificans*, a model gram negative bacterium shows 3 operators of interest that are upregulated in case of

zinc starvation conditions. Two of these operons Azt, and Znu are class A ABC transporters which import zinc via a solute binding protein which binds zinc at high affinity, and the third Pd1341-1345 a class C ABC transporter. In the latter case, the ligand transported by this system is still to be determined. AztC the solute binding protein in the AztABC series has been cloned in a suicide vector to perform a gene knockout of AztC through insertion via a homologous recombination event. Once cloned, an expression plasmid with pd-1341 insert, the solute binding protein in the class C ABC transporter will be used to characterize the protein. Through characterization and gene knockouts of these two solute binding proteins will help inform to what extent these ABC transporters function together in zinc limited conditions whether their function is conserved, redundant or additive.

### **NATALIA ANKIEWICZ**

“Medieval Magical Plants and their Uses Today”

Major: Kinesiology and Psychology

Faculty Advisor: Dr. William Eamon, History

Honors College

In the Middle Ages, many plants were considered to have “occult qualities” that people who practiced magic would use. Most were considered to have healing and health properties. Today, we use plants to help in medicine and help in curing medical issues people have. I am going to explain and look at the similarities between the plants that are used today in society and the plants that are considered to have magical properties when magic was believed in, studied, and used in the medieval times.

### **KIMBERLY APODACA**

“Conferring resistance to *Phytophthora capsici* in *Capsicum annuum* using biotechnology”

Major: Genetics & Biotechnology

Faculty Advisor: Dr. Champa Gopalan, PES (HHMI)

*Phytophthora capsici* is a devastating plant pathogen that causes root rot and blight in many plant species, including chile peppers. Resistance genes within a plant can elicit a resistance response against an invading pathogen by inducing defense genes. The RB gene is a resistance gene from wild potato *Solanum bulbocastanum* that has been shown to elicit a broad spectrum resistance to *P. capsici*. Transient expression of the RB gene determined that the RB gene can be expressed in *C. annuum* and can elicit a resistive response against *P. capsici*. Susceptible *C. annuum* plants were transformed with the RB gene.

### **JUSTIN APODACA**

“Effects of corticosterone-induced stress on vocal learning in the budgerigar”

Major: Biology

Faculty Advisor: Dr. Timothy Wright, Biology (NIH)

Budgerigars, *Melopsittacus undulatus*, can modify their calls to match those of other birds in their flock. We examined changes in the ability of vocal plasticity under induced stress from elevated corticosterone. Osmotic pumps containing corticosterone were surgically placed in male birds with three different treatments. After the pumps were incorporated, males were paired off with different females to measure call plasticity. A prediction was made that high levels of induced stress will result in reduced vocal learning. Male cognitive abilities from the

# ABSTRACTS

induced stress hormone were found to not have any significant matching of pair vocal plasticity.

## DANTE AVALOS

“Mechanism of Zinc Transfer to Solute Binding Protein AztC from Chaperone AztD”

Major: Biochemistry

Faculty Advisor: Dr. Erik Yukl, Chemistry and Biochemistry (HHMI)

Zinc is a required element for homeostasis in most organisms. Pathogens use high affinity ATP-Binding cassette (ABC) transporters to sequester Zinc from the host to maintain cytoplasmic zinc concentration. These ABC transporters rely heavily on solute binding proteins, like AztC. AztC participates in a transfer involving a chaperone, AztD. The mechanism for the transfer is unknown. Using crystallographic evidence, ideas of how this transfer occurs arise for future research on this zinc uptake system. This information can be used in future research in the development of antibiotics against pathogens with this ABC transporting system.

## SOFIA BALI

“Computational Analysis of Synthetic Molybdenum Complexes Modeling Molybdoenzymes”

Major: Biochemistry

Faculty Advisor: Dr. Feifei Li, Chemistry and Biochemistry

Molybdoenzymes catalyze a wide range 2 electron oxo-transfers and hydroxylation reactions; low functionality can lead to diseases such as gout and hyperuricemia. The changes in the reaction trajectory in the presence of acids, specifically pyridinium, was tested using small molecule molybdenum complexes. Experimental results showed a shift from an associative interchange to a dissociative interchange mechanism. Computational analysis for the reaction

mechanism of a small molecule molybdenum complex were performed. Using density functional theorem analysis, the energy profiles of both mechanism was determined as well as identifying the transition states of the mechanisms.

## DANIELA BARRAZA

“A B12 receptor serves a role in membrane stability of *Caulobacter crescentus*”

Major: Biochemistry and Chemistry

Faculty Advisor: Dr. Paola Mera, Department of Chemistry and Biochemistry (MARC)

This project focuses on studying the function of BtuB, a highly expressed transmembrane receptor in bacteria. In *E. coli*, BtuB is involved in the active import of vitamin B12. The role of BtuB in our model organism *C. crescentus* is currently unknown. We hypothesize that this membrane receptor serves to stabilize the outer membrane of *C. crescentus*. We began by constructing a *btuB* deletion mutant and collecting data regarding morphology, growth rate, motility, and viability characteristics as compared to wild type. Our data suggests that this membrane receptor is playing a role in membrane integrity aside from vitamin B12 transport.

## MORGAN BEASLEY

“Revolutionary Women: Virginia Johnson’s Contribution to STEM Research”

Major: Psychology

Faculty Advisor: Dr. Manal Hamzeh, Gender & Sexuality Studies

NMSU Department of Gender & Sexuality Studies

When examining the work of Revolutionary Women who have largely been silenced throughout history, one cannot ignore the groundbreaking work of women in STEM. The focus of this

presentation is Virginia Johnson, a sexology research pioneer. Half of the research team “Masters & Johnson,” Virginia aided in dispelling sexist Freudian myths on the perceived inferiority of female sexuality through her lab recordings of physiological responses during sexual activity. Her unprecedented research contributed to a paradigm shift that enabled the sexual revolution of the 1960s and the 1970s feminist movement through advancements made in understanding of human sexuality and women’s health.

### **MICHAEL BENNETT**

“Characterization of Escherichia coli RecA Q300R mutant through RecA mediated DNA strand exchange”

Major: Biochemistry

Faculty Advisor: Dr. Shelley Lusetti,  
Chemistry and Biochemistry, (MARC)

Escherichia coli RecA is a recombinase protein that is involved in the repair of DNA double strand breaks (DSB) via homologous recombination (DNA strand exchange in Vitro). Normally, RecA mediated DNA strand exchange is optimized under conditions where Mg<sup>2+</sup> levels are around 6-8 mM concentrations. It has previously been shown that removal of amino acids on the E. coli RecA C terminus down shifts the amount of Mg<sup>2+</sup> concentration needed for optimal DNA strand exchange. RecA Q300R is a mutant that carries an arginine substitution at the C-terminal Gln-300 of RecA. Little is known of this mutant other than it being deficient in mitomycin C induced DNA damage repair. The goal of this study is to further characterize this RecA mutant. It was found that the Q300R mutant promotes RecA mediated DNA strand exchange in E. coli at a slower rate when compared to wild type RecA protein. This mutant optimizes DNA strand exchange when Mg<sup>2+</sup> excess concentrations are much lower than wildtype; approximately 2 – 2.5 mM.

### **NUBIA BERMUDEZ**

“Ephrins and their receptors may impact placental development.”

Major: Biology

Faculty Advisor: Dr. Ryan Ashley,  
Animal and Range Sciences  
(HHMI)

Trophoblast attachment to the endometrium and placental development are critical processes during early pregnancy. Failure of normal placental formation results in fetal growth complications and can impact survival. Our lab demonstrated that inhibiting the chemokine receptor CXCR4 impacts proteins involved in placental development. To further define the role CXCR4 signaling may play at the fetal-maternal interface, we examined the presence of ephrins and their receptors using immunoblotting in sheep endometrium after CXCR4 inhibition. Signaling by Ephrins through their respective receptors is important for cell adhesion, migration, and proliferation in normal placental development. We hypothesize that ephrins are affected by CXCR4 inhibition in vivo...

### **KRISTY BURCHELL**

“Pause Duration and Suprasegmental Characteristics of Cochlear Implant Users Speech”

Major: Communication Disorders

Faculty Advisor: Dr. Heike Lehnert-Lehouillier, Special  
Education & Communication Disorders  
Honors Thesis

Forty-six first year university students using one or two cochlear implants participated in this study under a previously approved IRB. The intelligibility of an utterance may be compromised when too many pauses or excessive pause durations are present leading to an inability to be understood by potential conversation

# ABSTRACTS

partners. The t-scores revealed that the pause durations of individuals implanted after 10 years of age were significantly longer and more frequent than those implanted earlier in life.

