# SURCA

## SHOWCASE FOR UNDERGRADUATE RESEARCH AND CREATIVE ACTIVITIES

**March 28, 2016**

Hosted by WSU Undergraduate Education, SURCA is an Office of Undergraduate Research event. SURCA is part of WSU Showcase Week.

*Office of*
Undergraduate Education
WASHINGTON STATE UNIVERSITY

# SURCA 2016

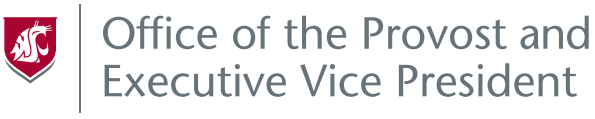
## Showcase for Undergraduate Research and Creative Activities

### Table of Contents

SURCA 2016 thanks these exceptional companies and organizations for their generous support of the SURCA 2016 awards to top undergraduate research presenters:







# The SURCA 2016 Committee

| | |
|---|---|
| Talea Anderson | WSU Libraries |
| Michael Benedict | Office of Undergraduate Education |
| Lydia Gerber | College of Arts and Sciences |
| Samantha Gizerian | College of Veterinary Medicine |
| Jeremy Lessmann | College of Arts and Sciences |
| Mary Sanchez Lanier | Office of Undergraduate Education |
| Beverly Makhani | Office of Undergraduate Education |
| Josh Munson | Global Connections |
| Dee Posey | College of Arts and Sciences |
| Shelley Pressley | Office of Undergraduate Education |
| Daniel Rieck | Office of Undergraduate Education |
| Andrei Smertenko | College of Agricultural, Human and Natural Resource Sciences |
| LeeAnn Tibbals | Health Professions Student Center |
| Cindy Williams | Office of Undergraduate Education |

# SURCA 2016
# Showcase for Undergraduate Research and Creative Activities

Monday, March 28, 2016
CUB M.G. Carey Senior Ballroom and
CUB Junior Ballroom

## SCHEDULE OF EVENTS

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| 2:00 – 3:00 pm | Informal Judging, Senior Ballroom – Judges have access to review the posters without presenters present. There will be an area of the Sr. Ballroom open to judges with refreshments available. No students, non-judging faculty, or public allowed during this period. |
| 3:00 – 4:00 pm | FORMAL JUDGING, Senior Ballroom – Student presenters will be present to answer questions. All tally sheets must be submitted by 4:00 PM. |
| 3:30 – 4:45 pm | Senior Ballroom open to the public for viewing of the posters. Refreshments will be served. |
| 4:45 pm | AWARDS PROGRAM, Junior Ballroom. Presentation of Awards. |

# RUBRIC FOR WSU SHOWCASE FOR UNDERGRADUATE RESEARCH AND CREATIVE ACTIVITIES (SURCA)

| ELEMENT | EXCELLENT (4) | GOOD (3) | ACCEPTABLE (2) | POOR (1) | ABSENT (0) |
|---|---|---|---|---|---|
| **Student Position**<br>*The perspective, thesis, hypothesis, idea, or claim which inspired the project.* | Specific position (perspective, thesis/hypothesis) is imaginative and analyzes the complexities of the position, synthesizes other points of view or disciplinary contexts, and demonstrates a clear understanding of the project limits. | Specific position (perspective, thesis/hypothesis) takes into account the complexities of the project, its underlying assumptions, and identifies other points of view. | Specific position (perspective, thesis/hypothesis) is present and addresses the context of the project. | Specific position (perspective, thesis/hypothesis) is present, but is simplistic and obvious. | Position is not present or is unclear. |
| **Novel Contribution/ Innovative Thinking**<br>*Novelty or uniqueness of idea, claim, question, form, etc.* | Expands a novel or unique idea, question, format, product, or approach to generate new knowledge or creative works. | Creates a novel or unique idea, question, format, product, or approach. | Attempts to create a novel or unique idea, question, format, product, or approach. | Reformulates an idea or collection of available ideas or approaches. | Presents already established information. |
| **Process/Method**<br>*Discipline-specific approach to addressing the idea, question, hypothesis, or claim.* | Skillfully manifests the relationship between process and end product and methods needed to accomplish the end product. | Understands the relationship between process and end product and methods needed to accomplish the end product. | Recognizes the relationship between process and end product and methods needed to accomplish the end product. | Misunderstands the relationship between process and end product and methods needed to accomplish the end product. | Lacks knowledge of the relationship between process and end product and methods needed to accomplish the end product. |
| **Conclusion/Outcome/Creative Product**<br>*A synthesis of key discoveries drawn from evidence or the creative process. How results or creations apply to a larger context or the real world.* | Outcomes reveal insightful patterns, differences, or similarities related to focus. Assertions are well supported.<br><br>Significance of what was discovered, learned or created is clear and implications are explored. | Outcomes reveal important patterns, differences, or similarities related to focus. Assertions are somewhat supported.<br><br>Significance of what was discovered, learned, or created is clear. | Outcomes are presented, but the organization is not effective in revealing important patterns, differences, or similarities. Assertions lack adequate support.<br><br>Significance of what was discovered, learned, or created is unclear. | Presents outcomes, but they are limited and/or are unrelated to focus. Assertions are incorrect or unwarranted.<br><br>Significance of what was discovered, learned, or created is absent. | Project lacks outcomes, support for assertions, and significance of what was discovered, learned, or created. |
| **Presentation/ Display**<br>*Visual presentation of project materials.* | Quality of presentation of materials gives the impression of consistency, professionalism and an astute attention to detail. | Attention to detail is generally good, but there are frequent minor errors or inconsistencies. There are no or very few large problems. | Attention to detail is generally good, but there are frequent minor errors or inconsistencies, and occasional large problems. Professionalism is not obvious. | Numerous small and large errors or inconsistencies in presentation. Details are present, but not sufficient for a professional product. | Presentation is crude, messy, unsophisticated, or very inconsistent. |
| **Presenter**<br>*Oral presentation of the content of the project.* | Actively and effectively engages audience; communication indicates extensive knowledge of the project, is articulate and confident, and presents a mature professional demeanor. | Effectively engages with audience, communication indicates appropriate knowledge of the project, speaks clearly, and presents a professional demeanor. | Somewhat enthusiastic but struggles to communicate clearly. Communication indicates adequate knowledge of the project. Demeanor is appropriate. | Is minimally engaged and communicates ineffectively. Communication indicates limited knowledge about the project. Presents an unprofessional demeanor. | Is disinterested, non-communicative, insufficient knowledge base, unprofessional demeanor, or absent. |

# SURCA 2016
# Showcase for Undergraduate Research and Creative Activities

## JUDGES

We wish to thank our more than 200 judges who have donated their time this afternoon. The judging pool is comprised of many volunteers from:

Alturas Analytics, Inc.

BowTie

Clearwater Paper Corporation

Clinton Health Access Initiative

Decagon Devices, Inc.

Gritman Medical Center

Microsoft Corporation

Nez Perce Tribe

Schweitzer Engineering Laboratories, Inc.

USDA Forest Service, Rocky Mountain Research Station

University of Idaho

US Navy

Washington Research Foundation Capital

WSU Faculty and Staff

Post-Doctoral Fellows

WSU Emeriti

2016
SHOWCASE FOR UNDERGRADUATE RESEARCH
AND CREATIVE ACTIVITIES
ENTRIES
**ALPHABETICALLY BY PRESENTER**

| Poster No. | Presenter | Category | Title of Abstract |
|---|---|---|---|
| **91** | **Abarca, Jonathan and Holland, Destin**; mentor: Amit Dhingra | Molecular, Cellular, and Chemical Biology | Transformation of Camelina sativa |
| **168** | **Abercrombie, Kevin and Lusk, Justin**; mentor: Cristina Wilson | Social Sciences | The Utility of Foregone Choice Outcomes in Reducing Risky Decision Bias |
| **10** | **Abel, Joshua**; mentor: Theresa Jordan | Humanities | The Development of Medieval Castles. |
| **97** | **Adams, Taylor, Panchagnula, Sreenath and Tilke, Dominique**; mentor: Dr. Aaron Crandall | Computer Science, Mathematics, Statistics, and Information Sciences | Usability Evaluation of Smart Home in a Box (SHiB) |
| **158** | **Albert, Alexandria**; mentor: Lindsay Welfelt | Organismal, Population, Ecological, and Evolutionary Biology | Black Bear Habitat Selection |
| **160** | **Alnamnakani, Elyas**; mentor: Dr. Jun Xu | Molecular, Cellular, and Chemical Biology | Motor Coordination Deficits and Gene Mis-Regulation in Kdm6a Gene Deficient Mice |
| **16** | **Alshidhani, Said**; mentor: Genell Wells Ebbini | Arts and Design | Optimum Ablution: A Design Response |
| **24** | **Armstrong, Madison; Thomas, Christina**; mentor: Mark Dybdahl | Organismal, Population, Ecological, and Evolutionary Biology | The Predicted Invasion of the New Zealand Mudsnail across the Northern United States |

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| **169** | **Arroyo, Raul**; mentor: Dr. Karen Sanguinet | Applied Sciences | Over-Expression of BdCAD and BdCOMT in B.distachyon to Improve Drought Tolerance in Grasses |
| **43** | **Baggette, Chelsea; Harris, Samuel**; mentor: Courtney Meehan | Social Sciences | Race Relations between Black and Latino/a College Students at a Predominantly White Institution |
| **94** | **Bailey, Zachary**; mentor: Devendra Shah | Molecular, Cellular, and Chemical Biology | Evaluation of Efficacy of Avian Egg-yolk Derived Antibodies (IgY) against *C. jejuni* Colonization of Human Intestinal Epithelial Cells |
| **149** | **Baker, Peter**; mentor: Jeff Vervoort | Engineering and Physical Sciences | The Geologic Evolution of the Ruby Range, SW Montana |
| **110** | **Barbery, Normando; Bergman, Sarah; Gold, Sarah; Gottlieb, Samantha; Harris, Veronica; Krone, Cheyenna; Palladino, Samantha; Spencer, Pierce**; mentor: Dr. William B Davis | Organismal, Population, Ecological, and Evolutionary Biology | Bioinformatics Analysis of Mycobacterial R Cluster Phages |
| **127** | **Bartoshevic, Randy**; mentor: Shelley Pressley | Applied Sciences | Quantifying Whole Vineyard Water Use Efficiency with the Eddy Covariance Technique |
| **9** | **Bartrand, Arill**; mentor Dr. Vikram Yadama | Engineering and Physical Sciences | Reinforcing Bolted Connections in Wood |
| **110** | **Bergman, Sarah Barbery, Normando;; Gold, Sarah; Gottlieb, Samantha; Harris, Veronica; Krone, Cheyenna; Palladino, Samantha; Spencer, Pierce**; mentor: Dr. William B Davis | Organismal, Population, Ecological, and Evolutionary Biology | Bioinformatics Analysis of Mycobacterial R Cluster Phages |
| **187** | **Birrueta, Maira**; mentor: Christina Falci | Social Sciences | Research Collaboration Networks and Work-Family Conflict: Gender Differences |

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|---|---|---|---|
| **146** | **Bishop, Sierra**; mentor: Brandan M Cook | Molecular, Cellular, and Chemical Biology | Extracellular Vesicles as Double Agents: A New Means of Tissue Specific Drug Delivery |
| **88** | **Blackburn, Alexander**; mentor: Kulvinder S Gill | Molecular, Cellular, and Chemical Biology | Moving-Mesh Partial Differential Equations for Modeling Neutron Star Binaries |
| **186** | **Bleasdale, Andrew**; mentor: Gary S Collins | Engineering and Physical Sciences | Predicting Site Preferences of Impurity Atoms in Intermetallic Compounds Using the Miedema Model |
| **203** | **Boege, Mary**; mentors: Jenna Beaver and Dr. Maureen Schmitter-Edgecombe | Social Sciences | Examining Omission Errors made by Individuals with Mild Cognitive Impairment and Dementia when Completing Activities of Daily Living. |
| **130** | **Botkins, Jack**; mentor: David R Gang | Molecular, Cellular, and Chemical Biology | Metabolomic Investigation of *Phragmites australis* |
| **52** | **Bromley, Jordan; Hembree, Luke; Moro, Meisha; Pederson, Libby; Sinclair, Peter**; mentor: Michael Allen | Engineering and Physical Sciences | The Drake Equation - Calculating the Amount of Life in the Universe |
| **17** | **Brookman, Madeleine**; mentor: Dene Grigar | Humanities | Chronicles: Documenting the Articulation of Culture in Video Games |
| **183** | **Brutman, Julianna**; mentor: Dr. Jon Davis | Molecular, Cellular, and Chemical Biology | Gut Brain Communication and Food Addictive Behaviors |
| **124** | **Bye, Amanda**; mentor: Ian Richardson | Engineering and Physical Sciences | Hydrogen Sorption of Nanosprings |
| **54** | **Cady, Crysta**; mentor: Joyce Ehrlinger, PhD | Social Sciences | Parent Attitudes and Higher Education: The Influence of Perception of Parental Support on College Experience |
| **123** | **Callanan, Jennifer**; mentor: Dr. A. L. Adams Progar | Organismal, Population, Ecological, and Evolutionary Biology | Relationship Between Cow Lying Behavior and Free-stall Barn Design |

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| **202** | **Camarillo, Gilberto**; mentor: Matthew David Whiting | Applied Sciences | Fruit Height and Shoot Relation to Cherry Fruit Quality |
| **44** | **Carnes, Rachel; Vreeken, Madison**; mentor: Brendan Walker | Organismal, Population, Ecological, and Evolutionary Biology | Race Relations between Black and Latino/a College Students at a Predominantly White Institution |
| **100** | **Cavender, Kevin**; mentor: Dr. Konstantin Matveev | Engineering and Physical Sciences | Vortex Tube for Hydrogen Liquefaction using CFD |
| **92** | **Celmer, Lauren**; mentor: Dr. Shyam Sablani | Engineering and Physical Sciences | Microencapsulation of Omega-3 Fatty Acid Rich Flax Seed Oil using Pea Protein Isolate |
| **190** | **Charlton, Akaisha**; mentor: Dr. David Crowder | Organismal, Population, Ecological, and Evolutionary Biology | Effects of Intercropping on Aphid Mobility and Density. |
| **201** | **Cheatham, Jasmine**; mentor: Kimberly Rhoades | Social Sciences | Making a Difference in Disadvantaged Communities |
| **180** | **Cole, Brittany**; mentor: Michael Varnum | Molecular, Cellular, and Chemical Biology | Ubiquitin-Proteasome System Impairment in Ethanol-Mediated Vision Loss |
| **58** | **Conyers, Raven**; mentor: Jennifer Watts | Molecular, Cellular, and Chemical Biology | The Effect of FUdR on Fatty Acid Composition in C. elegans |
| **153** | **Cortez, Luis**; mentor: Steven A Roberts | Molecular, Cellular, and Chemical Biology | APOBEC3A and APOBEC3B Preferentially Deaminate the Lagging Strand Template during DNA Replication |
| **208** | **Coulston, Kayl**; mentor: Matt Taylor | Engineering and Physical Sciences | Autonomous Rover |
| **60** | **Cundy, Don**; mentor: Dr. Anita Vasavada | Engineering and Physical Sciences | Neck Posture Over Time: A Potential Link to Pain |

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| **32** | **Curry, Mattie; Guynes, Keroshini; Perez, Noelle; Prosser, Lora**; mentor: Courtney L. Meehan | Social Sciences | Who cares for children? A cross-cultural investigation of child holding |
| **112** | **Cwick, Dustan**; mentor: Shantel A Martinez | Molecular, Cellular, and Chemical Biology | Understanding Seed Dormancy Breaking Methods in Pacific Northwest Wheat to Prevent Preharvest Sprouting |
| **63** | **Dahmen, Jordana**; mentor: Dr. Diane Cook | Social Sciences | Physical Therapist Feedback Regarding Wearable Technology |
| **78** | **Davie, Ashley**; mentors: Bernard J. VanWie, PhD and Nehal Abu-Lail, PhD | Molecular, Cellular, and Chemical Biology | Bovine Cartilage Digestion and Characterization of Cellular Surface Proteins using Atomic Force Microscopy |
| **98** | **Davies, Tamara**; mentor: Michael Varnum | Molecular, Cellular, and Chemical Biology | Using CRISPR/Cas9 Genome Editing to Alter the CNGA3a Gene in Zebrafish |
| **67** | **Dawson, Krysta**; mentor: Erica Crespi | Organismal, Population, Ecological, and Evolutionary Biology | Extracting Health Effects of Exposure to Oil Sands Pollutants during Early Development in the Wood Frog, *Lithobates Sylvaticus*. |
| **56** | **DelCarmen, Jessica**; mentor: Dr Ting Chi | Social Sciences | Apparel reshoring movement: a case study of a made-in-USA business model |
| **37** | **Delgado, Haley; Wirkkala, Sydney**; mentors: Paul Whitney and John Hinson | Social Sciences | Beneficial Effects of Varying Mood States on Cognition |
| **39** | **DeLong, Austin**; mentor: Dr. Jay Hmielowski | Social Sciences | Effects of Technical Jargon and Numbers on Perceived Information Gathering Capacity |
| **159** | **Derricks, Precelia**; mentor: r. Charles Weller | Social Sciences | Israelis v Palestinians:The Holocaust, Religion, and the Western World |
| **207** | **Diamond, Molly**; mentor: Erica Crespi | Organismal, Population, Ecological, and Evolutionary Biology | Behavior and Disease Recognition of Wood Frog (Lithobates sylvaticus) Juveniles |

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| **81** | **Dittmann, Katherine**; mentor: Lydia Gerber | Humanities | Good Successors to the Communist Cause: Little girls as Instruments of Virtue in Children's Books from the PRC |
| **89** | **Dorrian, Theresa**; mentor: Rita Fuchs Lokensgard | Molecular, Cellular, and Chemical Biology | Cocaine-Memory Reconsolidation - Neural Mechanisms |
| **118** | **Edwards, Beau**; mentors: Paul Whitney and John Hinson | Social Sciences | Detrimental Effects of Negative Moods on Cognition |
| **48** | **Egerton, Kirstin**; mentor: Nehal I Abu-Lail | Engineering and Physical Sciences | Quantification of Diameters of Cellulose Fibrils and Particle Size of Lignin Precipitates on Various Pulp Substrates |
| **77** | **Engle, Kaitlyn**; mentor: Dr. Hang Liu | Applied Sciences | Study on Physical and Mechanical Properties of Agricultural Netting Products |
| **82** | **Erickson, Jaslyn**; mentor: Dr. Her | Molecular, Cellular, and Chemical Biology | Effects of Histone Acetylation on DNA Double Strand Break Repair Mediated by Non-Homologous End Joining (NHEJ) |
| **101** | **Erikson, Chloe**; mentor: Dr. Brendan Walker | Organismal, Population, Ecological, and Evolutionary Biology | Maladaptive Behavioral Regulation in Alcohol Dependence: Role of Dynorphin / Kappa-opioid Receptor Neuroadaptations in the Bed Nucleus of the Stria Terminalis |
| **7** | **Estes, Karl; Kendall, Kendra; Ketcham, Paige; Saur, Allison**; mentor: Dr. Robin Bond | Humanities | Back in Time: An Interpretation of Ancient "Antigone" for Contemporary Audiences |
| **105** | **Evans, Kent**; mentor: Dr. Arda Gozen | Engineering and Physical Sciences | Ink-jet based microlens array manufacturing |
| **35** | **Fabrick, Alex**; mentor: Dr. Scott Beckman | Engineering and Physical Sciences | Modelling Diffusion in Pancreatic Transplant Cells |
| **72** | **Fernandez, Jordan**; mentor: Dr. Zachariah Heiden | Engineering and Physical Sciences | Painting the Color Spectrum with Heavy Metals |
| **26** | **Fetters, Courtney**; mentor: Gulhan Unlu | Applied Sciences | Lactic Acid Bacteria in Raw Bovine Milk on the Palouse |

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|---|---|---|---|
| **47** | **Filardo, Laura**; mentor: Kathleen Ryan | Arts and Design | The Panoptic Experience |
| **79** | **Finlay, Myles**; mentor: Dr. Sterling McPherson | Social Sciences | Treatment for Alcohol Use Disorders in Seriously Mentally Ill Adults Using the Ethyl Glucuronide Biomarker |
| **96** | **Fleming, Konner**; mentor: Elias Bloom | Organismal, Population, Ecological, and Evolutionary Biology | Bumblebee Diversity and Traits in Urban and Rural Farms |
| **107** | **Forte, Adelaine**; mentor: Dr. Carol Salusso | Arts and Design | Senior Apparel Design Collection: Resolute |
| **129** | **Fortson, Alistair**; mentor: Dr. Lydia Gerber | Humanities | 'Black and White, Unite and Fight!' Kaiser Metals Corporation and the 1946 Oakland General Strike |
| **80** | **Foster, Rachel**; mentor: Sterling McPherson | Social Sciences | Preliminary Findings: Predictors and Mediators of HIV/STD Risk Among Crack Cocaine Dependent Patients Receiving Treatment in Sao Paulo Brazil's "Crackland" |
| **144** | **Fredrickson, Michelle**; mentor: Amanda Boyd | Social Sciences | The Tip of the Iceberg: Geographic Discrepancies in Reporting Arctic Mercury Poisoning |
| **70** | **French, Hannah**; mentor: James K Pru | Molecular, Cellular, and Chemical Biology | The Role of PGRMC1/2 in Uterine Lipid Metabolism |
| **171** | **Funk, Corydon**; mentor: melba Salazar-Gutierrez | Organismal, Population, Ecological, and Evolutionary Biology | Climate and Relation to grape quality |
| **90** | **Galindo, Lionor**; mentor: Dr. Thomas G Power | Social Sciences | Latina Mothers' Influence on Their Preschool Children's Self-Regulation of Eating: A Longitudinal Study |
| **42** | **Galvan, Crystal**; mentor: Dr. Carmen R Lugo-Lugo | Social Sciences | Race Relations between Black and Latino/a College Students at a Predominantly White Institution |

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| **164** | **Garcia, Ariana**; mentor: Dr. Kathleen Rodgers | Social Sciences | The Relation of Music Videos to Sexual Consent Negotiation |
| **21** | **Garcia, Karina**; mentor: Bin Yang | Applied Sciences | Biological method of lignin degradation for lipid production |
| **210** | **Garnica, Guadelupe**; mentor: Stacey Hust | Social Sciences | Making Sense of Virginity Loss and Sexual Debut in the Media |
| **147** | **Garnica, Tanya**; mentor: Aaron Roussell | Social Sciences | The Impacts of School Disciplinary Policies on the Academic Achievement of Latino Youth and the School-to-Prison Pipeline |
| **131** | **Garza. Melinda; Hottell, Daniel; Ocampo, Carina**; mentor: Dr. Naidu Rayapati | Organismal, Population, Ecological, and Evolutionary Biology | Gambling with Grafting: Do's and Don’ts |
| **41** | **Go, Mitchell**; mentor: Dr. Brian Kemp | Molecular, Cellular, and Chemical Biology | Using mtDNA Barcodes to Design Universal North American Bird Primers |
| **20** | **Goglin, Connor**; mentor: Dr. Dene Grigar and Will Lewis | Arts and Design | Drink Draw Jump |
| **18** | **Goglin, Connor; Essman, Megan; Luttrell, Randy; Lyons, Matthew; Stassens, Holly; Wollcot, Amanda**; mentor: Dr. Dene Grigar | Arts and Design | T1VR |
| **49** | **Gold, Sarah**; mentor: Hanjo Hellmann | Molecular, Cellular, and Chemical Biology | Classification of Suppressor Mutants Involved in Vitamin B6 Synthesis in Higher Plants |
| **110** | **Gold, Sarah; Barbery, Normando; Bergman, Sarah; Gottlieb, Samantha; Harris, Veronica; Krone, Cheyenna; Palladino, Samantha; Spencer, Pierce**; mentor: Dr. William B Davis | Organismal, Population, Ecological, and Evolutionary Biology | Bioinformatics Analysis of Mycobacterial R Cluster Phages |

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| **1** | **Gomez, Giselle**; mentor: Alex Dimitrov | Engineering and Physical Sciences | iSci: Interactive Technologies for Science Immersion |
| **178** | **Gonzalez, Ramiro**; mentor: Soumik Banerjee | Engineering and Physical Sciences | Modeling Next Generation Lithium-Sulfur Batteries |
| **110** | **Gottlieb, Samantha; Barbery, Normando; Bergman, Sarah; Gold, Sarah; Harris, Veronica; Krone, Cheyenna; Palladino, Samantha; Spencer, Pierce**; mentor: Dr. William B Davis | Organismal, Population, Ecological, and Evolutionary Biology | Bioinformatics Analysis of Mycobacterial R Cluster Phages |
| **138** | **Greene, Nicholas**; mentor: Dr. Rebecca Craft | Organismal, Population, Ecological, and Evolutionary Biology | Modulation of THC Tolerance by CBD |
| **143** | **Grover, Samantha**; mentor: Mert Colpan | Molecular, Cellular, and Chemical Biology | Effect of Cardiomyopathy-related Mutation K15N in Tropomyosin on Actin and Tropomodulin Binding. |
| **31** | **Guenther, Quentin**; mentor: Dr. Jennifer Watts | Molecular, Cellular, and Chemical Biology | A Quantitative Approach to Measuring RNAi Deficiency |
| **25** | **Guizar, Jose**; mentor: Doug Call | Molecular, Cellular, and Chemical Biology | The Mechanism of the Adaptive Response to the Antibiotic Florfenicol |
| **34** | **Gustavson, Ashleigh**; mentor: Jun Xu | Molecular, Cellular, and Chemical Biology | Morphological Analysis of Mice Deficient for the Chromatin Modifying Enzyme Kdm6a |
| **32** | **Guynes, Keroshini; Curry, Mattie; Perez, Noelle; Prosser, Lora**; mentor: Courtney L. Meehan | Social Sciences | Who Cares for Children? A Cross-cultural Investigation of Child Holding |
| **152** | **Hall, Jacob**; mentor: Dr. Amy Arguello | Molecular, Cellular, and Chemical Biology | Optogenetic Inhibition of a Lateral Orbitofrontal Cortex (lOFC) to Basolateral Amygdala (BLA) Subcircuit: Effects on Reinstatement of Food-seeking Behavior |
| **139** | **Hansen, Kyle**; mentor: Dr. Michael Goldsby | Humanities | Circling the Truth: Model Selection Criteria as a Metric of Verisimilitude in Theory Selection |

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| **43** | **Harris, Samuel; Baggette, Chelsea;** mentor: Courtney Meehan | Social Sciences | Race Relations between Black and Latino/a College Students at a Predominantly White Institution |
| **110** | **Harris, Veronica; Barbery, Normando; Bergman, Sarah; Gold, Sarah; Gottlieb, Samantha; Krone, Cheyenna; Palladino, Samantha; Spencer, Pierce**; mentor: Dr. William B Davis | Organismal, Population, Ecological, and Evolutionary Biology | Bioinformatics Analysis of Mycobacterial R Cluster Phages |
| **65** | **Hastings, Mackenzie**; mentor: Jun Xu | Molecular, Cellular, and Chemical Biology | Interaction between Sex Hormones and Sex Chromosome Complement in Metabolism |
| **165** | **Heer, Bryan**; mentor: Amit Bandyopadhyay | Engineering and Physical Sciences | Additively Manufactured Metallic-Ceramic Composite Coatings |
| **135** | **Heid, Haille**; mentor: Mark VanDam, PhD | Social Sciences | Semi-automated linguistic transcription of daylong audio files |
| **52** | **Hembree, Luke; Bromley, Jordan; Moro, Meisha; Pederson, Libby; Sinclair, Peter**; mentor: Michael Allen | Engineering and Physical Sciences | The Drake Equation - Calculating the Amount of Life in the Universe |
| **120** | **Hemmer, Jeremy**; mentor: Dr. Martin Maquivar | Organismal, Population, Ecological, and Evolutionary Biology | What can we Learn from the Sexual Behavior in Cattle? Assessment of Sexual Behavior, Ovarian Physiology, and Fertility in Beef Cattle. |
| **215** | **Henson, Alicia**; mentor: Lydia Gerber | Social Sciences | Sex-Trafficking in China: the Politics vs the People |

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|---|---|---|---|
| **208** | **Hidalgo-Mendez, Jackelyn**; mentor: Judy Schultz | Applied Sciences | A Pilot Study: Parental Reports of Physical Activity Participation and Characteristics of Sensory Processing Disorder in Elementary School Children |
| **148** | **Hiemstra, Alice**; mentor: Dr. Lydia Gerber | Humanities | Beauty in Exemplary Women of Early China |
| **3** | **Hill, Chelsea**; mentors: Stefano Musacchi and Sara Serra | Applied Sciences | Mechanical Pruning of Pink Lady and Kanzi Apple Varietiesz |
| **157** | **Hohman, Hayley**; mentor: Dr. Philip Wandschneider | Social Sciences | The Effect of Student Preferences for Coffee with Regard to Ethical Origins on the Supply and Market of Coffee. |
| **91** | **Holland, Destin and Abarca, Jonathan**; mentor: Amit Dhingra | Molecular, Cellular, and Chemical Biology | Transformation of Camelina sativa |
| **131** | **Hottell, Daniel; Garza. Melinda; Ocampo, Carina**; mentor: Dr. Naidu Rayapati | Organismal, Population, Ecological, and Evolutionary Biology | Gambling with Grafting: Do's and Don'ts |
| **28** | **Howard, Zachary**; mentor: Alan Goodman | Molecular, Cellular, and Chemical Biology | Vertical Transmission of Coxiella burnetii in Drosophila melanogaster |
| **38** | **Hurst, Natalie**; mentor: Dr. Jennifer Zambriski | Applied Sciences | The Effect of Stanchion Housing on Behavior and Health Evaluation in Calves Experimentally Challenged with Cryptosporidium parvum |
| **137** | **Ibrahim, Salman and Saldivar, David**; mentor: Cristina Wilson | Social Sciences | Reducing Risky Decision Making Bias in Trait Anxious Idividuals |
| **29** | **Inglis, Briauna**; mentor: Mark Swanson | Organismal, Population, Ecological, and Evolutionary Biology | Camera Trap Documentation of Mammal Occurrences in Created Snag Gaps in Coastal Temperate Rainforest, northwestern Washington |

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|---|---|---|---|
| **53** | **Jones, Ashley**; mentor: Lee William Daffin, Jr, PhD | Applied Sciences | Assessing the Impact of Online Proctored Exams on Student Performance |
| **161** | **Jones, Nicole**; mentor: Jessica Higginbotham and Rita Fuchs | Molecular, Cellular, and Chemical Biology | Involvement of Basolateral Amygdala CB1 Receptors in Cocaine Memory Reconsolidation |
| **185** | **Kacprzyk, Rafal**; mentor: Andrei Smertenko | Molecular, Cellular, and Chemical Biology | Characterization of novel regulator of cell division in plants |
| **7** | **Kendall, Kendra; Estes, Karl; Ketcham, Paige; Saur, Allison**; mentor: Dr. Robin Bond | Humanities | Back in Time: An Interpretation of Ancient "Antigone" for Contemporary Audiences |
| **7** | **Ketcham, Paige; Estes, Karl; Kendall, Kendra; Saur, Allison**; mentor: Dr. Robin Bond | Humanities | Back in Time: An Interpretation of Ancient "Antigone" for Contemporary Audiences |
| **189** | **Kindle, Michael**; mentor: Dr. Min-Kyu Song | Engineering and Physical Sciences | The Effect of a Mno2-Sulur Composite Cathode on Li-S Batteries for use in Emerging Technologies |
| **199** | **Kim, Sarah**; mentor: Susan Dexheimer | Engineering and Physical Sciences | X-ray Absorption Spectroscopy Studies of Structurally Tunable Electronic Materials |
| **40** | **Klise, Bernice**; mentor: Mark Smithson | Organismal, Population, Ecological, and Evolutionary Biology | Effects of Maternal Environment on Offspring Success of New Zealand Mud snail |
| **110** | **Krone, Cheyenna; Barbery, Normando; Bergman, Sarah; Gold, Sarah; Gottlieb, Samantha; Harris, Veronica; Palladino, Samantha; Spencer, Pierce**; mentor: Dr. William B Davis | Organismal, Population, Ecological, and Evolutionary Biology | Bioinformatics Analysis of Mycobacterial R Cluster Phages |

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| **163** | **LaFrance, Emily**; mentor: Jennifer Thigpen | Humanities | Finding Lives of Independence: The Tattooed Lady and the Nineteenth-Century American Traveling Circus |
| **33** | **Lane, Holly**; mentor: Douglas Collins | Applied Sciences | The Effects of Reduced Tillage on Soil Moisture, Temperature, and Light Penetration in Organic Vegetable Systems |
| **83** | **Larios, Sandra**; mentor: Jenifer Barclay, PhD | Social Sciences | Racial Awareness of American College Freshmen Students attending a Predominantly White University |
| **75** | **Lazar, Jake**; mentor: Ragupathi Nagarajan | Molecular, Cellular, and Chemical Biology | Identification of Mechanisms Controlling Heat Tolerance in Wheat |
| **155** | **Littleton, Antonia**; mentor: Crystal Lederhos | Social Sciences | Development of Multi-family Group and Mindfulness Treatment for Chronic Pain: Preliminary outcomes |
| **95** | **Logan, Meaghan and Selleg, Mackenzie**; mentor: Dr. Rayna Sage | Social Sciences | The Rural Food Pantry Experience: Exploring Ways to Reduce Stigma, Create Community, and Enhance Access to Fresh Foods |
| **168** | **Lusk, Justin and Abercrombie, Kevin**; mentor: Cristina Wilson | Social Sciences | The Utility of Foregone Choice Outcomes in Reducing Risky Decision Bias |
| **13** | **Luttrell, Randy and Wolcott, Amanda**; mentor: Dr. Michael Rabby | Arts and Design | Anti-Nitrous Discrimination: Using Fiction to Promote Change |
| **18** | **Luttrell, Randy; Essman, Megan; Goglin, Connor; Lyons, Matthew; Stassens, Holly; Wollcot, Amanda**; mentor: Dr. Dene Grigar | Arts and Design | T1VR |
| **15** | **Ly, Ahn**; mentor: Su Ha | Engineering and Physical Sciences | Low Temperature Combustion of Bio-diesel in Lanthanum Manganese Oxide with Support |

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| **18** | **Lyons, Matthew Essman, Megan; Goglin, Connor; Luttrell, Randy;; Stassens, Holly; Wollcot, Amanda**; mentor: Dr. Dene Grigar | Arts and Design | T1VR |
| **194** | **Marshall, Chris**; mentor: Sergey Lapin | Computer Science, Mathematics, Statistics, and Informational Sciences | Mathematical Predation Models |
| **68** | **Martin, Marina**; mentor: Alan Goodman | Molecular, Cellular, and Chemical Biology | Overexpression and Knockdown of Drosophila Stimulator of Interferon Genes (dSTING) Suggests a Conserved Immune Response to Bacterial Infection |
| **111** | **Martin, Samantha**; mentor: Dr. Sterling McPherson | Applied Sciences | Pre-randomization Alcohol Use Predicts Duration of Treatment Period Alcohol Abstinence in Adults with Serious Mental Illness |
| **55** | **Martinez, Karla**; mentor: Dr. Blanca Barquera | Molecular, Cellular, and Chemical Biology | Expression of Pseudomonas aeruginosa Na+ - NQR |
| **108** | **Martinez-Tlatenchi, Antonio**; mentor: Dr. Niels Nielson | Social Sciences | Sleep for Science: The Effect of Age and Emotion on Selective Memory Consolidation During Sleep |
| **170** | **Matteson, Holly**; mentor: Dr. Ashley Boyd | Humanities | PROGRESS: A Social Justice Framework for Critical Literacy |
| **141** | **Matz, Keesha**; mentor: Hector Aguilar-Carreno | Molecular, Cellular, and Chemical Biology | Roles of Nipah Virus Attachment, Fusion, and Matrix Proteins in Viral Assembly and Budding |
| **204** | **McCartan, Ryan**; mentor: Jennifer Thigpen | Humanities | The Battle of the Sexes: Billie Jean King v. Bobby Riggs 1973 |
| **102** | **McCurdy, Dana**; mentor: Dr. Hanu Pappu | Molecular, Cellular, and Chemical Biology | Tobacco Rattle Virus Genetic Analysis |
| **106** | **McCurdy, Dana**; mentor: Dr. Cliff Berkman | Molecular, Cellular, and Chemical Biology | Prostate Cancer NA-LNCaP Cell Characterization |
| **6** | **McGinnis, Alan**; mentor: Brenda Grell | Arts and Design | Technology as an Extension of the Human Body |

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| **181** | **McMenimen, Kiera**; mentor: Andy Cavagnetto | Social Sciences | Development of Prosocial Observation Protocol and Inter-rater Reliability in the Classroom |
| **216** | **Miller, Kaitlin**; mentor: Joe Harrison | Engineering and Physical Sciences | Historical Precipitation Analysis in Relation to the Impact of Climate Change on Regional Dairy Manure Storage and Land Application |
| **119** | **Minette, Victoria**; mentor: Carolyn F Ross | Applied Sciences | Spicy Compounds and the Electronic Tongue |
| **136** | **Mitchell, K Rebecca**; mentor: Sergey Lapin | Computer Science, Mathematics, Statistics, and Information Sciences | Optimal virulence strategies of whooping cough |
| **22** | **Moffitt, Natasha**; mentor: Dr. Jan Busboom and Sarah Smith | Humanities | Swine Handling Video for 4-H and Small-Scale Producers |
| **50** | **Monson, Kayla**; mentor: Ella Inglebret | Social Sciences | An Examination of the Reporting Procedures of Socioeconomic Status in Pediatric Hearing Studies |
| **87** | **Morales, Mariany**; mentor: Fang Zhu | Organismal, Population, Ecological, and Evolutionary Biology | Valid Reference Gene Selection for Xenobiotic Adaptation in *Tetranychus urticae* |
| **52** | **Moro, Meisha; Bromley, Jordan; Hembree, Luke; Pederson, Libby; Sinclair, Peter**; mentor: Michael Allen | Engineering and Physical Sciences | The Drake Equation - Calculating the Amount of Life in the Universe |
| **126** | **Mortensen, Daniel**; mentor: Steven R Saunders | Engineering and Physical Sciences | NMR Investigation Into the Influence of Phase Transfer Catalyst Aggregation on Brust-Schiffrin Nanoparticle Final Size |
| **11** | **Murray, Katey**; mentor: Theresa Jordan | Humanities | Ancient Childbirth: History of the Myths |
| **84** | **Musa, Christopher**; mentor: N.A. Wall | Engineering and Physical Sciences | Effect of Iron and Silica on Glass Alteration |

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| **115** | **Navarro, David**; mentor: Dr. Lisa Shipley | Organismal, Population, Ecological, and Evolutionary Biology | Determining the Accuracy of Deer Behavior Patterns from Different Accelerometer Settings |
| **117** | **Niedermayer, Justin**; mentor: Peter Engels | Engineering and Physical Sciences | Saturated Absorption Spectroscopy and Calibration of a Magneto-Optical Trap for Rubidium-87 |
| **128** | **Nishimoto, Shristine**; mentor: Thomas Besser | Organismal, Population, Ecological, and Evolutionary Biology | Phenotypic and Genetic Characterization of Bacterial Species Isolated from Bighorn Sheep, Domestic Sheep, and Cattle |
| **167** | **Nolan, Sean**; mentor: Steve Bollens | Organismal, Population, Ecological, and Evolutionary Biology | Diel Vertical Migration of Zooplankton in Response to Hypoxia in Lacamas Lake, WA |
| **131** | **Ocampo, Carina; Garza. Melinda; Hottell, Daniel**; mentor: Dr. Naidu Rayapati | Organismal, Population, Ecological, and Evolutionary Biology | Gambling with Grafting: Do's and Don’ts |
| **61** | **O’Neill, Sofia**; mentor: Wipawee Winuthayanon | Molecular, Cellular, and Chemical Biology | The Impact of Estrogen Signaling in the Oviductal Cilia |
| **182** | **Oregon, Yadira**; mentor: Dr. Jeffrey Milem | Social Sciences | Family Support and Campus Climate relevance to URIM Experiences in a Pre-Medical Program |
| **85** | **Orenday-Ortiz, Jose**; mentor: Mei-Jun Zhu | Applied Sciences | Reducing Shiga Toxin-Producing E. coli on Fuji Apple by Cinnamon Oil |
| **116** | **Orvis, Austyn**; mentor: Kwanhee Kim | Molecular, Cellular, and Chemical Biology | Phthalate Plasticizers Inhibit Retinoic Acid Receptor Activity Mediated Through Peroxisome Proliferator Activated Receptor Alpha. |
| **64** | **Osborn, Joseph**; mentor: Dr. John McCloy | Engineering and Physical Sciences | Glass of the Ancient Forts |
| **133** | **Osmanson, Allison**; mentor: Lei Li | Engineering and Physical Sciences | Mass Production of Ibuprofen-Loaded Soy Protein Nanoparticles by Rapid Desolvation Technology |

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| **113** | **Pace, Courtney**; mentor: Dr. Yujung Nam | Social Sciences | The Impact of Social Norms and Pressures on Donation Habits |
| **4** | **Palermini, Kate; mentor: Dr. John F Barber** | Arts and Design | Building Stories |
| **110** | **Palladino, Samantha; Barbery, Normando; Bergman, Sarah; Gold, Sarah; Gottlieb, Samantha; Harris, Veronica; Krone, Cheyenna; Spencer, Pierce**; mentor: Dr. William B Davis | Organismal, Population, Ecological, and Evolutionary Biology | Bioinformatics Analysis of Mycobacterial R Cluster Phages |
| **188** | **Palmer, Erica**; mentor: Brian Kemp | Molecular, Cellular, and Chemical Biology | Ancient Smelt Fish DNA Species Identification from Northern California Region Archaeological Projects |
| **97** | **Panchagnula, Sreenath, Adams, Taylor, and Tilke, Dominique**; mentor: Dr. Aaron Crandall | Computer Science, Mathematics, Statistics, and Information Sciences | Usability Evaluation of Smart Home in a Box (SHiB) |
| **213** | **Pearson, Keith**; mentor: D. Blume | Engineering and Physical Sciences | Numerical determination of resonance states of quantum mechanical few-body systems. |
| **52** | **Pederson, Libby; Bromley, Jordan; Hembree, Luke; Moro, Meisha; Sinclair, Peter**; mentor: Michael Allen | Engineering and Physical Sciences | The Drake Equation - Calculating the Amount of Life in the Universe |
| **150** | **Perez, Lysandra**; mentor: Monica Kirkpatrick Johnson, PhD | Social Sciences | First-Generation Latino/a College Student's Transition Experiences: Collectivism to an Individualistic Environment. |

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| **32** | **Perez, Noelle; Curry, Mattie; Guynes, Keroshini; Prosser, Lora**; mentor: Courtney L. Meehan | Social Sciences | Who cares for children? A cross-cultural investigation of child holding |
| **175** | **Pierce, Courtney and Vasil, Christopher**; mentor: Hector Aguilar-Carreno | Molecular, Cellular, and Chemical Biology | Importance of Nipah Virus Fusion Glycoprotein Cytoplasmic Tail in Localization in Lipid Rafts and Virus-Like Particles |
| **5** | **Price, Sophia**; mentor: Leeann Hunter | Humanities | Connection Between Reading and Feeling |
| **32** | **Prosser, Lora, Curry, Mattie; Guynes, Keroshini; Perez, Noelle;**; mentor: Courtney L. Meehan | Social Sciences | Who cares for children? A cross-cultural investigation of child holding |
| **166** | **Puente Arroyo, Jessica**; mentor: George Vandemark | Molecular, Cellular, and Chemical Biology | Genetic Diversity of Rhizobium leguminosarum and Mesorhizobium ciceri from Pea and Chickpea Fields in the Palouse |
| **214** | **Pulcastro, Hannah**; mentor: Bertrand Tanner | Molecular, Cellular, and Chemical Biology | Increasing titin Compliance Reduces Length-Dependent Force Production and Slows Cross-Bridge Kinetics in Skinned Myocardial Strips from RBM20-/- Mice |
| **193** | **Ramirez, Juan**; mentor: Erica Crespi | Organismal, Population, Ecological, and Evolutionary Biology | Examining Variation in Plastic Responses to Different Selective Agents in the Least Killifish |
| **206** | **Ramos, Jose**; mentor: Jacob Leachman | Engineering and Physical Sciences | Thermal Compression Assist for Cryogenic Fuel Cell Busses |
| **19** | **Ranft, Olivia**; mentor: Jacqueline Burgher | Engineering and Physical Sciences | Optimization of a Bench-Sized Biomass Gasification Reactor |
| **179** | **Riggan, Brynden**; mentor: N.A. Wall | Engineering and Physical Sciences | Alteration of ISG and SON68 Nuclear Waste Glass Under Gamma Irradiation |
| **140** | **Rita, Shantel**; mentor: Stephen Bischoff | Social Sciences | College Adjustment of Students from Hawaii in a Predominately-White Institution |

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| **93** | **Roa, Alejandra N**; mentor: Tami L Stubbs | Applied Sciences | Differences in Decomposition Potential of Winter Wheat Residue and NIRS Prediction Models |
| **174** | **Rodgers, John**; mentor: Brian Clowers | Engineering and Physical Sciences | Rapid Gas-Phase Quantification of Chemical Warfare Precursors and Degradants |
| **196** | **Rocchi, Angela**; mentor: Dr. Joseph Harding | Molecular, Cellular, and Chemical Biology | Chronic Dihexa Treatment of Normal Rats creates Potential Treatment for Heart Failure |
| **36** | **Rodriquez, Lindsay**; mentor: Dr. Charles Weller | Humanities | Reemergence of Poliomyelitis in Syria: The Impacts of War |
| **51** | **Romero-Sabo, Samantha**; mentor: Jeb OwenMichael Konkel | Molecular, Cellular, and Chemical Biology | The Chicken you buy at the Store is not as Safe as you Think |
| **177** | **Rus, Adrian**; mentor: Todd Katzner | Organismal, Population, Ecological, and Evolutionary Biology | Role of Experience and Meteorological Factors in Migratory Performance of Golden Eagles (Aquila chrysaetos) |
| **209** | **Sader, Anthony**; mentor: Steven Roberts | Molecular, Cellular, and Chemical Biology | Creating a Model System for Characterizing APOBEC3A and APOBEC3B Induced Mutagenesis in Human Cells |
| **162** | **Saleh, Adam**; mentor: Jean-Sabin McEwen | Engineering and Physical Sciences | Cobalt Doping Effects on Oxygen Vacancy Formations in TiO2(110) |
| **173** | **Salmon, Kacie**; mentor: Dr. Jacob Leachman | Arts and Design | Hyper Games |
| **137** | **Saldivar, David and Ibrahim, Salman**; mentor: Cristina Wilson | Social Sciences | Reducing Risky Decision Making Bias in Trait Anxious Idividuals |
| **7** | **Saur, Allison**; **Estes, Karl; Kendall, Kendra; Ketcham, Paige;** mentor: Dr. Robin Bond | Humanities | Back in Time: An Interpretation of Ancient "Antigone" for Contemporary Audiences |
| **121** | **Schilling, Kevin**; mentor: Jennifer Thigpen | Humanities | Pioneer Interpretations: Gendered, Religious, and Cultural Experiences of the American West |