## **MAKENNA CABALLER**

“Women Revolutionizing the Sport of Roller Derby”

Major: Gender and Sexuality Studies

Faculty Advisor: Dr. Manal Hamzeh, Gender and Sexuality Studies

Gender and Sexuality Studies

Roller derby is the fastest growing women dominated sport in the world despite the hegemonic gender structures in common sports in our society today. The rate at which the sport is growing shows us a revolutionary trend in relation to women and sports. Roller derby also breaks the gendered athletic norms regarding the shapes and types of women that play. This trend is explored in relation to feminism and the construct of alternative femininities. Roller derby empowers women while simultaneously disrupting the hegemonic relations between femininity and masculinity.

## **LILLIAN CALHOUN**

“Simplified Perception”

Major: Dance

Faculty Advisor: Prof. Jermei Edmonson, Kinesiology and Dance

NMSU Kinesiology and Dance Program

Dance has evolved from a foundation of movement into a dynamic art form that requires a large amount of skill and dedication. As a dancer and human I have witnessed the power of pedestrian movement and body language in everyday day life. I am currently exploring how dancers can demonstrate the subtle interactions between people and the power of awareness. Ultimately,

I am choreographing a piece that considers the power each person holds and how to harness that for the betterment of humankind.

## **PASCUAL CAMACHO**

“Sustainable Concrete Structures using Recycled Concrete Aggregate: Short-Term and Long-Term Behavior Considering Material Variability”

Major: Civil Engineering

Faculty Advisor: Dr. Brad Weldon, Civil Engineering (AMP)

As the world’s infrastructure grows, so does the depletion of one of earth’s natural resources, virgin aggregate. Using RCA in structural applications greatly depends on its ability to demonstrate sufficient strength, stiffness, and durability. Experimental tests are being conducted to investigate strength characteristics as well as the resistance to alkali silica reaction and freeze-thaw cycles.

## **BRENT CARRILLO**

“Target Synthesis of LeptoA”

Major: Chemical Engineering

Faculty Advisor: Dr. William Maio, Chemistry (MARC)

Over 80% of modern pharmaceuticals are either natural products or derivatives that were derived from or inspired by natural products. In most cases, due to the scarcity of these molecules from natural sources, there is a need for efficient synthetic methods to meet the demands of modern drug production. Recently, we have begun work on the cytotoxic, marine-derived natural product LeptoA, which has nine undefined stereocenters. By mixing and matching similar, but spatially related pieces, we will be able to determine the correct structure by 1H NMR analysis. This poster will discuss our progress towards the targeted synthesis of the south east hemisphere of LeptoA.

**CARLEY CASEY**  
**STEPHANIE CLARK**  
**BRIANNA DEVER**  
**LAURA MAE DILLE**  
**ALEXIS PUENTE**

“Quid Sit Versu Tibi?”

Major: Dance

Faculty Advisor: Prof. Ann Gavit, Kinesiology and Dance  
NMSU Kinesiology and Dance

We ask questions every day. These questions may be asked internally, said aloud, or looked upon as “stupid”. Sometimes, we are confident or persistent. Other times, we are afraid to ask because we fear the answer or judgment. This piece examines the body language of raising your hand. The way that we raise our hand exemplifies our approach to the question. Our body language changes depending on the reason why we have raised our hand and the anticipated reaction of others. Questions play an important role in helping us define who we are and our answer to the question, “What will your verse be”?.

**SAMANTHA CEBALLES**

“Modeling of Carbon Nanotubes as Dynamical Systems and their Applications”

Major: Mechanical Engineering and Aerospace Engineering

Faculty Advisor: Dr. Abdessattar Abdekfefi,  
Mechanical and Aerospace Engineering  
(AMP)

Carbon nanotubes are currently being considered for several applications in nanotechnology. Applications include biomass sensing and drug delivery, as well as components in microelectromechanical and nanoelectromechanical systems. In the project, variations in boundary conditions, length, and diameter will be considered. Further, nonlocal effects using different

beam and shell modeling equations will be utilized to better match experimental data.

**MARLENE CHAIREZ**

“Emma Goldman an Anarchist Revolutionary Women”

Major: Engineering Physics- Mechanical Engineering

Faculty Advisor: Dr. Manal Hamzeh, Gender &  
Sexuality Studies

Gender and Sexuality Studies

I will introduce the biography of Emma Goldman (1869-1940) an America anarchist of Russian origin from the late 1900century. She mainly teaches us through her personal feelings about the different racist and sexist situations she had faced from her arrival to America to the day of her first lecture. She was a practicing anarchist, a labor agitator, a pacifist in World War 1, an advocate of political violence, a feminist, a proponent of free love and birth control, a communist, and a street-fighter for justice. Emma Goldman is a revolutionary woman who will inspire people toward justice.

**MELISSA CHAVEZ**

“Elucidating the Impact of Protein Phosphatases in the Replication Stress Response”

Major: Biology

Faculty Advisor: Dr. Amanda Ashley,  
Chemistry and Biochemistry  
(MARC)

Phosphorylation of multiple proteins is central to the DNA damage response (DDR) pathways, serving to both sense and respond to DNA damage. Central to these pathways are a number of well-studied protein kinases, especially the PIKK family kinases DNA-PKcs, ATM, and ATR. Quelling of the DDR signals, facilitated by protein phosphatases, is not well understood. We are investigating the roles that protein

# ABSTRACTS

phosphatases PP1, PP2, PP4, PP6, and Wip1 play in modulating the cellular responses to replication stress, and particularly interrogating the interplay between members of DNA double strand break repair pathways with the regulation and activity of these phosphatases.

## GABRIEL CLARK

“Overexpression of sucrose phosphate synthase, the key enzyme in sucrose synthesis, improves performance of alfalfa plants”

Major: General Horticulture

Faculty Advisor: Dr. Champa Gopalan,  
Plant and Environmental Sciences  
(HHMI)

We have introduced a key gene in sucrose synthesis, sucrose phosphate synthase in alfalfa plants utilizing an *Agrobacterium tumefaciens* mediated transformation. Sucrose provides energy and carbon skeletons for the synthesis of biomolecules and also acts as a signal in plant metabolism. The transformants exhibit increased growth and an overall improvement in performance. Because of the longer root system and higher accumulation of sucrose that can act as an osmolyte, we propose that these transformants are more drought tolerant than the untransformed plants. Data on the characterization of these transformants will be presented along with some initial data on drought tolerance studies.

## JESUS DE LA CRUZ

“Spray Drying of Glandless Cottonseed Meal Protein”

Major: Nutrition and Dietetic Science

Faculty Advisor: Dr. Efen Delgado, Food  
Science and Technology  
(AMP)

The glandless cottonseed meal (GCSM) is a by-product of the cottonseed oil extraction pro-

cess. By extracting and spray drying the protein, a plant-based protein powder could be derived to substitute high allergenic proteins. The protein will be extracted with 0.1 M KOH, and precipitated with 0.5 M HCL. The FT80 Spray Dryer will be used to spray dry the protein from the GCSM. An experimental designed was created to optimize the production of dried protein; which will determine the ideal relative humidity (%), inlet temperature (°C), and feeding pump pressure (Hz).

## QUINTIN DEAN

“Effects of nonnative brown trout, *Salmo trutta*, on the foraging ecology of Rio Grande cutthroat trout, *Onchorhynchus clarkii viriginialis*”

Major: Wildlife Science

Faculty Advisor: Dr. Colleen Caldwell, *FWCE*

Competition with nonnative fishes has displaced many native trout populations across North America. Our goal was to determine if invasive brown trout (SATR) affect the foraging ecology of native Rio Grande cutthroat trout (RGCT). We compared benthic macroinvertebrate collections with fish diets collected from RGCT populations with and without SATR. RGCT in sympatry with SATR consumed a higher prey diversity and higher forage biomass than SATR in sympatry as well as compared to RGCT in allopatry. Our results indicate SATR have an impact on the foraging ecology of RGCT and suggests SATR may play a significant role in RGCT productivity.

## **JOHN DESGEORGES**

““Help me Google?: A complete failure to replicate a prominent Science article””

Major: Psychology

Faculty Advisor: Dr. Michael Hout, Psychology

Discovery Scholars

We report a failure to replicate Sparrow et al.'s “Google Effect.” They suggested individuals automatically think of computers (and search engines) when confronted with difficult informational demands. The researchers primed participants by asking them to answer varying yes/no questions, followed by a “Stroop task” wherein participants were shown a word, and indicated its font color. Longer RTs for computer-related terms (relative to unrelated terms), suggested that accessing information in memory activated concepts pertaining to computer-assisted information retrieval. Despite faithful methodological replication, we failed to duplicate their findings. Future work will include updated, normative stimuli in a second attempt at replication.

## **ALEJANDRA ENRIQUEZ**

“Experimental Evolution in *Vibrio fischeri*”

Major: Biology

Faculty Advisor: Dr. Michele Nishiguchi, Biology (MARC)

Experimental evolution tests the responses that occur in organisms while controlling for various environmental factors. Bacteria have short generation times and are ideal for these types of adaptation studies. The mutualism between *Vibrio fischeri* and *Euprymna* squids is environmentally transmitted and provides experimental frameworks to examine bacterial evolution and its effect on colonization. Three strains of *V. fischeri* from different geographic origins and temperatures and evolved.

## **JACQUELINE FIGUEROA**

“Don't Breath if You Want to Live: Activation of Neuronal Protective Mechanisms in the *Trichoplusia ni*. Model”

Major: Biochemistry

Faculty Advisor: Dr. Giancarlo Lopez-Martinez, Biology Honors Thesis

BP-ENDURE (BRAiN)

Living organisms contain regulative mechanisms for maintaining health and vitality. Thus, one angle of therapeutic research aims to manipulate such mechanisms in order to activate repair and maintenance at will. Previous studies have shown that low doses of stress can activate a protective response and upregulate certain pathways to prevent damage. This phenomenon is known as Hormesis, and in this experiment an anoxic conditioning treatment (oxygen-free nitrogen atmosphere) showed improvements in longevity, and oxidative damage assays revealed improvements in the treated moths suggesting activation of neuronal protective mechanisms. Fertility was also observed, as well as differences between the sexes.

## **VIRGINIA FUENTES**

“Review for Biological and Bio-Inspired Aquatic Systems”

Major: Mechanical Engineering

Faculty Advisor: Dr. Abdessattar Abdelkefi, Mechanical & Aerospace Engineering (AMP)

Lately, the implementation of robotic systems has brought attention to researchers for their various applications in aquatic environments. A research was conducted to analyze size, speed, and propulsion locomotion of various biological species, including cephalopods. In addition, an investigation of existing bio-inspired aquatic robots was gathered to compare their mimicry to biological systems in regards to size, movement, and materials applied to mimic skin.



# ABSTRACTS

## STEPHANIE FULLAM

“PERIPLASMIC ZINC TRANSFER REDUCTION BY SITE DIRECTED MUTAGENESIS”

Major: Biochemistry

Faculty Advisor: Dr. Erik Yukl, Chemistry & Biochemistry

Zinc is an essential nutrient, and proteins mediating zinc homeostasis are important virulence factors among pathogenic bacteria. Of particular interest are the ATP binding cassette (ABC) transporters, which utilize extracellular solute binding proteins (SBPs) to bind zinc with high affinity and specificity for delivery into the cell via integral membrane permeases. We are studying the zinc import machinery of *Paracoccus denitrificans* as a model for highly homologous systems in pathogenic bacteria.

## JOSI GABALDON

“MEDICATION STATUS AND GAIT MECHANICS IN OLDER ADULTS: A MULTIVARIATE ANALYSIS”

Major: Kinesiology

Faculty Advisor: Dr. Robert Wood, Kinesiology, BP-ENDURE (BRAiN)

The purpose of this investigation is to test the hypothesis that there will be an interaction between number of medications and certain gait parameters on self-reported falls. The Multivariate test reveals differences in gait factors between individuals according to medication status. Univariate follow-up tests reveal that double-support time is longer and stride-length is shorter in persons on four or more meds as compared to those on three or fewer.

## BRANDON GASS

“On the ‘Live’ Theories of Time”

Major: Philosophy

Faculty Advisor: Jean-Paul Vessel, Philosophy

Honors Thesis

What is time? Does time pass? Can time exist independently of space? In the philosophical literature, there are three competing theories regarding the ontological nature of time. Presentism says only the present exists, past and future do not exist. The Growing-Universe Theory says that the past and present exist, the future does not. Eternalism says past, present, and future all exist. Let’s discuss the motivations and concerns regarding each of these theories.

## CAITLIN GEAR

“The Revolutionary Life of Congress Woman Shirley Chisholm”

Major: Gender & Sexuality Studies

Faculty Advisor: Dr. Manal Hamzeh, Gender & Sexuality Studies

Gender & Sexuality Studies

Shirley Anita Chisholm was the first African-American Congress woman, as a Representative for the 12th Congressional District in Brooklyn, New York. Elected in 1968, she served as a Representative of the same District until 1983. In 1972, she ran for the Democratic presidential nomination, becoming the first African-American woman within a major party. Chisholm’s election to Congress occurred during the Civil Rights Movement in the United States, which focused on the racial injustice of African-Americans. The defiance and activism against a predominantly White Congress, makes Shirley Chisholm a revolutionary woman.

## **ARIELLE GONZALES**

“Discourse Analysis”

Major: Spanish Language

Faculty Advisor: Dr. Mark Waltemire, Linguistics

Honors Thesis

The goal of this study was to better understand how linguistic diversity in underrepresented communities affects safety and overall patient care. This was achieved by participating as a member of a linguistically diverse critical care team in the diglossic communities of Haiti, mainly Port-au-Prince. The study concluded that there were communication barriers present with every patient encounter, that they were primarily linguistic in nature, due to altered mental statuses, and/or due to physical impairment. The study also concluded that some, not all of the communication barriers, could be mitigated with the use of modern technology and good crew resource management.

## **CLARA HANSEN GREGORY M. KOHN, TIMOTHY F. WRIGHT**

“Social networks and call sharing in female Budgerigar flocks”

Major: Biology

Faculty Advisor: Mr. Timothy Wright, Biology (HHMI)

Budgerigars are highly social parrots that are among a few species of animals capable of vocal learning and sound imitation. In this study we investigate whether captive female budgerigars that share a higher proportion of call types have stronger affiliative connections in a social network. Contact call recordings and behavioral observations were conducted in groups of 5 females for 4 weeks. We found no correlation between birds that shared a higher proportion of call types and birds with

stronger affiliative connections. Further studies will explore the role social networks play in call sharing in larger, mixed-sex flocks.

## **ALYSSA HENDREN**

“Biochar for Desalination Concentrate Management”

Major: Chemical Engineering

Faculty Advisor: Dr. Catherine Brewer, Chemical and Materials Engineering (AMP)

High salt concentrations in soil can make the soil unfit to grow glycophytes, a classification of plants that includes most traditional crops. Halophytes are plants that can survive and even thrive in saline soils. The focus of the project is to use a technique known as pyrolysis to obtain biochar from halophyte biomass and to immobilize salt from the biomass in the biochars, resulting in a net removal of salt from the soil. Slow pyrolysis will be used for two different halophytes, *A. lentiformis* and *A. canescens*, at varying temperatures. Leaching experiments will be done to measure the salt retention potential of the biochars. Analytical methods used to measure salt in the biochars and leachates include inductively coupled plasma atomic emission spectrophotometry (ICP) and ion chromatography (IC).

## **CRYSTAL HERNANDEZ**

“Constitutively active Rap1 drives non-photoreceptor cell fate in the *Drosophila* eye”

Major: Biology

Faculty Advisor: Dr. Jennifer Curtiss, Biology (AMP)

The *Drosophila melanogaster* eye is made up of approximately 800 ommatidia, each containing eight neuronal photoreceptors, four lens producing cone cells, and eight pigment

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cells. Eye development in *Drosophila* requires precise cell-cell communication, making the eye a good model to study cell specification. We show that expressing a constitutively active form of Rap1 (Rap1V12) in the eye has little effect on photoreceptor quantity, but increases pigment cells and cone cells, a phenotype that is exacerbated in homozygous Rap1V12 mutants. We hypothesize that Rap1 mutants produce aberrant cell numbers by inhibiting apoptosis or driving cell proliferation through mitosis.

**CARLOS HERRERA**  
**NASER ALMERRI**  
**SALEH ALMARRI**  
**HAMAD AL QABW**  
**NASHER ALAJMI**

“Navajo Water - Rotating Device”  
Major: Mechanical Engineer  
Faculty Advisor: Dr. Antonio Lara,  
Chemistry and Biochemistry  
(USDA NIFA HIS)

It is important to take care of the people who doesn't have the enough resources to make potable their own water, as in the Navajo region. Our goal is to find a viable way to test and record the rate at which uranium is absorbed by clay pellets in water. The device's task is to rotate roughly with 300 test tubes with different orientations as well. The plan is making an NX model of the planned approach to achieve the desired results. And the next step will be created a prototype to test on small scale.

## **GRACE HOOKS**

“Targeting ERBB3 in Triple Negative Breast Cancer”  
Major: Biology  
Faculty Advisor: Dr. Amanda Ashley,  
Chemistry and Biochemistry  
(HHMI)

Triple Negative Breast Cancer (TNBC) is an aggressive clinical subtype of breast cancer that has no ERBB2 gene amplification. We sought to identify genetic vulnerabilities specific to anthracycline resistant TNBC that can be targeted for therapy. ERBB2 is an epidermal growth factor receptor protein that heterodimerizing with other EGFR proteins such as ERBB3 to stimulate intracellular signaling. We identified ERBB3 as a potential target in doxorubicin-resistant TNBC. ERBB3 depletion does not increase sensitivity to doxorubicin, however, results show that apoptosis in TNBC cells is triggered by knockdown alone, and hence ERBB3 may be a target of therapeutic interest.