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| **122** | **Schneider, Seth**; mentor: Anthony Nicola | Molecular, Cellular, and Chemical Biology | Re-purposing an Anticancer Drug to Combat Herpes Simplex Virus Infection |
| **62** | **Schneider, Sydney**; mentor: Dr. Erica Crespi | Organismal, Population, Ecological, and Evolutionary Biology | The Effects of Permethrin Exposure on Developing Common Quail (Coturnix Coturnix) Embryos through use in Nesting Material |
| **192** | **Scott, Kristin**; mentor: Terry Hassold | Molecular, Cellular, and Chemical Biology | Centromeric Behavior and Morphology of Chromosome 16 |
| **95** | **Selleg, Mackenzie and Logan, Meaghan**; mentor: Dr. Rayna Sage | Social Sciences | The Rural Food Pantry Experience: Exploring Ways to Reduce Stigma, Create Community, and Enhance Access to Fresh Foods |
| **205** | **Shaffer, Forrest**; mentor: James Peters | Molecular, Cellular, and Chemical Biology | Ion Channel Profiling in Vagal Afferent Neurons |
| **195** | **Shipman, Molly**; mentor: Maureen Schmitter-Edgecombe | Social Sciences | Increasing Aging Services Technologies Awareness through a Video-based Intervention for Caregivers |
| **184** | **Sidebottom, Darian**; mentor: Cristina Wilson | Social Sciences | The Flexible Nature of Cognitive Control |
| **52** | **Sinclair, Peter; Moro, Meisha; Bromley, Jordan; Hembree, Luke; Pederson, Libby;** mentor: Michael Allen | Engineering and Physical Sciences | The Drake Equation - Calculating the Amount of Life in the Universe |
| **125** | **Sitton, Ciera**; mentor: Kwan hee Kim | Molecular, Cellular, and Chemical Biology | Retinoic Acid Receptor Alpha in Male Germ Cells Causes Junction Instability in the TestisTubule |
| **86** | **Smith, Christopher**; mentor: Bin Yang | Molecular, Cellular, and Chemical Biology | Biological Conversion of Aqueous Wastes from a Pilot Hydrothermal Liquifiaction Biorefinery to Lipids |

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| **176** | **Smith, Paxton**; mentor: Raymond M Quock | Organismal, Population, Ecological, and Evolutionary Biology | Investigating the Antinociceptive Effect of Hyperbaric Oxygen (HBO2) in an Animal Model of Fibromyalgia: Role of Nitric Oxide |
| **109** | **Soth, Madison**; mentor: Rock Mancini | Molecular, Cellular, and Chemical Biology | Receptorless Activation of MyD88 Immune Response by BB-Loop Epitope Multimers |
| **57** | **Spangenberg, Kaylee**; mentors: Dr. Maureen Schmitter-Edgecombe, Dr. Diane Cook | Social Sciences | Development and Usability testing of a Digital Memory Notebook |
| **145** | **Sparkman, Kristen**; mentor: Garish Ganjyal | Humanities | An Overview of Shelf Stable Foods |
| **110** | **Spencer, Pierce; Barbery, Normando; Bergman, Sarah; Gold, Sarah; Gottlieb, Samantha; Harris, Veronica; Krone, Cheyenna; Palladino, Samantha;**; mentor: Dr. William B Davis | Organismal, Population, Ecological, and Evolutionary Biology | Bioinformatics Analysis of Mycobacterial R Cluster Phages |
| **156** | **Sruj, Ola**; mentor: Kathleen Ryan | Arts and Design | From the Ashes Small-town Plans their Comeback |
| **18** | **Stassens, Holly; Essman, Megan; Goglin, Connor; Luttrell, Randy; Lyons, Matthew; Wollcot, Amanda**; mentor: Dr. Dene Grigar | Arts and Design | T1VR |
| **211** | **Sterner, Mariah**; mentor: Bob Simmons | Social Sciences | Factors for Long-Term Volunteer Participation in Environmental Stewardship Programs |
| **142** | **Stoudt, Alexander**; mentor: Raymond M Quock | Organismal, Population, Ecological, and Evolutionary Biology | Hyperbaric oxygen produces antinociception in mice by activating CB1 cannabinoid receptors |

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| **114** | **Summers, Ryan**; mentor: Zhiwu Zhang | Computer Science, Mathematics, Statistics, and Informational Sciences | Parallel Computing in Genome Wide Association Studies |
| **66** | **Sund, Taylor**; mentor: Nathan Havko | Molecular, Cellular, and Chemical Biology | Investigating the role of Jasmonate signaling in resource partitioning during the defense response in Arabidopsis. |
| **27** | **Sutherland, Kathryn**; mentor: Dr. Lydia Gerber | Social Sciences | Fear of a Woman's Sexuality and the Practice of Concubinage in the Qing Dynasty |
| **24** | **Thomas, Christina, Armstrong, Madison;**; mentor: Mark Dybdahl | Organismal, Population, Ecological, and Evolutionary Biology | The Predicted Invasion of the New Zealand Mudsnail across the Northern United States |
| **59** | **Thompson, Jeremy;** Mentor: Dr. Pete Jacoby | Applied Sciences | Saving Water: Deep Subsurface Drip Irrigation for Vineyard Applications |
| **151** | **Tidd, Adam**; mentor: Raymond M Quock | Organismal, Population, Ecological, and Evolutionary Biology | Role of Serotonin in the Acute Antinociceptive Effect of Hyperbaric Oxygen (HBO2) in Mice |
| **97** | **Tilke, Dominique, Adams, Taylor, and Panchagnula, Sreenath**; mentor: Dr. Aaron Crandall | Computer Science, Mathematics, Statistics, and Information Sciences | Usability Evaluation of Smart Home in a Box (SHiB) |
| **76** | **Titialii, Kayla**; mentor: Erica Crispi | Organismal, Population, Ecological, and Evolutionary Biology | A role for leptin in mediating blastema formation and growth in Xenopus laevis limbs |
| **73** | **Torpey, Tillie**; mentor: Paula Groves Price | Social Sciences | Čšťim: Indigenous Methodologies, Culture and Language Revitalization Programs in Salish Communities |
| **8** | **Townsend, Danessa**; mentor: Jeff Brown | Organismal, Population, Ecological, and Evolutionary Biology | Preference for Age Class in Prey Selection of the Gray Wolf (Canis lupus) in Northeast Washington |
| **99** | **Vanderyacht, Bryce**; mentor: Dr. helen Joyner | Applied Sciences | Evaluation of Wear Behaviors in Ideal Gel Systems |

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| **175** | **Vasil, Christopher and Pierce, Courtney**; mentor: Hector Aguilar-Carreno | Molecular, Cellular, and Chemical Biology | Importance of Nipah Virus Fusion Glycoprotein Cytoplasmic Tail in Localization in Lipid Rafts and Virus-Like Particles |
| **45** | **Velasco, Tyra**; mentor: David G Gang | Organismal, Population, Ecological, and Evolutionary Biology | Investigating Environmental Triggers for Phragmites australis Allelopathy |
| **14** | **Vest, Sarah**; mentor: Dr. Amy Meredith | Arts and Design | Anti-Nitrous Discrimination: Using Fiction to Promote Change |
| **200** | **Villalpando, Beija**; mentor: Allison B Coffin | Molecular, Cellular, and Chemical Biology | Larval Zebrafish Lateral Line as a Model for Acoustic Trauma |
| **197** | **Wagner, Mitchel**; mentor: Dr. Jim Cooper | Molecular, Cellular, and Chemical Biology | The Role of Thyroid Hormone in the Development of the Functional Morphology of Feeding in the Zebrafish |
| **69** | **Waldrip, Matthew**; mentor: Brian Collins | Engineering and Physical Sciences | Time Delayed Collection Field Techniques for Organic Solar Cells |
| **74** | **Ware, Terrell**; mentor: Andy Cavagnetto | Social Sciences | A look at Pedagogy in the Classroom: Prosocial Behavior and Instructor Deportment |
| **212** | **Weimar, Halle**; mentor: Dr. Jun Xu | Molecular, Cellular, and Chemical Biology | Elevated Testosterone Levels in Mice Deficient in the Chromatin Remodeling Enzyme Kdm5c |
| **71** | **Weller, Rebecca**; mentor: Dr. Christopher Connolly | Applied Sciences | Relationships between Preference for Proxy Assistance and Self-Efficacy for Various Modalities of Pregnancy Physical Activity |
| **23** | **Werth, Sonja**; mentor: Dr. Paul Verrell | Organismal, Population, Ecological, and Evolutionary Biology | Does Psychological Stress Predict Telomere Length in Wild Spotted Hyenas (*Crocuta crocuta*)? |
| **132** | **Weyand, Logan**; mentor: Tom Besser | Molecular, Cellular, and Chemical Biology | Investigation of the Mycoplasma ovipneumoniae p113 Gene as a Potential Virulence Predictor of Pneumonia Outbreaks in Bighorn Sheep |

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| **2** | **Wickham, Logan**; mentor: Nikolaos Voulgarakis | Computer Science, Mathematics, Statistics, Information Sciences | The Effect of Electrostatic Interactions on Lipid Rafts |
| **217** | **Wilson, Jorden**; mentor: Rodney Frey | Arts and Design | Schitsu'umsh Legends: Chief Child of the Yellow Root |
| **37** | **Wirkkala, Sydney and Delgado, Haley**; mentors: Paul Whitney and John Hinson | Social Sciences | Beneficial Effects of Varying Mood States on Cognition |
| **13** | **Wolcott, Amanda and Luttrell, Randy**; mentor: Dr. Michael Rabby | Arts and Design | Anti-Nitrous Discrimination: Using Fiction to Promote Change |
| **18** | **Wolcott, Amanda Essman, Megan; Goglin, Connor; Luttrell, Randy; Lyons, Matthew; Stassens, Holly;**; mentor: Dr. Dene Grigar | Arts and Design | T1VR |
| **172** | **Wooldridge, Dayton**; mentor: Alla Kostyukova | Molecular, Cellular, and Chemical Biology | Localization of an Actin Binding Site in the N-terminal region of Leiomodin |
| **198** | **Yochim, Jan**; mentor: Dr. Dana Baker | Social Sciences | Mental Health Assessment in Zero Tolerance Education Policies |
| **104** | **York, Zara**; mentor: Pete Jacoby | Applied Sciences | Deep Subsurface Irrigation in Concord Vineyards |
| **154** | **Young, Heather**; mentor: Dr. Amber Adams-Progar | Organismal, Population, Ecological, and Evolutionary Biology | Behavioral and Physiological Responses to Hot Weather Conditions in Holstein Calves |
| **12** | **Young, Michael**; mentor: Lydia Gerber | Humanities | Li Qingzhao: Studies in How Her Husband Effected Her Poetry |
| **46** | **Zecena, Ruben**; mentor: Linda Heidenreich | Humanities | Learning Where to Listen: Examining Third Space Activism in Times of Neoliberal Rhetoric |

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| **30** | **Zerger, Randee**; mentor; Tracie Hanson | Social Sciences | Effectiveness of 4-H Activities for Skill Building through Experiential Education |

Presentation Number **1**

# ABSTRACT:

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|---|---|---|---|
| **Abstract Title:** | **iSci: Interactive Technologies for Science Immersion** | | |
| **Presenter:** | Giselle Gomez | | |
| **Mentor:** | Alex Dimitrov | **Campus:** | Vancouver |
| **Co-Authors:** | Alex Dimitrov Ph.D, Dene Grigar Ph.D | | |
| **Major** | Digital Technology and Culture, Computer Science, CEA, CAS | | |
| **Category:** | Engineering and Physical Sciences | | |


The Idea Behind the Project:

Young people learn best through interacting with information. This model of learning is referred to as *direct experience*. We propose to tap into this powerful experiential learning style by creating an augmented reality (AR) environment that allows students to interact directly with science content objects, sense and perturb them, and naturally develop the basic intuition needed to comprehend concepts that they have previously been unable to experience or develop a complete understanding of.

Our project builds on interactive game environments such as the Xbox/Kinect and Wii, which rely on physical motion and experiential intuition. We propose to assemble an interactive environment that brings together movement and haptic senses, motion tracking, augmented reality, and 3D projections to make this type of learning possible for STEM.

What We've Implemented So Far:

Haptic feedback, a tactile feedback technology, uses the sense of touch in a user interface by applying forces, motions, or vibrations computed in a simulation, to the user.
Using haptic feedback technology, we've been able to map out chemical bonds onto a Novint Falcon controller. This has allowed our team to create an environment in which the actions of the user cause palpable changes. We also incorporate the Xbox Kinect into this interactive environment, in order to make the experience fully immersive. And by using an iPad to first connect commonplace items (like saltwater) to these more complicated technologies, we can introduce complex ideas through familiar gateways – allowing students to intuitively learn the truths behind chemical reactions and bonds.

What Further We Hope to Accomplish:

Create an immersive environment for students to learn in a physically realistic simulation of complex ideas, with the complete scope of this year being to further implement interactivity by adding an Oculus Rift to the currently developed environment.

Presentation Number **2**

# ABSTRACT:

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|---|---|---|---|
| **Abstract Title:** | **The Effect of Electrostatic Interactions on Lipid Rafts** | | |
| **Presenter:** | Logan Wickham | | |
| **Mentor:** | Nikolaos Voulgarakis | **Campus:** | Tri-Cities |
| **Co-Authors:** | Nikolaos Voulgarakis | | |
| **Major** | Computer Science, CEA | | |
| **Category:** | Computer Science, Mathematics, Statistics, and Information Sciences | | |

In this work we study the effect of electrical forces on multiphase fluid dynamics at scales comparable to human cells. Based on the Fluctuating Hydrodynamics (FHD) framework, our mathematical model is capable of simulating diffusion at nanoscopic scales. Our contribution to the field of nanoscale hydrodynamics is the consideration of electrostatic forces in FHD equations. With all the different factors involved in this framework, the calculations were handled by computer programs. We will present results to show how electrostatic forces affect the formation and stability of lipid rafts on a cell membrane, something that can be shown with our model. We believe that our project will be useful in future research in the biological fields where these interactions play an important role in a cell's communication with its surroundings.

Presentation Number **3**

# ABSTRACT:

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|---|---|---|---|
| **Abstract Title:** | **Mechanical Pruning of Pink Lady and Kanzi Apple Varietiesz** | | |
| **Presenter:** | Chelsea Hill | | |
| **Mentor:** | Stefano Musacchi and Sara Serra | **Campus:** | Pullman |
| **Major** | IPS: Tree Fruit and Vegetable Management, IPS: Turfgrass Management – CAHNRS | | |
| **Category:** | Applied Sciences | | |


Pruning and thinning in the orchard industry is a labor and time demanding operation that comes at a great cost for tree fruit growers worldwide. Research has been initiated over the past few years to determine how new methods and improvements to pruning and thinning processes can be used to decrease costs while maintaining sustainable agriculture products for our growing economy.

In 2013, Dr. Stefano Musacchi and Sara Serra along with Karen Lewis and Mathew Whiting launched a research program to study the comparative results between traditional hand pruning methods and mechanical pruning by the use of a sickle bar machine over the course of three years. The research would be compared on two different apple varieties, Pink Lady grafted on a M9337 rootstock in Mattawa, WA and Kanzi grafted on a M9 rootstock in Quincy, WA.

The program was designed to help identify appropriate tree blocks and specific tree architectures that would be suitable for mechanized use. The focus was to determine the most effective and efficient pruning and thinning methods in medium-high density plantings of apple orchards. Data was collected in several different measurable areas such as vegetative and fruit yield, fruit quality, and overall tree physiology to determine the best approach for the selected orchard.

There were significant findings in the trial, which showed that mechanical pruning was two times faster than traditional hand pruning on average. In the orchard blocks that used mechanical pruning showed a number of scraped or peeled branches causing a higher rate of dirty cuts compared to traditional hand pruning methods. Seasons also greatly affected how much material was removed. In the winter results showed higher yields of material removed from the control plots versus mechanical pruning and in the summer more wood and leaves were removed by mechanical pruning. This research program is expected to conclude at the end of 2016 with high hopes of improved tree fruit, orchard performance and management for worldwide use.

Presentation Number **4**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Building Stories** | | |
| **Presenter:** | Kate Palermini | | |
| **Mentor:** | Dr. John F. Barber | **Campus:** | Vancouver |
| **Major** | Digital Technology and Culture, Anthropology, CAS | | |
| **Category:** | Arts and Design | | |


**Description**
*Building Stories* is a multimedia experience for mobile devices that combines augmented reality, a technology that superimposes a computer-generated image on a user's view of the real world, and digital media to create a series of interactive stories centered in downtown Vancouver, Washington. *Building Stories* utilizes the existing architecture of downtown Vancouver buildings to create a series of storyscapes by turning each building into a "trigger image" that, when scanned with the mobile device, overlays the building with digital media to immerse and engage the reader. The buildings, in essence, become the pages of a book. *Building Stories* utilizes text, image and sound to create story vignettes celebrating and sharing the history of the Vancouver community.

**Research Question**
With the increasing popularity of interactive media, such as video games and virtual reality, how can augmented reality be used to create an educational environment that showcases the rich history of the Vancouver community in a way that will engage and educate the public?

**Research Methodology**
The Action Research methodology will be used to quantify the efficacy of the project. Action Research is "systematic enquiry conducted though the medium of practical action, calculated to devise or test new, or newly imported, information, ideas, forms, or procedures and to generate communicable knowledge." **1** This approach focuses the researcher on four stages: designing, testing, optimizing, and showing.

**Outcome**
The desired outcome of *Building Stories* is to create an immersive environment that allows the general public of the downtown Vancouver, WA, area and visitors to access historical data and stories in an engaging and interesting way.

Presentation Number **5**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Connection Between Reading and Feeling** | | |
| **Presenter:** | Sophia Price | | |
| **Mentor:** | Leeann Hunter | **Campus:** | Pullman |
| **Major** | Literary Studies - CAS | | |
| **Category:** | Humanities | | |

My project revolves around the hypotheses of how reading is involved with feelings, and how this idea helps a person perceive what they are reading. I set out to answer two questions: How does reading stimulate emotional feelings? And how does the way a person touches what they are reading help them perceive what they are reading? Through research and comparison, I was able to discover the different forms of reaction to reading.

I discovered the different forms of emotional response by looking closely at a study done by David Bleich on how students react to passages in a classroom setting. This was done by giving students different kinds of material to respond to, thus showing the different reactions gained. Emotions are a subconscious feeling. They naturally occur from something that is read. The intensity of the emotional reaction changes through the association a person has with certain words or phrases. From those emotions stems an emotionally physical response. It was then discovered that physical responses come from an emotional response. The sweating of palms, the heart racing even faster, and the face growing red; these are all physical reactions to emotions.

My second hypothesis involved the topic of haptics; the study of touch. Through research I discovered how different forms of literature change the different perception of reading. For instance, how do Chris Ware's comic books differ from Andy Campbell's touch poems, which change as you hover over a different blurb. Through looking at the different ways literature is evolving from the interaction of advanced technology, I researched how this changes a person's perception of reading. Through looking deeper into the topic of haptics, a conclusion was found that physical touch is strongly involved in emotional response. When a person uses their tactical sense, optical senses are often involved, stimulating an emotional response. The idea of perception is formed through emotional and physical responses. By concluding these questions, the involvement of feelings with reading has proven to intertwine. Different forms of feelings stem from different forms of literature, though there is more information to discover on these topics.

Presentation Number **6**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Technology as an Extension of the Human Body** | | |
| **Presenter:** | Alan McGinnis | | |
| **Mentor:** | Brenda Grell | **Campus:** | Vancouver |
| **Major** | Digital Technology and Culture - CAS | | |
| **Category:** | Arts and Design | | |

The purpose of "Technology as an Extension of the Human Body" is to explore how volunteer communities and open source software can make assistive technology cheaper for those with disabilities. The people who need this technology the most are those with physical, visual, and auditory disabilities. My research focuses on technology to assist those with these disabilities. The technology includes 3D printed hands for partial hand or finger amputees, glasses to help people with amyotrophic lateral sclerosis (ALS) communicate, and the use of vibrating motors to help the deaf hear and the blind see. My process involves 1) Interviewing makers and studying their models 2) Creating content that documents my findings and serves as a resource on a website and 3) Drawing visitors to the website with a working prototype so that people can understand the way in which technology must work in conjunction with the human body.

At the SURCA presentation I will be exhibiting the website. The website, which functions as a resource for people with disabilities, offers information about the assistive technology needed by those with disabilities. Visitors will also be able to explore the different communities, learn how to make their own prototypes, and find out how they can become involved. Information is presented in multiple formats to accommodate different learning styles. The website is built on WordPress with multiple pages that have information about my research, tutorials for making low cost assistive technology, and information about the various communities who donate their time and energy to help others. The plan is to promote the website through forums and social media to draw engagement.

Presentation Number **7**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Back in Time: An Interpretation of Ancient "Antigone" for Contemporary Audiences** | | |
| **Presenter:** | Karl Estes, Kendra Kendall, Paige Ketcham, Allison Saur | | |
| **Mentor:** | Dr. Robin Bond | **Campus:** | Pullman |
| **Co-Authors:** | Paige Ketcham, Kendra Kendall, Allison Saur, Abe Podkranic | | |
| **Major** | Estes: Computational Neuroscience, Kendall: Management Information Systems, CCB, Honors; Ketcham: Management Information Systems, Innovation & Change – CCB, Honors, Saur: Speech and Hearing Sciences, CMS, Honors | | |
| **Category:** | Humanities | | |

The goal of our interpretation was to explore how Sophocles' *Antigone* (ca. 441 B.C.E) would have been interpreted by the original ancient Greece audience. We hoped to provide an insight for modern audiences into the social issues that plagued ancient Greek society and guide them away from the current contemporary interpretation of the play. While modern audiences are inclined to sympathize with Antigone due to progressive feminist views, we believe that the ancient Greek audience would have viewed her as a strong voice for the sacred duty of women. Additionally, we believe that neither Kreon nor Antigone would have been seen by the Greek audience as the villain or the hero; therefore, we encouraged our audience to refrain from discounting one character over the other. We also discouraged our audience from disregarding Ismene as an important character. In Ancient Greek society, she would most likely have been seen as a strong voice for the role of women rather than weak willed and submissive. After viewing multiple translations of Antigone, both ancient and modern, we decided to utilize The Complete Sophocles, Volume I, translated by Reginald Gibbons and Charles Segal. We felt that this translation provided a solid foundation for adding, removing, and shifting lines to create a new script that would elicit a classically Greek response within a contemporary audience.The bulk of our background knowledge on Ancient Greece during the golden age of Athens was gained from the Honors 280 class taught by our mentor Dr. Robin Bond.This knowledge proved invaluable in assessing how we approached the play. We also did additional research on Sophocles, the mythology behind *Antigone*, the historical context and the social issues surrounding around the play. Specifically, *Antigone* would have brought up issues from the time period regarding the development of democracy and the Greek polis, the movement away from the former polytheistic religion, and the debate over a woman's role at home versus her sacred duty.

Presentation Number **8**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Preference for Age Class in Prey Selection of the Gray Wolf (Canis lupus) in Northeast Washington** | | |
| **Presenter:** | Danessa Townsend | | |
| **Mentor:** | Jeff Brown | **Campus:** | Pullman |
| **Major** | Wildlife Ecology - CAHNRS | | |
| **Category:** | Organismal, Population, Ecological, and Evolutionary Biology | | |

The gray wolf (*Canis lupus)* is naturally recolonizing in the state of Washington from adjacent states and provinces, and are listed as a state and federal endangered species. When managing for large carnivores it is important to understand the variable aspects of their prey species. This study was done to determine if there was specific age class preference shown among gray wolves and their prey species selection in northeast Washington. GPS cluster points from wolf locations were visited and analyzed to determine the prey species and age class. Age classes documented were juvenile or adult. Juveniles were constituted by the young of the year and yearlings from the previous year, and all others were considered adults. Age class was determined using the dental analysis of the lower mandibles or the presence of skull fragments from the young of the year. Using a chi-squared test of independence for age class and prey species, we found that wolves in northeast Washington show no statistical preference for age class among their prey species.

Presentation Number **9**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Reinforcing Bolted Connections in Wood** | | |
| **Presenter:** | Arill Bartrand | | |
| **Mentor:** | Dr. Vikram Yadama | **Campus:** | Pullman |
| **Co-Authors:** | Dr. Vikram Yadama | | |
| **Major** | Civil Engineering, Applied Mathematics – CEA, CAS, Honors | | |
| **Category:** | Engineering and Physical Sciences | | |

Failures in wood structures are often governed by the integrity of connections where stresses tend to be localized. These areas of high stress can cause splitting, crushing, or shear failures of the wood. Often wood connections consist of bolts which are a good example of forces being concentrated as they pass from one structural element to another. One potential method of reinforcing the wood around the bolt is to add layers of a reinforcing material to strengthen areas experiencing higher levels of stress. In this study, sheets of glass fiber reinforcement were used as the reinforcing material. Other materials such as carbon fiber and laminated wood could also be used and investigated in further studies, but glass fiber was chosen for its viability with regard to both cost and strength. The work of this study was to analyze connections using a theoretical model and predict how reinforcement would bolster the overall connection strength. To validate the model, testing was performed on connections with and without reinforcement. Since wood is an orthotropic material (i.e. exhibiting different material properties in different directions) the model takes into account the differing material properties in each direction of the material. Independent testing was performed on the wood to furnish these material properties in order to increase the accuracy of the model's predictions.

Presentation Number **10**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **The development of Medieval castles.** | | |
| **Presenter:** | Joshua Abel | | |
| **Mentor:** | Professor Theresa Jordan | **Campus:** | Pullman |
| **Major** | History - CAS | | |
| **Category:** | Humanities | | |

My project will be centered on the development of the castles of Western Europe, the Islamic Empire and those of Japan and China during the sixth through fourteenth centuries. I will discuss their uses as residences, as offensive tools to wage campaigns against rivals, and defensive tools against the same rivals.

The castles of Western Europe were developed based on the concepts of the Roman Castra and the older Oppila hill forts. Many of these earlier castles were based on these designs such as the Motte-and-bailey castles, and Saxon Burghs. These wooden and earth style castles would be transformed into shell keeps and stone castles such as the Norman Donjons. These castles would be used by Western European lords as residences as well as fortresses from which to keep control of the country side and as bases for military conquests.

The castle design of the Umayyad, and Abbasid dynasties were far more advanced than those of Western Europe during the sixth through tenth centuries. They would be constructed out of stone, something not nearly as common in Western Europe during this time frame, with their uses also being different as well. The nobles of these two dynasties would not live in castles like their Western European contemporaries instead building their castles at strategic areas to defend trade routes as well as approaches to cities.

Finally I will analyze of Japanese castles during this time period and compare them to the Islamic and Western European castles. The comparison will include their construction methods, styles and uses as both military assets and residences. The Japanese castles would mirror those of the west slightly developing out of wooden stockades, though the Japanese castles would always primarily being built of wood usually only using stone at the base of the castle.

Presentation Number **11**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Ancient Childbirth: History of the Myths** | | |
| **Presenter:** | Katey Murray | | |
| **Mentor:** | Theresa Jordan | **Campus:** | Pullman |
| **Major** | History, Communication – CAS, COMM | | |
| **Category:** | Humanities | | |

For the last six months, I have been working on research that concerns the history of the myths and practices of ancient and medieval childbirth. My sources include Pliny the Elder and Celsus, two men who wrote numerous texts of Roman midwifery and gynecological discoveries who had no medical training, but their education allowed them to write about the folklore that surrounded childbirth.

I expect to explore the folklore surrounding childbirth practices, such as the Roman legend that has persisted even in modern times that states if you place a knife under the bed during labor it is supposed to cut the labor pain in half. I was interested to learn that both Rome and throughout medieval Europe, C-sections were only preformed when the mother had died or was nearly dead and that was the only hope of possibly saving the child. They did not have modern knowledge of anatomy and thus would usually cause so much harm to the mom that her survival was unimaginable.

In conclusion, I found that the childbirth practices in mediaeval times can be classified as barbaric and deadly for women. This being said, I also found that though this was a period in history with relatively poor hygiene practices, there was nonetheless a deep understanding of keeping a women healthy for childbirth.

Presentation Number **12**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Li Qingzhao: Studies in How Her Husband Effected Her Poetry** | | |
| **Presenter:** | Michael Young | | |
| **Mentor:** | Lydia Gerber | **Campus:** | Pullman |
| **Major** | Foreign Langauges and Cultures (Chinese), Foreign Langauges and Cultures (Japanese) – CAS, Honors | | |
| **Category:** | Humanities | | |

This paper focuses on Li Qing Zhao, a very famous woman poet who lived in the 1100's in the Song Dynasty, her life, and how her poems got effected by her husband, Zhao MingCheng. The two shared a great romance, and a rich, cultured life, but the invading tribes of the Mongols and Tartars threw China into chaos. Zhao MingCheng soon dies after he is called out on a governmental post, leaving Li Qing Zhao alone and heartbroken. This paper looks at how Zhao MingCheng was both an inspiration for her poetry as well as a way to allow her to be a female artist in a strict patriarchy. The paper then analyses the poems she wrote in her life, and looks at their content. I use direct translations of the ~40 ci poems that have survived, written in *Sino-Platonic Papers*, which also includes the original Chinese text. I also used commentaries on her life by various authors, and other books to help me look at the original versions of the poems. It briefly looks at similes and allusions, the radicals of the characters used in the poems themselves etc. The essay looks at how radicals, similes, and allusions change from before and after his death, and what that says about how he affected Li Qingzhao and her poetry as a whole.

Presentation Number **13**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Anti-Nitrous Discrimination: Using Fiction to Promote Change** | | |
| **Presenter:** | Randy Luttrell, Amanda Wolcott | | |
| **Mentor:** | Dr. Michael Rabby | **Campus:** | Vancouver |
| **Co-Authors:** | Tommy Billison; Dallen Clark; Jordon Gonzales; Amanda Wolcott | | |
| **Major** | Luttrell: Digital Technology and Culture - CAS, Wolcott: Digital Technology and Culture - CAS | | |
| **Category:** | Arts and Design | | |

The Anti-Nitrous Discrimination project presents a prototype for an anti-bullying campaign that utilizes a variety of digital mediums to reach a school and college-aged audience on the topic of bullying and discrimination. The alien race Nitrous represents a discriminated population, and provides a metaphor to allow most viewers a connection point to their travails. A fictionalized race also gives the viewer a change to grapple with the underlying issues related to discrimination and bullying, without the triggers that a more reality-based approach could entail. The project employs transmedia to tell its story, using a variety of channels that young people are likely to view. A series of videos illustrates the problems the Nitrous experience in everyday life, and shows how people around them treat them cruelly. An animation introduces the mood toward the Nitrous race, and provides branding for the project. A fictional blog from a leading advocate on equality provides readers continuous advice on appropriate behaviors. Facebook and Twitter accounts reach people through their social media channels, which then pull them back to the website and beyond. Finally, the website hosts all of the disparate elements and links in one place, and provides a centralized space that people can engage with the story. Beyond the fictional storytelling, the project presents resources for awareness and action relating to bullying and discrimination. These resources include instructions on what to do when people encounter bullying and places to support further anti-bullying efforts. Given the prevalence of bullying in our society, and the ease that the Internet can enable it, this project provides a unique and important strategy to address this issue. It also demonstrates the work that WSU students can contribute to a national conversation. Research included a comparative analysis of anti-bullying and anti-discrimination campaigns and their use of different media to disseminate their message. Another research question was how different forms of fiction have been used to promote social change and what criteria constitute the success of social change through fiction.

Presentation Number **14**

# ABSTRACT:

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|---|---|---|---|
| **Abstract Title:** | **Cleft Palate Film Production** | | |
| **Presenter:** | Sarah Vest | | |
| **Mentor:** | Dr. Amy Meredith | **Campus:** | Spokane |
| **Major** | Speech and Hearing Sciences, CMS | | |
| **Category:** | Arts and Design | | |

Impoverished children and adults with cleft lip and/or cleft palate in Guatemala and neighboring countries travel to a clinic operated by Hearts In Motion (HIM), a non-profit agency that provides critical reconstructive surgery. Since 2011, WSU-Spokane's annual weeklong mission trip empowers Speech and Hearing Science students to develop Speech Therapy skills. Language barriers further compound the limited science knowledge of the patients and their families. Previous student and faculty participants researched existing Spanish-language information about cleft and discovered resources for an audience with formal science education. As available materials do not appropriately engage the target population, they proposed creating an educational film for the surgical waiting room.

The film production project was formed in mid-2015. The project manager interviewed previous trip participants to develop the scope, established a project timeline and recruited student volunteers. Production teams researched and generated the script, translated and narrated the text, recorded interviews or collected images. The project manager assembled the materials into a film.

The final project illustrated the basics of speech, breathing and swallowing followed by the cause of cleft and the impact of cleft on those processes. A surgeon interviewee described the most common surgeries; a Speech Language Pathologist interviewee emphasized the need for Speech Therapy after surgery. The final section described advice for recovery and long-term success including pain management, nutrition selection and wound care.

This project creatively supports the discipline of Speech and Hearing Science by educating, empowering and improving the quality of life for an underserved population. Initially available for the March 2016 Guatemala HIM mission trip, the scope of this presentation is limited to the project management aspect of the film. The socioeconomic status of the patients increases the burden of traveling between their residence and the HIM clinic; one element of the film is to explain the potential medical need of returning for additional care when follow-up is recommended by the surgeon. To assess the impact of film topics, student participants of the March 2016 trip will survey the audience before and after viewing the film, discussing their results in a future presentation.

Presentation Number **15**

# ABSTRACT:

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|---|---|---|---|
| **Abstract Title:** | **Low Temperature Combustion of Bio-diesel in Lanthanum Manganese Oxide with Support** | | |
| **Presenter:** | Anh Ly | | |
| **Mentor:** | Su Ha | **Campus:** | Pullman |
| **Co-Authors:** | Oscar Marin-Flores, Grant Norton | | |
| **Major** | Chemical Engineering - CEA | | |
| **Category:** | Engineering and Physical Sciences | | |

Heat energy sources are important not only for operating vehicles but also to warm up houses, cooking, and generate electricity from thermoelectric devices. Nowadays, the most world widely used heat energy source comes from burning fossil fuels which will run out in the near future. Therefore, finding a renewable energy source and combustion method, with high efficiency and reduced amount of harmful emissions, is necessary to protect our environment and thus lower the cost of energy. Biodiesel is a biofuel formed by a mixture of methyl esters with two or more oxygen atoms in their molecules, which makes easier to reach completed combustion, as compared with commercial diesel fuel. In addition, biodiesel can be synthesized from the biomass present in the waste of agricultural process, which reduces the costs of production as well as makes it an environmentally friendly process. Normal combustion of biodiesel occurs at very high temperatures (above 1,000°C), and produces harmful pollutants such as nitrogen oxide, soot, and carbon monoxide due to uncompleted combustion. Expensive ruthenium-based materials have been used as catalysts for the combustion of biodiesel below 1,000°C. However, these noble-metal based materials are cost-prohibitive for commercial operations. In the present work, we have developed a lanthanum-manganese perovskite catalyst supported on yttrium-stabilized zirconia (LM-YSZ) as an inexpensive alternative to the aforementioned ruthenium-based catalysts and chemically stable in oxygen-rich environments. In the other hand, we tried lanthanum manganese oxide in different support such as titanium oxide. However, the experimental data obtained from our 24-h activity tests indicates that LM-YSZ shows a remarkable stability as well as a high carbon dioxide conversion than the lanthanum manganese catalyst in titanium oxide support where the oxygen carbon ratio is 1.6 compare with the stoichiometry ratio is 1.41. Finally, Lanthanum Manganese oxide perovskite catalyst supported in YSZ showed high efficiently, cleanly and economically generate heat energy from catalytic combustion of biodiesel at the lower temperature.

Presentation Number **16**

# ABSTRACT:

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|---|---|---|---|
| **Abstract Title:** | **Optimum Ablution: A Design Response** | | |
| **Presenter:** | Said Alshidhani | | |
| **Mentor:** | Genell Wells Ebbini | **Campus:** | Pullman |
| **Major** | Architectural Studies - CEA | | |
| **Category:** | Arts and Design | | |

Oman is an arid region with challenging water demands. To meet this demand the country relies on desalination water for 35% of the total need with the remaining through groundwater. Saline water intrusion into groundwater is imminent if water withdrawal exceeds natural replenishment. Islam being the main religion of Oman, practicing Muslims perform ablution, known as Wu'dhu, a cleansing ritual before each of the five daily prayers. Ablution involves washing exposed parts of the body; using clean water, requiring 2 – 4 minutes to complete subject to individuals' customary practice, age and physical condition. Ablution sites are designed with on-demand water fixtures drained through troughs. During ablution, water is kept running, creating waste and increased water consumption.

This research evaluated the design of ablution systems to identify practical design solutions for water conservation. This study investigated present-day and past methods in practicing ablution by observing various male-multi generational practicing Muslims in Al-Khudh, Oman and Pullman, Washington. This study group presented various physical abilities, cultural behaviors, and occupations. The author recorded the individuals performing ablution at ablution sites and using the traditional method as described in Islamic historical record the use of a bowl. The findings revealed that water consumption during one ablution consumed 7.0 – 10.5 liters of water compared to 0.3 – 0.5 liters while using the traditional bowl design. Water consumption in ablutions sites during one ablution is enough to do 24 ablutions by using the traditional method – bowl.

A design concept, Optimum Ablution, was developed to aid in water reduction during ablution in Mosques and Islamic Centers. The design focused on conserving the ritual significance of Ablution using a modern, user-friendly mechanical system that controls water flow, minimizing water consumption. The design fused the efficient traditional bowl method and on-demand water fixtures. The system is designed to channel greywater for further water use reduction. By using Optimum Ablution, water savings are estimated to range from 90% - 93% compared to water fixtures, saving 2 – 3 gallons of water per ablution.

Presentation Number **17**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Chronicles: Documenting the Articulation of Culture in Video Games** | | |
| **Presenter:** | Madeleine Brookman | | |
| **Mentor:** | Dene Grigar | **Campus:** | Vancouver |
| **Major** | Digital Technology and Culture, CAS | | |
| **Category:** | Humanities | | |

In this display, I feature *Chronicles,* a digital preservation project that focuses on the video game, *Chrono Trigger* (circa 1995) and answers the question: How is Japanese culture articulated to North American gaming communities?

Funded by a 2015 College of Arts and Sciences (CAS) Summer Mini-Grant, *Chronicles* applies best practices of digital publishing in order to capture the experience of playing *Chrono Trigger* and documents the articulation of cultural context witnessed between Japan and North America during the nineties. The project takes the form of an online multimedia book developed and hand-coded in the Scalar digital platform – filled with 16 video clips of players experiencing the work, 32 images of physical ephemera, and 34 pages (33,858 words) of written documentation of the cultural and historical context embedded within the artifact.

Due to the innovation, success, and extensive remediation featured throughout *Chrono Trigger*'s lifetime, as well as its status as a video game "classic," this artifact was chosen as the subject of archival and examination for *Chronicles.*

As an undergraduate researcher, I conducted four video-capture sessions and interviews (approximately 7 hours in total), examined physical ephemera, and analyzed the discrepancies and similarities found in the Japanese and English localizations and remakes of the game. By reviewing this material, it is clear that the original *Chrono Trigger* was inherently different from its North American counterpart. By preserving this phenomenon, a more accurate depiction of *Chrono Trigger,* as well as a comprehensive view of the history behind North American localization practices, will provide scholars with contextual knowledge that may have otherwise been lost to obsolescence, while also supplying game designers with an understanding of ways in which games may be adopted cross-culturally.

What I have brought today, is the result of my efforts – a wealth of knowledge concerning the cultural material embedded within *Chrono Trigger* and its subsequent localization. It is my hope, that by preserving and providing this cultural material and context of *Chrono Trigger* to video game scholars and academic institutions, we will be able to provide future scholars with a better idea of these important cultural artifacts.

Presentation Number **18**

# ABSTRACT:

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|---|---|---|---|
| **Abstract Title:** | **T1VR** | | |
| **Presenter:** | Megan Essman, Connor Goglin, Randy Luttrell, Matthew Lyons, Holly Stassens, Amanda Wolcott | | |
| **Mentor:** | Dr. Dene Grigar | **Campus:** | Vancouver |
| **Co-Authors:** | Connor Goglin, Randy Luttrell, Matthew Lyons, Holly Stassans & Amanda Wollcot | | |
| **Major** | All: Digital Technology and Cultures - CAS | | |
| **Category:** | Arts and Design | | |

T1VR is a VR environment that tells the story of Vancouver Washington's waterfront's past, present, and future through a dramatic narrative in which users immerse themselves through visual elements, sound, and movement. As a research project it explores the relationship between the applied practice of virtual reality (VR) development and storytelling pedagogy. Although VR has been in development for over two decades, with the recent advances in VR technology making VR more affordable and accessible, there is a need to identify best practices for the utilization of the VR medium as a tool for communication to a general audience. The narrative is spoken by a guide within the environment that takes the form of a robot.

**Research Question:**
What are the best methods for storytelling that incorporate the sensory modalities afforded to the media-rich virtual reality medium for a general audience that is both engaging and ethically sound?

**Methodology:**
The T1VR project frames its research by Action Research, a method discussed by Stefano M. Vannotti that holds knowledge is produced by and through design. In his essay *Let Us Do What We Do Best: But How Can We Produce Knowledge by Designing Interfaces*, Vannotti defines Action Research as, "[s]ystematic enquiry conducted through the medium of practical action, calculated to devise or test new, or newly imported, information, ideas, forms, or procedures and to generate communicable knowledge" or "research through practice" (55). Using this method our team must develop the project, test it, and then write about our work so that others can replicate and utilize our findings.

**Expected Outcomes:**
We expect to find that best design practices are found by designing within the specific system/medium. We also expect that storytelling within virtual reality environments is more than just textual and visual, developers must also design for the haptic, sonic, and gestural experience and that because of these medium specific affordances, virtual reality can enhance the storytelling experience. Through our action research we aim to find the best way to incorporate sound so that users receive feedback when they interact with the environment.

Presentation Number **19**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Optimization of a Bench-Sized Biomass Gasification Reactor** | | |
| **Presenter:** | Olivia Ranft | | |
| **Mentor:** | Jacqueline Burgher | **Campus:** | Pullman |
| **Co-Authors:** | Jacqueline Burgher, Bernard Van Wie | | |
| **Major** | Chemical Engineering - CEA | | |
| **Category:** | Engineering and Physical Sciences | | |

The number of engineering graduates is failing to meet the current and future research, development, and technology needs of the nation. Thus, alternatives that engage students in active learning instead of traditional passive and lecture-based teaching pedagogies are essential to retain students in engineering disciplines. This project aims to create a safe, bench-sized biomass gasification reactor for use in the engineering classroom to leverage and facilitate hands-on learning and collaborative work among students, which has been shown to increase retention and learning gains. The system allows students to witness biomass gasification, a promising thermochemical conversion alternative energy process in real time and encourages them to explore fundamental engineering concepts such as heat and mass transfer with their peers. Constraints on the system including the small size of the reactor and large surface area to volume ratio, the need for visualization of the reaction, and the containment of heat and the gaseous reaction products to ensure student safety represent unique problems inherent to this novel system. In the prototype, the system temperature did not reach $700^0$C, and the reactor conditions favored combustion rather than gasification reactions. This presentation describes the process and design changes to the system to optimize the temperature of the reactor as well as the composition of the synthesis gas, such as adjustments to the flowrate and composition of the inlet gas. Based on current results, the design has been altered sufficiently to achieve gasification reactions and produce syngas that is consistent with gasification. These changes have allowed implementation of the gasifier in an undergraduate engineering course.

Presentation Number **20**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Drink Draw Jump** | | |
| **Presenter:** | Connor Goglin | | |
| **Mentor:** | Dr. Dene Grigar, Will Lewis | **Campus:** | Vancouver |
| **Major** | Digital Technology and Culture - CAS | | |
| **Category:** | Arts and Design | | |

Under mentorship from Dene Grigar and Will Lewis from the Portland Indie Game Squad (PIG Squad), I developed 'Drink Draw Jump'. This creative project uses cross-disciplinary techniques of visual arts, game design, computer science and community involvement to create a virtual reality (VR) representation of a PIG Squad event. It uses technology such as Unreal Engine 4 and an Oculus Rift to immerse viewers into a virtual environment. The project runs on a specially built computer, and a viewer puts on a head-mounted display device to experience the virtual environment directly. The virtual environment the viewer experiences is both interactive and highly immersive, and a combination of technical applications and artistic choices work to contribute to the viewer's feeling of 'presence' in the virtual world. By integrating motion-tracking technology, the virtual environment responds to the player's motions in the real world. The VR environment artistically represents a PIG Squad community event called a Drink-and-Draw, and allows the user to experience what it is like to take part in a lively Portland indie game community event. The project also features the use of footage and sound from real Portland independent game developers to help further immerse the user in the created virtual space.

"Drink, Draw, Jump," represents a unique contribution to the field of digital technology and culture in a number of ways. Firstly, by fusing disparate disciplines such as digital art, programming, game design, and audio design, which are all used to create a complete experience. Secondly, by incorporating community-supplied elements from real indie game developers, the project presents a uniquely immersive representation of the culture that is the independent game development scene in Portland. The project is important to the Portland indie game community as a way to show newcomers what it's like to partake in Portland Indie Game Squad events, and as a way to showcase the collaboration that's essential to its community. "Drink, Draw, Jump" will be made available for download after it's completed, and it will be shown at PIG Squad Events.

Presentation Number **21**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Biological Method of Lignin Degradation for Lipid Production** | | |
| **Presenter:** | Karina Garcia | | |
| **Mentor:** | Bin Yang | **Campus:** | Tri-Cities |
| **Co-Authors:** | Xiaolu Li | | |
| **Major** | Biological Sciences - CAS | | |
| **Category:** | Applied Sciences | | |

In the world search for renewable energy, biomass appears to be a promising source. Biomass is organic matter that can be processed into a viable energy source that can help reduce fossil fuel dependency. Our research uses a biological method of lignin biomass processing. Three different bacteria were used for lignin in order to produce lipids. PD630, RHA1, and Van A- were inoculated and the bacteria were then placed in mediums of different concentrations in order for fermentation to occur. The mediums included glucose, vanillin, vanillic acid, and lignin. Combinations of varying concentrations of mediums were explored in order to find which combinations produced the highest lipid production. In order to analyze the amount of lipids produced by the bacteria, the samples were run in a UV spectrophotometer. The samples were then centrifuged, allowing us to remove liquid from the samples. Once the liquid was removed, the sample's mass was recorded. Due to extenuating circumstances, there wasn't enough data that was collected in order to make a conclusion. The continuation of the project will include setting up a custom fermentation bioreactor and running more trials with the bacteria. Being able to produce an efficient and cost-effective method of lipid production from lignin can provide access to a new and effective biofuel. It is our hope that this research can help contribute to the development of practical use of lignin as a renewable energy source.

Presentation Number **22**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Swine Handling Video for 4-H and Small-Scale Producers** | | |
| **Presenter:** | Natasha Moffitt | | |
| **Mentor:** | Dr. Jan Busboom and Sarah Smith | **Campus:** | Pullman |
| **Major** | Animal Science - CAHNRS | | |
| **Category:** | Humanities | | |

The purpose of this project was to create a swine handling video to serve as a resource for youth swine producers (4-H and FFA) as well as new producers. The video contains basic knowledge about pig flight zones as well as how pigs see, move, and react. It describes how to use this knowledge to create a low stress and safe handling environment for both pigs and handlers. The video was created using footage that I recorded while training and handling the WSU Student Swine Cooperative pigs and using footage of youth producers showing their pigs at a fair. There are also animations effectively demonstrating the flight zones and reactions of pigs. This video is important because it provides training that is unavailable to many youth and small scale swine producers and is easily accessed online. This video also builds on a video created by WSU extension created for low stress handling of cattle. The model used for both the cattle handling video and swine handling video will be used to create a low stress handling video for sheep in the future. Creating this video provided me with the opportunity to learn what a WSU extension educator does and gave me the chance to work with and learn from a videographer.