## **YESENIA IBARRA**

“Ergonomic Analysis for Portable Urban Mobility Access (PUMA) Device”  
Major: Industrial Engineering  
Faculty Advisor: Dr. Delia Valles, Industrial Engineering  
(AMP)

This investigation proposes to identify optimal ergonomic specifications for PUMA. Ideally, consumer products are designed around human anthropometric and ergonomic principles to maximize efficiency, effectiveness and safety (Tannen 2013). An ergonomic analysis will be performed using Technomatix Jack software. Anthropometric measurements for the 5th and 95th percentile of both female and male populations will be used to maximize market penetration. The proposed ergonomic analysis will

offer optimal measurements and recommendations for modifications to the design and manufacturability of the proposed PUMA device.

**BELKIS JACQUEZ**  
**JORDAN COLMANT**

“Interprofessional collaboration between disciplines in a health care environment”

Major: Anthropology

Faculty Advisor: Mary Alice Scott,

Department of Anthropology

BP-ENDURE (BRAiN)

Interprofessional collaboration is pivotal for effective communication and teamwork in any healthcare environment. Patient care relies on the expertise and involvement of numerous health care professionals receiving and acting on information, instructions, and commands. The medical community recognizes interprofessional collaboration as a determinant of patient satisfaction and well-being. How interprofessional collaboration can be integrated in the beginning stages of any medical curriculum is yet to be developed. Here we provide an analysis of an interprofessional collaboration training held for medical disciplines. Utilization of field observations, focus groups, and journal entries are used to gain a holistic understanding of the reception and effectiveness of the training.

**SABRINA JAMISON**  
**YVETTE SALCEDO**

“2016 New Mexico Educator Vacancy Report”

Major: Secondary Education-Life Sciences

Faculty Advisor: Dr. Karen Trujillo

STEM Outreach Alliance Research Lab

In recent years New Mexico has been experiencing an educator shortage. In December of 2015, The Alliance for the Advancement of

Teaching and Learning at NMSU released the first report about teacher vacancies. This report was completed to provide a clearer picture of this educator shortage. The 2016 report has been expanded to include data from Institutes of Higher Education (IHE) in New Mexico that offer Teacher Preparation Programs (TPPs). The purpose of this report is to provide superintendents, deans and policy makers with information relevant to the teacher pipeline issues we face in New Mexico.

**MARVIN JOJOLA**

“Allelopathy Under Various Temperatures”

Major: Wildlife Science

Faculty Advisor: Dr. Wiebke Boeing, Department of Fish, Wildlife, and Conservation Ecology (MARC, NRCT)

Much effort is being put into algal biofuel research. However, we have to better understand interactions between algae to reduce cultivation risk. We noticed a takeover in outdoor raceways, where invasive *Coelastrella* sp. outcompeted desired *Chlorella sorokiniana*. We conducted experiments and grew *Coelastrella* sp. with three different strains of *C. sorokiniana* at three different temperatures (18, 25, 32 °C). We found that all mixtures between the strains produced the allelopathic chemical but only one of the *Chlorella* strains responded with strong growth inhibition to the allelopathic chemical. Future experiments will focus on *C. sorokiniana* 1412 using additional temperature treatments.

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## **MICHAEL KAEMINGK**

“Development of a Prototype Slow Control System”

Major: Engineering Physics

Faculty Advisor: Dr. Robert Cooper, Physics  
(AMP)

Experimental equipment often requires that environmental parameters such as pressure, temperature, and liquid levels remain in specified ranges. Auxiliary slow control systems are used to monitor these parameters and raise alarms if critical conditions are met. These systems can be expensive and intractable. My goal is to develop a low cost, easy to work with prototype slow control system, using Raspberry Pi and Arduino development hardware. The main work consists of building the circuits necessary for sensors to be compatible with the electronic interface boards; writing the software to activate the sensors; and collecting, analyzing, and storing the resulting data.

## **JACQUELINE KIELTYKA**

“IGF-1R expression influences tamoxifen sensitivity of triple negative breast cancer (TNBC) cells”

Major: Biochemistry, Biology, and Genetics and Biotechnology

Faculty Advisor: Dr. Kevin Houston,  
Chemistry and Biochemistry  
(HHMI)

Tamoxifen is an estrogen receptor antagonist in breast cancer cells. Previous work from our laboratory demonstrated that the G protein-coupled estrogen receptor (GPER1) mediates the extracellular accumulation of the insulin-like growth factor binding protein 1 (IGFBP1), resulting in the inhibition of the IGF-1R in ER positive breast cancer cells. We hypothesize that GPER1-mediated inhibition of the IGF-1R signaling pathway in tamoxifen treated triple

negative breast cancer (TNBC) cells similarly results in decreased cell viability. This study examines the efficacy of tamoxifen in TNBC to inhibit cell proliferation through the GPER1 pathway, with an emphasis on the role of IGF-1R.

## **SARA KUSSEROW, KELCIE GERRY, PAIGE RAMSEY**

“Residency As Bootcamp”

Major: Anthropology

Faculty Advisor: Dr. Mary Alice Scott, Anthropology

Honors Thesis

BP-ENDURE (BRAiN)

Burnout among physicians has steadily increased over the last 20 years. Nearly 50% of physicians experience burnout. Burnout reduces the number of physicians available, negatively affects patient care and damages physician health and well-being. Our research explores the root causes of burnout in a medical residency in southern New Mexico. Over the last two years we have collected qualitative data through interviews with residents and faculty and observations in clinic and hospital settings. Research participants often refer to residency as “boot camp,” and our data demonstrates that structural issues such as intense pressure and unreasonable demands are causes of burnout.

## **TRAVIS LEDOUX**

“Hydrothermal Liquefaction Optimization for High and Low-Lipid Algae”

Major: ChME

Faculty Advisor: Mrs. Dr. Catherine Brewer, ChME  
(AMP)

Biofuels produced from a third generation of algae for hydrothermal liquefaction (HTL) continue to develop rapidly. Such advantages of algae-derived oils using the process of hydrothermal

liquefaction have attributes that include, but not limited to high algae growth rates, and strong CO<sub>2</sub>-mitigation potential. For HTL, subcritical water is used to depolymerizes lipids, proteins and carbohydrates in algae, which leads to a high yield of bio-crude oil. With further refinement of the process the product can be upgraded to better produce transportation fuels. This study includes the continuing delineation of bio-crude composition when influenced by an operating change in temperatures ranging from 310-350°C, along with a residence time ranging from 5-60 min, and a solid algae content of 5-10 wt.%. This delineation is included for both the high-lipid microalgae *Nannochloropsis salina* and the low-lipid microalgae *Galdieria sulphuraria*. Bio-crudes of interest are characterized by using several different methods of which include resonance mass spectroscopy (FT-ICR MS), fatty acid methyl ester (FAME), analysis by gas chromatography mass spectroscopy (GC/MS), oxy-combustion calorimetry, and elemental analysis (CHNS). Obtained results are used to optimize species-specific operating conditions for a 1.8 L batch reactor as well as well as to predict optimized conditions for new algae strains based on their feedstock compositions and knowledge of compound degradation pathways. Additional work includes, characterization of results to determine the initial conditions for a pilot-scale continuous flow HTL reactor which is designed to produce char-free biocrude oil from low-solid-content feedstock without centrifugation.

## **ALEJANDRA LERMA**

“Today’s Revolutionary Women: The Black Lives Matter Movement”

Major: Animal Science, Biology, Gender and Sexuality Studies

Faculty Advisor: Dr. Manal Hamzeh, Gender and Sexuality Studies

Gender and Sexuality Studies

The dismantling of political-economic systems of oppression such as capitalism, imperialism and patriarchy is central to contemporary feminist movements. As queer women of color and leaders of the Black Lives Matter movement, Alicia Garza, Opal Tometi, and Patrisse Cullors, are disrupting the systemic silence imposed on them by sexist, racists and heteronormative institutions. This black feminist movement highlights the significance of intersectionality theoretically and on the ground.

## **DIANA LOPEZ**

“The Revolution of the Borderlands through the Work of Gloria Anzaldúa”

Major: Psychology, Spanish, Gender and Sexuality Studies  
Faculty Advisor: Dr. Manal Hamzeh, Gender and Sexuality Studies

Gender and Sexuality Studies

The Borderlands, *la frontera* is a place of inbetweenness that allows us to explore bleeding experiences of women of color. Through her legendary book, *Borderlands La Frontera* Gloria Anzaldúa provides a space for mestizas, xicanas, queer women of color, inclusiveness for all women looking for a place of visibility. The work of legendary, Gloria Anzaldúa continues to provide voices for the unheard by helping express the decolonization of identities through her writing, testimonios, and poetry. Her work as a revolutionary queer mestiza continues to

# ABSTRACTS

impact the lives of people creating solidarity in the borderlands in times when needed the most.