Presentation Number **23**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Does Psychological Stress Predict Telomere Length in Wild Spotted Hyenas (*Crocuta Crocuta*)?** | | |
| **Presenter:** | Sonja Werth | | |
| **Mentor:** | Paul Verrell | **Campus:** | Pullman |
| **Co-Authors:** | Nora Lewin, S. Kevin McCormick, Kay E. Holekamp | | |
| **Major** | Zoology, CAS | | |
| **Category:** | Organismal, Population, Ecological, and Evolutionary Biology | | |

Telomeres are protective caps of repetitive DNA at the end of chromosomes. They may serve as important biomarkers of ageing and can reveal how stress acts at the cellular level. Previous work in our lab showed a positive relationship between dominance rank and telomere length among spotted hyenas. The mechanism mediating this relationship remains unknown, but high levels of psychological stress are associated with shortened telomere lengths in humans and may be operating similarly in spotted hyenas. In hyenas, aggressive behavior is often directed down the social hierarchy to enforce the *status quo*, and may exact substantial psychological stress for subordinate individuals. Social instability is also associated with elevated stress hormones and may explain the significant inter-clan variation in telomere lengths previously found. In this study, we investigated the degree to which psychological stress negatively impacts telomere lengths. Psychological stress was coded as the rates and intensities of aggressive behavior received by an individual. As measures of clan instability, we calculated average clan-wide rates and intensities of psychological stress and the frequencies at which aggressive behavior was directed up the dominance hierarchy. We predicted that low ranking individuals have short telomere lengths due to high levels of psychological stress. We found that there is a positive correlation between aggressions received and shortened telomere lengths. Additionally, we predicted that clans with short telomeres should have high levels of clan-wide psychological stress and frequent challenges up the dominance hierarchy. We found that clan-wide aggressions received was significantly different for one of the three clans sampled. Although correlational, this work is the first to explore the relationship between psychological stress and telomere length in a social, free-ranging mammals.

Presentation Number **24**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **The Predicted Invasion of the New Zealand Mudsnail across the Northern United States** | | |
| **Presenter:** | Madison Armstrong, Christina Thomas | | |
| **Mentor:** | Mark Dybdahl | **Campus:** | Pullman |
| **Co-Authors:** | Christina Thomas, Mark Dybdahl | | |
| **Major** | Armstrong: Evolutionary Biology and Ecology, Neurosceince – CAS, CVM, Honors; Thomas: Zoology, Pre-Veterinary Medicine – CAS | | |
| **Category:** | Organismal, Population, Ecological, and Evolutionary Biology | | |

Whether an invasive species establishes and spreads in a new region, depends on their ability to disperse and tolerate new environment conditions. In this study, we examine the determinates for the spread of the New Zealand mudsnail (*Potamopyrgus antipodarum)* across the northern tier of the US. Populations of this clonal snail are comprised of two major genotypes: US 1 which occupies streams and rivers in 11 states in the western US, and US 2 which occupies the Great Lakes and large portions of continental Europe. Recently, six new stream and river populations were discovered across Wisconsin, Michigan, Pennsylvania and Ontario. We used an ecological niche model to predict which genotype would most likely tolerate the environments of these newly invaded regions. If the environmental conditions play a greater role than dispersal distance, US 1 snails should be present in these populations. This was tested by using allozyme electrophoresis to identify the clones using their six-locus genotype. Snails from Wisconsin, Michigan, and Pennsylvania, were established as entirely US 1 clones and snails collected from Lake Ontario were a mixture of US 1 and US 2. Therefore, environmental conditions likely played a larger role than dispersal distance in the founding of new populations in these northern tier states. We suspect that dispersal occurs by the increased interaction of recreationists with the US 1 genotype among the rivers and streams, than with US 2 in the deeper waters of lakes.

Presentation Number **25**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **The Mechanism of the Adaptive Response to the Antibiotic Florfenicol** | | |
| **Presenter:** | Jose Guizar | | |
| **Mentor:** | Doug Call | **Campus:** | Pullman |
| **Co-Authors:** | Lisa Orfe, Doug Call | | |
| **Major** | Chemical Engineering, Math Minor, CEA, CAS | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

The bacterial pathogen *Salmonella* causes a gastrointestinal (diarrhea) infection in people and animals. Nuflor (florfenicol) is a veterinary antibiotic that is used to treat respiratory illness in livestock, but its use also selectively favors strains of *Salmonella* that are resistant to florfenicol. We don't use florfenicol in people, but resistance to this antibiotic is cross-protective to chloramphenicol, and selection for florfenicol resistance also co-selects for other antibiotic resistance traits in pathogens such as *Salmonella*.

Florfenicol resistance is often conferred by an efflux pump that is called FloR. We have observed that it is possible to gradually "ramp-up" resistance from this pump by passaging the bacteria on media with increasing concentrations of florfenicol. This process can take a conventional resistance phenotype from 64 ug/ml to an incredibly high concentration of >1 mg/ml. There are four hypothesized mechanisms to explain this effect. If the effect is genetic or epigenetic or synergetic with other efflux pumps, this has important implications for how resistance can evolve. It is also possible that this is a unique consequence of efflux protein accumulation in the bacterial membrane. My project will test these alternative mechanisms to determine if the exaggerated level of resistance represents a long-term threat to public health.

Presentation Number **26**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Lactic Acid Bacteria in Raw Bovine Milk on the Palouse** | | |
| **Presenter:** | Courtney Fetters | | |
| **Mentor:** | Gulhan Unlu | **Campus:** | Pullman |
| **Co-Authors:** | Gulhan Unlu, Barbara Nielsen | | |
| **Major** | Food Science, CAHNRS | | |
| **Category:** | Applied Sciences | | |

As consumers become increasingly concerned with natural approaches to increase the health and safety of their food, researchers try to incorporate probiotics in products. Probiotics are described by the Food and Agriculture Organization of the United Nations as "live microorganisms which, when administered in adequate amounts, confer a health benefit on the host." Select lactic acid bacteria are recognized as probiotics.

In this study, three samples of raw bovine milk were collected from three different dairies in Palouse region of Idaho. A total of 106 colonies were isolated on microbiological media selective for lactic acid bacteria. Phenotypic tests were performed to characterize the isolates, including catalase activity, Gram stain, oxidase activity, and hemolysis. Seven isolates that were Gram positive, catalase negative, oxidase negative, and beta hemolysis negative were selected for further testing.

Further identification will include bacteriocin production and carbohydrate fermentation by the isolates. Bacteriocins are antimicrobial proteins that the bacteria produce to inhibit closely related species. Cell-free supernatant from the isolates will be used in modified deferred antagonism and agar well diffusion assays to screen for bacteriocin production. Nisin, a well-known bacteriocin, will be used as a positive control. Carbohydrate fermentations will be performed using a 96-well titer plate and bromocresol purple as the pH indicator. API 50 CHL will be used to confirm carbohydrate fermentation profiles. The isolates will be also tested against common antibiotics by test disks.

Presentation Number **27**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Fear of a Woman's Sexuality and the Practice of Concubinage in the Qing Dynasty** | | |
| **Presenter:** | Kathryn Sutherland | | |
| **Mentor:** | Dr. Lydia Gerber | **Campus:** | Pullman |
| **Co-Authors:** | Dr. Gerber | | |
| **Major** | Wildlife Ecology and Conservation, Spanish, CAHNRS, DVM, CAS, Honors | | |
| **Category:** | Social Sciences | | |

Imperial China was a time of great contradiction when it came to the role of women. Women were widely thought of as potentially disastrous to a man's ability to rule, yet emperors chose to be surrounded by beautiful and accomplished, and therefore also dangerous young women as imperial concubines. This project explores both sides of this paradox. Supported by secondary sources on gender and masculinity in Chinese history, it offers a qualitative analysis of the messages inherent in traditional Chinese tales of women who ruined men in leadership roles in order to identify root causes of this ruin. Next, this research investigates an unusual ruler during the Qing dynasty, the Taiping ruler and "younger brother of Jesus" Hung Hsiu-ch'uan (1814-1864) and his book Poems by the Heavenly Father, which includes hundreds of didactic poems for his harem. This gives a unique primary-source view of how an emperor proposed to deal with so many royal consorts and the problems regularly associated with them. Hung's main method of managing so many women was to place an emphasis on (Christian) religion and proper consort behavior, and to threaten his consorts physically and eternally if they would not abide. This research finds that there were several justifications for housing so many women despite their distracting nature; including continuing royal lines, keeping an emperor from becoming too distracted by one women by surrounding him with hundreds, and proving a man's masculinity, which was extremely important in an honor driven society such as China. These results are significant since they propose answers to a confusing and prevalent contradiction in Chinese history.

Presentation Number **28**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Vertical Transmission of Coxiella burnetii in Drosophila melanogaster** | | |
| **Presenter:** | Zachary Howard | | |
| **Mentor:** | Alan Goodman | **Campus:** | Pullman |
| **Co-Authors:** | Reginaldo Bastos, Alan Goodman | | |
| **Major** | Genetics and Cell Biology – CVM, Honors | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

*Coxiella burnetii* is a gram-negative obligate intracellular bacteria and the causative pathogen of the global zoonosis, Q Fever, which causes fever-like symptoms in humans. *Coxiella* is classified as a potential bioterrorism agent because of the extremely low $ID_{50}$ (Infectious Dose) which makes it highly contagious. The bacteria is thought to be carried by ticks and rodents and the natural hosts are domestic ruminants such as sheep, goats, and cattle. The main source of horizontal transmission of *Coxiella* to humans is aerosolized bacteria, especially shed from aborted fetuses of domestic ruminants. Commonly, female ruminants infected with *Coxiella* experience spontaneous abortion because of a high localization of the bacteria around the placenta. In fact, these effects on fetal development have also been observed in humans infected with the bacteria. However, despite this aspect of *Coxiella* pathogenesis, regarding the effect of the bacteria on developing fetuses and localization in proximity to germ line cells, such as in the placenta, there remains a paucity of research on the possibility of vertical transmission of *Coxiella*. Recently, our lab has revealed that *Drosophila melanogaster* can be used as a viable model for *Coxiella* infection. Therefore, we used flies to model vertical transmission of the *Coxiella burnetii* Nine Mile Phase II Clone 4 strain. This is an attenuated strain and is non-pathogenic in humans, due to a truncated lipopolysaccharide chain but has been shown to replicate in *Drosophila*. We infected flies with *Coxiella* and used RT-qPCR analysis to measure the quantity of bacteria present in both parent flies and larval, pupal, and adult stage offspring. The study showed the presence of *Coxiella* in the offspring of the infected parents indicating a possibility of successful vertical transmission. Future studies will elucidate the mechanism behind *Coxiella* transmission in flies and search for homologs implicated in this aspect of the pathogenesis of *Coxiella* that may help prevent or treat outbreaks in both humans and ruminants.

Presentation Number **29**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Camera Trap Documentation of Mammal Occurrences in Created Snag Gaps in Coastal Temperate Rainforest, northwestern Washington** | | |
| **Presenter:** | Briauna Inglis | | |
| **Mentor:** | Mark Swanson | **Campus:** | Pullman |
| **Co-Authors:** | Mark Swanson, Landon Charlo | | |
| **Major** | Wildlife Ecology - CAHNRS | | |
| **Category:** | Organismal, Population, Ecological, and Evolutionary Biology | | |

As part of a long-term habitat mitigation project for the ecological impacts of a utility reservoir (Culmback Dam/Spada Lake) on the Sultan River, the landowner (Snohomish Public Utility District) has created 200+ gaps via snag creation (deliberate killing of trees to create standing snags) to accelerate the development of late seral forest characteristics. The forest type is Douglas-fir/western hemlock (*Tsuga heterophylla/Polystichum munitum* association), with most stands in the study area between ages 40 and 100 as a result of clearcut timber harvest in the mid to late 20$^{th}$ century. We used remotely activated camera traps (Browning, Moultrie brands) to document the occurrence of wildlife species within these gaps during the 2015 field season. During the summer of 2015, 50 gaps and 11 pseudo-gaps were outfitted with a range of 2 to 6 camera traps. Each camera was placed facing towards the center of the gap. Camera traps were left in the gaps for approximately two weeks for each gap. A wide range of native mammals was observed in the gaps, including blacktailed deer (*Odocoileus hemionus columbianus*, n=64), Douglas squirrel (*Tamiasciurus douglasii*, n=61*)*, bobcat (*Lynx rufus*, n=8), black bear (*Ursus americanus*, n=8*)*, coyote (*Canis latrans*, n=12), mouse (*Peromyscus spp.*, n=10), mountain cottontail (*Sylvilagus nuttallii*, n=14), opossum (*Didelphis virginiana*, n=3), and raccoon (*Procyon lotor pacificus*, n=2). More camera trapping outside the created gaps is planned for spring and summer 2016 to provide a better statistical control to assess the actual effects of the gap on mammal behavior.

Presentation Number **30**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Effectiveness of 4-H Activities for Skill Building through Experiential Education** | | |
| **Presenter:** | Randee Zerger | | |
| **Mentor:** | Tracie Hanson | **Campus:** | Pullman |
| **Major** | Agriculture and Food Security - CAHNRS | | |
| **Category:** | Social Sciences | | |


Education is vital at any level, because it impacts children and adults alike and could ultimately affect the outlook of global, economic, environmental and societal contexts. The national mission of 4-H is "4-H empowers youth to reach their full potential, working and learning in partnership with caring adults." 4-H incorporates the "do, reflect, apply" experiential education strategy in almost all activities and promotions such as club activities or events, public education or summer camps.

The purpose of this study is to look into the effectiveness of several activities in 4-H summer camps and how they affect a child's learning and skill building. This information is vital for organizing future camps and assisting with 4-H volunteers and directors in ways to improve learning through different hands-on activities. In order to study this further, an evaluation was given to all of the participants at both Mason County and Grays Harbor County 4-H summer camps at Panhandle Lake.

The evaluations were distributed on the day before the camp had ended. This way, the campers, counselors and adult volunteers could look back on their experiences, state what they learned, what they wish they learned, and what their favorite and least favorite parts of camp were. These components of the evaluation would show what they "did" and "reflect" on that experience and finally, "apply" that new knowledge to real life.

Evaluations were completed by 136 people total (including campers, counselors and adult volunteers). Of the participants completing the evaluation, 78% stated that they learned at least one new skill that they will use in the future. Campers learned skills ranging from how to make crafts, to how to fish, to learning manners, how to teach others, work in teams, and learn valuable leadership skills. It is evident that going to camps and participating in varied activities allowed children from the age of eight to learn valuable new skills and apply that to their life. These evaluations show the potential that youth as well as adult volunteers can reach, supporting learning, improvement and fun.

Presentation Number **31**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **A Quantitative Approach to Measuring RNAi Deficiency** | | |
| **Presenter:** | Quentin Guenther | | |
| **Mentor:** | Dr. Jennifer Watts | **Campus:** | Pullman |
| **Co-Authors:** | Dr. Jennifer Watts, Jason Watts | | |
| **Major** | Cell Biology / Genetics - CVM | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

RNA Interference (RNAi) is a valuable research tool used to systematically knock down genes by the destruction of mRNA. Knockdown by RNAi allows researchers to identify genes important to a cellular process, and is a practical tool used in biotechnology, medicine, and insecticides. Genetic screens in *Caenorhabditis elegans* have revealed many of the genetic components of the RNAi pathway. We sought to quantitate the contribution of these genes to the RNAi capacity of *C. elegans*. We developed a simple and sensitive technique for quantifying the RNAi capacity in *C. elegans* strains carrying mutations in the RNAi pathway. Gas Chromatography/Mass Spectrometry was used to measure fatty acid composition and calculate the extent of fatty acid desaturase activity. These measurements gave quantitative data that describes the capacity of these mutants to knock down gene function using RNAi. Our study demonstrates that *C. elegans* "RNAi-deficient" mutant strains actually perform a significant amount of RNAi, even though they carry mutations in genes previously thought to be necessary for the process. Additionally, we identified several RNAi pathway genes that are required for transgenerational inheritance of RNAi gene silencing. These results indicate that previously unidentified genes could be compensating for disruptions in the RNAi pathway, and our method could be used to help identify these genes.

Presentation Number **32**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Who Cares for Children? A cross-cultural investigation of child holding** | | |
| **Presenter:** | Mattie Curry, Keroshini Guynes, Kylie Perez, Lora Prosser | | |
| **Mentor:** | Courtney Meehan | **Campus:** | Pullman |
| **Co-Authors:** | Courtney Meehan, Jessica Collins, Lora Prosser, Noelle Perez, Kero Guynes | | |
| **Major** | Curry: Anthropology - CAS; Guynes: Anthropology, Biology – CAS; Perez: Anthropology, Biology – CAS, Honors; Prosser: Anthropology - CAS | | |
| **Category:** | Social Sciences | | |

Humans are considered to be cooperative breeders – infants receive allomaternal (non-maternal) investment through caregiving and provisioning. However, relatively minimal quantitative data exist which document the range and extent of allomaternal investment. Data which exist have often been collected via different methodologies and have focused on only one or two caregivers, making comparisons impossible and limiting our ability to document the breadth of caregivers who invest in infants and young children. Here, we explore non-maternal caregiving in two small-scale societies among the Aka foragers and Ngandu horticulturalists in the Central African Republic. Specifically, we examine who invests in child care by documenting the range and number of caregivers who hold infants and young children and the frequency of their investment. Quantitative behavioral observation data were collected on 80 Aka and 51 Ngandu infants and children between birth and 4 years of age. Observations documented infant or child interactions with caregivers every 30 seconds over all daylight hours. In total the data set encompasses over 1,000 hours of observations and almost 150,000 observations of infants and young children and their caregivers. We focused our investigation on holding by mothers, fathers, female/male siblings, grandmothers, and other juvenile girls/boys, adult women/men, and elderly women/men. Our results explore cross-cultural variation in who and how frequently non-maternal caregivers hold infants and young children. Moreover, our investigation documents variation in the categories of caregivers who invest, indicating that human cooperative breeding is flexible and that multiple individuals can and do support human children's lengthy developmental period.

Presentation Number **33**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **The Effects of Reduced Tillage on Soil Moisture, Temperature, and Light Penetration in Organic Vegetable Systems** | | |
| **Presenter:** | Holly Lane | | |
| **Mentor:** | Douglas Collins | **Campus:** | Pullman |
| **Co-Authors:** | David Sullivan | | |
| **Major** | Organic Agriculture Systems, Agricultural Biotechnology - CAHNRS | | |
| **Category:** | Applied Sciences | | |

Growing soil health concerns in conventional tillage systems have led to increased interest in reduced tillage practices due to enhanced soil quality and decreased erosion (Carr, et al.). Traditional Organic production relies on routine soil disturbance through field cultivation to address weed pressure. High residue spring terminated cover crops suppress weeds through establishing an in situ vegetative mulch layer (Carr, et al.). Such systems have been shown to increase soil moisture when compared to conventional tillage systems (Haramoto and Brainard, 2012) as the mulch layer reduces evaporation (Johnson and Hoyt, 1999). This project compared the effects of strip-till, no-till and conventional tillage systems on soil moisture, temperature, and light penetration in irrigated, organic squash production. An additional cover crop termination factor was used to compare the effects of roller crimping and flail mowing. Both reduced tillage treatments maintained significantly higher soil moisture when compared to full till. Early in the season, reduced tillage treatments had significantly reduced light penetration, while no-till maintained significantly lower light penetration when compared to strip tilled plots. However, full till plots maintained a significantly higher soil temperature when compared to both reduced tillage treatments throughout the entirety of the growing season. These results provide evidence that suggests reduced tillage can increase soil moisture while reducing the amount of light received by weeds when used in combination with terminated cover crops, yet soil temperature is decreased throughout the season.

Presentation Number **34**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Morphological Analysis of Mice Deficient for the Chromatin Modifying Enzyme Kdm6a** | | |
| **Presenter:** | Ashleigh Gustavson | | |
| **Mentor:** | Jun Xu | **Campus:** | Pullman |
| **Major** | Genetics - CVM | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

The X-linked Lysine-specific demethylase Kdm6a acts as a transcriptional regulator. When Kdm6a is mutated, it causes Kabuki Syndrome characterized by poorly developed motor coordination and intellectual disability. Previous research has shown that a common feature in intellectual disability and other cognitive deficits (e.g. dementia) is the abnormal neuronal morphology, such as reduced dendritic length. It's not clear if similar changes might be present in Kabuki syndrome.

We generated neuron-specific Kdm6a deficient mice using the Cre-LoxP recombination system. To examine the morphological differences between Kdm6a deficient and wild type animals, we first genotyped mice upon weaning using PCR amplification of tail DNA, resulting in 5 mutant and 4 wild type mice. The brains were then collected and processed using the Golgi Staining technique, with 150 µm thick sagittal brain sections collected on a vibritome. Photos were obtained on a Leica upright microscope equipped with digital camera and image processing software. Currently we are quantifying the dendritic morphology of the cortical pyramidal neurons and Purkinje cells in the Cerebellum. A potential effect of Kdm6a on dendritic growth can be determined through the comparison between wild type and deficient neurons.

We believe that this study will help to better understand brain and neuronal correlates of intellectual disability and the symptoms of Kabuki Syndrome.

Presentation Number **35**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Modelling Diffusion in Pancreatic Transplant Cells** | | |
| **Presenter:** | Alex Fabrick | | |
| **Mentor:** | Scott Beckman | **Campus:** | Pullman |
| **Co-Authors:** | Scott Beckman | | |
| **Major** | Material Science & Engineering - CEA | | |
| **Category:** | Engineering and Physical Sciences | | |

Ongoing research investigates pancreatic cell transplants as a treatment for diabetes. To protect the transplant cells from rejection by the host, clusters of transplant cells are surrounded by a layer of alginate material and an outer coating which promotes the intake of oxygen. To be functional in the host, the cell clusters must be able to produce insulin and take in oxygen and glucose at acceptable rates. This project aims to produce a mathematical model of diffusion through this system.
Construction of the model will be done in four steps: first, diffusion through just the transplant cell cluster; second, diffusion through the alginate layer; third, the combination of the cell cluster and the alginate layer; and finally, the addition of an outer coating which promotes oxygen intake. At least the first of these steps involve non-linear, non-homogeneous partial ordinary differential equations, which will be solved by finite difference methods. These models will be constructed under steady-state conditions; further research may investigate the transient state.

Presentation Number **36**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Reemergence of Poliomyelitis in Syria: The Impacts of War** | | |
| **Presenter:** | Lindsay Rodriquez | | |
| **Mentor:** | Dr. Charles Weller | **Campus:** | Pullman |
| **Major** | Zoology - CAS | | |
| **Category:** | Humanities | | |

Until 2011, UNICEF estimated Syria to have one of the best immunization programs in the Eastern Mediterranean Region (EMR). Following the campaigns that eradicated the variola virus in the 1970's, immunization rates reached as high as 94%. Historically, the Eastern Mediterranean Region has been plagued with ongoing regional conflict; however, it has been able to maintain an effective immunization campaign. Strategies introduced in the early 1900's such as routine vaccine programs and the tracking of communicable disease proved successful in eradicating poliomyelitis by 1995. However, rising conflict and civil unrest following the events in 2011 have been correlated with the degradation of Syria's healthcare system and the resurrection of poliomyelitis. Today, disease surveillance and outreach has been hindered due to closed borders, military sieges, inaccessible communities, and the constant migration of displaced Syrians. By 2014, oral poliomyelitis vaccine (OPV) coverage dropped to 52% with 36 confirmed cases of infection. Ultimately, organizations and institutions dedicated to preserving the health of the Syrian people have been compromised due to the decreased ratio between professional personnel to the at-risk population. This study investigates the history behind this complex issue by tracing the outbreaks and responses to poliomyelitis and related viruses in Syria and the broader Middle East. Based on this history, it identifies key internal as well as interregional factors which need to be monitored and controlled amid ongoing efforts to negotiate the political and international complexities of the crisis, including in particular the mass displacement of civilians and destruction of medical facilities which are most responsible for the drop in vaccine administration. It also offers suggestions for ways in which the vaccination program can be reinforced and potentially enhanced amid the current crisis.

Presentation Number **37**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Beneficial Effects of Varying Mood States on Cognition** | | |
| **Presenter:** | Haley Delgado, Sydney Wirkkala | | |
| **Mentor:** | Paul Whitney, John Hinson | **Campus:** | Pullman |
| **Co-Authors:** | Amy Therese Nausbaum,Paul Whitney, John Hinson | | |
| **Major** | Delgado: Zoology, Pre-Medicine – CAS Wirkkala: Psychology, Philosophy - CAS | | |
| **Category:** | Social Sciences | | |

There has been a great deal of research on the effects mood states have on cognition and mental capacities. The nature of mood effects depends on the nature of the mental ability being studied. One important form of cognition that has been studied with mood is cognitive flexibility; however, these results have been largely inconclusive. Cognitive flexibility is the ability to adapt to changing environmental circumstances. One example of this is multi-tasking, or shifting attention among multiple tasks. Mood has been thought to influence the general efficiency of cognitive processes, with negative mood having a disruptive effect, and positive mood having a beneficial effect. The specific impact of negative mood on cognitive flexibility remains uncertain. This study used a task-switching procedure to assess cognitive flexibility. The procedure required individuals to learn how to respond to a stimulus based on a given rule and then repeatedly switched that rule. The dependent measure of interest was the difference in reaction time (RT) between trials in which the rule stays the same and trials in which the rule changes. Greater cognitive flexibility should result in decreased switch costs, defined as a negative or small RT difference. The results were contrary to the common idea that negative mood is detrimental to efficient cognitive processing. Both positive and negative mood conditions led to increased cognitive flexibility when compared to participants that were in a neutral mood. These data indicate that in some situations negative mood can have beneficial effects on cognitive flexibility. These findings could also lead to a better understanding of how mood can influence the ability to adapt to a changing environment.

Presentation Number **38**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **The Effect of Stanchion Housing on Behavior and Health Evaluation in Calves Experimentally Challenged with Cryptosporidium parvum** | | |
| **Presenter:** | Natalie Hurst | | |
| **Mentor:** | Dr. Jennifer Zambriski | **Campus:** | Pullman |
| **Co-Authors:** | Geneva Graef, Lance Kidder | | |
| **Major** | Animal Sciences, Pre-Veterinary Medicine – CAHNRS, CVM, Honors | | |
| **Category:** | Applied Sciences | | |

This study compared the behavioral and health effects of two housing methods used for research of the cryptosporidium parasite on Holstein calves. Fourteen Holstein calves were obtained and housed as follows: one in a box stall setting, 13 in a stanchion (elevated crate) setting. The calf in a box stall was infected with cryptosporidium, 12 of the calves in stanchions were infected with cryptosporidium, and one of the calves housed in a stanchion setting was a negative control free of the parasite. Calves were housed in stanchions for 10 days and then released into a box stall setting. The calves were placed in their designated housing within 48 hours of birth and infected with the parasite cryptosporidium within the same time frame. All the calves housed in stanchions showed higher average daily gains upon release from stanchions including the negative control. Calves showed increased oral behaviors while housed in stanchions compared to the calf housed in a box stall. In general calves housed in stanchions received more intervention through fluid therapy or other treatments than the calf housed solely in the box stall. Calves that had the cryptosporidium parasite and were housed in stanchions had a higher incidence of umbilical infections and pressure sores. Maintaining consistency in research and coming up with accurate models is a core tenant of repeatable and applicable research. This study suggests that housing may affect not only the comfort of the animal but also response to the parasitic infection and frequency of other health issues. Housing in stanchions may cause symptoms and health issues to be amplified and thus provide an unrealistic model of the behavioral and health effects of cryptosporidium infection.

Presentation Number **39**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Effects of Technical Jargon and Numbers on Perceived Information Gathering Capacity** | | |
| **Presenter:** | Austin DeLong | | |
| **Mentor:** | Dr. Jay Hmielowski | **Campus:** | Pullman |
| **Major** | Communication – COMM, Honors | | |
| **Category:** | Social Sciences | | |

Explaining risk to the public remains a complex subject for scientists. Often, the scientific community relies on technical jargon and numbers to explain an individual's susceptibility to a particular risk. Indeed, this leads to unnecessary panic from the lay public. For instance, when the Ebola outbreak occurred in Africa in 2014, panic spread throughout the United States, despite the public's low probability of contracting the disease. The Model of Risk Information and Processing outlines that attitude, social norms, and perceived information gathering capacity affects whether or not a person will have the intention to perform a behavior. For the purpose of this study, I focused on the perceived information gathering capacity component of the theory. Previous research led me to hypothesis that an article containing technical jargon and numbers decrease an individual's perceived information gathering capacity compared to an article with no technical jargon or numbers. The experiment utilizes a two-factor design that manipulates technical jargon and numbers. I will analyze the data using an analysis of variance (ANOVA). ANOVA allows the comparison of multiple independent factors, while reducing systematic and random error.

Presentation Number **40**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Effects of maternal environment on offspring success of New Zealand mud snail** | | |
| **Presenter:** | Bernice Klise | | |
| **Mentor:** | Mark Smithson | **Campus:** | Pullman |
| **Co-Authors:** | Mark Smithson | | |
| **Major** | Biology (General), Spanish - CAS | | |
| **Category:** | Organismal, Population, Ecological, and Evolutionary Biology | | |

Ecological epigenetics refers to how an organism's phenotype is affected by its outside environment through the silencing and activating of different sections of DNA. Because they lack the ability to generate novel phenotypic variation through genetic recombination, asexual species may adapt to changing environments through epigenetics. The New Zealand mud snail, *Potamopyrgus antipodarum*, is a species that exhibits remarkable adaptive and invasive ability while only reproducing clonally in its invasive range. It has already been observed that genotypically identical populations of *P. antipodarum* exhibit differing shell shapes which are heritable after being raised identical lab environments. This shell shape variation has also been associated with differences in DNA methylation across the genome (a type of epigenetic mark). This past semester I began investigating the relationship between maternal flow environments, and the associated epigenetic differences, on offspring fitness, in this case determined by size and age of reproductive maturity. Specifically, I have been measuring and comparing the effects of maternal environment on the rate of growth and reproduction of offspring when in identical, stagnant, lab environments. I predicted that snails with parents from a low flow environment would exhibit faster and earlier reproduction time when introduced to the similar low flow lab environment. However, when growth rates were compared, those of the high flow lineage were observed to grow faster. These preliminary results suggest that aspects of the maternal environment of *P. antipodarum*, beyond only that of flow, have an effect on offspring performance. As none of this generation has completely developed, the effects of maternal environment on age of reproductive maturity are yet to be observed. Moving forward, we aim to better understand the mechanisms behind the two distinct phenotypes exhibited by *P. antipodarum* and the critical window during which offspring fitness is determined.

Presentation Number **41**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Using mtDNA Barcodes to Design Universal North American Bird Primers** | | |
| **Presenter:** | Mitchell Go | | |
| **Mentor:** | Dr. Brain Kemp | **Campus:** | Pullman |
| **Co-Authors:** | Dr. Brain Kemp, Dr. Christine Parents | | |
| **Major** | Biochemistry - CVM | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

One of the quickest and easiest ways to identify faunal remains is through morphology. However, it is not always possible to use morphology alone to distinguish remains down to the species level. Such difficulties could be due to fragmentation of remains, alterations made to them in the past to make tools or art, or the remains could represent a deceased juvenile that has yet to developed species distinguishable morphological features. When this is the case, DNA barcoding may be a useful alternative tool for species identification. DNA barcoding is the idea that each species has its own, short, unique DNA sequence that can be used for identification. Using known North American bird cytochrome oxidase I (COI) sequences, our goal is to identify sequences of bird remains found in Native American sites.

Unfortunately, DNA from recovered ancient specimens will have undergone damage and degradation, resulting in short strand lengths. We designed an approach to be able to still utilize DNA barcoding to identify the species of the specimens. Using GenBank's library of bird COI sequences, we identified short regions (about 120 to 160 bps long) that had high variability between species of North American birds. Thus, four primer sets were designed (about 20 bps long) to flank both ends of these target regions. Unlike the target region, the primers should be designed to anneal to a region that had low variability between these same species. To design these primers, the three most common haplotypes of possible primer sequences were used to design a single primer set by conserving identical nucleotides at the same position, and using ambiguous nucleotides for sites that differed. For example, if ATC, ACC and ATC were the three most common sequences, the resulting sequence used would be AYC. Laboratory based experiments demonstrate that our approach works and combined with the extensive database of bird COI sequences, theoretically we can identify up to 96% of North American birds to the species level.

There are many applications for using this ancient DNA barcoding tool such as reconstructing site seasonality of prehistoric Native American tribes, forensic applications, or conservational purposes.

Presentation Number **42**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Race Relations between Black and Latino/a College Students at a Predominantly White Institution** | | |
| **Presenter:** | Crystal Galvan | | |
| **Mentor:** | Dr. Carmen R. Lugo-Lugo | **Campus:** | Pullman |
| **Major** | Sociology, Comparative Ethnic Studies - CAS | | |
| **Category:** | Social Sciences | | |

This study examines Black-Latino/a relations at predominantly white institutions focusing on the Pullman campus of Washington State University (WSU), where Black and Latino/as make up 17% of the student population. Focus groups will be conducted with students and in-depth interviews with faculty members and staff to unpack the complexities of Black-Latino/a relations at Washington State University. In such interviews, I will expose common histories, struggles, and the strained relations both of these groups have with one another on campus. The literature review focuses on the complexities, complications, and commonalities of Black-Latino/a relations operating on a larger context in society, and affecting the dynamics between these two groups today. Themes included within the literature review are common histories of the struggle, stereotypes, intergroup contact theory, coalition building, and Black-Latino/a relations in higher education. Two theories are used to situate and analyze Black-Latino/a relations in great depth: (1) critical race theory, originally developed by legal scholars, and (2) intergroup contact theory. Critical Race Theory will aid to understand the relationship of Black and Latino/as relations related to conceptions of race in the U.S., racism, and power. The intergroup contact theory deals with explaining prejudices and other preconceived notions that affect relations between Blacks and Latino/as. I suggest from the findings of the literature review that the strained relations between Black and Latino/a students at WSU, limits activism and friendships that can arise from alliances and coalitions. Therefore, the study posits that students and faculty can take initiative to build bridges on campus between Blacks and Latino/as, to bring both groups together in order for activism and social projects to thrive and benefit our communities of color.

Presentation Number **43**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Cross-Cultural Analysis of Early Infant Breastfeeding Practices** | | |
| **Presenter:** | Chelsea Baggette, Samuel Harris | | |
| **Mentor:** | Courtney Meehan | **Campus:** | Pullman |
| **Co-Authors:** | Sam Harris, Caitlyn Leonardson-Placek, Katherine Flores, Courtney Meehan | | |
| **Major** | Baggette:Anthropology - CAS Harris: Anthropology, Psychology - CAS | | |
| **Category:** | Social Sciences | | |

The World Health Organization recommends initiation of breastfeeding within the first hour, the delivery of colostrum, and frequent day and nighttime breastfeeding in early infancy. Despite significant inroads into the delivery of this public health message, cross-culturally infant feeding practices remain highly variable. Here, we explore cross-cultural variation in early infant feeding patterns. Data were gathered from 364 mothers in 7 countries, in 9 regions, on 3 continents [rural Ethiopia (n=36), urban Ethiopia (n=40), rural Gambia (n=40), urban Gambia (n=40), Ghana (n=42), Kenya (n=41), Peru (n=43), Spain (n=41), and the United States (n=41)]. Mothers with infants between 1-4 months were interviewed regarding when they initiated breastfeeding, whether the infant received colostrum, why they initiated breastfeeding, at what time, and how frequently across the day and night their infants breastfed. We also explored how often mothers were separated from their infants across day and nighttime hours and how such separations affected infant feeding. Our findings indicate significant cross-cultural variation in early infant feeding patterns. Although the majority of infants were given colostrum there is variation in why and the timing of when mothers commenced breastfeeding. Additionally, results indicate, not surprisingly, infants were fed significantly few times per day when maternal activities required them to be separated for longer periods during the day. Our results reveal that early infant feeding patterns are a remarkable example of biosocial behaviors. Human infants have evolved needs, but addressing such needs are situated within culturally available and imaginable ways.

Presentation Number **44**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Negative Affective-Like Cues Promote Escalated Alcohol Self-Administration In Transgenic Alcohol Non-Dependent Mice** | | |
| **Presenter:** | Rachel Carnes, Madison Vreeken | | |
| **Mentor:** | Brendan Walker | **Campus:** | Pullman |
| **Co-Authors:** | Madison Vreeken, Brendan Walker | | |
| **Major** | Carnes: Genetics and Cell Biology - CVM Vreeken: Basic Medical Sciences - CAS | | |
| **Category:** | Organismal, Population, Ecological, and Evolutionary Biology | | |

Kappa-opioid receptor (KOR) activation produces dysphoric and aversive states in humans and animals and both dynorphin (endogenous ligand for the KOR) expression and KOR function are upregulated during the transition to alcohol dependence. Furthermore, our laboratory previously showed that rats could learn to associate cues with kappa-opioid receptor (KOR) agonist-induced aversive states. Importantly, when presented alone, those aversive cues promoted escalated alcohol self-administration, the expression of which was sensitive to KOR antagonism. To complement the previous pharmacological data that was generated and to take advantage of contemporary genetic manipulation approaches, this project sought to recapitulate the rat model in transgenic conditional KOR knockout mice. To this end, *floxed Oprk1* C57BL/6J mice acquired alcohol self-administration and then were subjected to associative conditioning sessions involving injections of the KOR agonist U50,488 (0 – 2.5 mg/kg) and exposure to an olfactory scent. Following conditioning sessions, the mice continued self-administering alcohol until stable drinking behavior was observed and then presented with the olfactory cue prior to the subsequent day's alcohol self-administration session. The results showed that compared to the vehicle-treated control group, KOR agonist-associated negative affective cues induced significant escalation of alcohol self-administration which identifies this model as a viable approach to capitalize on the use of conditional gene knockout approaches in future studies.

Presentation Number **45**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Investigating Environmental Triggers for Phragmites australis Allelopathy** | | |
| **Presenter:** | Tyra Velasco | | |
| **Mentor:** | David G. Gang | **Campus:** | Pullman |
| **Co-Authors:** | Rebecca Weed, David G. Gang | | |
| **Major** | Microbiology - CVM | | |
| **Category:** | Organismal, Population, Ecological, and Evolutionary Biology | | |

Common Reed (*Phragmites australis*) is an invasive plant in North America. To date, no specific mechanism has been determined for haplotype M's invasiveness. Where the invasive haplotype M dominates, other plants do not grow near or within the dense clonal population. Previous data has shown the *P. australis* may be competing via an allelopathic mechanism. Allelopathy is a competitive strategy where a certain plant tissue, such as roots or rhizomes, exudes compounds into their surrounding environment to inhibit the growth of other plants. In this study, we investigated possible environmental stresses that could trigger *P. austalis* to produce an allelopathic compound. These stresses included drought, cutting back stems, and shading. Over the course of a 10 week trial roots and rhizomes were collected from plants grown under each stress as well as the experimental control (no stress). Extracts from the tissues were isolated via a liquid extract method and were tested for germination inhibition with a germination assay using, lettuce (*Latuca sativa)*. We concluded that *P. austalis* grown under the drought stress showed allelopathy.

Presentation Number **46**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Learning Where to Listen: Examining Third Space Activism in Times of Neoliberal Rhetoric** | | |
| **Presenter:** | Ruben Zecena | | |
| **Mentor:** | Linda Heidenreich | **Campus:** | Pullman |
| **Major** | Women's Studies, English - CAS | | |
| **Category:** | Humanities | | |

This paper maps the criminalization of transgender and queer bodies that are mobilized through immigration policies. Following President Obama's executive orders on immigration, I argue that these orders rest on "family reunification" rhetoric that imposes a dichotomous relationship between heteronormative families and queer bodies. Benefiting from the activism of the Los Angeles based organization, Familia: Trans Queer Liberation Movement (Familia), and an oral interview with one of their staff members, this paper listens the voices of those who are silenced by President Obama's executive orders. Through close readings of online documents and activist organizing, I look at the third spaces where neoliberal rhetoric is disrupted; thus, the paper draws from Queer Chican@ methodologies of Chela Sandoval's oppositional consciousness and the use of counterpublics. As I argue, trans and queer organizations disrupt neoliberal rhetoric where it becomes necessary to explore the third spaces where counterpublics thrive. Such spaces and actions are exhibited by a founding member of Familia: Jennicet Gutiérrez. She is a trans mujer de Mexico who lifted many veils when she interrupted Obama at a White House pride reception. The silencing and booing from the audience, and Obama himself, highlights the limited spaces where transgender women of color are heard and seen. Overall, this paper emphasizes critical listening practices in times when transgender women of color, specifically trans Latinas, are silenced in "progressive" liberal spaces.

Presentation Number **47**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **The Panoptic Experience** | | |
| **Presenter:** | Laura Filardo | | |
| **Mentor:** | Kathleen Ryan | **Campus:** | Pullman |
| **Major** | Interior Design - CAHNRS | | |
| **Category:** | Arts and Design | | |

**Goal:** The town of LaCrosse, WA and the Ice age Flood Institute are working together to combine information on the regional ice age floods with a welcoming visitors center for the town. A major goal was to make the site visible and graphically exciting to the town, and visitors.
**Background:** The site is a vacant lot surrounded by historic buildings built from the areas basalt rock. The goal is to create a graphically and physically exciting spot for the town's visitor center and for interpretation of the ice age floods.
**Method:** Research on the town of LaCrosse, WA included looking into the area's history, the local environment created by the ice-age floods, and the site itself. Research on the geological history included understanding what had occurred, its relationship to the town and the region and its importance as well as inspiration for design. Case-studies were completed on pop-up exhibits (low-cost, temporary exhibits, graphics) in order to gain knowledge of the building type.
**Results:** The conceptual design is the panoptic experience. Panoptic means all-encompassing or seeing the whole in one view. The whole site is an experience of many characteristics of the ice age floods and encompasses local heritage. A cargo box provides the visitor and exhibit shell. It will be easily visible from any approach. The box itself is at an angle to maximize daylighting and receive the least amount of exposure to the wind. The cargo box will have a stripping detail to mimic the layers of sediment banding and rolling hills caused by the ice age floods. A large awning is custom shaped to mimic the look of a glacier to provide some shading at the entry. Inside the center are hands-on learning exhibits.
The visitor center site will be an open and welcoming place. The result effectively addresses the design problem while giving a great new space to the community and visitors to learn about the long and short-term history of LaCrosse.

Presentation Number **48**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Quantification of Diameters of Cellulose Fibrils and Particle Size of Lignin Precipitates on Various Pulp Substrates** | | |
| **Presenter:** | Kirstin Egerton | | |
| **Mentor:** | Nehal I. Abu-Lail | **Campus:** | Pullman |
| **Co-Authors:** | Baran Arslan, Xiao Zhang, Nehal I. Abu-Lail | | |
| **Major** | Chemical Engineering – CEA | | |
| **Category:** | Engineering and Physical Sciences | | |

In the conversion of biomass to biofuels, the enzymatic hydrolysis of cellulose limits the efficiency of the overall process. Heterogeneity in substrate surface morphology limits our complete understanding of how enzymes act on a biomass surface. Surface morphology analysis was conducted in order to increase our understanding of how the efficiency of the enzymatic hydrolysis can be improved. In order to do this, cellulosic biomass was imaged using an atomic force microscope. The images were then analyzed in order to obtain a quantitative analysis of cellulose fibril and lignin particle diameters present on substrates that were prepared via different pretreatment protocols. Substrates pretreated with kraft, sulfite or organosolv pulping were compared. The fibril and particle diameters were measured from the images, then depicted in histograms, in order to determine the distribution of lignin particle size present on the biomass surface and available for enzymatic interactions. Lignin free substrates showed an approximate cellulose fibril diameter of 25 nm with uniform size. It can be concluded that the treatment methods used had no significant effect on cellulose fibril diameter size. Kraft lignin precipitates have particle sizes that are ≈18% larger than lignosulfonates and orgonosolv lignin. This may be due to kraft lignin having a higher hydrophobicity, resulting in an increased aggregation of the lignin. These different particle sizes influence the accessibility of the enzymes, therefore changing the efficiency of the enzymatic hydrolysis.

Presentation Number **49**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Classification of Suppressor Mutants Involved in Vitamin B6 Synthesis in Higher Plants** | | |
| **Presenter:** | Sarah Gold | | |
| **Mentor:** | Hanjo Hellmann | **Campus:** | Pullman |
| **Co-Authors:** | Hanjo Hellman | | |
| **Major** | Microbiology, Pre-med – CVM | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

Understanding plant metabolism and its impact for development, reproduction, and stress tolerance is key research in an expected globally changing environment, which may impact critical aspects of future crop production and human nourishment. Vitamin B6 is one of the most versatile co-factors known in the living world. It participates in more than 140 chemical reactions and plays central roles in amino acid and carbohydrate metabolism, biosynthesis of other vitamins, and photosynthetic processes in plants. Additionally it represents a very potent antioxidant, which has been shown to help plants cope with abiotic stress situations such as high-light, UV-B, oxidative stress and water deficiencies. This diversity of function makes the vitamin an indispensable factor to the cell, and plants affected in vitB6 biosynthesis show various developmental defects and become highly susceptible to abiotic stress. Unlike mammals, plants have the capacity to synthesis vitB6 de novo through a complex called the PLP synthase, which is composed of an inner ring of PDX1 proteins and an outer wheel of PDX2 proteins. Although the biochemical pathway for vitB6 synthesis is well-defined, very little is known about its regulation. Previous work in the lab demonstrated that a point mutation, resulting in an amino acid change in a PDX1 protein, significantly impacts the function of the synthase activity and results in short-rooted plants in the absence of exogenously supplied vitB6. A mutagenesis was performed on an Arabidopsis line carrying this point mutation, and the progeny were screened for suppression of the short root by looking for a reversion back to long roots. One of these suppressor lines has been mapped and identified to have a mutation in an undescribed gene that we are calling PDX1-like (PDL). My project focused on defining the role of PDL in relationship to vitB6 regulation.

Presentation Number **50**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **An Examination of the Reporting Procedures of Socioeconomic Status in Pediatric Hearing Studies** | | |
| **Presenter:** | Kayla Monson | | |
| **Mentor:** | Ella Inglebret | **Campus:** | Pullman |
| **Major** | General Biological Sciences, Spanish – CAS, Honors | | |
| **Category:** | Social Sciences | | |

Over the last two decades pediatric hearing studies have demonstrated a relationship between low socioeconomic status (SES) and access to service delivery designed to prevent, identify, and treat hearing loss. As a consequence, the American Speech-Language-Hearing Association (ASHA) has encouraged the reporting of SES in research studies. However, the extent to which SES is reported in journals published by ASHA is unknown. The purpose of this study was to examine the frequency with which SES is reported in pediatric hearing studies, and analyze the studies collectively for any existing patterns in how SES was reported during 2010-2015. Articles were selected from two ASHA published journals: the American Journal of Audiology (AJA) and the Journal of Speech, Language, and Hearing Research (JSLHR). Articles selected for this review met the following criteria: 1) Some or all participants ranged in age from birth to 18 years; 2) All studies included a method section that described the participants; 3) All studies included examination of the original data; 4) The participants were individuals who lived in the United States. Of the 65 articles drawn from the two journals during 2010-2015, only 16 reported SES. This equates to about 25% of the articles reporting SES. When reported, indicators used were maternal education level, family/household income, or other. The patterns arising from this review offer insight into the current reporting practices of SES that can guide authors of subsequent manuscripts. As the importance of reporting SES continues to be emphasized, it is expected that the rate of SES reporting will increase. As a result, professionals reading the articles will have more information to determine if research studies pertain to the individuals they serve who are from low SES backgrounds.