## **SICILEE MACKLIN**

“Adsorption onto Pecan Shell Biochar for Removal of N-Nitrosodimethylamine from Water”

Major: Chemical and Materials Engineering

Faculty Advisor: Dr. Catherine Brewer,

Chemical and Materials Engineering

(AMP)

The constant threat of water contamination promotes development of new methods and materials to effectively clean water before consumption. As a known carcinogen to animals with deteriorative effects to lungs and liver in humans, N-Nitrosodimethylamine (NDMA) has recently gained attention in the scientific community. Harmful consequences can result for living beings from exposure at low concentrations of NDMA, down to the parts per trillion level. Therefore, it is of increasing importance to remove NDMA from the water supply. Activated carbon is commonly used to adsorb a myriad of compounds from water. In New Mexico, pecan shells are found in abundance owing to the influence of the pecan industry and are commonly thought of as a waste material. In this project, local pecan shells are pyrolyzed, some further activated to increase surface area, before testing their adsorptivity of NDMA. The current focus of this project is to utilize scintillation counting, a method used to measure the radioactivity of materials. Carbon-14-labeled NDMA is adsorbed onto the pecan shell char and the radioactivity of these samples determined via scintillation counting. The measure of radioactivity then indicates how much NDMA was adsorbed onto the pecan shell char. Various types of char pyrolyzed at different temperatures will be compared,

along with a coconut shell carbon standard, to determine the best option for NDMA adsorption.

## **SARA MANSHAD**

“The Auditory System Knowledge Space in Public Domain Internet Sources”

Major: Biology

Faculty Advisor: Dr. Elba Serrano, Biology

Serrano Neurolab

Internet queries are used by specialists and non-specialists alike to access scientific information. This work-in-progress evaluates the prevalence of internet resources for auditory science using popular search tools used by the general public (4) and scientists (2). A lexicon of terms for anatomical landmarks of the auditory system was used to query URLs with six search engines. Preliminary results demonstrate differences in the relative number and ranking of URLs retrieved by lexicon queries with public search tools compared to specialist search engines. These findings highlight disparities in auditory system knowledge by both communities and identifies areas for enhanced scientific communication.

## **LIZET MARTINEZ**

“Temperature adaptation influences symbiont specificity in an experimentally evolved bobtail squid-luminous bacterium association”

Major: Microbiology

Faculty Advisor: Dr. Michele Nish, Head

of Department of Biology

(AMP)

Marine bacteria encounter a myriad of abiotic factors that can influence fitness. Specifically, bacterial symbionts that are environmentally transmitted have dual roles that select for both phenotypic and genetic adaptations that influence survival in the planktonic and

symbiotic state. We used an experimental evolution approach to investigate whether adaptation to specific environmental conditions (e.g. temperature) increased the ability of symbiotic bacteria to accommodate novel hosts. Using physiological measures associated with symbiotic fitness (bioluminescence, generation time), we compared ancestral to evolved strains from several Indo-west Pacific populations to determine whether temperature increases the ability of *V. fischeri* to expand their host range.

### **MANUEL MARTINEZ**

“Preparation of Water Purification Membranes via Polymerization Induced Microphase Separation”

Major: Chemical Engineering

Faculty Advisor: Dr. Reza Foudazi, Dr. David A. Rockstraw (AMP)

The use of filtration membrane technologies has revolutionized the way we can obtain clean water. A new alternative has been proposed which consists of developing filtration membranes via polymerization-induced microphase separation (PIMS). This polymerization technique allows the creation of a bi-continuous structure with tunable domain sizes. Selective removal of one of the phases after PIMS, which produces pores in nanometer range, can be employed to make ultrafiltration membranes for water treatment. The ability to select different pore sizes while maintaining the membrane mechanically robust can potentially eliminate common issues in current filtration membranes.

### **CASEY MCKIM**

“Themis: Performance Poetry on the Female SCOTUS Justices”

Major: English

Faculty Advisor: Dr. Manal Hamzeh, Gender and Sexuality Studies, Gender and Sexuality Studies

Today, the field of law remains extremely gendered. There are only four women to date who have been appointed as US Supreme Court Justices. This performance poem will focus on the lives and struggles of these revolutionary women. It will be based on the auto/biographies of Sandra Day O’Connor, Ruth Bader Ginsburg, Sonia Sotomayor, and Elena Kagan. This poem will center around how these women achieved their successes, changed the field of law and the Supreme Court, and the impact that they have had on aspiring young female attorneys.

### **CASEY MCKIM**

“Carving Out a Niche: The Effects of Windsor and Obergefell”

Major: English

Faculty Advisor: Dr. Elizabeth Schirmer, English Honors Thesis

Same-sex marriage was legalized through *US v Windsor* in 2012 and *Obergefell v Hodges* in 2014. These cases made a large impact on both the legal landscape and the queer community, and faced scrutiny and criticism from both pro- and anti-same-sex proponents. Through examination of the rhetoric used by the Supreme Court Justices as well as the commentary made by both legal scholars and queer theorists, this paper attempts to show that the legalization of same-sex marriage does not widen this straight space to make room for queer couples but instead forces them to heterosexualize themselves.



# ABSTRACTS

## LAKKEN MEDINA

“Adiona”

Major: Dance

Faculty Advisor: Prof. Ann Gavit, Kinesiology and Dance  
NMSU Kinesiology and Dance Program

I was inspired to create the solo Adiona from the poem, I Carry Your Heart with Me by E.E. Cummings. The shapes and imagery used were inspired by Ancient Greek artwork and the work of Isadora Duncan. The piece’s floor plan focuses on the use of a diagonal line across the stage. Everything done is meant to move back and forth, accentuating the idea of one being pulled. The piece is about an emotional struggle between two ends. Adiona isn’t meant to tell an exact story, but to instead express the words of the poem through movement and emotion.

## MATTHEW MENA

“Contrasting mitochondrial metabolism with glycolysis in cancer cells with time-resolved flow cytometry”

Major: Chemistry

Faculty Advisor: Dr. Jessica Houston, Chemical Engineering (MARC)

Evaluation of glucose uptake in cells is fundamental for cancer research. Metabolism is well-studied in cancer because differentiation and proliferation of cells, requires mitochondrial metabolism in combination with glycolysis to meet increased energy demands. Quantifying two endogenous fluorophores in tissue, reduced nicotinamide adenine dinucleotide (NADH) and flavin adenine dinucleotide (FAD) is a reliable way to track reduction-oxidation states in the electron transport chain. Higher NADH fluorescence corresponds to tumors that rely more on glycolysis while increased FAD fluorescence corresponds to tumor cells that rely heavily on oxidative phosphorylation. Yet, these measurements are

more complex because the ratio of NADH and FAD does not directly report on glucose uptake nor mitochondrial activity given that cytosolic NAD(P)H also contributes to endogenous fluorescence, which is similar to that of NADH. In this project we use flow cytometry to measure differences in the metabolic pathways for a range of metabolically altered cancer cells. Our objective is to determine if our cell counting system is capable of screening for metabolism at a high throughput. We introduce time-dependent parameters, which allow us to distinguish between NADH, the bound form of NADH and NAD(P)H. To confirm our time-dependent measurements we will compare to fluorescence from exogenous compounds used to demarcate glucose uptake and mitochondrial membrane potential. In vitro experimentation of cancer metabolism with flow cytometry is important for the development of a full understanding of the relationship between mitochondrial activity and glycolysis during cell differentiation and proliferation.

## LESLIE MOSSO

“Screen to Save: Colorectal Cancer Awareness Month”

Major: Public Health

Faculty Advisor: Dr. Rebecca Palacios,  
Public Health Sciences  
NCI U54 CA132381

Colorectal cancer (CRC) is the second leading cause of death from cancer in the US. In NM, Hispanics 50 years and older, have lower CRC screening rates (55%) compared to non-Hispanic whites (65%). The NCI’s Screen to Save (S2S) Initiative seeks to increase CRC knowledge, attitudes, positive lifestyle change, intent to screen and CRC screening completion. In response to the S2S initiative, the NMSU Cancer Outreach Program collaborated with local health agencies to host a CRC Awareness

health fair in Las Cruces, NM, using the Inflatable Colon. As a result of the S2S health fair, strong partnerships were developed.

### **ADDI MOYA**

“Characterization of protein methyl transferases in *Caulobacter crescentus*”

Major: Biology

Faculty Advisor: Dr. Paola Mera, Chemistry and Biochemistry (HHMI)

The hypothesis is that bacterial methylation of proteins is used to regulate the activity of cytoskeletal proteins. We identified 6 genes that encode different methyltransferases in *Caulobacter Crescentus*. The goal is to construct a mutant strain in which all six methyltransferase genes are deleted. A plasmid was constructed to delete the gene of interest, using transformation via electroporation. Phenotypes are compared to the wild type. So far gene 03465 has been deleted, morphological results appear normal in relation to the wild type. Results from this project will potentially identify novel strategies bacteria use to regulate their growth.

### **JAIME MOYA GAGE BLAIR JOHN JACUES**

“Water Purification System for Pumps in Rural Communities”

Major: Engineering Physics

Faculty Advisor: Dr. Delia Valles-Rosales, Industrial Engineering

Aerospace engineering Capstone

In rural communities around the globe, water is pumped directly out of the ground. To eliminate the hazards of ingesting microbes in the water, an external attachment system is designed to fit a pump and rid the water of microbes. The design consists of a gearing system that drives a

DC motor. The current is passed through a string of nanotubes. Promising results show when the current is passed through the nanotubes in the presence of oxygen, peroxide forms and kills the potentially hazardous microbes.

### **NHAT NGUYEN**

“Clay Dehydroxylation Analysis with TGA/DSC to Enhance Pellet Fabrication”

Major: Biochemistry

Faculty Advisor: Dr. Antonio Lara, Chemistry and Biochemistry

FY 17 NM WRRRI Student Water Research Grant

Consumption of uranium-contaminated water in the Navajo Nation results in serious health problems. Natural clays with unique cation exchange capabilities have proven to be excellent cost-effective sorbents for uranium. Although effective, clays are difficult to manage. Thus, clay pellets are being fabricated; we hypothesize a dehydroxylation process for this. Precise dehydroxylation temperatures are essential for robust pellets. Gallup clay's firing temperatures are analyzed by TGA/DSC to establish initial protocols for future analysis of other clays. Gallup's dehydroxylation temperature range is between 672.4°C and 715.2°C with the optimal temperature at 699.3°C, resulting in a 1.67% overall mass loss.

# ABSTRACTS

**HANNAH NICHOLS**  
**LILIAN CALHOUN**  
**LAKKEN MEDINA**  
**NOELIA DE LA ROSA**

“Body Stories: The Trinity of Body, Mind, and Soul”

Major: Dance

Faculty Advisor: Prof. Ann Gavit, Dance and Kinesiology  
NMSU Kinesiology and Dance Program

Body Stories is a two-year project started in the Fall of 2016 that explores humans and the way we relate to our bodies. The Trinity of the Body, Mind, and Soul is an excerpt from this project that focuses on the subconscious way we divide ourselves into three sections; the body, mind, and soul. Dancers and choreographer journaled weekly about their experiences in daily life of when they make this separation and the effect it has on their thoughts and actions toward themselves and others. Overall, it was found that humans are more abusive of themselves and others when this separation is made. When thought of as a unit of Mind-BodySoul, negative thoughts and actions occurred less frequently. The piece of choreography and costuming were created to reflect these findings.

**TAYLOR NUNN**

“Mining Genome Expression Omnibus (GEO) datasets for analysis of TRP channels in glioma cell lines”

Major: Genetics/Biology

Faculty Advisor: Dr. Elba Serrano, Biology  
Discovery Scholars

Morphological differences have been observed between glioma cell lines cultured in monolayer and those cultured in 3D matrix. The mechanosensitive pathways that facilitate this environment-dependent morphology have yet to be well defined. However, a number of transient receptor potential (TRP) channel proteins have been implicated as playing a role

in glioma proliferation and progression. Using open-source microarray data from NCBI Gene Expression Omnibus (GEO), we conducted expression analysis for 13 TRP channel proteins across 7 glioma cell lines to identify candidates for further study. TRPC1, TRPM7, TRPP2 were found to have the highest expression across the cell lines analyzed. Research Support: Manasse Endowment Fund, Discovery Scholars Program.

**FRANCESCA ORTEGA**

“In silico Identification of Pentatricopeptide Repeats in Capsicum”

Major: Genetics

Faculty Advisor: Dr. Paul Bosland, Plant and Environmental Sciences  
(HHMI)

Cytoplasmic male sterility (CMS) – restorer to fertility (Rf) systems are useful in the efficient hybrid seed production. Pentatricopeptide repeat (PPR) proteins are involved in the modulation of organellar gene expression, including the mRNA silencing of CMS. Through in silico analysis, using MAKER2, Biostrings, and ExPASy software, we identified 552 putative PPR genes in the genome of *C. annuum*. Of these, 153 are structurally similar to previously characterized PPR genes, and 14 are similar to previously reported Rf genes. Further characterization through sequencing reveal SNPs among samples that may be useful for future development of molecular markers.

**SEALTIEL ORTEGA-RODRIGUEZ**

“Reference-Seeded Iterative Long-Reads Assembler”

Major: Independent Studies

Faculty Advisor: Donovan Bailey, Biology  
(MARC)

In recent years, long read sequencing assemblies have become more prevalent, as researchers

have attempted to find simpler ways to assemble highly complex genomes. Complex genomes, such as plant mitochondrial genomes, are especially difficult to assemble through conventional methods due to their highly transient nature, as well as their large repeat regions. While next generation sequencing has led to an increase in the number of nuclear genomes published, there has not been a correspondent increase in the number of mitochondrial genomes published, even though the datasets are available. This is largely due to the difficulty in assembling quality mitochondrial genomes. Here, we introduce Reference-seeded Iterative Long-reads Assembler (RILA), an assembly strategy for assembling small complex genomes, as well as genomes from complex data sets.

**WILLIAM PECK**  
**LINDSEY SKOWLUND**  
**ABDULAZIZ ALAZEMI**

“Apache Point Observatory Scheduling Optimization”

Major: Industrial Engineering

Faculty Advisor: Dr. Hansuk Sohn, Industrial Engineering

Capstone: IE and ASTR Departments

Apache Point Observatory is an astronomical observatory located in NM, serving numerous institutions who request time on instruments to observe and collect data for their own research. Staff of APO receive and schedule these requests quarterly, and by hand, which has become a tedious and complicated task, with conflicting requests and dated software. Our team seeks to update the proposal system by revamping the front-end request process using Google Forms, as well as creating a back-hand optimization program that will take the requests and their constraints (dates, type of night, instrument) and output the most optimal solution of a schedule.

**MIKAYLA PULLIAM**  
**AMUDHU GOPALAN**  
**HOLLIE JACOBS**

“A new approach to the synthesis of hydroxamic acids linked by sulfonamide bonds”

Major: Biology

Faculty Advisor: Prof. Amudhu Gopalan,

Chemistry & Biochemistry

(HHMI)

Hydroxamate ligands are well known for their ability to complex hard metal ions such as Fe(III) and Gd(III). They have also been shown to be effective enzyme inhibitors resulting in therapeutic agents for cancer treatment. Many pharmaceuticals contain a sulfonamide linkage which is more stable to enzymatic hydrolysis. Because of this, convenient methods to synthesize hydroxamic acids that are tethered by sulfonamide bonds must be developed. Here we report our approach to prepare novel hydroxamic acids that are tethered by sulfonamide bonds. The key reagent is synthesized by Micheal addition of a protected hydroxylamine to a vinyl sulfonate ester.

**ANTHONY QUINTANA**

“Conceptual design and performance improvement of growing micro unmanned air vehicle”

Major: Mechanical Engineering

Faculty Advisor: Dr. Abdessattar Abdelkefi,

Mechanical Engineering

(AMP)

As technologies advance, the desire for drones with a magnitude of capabilities, including unmanned and micro air vehicles, has increased for both civilian and military applications. This introduces a new era in which autonomous UAV's are capable of perceiving and generating solutions in complex environments. Due to their many potential applications and functions, the

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popularity of these devices has greatly risen, leading to a variety of unique drones with different sizes, shapes, and weights. One of the interesting aspects of avian flight dynamics is how natural flyers, such as birds can deform their shape to optimize their flight in different flight modes. For most of the birds, these changes take place through morphing of the wings. Therefore, the concept of a morphing drone originated from the observation of birds as they flew through the sky. Birds have a unique ability to change several aspects of their wings and body mid-flight in order to alter velocity, altitude, maneuverability, or save energy.

## LYDIA QUINTANA

“Dolores Huerta “La Pasionaria””

Major: Independent Studies

Faculty Advisor: Dr. Manal Hamzeth, Gender & Sexuality Studies

Gender and Sexuality Studies

Dolores Huerta is activist and labor leader who co-founded the United Farm Workers. She has worked to improve the working conditions for migrant farm workers and women. She organized a boycott on grapes, the boycott made the entire country aware of the farm workers struggle. She has been honored for her work as a fierce advocate for farm workers, immigration and women. Her life remains a challenge, after nearly thirty-five years of hard work with the union; many farm-working families still live in poverty. Dolores has always been an active feminist. Her own struggle against sexism and racism will continue.

## ALDO RAMIREZ

“Lower intra-specific levels of aggression found between neighboring urban *Pogonomyrmex rugosus* ant colonies than that of rural colonies”

Major: Biology

Faculty Advisor: Dr. Timothy Wright, Biology (HHMI)

Urbanization can lead to differences in behavior and genetics for many species. We examined aggressive behavior, genetic diversity, and genetic similarity between urban and rural rough harvester ant (*Pogonomyrmex rugosus*) populations. Aggression trials were conducted between urban and rural colony individuals at three different spatial distances. Genetic data was acquired using genotype data at three microsatellite loci. Less aggression was displayed between urban neighboring colonies than for rural neighboring colonies. Genetic diversity was similar for urban and rural colonies, however urban colony pairs from different sites were less similar than that of rural colony pairs from different sites.