Presentation Number **51**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **The Chicken You Buy at the Store is Not as Safe as You Think** | | |
| **Presenter:** | Samantha Romero-Sabo | | |
| **Mentor:** | Michael Konkel | **Campus:** | Pullman |
| **Co-Authors:** | N. Negretti, C. Gourley | | |
| **Major** | Biology – CAS, Honors | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

*Campylobacter jejuni* is a leading cause of bacterial gastroenteritis in the United States and worldwide. Campylobacteriosis (*C. jejuni*-mediated gastroenteritis) is characterized by abdominal cramps, fever, nausea, and diarrhea, which may contain blood and leukocytes. Individuals become infected with *C. jejuni* predominantly through the consumption of food that has been cross-contaminated with raw chicken. This is unsurprising as most commercially reared poultry are colonized by *C. jejuni* within 2-3 weeks of age, and 50-90% of domestic chicken carcasses are contaminated with *C. jejuni* at the time of sale. The incubation period for human infection is 2-5 days and requires a very small number of bacteria (~800) to establish infection. Campylobacteriosis is often a self-limiting infection, but it can result in serious complications including flaccid paralysis due to the development of Guillain-Barré syndrome. The purpose of this poster is to educate consumers why proper handling of raw poultry is important to prevent development of campylobacteriosis.

Although *C. jejuni* has been recognized to cause disease since the 1970's, there have been limited advances in understanding *C. jejuni* disease factors. We do know that once consumed and passed into the intestine, *C. jejuni* invade the cells of the intestinal tract causing tissue damage and inflammation. This is a multifactorial process, where the bacteria must be motile in order to adhere to and invade the intestinal wall. How this process is mediated remains largely unidentified and is a current area of research.

One strategy to better understand *C. jejuni* disease factors is to compare strains isolated from different environmental sources that have different disease profiles. We hypothesize that differences in disease profiles could result from unique genes contained in some strains but not others. Our lab works to identify the function of these unique genes in the hope of identifying novel disease factors.

Presentation Number **52**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **The Drake Equation - Calculating the amount of life in the universe** | | |
| **Presenter:** | Jordan Bromley, Luke Hembree, Meisha Moro, Libby Pederson, Peter Sinclair | | |
| **Mentor:** | Michael Allen | **Campus:** | Pullman |
| **Co-Authors:** | Michael Allen | | |
| **Major** | Bromley:Psychology, Neuroscience – CAS, CVM; Hembree: Mathematics - CAS Moro: Zoology – CAS; Pederson: Communications – CCB, Comm; Sinclair: Physics – CAS, Honors | | |
| **Category:** | Engineering and Physical Sciences | | |


We have calculated that, while there are likely to be a thousand civilizations in the galaxy around us, they are sufficiently far apart that any contact is unlikely.

To estimate the number of civilizations in the galaxy, we use a powerful tool called the Drake Equation. This equation breaks down the problem into several quantifiable terms. The equation is composed of two sections: the number of planets in the galaxy which have the capacity for life, and the fraction of those planets which develop intelligent civilizations. The product of these terms is a value for *N*, the number of civilizations capable of radio communication in our galaxy.

In this project, we identify and quantify the core requirements for intelligent life to arise. This allows us to understand the likelihood of life arising on planets other than Earth.

Performing an analysis of these requirements, we arrive at a result of 1440 intelligent civilizations existing within our galaxy. Considering the margins of error on our individual values, this number could range from 6144 to 38.

Using the volume of the galaxy, we estimate that the average distance between civilizations is 8000 light years.

These values imply that, while there are thousands of other civilizations in the galaxy, they are so distant from each other that they cannot communicate. This result resolves Fermi's Paradox – the question of why we see no other intelligent life.

Humankind has long wondered whether or not it is alone in the universe. Finding an alien civilization would be among humanity's greatest discoveries. The question of how many other civilizations there are in the galaxy is of the utmost importance because information of extraterrestrial intelligence would allow us to understand more about the conditions under which life arises, and will give us a universal context for our own existence.

Presentation Number **53**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Assessing the Impact of Online Proctored Exams on Student Performance** | | |
| **Presenter:** | Ashley Jones | | |
| **Mentor:** | Lee William Daffin, Jr., Ph.D. | **Campus:** | Global |
| **Co-Authors:** | Lee William Daffin, Jr., Ph.D. | | |
| **Major** | Psychology, CAS | | |
| **Category:** | Applied Sciences | | |

Proctored exams, along with plagiarism checkers, are a way to keep students honest in the online setting, but are not required in all classes. This begs the question of whether they are needed to uphold academic integrity, especially if students are ignoring instructions not to use outside sources. The purpose of this study is to determine if there is a significant difference in test scores for proctored versus non-proctored exams in online courses offered through the psychology department at Washington State University. Additionally, we investigate whether there is a difference in the time it takes students to complete proctored and non-proctored exams. We hypothesize that students will perform better on and take longer to complete non-proctored versus proctored exams. Data was obtained from the Fall 2012 for select classes offered through Angel, and from Fall, Spring, and Summer 2015 for twelve courses through Blackboard. Courses from 2012 used ProctorU while courses from 2015 used the Global Campus Proctoring Service (GCPS). Results indicate that the average percent earned on proctored exams across all psychology classes ($M$ = 64.75) was significantly lower than the average percent for non-proctored exams ($M$ = 77.41). As well, the average time to complete proctored exams ($M$ = 27.85) was significantly lower than the average time to complete non-proctored exams ($M$ = 48.43). All comparisons were statistically significant at $p < .001$ and confirm our hypotheses. Students on average score 12.66% higher and spend about 20 minutes longer completing non-proctored exams than proctored exams. One explanation is that students are using the extra time to look up answers. The effects hold regardless of proctoring service used, who taught the class, and counterbalancing of which exam was proctored in each class. Implications for online education are discussed.

Presentation Number **54**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Parent Attitudes and Higher Education: The Influence of Perception of Parental Support on College Experience** | | |
| **Presenter:** | Crysta Cady | | |
| **Mentor:** | Joyce Ehrlinger, Phd | **Campus:** | Pullman |
| **Co-Authors:** | Joyce Ehrlinger, Phd | | |
| **Major** | Psychology, CAS | | |
| **Category:** | Social Sciences | | |

The present research aims to explore minority students' perceptions of their parental support on their experience in higher education compared to non-minority peers. For the purposes of this study, minority students are defined as both underrepresented students of color (African American/Black, Hispanic/Latino, Native American, Pacific Islander) and first-generation students (those whose parents do not hold an education beyond a high school diploma or equivalent). Data was collected using a survey delivered online to participants at a traditional four-year university in spring 2015. The survey measured perceived parental support and other characteristics related to college experience. It was predicted that minority students would perceive both parents as being less supportive than non-minority peers and thus would exhibit a more inhibited college experience. The study yielded moderately significant results suggesting that minority students perceive both parents as slightly less supportive than non-minority students. A within-subjects ANOVA revealed a significant difference suggesting that both minority and non-minority students perceive their father as being less supportive than their mother, and this different was especially large if the students were part of the minority group.

Presentation Number **55**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Expression of *Pseudomonas aeruginosa* Na+ -NQR** | | |
| **Presenter:** | Karla Martinez | | |
| **Mentor:** | Dr. Blanca Barquera | **Campus:** | Pullman |
| **Co-Authors:** | Andrew Jones, Katherine Mezic, Teri Hreha, Dr. Mattheos Koffas and Dr. Blanca Barquera | | |
| **Major** | Biochemistry – CVM, Honors | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |


The $Na^+$-pumping NADH:quinone oxidoreductase ($Na^+$-NQR) is the entrance for electrons into the respiratory chain of many marine and pathogenic bacteria, including *Pseudomonas aeruginosa*.

$Na^+$-NQR catalyzes the oxidation of NADH, the reduction of quinone and pumps of $Na^+$ across the membrane, creating a sodium electrochemical gradient. This gradient is used by the cells to transport nutrients into the cells, to export toxins and virulence factors and to drive flagellar motion. $Na^+$-NQR and other respiratory enzymes are key for survival and regulation of virulence in *Pseudomonas aeruginosa*. In order to understand the role of $Na^+$-NQR we deleted the nqr operon and characterized the mutant (Dnqr). Among other properties, the nqr deletion strain expresses higher levels of the virulence factor, pyocyanin.

We predicted that a complementation strain, in which $Na^+$-NQR is expressed from a plasmid, should have reduced levels of pyocyanin similar to those of the WT strain.

For this work, we have constructed an expression vector containing the nqr operon in the pHERD-28 vector, which also includes the gene that confers resistance to the antibiotic trimethoprim and a 6X-His tag at the C-ter of NqrF.

This expression vector was successfully transformed in Dnqr cells and we were able to demonstrate that the $Na^+$-NQR complex is assembled. However, the activity of the isolated $Na^+$-NQR complex was low. Levels of pyocyanin in the complementation strain were similar to those in the deletion strain, likely because the low $Na^+$-NQR activity. Furthermore, the deletion strain exhibited some resistance to trimethoprim, which necessitated the use of higher concentrations of the antibiotic to select for complementation and these higher concentrations appear to be deleterious to the cells.

Here, we report the expression of the nqr operon using the pHERD-28 expression vector, in the Dnqr mutant. This vector confers resistance to the antibiotic trimethoprim. We demonstrated that $Na^+$-NQR is assembled but the enzyme has low activity. We also observed that the antibiotic Tm at the concentration used is deleterious to the cell. Since the activity of $Na^+$-NQR was very low, the levels of pyocyanin were not reduced.

Presentation Number **56**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Apparel Reshoring Movement: A Case Study of a Made-in-USA Business Model** | | |
| **Presenter:** | Jessica Del Carmen | | |
| **Mentor:** | Dr. Ting Chi | **Campus:** | Pullman |
| **Major** | Apparel Merchandising - CAHNRS | | |
| **Category:** | Social Sciences | | |

Apparel manufacturing, which left the U.S. in massive waves in the past two decades, is trickling back (Davidson, 2013). In recent years, an increasing number of apparel brands and retailers such as Brooks Bros., Nike, and Saks have moved some production from oversea back to the U.S. Reshoring (i.e., local sourcing) allows brands and retailers to be more responsive to actual consumer buying behavior. To generate useful insights on this emerging issue, this study used an in-depth case study method to systematically analyze a game-changing business model (i.e., Apparel Made 4 You (AM4U), invented and demonstrated by a company in California) that enables apparel to be made profitably in America again. The competitive advantage theory provided the theoretical framework for this study. Competitive advantage results from matching core competencies to the opportunities presented in an industry. Firm's ability in effective and efficient response to customer needs creates an edge over competitors (Porter, 2011). Competitive advantage can lead to increased profit. Both published secondary information and primary information gathered from interviews were utilized for analysis.

AM4U model integrates digital technologies to reengineer the business processes of how apparel is bought and manufactured. Two distinctive features that AM4U model possesses are purchase activated manufacturing (PAM) and zero inventory production (ZIP). PAM is the idea of changing demand to supply instead of supply to demand. Consumers may customize their apparel to their sizes using 3D body scanning technology. The desired apparel can be designed, produced, and shipped to the customer within three days. During this process, AM4U patented zero pollution air dye technology for coloration. TUKATECH CAD/CAM for pattern making and sampling, Gerber fabric cutting system, and Eton apparel production system are fully integrated for quick production and lower cost. ZIP is the idea of owning AM4U mini factory by brands or retailers and replenishing stock once it is sold. In this way there will be endless choices for consumers and low to zero inventory for companies. AM4U model provides a feasible and profitable option for apparel companies that are considering local sourcing for quick response, less markdowns, and job creation.

Presentation Number **57**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Development and Usability Testing of a Digital Memory Notebook** | | |
| **Presenter:** | Kaylee Spangenberg | | |
| **Mentor:** | Dr. Maureen Schmitter-Edgecombe, Dr. Diane Cook | **Campus:** | Pullman |
| **Co-Authors:** | Jenna Beaver, Brittany Cole, Christine McManus, Jessamyn Dahmen, Dr. Maureen Schmitter-Edgecombe, Dr. Diane Cook | | |
| **Major** | Psychology - CAS | | |
| **Category:** | Social Sciences | | |

The current aim of this study is to create a user friendly digital memory notebook, or DMN that will help assist individuals in everyday events such as scheduling appointments, logging activities, and even completing tasks they may otherwise forget to do by sending out reminders, in the hopes of helping them maintain their independence and help compensate for cognitive declines. Another goal of the study is to develop and test the DMN application both as a standalone tool and as part of a smart environment system. Eleven participants were interviewed for feedback on aesthetics and usability of app interface mock-ups, ages ranging from 34-78 years. A preliminary qualitative analysis revealed that at least nine of the eleven participants noted the following feedback trends: The app is viewed as similar to existing calendar/reminder apps and also similar to paper versions of daily planners, the app does not seem like it will require extensive training, it seems intuitive to operate, background colors need to be changed to show more contrast, and consistent “home” and/or “back” buttons should be displayed on each page. Using this feedback, an initial design of the application has been started. So far, the participant feedback process has provided valuable insight into what individuals think of the application. Once a preliminary version of the app is complete, further trialing with older adults and caregivers in a more structured manner will lead to additional valuable and interpretable feedback, which will lead to adjustments within the app design and functionality. Once a user-friendly and functional app has been developed it will be able to provide cognitively impaired older adults with considerable assistance in maintaining functional independence in their everyday lives. Future directions for the following semester include further development and refinement of the app, further participant testing with the app and re-design process, and a finalization of the DMN app.

Presentation Number **58**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **The Effect of FUdR on Fatty Acid Composition in C. elegans** | | |
| **Presenter:** | Raven Conyers | | |
| **Mentor:** | Jennifer Watts | **Campus:** | Pullman |
| **Co-Authors:** | Xun Shi, Jennifer Watts | | |
| **Major** | Genetics and Cell Biology- CVM | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

5-Fluoro-2'-deoxyuridine, more commonly known as FUdR, is often used in *C. elegans* aging research. FUdR is a widespread chemotherapy drug that acts by inhibiting cell division. This feature has made it a popular drug used in *C. elegans* aging experiments, because progeny of the experimental nematodes fail to develop, eliminating the need for daily transferring of worms. Since FUdR is so widely used we asked the questions: Does FUdR alter the metabolism of *C. elegans*? Should this powerful drug be used in aging experiments?

*C. elegans* are free-living, non-parasitic nematodes that are a popular organism for aging studies. The worms are easily grown in the lab on agar plates together with *E. coli*, which serve as their food source. At room temperature, *C. elegans* develop rapidly and live for about two weeks. It has been previously reported that FUdR does not significantly affect the lifespan of wild type *C. elegans*. We observed that certain *C. elegans* mutants with altered fatty acid composition had short lifespans when grown without FUdR. However, in assays including FUdR, the lifespans of these mutants were longer, similar to wild type. We used gas chromatography/mass spectrometry to determine the fatty acid composition changes in OP50 *E. coli* and in *C. elegans* in the presence and absence of FUdR. Our experiments showed that FUdR altered the fatty acid composition of the dietary *E. coli* as well as the fatty acid composition of the nematodes feeding on them. Bacteria and *C. elegans* grown in the presence of FUdR contained increased relative amounts of monounsaturated fatty acids and decreased cyclopropane fatty acids. Our findings indicate that the changes in the fatty acid composition caused by growth on FUdR confer beneficial effects on *C. elegans* mutants with abnormal fatty acid composition. Therefore, aging assays using *C. elegans* mutants should be conducted both in the presence and absence of FUdR.

Presentation Number **59**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Saving Water: Deep Subsurface Drip Irrigation for Vineyard Applications** | | |
| **Presenter:** | Jeremy Thompson | | |
| **Mentor:** | Dr. Pete Jacoby | **Campus:** | Pullman |
| **Co-Authors:** | Dr. Pete Jacoby, Zara York | | |
| **Major** | Agricultural Technology and Production Management, Minors; Horticulture, and Crops and Soil Sciences - CAHNRS | | |
| **Category:** | Applied Sciences | | |

Research trials are underway to evaluate the application of a new high efficiency sub-surface micro-irrigation system for vineyard applications. Water is distributed through standard suspended dripline via pressure compensated emitters housed at the upper section of a PVC pipe placed vertically into the soil to depths ranging from 1-3 feet below the soil surface. The research hypothesis is that grapevine roots will extend deeper for access to this water source than those grown under surface drip systems. We also hypothesize that these deeper rooted vines will be more drought resistant and respond more effectively to regulated deficit irrigation. Our research objectives are to: 1) determine capacity of vines to develop deeper and more robust root systems than typically occur under standard surface drip systems; 2) evaluate the water use efficiency of vines managed under each treatment; and 3) quantify potential for more precise utilization of regulated deficit irrigation through sub-surface micro-irrigation to maintain heathy vines and produce superior quality of grapes. We are comparing physiological responses between vines irrigated with standard surface drip irrigation with those being watered with reduced amounts of water according to delivery depth, amount, and under continuous versus pulsed application schedules. Plant physiological responses will be quantified by measuring xylem pressure potential, photosynthetic rate, and near infrared spectral analyses of leaf surface temperature from ground and aerial platforms. Sub-treatments also include length of irrigation period (full, half, and quarter) and pulsed versus continuous application to determine sub-surface water distribution patterns under different soil types. In addition to the physiological responses of the vines we will be monitoring other agronomic factors such as weed growth and pest management under the new system. From the initial data collected this new method of irrigation has shown that the grower can produce comparable yields while using 60% or less water as compared to the controls. Our team will collect a significant amount more data over the next few years and will have a comprehensive report of our findings at a later date.

Presentation Number **60**

# ABSTRACT:

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|---|---|---|---|
| **Abstract Title:** | **Neck Posture Over Time: A Potential Link to Pain** | | |
| **Presenter:** | Don Cundy | | |
| **Mentor:** | Dr. Anita Vasavada | **Campus:** | Pullman |
| **Co-Authors:** | Dr. Anita Vasavada | | |
| **Major** | Bioengineering, Pre-Med - CEA | | |
| **Category:** | Engineering and Physical Sciences | | |


There are numerous risk-factors for neck-pain. Certain dynamic posture patterns may fall within this category. Thus, correlations between these patterns and the settings in which they occur (such as activity and duration) could provide significant insight toward deciphering the link between posture and pain. Current investigation focuses on the investigation of the angle of the neck (NA) with respect to time and activity being performed by the subject.

The goals of this investigative study were to (1) determine the feasibility of measuring posture using an electromagnetic device; and (2) quantify the changes in head and neck posture during subject computer-use in pilot studies. The electromagnetic device used (Polhemus G4) senses spatial 3-D location and orientation and transmits this data for record-keeping and analysis via electromagnetic waves (wireless signal). However, nearby metal can interact with and distort wireless signals. To combat this obstacle, a mobile set-up of known sensor configurations was designed and constructed. Data collected with this mobile set-up can then be compared to that collected in a distortion-free area, effectively measuring the extent of signal distortion in a given room. The result is the ability not only to screen for precise data, but to characterize the nature of any distortion through selectively varying each location/orientation variable independently. Results will provide evidence on the feasibility of using electromagnetic devices for posture research.

Pending results on the feasibility of using the Polhemus G4, promising methods for analysis of postural data in relation to time and ultimately neck-pain include *Exposure Variation Analysis*, wherein 3-D histograms are used to graphically visualize trends between three variables. In this case, those three variables may be (1) Neck Angle (NA), (2) duration spent at a given NA, and (3) percent of total time for a given duration length and NA. By the nature of histograms, in this example variables (1) NA and (2) duration would be discretized to allow for data-subset grouping. If postural patterns can be tied to reported levels of neck-pain, it may lead to revision of current ergonomics guidelines or the development of body-worn sensors to monitor postural exposure that leads to pain.

Presentation Number **61**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **The Impact of Estrogen Signaling in the Oviductal Cilia** | | |
| **Presenter:** | Sofia O'Neill | | |
| **Mentor:** | Wipawee Winuthayanon | **Campus:** | Pullman |
| **Co-Authors:** | Wipawee Winuthayanon | | |
| **Major** | Genetics and Cell Biology, Biology – CVM, CAS | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

Reproductive health is influenced by expression of the estrogen receptor, ERα. This receptor is encoded by the *Esr1* gene and is expressed in the epithelial cells of the reproductive tract. Any deficiency or absence of this gene can lead to the following reproductive physiological impairments: infertility or reduced fertility function. The ciliated epithelial cells lining the oviduct is believed to play an important role in the successful transport of embryos to the uterus. When there is normal expression of ERα in the oviduct, the embryos are gently caressed and guided by the cilia of these epithelial cells towards the uterus. In this study, the primary focus will be the impact of lacking ERα on the oviduct and its ciliary epithelial cells. We found that the absence of ERα expression in the epithelial cells hinders the embryonic migration in the murine models; the embryos remain in the oviduct and are not transported to the uterus for implantation. We hypothesize that, with the absence of ERα expression in the oviduct, there would be a reduction in the numbers of ciliated epithelial cells or abnormalities in the structure or function of the cilia. In order to test our hypothesis, oviduct tissue will be collected from the following murine strains: wild type (WT) and ERα knockout (ERαKO). First, we will confirm expression of ERα in the ciliated epithelial tissues of the oviduct in the ERα knockout and compare it to the wildtype strain. The next step in this study is to count the number of ciliated cells in the oviduct of the wildtype and ERαKO murine strains. The findings from this study will provide insight whether disruption of the estrogen signal could interfere with the function of ciliated cells in the oviduct and, ultimately, alter pregnancy outcome.

Presentation Number **62**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **The Effects of Permethrin Exposure on Developing Common Quail (*Coturnix Coturnix*) Embryos through use in Nesting Material** | | |
| **Presenter:** | Sydney Schneider | | |
| **Mentor:** | Dr. Erica Crespi | **Campus:** | Pullman |
| **Co-Authors:** | Marissa Bernhofer | | |
| **Major** | Zoology – CAS, Honors | | |
| **Category:** | Organismal, Population, Ecological, and Evolutionary Biology | | |

Herpes simplex virus (HSV) infections, while sometimes painful, can be managed with available antiviral drugs. The acyclovir family of drugs, for example, inhibits the herpes viral DNA polymerase and thus halts virus replication. New HSV strains resistant to acyclovir can emerge, particularly in immunocompromised individuals. Thus, there is a clear need for novel anti-HSV therapeutics. HSV enters a new host cell by hijacking the cell's own proteasome, a structure normally used by the cell to break down proteins no longer needed. The entering HSV particle utilizes the proteasome to transport itself inside the cell. Therefore, an effective antiviral compound might target the proteasome for inhibition, rendering HSV unable to enter the cell at all. Antiviral drugs that target viral proteins are more likely to select for drug-resistant viral mutants. In contrast, a drug targeting a host cell factor such as the proteasome is not constrained by these limitations. The FDA-approved compound bortezomib is a proteasome inhibitor used to treat certain blood cell cancers. This study aims to re-purpose bortezomib as an off-the-shelf therapeutic for HSV. Bortezomib blocked infection by both wild type HSV-1 and HSV-2 and acyclovir-resistant HSV strains in a dose-dependent manner. Inhibition was detected at bortezomib concentrations that were not toxic to the cells. The bortezomib concentration that results in 50% cytotoxicity divided by the concentration that reduces HSV infection by 50% will yield the selectivity index. This index will indicate the potential usefulness of bortezomib as an antiviral drug against both HSV and drug-resistant HSV.

Presentation Number **63**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Physical Therapist Feedback Regarding Wearable Technology** | | |
| **Presenter:** | Jordana Dahmen | | |
| **Mentor:** | Dr. Diane Cook | **Campus:** | Pullman |
| **Co-Authors:** | Gina Sprint, Dr. Diane Cook and Dr. Douglas Weeks | | |
| **Major** | Biology- CAS | | |
| **Category:** | Social Sciences | | |

Wearable technology has the potential to augment current subject evaluation with objective measurements of gait in inpatient rehabilitation settings. An ongoing study at St. Luke's Rehabilitation Institute has been investigating such wearable sensor-derived measurements by having patients perform a sequence of ambulatory tasks that resemble every day activities. Gait characteristics are computed from the collected acceleration and angular velocity data from three wearable inertial sensors. From this data researchers are able to quantitatively describe ambulation performance and present the information with visualizations such as plots and graphs. The results of this research are relevant to the engineering community; however, the usefulness of this data for the clinical community has not been verified. To investigate the clinical utility, Physical Therapists (PT) from St. Luke's were recruited to undergo an interview process to gather their feedback (N=7). PTs were presented with several gait metrics and visual displays of gait characteristics. They were then asked a series of questions related to the data and its perceived usefulness. The PT responses yield both qualitative and quantitative evidence regarding applicability and adoptability for wearable sensors in rehabilitation. The quantitative responses were on a scale from 1(strongly disagree/not useful) to 5(strongly agree/very useful). The PTs responded expressing comfort with technology (4.00 ± 0.82) although currently they use very limited technology to provide therapy services. The interview responses showed an interest in using wearable technology for their patients (4.43 ± 0.53) with 5 PTs expressing an interest in technology for balance assessment and gait analysis. We will use these PT responses for future research directions.

Presentation Number **64**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Glass of the Ancient Forts** | | |
| **Presenter:** | Joseph Osborn | | |
| **Mentor:** | Dr. John McCloy | **Campus:** | Pullman |
| **Major** | International Business, Materials Science and Engineering, CCB, CEA | | |
| **Category:** | Engineering and Physical Sciences | | |

The research I conduct under the direction of Dr. McCloy is ultimately focused on finding a glass composition suitable for safely storing nuclear waste from the Hanford Site. Melting nuclear waste with a specific, approved mixture of glass oxides, then cooling it into a solid glass, is a common means of containing nuclear waste in a form that is relatively safe to store. Unfortunately, the waste found at the Hanford Site is far more difficult to achieve this with than a typical, modern nuclear waste form. Whereas modern reactor waste is of specific compositions that are known to reliably form glass when melted, the Hanford waste contains over half of the periodic table of elements. High levels of sodium and aluminum in the Hanford waste greatly increase the odds of the waste forming a crystalline rock-like material rather than a glass. Because crystalline substances such as nepheline are more prone to corrosion than glass, they are unacceptable for storing nuclear waste.

To ensure nuclear waste remains safe even for future generations, it is generally accepted that nuclear waste glass should not corrode to a significant degree for at least 100,000 years. Since it is impossible for us to perform a corrosion test lasting over a thousand years, we have focused my research project on ancient vitrified fort glass. Throughout much of Western Europe, ancient stone forts may be found whose outer edges were at one point brought to a high enough temperature that when melted, they turned to glass. Many of these forts have been exposed to all weather conditions for over a thousand years. After searching multiple publications and transcribing hundreds of vitrified fort chemical compositions into a spreadsheet, I began recreating the glass compositions by weighing out different high-purity oxides into batches and melting them in a furnace. Some of these never fully melted, but I was able to form glassy solids with most of them, and two of them formed highly homogenous glasses. From here, we prepare to embark on a multiple month long lab corrosion test for the more promising looking glass compositions.

Presentation Number **65**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Interaction between Sex Hormones and Sex Chromosome Complement in Metabolism** | | |
| **Presenter:** | Mackenzie Hastings | | |
| **Mentor:** | Jun Xu | **Campus:** | Pullman |
| **Co-Authors:** | Jun Xu, David Dewitt | | |
| **Major** | Neuroscience – CVM, Honors | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

With a huge market for diet pills and a constant search to find the best way to keep a healthy metabolism, we look to genetics for insight. As found in previous studies, men usually have faster metabolisms than females. Using the four core genotype (FCG) mice, a mouse model which consists of male and female mice with either the XX or XY sex chromosome complement, we aimed to find differences between the genotypic genders (XX males and XY females as well as normal genotypic gender) in metabolism. To study this, we placed the mice in a metabolic chamber for nine days and monitored various physiological activities as well as ran PCR on tail DNA for all mice to find the genotype. Our results found that gonadal sex hormones significantly affect body mass, resting metabolic rate, oxygen uptake, and carbon dioxide production. In all four cases, mice with testes (*sry* gene present) scored higher, proving previous studies once more. By comparing the FCG mice, our study's findings alludes to the fact that for certain physiological processes, it may be the testicular phenotype and XX genotype that operate to reduce the levels of activities such as oxygen intake, carbon dioxide intake and food intake. Conversely, the ovarian phenotype and XY genotype act to increase these activities. We also found that gonadal males outweighed gonadal females as well as had a higher percentage of lean mass and fluid when examined with the NMR magnet. No effect was found with sex chromosome complement nor with interaction between gonadal and genetic sex.

Presentation Number **66**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Investigating the role of Jasmonate signaling in resource partitioning during the defense response in Arabidopsis.** | | |
| **Presenter:** | Taylor Sund | | |
| **Mentor:** | Nathan Havko | **Campus:** | Pullman |
| **Co-Authors:** | Nathan Havko, John Browse | | |
| **Major** | Microbiology - CVM | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

As the world population continues to grow, so will the global demand for food. Crops will need to withstand factors such as disease, drought and attack from herbivore pests in order to meet future demand. Innately plants defend themselves from some pests with defense responses that are regulated by a hormone called Jasmonate (JA). The plant produces JA when wounded, or when herbivores or pathogens are detected. JA changes the expression of thousands of genes, including many related to the synthesis of defense compounds and proteins. The activation of defenses by JA is accompanied by repression of growth. By diverting the plant's limited resources away from the construction of new leaves and to defensive secondary metabolism JA is managing the dilemma of plants- to grow or defend. Additionally, JA has been shown to alter the partitioning of resources between leaves and roots. We tested the effects of simulated herbivory on root and leaf morphology and the ability of Arabidopsis rosettes to recover from complete defoliation. According to our preliminary results, wild-type lateral root formation was inhibited by wounding. Wounding had no effect on lateral root formation in a mutant incapable of producing JA. We also observed enhanced survival of defoliation by wild-type plants that had received wounding, suggesting a role for micronutrient partitioning underground during defense. Following these new insights, we will investigate effect of wounding on nutrient composition in roots and leaves.

Presentation Number **67**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Extracting Health Effects of Exposure to Oil Sands Pollutants during Early Development in the Wood Frog, *Lithobates sylvaticus*.** | | |
| **Presenter:** | Krysta Dawson | | |
| **Mentor:** | Erica Crespi | **Campus:** | Pullman |
| **Co-Authors:** | Erica Crespi, Travis Seaborn, Sonja Hansen | | |
| **Major** | Zoology, Pre-Veterinary - CAS | | |
| **Category:** | Organismal, Population, Ecological, and Evolutionary Biology | | |

The Athabasca Oil Sands region in northern Alberta produces 1.98 million barrels of oil per day and increasing as the number of oil extraction mines is expanding. One major concern of the extraction process includes the seepage from tailings ponds (water used during the extraction of oil), which contaminates adjacent wetlands with pollutants such as polycyclic aromatic hydrocarbons and naphthenic acids, a potential anti-androgenic endocrine disruptor. However, little is known about the effects of these compounds on wildlife, or whether exposures during early development could have long-lasting effects on reproductive health of the organisms living in around the area, including humans. This study aimed to characterize the effects of these pollutants on larval and post-metamorphic wood frogs (*Lithobates sylvaticus*), one of only three amphibian species local to the area. We assessed health of tadpoles by measuring growth, disease prevalence, and stress hormone profiles collected from 5 ponds that vary in distance to nearest mine and containment levels. We also measured survivorship, growth, and morphological deformities of juveniles that emerged from these ponds to determine whether environmental conditions experienced early in life have health effects that extend into later life history stages. Health effects from exposure to mine related containment will help us understand the effects of mines on populations in the surrounding areas.

Presentation Number **68**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Overexpression and Knockdown of Drosophila Stimulator of Interferon Genes (dSTING) Suggests a Conserved Immune Response to Bacterial Infection** | | |
| **Presenter:** | Marina Martin | | |
| **Mentor:** | Alan Goodman | **Campus:** | Pullman |
| **Co-Authors:** | Alan Goodman | | |
| **Major** | Biochemistry, Pre-Medicine, CVM | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

The immune system is critical for protecting organisms from pathogens. While important for defense against bacteria and microbes, the immune response must be regulated to avoid autoimmune disease. One component of the human immune system is Stimulator of Interferon Genes (STING). STING is important for the antibacterial response to Listeria monocytogenes, an intracellular microbe that causes the food borne disease Listeriosis. During *Listeria* infection, cyclic dinucleotides are secreted as part of the life cycle. These molecules are sensed by STING, which is responsible for interferon induction, which leads to a systemic immune response. However, the STING response must be kept in check. Human overexpression mutations observed in STING result in STING-associated vasculopathy with onset in infancy (SAVI), an inflammatory condition most particularly affecting the skin, blood vessels, and lungs. While STING was discovered in mammals and shown to be a critical signaling component of the innate immune response, a homolog in the fruit fly, Drosophila melanogaster was identified, (termed dSTING). We hypothesize that the evolutionarily conserved protein STING plays a role in the *Drosophila* innate immune response, and that we can use the fly model to study both immune deficiency and autoimmunity caused by mutations in dSTING. In this study, *Listeria monocytogenes*, an invasive Gram-positive bacterium, was used to study bacterial growth and replication following thoracic injection of *Drosophila*. Through knockdown and overexpression of dSTING, the levels of antimicrobial peptides produced will determine the ability of the flies will able to combat infection. Deletion of dSTING promoter elements have been generated to confirm the role of dSTING in regulating the production of antimicrobial peptides in response to intracellular infection. On the other hand, when overexpressed, the increase in antimicrobial peptides leads to the ability to fight off infection. Additionally, further RNAi studies of dSTING will seek to understand the role of dSTING in mediation of the innate immune response.

Presentation Number **69**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Time Delayed Collection Field Techniques for Organic Solar Cells** | | |
| **Presenter:** | Matthew Waldrip | | |
| **Mentor:** | Brian Collins | **Campus:** | Pullman |
| **Co-Authors:** | Michael Pope, Brian Collins | | |
| **Major** | Physics – CAS, Honors | | |
| **Category:** | Engineering and Physical Sciences | | |


Organic solar cells (OSCs) are a promising technology to provide an economical source of renewable energy. They are made from non-toxic polymers (plastics) that can be printed from inks on a roll-to-roll process similar to newspapers. The only problem is efficiency. Currently, production OSCs are low performance, so intense research is being done to identify efficiency loss mechanisms, and consequently, how the eliminate them.

In principal, an OSC is like an LED light run backwards: put light in, get energy out. When photons are absorbed by the device, they split into positive and negative charges which drift to the electrodes, providing battery-like power. However, not all charges make it out. On the very short timescale (a few nanoseconds) newly formed charges can recombine with each other, while on the slightly longer timescale (hundreds of nanoseconds) they can recombine with a new partner. Neither loss process is well understood, but our new measurement technique is shedding some light on the subject.

We developed a time delayed collection field (TDCF) measurement suitable for OPSCs. For TDCF, the device is stimulated with a laser pulse, creating a plethora of charges. Immediately afterward, an electric field is applied across the device, sweeping out charges before they have a chance to recombine. Thus, we can measure the amount of charge created by the laser pulse. By delaying the electric field, we calculate how many charges recombine and how fast they do so. These results can be used to determine how recombination is occurring.

Only one other laboratory in the world has published results from performing TDCF on OSCs, but they require specialized devices. This project is unique in that TDCF is performed on standardized devices so that a range of different tests can be performed and trends can be correlated. This breakthrough in TDCF is achieved through a novel means of applying the electric field.

Presentation Number **70**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **The Role of PGRMC1/2 in Uterine Lipid Metabolism** | | |
| **Presenter:** | Hannah French | | |
| **Mentor:** | James K. Pru | **Campus:** | Pullman |
| **Co-Authors:** | Nicole C. Clark, Cindy A. Pru, Andrea R. Smith, James K. Pru | | |
| **Major** | Animal Sciences – CAHNRS, Honors | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

Approximately 15% of reproductive age couples are infertile. Pregnancy is facilitated by steroid hormones including progesterone (P4). Understanding the molecular events in P4 signaling is critical for understanding pregnancy and treating infertility. P4 signals through the classical progesterone receptor and through non-classical receptors like progesterone receptor membrane component (PGRMC) 1 and PGRMC2. PGRMC1/2 mediate P4 actions and function in cell processes such as mitosis and cell survival. The Pru lab developed mutant mice in which *Pgrmc1* and *Pgrmc2* were dually conditionally ablated from female reproductive tissues (*Pgrmc1/2*$^{d/d}$ mice). These mice are subfertile, producing fewer pups per litter, and undergo premature reproductive senescence. These mice also lack the capacity to undergo normal decidualization, a process required for successful pregnancy. RNA-sequencing revealed that several lipid metabolic genes (eg, *Srebf1*, *Pparg*, *Scd1*, *Acsl3*, *Ldlr*) were differentially expressed in *Pgrmc1/2*$^{d/d}$ uteri compared with control animals. It was hypothesized that PGRMC1/2 play a role in lipid metabolism in the uterus. This may explain why conditional ablation of *Pgrmc1/2* led to uterine dysfunction and subfertility. To test this hypothesis, transmission electron microscopy and Oil Red O staining were used to analyze uterine histology, revealing that *Pgrmc1/2*$^{d/d}$ uteri had accumulated plasma membranes and deficient stored triglycerides within the uterine epithelium. qPCR was used to confirm RNA-sequencing data. Immunohistochemistry was used to show that a master transcriptional regulator of lipid metabolism, SREBP1, was upregulated in *Pgrmc1/2*$^{d/d}$ uteri to confirm the qPCR data. Western blot analysis of SREBP1 was used to quantify SREBP1 expression in control and *Pgrmc1/2*$^{d/d}$ uterine tissue. No difference in SREBP1 was observed, but we suspect this is because of the restricted expression pattern of SREBP1, which is limited to the epithelial and subluminal stromal compartments. Ongoing studies are now focused on determining if changes in SREBP1 observed in *Pgrmc1/2*$^{d/d}$ mice also translate to the human. We have generated PGRMC1-intact and PGRMC1-deplete human endometrial epithelial cells and are working to compare expression of lipid metabolizing enzymes in these cells which differ in PGRMC1 expression. Establishing a role for PGRMC1/2 in uterine lipid metabolism could lead to therapies targeting these pathways to treat infertility.

Presentation Number **71**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Relationships between Preference for Proxy Assistance and Self-Efficacy for Various Modalities of Pregnancy Physical Activity** | | |
| **Presenter:** | Rebecca Weller | | |
| **Mentor:** | Dr. Christopher Connolly | **Campus:** | Pullman |
| **Co-Authors:** | Dr. Christopher Connolly, A.Ede | | |
| **Major** | Kinesiology - COE | | |
| **Category:** | Applied Sciences | | |


Self-efficacy (SE) has been shown repeatedly to predict physical activity (PA) among pregnant women. Low SE can impede participation in certain types of exercise. However, individuals with low SE may benefit from receiving help from fitness instructors or trainers with expertise to guide them.

**PURPOSE:** We sought to investigate pregnant women's preferences for an instructor-led approach (proxy assistance) compared to self-guided exercise for various modalities of pregnancy physical activity. For each modality, we also sought to determine the relationship between SE and preference for proxy assistance.

**METHODS:** An online survey containing questions on beliefs, preferences, and behavior with respect to specific physical activity modalities was completed by 498 pregnant women. Exercise SE was assessed for each on an 11-point Likert scale. Additionally, participants reported whether they preferred the modality to be instructor-led, self-guided, or preferred not to participate in that exercise. Relative frequencies were calculated for these responses. Spearman correlations were calculated to examine relationships between SE and preference for proxy assistance for each modality.

**RESULTS:** Brisk walking (90.4%) and prenatal yoga (64.9%) were the most preferred modalities. A self-guided approach was preferred over proxy assistance for a number of modalities, but most prominently for brisk walking (95.7%), light jogging (92.3%), and light swimming (91.4%). In contrast, participants preferred proxy assistance for prenatal yoga (66.1%), prenatal aerobic dance (74.4%), and CrossFit-type resistance exercises (75.6%). Significant inverse correlations ($p < 0.05$) were found between preference for assistance and SE for light jogging ($r = -0.13$), intense cycling ($r = -0.19$), light swimming ($r = -0.11$), intense swimming ($r = -0.28$), weight lifting ($r = -0.23$), resistance-band exercises ($r = -0.22$), and CrossFit-type exercises ($r = -0.36$).

**CONCLUSION:** Preference for exercise to be instructor-led is inversely related to SE for a number of exercise modalities typically considered to be individual activities. Interventions seeking to increase pregnancy PA levels through these specific modalities should consider utilizing an instructor-based approach.

Presentation Number **72**

# ABSTRACT:

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|---|---|---|---|
| **Abstract Title:** | **Painting the Color Spectrum with Heavy Metals** | | |
| **Presenter:** | Jordan Fernandez | | |
| **Mentor:** | Dr. Zachariah Heiden | **Campus:** | Pullman |
| **Co-Authors:** | Rocio Rodriguez | | |
| **Major** | Chemistry - CAS | | |
| **Category:** | Engineering and Physical Sciences | | |

The development of fluorescent metal sensors to detect biologically hazardous metal cations has become a great interest for biological, industrial, and environmental applications. Heavy metals have been proven to cause several deleterious health effects including respiratory difficulties, kidney dysfunction, and degradation of neurons when their concentrations are exceeded in the body. While the production and use of heavy metals in industry has decreased since the 1990's, people are still exposed to heavy metals such as mercury, cadmium, arsenic, lead, and copper through food and water sources. The design of fluorescent metal sensors for the rapid colorimetric analysis of heavy metals in biology, industry, and the environment is critical. Current heavy metal sensors have limited applicability because they are not effective towards a single metal, are hard to analyze due to low changes in fluorescence, not compatible with living cells, and are not effective for screening water sources due to their limited solubility. A possible solution to the limited applicability of current heavy metal sensors is the implementation of a readily tunable, biologically compatible boron-based fluorescent molecule. To investigate the interaction of heavy metals with the boron-based fluorescent molecule, this poster will discuss how model compounds can be used to predict heavy metals binding and design new heavy metals fluorescent sensors.

Presentation Number **73**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Čšťim: INDIGENOUS METHODOLOGIES, CULTURE AND LANGUAGE REVITALIZATION PROGRAMS IN SALISH COMMUNITIES** | | |
| **Presenter:** | Tillie Torpey | | |
| **Mentor:** | Paula Groves Price | **Campus:** | Pullman |
| **Major** | Elementary Education, CAS | | |
| **Category:** | Social Sciences | | |

A wide concern in many, if not all indigenous communities is the preservation of their heritage, specifically through their language and epistemologies. Within the North American indigenous communities, the colonial establishment of boarding schools and relocation programs established by the U.S. Federal Government to assimilate indigenous youth from their ways of being, has resulted in the extinction of over 50% of North American indigenous languages and ways of living. This project identifies the most effective practices used in language revitalization programs within Salish speaking communities in the Pacific Northwest. This project used the indigenous and qualitative methodologies to understand the close relationship between language and culture for Salish speaking communities. The data collected include interviews, observations, and talking circles in language programs on the Flathead and Okanogan tribes.

Presentation Number **74**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **A look at Pedagogy in the Classroom: Prosocial Behavior and Instructor Deportment** | | |
| **Presenter:** | Terrell Ware | | |
| **Mentor:** | Andy Cavagnetto | **Campus:** | Pullman |
| **Major** | Biology - CAS | | |
| **Category:** | Social Sciences | | |

To be prosocial is to take action that actively seeks to create a positive, and helpful atmosphere. In the classroom, the instructor takes a facilitator role and allows students to take charge of their own learning with full class discussions and discourse. In this study, teacher behavior and its effect on prosociality via student talk, physical layout, and teacher student interaction is explored. Physical layout is the physical space of the classroom- whether or not the students work are displayed around the classroom, if the desks are facing each other, and if applicable, technology. Student talk is the verbal interaction that students have with each other- if the students are actively seeking argumentative discourse. Teacher interaction is the interaction the instructor is having with students in order to make the atmosphere more prosocial in nature (e,g,, questions that prompt students to challenge each other's ideas). Three videos of a rural fifth grade class room were analyzed using a prosocial protocol developed from Elinor Ostrom's work on effective groups. Ostrom identified eight core design principles that were common to effective groups. Field notes from on-site classroom observations were also collected from a local rural school in Washington. Physical layout was explored by the use of field notes, as the physical space is most reliably evaluated in person. Teacher interaction and student talk were explored through video evidence collected from the class by the use of the prosocial protocol. Preliminary findings will be presented and discussed.

Presentation Number **75**

# ABSTRACT:

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|---|---|---|---|
| **Abstract Title:** | **Identification of Mechanisms Controlling Heat Tolerance in Wheat** | | |
| **Presenter:** | Jake Lazar | | |
| **Mentor:** | Ragupathi Nagarajan | **Campus:** | Pullman |
| **Co-Authors:** | Kulvinder Gill, Sheila Fitzgerald, Ragupathi Nagarajan, vikas gupta | | |
| **Major** | Fruit and Vegetable Management - CAHNRS | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

Global warming and increasing temperatures severely affect wheat growth and grain yield, which may become a threat to world food security. The optimum temperature for wheat growth, anthesis and grain filling ranges from 12 to 22°C and exposure to temperatures above this can significantly reduce grain yield. Currently, most wheat varieties grown in high temperature risk zones are heat sensitive and any increase in temperatures during growing seasons will affect yields and quality. The main objective of this project is to identify heat tolerance traits from specific wheat lines collected from different regions of the world and transfer these traits into the adapted cultivars using the wheat × maize doubled haploid system. We have identified five donor wheat varieties with various heat tolerance traits such as plant height, biomass, flowering time, per plant yield and tiller number. These varieties were crossed separately with two adapted cultivars PBW 343 and HD 2967. The hybrid seeds were used for doubled haploid production. The resulted crosses, haploids and doubled haploids are in different developmental stages growing in the lab and greenhouses, and the populations developed from these crosses will be used to study the mechanisms controlling abovementioned heat tolerance traits. The knowledge generated from these studies will be used to develop superior heat tolerant wheat cultivars which can be grown in different heat affected regions of the world.

Presentation Number **76**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **A Role for Leptin in Mediating Blastema Formation and Growth in Xenopus Laevis Limbs** | | |
| **Presenter:** | Kayla Titialii | | |
| **Mentor:** | Erica Crespi | **Campus:** | Pullman |
| **Co-Authors:** | Erica Crespi | | |
| **Major** | Zoology, CAS | | |
| **Category:** | Organismal, Population, Ecological, and Evolutionary Biology | | |

Leptin is known as an “adipostat” hormone that is secreted by fat. While leptin has been largely associated with behavioral, metabolic, and reproductive functions in adult vertebrates, our lab has shown that leptin plays a role in nutritional modulation of limb development of *Xenopus laevis* tadpoles. We also have shown that in *X. laevis*, limb regeneration is slowed in food-restricted tadpoles, and peripheral administration of leptin protein at the time of amputation accelerates the regeneration process in food-restricted tadpoles. In addition, leptin receptor is expressed in regenerating limbs and is activated by leptin administration. These findings support the hypothesis that leptin signaling modulates limb regeneration by affecting processes within the first 48 hours following amputation, including wound healing and blastema formation. To investigate the hypothesis further, we compared the cellular ultrastructure of amputated limbs 48 hours after saline or leptin injection in *X. laevis* tadpoles using scanning electron microscopy. We found that there was greater cellular proliferation on the distal tip of amputated limbs of leptin-injected tadpoles, resulting in a larger blastema relative to those of saline-injected tadpoles. In addition, cells looked jagged and shriveled at the plane of excision in saline-injected tadpoles, suggesting that cells might be necrotic and wound healing was not as robust at this time point. These findings support those of previous experiments in establishing an enhancing role for leptin during the first 48 hours of limb regeneration.

Presentation Number **77**

# ABSTRACT:

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|---|---|---|---|
| **Abstract Title:** | **Study on Physical and Mechanical Properties of Agricultural Netting Products** | | |
| **Presenter:** | Kaitlyn Engle | | |
| **Mentor:** | Dr. Hang Liu | **Campus:** | Pullman |
| **Major** | Apparel Merchandising and Textiles - CAHNRS | | |
| **Category:** | Applied Sciences | | |

Agriculture nets are textile fabrics/films used for shading and protection purposes. Various nets are available, such as anti-hail, anti-bird, shading, windbreak, and photoselective. Preliminary literature review revealed that much of the research on agricultural netting products was focused on their impact on the growth of plants and crops. Net properties, which are critical information needed for net selection, are kept as an industry secret by manufacturers and are not available to users. The purpose of this research was to delve into the mechanical and physical properties, that are critical to net selection, of various agricultural netting products.

The physical and mechanical properties studied included fabric characteristics (yarn size, yarn weight, and fabric thickness), durability (tensile strength and elongation, tearing strength, and abrasion resistance), flexibility, and covering power. Net selection was based on end use (photoselective, shading, and bird block), color of the product (black, green, sand, red, blue, and white), and chemical composition (polyethylene, nylon, and polypropylene). Altogether, there were thirteen different net samples and one film. Twelve of the net specimens were made of polyethylene, one was nylon, and one was polypropylene.

Results showed that for each property, the value varied based on the products. For example, yarn size ranged from 389 to 4295 Denier with majority of the values in between 400 to 700 Denier. Most of the nets had tensile strength (maximum load) in between 200 to 700 N but with extremes of 25 N and 1017 N. Since polyethylene, nylon, polypropylene are all synthetic polymers with excellent mechanical properties, the durability, flexibility, and covering power of netting products are determined by the product physical characteristics, mainly yarn size and fabric structure.

Presentation Number **78**

# ABSTRACT:

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|---|---|---|---|
| **Abstract Title:** | **Bovine Cartilage Digestion and Characterization of Cellular Surface Proteins using Atomic Force Microscopy** | | |
| **Presenter:** | Ashley Davie | | |
| **Mentor:** | Bernard J. VanWie PhD and Nehal Abu-Lail PhD | **Campus:** | Pullman |
| **Co-Authors:** | Tyler Cheung; Arshan Nazempour; Chrystal Quisenberry; Bernard J. VanWie PhD; and Nehal Abu-Lail PhD | | |
| **Major** | Chemical Engineering - CEA | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

Due to the avascular nature of cartilage, healing upon injury is problematic. For people suffering from cartilage damage, one possible solution is implantation of cartilage tissue *in vivo* in the damaged site. Researchers have been attempting to culture cartilage *in vitro* by use of bioreactors and scaffolds. Using a scaffold-free centrifugal bioreactor with mechanical and biochemical stimuli, we hypothesize that synergistic application of the stimuli in the reactor will improve chondrogenic potential and will result in an engineered tissue representative of the structure and function of native, healthy cartilage. In engineering this cartilage, chondrocytes, stem cells (adipose or bone marrow) or a coculture of the two are seeded in the reactor with appropriate growth factors and mechanical conditions applied. The bioreactor uses bovine chondrocytes that are harvested and digested from freshly obtained bovine knee joints. During cartilage harvesting, the tissue must be in an aseptic environment to eliminate risks of contamination. After harvesting the cartilage, cells are isolated by incubation in collagenase to break down the peptide bonds in collagen and separate the extracellular matrix from the cells. The cells are then strained and washed to separate the cells from leftover matrix and prepared for freezing and future experiments. Once the cells are tested for contamination using Tryptic Soy Agar plates, uncontaminated chondrocytes are inoculated into the centrifugal bioreactor and cultured to form a cartilage construct. Using atomic force microscopy (AFM) force-indentation measurements, the tissue elasticity is determined. The construct is digested to isolate the engineered chondrocytes and map the location and density cell surface proteins using AFM. The data from this experiment are currently being analyzed. Data will be compared to recent results obtained for cartilage tissues grown using adipose-derived stem cells (ASCs) with oscillating hydrostatic in the presence of transforming growth factor. The mechanical properties of articular cartilage tissues grown using ASCs were comparable to the elastic module of human cartilage tissues. We expect to see similar results for chondrocytes.
In conclusion, our research helps identify how mechanical and chemical stimuli can alter the expression of proteins involved in mechanotransduction along with the mechanical properties of resulting tissues.

Presentation Number **79**

# ABSTRACT:

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|---|---|---|---|
| **Abstract Title:** | **Treatment for Alcohol Use Disorders in Seriously Mentally Ill Adults Using the Ethyl Glucuronide Biomarker** | | |
| **Presenter:** | Myles Finlay | | |
| **Mentor:** | Dr. Sterling McPherson | **Campus:** | Spokane |
| **Co-Authors:** | McDonell MG, Leickly E, McPherson S, Skalisky J, Srebnik D, Roll J, Ries RK | | |
| **Major** | Psychology - CAS | | |
| **Category:** | Social Sciences | | |

**Aim:** Contingency management (CM) is a behavioral intervention in which participants receive reinforcers for engaging in a desired behavior. CM has been shown to reduce substance use in individuals with serious mental illness. The aim of this study was to determine if individuals suffering from co-occurring serious mental illness and alcohol dependence who were randomized to CM for alcohol-abstinence as assessed by the ethyl glucuronide (EtG) biomarker were more likely to attain at least 4-weeks of continuous alcohol abstinence, relative to those participating in a non-contingent control condition.

**Methods:** 79 adults were randomized to receive treatment-as-usual and either 12-weeks of CM (n=40) or a control condition (n=39). Utilizing the variable magnitude of reinforcement approach, tangible reinforcers were delivered to CM participants for providing urine samples negative for EtG, an alcohol biomarker detectable in urine for up to 5 days. Control participants were provided with reinforcers for providing urine samples, regardless of their EtG result. Descriptive and chi-square analyses were conducted to examine and compare the duration of alcohol abstinence in weeks by group over the 12-week treatment period.

**Results:** In the CM group, 25.0% of the participants were abstinent for four weeks compared to 7.7% ($\chi^2$=4.30, $p$=0.04) in the non-contingent group.

**Conclusion:** Participants with co-occurring serious mental illness who received an EtG-based CM intervention were 3.3 times more likely to achieve a period of clinically significant abstinence (4 weeks), relative to those receiving the control condition. These results indicate that an EtG-based CM intervention can be used to promote alcohol abstinence in this difficult to treat population.

**Financial Support**: This research was supported by NIAAA, Grant R01AA02024801A1.

Presentation Number **80**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Preliminary Findings: Predictors and Mediators of HIV/STD Risk Among Crack Cocaine Dependent Patients Receiving Treatment in Sao Paulo Brazil's 'Crackland'** | | |
| **Presenter:** | Rachel Foster | | |
| **Mentor:** | Sterling McPherson | **Campus:** | Spokane |
| **Co-Authors:** | Foster, R., Madruga, C., Miguel, A., McDonell, M., Ribeiro, A., McPherson, S. | | |
| **Major** | Psychology, Sociology - CAS | | |
| **Category:** | Social Sciences | | |

**Aims:** To examine whether several demographics are predictors of human immunodeficiency virus (HIV) and sexually transmitted disease (STD), and whether education was a significant mediator between demographic predictors and HIV/STD status among crack cocaine dependent patients being treated in Sao Paulo, Brazil.

**Methods:** Crack cocaine dependent adults, aged 18 or above with no history of injection drug use were interviewed at the Reference Centre of Drug Addiction Treatment (CRATOD). Participants provided samples that were tested using validated, rapid tests for HIV and STDs (including Hepatitis C [HepC], and syphilis). We used path analytic techniques to examine age, sex, and housing status as predictors of HIV/STDs, and whether education was a significant mediator between demographic predictors and HIV/STD status. Stata 14.1 was used for all analyses and because we treated this small sample (n=107) study as preliminary, our alpha threshold was set at 0.075 for all analyses.

**Results:** Education was a predictor of syphilis status such that those with more education were less likely to have contracted syphilis (odds ratio [OR]=0.44, $p$=0.062). Education was a full mediator for housing status such that housing status was positively associated with education ($\beta$=0.44, $p$=0.001) but not syphilis status. There was a significant, direct relationship between sex and syphilis (OR=5.84, $p$=0.003), and education partially mediated this relationship ($\beta$=0.30, $p$=0.054). Age was significantly associated with HepC status such that older adults ($\beta$=0.06, $p$=0.024) were more likely to test positive for HepC and less likely to be HIV positive ($\beta$=-0.12, $p$=0.069). Education was not a mediator for either HepC or HIV.

**Conclusions:** More precise strategies are needed to design effective treatment modalities to fight the two-front battle of HIV/STD and crack cocaine use, both of which have reached high levels and are feeding one another's epidemic numbers throughout Brazil and especially within 'crackland'.

**Financial Support:** FAPESP Grant numbers 2011/01469-7 and 2013/04138-7 financed this study.

Presentation Number **81**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Good Successors to the Communist Cause: Little girls as Instruments of Virtue in Children's Books from the PRC** | | |
| **Presenter:** | Katherine Dittmann | | |
| **Mentor:** | Lydia Gerber | **Campus:** | Pullman |
| **Major** | Exploring - CAS | | |
| **Category:** | Humanities | | |

The "Mao Era" (1949-1976) represented a time in China's history in which the government had stringent control over the lives of the general population. It happened to be during this period that the genre of children's picture books first became prominent in China. To research for this paper, I utilized five children's picture books from the People's Republic of China "Young Riders on the Grassland", "A Boy and His Kitten," "At Ferry-Boat Landing," "Big Brother and Little Brother," and "Dong Dong and His Kitten." These five picture books were all distributed in English by two government-subsidized publishing houses in China -- The Foreign Languages Press, and Dolphin Books. I chose these five books, because gender appeared to be most relevant to their story line. This paper first presents secondary research on the history of children's book in the People's Republic of China, delving into the traditional methods of literacy education in China and defining virtues by contextual cultural standards, then moves on to explore aspects of gender presentations in teachings of literacy to developing minds and the implications of gender constructs within these representations. Following a summary and qualitative analysis of each children's text, I divided them into two categories female children as sources of virtue, and mothers as sources of virtue. I argue that the portrayal of females as virtuous in children¹s books from the People's Republic of China embodies a sort of institutional sexism, in which the culturally-conditioned feminine aspect of virtue is embraced as the best way for children to be in a strict and authoritative society, and explore the functions of this approach toward children's education as a roundabout means for government control of the civilian population. This paper contributes to our understanding of gender and education in Modern China.

Presentation Number **82**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Effects of Histone Acetylation on DNA Double Strand Break Repair Mediated by Non-Homologous End Joining (NHEJ)** | | |
| **Presenter:** | Jaslyn Erickson | | |
| **Mentor:** | Dr. Her | **Campus:** | Pullman |
| **Major** | Microbiology, Genetics and Cell Biology – CVM, Honors | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |


Repair of DNA double strand breaks (DBS) involves two pathways: homologous recombination (HR), which uses a homologous strand to accurately repair the break; and non-homologous end joining (NHEJ), which directly ligates the broken strands but is error-prone. Besides deletions and insertions as the repair junctions, inter-chromosomal NHEJ leads to translocation events. Histone acetylation is regulated by proteins such as p300 – a histone acetyltransferase, which adds acetyl groups to histones, or CTK7A – an inhibitor of p300 that prevents addition of acetyl groups. Histone deacetylase (HDAC) inhibitors can prevent the removal of acetyl groups, thereby increasing the levels of acetylation.

In this study it was hypothesized that HDAC inhibitors combined with p300 would regulate NHEJ, due to the dramatic increase in acetylation. Conversely, HDAC inhibitors combined with CTK7A would restore normal levels of NHEJ-mediated DNA repair, when compared to controls.

To test these hypotheses, HEK293T (human embryonic kidney) cells, which harbors a chromosomal reporter system, were treated with HDAC inhibitors in combination with p300 or CTK7A to study the affects varying levels of acetylation has on NHEJ. An hcas9/EJ system was used to induce double strand breaks (DSB) in the cells. Green and red fluorescent protein (GFP and RFP) expressing cells were monitored and analyzed for “intra-chromosome” (GFP), and “inter-chromosome” (RFP) NHEJ events.

When HDAC inhibitors were combined with p300, a decrease in both NHEJ events was observed. When HDAC inhibitors were combined with CTK7A, a decrease in intra-chromosome NHEJ and an increase in inter-chromosome NHEJ was observed. These results support the hypothesis that the levels of acetylation control the outcomes of NHEJ events. Conclusions that can be drawn from these results are: 1. DSBs are not repaired in cells that are hyper-acetylated, leading to cell death, 2. The regulation of NHEJ-mediated DSB repair by acetylation is dynamic, in which acetylation does not always increase repair. If it is possible to manipulate DNA repair at specific locations leading to either cell death or cell survival, then specialized treatments can be created that treat disease such as cancer.

Presentation Number **83**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Racial Awareness of American College Freshmen Students attending a Predominantly White University** | | |
| **Presenter:** | Sandra Larios | | |
| **Mentor:** | Jenifer Barclay, Ph.D. | **Campus:** | Pullman |
| **Major** | Sociology, Psychology - CAS | | |
| **Category:** | Social Sciences | | |

The ideology of colorblindness is an issue prevalent in multiple areas of American society. The environment in which college students receive their education could affect whether or not they will develop racial consciousness. Educators at a high school level should teach students to become aware of race and how to recognize the myriad ways that race shapes individuals' lives and social institutions. This study will compare college student's understanding of race and white privilege from a predominantly white university. The university that is being used to collect the data is a predominantly white institution where about 66% of the student population identifies as white. Scholarship on this topic highlights how there are many factors that influence the ways in which privilege is (or is not) being taught to American students. White students who fail to realize the privileges that come with their race don't feel like they have social responsibility to others, they can live without being troubled by social inequity, and they can continue to live like their actions do not affect anyone else (Adams, 2015). Thus, for the purposes of this study colorblind ideology and symbolic interactionism theory are the perspectives that the data will be analyzed and interpreted through. The research will use questionnaires to observe the racial awareness of students. After completion of the questionnaire, the results could potentially demonstrate a correlation between the students understanding of race and the educational context that they are in at our chosen university. Additionally, the results could provide the extent to which educational context influences American college freshmen's understanding of race and white privilege. Recognizing that race and white privilege are still embedded in the American culture will allow not only members of the minority population but also the majority population to take a step forward to acknowledging the racially based injustices and inequalities that exist in today's society.

Presentation Number **84**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Effect of Iron and Silica on Glass Alteration** | | |
| **Presenter:** | Christopher Musa | | |
| **Mentor:** | Prof. N.A. Wall | **Campus:** | Pullman |
| **Co-Authors:** | Lindsey Neill, Benjamin Parruzot, Prof. N.A Wall | | |
| **Major** | Chemistry - CAS | | |
| **Category:** | Engineering and Physical Sciences | | |

Safe disposal and storage of radioactive waste has become increasingly important to the continued use of nuclear power. The most studied way to safely dispose of the resulting waste is to incorporate the radioactive waste into a glass matrix, a process known as vitrification. These glass matrixes will then be placed into stainless steel containers and placed into underground repositories. Over several thousand years, the glass and steel can start to break down and increase the probability that radioactive elements will come into contact with the environment. To prevent the release of these elements several studies are performed to understand how glass and iron interact. International Simple Glass (ISG) was used and placed in several relevant environmental conditions to understand how glass alters under these conditions. These environmental conditions consist of an iron corrosion product to simulate the breakdown of the containment system and an additional silica source. When glass is in contact with iron the rate of alteration is believed to increase due to the sorption of silica from the surrounding environment and growth of iron rich secondary phases. Silica is used to represent an environment where the glass has already undergone alteration and released silica. When iron is placed into contact with this environment, the rate of alteration is believed to increase due to the iron reacting with the silica in the environment to create iron rich secondary phases that then interact with the pristine glass. When glass is placed in the pure water environment, little difference is observed in the rate of alteration between the glass sample with iron and the glass sample without iron. In the silica environment, the rate of alteration of the glass and iron sample is higher than the glass only sample.

Presentation Number **85**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Reducing Shiga Toxin-Producing E. coli on Fuji Apple by Cinnamon Oil** | | |
| **Presenter:** | Jose Orenday-Ortiz | | |
| **Mentor:** | Mei-Jun Zhu | **Campus:** | Pullman |
| **Co-Authors:** | Lina Sheng, HeShin Tsai, Hongmei Zhu, Mei-Jun Zhu | | |
| **Major** | Food Science - CAHNRS | | |
| **Category:** | Applied Sciences | | |

Shiga Toxin-producing *Escherichia coli* (STEC) has gained increasing awareness due to several recent outbreaks in which fresh produce was the vehicle of transmission to humans. Among STEC, *E. coli* O157:H7 is an important foodborne pathogen associated with enteritis, hemolytic uremic syndrome, and death. Likewise, Non O157:H7 STEC (Non-O157 STEC) are gaining notoriety as new diagnostic assays have contributed to an increased appreciation for these virulent strains, and the number of cases continues to rise. The current food industry application for reducing microbial loads among fresh produce is the use of chlorinated water. However, its efficacy varies and rising health concerns with the use of chemical sanitizers have spiked an interest in the use of natural compounds as inhibitory agents. Cinnamon oil is a natural plant-derived essential oil that is generally recognized as safe (GRAS). Traditionally, it has been used to preserve foods and enhance food flavor. Studies have shown that cinnamon oil has antibacterial effects. The objective of this study was to examine the antimicrobial activity of cinnamon oil washing against non-O157:H7 and O157:H7 STEC on Fuji apples.

The principle methods in this study involved the inoculation of Fuji apples by a non-O157 STEC three strain cocktail (O26:H11, O121:H19, and O145:NT) and O157:H7 three strain cocktail (EDL933, Sakai 8624, 93-111). Surface-inoculated apples were then washed with phosphate buffered saline (PBS), 200 ppm chlorine, 0.125%, 0.25%, 0.5%, and 1.0% cinnamon oil solution (v/v). Residual bacteria on apples as well as in washing solutions were enumerated onto LB plates at 0, 14, and 28 days.

PBS and 0.125% wash resulted in ~1 log reduction for both O157 and non-O157:157 strains. 0.5% cinnamon oil was comparable to 200 ppm chlorine, resulting in ~2-2.5 log reduction. Non-O157:H7 and O157:H7 strains were not detectable in 0.5% cinnamon oil and chlorine solutions. Chlorine wash showed little effect on reducing the bacterial number during storage, while 0.5% cinnamon oil washed apples were ~5 log lower than unwashed apples after 14 days and undetectable after 28 day storage. Cinnamon oil has the potential to be utilized as a natural chemical agent in the apple industry.

Presentation Number **86**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Biological Conversion of Aqueous Wastes from a Pilot Hydrothermal Liquifiaction Biorefinery to Lipids** | | |
| **Presenter:** | Christopher Smith | | |
| **Mentor:** | Bin Yang | **Campus:** | Tri-Cities |
| **Co-Authors:** | Hasan Bugra Coban, Xioayun Xue, Yucai He, and Bin Yang | | |
| **Major** | Biology, CAS | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |


Biofuels are chemical substances produced from an organic source that are used to store energy. Biofuels are of interest to many people as they are renewable because plant waste products can be recycled. Biofuels are often made from farm waste, providing for an easy way to eliminate excess organic waste produced by the agricultural industries.

One method of producing biofuels is through a process known as Hydrothermal Liquefaction (HTL). In this process, a high amount of heat and pressure are applied to a biomass, causing breakdown of highly recalcitrant biopolymers into smaller hydrocarbons. The HTL process produces an organic phase and an aqueous phase where the breakdown products are segregated. The organic phase can be further processed to be used as biofuels. The liquid phase cannot be used as a source of biofuels and often contains many toxic compounds within it. Many of these compounds have aromatic rings in their structure. Thus, a method of cleaning these compounds from the environment will require a process that targets aromatic chemicals. One proposed way to deal with aqueous HTL waste is to use bacteria to consume and breakdown the toxic chemicals. One species of bacteria, known as *Rhodococcus opacus*, has been shown to process chemicals that contain aromatic groups and convert them to membrane lipids. Thus, it is possible to treat wastewater from the HTL process with the *Rhodococcus opacus* bacteria and eliminate the toxic compounds.

In my project, I treated a series of samples of HTL wastewater with various strains of *Rhodococcus opacus*. These samples would then be allowed to ferment for a period of nine days, with samples being taken every three days. These samples would then be measured for lipid production, bacterial density, and the concentration of chemical compounds in them. This was used to test the effectiveness of *Rhodococcus opacus* at processing toxic compounds and surviving in the toxic waste. In my poster I will discuss the experimental approach and present the results of these experiments.

Presentation Number **87**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Valid Reference Gene Selection for Xenobiotic Adaptation in Tetranychus urticae** | | |
| **Presenter:** | Mariany Morales | | |
| **Mentor:** | Fang Zhu | **Campus:** | Pullman |
| **Co-Authors:** | Bianca M. Mendoza, Laura C. Lavine, Mark Lavine, Douglas B. Walsh, Fang Zhu | | |
| **Major** | Biochemistry, Pre-Dentistry - CVM | | |
| **Category:** | Organismal, Population, Ecological, and Evolutionary Biology | | |

Two-spotted spider mites (*Tetranychus urticae*) are chronic pests with a broad host range on > 1,100 plant species including many economically important crops, ornamentals, fruits and vegetables. The damage of *T. urticae* on these crops results in significant yield reduction. To suppress spider mite populations, growers often apply numerous disruptive acaricides. Unfortunately *T. urticae* is well documented for developing resistance to a variety of acaricides. In order to design the most effective spider mite management tactics, the long-term goal of this research is to reveal the molecular mechanisms underlying the chemical adaptation of two-spotted spider mites. To achieve this goal, molecular methods have been developed for identifying the transcriptional expression of resistance-associated genes. Quantitative real-time PCR (qRT-PCR) is an extensively used, high-throughput method to analyze transcriptional expression of genes involved in acaricide resistance. An appropriate normalization strategy with reliable reference genes is required for evaluating differential gene expression across populations under diverse experimental conditions. In current study, we aim to evaluate and identify the best reference gene(s) for qRT-PCR analysis of *T. urticae* xenobiotic adaptation. We chose eight commonly used genes as candidate reference genes. The qRT-PCR data for these genes were evaluated from seven populations: a susceptible and three acaracide resistant populations feeding on lima beans, and three other susceptible populations shifting host plants from lima beans to peppers, roses, and potatoes. The stability of the candidate reference genes were assessed with four algorithms. Additionally, we used an online web-based tool to assign the overall final rank. Our study recommended that two reference genes *CycA* and *Rp49* are necessary for investigating gene expression in acaricide resistant populations of *T. urticae*. Three reference genes *GADPH*, *Rp49*, and *Rpl18* are required for host plant shift studies in *T. urticae*. Two reference genes *GADPH* and *Rp49* are the most stable reference genes to investigate differential expression under both experimental conditions. These results can facilitate the molecular and functional genomics research in this notorious agricultural pest.

Presentation Number **88**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Molecular Mapping of Gene Controlling Seedling Emergence Trait in Bread Wheat** | | |
| **Presenter:** | Alexander Blackburn | | |
| **Mentor:** | Kulvinder S Gill | **Campus:** | Pullman |
| **Co-Authors:** | Amita Mohan, Kulvinder S Gill | | |
| **Major** | Genetics and Cell Biology - CVM | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

Wheat seedling emergence is an important trait for early stand establishment. Fast emergence and establishment of wheat seedling helps not only in reducing competition with weeds but also to conserve the soil and water evaporation by canopy cover. Furthermore, quick establishment of wheat seedling correlates well with a robust growth and yield at the later stages of crop development. Wheat seedling emergence is a long-standing issue particularly in the dryer region where wheat is planted deep in the available soil moisture profiles. The currently grown wheat cultivars around the world (>95%) contains the similar dwarfing genes *Rht1* or *Rht2* associated with shorter coleoptile and reduced early vigor, resulting in poor stand establishment under stress conditions. With little or no information available on this trait; the objective of the study is to genetically dissect this trait in bread wheat. Previously, using specialized field emergence test, we have identified the fastest and slowest emerging lines by evaluating World Wheat Collection consisting of 662 wheat cultivars representing the major wheat growing areas of the world. The two selected contrasting lines were crossed to raise the $F_1$. The $F_1$ was grown in the Wheat Growth Facility at WSU to generate selfed progeny ($F_2$). Each $F_2$ individual, result of a single meiotic genetic recombination, will be genotyped using the molecular markers and phenotype with the specialized emergence test. The segregation ratio in the $F_2$ population will be utilized to develop the framework linkage map to identify the chromosome location and trait associated markers. The identified associated marker will help in more efficient screen for breeding this trait in wheat. With abiotic stresses on the rise around the globe and water becoming limiting, the novel findings from the study will help in developing new varieties with early emergence and robust growth resulting in better agronomics and improved yield.

Presentation Number **89**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Cocaine-Memory Reconsolidation - Neural Mechanisms** | | |
| **Presenter:** | Theresa Dorrian | | |
| **Mentor:** | Rita Fuchs Lokensgard | **Campus:** | Pullman |
| **Co-Authors:** | Jessica Higginbotham, Rita Fuchs Lokensgard | | |
| **Major** | Neuroscience, Psychology – CVM, CAS | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

Exposure to a cocaine-paired environmental context causes cocaine-associated memories to be retrieved from long-term memory stores and enter a state of instability. During this period, cocaine memories are sensitive to manipulation until they are re-stabilized through the process of memory reconsolidation. Therefore, inhibiting memory reconsolidation to combat drug relapse may be a worthwhile treatment option for recovering drug addicts. Our lab has previously shown that interaction between the basolateral amygdala (BLA) and dorsal hippocampus (DH) is necessary for contextual cocaine memory reconsolidation; however, the lack of direct anatomical connections between these brain regions suggests that a third brain region or circuit of brain regions mediates this interaction. Using retrograde and anterograde viral tracing methods and assessment of neuronal activity at the time of memory reconsolidation, we have identified the entorhinal cortex (EC), lateral septum (LS), and medial septum (MS) as potential relay structures between the BLA and DH critical for cocaine memory reconsolidation. To further test this hypothesis, additional experimentally-native groups of rats were then trained to lever press to obtain cocaine infusions in a distinct environmental context followed by extinction training in a different context. Cocaine memories were reactivated by re-exposing the rats to the cocaine-paired context. Immediately following context re-exposure, at the putative time of memory reconsolidation, GABA-A/GABA-B agonist were administered into the EC, LS, or MS to inhibit neuronal activity in these brain regions. We have hypothesized that inactivation of critical relay brain regions will inhibit communication between the BLA and DH and disrupt cocaine memory reconsolidation. Consequent weakening of cocaine memories will be indicated by a subsequent decrease in drug context-induced relapse to drug seeking behavior (i.e., lever pressing in the cocaine-paired context).

Presentation Number **90**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Latina Mothers' Influence on Their Preschool Children's Self-Regulation of Eating: A Longitudinal Study** | | |
| **Presenter:** | Lionor Galindo | | |
| **Mentor:** | Dr. Thomas G. Power | **Campus:** | Pullman |
| **Co-Authors:** | Dr. Thomas G. Power | | |
| **Major** | Human Development, CAHNRS | | |
| **Category:** | Social Sciences | | |

The present study examines low-income Latina mothers' influence on their preschool aged children's self-regulation of caloric intake. There is limited research done on the minority population in regards to parenting styles associated with children's self-regulation of eating. The hypothesis being tested is mothers, who override their children's responsiveness to their internal cues of fullness, will have children who show poor eating self-regulation in the future. The research conducted is part of a larger study and analyzes the children's self-regulation and parents pressuring their children to eat as contributors to childhood obesity in terms of several procedures. The total number of participants consisted of 187 low-income Head Start Latina mothers with the exception of 2 grandmothers and their preschool children. Four procedures are used in my study, which observes children in the eating in the absence of hunger task, caregiver reports of feeding practices, observed caregiver pressure to get their children to eat during meals, and anthropometrics. I am measuring self-regulation of eating by looking at children's response to eating in the eating in the absence of hunger task. We feed the children a meal until they are no longer hungry. The children are then interviewed with hunger assessment cartoon figures to indicate their fullness levels following their meal. Next, the children's self-regulation is observed for ten minutes as they are left in a room with a variety of snacks and toys to choose from. Pressure to eat is measured in two ways, by observing mothers with their children during a meal and by the caregiver feeding questionnaire that measures their typical eating habits in the home environment. The anthropometrics measures the children's weight status by looking at their body mass index. It is predicted that caregivers who pressure their children to eat at the first timepoint will have children who show low levels of self-regulation and higher BMI's, 18 months later.

Presentation Number **91**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Transformation of *Camelina sativa*** | | |
| **Presenter:** | Jonathan Abarca | | |
| **Mentor:** | Amit Dhingra | **Campus:** | Pullman |
| **Co-Authors:** | Benjamin Kilian and Amit Dhingra | | |
| **Major** | Fruit and Vegetable Management - CAHNRS | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

The oilseed crop *Camelina sativa* is a potential source of biofuel in our energy conscious society. High oil content and low environmental inputs characterize this crop. Several efforts are ongoing to perform genetic engineering of Camelina to improve important traits so that this crop can be widely cultivated. For nuclear transformation, floral dip method is highly efficient. However, an efficient protocol for genetic engineering using leaf based organogenesis is not available. Availability of the latter method will provide additional avenues for engineering Camelina. As a first step in that direction, we have identified ideal plant growth regulator concentrations for regeneration as well as identified additional genotypes that are efficient in leaf-based organogenesis.

Presentation Number **92**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Microencapsulation of Omega-3 Fatty Acid Rich Flax Seed Oil using Pea Protein Isolate** | | |
| **Presenter:** | Lauren Celmer | | |
| **Mentor:** | Dr. Shyam Sablani | **Campus:** | Pullman |
| **Major** | Food Science - CAHNRS, Honors | | |
| **Category:** | Engineering and Physical Sciences | | |

Microencapsulation is a novel food process, utilized by several industries including pharmaceutical, agricultural and even the cosmetic industry. For the food industry specifically, microencapsulation has countless possibilities for innovative use to stabilize vitamins, oils, antioxidants and flavors. This study investigated the microencapsulation efficiency of pea protein isolate (PPI) and maltodextrin as wall materials for encapsulating omega-3 fatty acid rich flax seed oil.

A viscosity baseline test was used to establish the greatest amount of solids (both oil and coating) that would run through the high-pressure homogenizer and spray dryer. The resulting product from these processes was a powder formed from the microcapsules. Microencapsulation efficiency was measured by subtracting the surface oil from the total oil, and dividing by the total oil content. This gives an accurate depiction of how complete the capsule formation is because more surface oil indicates inefficient microencapsulation. To determine this capsule formation, efficiency testing was performed to find the optimal ratio of PPI and maltodextrin to flax seed oil. The optimal combinations found were 6% PPI, 12% maltodextrin, 20% flax seed oil and 8% PPI, 6% maltodextrin and 20% flax seed oil. These specific compositions produced the most complete microcapsule surrounding the oil droplet.

Possible food-based applications for such microcapsules include dairy, energy bars, juices, bakery products and mixes. Using protein as a wall material adds additional protein to the product, following the market trends of consuming fewer carbohydrates and more protein. The incorporation of protein-based microcapsules will enhance the nutritional profile of food products, creating a higher value-added product.

Presentation Number **93**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Differences in Decomposition Potential of Winter Wheat Residue and NIRS Prediction Models** | | |
| **Presenter:** | Alejandra N. Roa | | |
| **Mentor:** | Tami L. Stubbs | **Campus:** | Pullman |
| **Co-Authors:** | Tami L. Stubbs, Arron H. Carter | | |
| **Major** | Animal Science - CAHNRS | | |
| **Category:** | Applied Sciences | | |

Residue decomposition is an important decision factor facing wheat growers. Different environmental settings determine if growers want residue for control of wind and water erosion or if they want the residue to decompose quicker in no-till production systems. Currently there are a variety of cultivars available to growers, although no information is present on their residue decomposition characteristics because the current method of determination is slow and costly. Decomposition rates are determined by the nutrient content within the wheat residue. Current methods of determination require running samples through acid detergent fiber, neutral detergent fiber, acid detergent lignin, and carbon and nitrogen content analysis. Based on a study done in 2009, near infrared spectroscopy (NIRS) showed promise as a high-throughput proxy for current methods in determining residue breakdown, although it has not been validated on breeding populations. The objective of this research is to validate if NIRS could be used as a proxy to evaluate wheat residue breakdown. The hypothesis is that NIRS is a more efficient method for screening straw residue breakdown. A population consisting of 180 individuals derived from Finch (slow straw breakdown) and Eltan (rapid straw breakdown) was grown in Pullman, WA in 2011 and 2015. Wheat residue was collected at harvest maturity. Samples were cut from ground level and individually bundled, then trimmed to the internodes which where ground to pass through a 1mm screen. Of each sample we used two grams, one gram was used for NIRS analysis and the other gram was run through the wet chemistry fiber analysis. In short, samples were digested in sulfuric acid and CTAB or detergent, with the remaining residues comprising hemicellulose, cellulose, and lignin. Comparing the wet chemistry and NIRS results from 2015 to results of 2011, the nutrient compositions were similar. This indicates stability of the method across environments and provides evidence that the NIRS method may be used as a high-throughput screening method for straw residue breakdown. This will allow plant breeders to screen for this trait and dissemination of this information to growers on currently grown cultivars.

Presentation Number **94**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Evaluation of Efficacy of Avian Egg-Yolk derived Antibodies (Igy) against C. Jejuni Colonization of Human Intestinal Epithelial Cells** | | |
| **Presenter:** | Zachary Bailey | | |
| **Mentor:** | Devendra Shah | **Campus:** | Pullman |
| **Major** | Zoology – CAS, Honors | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

*Campylobacter jejuni* is an important cause of food-borne gastroenteritis in human causing >1 million cases each year in the United States alone. Infection is generally characterized by either mild self-limiting diarrhea or in some cases haemorrhagic diarrhea. Severe cases are generally treated with antibiotics. However, antibiotic resistance has become increasingly common in *C. jejuni*. With the increasing trend in antibiotic resistance in bacterial pathogens, non-antibiotic alternative treatment or prevention methods for bacterial infectious diseases are of interest and could be of value to treat food-borne infections such as campylobacteriosis. In the last two decades, researchers have identified several *C. jejuni* proteins, also known as colonization associated proteins or CAPs, that are important for intestinal colonization, i.e. binding and internalization of *C. jejuni* in intestinal cells. To test above hypothesis, I will use anti-*C. jejuni* colonization-associated protein (CAPs)-specific antibodies (IgY) that were produced previously by hyperimmunizing hens with seven different recombinant CAPs. The purpose of this study is to evaluate if these anti-*C. jejuni* antibodies derived from highly-immunized egg-yolk product will effectively reduce or neutralize the ability of *C. jejuni* to adhere to and/or internalize in human intestinal cells. I will conduct series of experiments using cultured human intestinal epithelial cells (Caco-2 cells). Caco-2 cells will be grown using standard cell culture media whereas *C. jejuni* will be grown in nutrient rich laboratory media. Caco-2 cells will be treated with individual and combination of seven different IgYs before or after infection with *C. jejuni* and tested for binding and internalization. One group of cells will serve as a positive control, receiving bacteria but no treatment; one group of cells will be a negative control receiving the media without bacteria and one group of cells will receive non-specific IgY (treatment control). I expect to see a significant reduction in the mean colonization of human cells treated with IgY derived from highly immunized egg-yolk product versus those not treated. A statistically significant reduction in colonization would suggest that these antibodies could be useful as a treatment or preventative measure against *C. jejuni* infection in human.

Presentation Number **95**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **The Rural Food Pantry Experience: Exploring Ways to Reduce Stigma, Create Community, and Enhance Access to Fresh Foods** | | |
| **Presenter:** | Meaghan Logan, Mackenzie Selleg | | |
| **Mentor:** | Dr. Rayna Sage | **Campus:** | Pullman |
| **Co-Authors:** | Dr. Rayna Sage, Mackenzie Selleg | | |
| **Major** | Logan: Psychology – CAS; Selleg: Human Development, Criminal Justice – CAHNRS, CAS | | |
| **Category:** | Social Sciences | | |

American society continues to cultivate the belief that anyone who works hard enough can be self-reliant and flourish in society. Because of this, individuals and families that need extra support are often stigmatized and can feel uncomfortable or ashamed to use community resources. In this project, we have focused on rural food insecurity and how different types of organization, involvement, and delivery of food influences stigma associated with using this resource, the type of community it builds, and the level of access to fresh and healthy foods. In doing this we also explored the relationship between communities and the greater emergency food systems within a larger county in the Pacific Northwest to analyze how they were being used and in what ways they could increase their efficiency.

To accomplish this we have used a community-based participatory research approach. We spent over eighty hours doing participant observation, talked to hundreds of pantry visitors, collected information through dot surveys, and conducted interviews with a number of pantry volunteers and visitors. This data is expected to help communities understand different ways in which local culture and pantry design can enhance or reduce the stigma associated with its use. In addition, this information has the ability to lead to donations of fresh and healthy choices to food pantries, while helping to explain the culture of the pantry itself.

In reviewing what we have collected so far, we can see that our data is used to justify and inform action. The observations that we make and record are given back to the food pantries to help them become more efficient in their service and in reducing the stigma associated with using emergency food services. We are continuing to collect data from different emergency food services in rural areas, and hope to further our impact in community development.

Presentation Number **96**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Bumblebee Diversity and Traits in Urban and Rural Farms** | | |
| **Presenter:** | Konner Fleming | | |
| **Mentor:** | Elias Bloom | **Campus:** | Pullman |
| **Co-Authors:** | Elias Bloom, Rachel Olsson, David Crowder | | |
| **Major** | Environmental and Ecosystem Sciences – CAHNRS, CAS | | |
| **Category:** | Organismal, Population, Ecological, and Evolutionary Biology | | |

Bees provide pollination services to crops that account for 70% of the world food supply, with bumblebees (Apidae:*Bombus*) contributing to a portion of these services (e.g apples, tomatoes, cucumbers, etc.). Environmental stresses from agriculture and urbanization may impact bees and pollinator diversity, both important factors in the conservation of pollination services and functional trait richness. Functional traits are physical and behavioral characteristics that define a species. Therefore, functional trait variation must be considered when evaluating the impact of environmental factors on bee species richness, and the services bees provide. IT distance is the span between an insect's wings, and is used to estimate bee body size. IT distance may reflect a bee's foraging distance, as bees in urban settings may need to fly farther to acquire pollen and nectar. The objective of our study was to measure the IT distance of *Bombus* species found in urban and rural farms. We hypothesized that IT distance would differ between species found in urban and rural farms. *Bombus* specimens were collected in a one year period from 24 farms in western Washington. Farms were categorized as urban or rural based on the percent urbanized land surrounding the farm (greater than 50% or less than 50%, respectively), with urbanized land defined as land modified for human use (e.g. infrastructure, housing). Five urban and five rural farms were randomly selected. All *Bombus* specimens were identified to species, and IT distance was measured in millimeters by a calibrated micrometer. A total of 253 bees were measured, with a majority of the bees identified as *B. mixtus* (29%) or *B. vosnesenskii* (27%). Other species included *B. melanopygus*, *B. californicus*, and *B. caliginosus.* Average IT distance for all *Bombus* species was found to be 3.74 millimeters in rural settings and 3.84 millimeters in urban settings. Rural sites were found to have higher species richness (nine species) than urban farms (seven species). These results suggest that IT distance may not be the most accurate predictor in measuring the impacts of urbanization on pollinator diversity. Rather, IT distance may be more meaningful when jointly measured with other functional traits. (349 words)

Presentation Number **97**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Usability Evaluation of Smart Home in a Box (SHiB)** | | |
| **Presenter:** | Taylor Adams, Sreenath Panchagnula, Dominique Tilke | | |
| **Mentor:** | Aaron Crandall | **Campus:** | Pullman |
| **Co-Authors:** | Dominique Tilke, Sreenath Panchugnula, Yang Hu | | |
| **Major** | All: Psychology - CAS | | |
| **Category:** | Computer Science, Mathematics, Statistics, and Information Sciences | | |

This study is aimed towards looking at how simple or difficult it is for the senior population to be able to install a Smart Home in a Box (SHiB) on their own. Participants involved in this study are from the greater Palouse region, and average an age of [Need to look at our documents to calculate this age]. There are 12 participants in the study with an average age of 73. The SHiB package mailed to the participant includes several different types of sensors and a small computer. After installation of the SHiB, they are visited by researchers for a checkup of the sensors. The researchers evaluate how well the sensors were installed, and ask the resident questions about the installation process. The goal is to improve the SHiB design to make it easier for non-specialists to install and use the technology. Results have exposed design flaws in several specific sensors, notably doors and entryways, as well as issues getting the computer installed properly.

Presentation Number **98**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Using CRISPR/Cas9 Genome Editing to alter The CNGA3a Gene in Zebrafish** | | |
| **Presenter:** | Tamara Davies | | |
| **Mentor:** | Michael Varnum | **Campus:** | Pullman |
| **Co-Authors:** | Tshering Sherpa, Pete Meighan, Brittany Cole and Michael Varnum | | |
| **Major** | Neuroscience, CVM | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

Zebrafish possess retinas that are similar to the human retina, thus making them an excellent model to study human retinal diseases. In the photoreceptor cells of the retina, cyclic nucleotide-gated (CNG) ion channels help convert the light response into an electrical signal that is ultimately understood as vision. Dysfunction of CNG channels in photoreceptors can lead to blindness. The purpose of this study is to use CRISPR/Cas9 genome editing to alter CNG channel genes necessary for cone (daylight and high-acuity) vision, in order to develop a model that can be used to understand human retinal disorders that arise from CNG channel mutations. The CRISPR genome editing approach works by engineered guide RNAs recruiting Cas9 nuclease to a specific target(s) in the genome in order to generate strand breaks and mutations. We injected Cas9 mRNA with *CNGA3a* guide RNAs into embryos at the single-cell stage. *CNGA3a*-edited fish were identified using PCR and T7 Endonuclease I cleavage of DNA heteroduplexes, followed by sequencing representative edited targets. *CNGA3a* editing via CRISPR/Cas9 was associated with a decrease in visual performance, assessed using the optomotor response test of five to six day old zebrafish larvae, at a developmental stage where only cone photoreceptor-based vision is present. *CNGA3a* editing also was associated with disruption of electroretinogram responses in these larvae. Furthermore, *CNGA3a* editing produced structural perturbations in the photoreceptor layer of the retina compared to age-matched controls. Together these results indicate successful CRISPR/Cas9 editing of the *CNGA3a* gene in zebrafish with an accompanying phenotype that is consistent with disruption of cone photoreceptor function.

Presentation Number **99**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Evaluation of Wear Behaviors in Ideal Gel Systems** | | |
| **Presenter:** | Bryce Vanderyacht | | |
| **Mentor:** | Dr. Helen Joyner | **Campus:** | Pullman |
| **Major** | Food Science, CAHNRS | | |
| **Category:** | Applied Sciences | | |

Food products are complex systems comprising fats, proteins, water, carbohydrates, and other constituents that affect the texture of foods. Based solely on composition, it is difficult to predict breakdown and wear behaviors of foods or texture experienced in the mouth. However, it is possible to observe wear, compression, and breakdown behaviors of ideal food systems (e.g. gels) applying the information collected to complex systems. The objective of this study was to determine how composition of ideal food systems impacted their wear behaviors. Gel compositions in these experiments included strictly protein or carbohydrate formulations of varying concentration as the basis of gel formation along with water or calcium solutions with variable pH ranges to promote gelation. Friction and wear behaviors of the gel discs were measured under varying pressures and sliding speeds on a rheometer using a double-ball-on-disc attachment. Wear was evident as fretting in the direction of the sliding and splits in the gel surface perpendicular to the direction of sliding.

Higher concentrations of gelling agents (e.g. gelatin, carrageenan, pectin, whey protein) generally had lower wear. The amount of force to compress the gel samples under the texture analyzer was inversely related to the amount of wear observed on the gel discs during rheological tests.

These results can be used for fundamental control of wear behaviors in complex food systems by manipulating the ratio of constituents within the system, resulting in improved processing behaviors and more palatable textures.

Presentation Number **100**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Vortex Tube for Hydrogen Liquefaction using CFD** | | |
| **Presenter:** | Kevin Cavender | | |
| **Mentor:** | Dr. Konstantin Matveev | **Campus:** | Pullman |
| **Co-Authors:** | Dr. Jacob Leachman, Dr. Konstantin Matveev | | |
| **Major** | Mechanical Engineering - CEA | | |
| **Category:** | Engineering and Physical Sciences | | |

The Ranque-Hilsch Vortex tube is a topic of scientific debate to this day. It was invented on accident by French physics student George Ranque in 1931. It wasn't until 1945 that German physicist Rudolph Hilsch published a scientific paper describing the characteristics of why a vortex tube works. A vortex tube essential takes in a pressurized gas then exits in two streams, one hot, one cold. 70 years following the initial invention, we still don't know what the driving principal of the temperature separation is. There are numerous experimental studies as well as studies using Computational Fluid Dynamics (CFD) software all attempting to define a unified theory for describing the effect. The Vortex tube has novel application in gas liquefaction which has the potential to drastically reduce the cost specifically for hydrogen. Studies have identified the cooling performance with various working fluids, however a study on the vortex tube has not been conducted with hydrogen at cryogenic temperatures. The current study has identified a applicable software application, and verified its operation with prior Vortex Tube CFD analysis. With plans to validate the CFD results against simplified one-dimensional models and experimental results currently ongoing. The goal of the project moving forward is so we may analyze various parameters using CFD as a design tool to optimize the vortex tube. This would take a decade to do with conventional experimental techniques.

Presentation Number **101**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Maladaptive Behavioral Regulation in Alcohol Dependence: Role of Dynorphin / Kappa-Opioid Receptor Neuroadaptations in the Bed Nucleus of the Stria Terminalis** | | |
| **Presenter:** | Chloe Erikson | | |
| **Mentor:** | Dr. Brendan Walker | **Campus:** | Pullman |
| **Co-Authors:** | Chloe Erikson, Gengze Wei, Dr. Brendan Walker | | |
| **Major** | Neuroscience – CVM, Honors | | |
| **Category:** | Organismal, Population, Ecological, and Evolutionary Biology | | |

Given the high prevalence of alcohol use disorders in the United States and their ever increasing societal impact, the Laboratory of Alcohol and Addictions Neuroscience (LAAN) has begun to examine an important emerging role of the endogenous opioid dynorphin (DYN) and its receptor, the kappa-opioid receptor (KOR) in the treatment of addictive disorders such as alcohol dependence. The extended amygdala is profoundly involved with the regulation of motivational and emotional systems in a manner that promotes personal survival and propagation of the species and is defined by functional connectivity between the central nucleus of the amygdala (CeA), the nucleus accumbens (Acb), and a third important brain structure: the bed nucleus of the stria terminalis (BNST). Until more information is established regarding the role of the BNST in alcohol dependence, a critical gap in our knowledge base will exist and prevent the development of comprehensive strategies to lessen the number of individuals suffering from alcohol dependence. That said, recent publications and the preliminary data I have generated with the assistance of the LAAN heavily implicates the DYN/KOR system in the BNST as contributing to escalated alcohol self-administration and the emergence of negative affective states in dependent organisms during withdrawal. The current study aims to quantify alcohol dependence-induced increases in *Pdyn* and *Oprk1* gene expression during acute withdrawal in alcohol dependent rats to identify a genetic contribution to dysregulation of DYN / KORs in the BNST and illustrate that the infusion of KOR antagonist into the BNST can ameliorate escalated self-administration during acute withdrawal that putatively correspond to an altered *Pdyn* mRNA expression profile and support further molecular and genetic evaluation of the BNST in alcohol dependence.