## CYRENA RIDGEWAY

“Chemical Reactivity of Polymer Bonded Sands”

Major: Civil Engineering

Faculty Advisor: Dr. Douglas Cortes, Civil Engineering (AMP)

Soil cementation is a technique used for the improvement of soils mechanical properties. Many cementing agents are expensive both economically and environmentally. This research explores the production of cleaner alternatives to soil cementation using polymers. Polyethylene (PE) powder mixed with sand and water are injected with heat to melt the polymer, which flows and coats the sand. Upon cooling, the polymer solidifies rendering a thin polymeric film around the sand particles. This

film acts as a preventative barrier for mineral dissolution under acidic conditions. In this study, the mass loss due to mineral dissolution was observed to assess particle coating.

### **RACHEL RIDGEWAY**

“Review of Ptychography in Real and Fourier Space”

Major: Physics

Faculty Advisor: Dr. Edwin Fohtung, Physics  
(AMP)

Ptychography is a lens-less microscopy technique capable of imaging extended project. When performed in combination with Bragg diffraction and resonance edge scattering, material properties such as magnetization, strain, dislocation and atomic displacements distribution can be imaged in real space with extremely high resolution. This approach limits us to mechanically scan through the field of view (FOV). Fourier Ptychography (FP) on the other hand takes advantage of ptychographic technique without the limitation of mechanically scanning through FOV. This review is essential in the work being done to computationally simulate and construct a system that will be used to preform FP measurements.

### **FELICIA RODRIGUEZ**

“Synthesis of Molybdenum Complexes from Thiosemicarbazone Ligands”

Major: Chemical Engineering

Faculty Advisor: Dr. Feifei Li, Chemistry  
(AMP)

In nature, molybdoenzymes are used to catalyze oxo-transferring and other types of reactions of key physiological relevance. Bio-mimetic molybdenum and tungsten complexes can be synthesized to exhibit specific reactivities reminiscent of enzymatic functions, such as

those of acetylene hydratases or sulfite oxidase family of enzymes. We are currently synthesizing several variations of thiosemicarbazone ligands which can coordinate to a molybdenum or tungsten center to synthesize these biomimetic complexes. These organic synthesizes are carried out in four consecutive steps. After synthesizing these complexes, we began to characterize and purify them. Next, we will carry out reactivity studies to determine the bio-inspired catalytic applications of these compounds.

### **JORDAN SALAS**

“Effect of Confinement on the Acidity of Organic Acids”

Major: Biochemistry

Faculty Advisor: Dr. Michael Johnson,  
Chemistry and Biochemistry  
(MARC)

My research seeks to understand how the properties of organic acids, such as ascorbic acid, phenol, catechol, and structurally similar molecules, are altered when placed near a membrane interface. In this environment solvation of molecules varies compared to bulk media. Variation of the reverse micelle size changes the number of solvent waters present in each micelle. We use reverse micelles as a model system to study how molecules behave at an interface. Specifically we have determined how the acidity of these molecules is affected at interfacial locales. Measuring the 1D HNMR-spectrum at different pH's has allowed my group to precisely determine the apparent pka of these acids. Our results show that ascorbic acid and phenol do not significantly change in their acidities in reverse micelles formed with negatively charged interfaces irrespective of reverse micelle size. In contrast, organic acids show a decrease in acidity with decreasing reverse micelle size, when the interface has a positive charge.

# ABSTRACTS

## **SYDNEY SALAS**

“Implications of Microbial communication between the Sepioid squid and their bioluminescent symbionts: *V. logei* and *V. fischeri*”

Major: Biology

Faculty Advisor: Dr. Michele Nishiguchi, Biology (HHMI)

A shadow-less creature moves across the ocean’s surface, evading predators with an alien like bioluminescence. This organism known as the bobtail squid, represents a specialized symbiotic relationship where the squid serves as a host for bioluminescent bacterial symbionts: *Vibrio logei* and *Vibrio fischeri*. Quorum sensing mechanisms regulate luminescence genes in both bacterial species, generating the right amount of bioluminescence within the squid to match down welling moonlight. This project explores the mechanisms as to how different species of bacteria are able to communicate with one another, and the implications their association have on the overall symbiosis with the squid host.

## **TOREY SALGADO**

## **ANDREA ELLIS**

## **LESLIE TOLEDO**

## **CHARLES B. SHUSTER**

“Evolving roles of Arp2/3 actin networks during early development”

Major: Applied Biology

Faculty Advisor: Prof. Charles Shuster, Biology (MARC)

In nonmuscle cells, actin is organized into either branched or linear networks, and these networks determine cell shape and drive cell shape change. The Arp2/3 complex nucleates branched actin networks that are crucial for cell spreading, and while Arp2/3’s participation in cell motility is well characterized, its role

during early development is unclear. Using fluorescence and live cell microscopy, we have been studying the role of Arp2/3 following fertilization. To date, our results suggest that while Arp2/3 is dispensable for early cell shape changes, Arp2/3 is essential for the spherical-to-epithelial transition of cells of the early embryo.

## **ADAM SANCHEZ**

“Dynamic Characterization of Ultra High Performance Concrete”

Major: Civil Engineering

Faculty Advisor: Dr. Brad Weldon, Civil (AMP)

Ultra high performance concrete (UHPC) has advanced strength and durability properties. Due to a dense microstructure, UHPC has high compressive strengths. Additionally, due to the addition of high strength steel fibers, it has significantly improved tensile capacity. The research looks to investigate the dynamic characteristics. As testing is ongoing, scaled testing on UHPC beams, will help see the dynamic properties that will be evaluated.

## **RYAN SCRIBNER**

“A Rhetoric of Transformation: Empowering Esoteric Writing and Writers with an Augustinian Application of the *dissoi logoi*”

Major: English

Faculty Advisor: Dr. Justine Wells, English (Rhetoric) NMSU English Department

This research has sought to empower esoteric writing in three ways. First, by discovering that exoteric writing is unable to explicate reality. Second, by comprehending the main weaknesses of esoteric writing, and then acknowledging Richard Weaver’s liberating standards of obscurity; which acknowledge the circumstantial nature of the rhetorical situation in relation to Augustine of Hippo’s du-

alism of obscurity and clarity which establish the productive value of obscurity. Third, by considering Weaver's liberating standards of obscurity and Augustine's dualism of obscurity and clarity pedagogically with a rhetorical exercise designed to help students understand the difference between productive obscurity and unproductive obscurity.

### **MICHELLE SILBER**

"Reflections on Multicultural Competencies While Volunteering Internationally for Children with Disabilities"

Major: Communication Disorders/Linguistics

Faculty Advisor: Dr. Amelia Rau, Special Education & Communication Disorders

Honors Thesis

Little research in the field of speech-language pathology focuses on how student immersion programs internationally may help students develop multicultural competencies. The purpose of this paper is, firstly, to provide a literature review containing information on the topic, including limited studies with original quantitative and qualitative data. Secondly, a case study is presented exploring one student's experience and growth during an international service-learning experience in Peru regarding multicultural competencies. Grounded theory guided structured journaling before and during the international service-learning trip to provide the dataset of quotes and transcripts for a two-fold analysis per Kohnert's (2012) competency scale and themes.

### **MARY STOFAN**

"Analysis of the bile acid synthetic pathway in the absence of enzymes, CYP7A1 and CYP27A1"

Major: Chemistry

Faculty Advisor: Dr. Kevin Houston,  
Chemistry & Biochemistry  
(MARC)

In the digestion process, bile acids help absorb lipids. They are synthesized from either the "classic" pathway, catalyzed by the enzyme CYP7A1 or the "acidic" pathway, catalyzed by the enzyme CYP27A1. In order to analyze the effect of eliminating these key enzymes, tissue from wild type, single, and double knockout mice was used. Bile acid profiles were characterized by liquid phase extraction and quantified through LC-MS. Our results showed expected levels of bile acids in the gallbladder samples. However, the plasma samples showed an unexpected elevation of bile acid concentrations in the Cyp7a1 knockout when compared to the wild type.

### **SIERRA STREBE**

"Functional characterization of a highly transcriptional regulated gene in *Caulobacter crescentus*"

Major: Genetics & Biotechnology

Faculty Advisor: Dr. Paola Mera, Chemistry & Biochemistry  
(MARC)

Chemotaxis enables cell motility for bacteria to respond to external chemical signals that will potentially benefit or harm the cell. By understanding how to control the chemotaxis apparatus will enable the advancement in drug development of novel antibiotic. The gene *cagA1* is highly expressed during the swarmer and pre-divisional stages of life cycle of the bacterium *Caulobacter crescentus*. *cagA* is surrounded by chemotaxis operons. Our hypothesis is that deletion of gene *cagA1* will affect motility. Our



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results show that CagA is a membrane protein. We will determine if CagA1 is outer or inner membrane and its specific role in chemotaxis.