Presentation Number **102**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Tobacco Rattle Virus Genetic Analysis** | | |
| **Presenter:** | Dana McCurdy | | |
| **Mentor:** | Dr. Hanu Pappu | **Campus:** | Pullman |
| **Major** | Animal Science, Biology – CAHNRS, CAS, Honors | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

Tobacco rattle virus is a disease that affects over 50 families of plants, most of which are crop families. It is spread from plant to plant via nematode or other vectors such as pruning tools or even by seeds. Once a nematode is infected, the virus can thrive for years and be continually transmitted year after year. With each passing generation, it is crucial to characterize the virus and monitor the genome for simple modifications or drastic changes in the DNA sequence. To prevent the disease and keep it to a minimum, it is crucial to understand how the virus has evolved over time. Otherwise, there is a high possibility for dramatic crop loss in the future. To identify the genetic sequence for the virus from the 2015 Colorado sample, a series of procedures including polymerase chain reaction, gel electrophoresis, plasmid isolation, and DNA sequencing were utilized. From this data, we were able to compare the 2014 Colorado sample to the 2015 Colorado sample and identify differences between the two in addition to comparing it to samples from Minnesota, North Dakota and Idaho. The DNA sequence from the 2015 Colorado sample most closely resembled those of the North Dakota and 2014 Colorado samples. As a result, progress of the tobacco rattle virus can be monitored and allows us to look into the source of the initial infection as well as track the pathway for this virus in the future. In doing so, prevention and control of tobacco rattle virus is a real possibility that could save excessive crop loss from year to year.

Presentation Number **104**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Deep Subsurface Irrigation in Concord Vineyards** | | |
| **Presenter:** | Zara York | | |
| **Mentor:** | Pete Jacoby | **Campus:** | Pullman |
| **Co-Authors:** | Pete Jacoby, Troy Peters, Sindhuja Sankaran, Lav Khot, Jeremy Thompson | | |
| **Major** | Agricultural Biotechnology - CAHNRS | | |
| **Category:** | Applied Sciences | | |

Research is underway in the Concord Block of the Roza Unit at WSU Prosser-Irrigated Agriculture Research and Extension Center to evaluate the use of subsurface drip irrigation (SSDI) to conserve water while producing quality juice grapes. This techniques does not involve buried lines, but rather, uses a hard plastic PVC tube inserted from 1-4 feet below the surface and placed within 18 inches either side of each vine. A small feeder tube delivers water from a suspended line to a pressure compensated emitter at the top of tube. Emitters and lines are not in contact with soil. To date, results appear promising from weekly irrigations of 4-8 gallons per plant. Grapes grown under the SSDI systems were found to produce heavier cluster weights and more berries per cluster than those grown under the surface drip irrigation at lower than normal irrigation delivery at mid-veraison. At harvest, all SSDI treatments had somewhat higher cluster weights and berry number than in surface drip irrigation treatments grown under deficit irrigation conditions.

Presentation Number **105**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Ink-Jet Based Microlens Array Manufacturing** | | |
| **Presenter:** | Kent Evans | | |
| **Mentor:** | Dr. Arda Gozen | **Campus:** | Pullman |
| **Major** | Mechanical Engineering - CEA | | |
| **Category:** | Engineering and Physical Sciences | | |

Cost-effective methods for production of microlens arrays are becoming exceedingly important as the demand for microlens arrays continues to increase. Ink-jet printing (IJP) provides a cheap, low waste, and flexible alternative to the traditional photolithography method of microlens array production. While IJP has been shown as a viable method for microlens array production, prior works have always involved photolithography in substrate preparation or molding. This project demonstrates the tailoring of microlens array focal properties through modification of interfacial energies solely through the use of IJP. Two methods are presented to accomplish this goal. The first is through surface energy modification through deposition of thin films of material. This method resulted in a decrease in focal length of approximately 35%. The second method was through modification of the surrounding media. This method resulted in nearly spherical lenses with a reduction in radius of curvature of nearly 98%. Future work involves specific tailoring of both the thin films and the media to generate desired focal properties on demand.

Presentation Number **106**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Prostate Cancer NA-LNCaP Cell Characterization** | | |
| **Presenter:** | Dana McCurdy | | |
| **Mentor:** | Dr. Cliff Berkman | **Campus:** | Pullman |
| **Major** | Animal Science, Biology – CAHNRS, CAS, Honors | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

Prostate cancer is the second leading cause of death in men, affecting 1 of every 7 men in America. 220,800 new cases are expected to arise this year with 27,540 ultimately succumbing to the disease. If caught before metastasis, the five year survival rate is 100 percent whereas after metastasis, it drops to a mere 28 percent making metastasis the leading cause of death in prostate cancer patients. Cultured prostate cancer cells such as LNCaP, cells derived from a 50 year old Caucasian, allow for a wide array of *in vivo* and *ex vivo* experiments and are easily monitored in a laboratory setting. When stressed under androgen deprivation and placed in non-adherent plates, LNCaP cells were grown for multiple passages and monitored via western blotting. The area of interest was biomarker expression and its change over the increasing passages of the stressed LNCaPs. When compared to the parental line, the biomarker expression was less than that of the original cells but was able to recuperate when reintroduced to the previously deprived androgens. This behavior coincides with that of metastasized cells when comparing their ability to adapt quickly to their environment. More characterization is needed for this new cell line, but NA-LNCaP could drastically improve research on metastasized tumors.

Presentation Number **107**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Senior Apparel Design Collection: Resolute** | | |
| **Presenter:** | Adelaine Forte | | |
| **Mentor:** | Dr. Carol Salusso | **Campus:** | Pullman |
| **Major** | Apparel Merchandising Design and Textiles, Design Option - CAHNRS | | |
| **Category:** | Arts and Design | | |

I am a product of the world around me. And my creative process in creating my senior fashion collection involved absorbing the social environment I live in and interpreting it through apparel as a medium. Gender inequality in America has been prevalent in the news recently in regards to transgender bathroom laws. But sexism and gender inequality has always been present in America. Today it's seen in differences in pay and the prices of gendered products. The current social climate readily relates to fashion as what people wear is often a sign of the times. But my collection is particularly purposeful in portraying problems in our society.

Fashion is responsible for both questioning and contributing to global inequalities in gender, race, and class. Although clothing itself can't discriminate, it can and has been used to separate and sexualize people based on their gender or race. It is estimated that one in six people work in the global fashion industry, and are often exposed to the unfair working conditions the accompany fashion. Fashion is perceived as this silly frivolous pastime in our society, but the influence it has is immense. And I believe it is important for this industry to recognize the power it has and to use its power to make positive changes.

I wanted to create a line of clothing that combined typically feminine and masculine visual traits to reflect the gender equality I hope our society eventually achieves. I chose women's work wear because the professional working world is a place where gender inequality still exists in America.

Gender subtly colors everything we do every day. Gender goes beyond women wearing dresses and men wearing pants, people aren't bathroom sign figures. Gender as a concept is complex; therefore my collection goes beyond putting women in suits. Angular lines, modest necklines and muted colors are visual traits often attributed to men's apparel. I combined these with curved design lines, soft fabrics and undefined prints; These are traits often attributed to women's apparel.

My collection, resolute, is a call to myself and others to solve problems of injustice. It's a call to everyone to be admirable individuals regardless of gender.

Presentation Number **108**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Sleep for Science: The Effect of Age and Emotion on Selective Memory Consolidation During Sleep** | | |
| **Presenter:** | Antonio Martinez-Tlatenchi | | |
| **Mentor:** | Dr. Niels Nielsen | **Campus:** | Pullman |
| **Co-Authors:** | Dr. Sara Alger | | |
| **Major** | Psychology, CAS | | |
| **Category:** | Social Sciences | | |

Previous studies have demonstrated that sleep, even as little as a daytime nap, can improve the consolidation of declarative memories (Mednick, Nakayama, & Stickgold, 2003). Specifically, Slow Wave Sleep (SWS) and Sleep Spindles are implicated in the facilitation of memory consolidation (Rasch, Büchel, Gais, & Born 2007). Recent research also provides evidence for sleep preferentially preserving the emotional components of memory at the expense of associated neutral information (Payne, Chambers, & Kensinger 2012). Unfortunately, the majority of aforementioned findings were conducted in studies whose primary participants were young undergraduate adults and thus it is unknown whether results are similar in older age groups. Identifying if these sleep-based memory phenomena change with age is crucial given the evidence indicating that the ability to encode new information diminishes and a decrease in SWS and sleep spindles occurs as age increases (Landolt & Borbély 2001). With age, there is also a trend to view events in a more positive manner and thus tend to remember more positive, but less negative, information. This study seeks to address this gap in the literature through a 3X2X2X2 factorial design with two between (Nap Condition, Age Group) and two within (Valence, Session) group factors. Daytime naps were used to control the timing and thus the physiological composition of sleep, with amount of Stage 2 sleep decreasing as SWS increases in later naps. Participants (N=23) consisted of healthy Young Adults (18-39yrs, n=11) and Middle Age Adults (45-64yrs, n=12). Participants completed the emotional memory tradeoff task at 10am then tested for baseline performance and were subsequently assigned to a Wake (no nap), Early Nap (11am) or a Late Nap (3pm) condition. In both nap conditions, participants had a 90-minute sleep opportunity and were prepared for PSG recordings in-lab. Participants in all conditioned were then retested at 5pm. Factorial ANOVAS were used to analyze the data within age groups (condition X valence X session) and then compared between age groups (Young Adult X Middle Age). Analysis of EEG will reveal possible correlations between SWS and/or sleep spindles and results on the emotional tradeoff task.

Presentation Number **109**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Receptorless Activation of MyD88 Immune Response by BB-Loop Epitope Multimers** | | |
| **Presenter:** | Madison Soth | | |
| **Mentor:** | Rock Mancini | **Campus:** | Pullman |
| **Co-Authors:** | Abrrey Monreal and Rock Mancini | | |
| **Major** | Chemistry - CAS | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

Our goal is to develop a receptorless approach to activating the innate immune system leading to vaccines that are more effective. Current vaccines are dependent in part on activating innate immunity to reinforce activation of adaptive immunity leading to immunity to the desired pathogen. Several of these innate immune response activators or adjuvants are dependent on toll like receptor activation. While these receptors are generally highly conserved, there is a subset of the human population with mutations that can lead to ineffective vaccination or adverse reactions. These mutations can also play a part in other chronic inflammatory diseases including Crohn's disease and Lupus.

Our strategy utilizes two peptides (BB-Loops) identified as crucial components of the immune response cascade, attached to a cell penetrating peptide (CPP) used to transport impermeable cargos across cell membranes. Our hope is that the two cargos brought into the cell by the CPP will be able to activate an innate immune response by beginning the cascade of protein interactions that leads to inflammatory cytokine production. Immune response will be assessed using a special class of cells that allow any immune response to be evaluated via a colorimetric assay giving a blue color in the presence of immune activation. This would allow us to link the innate and adaptive immune system responses for effective vaccination leading to long lasting immunity. We chose this approach as a method for achieving receptorless activation of the innate immune system as a potential universal adjuvant for vaccinations. This would increase the efficacy of existing vaccines, as this would bypass currently used methods that are dependent on toll like receptor activation.

Presentation Number **110**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Bioinformatics Analysis of Mycobacterial R Cluster Phages** | | |
| **Presenter:** | Normando Barbery, Sarah Bergman, Sarah Gold, Samantha Gottlieb, Veronica Harris, Cheyenna Krone, Samantha Palladino, Pierce Spencer | | |
| **Mentor:** | Dr. William B. Davis | **Campus:** | Pullman |
| **Co-Authors:** | Cheyenna Krone, Pierce Spencer, Samantha Gottlieb, Samantha Palladino, Sarah Bergman, Sarah Gold, Veronica Harris, William B. Davis | | |
| **Major** | Barbery: Chemical Engineering – CEA; Bergman: Microbiology, Genetics and Cellular Biology – CVM; Gold: Microbiology, Pre-med – CVM; Gottlieb: Neuroscience, Psychology – CVM, CAS; Harris: Microbiology – CVM; Krone: Bio-engineering – CEA; Palladino: Pre-Veterinary Neuroscience – CVM, Honors; Spencer: Neuroscience, Biochemistry - CVM | | |
| **Category:** | Organismal, Population, Ecological, and Evolutionary Biology | | |

Traditionally, antibiotics have been used in medicine to kill bacteria, but due to their overuse, these chemicals have become less effective in recent years. An alternative, phage therapy, relies on bacteriophages-viruses that infect and kill bacteria in the environment. Mycobacteriophages infect organisms in the genus Mycobacterium, a group known for having species that are pathogenic to humans including *M. tuberculosis*, the causative agent of tuberculosis. In spring 2016, advanced bioinformatics approaches were used to analyze the five mycobacterial phages in the mycobacteriophage R Cluster family- Nilo, Papyrus, Send513, Weiss13 and Zenon. The goal was to discover more about the phages in this family since they were isolated in geographically distant locations and most are so new that their genomes have only been partially mapped and annotated. All five phages were isolated on *M. smegmatis*, a relative of *M. tuberculosis*. Using a variety of experimental approaches, conserved and unique genomic features of the five R cluster phages were ascertained. Evidence has been found after examining potential attP sites that R cluster phages now have a lytic life cycle, but might have evolved from species that were lysogenic. Predicted protein sequences were used to build evolutionary trees for D, H, R, and U cluster mycobacteriophages, and phages that infect a related bacterial species, Gordonia. Several features related to gene regulation, including promoters and terminators, were identified. Evidence was found for a mycobacterial origin of several open reading frames in R cluster phages. Synteny maps reveal the strong conservation of sequence in most regions of the R cluster genomes. There are several repeat elements in these genomes that might serve as sites for illegitimate recombination. Finally, potential membrane proteins, that might play roles in R cluster mycobacteriophages, were discovered. The study of the Cluster R phages could reveal information that might help in medical applications against more pathogenic species of mycobacteria. This work is also expected to provide new bioinformatics information about the genetics and function of this and other classes of bacteriophages.

Presentation Number **111**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Pre-randomization Alcohol Use Predicts Duration of Treatment Period Alcohol Abstinence in Adults with Serious Mental Illness** | | |
| **Presenter:** | Samantha Martin | | |
| **Mentor:** | Dr. Sterling McPherson | **Campus:** | Spokane |
| **Co-Authors:** | Emily Leickly, Michael McDonell, Sterling McPherson, Jordan Skalisky, Debra Srebnik, John Roll, Richard K. Ries | | |
| **Major** | Psychology - CAS | | |
| **Category:** | Applied Sciences | | |


**Principal Topic**

A 12-week randomized controlled trial was conducted to measure the effectiveness of a contingency management intervention among adults with alcohol use disorders and serious mental illness. The trial employed the ethyl glucuronide (EtG) biomarker as an objective assessment of alcohol use- levels that was assessed three times per week. This study aims to use EtG levels taken at baseline to predict the success of contingency management as intervention for adults with an alcohol use disorder and serious mental illness.

**Methods/Hypotheses**

Participants randomized to contingency management (N=40) were assigned to one of two groups based on mean EtG levels during the induction period: below 500ng/mL, or equal and above 500ng/mL. We used this particular level as previous findings show the cutoff of 500ng/mL as a reliable indicator of heavy drinking during the previous 24 hours. For this study alcohol abstinence was defined as longest consecutive EtG negative (< 150 ng/mL) samples collected over the 12-week treatment. We hypothesized that levels of EtG taken in the 4-week period prior to randomization would predict the length of alcohol abstinence during the 12-week intervention phase among those receiving contingency management.

**Results/Implications**

We found that participants with mean EtG levels below 500ng/mL at induction maintained longer periods of alcohol abstinent urine samples (Mean=11.15, SD=10.51), relative to controls (Mean=4.43, SD=7.1); $t(38)=2.14$, $p=0.04$. This indicates an approximate 15 more days of abstinence among the below 500ng/mL at induction group. We are able to conclude that a contingency management intervention for this population may result in poor outcomes for those with pre-randomization EtG levels at or above 500ng/mL.

Presentation Number **112**

# ABSTRACT:

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|---|---|---|---|
| **Abstract Title:** | **Understanding Seed Dormancy Breaking Methods in Pacific Northwest Wheat to Prevent Preharvest Sprouting** | | |
| **Presenter:** | Dustan Cwick | | |
| **Mentor:** | Shantel A. Martinez | **Campus:** | Pullman |
| **Co-Authors:** | Shantel A. Martinez, Rehana S. Parveen and Camille M. Steber | | |
| **Major** | Materials Science and Engineering - CEA | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

Preharvest sprouting (PHS), when seeds germinate while still on the mother, can occur under cool and wet conditions in the field. PHS results in a large economic loss to farmers because the germination process degrades starch. The wheat industry tests degradation of starch through a Falling Number test. PHS is largely due to the lack of seed dormancy. Dormancy is the inability to germinate, even under favorable conditions. Dormancy can be broken through cold stratification and can also be influenced by plant hormones. The goal of this study is to understand dormancy breaking methods between different wheat cultivars that have different degrees of seed dormancy. If a wheat cultivar is more dormant, then it will not germinate as much under dormancy breaking conditions compared to a non-dormant wheat cultivar. Intact wheat spikes were misted in the greenhouse for 6 seconds every minute over 7 days in order to determine germination potential of wheat while still on the mother spike. A second method of determining germination potential of wheat cultivars was conducted. This was done by a germination assay in the presence and absence of plant hormones that either stimulate or inhibit germination. Germination was scored daily over 5 days of incubation. Both methods show differences in wheat cultivars and their dormancy through the ability or inability to germinate. Furthermore, the Falling Numbers test was conducted on the same wheat cultivars that were grown in the field. Some wheat cultivars with lower seed dormancy had a lower Falling Number results. Finally, two separate wheat cultivars were germinated under different temperatures: 10°C, 15°C, 20°C, and 30°C. This experiment showed that even under very low temperatures, wheat still showed a difference in dormancy between cultivars. Further research will need to be conducted to determine what genes are influencing dormant cultivars versus non-dormant cultivars.

Presentation Number **113**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **The Impact of Social Norms and Pressures on Donation Habits** | | |
| **Presenter:** | Courtney Pace | | |
| **Mentor:** | Dr. Yujung Nam | **Campus:** | Pullman |
| **Major** | Communication & Society - COMM | | |
| **Category:** | Social Sciences | | |

Why do people donate money? Out of the goodness of their heart? Maybe they donate because "that's what everyone else is doing." This study is on how people react differently to social pressures in face-to-face communication and computer mediated communication when faced with the opportunity to donate money to a cause. This study aims to examine how social factors influence donation habits and measure the impact of said influence in both in-person and online donation opportunities. It is hypothesized that people are more influenced by their peers in face-to-face interactions and therefore more likely to donate in person than online. Participants will be males and females between the ages of 18 and 30. Participants will be subjected to surveys and interviews, in which their current donation habits will be recorded and their potential donation habits compared based on demographics and interest. How participants react to negative versus positive emotional appeals will be documented, along with the emotional results (feelings of inspiration opposed to pressure). Participants will view donation websites with identical content in different platforms e.g., a laptop and smart phone, and will also answer questions regarding hypothetical scenarios. Reactions to specific website properties (such as format and word choice) and appeals made by the cause will be observed and conclusions drawn regarding what factors make people more likely to donate money.

Presentation Number **114**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Parallel Computing in Genome Wide Association Studies** | | |
| **Presenter:** | Ryan Summers | | |
| **Mentor:** | Professor Zhiwu Zhang | **Campus:** | Pullman |
| **Co-Authors:** | Dr. Meng Huang, Prof. Zhiwu Zhang | | |
| **Major** | Computer Engineering – CEA, Honors | | |
| **Category:** | Computer Science, Mathematics, Statistics, and Information Sciences | | |

Within the field of statistical genomics, genome wide association studies (GWAS) are used to correlate mutations within the genome to a phenotypic response. In recent years, geneticists have devised efficient methods of analyzing DNA and provide their results online. However, current methods of correlating these datasets can take weeks of calculation time. Within GWAS, many matrix multiplication operations must occur between matrices consisting of billions of elements. In order to reduce the necessary computation time, this project aims to accelerate GWAS through parallel computing on graphics processing units (GPUs). GWAS presents an unprecedented opportunity for acceleration through parallel computing as matrix multiplications can be decomposed into individual dot product operations between two input vectors. By utilizing the many-cored architecture of GPUs for hundreds of simultaneous operations, the necessary calculation time can be drastically reduced. Additionally, algorithms can be tailored to GPU memory architectures to optimize data fetching in order to provide further speed increases. Initial inquiry into this method has resulted in over 750x speed increase of the matrix multiplication on a GPU over a sequential CPU algorithm. This project shows that GPUs present a powerful method of cheaply and efficiently accelerating calculations within GWAS by offloading repetitive computations for co-processing. Additionally, co-processing methodologies leave the CPU free for computation, allowing other portions of the GWAS program to execute asynchronously during matrix calculations.

Presentation Number **115**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Determining the Accuracy of Deer Behavior Patterns from Different Accelerometer Settings** | | |
| **Presenter:** | David Navarro | | |
| **Mentor:** | Dr. Lisa Shipley | **Campus:** | Pullman |
| **Major** | Wildlife Ecology and Conservation Sciences - CAHNRS | | |
| **Category:** | Organismal, Population, Ecological, and Evolutionary Biology | | |

Understanding how wild animals interact with each other and their environment is critical to understanding their ecology and to better conserve wildlife populations and habitat. To acquire this type of data, biologists must be able to measure what animals are doing, when they are doing it, where they are doing it at, and for how long each activity or behavior is occurring. This study will determine the balance between acquisition rate, accuracy of observed behaviors, and battery life of accelerometers while using deer as our test species. The accelerometers were fitted to collars worn by 4 tractable mule deer (Odocoileus hemionus) at four different recording settings; 1-, 15-, 30-, and 60- seconds. Settings were applied in a random order. Each deer was observed for a total of 4 hours during each setting to collect focal behavior data. Data from the accelerometers were compared to the focal surveys to determine which recording setting produced the best distinguishable patterns of behavior with respect to both battery life and the total amount of data collection. By determining the best calibration, we can obtain the most efficient data using accelerometers to determine what behaviors and what critical information about wild animals can be accurately measured in order to understand ecology and conservation.

Presentation Number **116**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Phthalate Plasticizers Inhibit Retinoic Acid Receptor Activity Mediated through Peroxisome Proliferator Activated Receptor Alpha.** | | |
| **Presenter:** | Austyn Orvis | | |
| **Mentor:** | Kwanhee Kim | **Campus:** | Pullman |
| **Co-Authors:** | Zulema Garcia, Kwan Hee Kim | | |
| **Major** | Zoology - CAS | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

Many commercial products, such as food packaging, paints, and toys, and blood transfusion bags contain plastics. One of the main components of plastics are phthalate plasticizers, which can leach from the plastic polymer matrix, contaminating their surrounding environment. Humans are exposed to phthalates by ingestion, inhalation, or direct contact through the skin. One of the most abundantly produced phthalates is di-2(ethyl-hexyl) phthalate (DEHP). Rodent studies have shown that exposure to DEHP can cause abnormal male germ cell development, including low sperm counts, disorganization of testicular germ cells, and cryptorchidism. Furthermore, cell culture studies have shown that DEHP antagonizes retinoic acid signaling, which is critical for sperm development, through the inhibition of retinoic acid receptor (RAR) transcriptional activity. RARs form heterodimers with retinoid x receptors (RXRs) and the RAR/RXR complex can bind retinoic acid response elements (RARE) and regulate target genes. DEHP is known to activate peroxisome proliferator activated receptors (PPARs). Interestingly PPARs can dimerize with RXRs to activate PPAR pathways, taking away RXR, thus inhibiting the formation of RAR/RXR complex. We used a transgenic *RARE-hsp68/lacz* mouse model to test the hypothesis that DEHP inhibits RAR activity through activation of PPARs. The *RARE-hsp68/lacz* mouse model allows the measurement of β-galactosidase reporter, which is equivalent to RAR activity. *RARE-hsp68/lacz* mouse pups were exposed to DEHP through maternal milk at various treatment windows. Results showed that RAR activity was significantly decreased after exposure to DEHP. To demonstrate that DEHP induced a decrease of RAR activity through activation PPARs, WY-14643, a PPAR alpha agonist, was used. WY treatment of testicular organ cultures significantly decreased RAR activity, similar to that observed in DEHP exposed animals. To prove that PPAR alpha was responsible for inhibiting RAR activity, *Ppara* siRNA transfections to inhibit PPARA function, followed by WY treatment of testis organ cultures were performed. The organ cultures showed an increase in RAR activity. Our results suggest that DEHP can inhibit retinoic acid signaling through inhibition of RAR activity and that the inhibition of RAR is mediated by PPAR alpha.

Presentation Number **117**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Saturated Absorption Spectroscopy and Calibration of a Magneto-Optical Trap for Rubidium-87** | | |
| **Presenter:** | Justin Niedermeyer | | |
| **Mentor:** | Peter Engels | **Campus:** | Pullman |
| **Co-Authors:** | Peter Engels | | |
| **Major** | Physics, Music, German for the Professions – CAS, Honors | | |
| **Category:** | Engineering and Physical Sciences | | |

The study of ultracold atomic systems, such as Bose-Einstein condensates and degenerate Fermi gases, requires a complex experimental setup which exploits atomic phenomena. By studying these systems, we can develop a profound understanding of fundamental quantum mechanics. Such studies provide new insights into superfluidity and may lead to important applications such as lossless electric transmission, quantum computation, and advanced medical imaging. Optical and magnetic fields which interact with atomic energy levels are an important part of the setup. The fields are used to cool the atoms to temperatures in the nanokelvin regime where quantum mechanical effects become dominant. This requires precise control over the interacting optical and magnetics field. Our apparatus employs a saturated absorption spectroscopy scheme to lock narrow-linewidth external cavity diode lasers to frequencies necessary to drive atomic transitions and begin the cooling process. The lasers, together with a suitable magnetic field, create a magneto-optical trap, which is a crucial step in preparing an ultracold system.
This report discusses the implementation of the saturation absorption spectroscopy scheme and the calibration of a magneto-optical trap for $^{87}$Rb. The theoretical background of the system will be presented, as well as an overview of the relevant optical and magnetic components. The methods employed to calibrate and optimize a magneto-optical trap will be discussed, including lasing thresholds and the magnetic recapture of cold atoms. Finally, the magneto-optical trap is characterized by the number of trapped atoms and the diameter of the atomic cloud.

Presentation Number **118**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Detrimental Effects of Negative Moods on Cognition** | | |
| **Presenter:** | Beau Edwards | | |
| **Mentor:** | Paul Whitney, John Hinson | **Campus:** | Pullman |
| **Co-Authors:** | Amy Nusbaum, Paul Whitney, John Hinson | | |
| **Major** | Psychology - CAS | | |
| **Category:** | Social Sciences | | |

Cognitive flexibility is the ability to switch mental processes in response to a change in the environment. Better cognitive flexibility allows an individual to more quickly adjust to changing circumstances, effectively confront new challenges, and apply information to achieve desired outcomes. Past studies have found that positive mood has a beneficial effect on this ability to adapt and change one's way of thinking. However, there has been little research comparing the effects of positive and negative mood on cognitive flexibility. Research has focused on positive moodstates and their effects on cognition, but negative moods have been largely ignored in the literature. The current study used a novel task to determine the effects of positive and negative moods on cognitive flexibility. Participants underwent a standardized mood induction and then completed a cognitive flexibility task. The task involved responding to either a smiling or frowning emoticon in different ways. Prior to responding, participants are presented with cues (hints) that either guide them towards or away from the correct response. The results showed that those who had been induced with a negative mood were less able to switch their thinking in response to performance feedback than those in either the positive or neutral state. This suggests that negative moods affect our ability to effectively deal with changing situations, can hinder our adaptation to these situations, and prevent us from finding solutions to problems.

Presentation Number **119**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Spicy Compounds and the Electronic Tongue** | | |
| **Presenter:** | Victoria Minette | | |
| **Mentor:** | Carolyn F. Ross | **Campus:** | Pullman |
| **Co-Authors:** | Charles Diako and Carolyn F. Ross | | |
| **Major** | Food Science - CAHNRS | | |
| **Category:** | Applied Sciences | | |

The electronic tongue (e-tongue) is a novel instrument equipped with sensors to detect non-volatile taste compounds and can complement traditional sensory evaluation techniques, thus overcoming associated limitations of human testing, including variability. The e-tongue has displayed promising results regarding the detection of different compounds that are below the human threshold range. Of particular interest are compounds that are highly fatiguing to sensory panelists, including spicy compounds. If the electronic tongue is capable of detecting different concentrations of various spicy compounds, it would be beneficial for product testing. The present study sought to determine the influence of type and concentration of seven spicy compounds on the response of the e-tongue. To test the response of the e-tongue, spicy tastant solutions were created to test discrimination among concentration levels. The concentrations of each sample used in testing were selected based on the known threshold value of the particular compound, along with concentrations that were higher and lower than this threshold value. The different compounds that were tested were capsaicin [chili pepper], zingerone [ginger], p-cymene [cumin], thymol [thyme], eugenol [clove], piperine [black pepper], and menthone [mint]. Results showed that the e-tongue displayed a discrimination index of 90%, indicating that the instrument was capable of highly distinguishing among these samples. The umami sensor was strongly associated with the thymol and eugenol compounds, while the spicy sensor was strongly associated with the zingerone and piperine. Each individual compound was compared at each concentration, for capsaicin, p-cymene, piperine, menthone and eugenol, the discrimination index was above 85%. This implies that the electronic tongue could differentiate among the concentrations with high accuracy. However, zingerone, and thymol had a discrimination index of 79 and 61 respectively suggesting that for these compounds, the e-tongue has a limited ability to differentiate among the different concentrations because of the similarity between the sensors readings. No studies have examined the different spicy compounds at varying concentrations, and the associated response of the e-tongue. This research will ultimately allow more accurate predictions of spicy levels in a product, as well as indicating the increased sensitivity of the e-tongue compared to a human palate.

Presentation Number **120**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **What can we Learn from the Sexual Behavior in Cattle? Assessment of Sexual Behavior, Ovarian Physiology, and Fertility in Beef Cattle.** | | |
| **Presenter:** | Jeremy Hemmer | | |
| **Mentor:** | Dr. Martin Maquivar | **Campus:** | Pullman |
| **Co-Authors:** | Morrow V., Chalcraft Z., Tendler T., Cherzan N., Parish S., and Maquivar M. | | |
| **Major** | Animal Sciences - CAHNRS | | |
| **Category:** | Organismal, Population, Ecological, and Evolutionary Biology | | |

Estrus synchronization protocols that facilitate fixed time artificial insemination (FTAI) in beef cattle have resulted in variable pregnancy rates. This variability has been attributed to different factors such as expression of sexual behavior, intensity and ovarian dynamics. The objective of the present study was to determine the effect of sexual behavior of bovine females under a hormonal synchronization treatment and fertility. A total of 98 females (27 heifers & 71 mature cows) were synchronized using a hormonal program (5 day CO-Synch + CIDR) to assess the sexual behavior length, intensity and fertility followed by FTAI. An animal in estrus was defined as having at least three sexual interactions within 2 hours, sexual behaviors (attempts to mount, mounts, exploration of external genitalia, butting, sniffing, and flehmen) were classified as active (behavior that an animal initiated and performed on another individual) and passive (behavior that an animal received from another individual). Behavior was assessed by visual observation for 72 hours after the culmination of the hormone therapy. Results were analyzed by ANOVA using a 2 x 2 factorial arrangements (Pregnancy status, confirmed after 60 days post FTAI and type of animal, mature cows or heifers). Overall, 77% (75/98) of the animals showed estrus and the pregnancy rate was 71% (53/75). Cows showed estrus 70% (50/71) and 68% (36/50) resulted pregnant whereas 92.5% (25/27) of the heifers showed sexual behaviors and 68% (17/25) become pregnant. Heifers exhibited longer ($P<0.01$) estrus (passive =7.5 hours or active=7.7 hours) compared to cows (active= 4.1 hours or passive =4.6 hours). The sexual behavior intensity (measured by the number of sexual interactions received and performed) showed that heifers performed more ($P<0.01$) active sexual behavior (95.4 activities/animal) and passive (54.8 activities/animal) compared to cows active sexual behavior (25.4 activities/animal) and passive (21.5 activities/animal). Additionally, cows performed and received a lesser ($P<0.01$) amount of mounts (either passive or active) compared to heifers. In conclusion expression of sexual behavior and detection of these activities is important to achieving higher pregnancy rates.

Presentation Number **121**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Pioneer Interpretations: Gendered, Religious, and Cultural Experiences of the American West** | | |
| **Presenter:** | Kevin Schilling | | |
| **Mentor:** | Jennifer Thigpen | **Campus:** | Pullman |
| **Major** | History - CAS | | |
| **Category:** | Humanities | | |

During this academic year, I have worked with Professor Jennifer Thigpen to analyze and interpret the letters of Elkannah and Mary Walker, two pioneering missionaries who traveled to the Pacific Northwest in the 1830s. The Walkers—contemporaries of Marcus and Narcissa Whitman, Henry and Eliza Spalding, and Cushing and Myra Eells—were deployed by the American Board of Commissioners for Foreign Missions (ABCFM). Along with Eells, they established the Tshimakin Mission near present-day Spokane. Their letters provide an interesting and necessary point of analysis for historians and the public to understand what life was like in what ultimately became the American West.

Gender, religion, and cultural exchange are the main themes that I examine in my project. Specifically, I explore the ways in which the Walkers reported their experiences to family, friends, and members of the ABCFM. The project is important and original in two ways: first, the Walkers, have been understudied by historians. My research aims to correct this oversight by showing that though they are lesser-known missionary pioneers, their successes and failures are important for our historical understanding of how the west developed. Second, an analysis of their letters and diaries will illuminate the role that gender, religion, and culture played in determining how men and women experienced life in the West.

My research makes extensive use of the Walker collection housed at WSU's Manuscripts, Archives, and Special Collections. Additionally, my research is directly related to current work of my faculty sponsor, Dr. Thigpen, who is working on a monograph that examines the interactions and experiences of different actors in the 1830's-1840, and more specifically argues that missionaries in the U.S. West acted as global players, deeply engaged in the work of American expansion. My work directly supports the focus of hers. Within our mentor/mentee relationship, Dr. Thigpen provides expert guidance working with me to produce an original historical research project. WSU will benefit from the success of this research due to the importance of studying underappreciated historical actors, and the relevance of it to the Pacific Northwest and the nation as a whole. Through supporting this work, WSU is fulfilling its mission as a land grant institution.

Presentation Number **122**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Re-Purposing an Anticancer Drug to Combat Herpes Simplex Virus Infection** | | |
| **Presenter:** | Seth Schneider | | |
| **Mentor:** | Anthony Nicola | **Campus:** | Pullman |
| **Co-Authors:** | Suzanne M. Pritchard, Darin J. Weed, and Anthony V. Nicola | | |
| **Major** | Genetics and Cell Biology – CVM, Honors | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

Herpes simplex virus (HSV) infections, while sometimes painful, can be managed with available antiviral drugs. The acyclovir family of drugs, for example, inhibits the herpes viral DNA polymerase and thus halts virus replication. New HSV strains resistant to acyclovir can emerge, particularly in immunocompromised individuals. Thus, there is a clear need for novel anti-HSV therapeutics. HSV enters a new host cell by hijacking the cell's own proteasome, a structure normally used by the cell to break down proteins no longer needed. The entering HSV particle utilizes the proteasome to transport itself inside the cell. Therefore, an effective antiviral compound might target the proteasome for inhibition, rendering HSV unable to enter the cell at all. Antiviral drugs that target viral proteins are more likely to select for drug-resistant viral mutants. In contrast, a drug targeting a host cell factor such as the proteasome is not constrained by these limitations. The FDA-approved compound bortezomib is a proteasome inhibitor used to treat certain blood cell cancers. This study aims to re-purpose bortezomib as an off-the-shelf therapeutic for HSV. Bortezomib blocked infection by both wild type HSV-1 and HSV-2 and acyclovir-resistant HSV strains in a dose-dependent manner. Inhibition was detected at bortezomib concentrations that were not toxic to the cells. The bortezomib concentration that results in 50% cytotoxicity divided by the concentration that reduces HSV infection by 50% will yield the selectivity index. This index will indicate the potential usefulness of bortezomib as an antiviral drug against both HSV and drug-resistant HSV.

Presentation Number **123**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Relationship between Cow Lying Behavior and Free-Stall Barn Design** | | |
| **Presenter:** | Jennifer Callanan | | |
| **Mentor:** | Dr. A. L. Adams Progar | **Campus:** | Pullman |
| **Co-Authors:** | A. L. Adams-Progar; H. A. Young | | |
| **Major** | Animal Sciences - CAHNRS | | |
| **Category:** | Organismal, Population, Ecological, and Evolutionary Biology | | |

There is concern that barn design may cause under-utilization of isolated free-stalls and lead to overcrowding and decreased dairy cow well-being. The objective of this study was to observe and describe cow utilization of isolated stalls in a free-stall barn. Two pens of Holstein cows (Pen A = 60 cows and Pen B = 36 cows), with stocking densities of 61% and 91%, respectively, were selected for observations because they were designed to include one row of free-stalls (isolated stalls = IS) that faced a concrete wall rather than other cows. Cows were randomly assigned a study number and identified with fluorescent animal marking paint. Cow attendance in the IS was observed via two time-lapse cameras mounted on the ceilings of each pen. Time-lapse images were captured at 20-s intervals over the course of seven days for each of two trials. The scan sampling method was implemented at one-hour intervals to record the number of cows within the IS, cow study numbers, and cow behavior (standing, perching, or lying). Correlations and t-tests were applied to analyze the data. Cows in pen B stood more often in the IS than cows in pen A; however, no differences were detected in the percentage of cows perching or lying in the IS. Cows were observed utilizing the IS only 58% of the total observed time, with at most 33% of cows utilizing the IS during any given time period. Surprisingly, older cows in Pen A, but not Pen B, spent significantly more time lying than younger cows, and younger cows in both pens spent more time perching than older cows. These results indicate that the IS in this study were utilized by some cows in both pens; however, the behavior of the cows in each pen differed as cows housed in a higher stocking density stood more than cows housed in a lower stocking density. In conclusion, the IS were used in both pens during all trials, indicating that barn designs containing isolated stalls may not lead to the under-utilization of free-stalls and some cows may have a preference for the IS.

Presentation Number **124**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Hydrogen Sorption of Nanosprings** | | |
| **Presenter:** | Amanda Bye | | |
| **Mentor:** | Ian Richardson | **Campus:** | Pullman |
| **Co-Authors:** | Ian Richardson | | |
| **Major** | Mechanical Engineering - CEA | | |
| **Category:** | Engineering and Physical Sciences | | |

Hydrogen is on the forefront in a world moving towards clean, renewable energy. Liquid hydrogen is energy intensive to transport and gaseous hydrogen is not dense enough to economically ship. With these challenges forcing high transportation costs, hydrogen is held back from becoming a practical energy source. Nanosprings have the ability to store gaseous hydrogen, making it dense enough to move efficiently, thus significantly reducing the cost of transportation. These experiments were meant to test the storage ability of four types of nanosprings under a range of pressures. Seven weight points were tested, with and without hydrogen, from vacuum to 80 bar. The pre-hydrogen and post-hydrogen weights were compared to find how much hydrogen each nanospring sample absorbed and retained under each pressure. Upon initial inspection there is retained hydrogen throughout the pressure range, increasingly so when the test is returned to vacuum. The preliminary calculations show the high potential of nanosprings as an energy efficient method of hydrogen transportation, making it a viable means of providing renewable energy.

Presentation Number **125**

# ABSTRACT:

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|---|---|---|---|
| **Abstract Title:** | **Retinoic Acid Receptor Alpha in Male Germ Cells Causes Junction Instability in the TestisTubule** | | |
| **Presenter:** | Ciera Sitton | | |
| **Mentor:** | Kwan Hee Kim | **Campus:** | Pullman |
| **Co-Authors:** | Natalie Peer, Kwanhee Kim | | |
| **Major** | Genetics and Cell Biology - CVM | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

Retinoic acid, or vitamin A, is vital in the reproductive system of male mice. Of the six retinoic acid receptors, our studies focus on retinoic acid receptor alpha (RARA). To study its role within male germ cells, *Rara* gene has been mutated specifically in germ cells, with mice generated referred to as *Rara* cKO (germ cell-specific conditional knockout) mice.

*Rara* cKO mice show ~50% decrease in sperm counts as well as disorganization of germ cells in testis tubules (seminiferous tubules). One phenotype seen in cKO mice is the sloughing of germ cells into the lumen of seminiferous tubules, an abnormality that occurs when germ cells lose attachment with each other and surrounding somatic Sertoli cells. Some of the tubules show clumps of cells in the lumen, while others show germ cells located abnormally throughout the tubule. Quantifying the number of sloughing tubules showed a significantly higher incidence of sloughing in testes of cKO animals compared to wild type (WT) controls, consistent with a 50% decrease in sperm counts. Together with our earlier findings of no significant change in the mitotic or apoptotic rates between cKO and WT germ cells, the results here indicate that the germ cell loss is primarily by cell sloughing.

To further analyze the cause of germ cell sloughing, we tested the hypothesis that RARA in germ cells is involved in cell junction stability. We performed a biotin assay in *Rara* cKO mice to assess their cell junction integrity. When biotin is injected into the interstitial space of the testis with cell junctions intact, biotin is restricted to the interstitial space. If cell junctions are perturbed, biotin passes into the lumen of seminiferous tubules. Quantifying the number of tubules with biotin signal in the lumen revealed a significant increase in cKO compared to WT control animals. These results indicate that junctions are perturbed in cKO animals. Together, the sloughing tubule counts and biotin assay data suggest that RARA in germ cells contributes to normal junction dynamics in seminiferous tubules, which is important for germ cell attachment and germ cell organization in the testis of male mice.

Presentation Number **126**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **NMR Investigation Into the Influence of Phase Transfer Catalyst Aggregation on Brust-Schiffrin Nanoparticle Final Size** | | |
| **Presenter:** | Daniel Mortensen | | |
| **Mentor:** | Steven R. Saunders | **Campus:** | Pullman |
| **Co-Authors:** | Trent R. Graham, Steven R. Saunders | | |
| **Major** | Chemical Engineering - CEA | | |
| **Category:** | Engineering and Physical Sciences | | |


Nanoparticles exhibit size-dependent properties. However, the ability to synthesize populations of gold nanoparticles that are a single size remains technologically challenging. The Brust-Schiffrin synthesis method is a procedure for synthesizing gold nanoparticles at room temperature and atmospheric conditions. The first step of the Brust-Schiffrin synthesis is phase transferring an aqueous metallic salt to the organic phase with tetraoctylammonium bromide (TOA-Br), a quaternary ammonium phase transfer catalyst. Currently, there is a debate regarding the morphology of the TOA-Br following the transport of gold ions into the organic phase. The mechanism is either (1) the formation of reverse micelles or (2) the phase transfer catalyst forming ion-ion aggregates.

We utilized quantitative $^{1}H$ Nuclear Magnetic Resonance Spectroscopy and Diffusion Oriented Nuclear Magnetic Resonance Spectroscopy (DOSY-NMR) to determine whether the phase transfer results in the formation of reverse micelles or ion-ion aggregates. DOSY-NMR uses a spatially dependent magnetic pulse to quantify the diffusion of molecules. Our results indicated that water hydrates the halide anions ionically bound to the quaternary ammonium, and that there is not enough water to form a reverse micelle. The extent of ion hydration in the organic phase was inversely related to the size of the quaternary ammonium salt anion. DOSY-NMR results were consistent with the formation of small aggregates. When the quaternary ammonium salt is bound to large halides, the ammonium salt aggregated more than when bound to smaller halides. In addition, we found that the phase transfer of the bromoaurate anion resulted in larger aggregates than the smaller chloroaurate anion. Syntheses comparing the size of nanoparticles produced with bromoauric or chloroauric acid revealed that the increase in aggregation exhibited by the phase transfer of bromoaurate anions correlated with larger nanoparticle sizes.

Our work indicates that the morphology of the tetraoctylammonium species involves ion-ion aggregates without an aqueous core and that the extent of aggregation influences the size of the produced nanoparticles. This research improves our understanding of the Brust-Schiffrin synthesis and moves towards improving syntheses of monodisperse nanoparticles. The production of monodisperse populations of gold nanoparticles will enable further investigation into the size-dependent properties of nanoparticles.

Presentation Number **127**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Quantifying Whole Vineyard Water Use Efficiency with the Eddy Covariance Technique** | | |
| **Presenter:** | Randy Bartoshevich | | |
| **Mentor:** | Shelley Pressley | **Campus:** | Tri-Cities |
| **Co-Authors:** | Jinshu Chi, Shelley Pressley, Heping Liu, Brian Lamb, Patrick Oâ€™Keeffe, Pete Jacoby, Sayed-Hossein Sadeghi | | |
| **Major** | Environmental Science, Music/Yoga Instruction | | |
| **Category:** | Applied Sciences | | |

Water availability has been identified as the most probable limiting factor for the growth of the wine grape industry in Washington. More variable weather patterns have potential to increase uncertainty in the seasonal water supply that undergirds this rapidly growing industry. Employing methods to increase vineyard water use efficiency (WUE) is one of the key management strategies by which grape growers can cope with water related issues to ensure sustainable annual production during climatic variation. WUE is defined as the ratio of Net Ecosystem Exchange (NEE), which is the exchange of carbon dioxide ($CO_2$) between the biosphere and the atmosphere, and Evapotranspiration (ET), or the water use. In spring of 2015, our research team sited an Eddy Covariance flux station within the Ciel du Cheval vineyard in the Red Mountain AVA near Benton City. This vineyard is using state-of-the-art technologies to schedule time and amount of irrigation delivery. The EC flux station is used to measure the exchange or flux of water, $CO_2$, and energy associated with grape production on a whole vineyard level. Currently, flux measurements are being collected to measure NEE and ET, and the EC tower is equipped with instruments capable of measuring meteorological quantities (e.g., air temperature, relative humidity, rainfall, wind direction and wind speed). Preliminary results from this study show NEE tends to increase in magnitude (become more negative) as VPD levels increase until it seemingly hits a threshold at roughly 2.5 kPa where NEE begins to decrease (become less negative) as a result of a water stress state. Results also suggest that NEE is the primary driving factor for WUE as low measurements of WUE correspond to low spikes in NEE. The eddy covariance technique employed over vineyards with and without similar watering strategies as Ciel du Cheval, would provide much needed data in this area of research to strengthen the understanding of WUE and vineyards' response to environmental factors and irrigation. This understanding could be useful in advising growers on when to water to achieve the highest (most negative) WUE.

Presentation Number **128**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Phenotypic and Genetic Characterization of Bacterial Species Isolated from Bighorn Sheep, Domestic Sheep, and Cattle** | | |
| **Presenter:** | Christine Nishimoto | | |
| **Mentor:** | Thomas Besser | **Campus:** | Pullman |
| **Co-Authors:** | Thomas Besser, Charlene Teitzel, Dubraska Diaz-Campos | | |
| **Major** | Microbiology, Pre-Veterinary - CVM | | |
| **Category:** | Organismal, Population, Ecological, and Evolutionary Biology | | |

Epidemic pneumonia has been identified as a major obstacle in the recovery of Bighorn sheep (Ovis Canadensis) populations in western North America, and this disease has been associated with infections with bacteria of the family *Pasteurellaceae* bacteria, especially *Mannheimia haemolytica*. However, it has recently been recognized that bacteria isolated from pneumonic bighorn sheep lungs and identified as '*M. haemolytica*' by conventional bacteriology often have small ribosomal subunit (16S) DNA sequences indicating that they were actually other *Mannheimia* spp., most frequently identified as *M. glucosida* or *M. ruminalis*. This project was designed to determine the ability of MALDI-TOF instrumentation, to accurately discriminate *Mannheimia* spp. isolated from the respiratory tracts of bighorn sheep, domestic sheep, and cattle. To achieve this goal, we randomly selected 90 *M. haemolytica* isolates banked by the Washington Animal Disease Diagnostic Laboratory (WADDL) between 200 and 2015; targeting 30 isolates from bighorn sheep, domestic sheep and domestic cattle.

Initially, all isolates were analyzed using the bacteriologic database provided with the MALDI-TOF instrument manufacturer. The results of that analysis were largely consistent with the WADDL presumptive identifications where 81 isolates (90%) were identified as *M. haemolytica*, and 6 additional isolates (6.7%) were identified as *Mannheimia* sp., with *M. haemolytica* as the closest match in the database. Then, when re-analyzed against the supplemented database, we found different distributions of *Mannheimia* sp. identification in the domestic sheep and bighorn sheep study isolates.

To confirm our finding from the MALDI-TOF identifications using the supplemented database; we also randomly selected ten strains each identified by supplemented MALDI-TOF instrument as *M. haemolytica*, *M. glucosida*, and *M. ruminalis*, for molecular identification based on small ribosomal subunit (16S) and RNA polymerase B (rpoB) DNA sequences homology to GenBank, and conducted phylogenetic analyses using MrBayes software.

We concluded that MALD-TOF based identification of *Mannheimia* sp. found in the respiratory tracts of bighorn sheep, domestic sheep, and cattle was more accurate than conventional bacteriologic techniques, provided the supplemented database was used. However, some of the *Mannheimia* sp. isolates represented novel, currently undescribed species.

Presentation Number **129**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **'Black and White, Unite and Fight!' Kaiser Metals Corporation and the 1946 Oakland General Strike** | | |
| **Presenter:** | Alistair Fortson | | |
| **Mentor:** | Dr. Lydia Gerber | **Campus:** | Pullman |
| **Co-Authors:** | None | | |
| **Major** | History, Minors in Anthropology and Political Science - CAS | | |
| **Category:** | Humanities | | |

During World War II, crews worked at a frantic pace 24 hours a day and seven days a week in the shipbuilding quays of the Kaiser Permanente Corporation in Richmond, California. Integrated by gender, class, and race, the yards presented conditions totally unique in all wartime industry. Kaiser Group Health, the first healthcare plan of its kind anywhere, kept workers healthy and happy to produce ships. Communal housing projects, although beset by racial segregation, provided acres of cheap housing. New miniaturized tools and specialized equipment allowed every build, body type, and gender to be fully represented. These shipyards, to the utter amazement of onlookers, were marked by continuous examples of cooperative race and class relations. Yet despite this, in early December 1946 a massive general strike paralyzed the Bay Area; uniting under the rallying cry “Black and White, Unite and Fight”, workers of all races and economic backgrounds rallied to Oakland. Many papers discuss the shipyards and the strikes that followed; however the connection between the workers, the American Federation of Labor (AFL) bosses in Richmond, and that paralyzing strike has not yet been examined through qualitative analysis. This entails an examination of the realities of life which escape numerical graphs; detailed minority scholarship and a commemoration book given to the released employees of the Permanente Metals Corporation help unravel the complex web of the Bay Area. Newspaper articles from the Washington State University Archives, as well as personal communications of top Kaiser Industries personnel and detailed AFL union records discovered during original research in the UC Berkeley Bancroft Library Archives during the summer of 2015 further illustrate the strong personality and industrial organization which made this incredible cooperation and strike possible. Unique even to this day, this gender equality, class integration, and racial desegregation in leadership forced by wartime emergency conditions remains a shining example for future workplace integration.

Presentation Number **130**

# ABSTRACT:

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|---|---|---|---|
| **Abstract Title:** | **Metabolomic Investigation of Phragmites australis ("Phragmites australis" is italicized)** | | |
| **Presenter:** | Jack Botkins | | |
| **Mentor:** | David R. Gang | **Campus:** | Pullman |
| **Co-Authors:** | Rebecca Weed and David R. Gang | | |
| **Major** | Biochemistry - CVM | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

The threat of invasive species is a globally growing phenomenon as trade and commerce become more intertwined over longer distances. Invasive plant species are distressing both to biodiversity and the economy (an estimated $120 billion is spent annually combating invasive plant species in the United States alone). *Phragmites australis* (Common Reed) is an especially robust species of wetland grass that migrated from Europe to the United States via ship in the late 18$^{th}$ to 19$^{th}$ century. After this period of rapid transatlantic migration, *P. australis* began choking out wetland fauna in the Northeast at an unprecedented rate. The plant eventually made its way across the country to the Pacific Northwest where it continues to stifle biodiversity in wetland ecosystems. In order to investigate its mechanism of invasion, root and rhizome tissues of many *P. australi* were sampled at many sites across the United States. These tissues were subjected to various liquid-liquid extractions designed to separate metabolites with specific properties. The extraction mixture was then analyzed using liquid chromatography-mass spectroscopy to gather a complete metabolic profile of the plant. The metabolic profiles of native and invasive species were then compared to identify any differences that could elucidate *P. australis'* mechanism of invasion.

Presentation Number **131**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Gambling with Grafting: Doâ€™s and Donâ€™ts during Top-Grafting** | | |
| **Presenter:** | Melinda Garza, Daniel Hottell, Carina Ocampo | | |
| **Mentor:** | Naidu Rayapati | **Campus:** | Tri-Cities |
| **Co-Authors:** | Daniel Hottell, Carina Ocampo, Naidu Rayapati (Mentor) | | |
| **Major** | Garza: Viticulture and Enology - CAHNRS, Hottel: Viticulture and Enology – CAHNRS, Ocampo: Viticulture and Enology - CAHNRS | | |
| **Category:** | Organismal, Population, Ecological, and Evolutionary Biology | | |

The Washington's grape and wine industry is striving to maintain world-wide reputation as a premium wine producing region in the US. With expanding acreage and shifting wine market priorities to red grape varieties, many growers are adopting top-grafting as a strategy to quickly replace non-preferred white grape varieties with a preferred red grape varieties. This strategy might help a grower avoid costs associated with removal of the existing vineyard block and replanting with new planting stock. However, growers should be aware of the risk of virus spread via cuttings used for top-grafting or from infected rootstock to newly grafted healthy scion. From June to mid-September 2015, we monitored a Riesling block top-grafted with cuttings from a Syrah block. We observed virus-like symptoms in several vines across the entire vineyard block. Testing symptomatic vines by PCR indicated the presence of Grapevine red blotch-associated virus (GRBaV). We selected ten symptomatic vines (positive for GRBaV) and an equal number of non-symptomatic vines (negative for GRBaV) to compare fruit yield and quality attributes. The results indicated nearly 35% reduction in fruit yield, 10% reduction in sugars and 42% reduction in anthocyanins per berry weight due to virus infections. These results, although from a single season, suggest negative impacts of virus diseases in top-grafted vineyards. Thus, growers should pay attention to the sanitary status of cuttings used for top-grafting in existing vineyards. Conversely, a virus present in rootstock can spread into the virus-free scion cutting used for top-grafting. Thus, it is important for growers to make sure that both the rootstock and scion are tested virus-free to maintain healthy vineyards. Some do's and don'ts will be presented to help growers avoid the risk of virus spread during top-grafting and maintain healthy vineyards.

Presentation Number **132**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Investigation of the Mycoplasma ovipneumoniae p113 Gene as a Potential Virulence Predictor of Pneumonia Outbreaks in Bighorn Sheep** | | |
| **Presenter:** | Logan Weyand | | |
| **Mentor:** | Tom Besser | **Campus:** | Pullman |
| **Co-Authors:** | Tom Besser, Frances Cassirer | | |
| **Major** | Wildlife Ecology – CAHNRS, Honors | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

When developing solutions for complex and persistent wildlife diseases it is important to understand the virulence mechanisms of causal pathogens. In the case of bighorn sheep (*Ovis canadensis)* pneumonia, there is strong evidence that *Mycoplasma ovipneumoniae* (Movi) is the causal agent, but there is incomplete knowledge about Movi virulence factor(s). One proposed Movi virulence factor is P113, a candidate adhesin (a molecule involved in the binding of a bacterium to the host cilia) encoded by the *p113* gene. In our study we tested the hypothesis that the Movi *p113* DNA sequence is associated with virulence, as reflected in the severity of pneumonia outbreaks in bighorn sheep populations. This hypothesis predicts: a) that *p113* sequences should reflect increased selection (dN/dS ratio) relative to housekeeping genes due to its role in virulence, b) that *p113* and 'housekeeping' genes may exhibit discordant relationships as a result of that selection and c) that therefore outbreak population mortality rates may be associated with clustering of either *p113* or housekeeping gene sequences. To test our hypothesis we performed a phylogenetic analysis on forty Movi strains isolated from forty pneumonia outbreaks that occurred in bighorn herds in western North America between 1995 and 2015. We amplified and sequenced a 285 bp segment of *p113* for each strain, and obtained the DNA sequences of two housekeeping genes *rpoB* (562 bp) and *gyrB* (400 bp) for the same strains from a pre-existing database. Using these sequences, we constructed phylogenetic trees for *p113*, *rpoB*, and *gyrB* using maximal parsimony and Bayesian approaches. Our data indicate that a) *p113* exhibits higher dN/dS than housekeeping genes, showing greater selection effects, b) *p113* topology exhibits different clustering than the housekeeping genes, consistent with different selection, and c) that neither the *p113* nor the housekeeping sequence clusters are significantly associated with outbreak severity.

Presentation Number **133**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Mass Production of Ibuprofen-Loaded Soy Protein Nanoparticles by Rapid Desolvation Technology** | | |
| **Presenter:** | Allison Osmanson | | |
| **Mentor:** | Lei Li | **Campus:** | Pullman |
| **Co-Authors:** | Yu-Chung Chang, Li-Ju Wang, Lei Li | | |
| **Major** | Materials Science and Engineering - CEA | | |
| **Category:** | Engineering and Physical Sciences | | |

Soy Protein (SP) Nanoparticles have recently gained considerable interest due to their potential applications as an alternative in nano-carriers in drug, gene, nutrient and nutraceutical delivery compared to existing coatings. These applications are due in part because of SP Nanoparticles' biocompatibility, biodegradability with low toxicity, and the abundant protein resources in the world. This work is among the first to use soy protein isolate (SPI) to develop nanoparticles and further applications are proven to use SPI to encapsulate ibuprofen. Desolvation is the most common method used to prepare protein nanoparticles and is primarily based on the differing solubility of the protein in various solvents, thus leading to phase separation. A sustainable and scalable process is necessary for large scale soy protein nanoparticle production. Controlling the size of SPI nanoparticles in various drug and food applications is crucial for improving bioavailability and lowering toxicity as well. Therefore, a robust size control of protein nanoparticles at high-yield rate is important to ensure the product's quality.

A scalable "rapid desolvation technology" (RDT) is presented for preparing SP nanoparticles at high-yield rates. The device used in this method is referred to as a multi-inlet vortex mixer (MIVM). In RDT, three high-speed streams of a desolvating agent (ethanol) fast impinged to a stream of soy protein suspension. Ibuprofen was dissolved in one of the desolvating agent streams. While the four streams rapidly mix together inside the MIVM, the sharp change of solvent polarity induces the self-assembly of SP nanoparticles encapsulating the ibuprofen molecules. In this study, the effect of the preparation parameters on particle size and stability was investigated to further understand how efficient this method is to encapsulate ibuprofen in SP particles by using varying flow rates, ibuprofen concentration with a fixed SPI concentration, cross link concentration, and desolvating agent ratios. The results were promising and can be optimized by further studies according to pharmacokinetics and on-demand drug control and release in the human body. Results show soy protein's feasibility as a potential nanocapsule for drug delivery and its capability of effective mass production of encapsulated medication by this low-cost and scalable RDT.

Presentation Number **135**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Semi-Automated Linguistic Transcription of Daylong Audio Files** | | |
| **Presenter:** | Haille Heid | | |
| **Mentor:** | Mark VanDam, PhD | **Campus:** | Spokane |
| **Co-Authors:** | Mark VanDam, PhD | | |
| **Major** | Speech and Hearing Sciences - CMS | | |
| **Category:** | Social Sciences | | |

This work describes the use of automatic speech processing coupled with human transcription to produce a very large dataset of child and family speech. This hybrid approach uses modern technology to collect larger and more useful datasets to study cognitive and language development in both child population that are both typically developing and at-risk.

Children acquire language by exposure. In order to better understand the effects of exposure, it is important to study the amount and types of language in natural family environments. Recently, there have been advances in technology that allow us to better study natural language development via daylong family audio recordings.

For this study, we used the LENA child-worn audio recording system (LENA Research Foundation, Boulder, CO), a small recording device that fits into a pocket on the front of specialized shirt. The LENA device records uninterrupted daylong audio from the child's auditory perspective. The audio is uploaded to a computer and LENA software processes the audio using automatic speech processing algorithms to identify linguistically important segments in the child's auditory environment. Segments include estimates of total TV/electronic media time, number of words spoken by the child, number of words adults (both males and females) utter, number of conversational exchanges the child engages in, and other categories such as periods of silence or noise. There are two principal advantages to the system. First, the technology automates data collection, reducing the labor and financial expense by orders of magnitude. Second, the data is highly natural, collected in the home environments of families.

This research project takes as input the audio files and machine-generated tagging from several daylong recordings that were automatically processed by the LENA system. That input is subsequently analyzed by trained human transcribers to augment the automatic processing, producing linguistic transcriptions of the audio files suitable for further analyses. The goal of this work is to demonstrate that a combination of machine-automated processes and human judgements can be combined to amass vastly more linguistic data than was previously available, while also maintaining naturalness at a reasonable cost.

Presentation Number **136**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Optimal Virulence Strategies of Whooping Cough** | | |
| **Presenter:** | K Rebecca Mitchell | | |
| **Mentor:** | Sergey Lapin | **Campus:** | Pullman |
| **Co-Authors:** | Sergey Lapin | | |
| **Major** | Microbiology, Geology, CAS, CVM, Honors | | |
| **Category:** | Computer Science, Mathematics, Statistics, and Information Sciences | | |

The incidence of whooping cough, caused by the bacterium *Bordetella pertussis*, is currently on the rise. In 2012, the United States saw the highest levels of incidence since 1955, shortly after the introduction of the vaccine in the 1940s. Current research shows that the bacteria may have evolved to evade vaccine-derived immunity. These new strains lack pertactin, a cell-surface protein of the bacteria that is a main component of the vaccine. The lack of pertactin results in a lowered rate of transmission. The evolving bacteria must balance the loss of virulence with an increased ability to evade acquired immunity. Compartmental modelling can be used to determine the evolutionary stable strategy of optimal virulence, where the pathogen can maximize evasion of vaccine-acquired immunity while minimizing loss of infectiveness.

Presentation Number **137**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Reducing Risky Decision Making Bias in Trait Anxious Individuals** | | |
| **Presenter:** | Salman Ibrahim, David Saldivar | | |
| **Mentor:** | Cristina Wilson | **Campus:** | Pullman |
| **Co-Authors:** | Cristina Wilson | | |
| **Major** | Ibrahim: Psychology - CAS, Saldivar: Zoology - CAS | | |
| **Category:** | Social Sciences | | |

Trait anxiety has been shown to have unfavorable effects on decision making, particularly when choice outcomes are uncertain, i.e., risky. People who are high in trait anxiety are more prone to systematic biases in their evaluation of decision options, resulting in unfavorable outcomes. For example, a bias towards risk-aversion leads individuals to avoid risky choice options that are potentially advantageous. Reducing the effect of bias should improve the decision making of trait anxious individuals, allowing them to make more advantageous choices. Previous research in our lab has demonstrated that bias can be reduced through experiencing feedback from decisions. The goal of this study was to determine whether experiencing feedback from earlier decisions can reduce decision bias in later decisions in trait anxious people. Risky decision making was assessed with the Framed Gambling Task (FGT), in which repeated choices are made between a sure option (gain or loss) and one of two risky options, similar to decks of cards. A framing bias, created by the sure option, leads individuals to choose the sure gain over the risky option, and choose the risky option over the sure loss. In the FGT, framing bias results in disadvantageous choices because one risky option is better than the sure gain, and the other risky option is worse than the sure loss. Framing bias in the FGT is reduced by learning which risky options are good and bad based on choice outcome feedback. The results show that individuals with high trait anxiety display greater framing bias than their low trait anxiety counterparts. However, high trait anxious people were able to reduce the framing bias and improve their choices over time. This finding is consistent with previous research in our lab, which shows that learning from decision outcomes can reduce biased decision making.

Presentation Number **138**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Modulation of THC Tolerance by CBD** | | |
| **Presenter:** | Nicholas Greene | | |
| **Mentor:** | Dr. Rebecca Craft | **Campus:** | Pullman |
| **Co-Authors:** | Dr. Rebecca Craft | | |
| **Major** | Neuroscience, Psychology – CVM, CAS | | |
| **Category:** | Organismal, Population, Ecological, and Evolutionary Biology | | |

Cannabidiol (CBD) and tetrahydrocannabinol (THC) are the two primary cannabinoid drugs found in cannabis. These two cannabinoids appear to be responsible for the majority of cannabis' effects, although THC causes subjective intoxication whereas CBD does not. While interactions between CBD and THC may be clinically important, CBD-THC interactions are still poorly understood. As medical and recreational marijuana use has become increasingly prevalent, mean THC content in marijuana has greatly increased while CBD content has fallen; it has been suggested that low CBD, high THC cannabis is more likely to produce adverse effects such as dependence or psychosis (Morgan et al., 2010). Therefore, it has become critically important to determine whether CBD actually alters THC's effects. This experiment is designed to determine whether CBD affects the development of tolerance to THC's pain-relieving and sedating effects, and whether CBD modulation of THC tolerance differs between male and female rats. Rats will be given increasing doses of THC and, after each dose, tested on measures of locomotor activity and acute pain thresholds to determine initial THC sensitivity. Then either placebo, CBD, THC, or a combination of CBD and THC will be administered to rats twice a day for four additional days. On the sixth day, rats will be given increasing THC doses, and retested on measures of locomotor activity and acute pain thresholds after each THC dose. We expect that rats given daily doses of THC will develop tolerance to THC's pain-relieving and sedating effects, while rats given the combination of THC and CBD will develop significantly less tolerance to THC. The results of this study may help to elucidate whether CBD affects the development of THC tolerance, and whether there are sex differences in how CBD affects THC tolerance.

Presentation Number **139**

# ABSTRACT:

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|---|---|---|---|
| **Abstract Title:** | **Circling the Truth: Model Selection Criteria as a Metric of Verisimilitude in Theory Selection** | | |
| **Presenter:** | Kyle Hansen | | |
| **Mentor:** | Dr. Michael Goldsby | **Campus:** | Pullman |
| **Major** | Philosophy, CAS | | |
| **Category:** | Humanities | | |

The purpose of this research is to investigate the possibility of using aspects of model selection theory to overcome both a logical problem and an epistemic problem that prevents progress towards the truth to be measured while maintaining a realist approach to science. Karl Popper began such an investigation into the problem of progress in 1963 with an idea of verisimilitude, but his attempts failed to meet his own criteria, the logical and epistemic problems, for a metric of progress. Although philosophers have attempted to fix Popper's verisimilitude, none have seemed to overcome both criteria yet. My research analyzes the similarities between Predictive Accuracy (PA) and Akaike's Information Criterion (AIC), parts of model selection theory, and Popper's criteria for progress. I find that, in ideal data situations, it seems that PA and AIC satisfy both criteria; however, in non-ideal data situations, there are issues that appear. These issues present an interesting dilemma for scientific progress if it turns out our theories are in non-ideal data situations, yet PA and AIC seem to be better overall indicators of scientific progress towards the truth than other attempts at overcoming the problems of Popper's verisimilitude.

Presentation Number **140**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **College Adjustment of Students from Hawaii in a Predominately-White Institution** | | |
| **Presenter:** | Shantel Rita | | |
| **Mentor:** | Stephen Bischoff | **Campus:** | Pullman |
| **Major** | Psychology - CAS | | |
| **Category:** | Social Sciences | | |

College retention in the United States has been a continual concern among minority populations for decades. However, the Asian American and Pacific Islander (AAPI) population is one of the most overlooked and understudied populations in higher education. This is due in large part to the incorrect assumption that all Asian Americans and Pacific Islanders do well in academia. The disaggregation of data among this diverse population allows for a better understanding of the various resources needed for AAPI subpopulations in higher academia. Although there have been numerous studies on specific subgroups in the Asian American and Pacific Islander community, minimal research has included Hawai'i's population in higher education. Furthermore, the state of Hawai'i is an understudied population in higher education considering its predominant AAPI demographics and "local" culture. The historical background of Native Hawaiian culture, European settlement, and the immigration of other AAPI cultures have heavily influenced the "local" culture. This research will explore the retention factors affecting college persistence and adjustment of students from Hawai'i. Through semi-structured interviews, this study will examine the experiences of undergraduate students from Hawai'i attending a predominately-white institution in the Pacific Northwest. Upon analyzing and coding, these responses will better understand how students from Hawai'i adapt to mainland life in relation to college retention.

Presentation Number **141**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Roles of Nipah Virus Attachment, Fusion, and Matrix Proteins in Viral Assembly and Budding** | | |
| **Presenter:** | Keesha Matz | | |
| **Mentor:** | Hector Aguilar-Carreno | **Campus:** | Pullman |
| **Co-Authors:** | Gunner Johnston, Hector Aguilar-Carreno | | |
| **Major** | Microbiology, CVM, Honors | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

Nipah Virus (NiV), in the family *Paramyxoviridae* is a bio-safety level 4 agent with a high mortality rate of 40-90% in humans. Symptoms in humans include acute encephalitis and respiratory disease. Since NiV can be transmitted between many mammalian species, this virus poses a great threat to humans and agriculture alike along with having bio-terrorism potential. There are no approved vaccines or cures for NiV, which means it is imperative that we understand the viral lifecycle in order to develop antiviral treatments. It is important to note that in our bio-safety level 2 laboratory, rather than the live virus, we work with virus-like particles (VLPs), which are noninfectious and can be easily manipulated to study the viral lifecycle. Three NiV proteins that are important for allowing the virus to enter the host cell, replicate, and bud from the host cell membrane to spread the viral infection throughout the body are the attachment (NiV-G), fusion (NiV-F), and matrix (NiV-M) proteins. We hypothesized that these three proteins would interact and affect incorporation of each other into VLPs. Previous research indicated that NiV-F can induce viral budding alone without any other NiV proteins present, thus we also hypothesized that a specific sequence of NiV-F, the cytoplasmic tail (CT), would interact with host cell factors to modulate VLP budding. To test these hypotheses, we used a viral budding assay to quantify the production of VLPs in the presence of different combinations of the proteins and mutants of the NiV-F CT. Results showed that NiV-G incorporation into VLPs increased significantly from single-expression of NiV-G (7%) as compared to co-expression of NiV-F and NiV-G (27%) or NiV-M and NiV-G (35%). Additionally, mutations in the NiV-F CT decreased budding by 60-90% as compared to wild-type NiV-F levels. In conclusion, NiV-M and NiV-F increase NiV-G's incorporation into VLPs, and we uncovered a role for the NiV-F CT in viral particle budding. A greater understanding about characteristics of NiV budding and infection may aid in the development of novel targets for antiviral treatments.

Presentation Number **142**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Hyperbaric Oxygen Produces Antinociception in Mice by activating CB1 Cannabinoid Receptors** | | |
| **Presenter:** | Alexander Stoudt | | |
| **Mentor:** | Raymond M. Quock | **Campus:** | Pullman |
| **Co-Authors:** | Yangmiao Zhang, Donald Y. Shirachi, Raymond M. Quock | | |
| **Major** | Neuroscience, CVM | | |
| **Category:** | Organismal, Population, Ecological, and Evolutionary Biology | | |

Exposure to increasing pressures of hyperbaric oxygen ($HBO_2$) produced a pressure-related antinociceptive response (Liu *et al.*, *Life Sci* 98:44-48, 2014). $HBO_2$ produces an acute antinociceptive effect in mice that is only partly antagonized by opioid receptor blockers (Heeman *et al.*, *Brain Res* 1540:42-47, 2013). This study was conducted in order to determine whether $HBO_2$-induced antinociception might owe part of its effect to endocannabinoid mechanisms, which are also known to be involved in antinociception (Pertwee *et al.*, *Prog Neurobiol* 63:569-611, 2001). The antinociceptive responsiveness of male NIH Swiss mice to $HBO_2$ was assessed using the acetic acid abdominal constriction test. Different groups of mice were pretreated with the cannabinoid receptor type 1 ($CB_1$) antagonist/inverse agonist 1-(2,4-dichlorophenyl)-5-(4-iodophenyl)-4-methyl-N-1-piperidinyl-1H-pyrazole-3-carboxamide (AM 251); and the anandamine transport-inhibitor N-(4-hydroxyphenyl)-5Z,8Z,11Z,14Z-eicosatetraenamide (AM 404); or their respective vehicles. Pretreatment with AM 251 caused a dose-dependent reduction in the magnitude of the antinociceptive response. Pretreatment with AM 404, which increases the availability of anandamide, enhanced the antinociceptive response to $HBO_2$. These findings are consistent with the hypothesis that endocannabinoid systems may contribute at least in part to $HBO_2$-induced antinociception.

Presentation Number **143**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Effect of Cardiomyopathy-Related Mutation K15N in Tropomyosin on Actin and Tropomodulin Binding.** | | |
| **Presenter:** | Samantha Grover | | |
| **Mentor:** | Mert Colpan | **Campus:** | Pullman |
| **Co-Authors:** | Mert Colpan, Thu Ly, Alla Kostyukova | | |
| **Major** | Bioengineering, Biological Science – CEA, CAS | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

Tropomodulin (Tmod) is a protein that binds at the pointed (slow growing) end of actin filaments in a tropomyosin (TM)-dependent manner. TM is a coiled-coil protein that binds and stabilizes actin filaments in muscle cells. Cardiomyopathy-associated mutation K15N in TM is located in vicinity of Tmod-binding site but the underlying mechanism for cardiomyopathy development is unknown. To study the effect of K15N mutation in TM's function, we tested binding of TM, wild-type and mutated, to Tmod using peptides corresponding to binding sites. The results obtained by circular dichroism suggested that the mutation drastically decreased binding between TM and Tmod. To examine the binding affinity between TM and actin filaments, co-sedimentation experiments were conducted. It was found that the K15N mutation caused a 3-fold decrease in binding of TM to actin. The mutation also diminished Tmod's binding to the pointed end of TM-coated actin filaments. Our data suggests that reduced affinities of the mutant TM to actin and Tmod may cause dilated cardiomyopathy.

Presentation Number **144**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **The Tip of the Iceberg: Geographic Discrepancies in Reporting Arctic Mercury Poisoning** | | |
| **Presenter:** | Michelle Fredrickson | | |
| **Mentor:** | Amanda Boyd | **Campus:** | Pullman |
| **Major** | Communication and Society (emphasis in Science Communication) – COMM, Honors | | |
| **Category:** | Social Sciences | | |

My research, which I have undertaken for my Honors Thesis project, focuses on the issue of mercury contamination in the Arctic region of Canada. The indigenous people in this region rely on traditional foods (i.e. caribou, ring seal, beluga whale, etc.) for nutrition, especially as their food insecurity rates climb. The food is also culturally and historically significant to the tribes living in the Arctic, and is beneficial in many ways to the communities. Certain food items, however, have been contaminated with mercury and other non-naturally occurring pollutants, making it unsafe for women of childbearing age to consume without endangering the health of their children. Indigenous communities in the Arctic have already seen an increase in neurological birth defects related to high levels of mercury in some traditional foods. However, given the nutritional necessity and cultural value of these foods, not eating them is not a valid option. Communicating this issue to the indigenous people and to the public at large is a unique challenge.
As important an issue as this contamination is to people in the far north, it garners little attention in the southern, more populated regions of Canada. To study this further, I have conducted a content analysis on newspapers from several regions in the north and south. Using the search term 'mercury,' I found all articles related to mercury in the Arctic from January 2006 to January 2016 in the 10 newspapers I searched. I am in the process of analyzing these articles for differences in the number of articles present during this timeframe; the tone the author uses; the sources that are quoted; what future options are outlined; how the article describes the contaminant; and more. From there, I will be able to describe differences in coverage of mercury contamination between northern and southern papers over the past decade, which will help provide a better understanding of the greater context for the communication challenge.

Presentation Number **145**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **An Overview of Shelf Stable Foods** | | |
| **Presenter:** | Kristen Sparkman | | |
| **Mentor:** | Garish Ganjyal | **Campus:** | Pullman |
| **Co-Authors:** | Garish Ganjyal | | |
| **Major** | Food Science, CAHNRS | | |
| **Category:** | Humanities | | |

An overview of shelf stable foods fact sheet was designed for easy, clear use of common food controls for small processors and/or farmers. Many small farmers/processors sell at farmers markets and do not realize that there are regulations specific to processing of foods, even on a smaller scale that they must follow for manufacturing and selling their product. This is particularly a concern for canned products, jams and jellies, as these are most commonly found at small farmers markets. Jams, jellies, and canned products fall in a spectrum of acid, acidified, or low acid foods. The fact sheet was designed to make the complicated Federal Department of Agriculture (FDA) regulations less confusing for individuals unfamiliar with the Code of Federal Regulations (CFR) Title 21, which regulates the majority of the foods in the United States. Along with laying out the basics of acid, acidified, and low-acid food product, data was collected on the buffering capacity of common foods added to products. Knowing the buffering capacity of the original food, in response to the added low-acid food allows for processors to better regulate the pH of the final product. Other facts added in the fact sheet included thermal processing requirements, record keeping, operational information, and foods of concern involving food borne illness and allergens. The fact sheet provides small food processors with general information on food processing and resources to use beyond the main purpose of this fact sheet. This should help small processors in providing communities with safe food products and thus helping the well-being of our communities.

Presentation Number **146**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Extracellular Vesicles as Double Agents: A New Means of Tissue Specific Drug Delivery** | | |
| **Presenter:** | Sierra Bishop | | |
| **Mentor:** | Brandan M. Cook | **Campus:** | Pullman |
| **Co-Authors:** | Brandan M. Cook, Cliff Berkman | | |
| **Major** | Chemistry, Material Science Engineering – CAS, CEA, Honors | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

Prostate cancer (PCa) continues to prevail as the leading origin of cancer-based fatalities in men. PCa patients who are diagnosed with metastatic prostate cancer undergo radical therapies to various efficacies. Consequently, 25% of PCa patients, post-treatment, will suffer from relapse resorting to androgen deprivation therapy. This provisional treatment acts as a temporary control, however most patients will ultimately develop castrate resistant PCa with reoccurrence of tumor growth and progression to metastatic disease.

Anticancer chemotherapeutics have limited utility due to poor target selectivity and systemic toxicities. Recently in cancer research, work on developing chemotherapeutic delivery systems found that exosomes derived from tumor cells express characteristics that non-malignant cells lack. This knowledge could be utilized to enhance the selective targeting of anticancer therapeutics to the diseased tissues by exploiting the normal physiology of tumor tissues without extensive bioengineering.

In successful development of a proof-of-concept, we will package the FDA approved prodrug (DHA-Paclitaxel) into tumor derived synthetic exosomes. Then we will test the *in vitro* cytotoxicity against PCa cells and cellular specificity of internalization against non-tumorigenic normal prostate cells **(Figure 2)**. In support of our research approach, a phase I study of Dexosome (exosomes secreted from dendritic cells) immunotherapy in patients with advanced non-small cell lung cancer previously demonstrated the safety and efficacy of using autologous dendritic cell derived exosomes loaded with MAGE tumor antigens. *Results from this study showed that the treatment was well tolerated and showed little to no toxicity, thus progressing it to phase II clinical studies.*

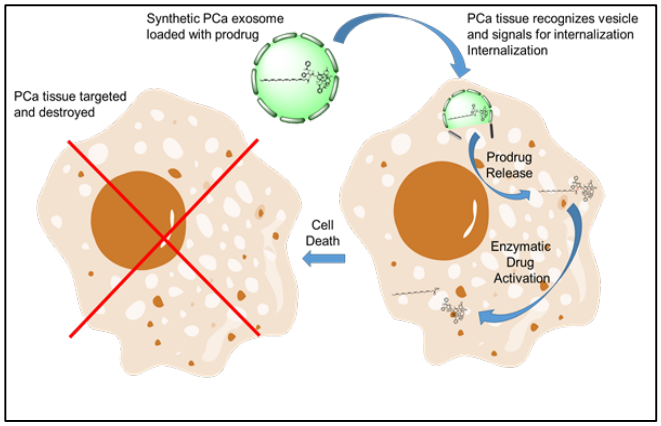


**Figure 1.** PCa derived synthetic exosome carrying therapeutic cargo. Upon cellular internalization the prodrug is enzymatically hydrolyzed thus activating the antimitotic activity.

Ultimately, the expectation of this comprehensive study will lead to the successful development of a dynamic drug delivery scaffold for PCa tumors. This anticipated drug delivery system will exploit upon the body's own mechanisms for cell and tissue specificity, thus improving chemotherapeutic vitality, and reduce extraneous side effects on the patient. Based on prior work, we have created an innovative approach to building a seek-and-destroy drug delivery system using tumor derived synthetic exosomes.

Presentation Number **147**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **The Impacts of School Disciplinary Policies on the Academic Achievement of Latino Youth and the School-to-Prison Pipeline** | | |
| **Presenter:** | Tanya Garnica | | |
| **Mentor:** | Aaron Roussell | **Campus:** | Pullman |
| **Co-Authors:** | Aaron Roussell | | |
| **Major** | Criminal Justice - CAS | | |
| **Category:** | Social Sciences | | |

Since the increase of criminalization of school disciplinary policies in public schools, Latinos have experienced a higher rate of expulsion and suspension than ever before. The criminalization of disciplinary policies contributes to the racial disproportion found in evidence when examining which students are more likely to be suspended or expelled. Policies such as zero tolerance, are part of the "get tough" approach to bringing down school violence. This "get tough" approach includes procedures such as expulsion, suspension, and referrals to alternative schools. The study is to examine how Latinos are directly impacted in their education as a result of "get tough" school disciplinary policies and how they become hyper-criminalized as a result. Hyper-criminalization can be defined as the process of punishing students for actions or behaviors in schools and other youth oriented institutions that then bleed over into the criminal legal system and produce criminal labeling. This can produce a negative self-image in those students as well as derailing their education. This study is an examination of expulsion, suspension, and academic achievement through a series of surveys of students at two different high schools in Washington State. Student participants will be drawn from all specific classrooms including honors courses, students not on track to graduate, a mandatory general course , and an alternative school class. By understanding the mechanisms and extent to which expulsions and suspensions can disrupt the education of students, we can add data from affected students to help determine if these forms of discipline are of any benefit to the student or school.

Presentation Number **148**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Beauty in Exemplary Women of Early China** | | |
| **Presenter:** | Alice Hiemstra | | |
| **Mentor:** | Dr. Lydia Gerber | **Campus:** | Pullman |
| **Co-Authors:** | Dr. Lydia Gerber | | |
| **Major** | Oboe Performance – CAS, Honors | | |
| **Category:** | Humanities | | |

Liu Xiang's *Biographies of Exemplary Women of Early China* (1st century CE) are the earliest published writings in Chinese history written for the moral instruction of women. This research evaluates, through qualitative analysis, how the issue of female beauty and ugliness is presented in all of the 125 biographies (in English translation) and what these stories, taken together, suggest to both male and female readers about the impact of beauty on government and social relationships.

Every biography about 'a beautiful woman' describes circumstances of strife. Each 'beautiful woman' obtained power over a man through her attractiveness, often causing him to compromise on personal responsibility and morals. Rulers were known to kill innocent people and neglect duties, occasionally leading to the destruction of an entire dynasty. During Liu Xiang's own time, infamous women such as Empress Zhao and Favorite Beauty Wei used their beauty in ways that seemed inappropriate and reckless and endangered the traditional Confucian ideals that reformers such as Liu tried to strengthen. On the other hand, Liu gives examples of several noticeably ugly women who offered sage advice to rulers.

By exploring all 125 biographies, rather than only those about infamous Chinese beauties, this project concludes that the intent behind Liu Xiang's treatment of beauty in the biographies was to warn men of the dangers of beauty and to exhort women to control and perhaps destroy their beauty for the good of the family and the state. In this way, the *Biographies* recognized the magnitude of the power of beauty but also emphasized that not only men but women as well could contribute to limiting its negative impact through their life choices. This project contributes to deepening our understanding of the role of women in China.

Presentation Number **149**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **The Geologic Evolution of the Ruby Range, SW Montana** | | |
| **Presenter:** | Peter Baker | | |
| **Mentor:** | Jeff Vervoort | **Campus:** | Pullman |
| **Co-Authors:** | Jeff Vervoort; Julie Baldwin | | |
| **Major** | Earth Science - CAHNRS | | |
| **Category:** | Engineering and Physical Sciences | | |

The Wyoming province contains some of the oldest rocks in North America. This province records a long history of magmatism and metamorphism from the Mesoarchean to the Mesoproterozoic. The details of these geological events throughout the province, however, remain elusive. Determining when and how these rocks formed—and how they have been modified by later tectonic processes—is important not only for understanding the geologic history of this region, but also for understanding how North America was formed and assembled. In this study we use U-Pb zircon Lu-Hf and garnet geochronology to determine magmatic and metamorphic ages to constrain the geologic history in the Ruby Range in southwestern Montana, located in the northwest part of the Wyoming province. Rocks of the Ruby Range consist of amphibolites, mylonitic garnet leucogneisses, metapelites, marbles, and rare ultramafics.

Previous U-Pb geochronology indicates that the oldest rocks in the Ruby Range formed at ~2.8-2.7 Ga based on zircons from migmatitic and quartzo-feldspathic gneisses (Jones, 2008). U-Pb monazite geochronology in the range yields ages at about 2.5 Ga and from 1.78 to 1.71 Ga. The Paleoproterozoic monazite ages led Cramer (2014) to suggest these indicate a major tectonic event involving the collision of two continental blocks during the Big Sky orogeny (Harms et. al. 2004). Our zircon U-Pb and garnet dating also indicates a significant tectonic event in the range in the earliest Paleoproterozoic. A garnet Lu-Hf isochron from a metasedimentary leucosome yields an age of 2.42 Ga. Zircons within this leucosome also yield an age of ~2.4 Ga. These new dates indicate that crustal melting and metamorphism occurred long before the 1.78-1.71 Ga metamorphism attributed to the Big Sky orogeny. Integrated U-Pb zircon and monazite geochronology—as well as Lu-Hf and Sm-Nd garnet geochronology—is in process to further constrain this complicated geologic history.

Presentation Number **150**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **First-Generation Latino/a College Student's Transition Experiences: Collectivism to an Individualistic Environment.** | | |
| **Presenter:** | Lysandra Perez | | |
| **Mentor:** | Monica Kirkpatrick Johnson, PhD | **Campus:** | Pullman |
| **Major** | Psychology - CAS | | |
| **Category:** | Social Sciences | | |

Despite recent growth in the rate of bachelor's degree attainment for Latino/a college students, from 8 percent in 1990 to 15 percent in 2014, Latino/as remain in the lowest division least likely to earn their four year degree (National Center for Education Statistics, 2015). Latino/a college students face many academic related barriers to obtaining a bachelor's degree, such as prior academic college preparation, socioeconomic barriers, and cultural/social capital (Crisp, 2009). However, this study is the examination of the cultural differences between many Latino/a home and community lives compared to the setting in a college or university. For example, many first-generation Latino/a students' experience a setting where they rely on family and community to navigate difficulties. However, in college these aforementioned students are away from the support they are accustomed with and may not be prepared for the challenges higher education brings. We will be conducting semi-structured interviews for personal in-depth answers that may potentially highlight transitional ordeals. Influenced from previous research, we are specifically examining what disparate experiences are happening when transitioning from their accustomed culture to an individualistic college campus. Are these students discouraged by unfamiliarity and the new challenges faced in another environment? How do these students solve problems at home versus issues in college? As a result, how does this transition impact first-generation Latino/a college students?

Presentation Number **151**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Role of Serotonin in the Acute Antinociceptive effect of Hyperbaric Oxygen (HBO2) in Mice** | | |
| **Presenter:** | Adam Tidd | | |
| **Mentor:** | Raymond M. Quock | **Campus:** | Pullman |
| **Co-Authors:** | Abigail L. Brewer, Yangmiao Zhang, Donald Y. Shirachi and Raymond M. Quock | | |
| **Major** | Neuroscience, CVM, Honors | | |
| **Category:** | Organismal, Population, Ecological, and Evolutionary Biology | | |

Hyperbaric oxygen ($HBO_2$) causes an antinociceptive effect in both humans and animals. Our laboratory has been elucidating the mechanisms that underlie $HBO_2$-induced antinociception and has reported that this effect is opioid- and nitric oxide-dependent. Since 5-hydroxytryptamine (5HT, serotonin) has been widely implicated in descending pain modulation, this study was conducted to investigate the role of serotonin receptors in the acute antinociceptive effect of $HBO_2$. Male NIH Swiss mice were pretreated intracerebroventricularly (i.c.v.) and intrathecally (i.t.) with increasing doses of the $5HT_{1A}$ receptor antagonist WAY-100635 (N-[2-[4-(2-methoxyphenyl)-1-piperazinyl]ethyl]-N-2-pyridinylcyclohexane carboxamide maleate) 30 min prior to receiving $HBO_2$ at 3.5 atmospheres absolute for 11 min. Antinociceptive responsiveness was assessed using the acetic acid-induced abdominal constriction test. Results show that both i.c.v. and i.t. pretreatments with WAY-100635 reduced the magnitude of $HBO_2$-induced nociception in a dose-related manner. In summary, these findings demonstrate a role of spinal and supraspinal $5HT_{1A}$ receptors in the acute antinociceptive effect of $HBO_2$.

Presentation Number **152**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Optogenetic Inhibition of a Lateral Orbitofrontal Cortex (lOFC) to Basolateral Amygdala (BLA) Subcircuit: Effects on Reinstatement of Food-Seeking Behavior** | | |
| **Presenter:** | Jacob Hall | | |
| **Mentor:** | Dr. Amy Arguello | **Campus:** | Pullman |
| **Co-Authors:** | M.P. Mitchell, G.D. Stuber, A.A. Arguello, R.A. Fuchs | | |
| **Major** | Bioengineering. CEA, Honors | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

Stimuli (cues) that were previously associated with drug-taking can induce craving and relapse in recovering drug addicts. The lOFC and BLA are two brain regions that are important for reward learning and decision-making. In humans and rodents, neuronal activation is increased in these regions following exposure to drug-associated cues. Previous research in the Fuchs' Lab has shown that disrupting communication between the lOFC and BLA can decrease relapse triggered by exposure to drug-related cues in rodents. Therefore, we hypothesized that inhibition of this subcircuit would also decrease relapse to a natural reward (e.g. food). Rats received bilateral infusions of a cre-recombinase (Cre)-dependent virus expressing halorhodopsin (light-sensitive ion channel, only expressed in the presence of Cre) into the lOFC, with optic fibers implanted above. Rats also received infusions of a second viral construct expressing Cre into the BLA, which allowed for halorhodopsin to be expressed only in lOFC neurons projecting to the BLA. Following surgery, rats were trained to lever press to receive food pellets on a 1-to-1 lever press/pellet ratio. Delivery of a food pellet was paired with presentation of a cue (light + tone). Rats then underwent extinction training, during which lever responses had no consequences. At test, active lever responses resulted in presentation of a cue coupled with laser light delivery via implanted optic fibers, resulting in inhibition of halorhodopsin-expressing lOFC neurons. Food-seeking behavior was assessed by the number of active lever responses. Our initial results indicate that the lOFC to BLA circuit is not involved in food-seeking behavior. However, all rats showed low levels of active lever responses during the reinstatement test, suggesting that a possible inhibition may not be observed due to a floor effect. To enhance lever responses, rats were retrained to increase the number of lever presses necessary for reward delivery (5-to-1 lever press/ pellet ratio), followed by extinction training. Rats showed increased active lever responses during reinstatement testing with the new training schedule. Future experiments will use this updated paradigm to continue to examine the involvement of the lOFC to BLA subcircuit in food-seeking behavior.

Presentation Number **153**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **APOBEC3A and APOBEC3B Preferentially Deaminate the Lagging Strand Template during DNA Replication** | | |
| **Presenter:** | Luis Cortez | | |
| **Mentor:** | Steven A. Roberts | **Campus:** | Pullman |
| **Co-Authors:** | James Hoopes, Tony Mertz, Ewa P. Malc, Piotr A. Mieczkowski, Steven A. Roberts | | |
| **Major** | Biochemistry, Genetics and Cell Biology, CAS, CVM | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

Human cancers have been found to frequently accumulate mutations consistent with APOBEC catalyzed cytidine deamination events. The APOBEC family of enzymes catalyze cytidine to thymidine mutations at specific DNA sequences in single-stranded (ss) DNA. One parameter which may affect the extent of mutagenesis in tumors is the amount of ssDNA present in cells that is targeted by APOBEC enzymes. This study seeks to determine if ssDNA intermediates generated during DNA replication is targeted by APOBEC enzymes. To accomplish this, APOBEC3A and 3B were expressed in strains of the model organism *Saccharomyces cerevisiae* with a forward mutation reporter to either side of a well-defined origin of replication. Once the APOBEC enzymes were expressed, the strains were allowed to accumulate mutations and the mutation frequency and spectrum was analyzed. Since ssDNA generated in lagging strand synthesis is formed on opposite DNA strands pending on direction of replication, APOBEC targeting of replication intermediates should produce solely Guanine (G) to Adenine (A) mutations 5' of, and Cytosine (C) to Thymine (T) mutations 3' of the origin of replication. Isogenic strains expressing APOBEC3A and APOBEC3B showed mutation spectra consistent with the enzyme targeting lagging strand synthesis. A similar pattern of predominantly G to A substitutions 5' of origins and C to T substitutions 3' of origins was also observed across the yeast genome through whole genome sequencing. In addition, replication stress induced through genetic replication fork defects and exposure to hydroxyurea greatly increased the mutagenesis of APOBEC3A and APOBEC3B. Thus, frequent replication and replication stress common in human tumors may provide an ideal chromosomal substrate for APOBEC-induced deamination. Furthermore, the potential for APOBEC enzymes to induce mutations in proto-oncogenes which leads to oncogene induced replication stress, may result in a "perfect storm" of genome instability during carcinogenesis.