## CASSANDRA SUTHER

“Isotherm of Ziziphus Jujuba”

Major: Food Science & Technology

Faculty Advisor: Dr. Efren Delgado, Food Science & Technology

Steinman Endowed Fellowship

The moisture equilibrium of Ziziphus Jujuba, commonly referred to as jujube, was determined at 20, 40, and 60°C using the gravimetric static method. Desecrators were filled with seven salts to change the relative humidity between a range of  $11.31 \pm 0.31$ -  $81.34 \pm 0.3$ . The data was analyzed using the BET model to determine equilibrium moisture content (EMC) along a nonlinear regression. Unique constants for the model were also calculated. As RH was increased, EMC also increased but EMC was also found to decrease with increasing temperature. Values of EMC at different temperatures and RH are important for the processing and storage of food.

## TYLAN TAPLEY

“Islamism in Bangladesh”

Major: Government

Faculty Advisor: Dr. Gregory Butler, Government

In the realm of political discourse, religion has frequently been used as a vehicle to enact change. This is especially prevalent in the more pious Islamic world via a politico-religious ideology called Islamism. Aside from the Middle East, Islamism has had a major influence in the southern Asian states; especially Bangladesh. The purpose of this is to analyze the effects the Islamist movement has had on Bangladeshi political discourse.

## ANGELINE TAYLOR

“Outward Appearance vs. Inner Being: Dissecting Hamlet’s Identity”

Major: English/Creative Writing

Faculty Advisor: Ms. Tracy Miller-Tomlinson, English Department

“Who’s there?” (1.1.1). The first line in Hamlet introduces the idea of the nature of uncertainty as it pertains to character identity within one of Shakespeare’s plays. There are some who reject discussion on character pertaining to Shakespearean plays deeming it anachronistic. They claim that “there was no conception of individuals in early modern (Renaissance)... England...[therefore] the drama of this period never portrayed them” (Levin, 216). However, in the year 1579 “self” was defined as “a noun or pronoun that indicates emphatically that the reference is to the person or thing mentioned and not, or not merely, to some other” (OED, A.). This definition was available to Shakespeare at the time he wrote Hamlet and argues against the belief that there was no conception of the individual in modern England. Therefore, Hamlet presents a play about a character trying to define his self-identity in relation to the living and the dead and who questions whether or not his outward appearances and actions are manifestations of his inner being.

## **GLEN THRONEBERRY**

“Kinematic and wing shape optimization of bio-inspired nano air vehicles for hovering”

Major: Mechanical Engineering

Faculty Advisor: Dr. Abdessattar Abdelkefi,

Mechanical and Aerospace Engineering

(AMP)

Seven insect wing shapes are considered to determine the best wing shape for hovering. Wing geometry of wings affects many aerodynamic properties and can alter the performance of the wing. The wings considered are assumed to be of equal wingspan allowing more focus to be placed on effect of wing shape rather than area. The aerodynamic modeling uses a quasi-steady approximation and a gradient method was used for the optimization. The optimum wing shape is selected based on minimum aerodynamic power.

## **ISMAEL TORRES**

“Forward Guidance Philosophies: The Bank of Japan versus the Federal Reserve”

Major: Economics

Faculty Advisor: Dr. Miriam Chaiken, Honors

Honors Thesis

Forward guidance is language used by a central bank to describe future policy in order to affect long-term interest rates and bond yields, which in turn affects aggregate expenditures. Due to the variability and qualitative nature of forward guidance, central banks approach the practice differently. In the U.S., the Federal Reserve has developed a cautious and subtle forward guidance practice. The opposite philosophy is exhibited by the Bank of Japan, which surprises markets with brash, unexpected announcements. This study compares the differing philosophies and how they affect the ability of each bank to accomplish its mandate by observing short-term indicators.

## **ANNELIESE TRUJILLO**

“A Genetic Engineering Approach in Developing Resistance Against *Phytophthora capsici* in Chile Pepper (*Capsicum annuum*)”

Major: Chemical Engineering

Faculty Advisor: Dr. Champa Sengupta-Gopalan,

Department of Plant and Environmental Sciences

(AMP)

Chile peppers are susceptible to different pathogens. *Phytophthora capsici* is known to be the most significant threat to chile production. Resistant chile cultivars have a resistance (R) gene that is induced following interaction with the pathogen. This interaction leads to induction of defense genes encoding for enzymes making antimicrobial metabolites collectively known as phytoalexins. A gene encoding an enzyme that plays a key role in the synthesis of the phytoalexins has been isolated and engineered for expression in chile. The engineered gene has been introduced into *Agrobacterium tumefaciens* and has been used in chile transformation and transient assay.

## **CHRISTIANE TSO**

“Characterizing the ERBB family members in triple negative breast cancer cell lines”

Major: Biology

Faculty Advisor: Mrs. Amanda Ashley,

Chemistry and Biochemistry

(MARC)

Triple negative breast cancer (TNBC) is characterized by the absence of nuclear estrogen and progesterone receptors and lack of over expression of HER2/ERBB2. We identified ERBB3 as a potential target in sensitizing TNBC cells to doxorubicin. ERBB3 is catalytically inactive, but heterodimerizes with other EGFR/ERBB kinases to stimulate signaling, including AKT acti-

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vation. To understand the expression of other EGFR/ERBB proteins in TNBC cell lines facilitating ERBB3 activity, we completed a series of western blots to characterize their expression levels. Knowledge of pathways that control sensitivity to doxorubicin may assist in developing novel drugs to target chemoresistant TNBC.

## **TRISTAN TYSON**

“Heaving/Plunging Motion”

Major: Aerospace Engineer

Faculty Advisor: Mr. Andreas Gross, MAE (AMP)

The aircraft industry is moving towards composite structures which allow for more efficient higher aspect ratio wings that flex as a result of unsteady aerodynamic loads. As a first step towards fluid structure interaction simulations for a full wing section, two-dimensional simulations are being carried out where the wing structure is being modeled by a spring constant and mass per unit span. The unsteady aerodynamic loads resulting from the vortex shedding were found to result in an unsteady heaving/plunging motion of the two-dimensional wing section. Fourier transforms of the unsteady motion reveal the dominant frequency content.

## **JORDAN ULIBARRI-SANCHEZ**

**Yael Mata**

**Michelle Frybarger**

**Jair Arciniega**

**Adriel Herrera**

**Jesus Castanon**

**Isaiah Ramos**

“Optimization of a Cotton De-Huller Machine”

Major: Mechanical Engineering

Faculty Advisor: Dr. Young Ho Park,  
Mechanical and Aerospace  
(USDA, NIFA, HIS)

The goal of the United States Department of Agriculture (USDA) Capstone projects’ is to optimize the process of de-hulling cottonseeds. Specifically, this group’s focus was that to optimize the de-hulling machine currently in use at Hills Farms. A couple of general ways to optimize a de-hulling machine includes: changing the feed system, creating better separation of product and byproduct and have it be more automated. Our capstone group chose to further improve the separation of product and byproduct by creating an additional, separate, component to the process that would focus solely on the separation process.

## **KRYSTAL VARGAS**

“In Search of “Nutri-Chemicals” in Yellow Capsicum species”

Major: Horticulture

Faculty Advisor: Dr. Ivette Guzman, Plant and  
Environmental Sciences  
Plant and Environmental Sciences

Two xanthophylls, lutein and zeaxanthin, are beneficial in preventing macular degeneration, promoting brain development and healthy cognitive function. Different genetic varieties of yellow chile peppers contain varying amounts of carotenoids including lutein and

zeaxanthin. Forty-eight yellow peppers were extracted and analyzed for lutein and zeaxanthin content. Chromatography results from 48 yellow *Capsicum annuum*s indicated that only seven varieties contain only zeaxanthin or lutein, while others contain a mixture of carotenoids. Overall, this research will profile chile carotenoids, like lutein and zeaxanthin, and may be used to increase the health promoting compounds, lutein and zeaxanthin, in our diet.

## **MOTICHA YELLOWMAN**

“Uranium Abatement Requires Robust Pellets - Fabrication Depends on Clay:Water Ratios”

Major: Chemistry

Faculty Advisor: Dr. Antonio Lara, Chemistry & Biochemistry (AMP)

Potable water is scarce worldwide, especially on the Navajo reservation with toxic uranium that's causing severe health problems. However, our dirt ceramic pellets abate uranium. They are fabricated from various clays; thus, they have unique properties. Yet, robust pellets are necessary to ensure structural integrity for safe transport and disposal. We hypothesize robust pellets are a consequence of increasing the clay:water ratio, and the ratio needs to be precise. Compression tests determined robustness. The optimal clay:water ratio for Gallup clay is 65:35. Robust pellets, in conjunction with proven uranium abatement capabilities, will help alleviate the problem on the Navajo Nation.