Presentation Number **154**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Behavioral and Physiological Responses to Hot Weather Conditions in Holstein Calves** | | |
| **Presenter:** | Heather Young | | |
| **Mentor:** | Dr. Amber Adams-Progar | **Campus:** | Pullman |
| **Co-Authors:** | Dr. Amber Adams-Progar | | |
| **Major** | Animal Sciences, Spanish – CAHNRS, CAS, Honors | | |
| **Category:** | Organismal, Population, Ecological, and Evolutionary Biology | | |

Dairy calves are susceptible to heat stress when environmental temperatures exceed 68°F. Heat stress conditions (hot weather coupled with high humidity) cause decreases in feed intake and increases in incidences of calf illness. The objective of this study was to determine how hot weather and humidity impact calf behavior and well-being. At the age of 24-48 hours, eight calves were housed in polyethylene stalls (3.44 $m^2$) at the Knott Dairy Center. Each calf was observed until weaning (42 days). Temperature and humidity within the stalls were recorded at 1-hour intervals using data loggers (HOBO®). The temperature-humidity index (THI; a measure of heat stress) was calculated based on these values. Calf body temperatures were recorded hourly using recording devices (iButton®). Calf weights were measured weekly. Blood samples were collected at 7, 24, and 42 days of age via jugular venipuncture. These samples were used to measure plasma concentrations of cortisol and thyroxine using enzyme-linked immunoassays (ELISA). Calf lying and standing behavior was recorded at 5-minute intervals using time-lapse video cameras. Pearson's correlation tests were conducted to detect relationships among variables and regression models were used to further analyze any significant relationships. The highest average THI (77) occurred during Week 1 and the lowest average THI (53) occurred during Week 10. As the environmental THI increased by one unit, the THI within calf stalls increased by 0.96 ± 0.02 units ($P < 0.0001$). In response, calf body temperature increased by 0.03 ± 0.01°F with each one-unit increase in stall THI ($P = 0.04$); however, THI did not appear to influence calf average daily gain. Calf plasma cortisol concentrations tended to demonstrate a negative relationship with thyroxine concentrations ($P = 0.13$), but neither hormone was correlated with stall THI. Furthermore, the percent of observed time a calf spent lying or standing during the hottest part of the day (12:00 - 5:00 PM) was not impacted by stall THI. Although calves in this study physiologically responded to hot weather, a behavioral response was not detected. A continuation of this project will include an analysis of additional calf behaviors and housing systems.

Presentation Number **155**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Development of Multi-family Group and Mindfulness Treatment for Chronic Pain: Preliminary outcomes** | | |
| **Presenter:** | Antonia Littleton | | |
| **Mentor:** | Crystal Lederhos | **Campus:** | Pullman |
| **Co-Authors:** | Crystal Lederhos, MS; Tracy L. Skaer, PharmD; Michael Orr, BA; Celestina Barbosa-Leiker, PhD; Donelle N. Howell, PhD; Dennis G. Dyck, PhD | | |
| **Major** | Psychology - CAS | | |
| **Category:** | Social Sciences | | |


The aim of this study was to develop, implement, and evaluate an integrated treatment for chronic pain and opioid use that combines the Multi-family group (MFG) format and process with Mindfulness-based Intervention (MBI). Understanding the preliminary results of this study could inform future treatments of chronic pain patients by showing how mindfulness training and MFG could be an alternative way to treat chronic pain patient's without the use of opioid medications, thereby reducing patient's need for opioids and future risk of addiction.

The main hypothesis of this study was that combining MFG format with a mindfulness-based intervention could enhance the effectiveness of both interventions simultaneously, and yield better outcomes for people with chronic pain than MBI would in isolation.

This was a treatment development study, which utilized 2 different interventions. All participants were required to attend 2 individual joining sessions with clinicians, a 4 hour educational workshop, and 16 weekly group meetings, and had an optional half-day mindfulness retreat. A multi-method analysis process was used for this treatment development study. Participants completed quantitative outcome measures using the current Opioid Misuse Measure, Anger Expression Scale, Beck Depression Inventory, Social Support Scale, and Perceived Stress Scale, at numerous stages of the intervention. Participants also attended a focus group, which was examined utilizing both deductive and inductive content analysis.

The results demonstrated an improvement in participants levels of depression and an increase in social support, as well as a reduction in anger expression and perceived stress. Qualitative analysis showed participants overall had positive evaluations of their experience consistent with similar interventions including positive group experience, skill acquisition, disease management, and commitment to practicing the skills learned. Inductive content analysis revealed a common theme of feeling stigmatized across participants. These findings offer important insight into further understanding how future MFG-Mindfulness intervention should be developed and implemented, and how to improve treatment acceptability and engagement for patients.

Presentation Number **156**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **From the Ashes Small-town Plans their Comeback** | | |
| **Presenter:** | Ola Stuj | | |
| **Mentor:** | Kathleen Ryan | **Campus:** | Pullman |
| **Co-Authors:** | Kathleen Ryan | | |
| **Major** | Landscape Architecture - CAHNRS | | |
| **Category:** | Arts and Design | | |


**Background**

Stimulating development and economic stability in rural landscapes by building on town's existing resources and enticing geographical location to welcome tourism. A crossroads will be created to promote this while simultaneously connecting both the residential and downtown fabrics of Pateros. Solutions were approached through participatory design exercises that engaged Rural Community Design Initiative members with community residents to collaborate in the process of rethinking their town center.

**Problem**

In 2004, Pateros was struck by the Carlton Complex wildfire that swept through the Methow Valley, destroying 30% of the town's homes. The town residents responded to the tragedy as an opportunity to come together to discuss the future and explore ideas in how to revive and strengthen their community.

**Goals**

Goal was to facilitate a town discussion on their idea of the future of Pateros, including how to identify their strengths as a town and build on them.

**Method**

The RCDI team of landscape architecture and interior design faculty and students traveled to Pateros and facilitated a community design workshop that encouraged active involvement between design expert and community member to share visions on the downtown revitalization. Design experts facilitated the discussion to support a dialogue among all participants. Critical questions to the community were: "What story represents your town; What are your town's strengths and weaknesses: and What do you wish to see developed to improve your town's vitality." The residents, business owners and town officials shared thoughts and ideas shared during a co-design meeting. The ideas were documented. The community expressions served as an important tool to the design experts in developing a design proposal. By having a richer understanding of the project's context from the town's perspective enabled the designers to develop creative thinking of concepts and visions for the design proposal.

**Conclusion**

The proposal was formatted as a large poster with earth images of the town center and annotations to describe the ideas for town access and growth generated at the community meeting. The City of Pateros is currently using the conceptual design plan to gather community feedback during meetings among the town residents.

Presentation Number **157**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **The Effect of Student Preferences for Coffee with Regard to Ethical Origins on the Supply and Market of Coffee.** | | |
| **Presenter:** | Hayley Hohman | | |
| **Mentor:** | Dr. Philip Wandschneider | **Campus:** | Pullman |
| **Major** | Quantitative Economics, CAHNRS, CAS, Honors | | |
| **Category:** | Social Sciences | | |

This study defines student preferences for coffee to determine how to influence consumers and shape the market towards ethically made coffee and will outline a way to prevent and combat labor exploitation. This will be accomplished through defining current consumer preferences and examining attitudes about ethical products. Ultimately, this impacts the supply of the product, since a single purchase of a good, repeated over time by many consumers, is the fundamental engine that keeps a firm alive and prosperous. If a consumer buys a product made under inhumane conditions, they are indirectly supporting and contributing to the "supply-chain slavery." Though outlining what motivates college students in their specific coffee purchases and what information they currently have access to, recommendations can be made to those marketing coffee products for implementation. The implications of this study have the ability to influence the common consumer and remove a profit incentive for corrupt businesses, thus working towards the eradication of labor exploitation and slavery in producer countries.

Presentation Number **158**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Black Bear Habitat Selection** | | |
| **Presenter:** | Alexandria Albert | | |
| **Mentor:** | Lindsay Welfelt | **Campus:** | Pullman |
| **Major** | Wildlife Ecology - CAHNRS | | |
| **Category:** | Organismal, Population, Ecological, and Evolutionary Biology | | |

Black bears (*Ursus americanus*) have been an iconic wildlife species in game management and recreation. Whether land owners want to manage for or against black bear habitat preference, little research has been done so see what habitat types have the highest black bear densities. The objective of this study was to compare black bear density with habitat type. We hypothesized that black bear populations will have higher densities in lowland vegetation areas where their primary forage is abundant. Using hair snag corrals set up between May – July of 2015, samples were collected from two study areas on the eastern central and western central portions of the Cascade mountain range in Washington State. Each study area had two sampling sessions, resulting with a total of 149 corals set which sampled 7 different habitat types within the central Cascade mountain range: Eastern Puget Uplands, Western Cascades Lowlands and Valleys, North Cascades Lowland Forests, North Cascades Highland Forests, North Cascades Subalpine/Alpine, Wenatchee/Chelan Highlands, and Chiwaukum Hills and Lowlands. Of the habitats in which black bears were detected, the habitats that had the greatest black bear density were North Cascades Lowland Forests in the western study area and Chiwaukum Hills and Lowlands in the eastern study area. Our results show that black bears have a tendency to select for lowland habitat types. Landowners who have an abundance of lowland habitat are more likely to have black bear occupancy than landowners of upland or highland habitat.

Presentation Number **159**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Israelis v Palestinians: the Holocaust, Religion, and the Western World** | | |
| **Presenter:** | Precelia Derricks | | |
| **Mentor:** | R. Charles Weller | **Campus:** | Pullman |
| **Co-Authors:** | R. Charles Weller | | |
| **Major** | Neuroscience, History – CVM, CAS | | |
| **Category:** | Social Sciences | | |

In 1882 to escape their troubles in Europe, Jews started to move in small numbers to the British mandate of Palestine. These migrations to Palestine would increase to high numbers during the Holocaust as a result of Zionist encouragement, causing high tensions between the Jews and the Arab Muslims who already had an established way of life. Using a qualitative analysis of primary sources, including a pamphlet by Osama bin Laden and Western newspaper articles, and secondary research articles, this project argues that actions of the West, in particular Britain, but currently also the United States have contributed to making this a situation that cannot be resolved. While some of these actions, which consistently favored Jewish over Arab interests are now in the past, this paper suggests that the consistent failure in the Western, particularly in the American public discourse, to acknowledge the Palestinian perspective, including massacres committed by Israelis on Palestinian civilians, plays a critical role in prolonging and intensifying the conflict.

Presentation Number **160**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Motor Coordination Deficits and Gene Mis-Regulation in Kdm6a Gene Deficient Mice** | | |
| **Presenter:** | Elyas Alnamnakani | | |
| **Mentor:** | Dr. Jun Xu | **Campus:** | Pullman |
| **Co-Authors:** | Ashleigh Gustavson, Halle Weimar, Jun Xu | | |
| **Major** | Bioengineering - CEA | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

Lysine (K)-Specific Demethylase 6A (*Kdm6a*) is an X chromosome-linked gene that codes for a histone demethylase, which in turn controls the chromatin structure and regulates the activity of certain genes. When mutated, it causes the pediatric congenital disorder Kabuki syndrome characterized with mild to severe intellectual disability and poor motor coordination, which indicates an important role of Kdm6a in brain development and function.

We generated neuron-specific Kdm6a deficient mice to circumvent the embryonic lethality of constitutive Kdm6a knockout mice. Behavioral testing identified various phenotypes, such as motor coordination deficits. RNA-seq analysis was then performed and individual genes were confirmed using RT-qPCR assays. Among the mis-regulated genes in Kdm6a deficient mice, cerebellar granule cell-specific genes, e.g. *Zic1*, *Etv1*, *Gabra6*, and *Grin2c*, were found to be up-regulated. Some of these genes, *Zic1* and *Etv1* for instance, are known to be crucial to the proliferation and differentiation of granule cell precursors.

We hypothesized that, in Kdm6a deficient mice, gene mis-regulation in the granule precursors leads to enhanced proliferation, and subsequently cerebellar abnormality in the inhibition-excitation balance as well as behavioral impairment in motor coordination. We are currently testing this hypothesis with methodologies such as BrdU cell lineage analysis and Golgi staining. We believe these studies are relevant to a better understanding of the etiology of Kabuki syndrome, and the epigenetic basis of brain development and motor behavior.

Presentation Number **161**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Involvement of Basolateral Amygdala CB1 Receptors in Cocaine Memory Reconsolidation** | | |
| **Presenter:** | Nicole Jones | | |
| **Mentor:** | Jessica Higginbotham, Rita Fuchs | **Campus:** | Pullman |
| **Co-Authors:** | Jessica Higginbotham, Rita Fuchs | | |
| **Major** | Neuroscience, Psychology – CVM, CAS | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

Targeted disruption of drug-associated memories responsible for eliciting cocaine seeking behavior may be useful for relapse prevention. Brief exposure to a cocaine-associated environment removes cocaine memories from long-term memory stores and destabilizes them. These cocaine memories are susceptible to manipulation prior to being restabilized through the process of memory reconsolidation. Our lab has demonstrated a role for type 1 cannabinoid receptors (CB1Rs) in cocaine memory reconsolidation. Here, we evaluated the specific contribution of CB1Rs in the basolateral amygdala (BLA) to this phenomenon. Rats were trained to self-administer cocaine in a distinct context followed by extinction training in a different context. Cocaine memories were reactivated by exposure to the cocaine-paired context and a CB1R antagonist (AM251) or agonist (WIN 55,212-2) or vehicle was infused into the basolateral amygdala (BLA) immediately or 6h later (i.e. outside of the window of memory reconsolidation). Cocaine-seeking behavior (non-reinforced active-lever presses) was assessed 72 hours after memory reactivation. Intra-BLA infusion of AM251 immediately, but not 6 hours, following memory reactivation, *facilitate* subsequent drug-seeking behavior. This suggests that BLA CB1Rs play an inhibitory role in cocaine memory reconsolidation. Conversely, CB1R agonist administered into the BLA immediately following memory reactivation failed to alter subsequent context-induced drug-seeking behavior. These findings suggest that endocannabinoids in the BLA have tonic inhibitory effect on cocaine memory reconsolidation.

Presentation Number **162**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Cobalt Doping Effects on Oxygen Vacancy Formations in TiO2(110)** | | |
| **Presenter:** | Adam Saleh | | |
| **Mentor:** | Jean-Sabin McEwen | **Campus:** | Pullman |
| **Major** | Chemical Engineering - CEA | | |
| **Category:** | Engineering and Physical Sciences | | |

CO hydrogenation to higher alcohols by Fischer-Tropsch synthesis over CoCu-based catalysts is currently being researched as an alternative to the energy-intensive and petroleum-reliant industrial process of olefin hydroformylation [1-3]. These higher alcohols are used as chemical feedstock for plastics and other highly desirable products, and producing them from domestically derived and potentially renewable CO and $H_2$ would represent a significant step toward carbon-neutral energy independence for the United States. Experimental evidence suggests that oxides play a critical role in the selectivity and activity of CoCu-based catalysts [1], and as such, oxides are the focus of this study. Specifically, we wish to quantify how adsorbates relevant to CO hydrogenation over CoCu-based catalysts effect the reduction and re-oxidation potential of rutile $TiO_2$ (a convenient oxide model) during reaction.

To accomplish this goal we have used Density Functional Theory (DFT) calculations to determine how single atoms of Co and Cu, as well as CO, influence oxygen vacancy formation on oxygen and hydroxyl terminated $TiO_2$(110) surfaces. Hydroxyl terminated surfaces are included to capture realistic reaction conditions in which hydrogen deposition by solvent or reactant gases are potentially relevant. While pure DFT treatment of oxides is known to inaccurately describe oxide electronic properties, energetic trends have been shown to be unaffected [4], and this work will therefore only use the pure DFT treatment. Our preliminary results indicate that the lowest coordinated oxygens of either surface are the most susceptible to the formation of vacancies, which is in accordance with Pabisiak et al [5]. Kim et al. [6] have found that the addition of adsorbents to $TiO_2$ tends to increase these vacancy formation energies and this will be investigated for the case of Co, Cu, and CO in future work.

Presentation Number **163**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Finding Lives of Independence: The Tattooed Lady and the Nineteenth-Century American Traveling Circus** | | |
| **Presenter:** | Emily LaFrance | | |
| **Mentor:** | Jennifer Thigpen | **Campus:** | Pullman |
| **Major** | Psychology – CAS, Honors | | |
| **Category:** | Humanities | | |

CO hydrogenation to higher alcohols by Fischer-Tropsch synthesis over CoCu-based catalysts is currently being researched as an alternative to the energy-intensive and petroleum-reliant industrial process of olefin hydroformylation [1-3]. These higher alcohols are used as chemical feedstock for plastics and other highly desirable products, and producing them from domestically derived and potentially renewable CO and $H_2$ would represent a significant step toward carbon-neutral energy independence for the United States. Experimental evidence suggests that oxides play a critical role in the selectivity and activity of CoCu-based catalysts [1], and as such, oxides are the focus of this study. Specifically, we wish to quantify how adsorbates relevant to CO hydrogenation over CoCu-based catalysts effect the reduction and re-oxidation potential of rutile $TiO_2$ (a convenient oxide model) during reaction.

To accomplish this goal we have used Density Functional Theory (DFT) calculations to determine how single atoms of Co and Cu, as well as CO, influence oxygen vacancy formation on oxygen and hydroxyl terminated $TiO_2$(110) surfaces. Hydroxyl terminated surfaces are included to capture realistic reaction conditions in which hydrogen deposition by solvent or reactant gases are potentially relevant. While pure DFT treatment of oxides is known to inaccurately describe oxide electronic properties, energetic trends have been shown to be unaffected [4], and this work will therefore only use the pure DFT treatment. Our preliminary results indicate that the lowest coordinated oxygens of either surface are the most susceptible to the formation of vacancies, which is in accordance with Pabisiak et al [5]. Kim et al. [6] have found that the addition of adsorbents to $TiO_2$ tends to increase these vacancy formation energies and this will be investigated for the case of Co, Cu, and CO in future work.

Presentation Number **164**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **The Relation of Music Videos to Sexual Consent Negotiation** | | |
| **Presenter:** | Ariana Garcia | | |
| **Mentor:** | Dr. Kathleen Rodgers | **Campus:** | Pullman |
| **Major** | Sociology, Social Sciences, CAS | | |
| **Category:** | Social Sciences | | |

Sex and violence have become more visible in the media, especially within music videos. With the constant advancement of media, sex, violence, and objectification of women are becoming more apparent and normalized. Social cognitive theory suggests that exposing adolescents to sexual content in the media can impact the viewer's attitude and behavior (Bussey & Bandura, 1999). This study is intended to determine the relationship between music videos, and college student's confidence and intentions to negotiate sexual consent and how sexual stereotypes impact the viewer's perceptions. Additionally, identifying how experiences of being a perpetrator or victim of violence can impact that individual's willingness to negotiate sexual consent. Sexual consent negotiation is broken into three categories: refusing sexual consent, adhering to sexual consent, and seeking sexual consent. This project examines these questions based on student responses from surveys collected from students at Washington State University. College students watched music videos and completed a survey after, each survey asked the participants to answer questions regarding their perception of the video. The participants then answered questions regarding their attitudes about gender and relationships, dating violence, and sexual consent negotiation. The participants who thought the music video was entertaining were more likely to negotiate sexual advances than those who thought the music video was realistic. Currently, there is a gap in the literature that examines college student's perception of music videos in relation to sexual stereotypes and willingness to refuse unwanted sexual advances. Identifying this role can help differentiate how college students' perceptions can be informed by music videos.

Presentation Number **165**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Additively Manufactured Metallic-Ceramic Composite Coatings** | | |
| **Presenter:** | Bryan Heer | | |
| **Mentor:** | Amit Bandyopadhyay | **Campus:** | Pullman |
| **Co-Authors:** | Amit Bandyopadhyay | | |
| **Major** | Materials Science and Engineering, Mathematics – CEA, CAS | | |
| **Category:** | Engineering and Physical Sciences | | |

Heat sensitivity is an unavoidable area of concern in the aerospace industry that can cause catastrophic failure to surface material. To effectively resist thermal fluctuations, surface materials must withstand astounding forces to maintain the integrity of internal systems, which usually requires a single material to perform on all levels. Alternatively, this could be achieved at a possibly higher standard with external coatings, ultimately providing a barrier of high mechanical properties between the environment and internal structures. Additively manufactured composite coatings could be applied in heat-sensitive zones to keep the bulk structure of the system the same while placing materials with improved properties where most essential. My contribution for the project is examining how processing parameters and differences in material composition change the properties of the coatings and what changes would be better for the end product. Three samples were made: each sample had the same change in composition while having their final step in the processing stage altered, ultimately effecting the topmost surface of the coating. Through multiple testing procedures as well as visual comparisons, these coatings were classified by performance in different loading conditions and by how well the coating adhered to the original structure, the substrate. All samples adhered to the substrate well, indicated through fluent material characteristics from the coating to the substrate. The samples also showed a large increase in hardness when compared to the substrate. Furthermore, coatings with the highest hardness values had the best wear resistance, which declined as the amount of surface treatment from the final processing steps increased. Since each coating contained ceramic particles, they would potentially have higher thermal resistance due to ceramic materials being excellent thermal barriers. Future high-temperature tests would investigate this assumption. Identifying different processing parameters and chemical compositions in additively manufactured composite coatings is a key step in determining if coatings on pre-existing parts are worthwhile. Current and future exploration on this topic will develop the understanding about how composite coatings alter original material properties.

Presentation Number **166**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Genetic Diversity of Rhizobium leguminosarum and Mesorhizobium ciceri from Pea and Chickpea Fields in the Palouse** | | |
| **Presenter:** | Jessica Puente Arroyo | | |
| **Mentor:** | George Vandemark | **Campus:** | Pullman |
| **Co-Authors:** | Rita Abi-Ghanem and George Vandemark | | |
| **Major** | Microbiology, Spanish – CVM, CAS | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

Rhizobia bacteria have the ability to fix atmospheric Nitrogen ($N_2$) in the nodules of legumes roots, which are historically important crops grown in rotation with cereal grains, such as wheat and barley. An understanding of genetic diversity among isolates of rhizobia will help facilitate identification of strains with greater capacity to fix atmospheric $N_2$ and improve understanding of plant-microbe interactions. The objective of the research is to isolate indigenous *Rhizobium leguminosarum* and *Mesorhizobium ciceri* from pea (*Pisum sativum* L.) and chickpea (*Cicer arietinum* L.) in the Palouse region of Washington and Idaho and to examine genetic diversity among these and several commercial isolates. A total of 89 isolates of *R. leguminosarum* were examined, which included 12 isolates from commercial sources and 77 isolates collected from five different pea fields. A total of 95 isolates of *M. ciceri* were examined, which included 11 commercial isolates and 74 isolates collected from four chickpea fields. DNA was extracted from each isolate and amplified by PCR. Genetic relationships are being determined based on DNA sequence analysis across several genes including 16S rRNA, *nif*H (nitrogen fixation), *nod*C (nodulation), *rec*A (DNA repair), and *GSII* (glutamine synthetase). The results have produced phylogenetic trees that show clusters of genetically distinct rhizobacteria. Phylogenies based on multilocus sequencing are being used to develop a panel of genetically distinct strains of *R. leguminosarum* and *M. ciceri* that can be used to associate DNA sequence polymorphisms with important traits including the ability to colonize legume hosts and fix biological nitrogen in low pH soils.

Presentation Number **167**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Diel Vertical Migration of Zooplankton in Response to Hypoxia in Lacamas Lake, WA** | | |
| **Presenter:** | Sean Nolan | | |
| **Mentor:** | Steve Bollens | **Campus:** | Vancouver |
| **Co-Authors:** | Steve Bollens, Gretchen Rollwagen-Bollens, Julie Zimmerman | | |
| **Major** | Biology, Environmental Science - CAS | | |
| **Category:** | Organismal, Population, Ecological, and Evolutionary Biology | | |

Zooplankton, microscopic aquatic animals, are often distributed vertically in the water column in unequal densities, sometimes exhibiting diel vertical migration behavior, in which the majority of the population resides in surface waters at night and at depth during daylight hours. In the past, the availability of food resources and the risk of predation have been shown to influence these behaviors; however, more recently the role of hypoxia and anoxia in the water column has come into question. We hypothesized that zooplankton will alter their vertical distribution and diel vertical migration patterns as a response to seasonally variable hypoxia in Lacamas Lake, a highly modified and managed reservoir in Southwest Washington. During three periods of varying hypoxia - June (mild hypoxia), August (strong hypoxia), and September (moderate hypoxia) - we collected vertically discrete zooplankton samples at six depths at mid-day and mid-night, which were subsequently analyzed by light microscopy to determine community composition, density, and position in the water column. Preliminary results show that, in contrast to our original hypothesis and contrary to some extant literature, zooplankton are indeed occupying the hypoxic zone of the water column. We found that some genera, such as *Skistodiaptomus* (copepods) and *Daphnia* (water fleas), occupy the entire water column, and exhibit little or no diel vertical migration, whereas some other taxa (rotifers) were more heterogeneously distributed. Statistical analysis is still ongoing and our preliminary results suggest the need for further investigation, specifically, i) observing additional taxa, such as microzooplankton and phytoplankton, for similar behaviors, ii) analyzing which environmental variables may be affecting these behaviors, and iii) analyzing other lakes in the region with similar and different biogeochemical profiles. This will help to generate a clearer picture of how naturally occurring and anthropogenically induced geochemical processes (e.g., hypoxia) affect the community ecology and ecosystem dynamics of freshwater lakes.

Presentation Number **168**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **The Utility of Foregone Choice Outcomes in Reducing Risky Decision Bias** | | |
| **Presenter:** | Kevin Abercrombie and Justin Lusk | | |
| **Mentor:** | Cristina Wilson | **Campus:** | Pullman |
| **Co-Authors:** | Cristina Wilson | | |
| **Major** | Abercrombie: Psychology - CAS, Lusk: Psychology, Sociology - CAS | | |
| **Category:** | Social Sciences | | |

In day-to-day life, humans must make decisions based on expected outcomes learned from past experiences, such as choosing to continue a medical treatment, or changing a financial investment. When decision making is based on experience, having more information about the potential outcome of each option should result in better decisions; however, previous research has shown that this is not always the case. When given information about the results of a foregone outcome (i.e., the end result of choosing the other option), people tend to make worse decisions. It is unknown, however, whether additional information can help individuals overcome a preexisting decision bias—a systematic deviation from a valid form of decision making that increases the risk of making a poor decision. The goal of this study was to determine whether providing information about forgone outcomes would improve the ability of individuals to overcome a preexisting framing bias. The study used a novel experiential decision making task in which participants made repeated choices between a sure option (gain or loss), and one of two risky (uncertain) options. Presentation of a sure option creates a framing bias, leading to preference for the risky option over the sure loss, and preference for the sure gain over the risky option. Participants must learn through experience about the outcomes of decisions to overcome the framing bias and make the most advantageous choices. Half of the participants were only given feedback for the chosen outcome (control condition), and the other half were provided with feedback for the chosen and the foregone outcome (foregone condition). The results showed that participants were capable of reducing framing bias by learning from experience about decision outcomes. Information about foregone outcomes actually impeded the ability to overcome framing bias. This finding is consistent with past research demonstrating that information about foregone outcomes can be disadvantageous for decision making.

Presentation Number **169**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Over-Expression of BdCAD and BdCOMT in B.distachyon to Improve Drought Tolerance in Grasses** | | |
| **Presenter:** | Raul Arroyo | | |
| **Mentor:** | Dr. Karen Sanguinet | **Campus:** | Pullman |
| **Co-Authors:** | Dr. Karen Sanguinet | | |
| **Major** | Agricultural Biotechnology - CAHNRS | | |
| **Category:** | Applied Sciences | | |

*Brachypodium distachyon* is a small, C3 temperate grass with a sequenced genome and is a proposed model for grasses such as wheat. Although grasses are very agronomically important, there is little known about their cell walls. Cell walls are primarily composed of cellulose, hemicellulose and lignin. Lignin is the generic term for a large group of aromatic polymers. These polymers are deposited in the walls of secondarily thickened cells, making them rigid and resistant. In addition to developmentally programmed deposition of lignin, its biosynthesis can also be induced upon biotic and abiotic stress conditions, such as wounding, pathogen infection, metabolic stress, and perturbations in cell wall structure. Although there are many genes involved in lignin biosynthesis, in this project we will only be studying the lignin biosynthesis enzymes *BdCAD* and *BdCOMT* because they have already been characterized in *B. distachyon.* The main goal this project is to determine the biological impact of designing a plant (Brachypodium *distachyon* in the Bd21-3 accession) that produces increased lignins. This is important because its biosynthesis can be induced in biotic and abiotic stresses such as pathogen infection and metabolic stresses, which are important in dryland wheat farming in the Palouse due to the harsh weather conditions experienced during the summer. The first first step in this project will be to clone *BdCAD* and *BdCOMT* genes from wild-type Bd21 stem cDNA. Then they will be cloned into a sequencing vector and then subjected to DNA sequencing to confirm the correct coding sequence was amplified. Then the *BdCAD* and *BdCOMT* coding sequence will be transferred to a binary vector containing a constitutive promoter for overexpression. After construction of the expression vectors, they will be introduced into the plant genome of Bd21-3 via infection with *Agrobacterium tumefaciens*. The process of plant transformation involves a sterile technique and generation of embryogenic calli from Bd21-3 immature embryos. Once the *BdCAD* and *BdCOMT* plants are obtained, they will be characterized for their resistance to biotic and abiotic stress. Our expectation is that plants with increased lignin will better resist pathogens, drought and heat stress.

Presentation Number **170**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **PROGRESS: A Social Justice Framework for Critical Literacy** | | |
| **Presenter:** | Holly Matteson | | |
| **Mentor:** | Dr. Ashley Boyd | **Campus:** | Pullman |
| **Major** | English, Teaching without Certification, CAS | | |
| **Category:** | Humanities | | |

There has been a surge in recent literature about English Language Arts education focusing on issues related to social justice and equity. However, gaps in the literature reveal that there lacks a framework (or method) on how to effectively integrate social justice education into the classroom. Therefore, PROGRESS was developed as a system in which to examine the content of a text for eight specific and tangible social justice-related aspects. They are: the ways in which characters are **P**ositioned; representations of **R**ace; sexual **O**rientation; **G**ender in the text; dynamics of **R**elationships; the factors of **E**nvironment that influence the characters' decisions; issues of **S**ocial class that are present; and manifestations of **S**tereotypes. Rooted in the educational philosophies of John Dewey, critical social justice, and critical literacy, PROGRESS works to engage students in analyzing texts, social practices, and the world around them to reveal the systems they uphold.

In order to accomplish this, a pamphlet was created to introduce each aspect of the framework (including a corresponding definition), suggest possible areas of inquiry, and prompt classroom discussion by giving examples of questions. For ease of understanding, a table was created that encompasses the intended scope of PROGRESS as well as a resource entitled 'PROGRESS Report' for assessing student understanding and ability to recognize instances of social justice issues in a text. In order to demonstrate how PROGRESS can be applied in a practical manner, the popular young adult novel *The Absolutely True Diary of a Part-Time Indian* by Sherman Alexie is utilized in the pamphlet, using examples of social justice instances from the text. Thus, the goal of PROGRESS is giving students the opportunity to become aware of social justice issues through evaluation in the hope that they will be able to see themselves reflected in the text, understand the complex problems confronting them today, and act on their new knowledge—which could be the first step in empowering students in pursuit for change.

Presentation Number **171**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Climate and Relation to Grape Quality** | | |
| **Presenter:** | Corydon Funk | | |
| **Mentor:** | Melba Salazar-Gutierrez | **Campus:** | Pullman |
| **Co-Authors:** | Melba Salazar-Gutierrez, Bernardo Chaves, Rick Hamman, Bill Riley | | |
| **Major** | Viticulture and Enology - CAHNRS | | |
| **Category:** | Organismal, Population, Ecological, and Evolutionary Biology | | |

Few studies have directly correlated wine grape harvest quality and bioclimatic indices. Wine grape qualities rely on the base climate of the location where grapes are being grown. The objective of this study was to analyze influence of climatic variability on wine grape harvest qualities. Four grape varieties including: Cabernet Sauvignon, Merlot, Chardonnay, and White Riesling were used for quality data. Harvest and weather data were collected for four locations from 2009 to 2014. The weather data included daily minimum, maximum, and average temperature, and daily precipitation. Following data collection, the weather data were compared to three wine grape qualities: pH level, titratable acidity, and Brix degrees. The bioclimatic indices revealed significant correlations between the two data sets. These indices included three temperature indices, i.e., the Winkler Index, the Huglin Index, and the Cool Night Index. The Cool Night Index was distinguished into three time periods: September, August, and July. The other index, the Branas, Bernon, and Levadoux Hydrothermic Index utilized the temperature and rainfall to estimate mildew susceptibility. The indices were then correlated to three wine grape qualities collected at harvest. The qualities were also compared to weather values with the multidimensional preference analysis (MPA) biplot as a tool to visualize the relationships between the wine grape quality and weather. The Winkler Index and the Huglin Index had significant correlations to all wine grape qualities. The Cool Night Index related significantly to titratable acidity. In contrast, the Branas Bernon and Levadoux index showed fewer significant correlations than those based on temperature. The biplot showed evidence of the relationship between yearly data and wine grape quality. Some qualities were affected by different year's weather more than others, and this could be broadly grouped. The multidimensional preference analysis showed that there was a relationship between grape qualities, location, and cultivar. Further study into the use of an MPA is needed, as this method does not show some known patterns. In summary, this study showed and confirmed that temperature has an impact on major wine grape qualities. Still, more data with new years and locations would be beneficial in the long term.

Presentation Number **172**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Localization of an Actin Binding Site in the N-terminal Region of Leiomodin** | | |
| **Presenter:** | Dayton Wooldridge | | |
| **Mentor:** | Alla Kostyukova | **Campus:** | Pullman |
| **Co-Authors:** | Thu Ly, Dmitri Tolkatchev, Gregory Helms, Alla Kostyukova | | |
| **Major** | Chemical Engineering – CEA | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

Actin polymerizes and forms the thin filaments in muscle sarcomeres. Leiomodin binds to the pointed end of actin filaments and facilitates actin polymerization. Homology with tropomodulin and indirect data suggest actin-binding site(s) in the N-terminal region of leiomodin. The N-terminal amino acid residues between the known tropomyosin-binding site and the Leucine-Rich Repeat domain were divided into peptide fragments, each approximately 40 amino acid residues in length, to study binding with actin by nuclear magnetic resonance (NMR) titration. Two fragments were subcloned. The first fragment, Lmod[45-93], homologous to the known actin-binding site in tropomodulin, was successfully expressed and purified using high performance liquid chromatography. Comparison of the one-dimensional NMR spectra of the pure fragment alone and in the presence of actin demonstrated a complex formation; therefore this fragment contained an actin-binding site. The second fragment, Lmod[113-150], had very low expression and did not result in enough protein to perform NMR titration, most likely due to its high Glu and Asp content. A bigger fragment, Lmod[103-201], was subcloned and purified as $^{15}$N-labeled peptide. Two-dimensional spectra of Lmod[103-201] alone and in the presence of actin were recorded. Unfortunately, even in the labeled sample about two thirds of peaks overlapped. For peaks that were resolved we were not able to observe spectral changes in the presence of actin. Further studies are necessary to study actin-binding properties of this region of leiomodin.

Presentation Number **173**

# ABSTRACT:

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|---|---|---|---|
| **Abstract Title:** | **Hyper Games** | | |
| **Presenter:** | Kacie Salmon | | |
| **Mentor:** | Dr. Jacob Leachman | **Campus:** | Pullman |
| **Co-Authors:** | Dr. Jacob Leachman | | |
| **Major** | Mechanical Engineering - CEA | | |
| **Category:** | Arts and Design | | |

This project stemmed from a desire for the WSU Hydrogen Properties for Energy Research (Hyper) Lab to display its research goals within its labs in a visually pleasing and motivating manner for the students performing research. The design was shaped by the four main stems of focus that the lab adheres to, and developed into a playful theme that would allow researchers to think and learn about different aspects of hydrogen research when looking at the project. The design process began with notebook sketches and moved into many iterations in digital form. The final poster was created completely through digital media, utilizing applications such as Publisher, paint, and pixel editors. Because of the goals of this design, we considered multiple design themes and chose a classic video game themed poster, with four lanes depicting the games and each game depicting a different aspect of research. Many engineers grew up playing classic video games, so the goal was to appeal to this nostalgia and enjoyment of these games. Each game quantitatively represents factual data about an aspect involving the research, such as Delta V values or the specific energy of fuels. In this way, viewers of the poster can decipher meaning from the puzzles hidden within the games, or simply appreciate the artistic representation of the Hyper Lab's research pillars. As of completion, the lab also plans on using the poster as a gift to those who donate to the lab to further the research being done.

Presentation Number **174**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Rapid Gas-Phase Quantification of Chemical Warfare Precursors and Degradants** | | |
| **Presenter:** | John Rodgers | | |
| **Mentor:** | Brian Clowers | **Campus:** | Pullman |
| **Co-Authors:** | Kelsey Morrison, Brian Clowers | | |
| **Major** | Chemistry, Mathematics (minor) - CAS | | |
| **Category:** | Engineering and Physical Sciences | | |

Rapid detection of chemical warfare agent (CWA) precursors and degradation products is crucial in the field of environmental and chemical forensics. The presence or absence of such compounds has implications in national security, international treaty compliance, and is vital in the context of chemical clean-up efforts. Mass spectrometry (MS) instrumental methods can permit such detection with the ability to acquire real-time data while maintaining adequate sensitivity. Careful manipulation of relative proton affinities between reactive species, gas-phase adduct complexes may be designed to enable ultra-sensitive detection techniques. While real-world CWA compounds are the ultimate detection targets, analogs of CWA precursors and degradants serve as safe laboratory surrogates for method characterization. These phosphonic acids and phosphonates possess significant structural similarity and known ionization patterns of actual CWA. This research is focused on the development of detection limits for a library of phosphonate and phosphonic acids differing in the length and structure of their carbon chain functional groups. This information and spectral library will be used to further develop methods using an Atmospheric Flow Tube Mass Spectrometer (AFT-MS), chosen for its demonstrated advantages of high-sensitivity detection of low vapor pressure compounds and real-time data output. By analyzing analyte speciation (ion fragmentation patterns), serial dilutions of analyte may be measured and quantified, which will allow for computation of detection limits. This research will report on the limits of detection and ionization trends for a series of phosphonic acid and phosphonate analogs of chemical warfare precursors and degradants.

Presentation Number **175**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Importance of Nipah Virus Fusion Glycoprotein Cytoplasmic Tail in Localization in Lipid Rafts and Virus-Like Particles** | | |
| **Presenter:** | Courtney Pierce, Christopher Vasil | | |
| **Mentor:** | Hector Aguilar | **Campus:** | Pullman |
| **Co-Authors:** | Erik Contreras, Gunner Johnston, Hector Aguilar | | |
| **Major** | Pierce: Animal Science – CAHNRS; Vasil: Chemistry - CAS | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

Nipah virus (NiV), from the genus Henipavirus, is an emerging zoonotic virus, which causes cell-cell fusion (syncytia) in vital organs including lungs, kidneys, and the brain. The ensuing pneumonia and encephalitis are major contributors to NiV having a mortality rate of ~75%. Due to the lack of treatments and vaccines, the virus is a potential bio-warfare agent. Currently, the Aguilar-Carreno lab is attempting to elucidate the importance of each viral protein as well as host cellular factors NiV infection, specifically during viral particle entry and egress. Previous studies suggest that the M (matrix) protein is crucial to viral assembly whereas the F (fusion) and G (attachment) glycoproteins are essential for viral entry. Interestingly, previous work and our preliminary findings also implicate an importance of the F protein in the processes of assembly and budding. Specifically, we have identified F cytoplasmic tail mutants that alter the ability for F to form viral particles while controlling for things such as protein expression. These mutants include deletion and point mutants and may be used in co-expression experiments with G and M to better illustrate the roles that F plays during budding. Based on findings in other paramyxoviruses implicating lipid rafts as sites of budding and important for viral entry, we are also interested in using lipid raft-deficient cell lines or drugs that inhibit their presence in conjunction with assays to assess the levels of viral particle formation. This focus is supported by preliminary data showing that the NiV F and M but not G proteins associate with lipid rafts when expressed alone. Interestingly, the presence of either F or M can incorporate G into both lipid rafts and into VLPs. These findings may lead to the discovery of a way to inhibit NiV entry or exit.

Presentation Number **176**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Investigating the Antinociceptive effect of Hyperbaric Oxygen (HBO2) in an Animal Model of Fibromyalgia: Role of Nitric Oxide** | | |
| **Presenter:** | Paxton Smith | | |
| **Mentor:** | Raymond M. Quock | **Campus:** | Pullman |
| **Co-Authors:** | Abigail L. Brewer, Yangmiao Zhang, Donald Y. Shirachi and Raymond M. Quock | | |
| **Major** | Neuroscience, CVM, Honors | | |
| **Category:** | Organismal, Population, Ecological, and Evolutionary Biology | | |

Hyperbaric oxygen ($HBO_2$) has been shown to produce antinociception in acute, chronic, and inflammatory pain models in animals [Chung *et al.*, *J Pain*, 11:847-853, 2010; Gibbons *et al.*, *Brain Res.* 1537:111-116, 2013; Sümen *et al.*, *Eur J Pharmacol* 431:265-268, 2001]. This antinociceptive effect of $HBO_2$ has been shown to last for up to two weeks in both chronic and acute pain models. The antinociceptive effect of $HBO_2$ is mediated by nitric oxide (NO) according to previous studies. It has been reported that $HBO_2$ is effective in reducing pain in human subjects suffering from fibromyalgia [Yildiz *et al.*, *J Int Med Res* 32:263-267, 2004]. The mechanism of $HBO_2$-induced antinociception in fibromyalgia has not been investigated to our knowledge. The acidic saline model is a rodent model of fibromyalgia and has been shown to mimic some of the symptoms of the disease [Sluka *et al.*, *Muscle Nerve* 24:37-46, 2001]. The aim of this work was to determine if treatment with $HBO_2$ treatment was effective in reducing nociception in an animal model of fibromyalgia and ascertain whether NO mediates the antinociceptive effect of $HBO_2$. Baseline paw pressure measures were taken, using a Randall-Selitto paw pressure analgesy-meter (Ugo Basile). Animals were injected unilaterally in the gastrocnemius muscle with 20 µl pH 4 acidic saline or pH 7 saline (vehicle). Two days later, animals were injected again with either acidic saline or saline. After 90 min recovery, animals were exposed to a single 60-min treatment of $HBO_2$ at 3.5 ATA or exposed to room air. After another 90 min, mice were assessed, using the paw pressure assay. Results indicate that a single 60-min treatment of $HBO_2$ significantly increased paw pinch thresholds compared to animals exposed only to the acidic saline model of fibromyalgia. Other groups of mice were injected s.c. with either L-$N^G$-nitro-arginine (L-NOARG) or vehicle 60 min before pain testing. We showed that the $HBO^2$-induced antinociceptive effect was reversed by inhibition of nitric oxide synthase. These data indicate that $HBO_2$ effectively reduces nociception caused in the acidic saline model and that the antinociceptive effect of $HBO_2$ may be mediated by production of NO.

Presentation Number **177**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Role of Experience and Meteorological Factors in Migratory Performance of Golden Eagles (*Aquila chrysaetos*)** | | |
| **Presenter:** | Adrian Rus | | |
| **Mentor:** | Todd Katzner | **Campus:** | Pullman |
| **Co-Authors:** | Tricia A. Miller, Adam E. Duerr, Melissa Braham, David Brandes, Michael Lanzone, Todd Katzner | | |
| **Major** | Wildlife Ecology and Conservation - CAHNRS | | |
| **Category:** | Organismal, Population, Ecological, and Evolutionary Biology | | |

Migratory performance of large soaring raptors is influenced by age, experience, and environmental conditions. However, the majority of study of this issue has focused on age, experience and single weather variables. In this study, we used GPS-GSM telemetry to examine the role of a suite of meteorological characteristics on the migratory performance of eastern North American Golden Eagles (*Aquila chrysaetos*). To better understand the variation in daily distance traveled of migrant eagles, we tested two competing hypotheses; 1) migratory performance is determined by weather, and 2) migratory performance is determined by age (and thus experience). We paired meteorological data on solar radiation, wind speed and direction and availability of updraft with telemetry data on 65 eagles of three age classes (juvenile, sub-adult, and adult). Our results show that Golden Eagles traveled longer distances during spring migration than in fall migration and that migratory performance was influenced by weather factors that differed between the two seasons. During autumn migration tailwinds and crosswinds most strongly influenced daily distance traveled. In contrast, during spring migration tailwinds were paired with downward solar radiation (which encourages thermal formation) to most strongly influence daily distance traveled. Adult golden eagles traveled similar distances through worst flying weather than did pre-adults, suggesting a role for experience in determining migratory performance. Our findings provide new insights into the mechanisms that eagles employ in response to different meteorological factors, and into how experienced individuals balance reproductive constraints with the need to travel in ~~weather~~ unfavorable flying ~~for~~ weather~~flying~~.

Presentation Number **178**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Modeling Next Generation Lithium-Sulfur Batteries** | | |
| **Presenter:** | Ramiro Gonzalez | | |
| **Mentor:** | Soumik Banerjee | **Campus:** | Pullman |
| **Co-Authors:** | Aniruddha M. Dive, Soumik Banerjee | | |
| **Major** | Mechanical Engineering - CEA | | |
| **Category:** | Engineering and Physical Sciences | | |

Lithium-sulfur batteries have a maximum theoretical capacity of 2680 Wh/kg, which is roughly four times that of the commercial lithium ion batteries available, and therefore hold excellent promise as energy storage devices for electric vehicles. However, the capacity of lithium-sulfur batteries shows drastic decrease with increasing charge-discharge cycles. This rapid capacity fade occurs because the polysulfides, which are the principal products formed during operation of lithium-sulfur batteries, separate from the cathode, dissolve in the electrolyte solvent and eventually precipitate back at the cathode. Several research articles mention that this so called “shuttle effect” of the polysulfides leads to decrease in active material of the cathode and hence diminishing performance of the battery. The objective of this project is to find a way to improve the cyclic capacity of lithium-sulfur batteries. Our plan to overcome this problem is to model several different cathode support structures based on graphene and graphene oxides with epoxy and hydroxyl functional groups in a DME/DOL (1:1 v/v) electrolyte solution. We have used atomistic simulations to calculate the diffusion coefficients of polysulfide ($S_8^{2-}$) chains and determine the nature of interactions of these polysulfides with the graphene/graphene oxide sheets. We find that the majority of the polysulfides are attracted to and remain on these sheets preventing them from going into the electrolyte solution. The modeled systems show great promise to effectively keep the polysulfides attracted to the graphene/graphene oxide sheets and hence could potentially be used to develop commercial lithium-sulfur batteries with low capacity fade.

Presentation Number **179**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Alteration of ISG and SON68 Nuclear Waste Glass under Gamma Irradiation** | | |
| **Presenter:** | Brynden Riggan | | |
| **Mentor:** | Professor N. A. Wall | **Campus:** | Pullman |
| **Co-Authors:** | Benjamin Parruzot; Lindsey Neill; Thibaut Martin; Nathalie Wall | | |
| **Major** | Chemistry - CAS | | |
| **Category:** | Engineering and Physical Sciences | | |

The primary deterrent to using nuclear power is the formation of radioactive wastes, the lack of a sufficient long term disposal method, and the possibility of leaching radioactive elements into the environment over time. One proposed method for storing nuclear waste is by incorporating the radioactive wastes into a glass matrix - a process called vitrification - after which the glass will be packaged into stainless steel containers and stored in a long term repository. This study evaluates the rate of alteration of the glass under irradiation under conditions representative of actual wastes. The effects of self-irradiation on glass alteration is not typically studied, because of the difficulty of handling of radioactive materials. The influence of gamma irradiation on the glass alteration have been studied, using the unique facility at the WSU Nuclear Radiation Center. Additionally, iron compounds form as part of the corrosion products from the stainless container and also influence glass alteration characteristics. Observation of these effects was achieved by continued monitoring of glass alteration and leaching using Inductively Coupled Plasma Optical Emission Spectroscopy (ICP-OES). These glass alteration studies are vital for the development of the next generation of nuclear waste glasses.

Presentation Number **180**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Ubiquitin-Proteasome System Impairment in Ethanol-Mediated Vision Loss** | | |
| **Presenter:** | Brittany Cole | | |
| **Mentor:** | Michael Varnum | **Campus:** | Pullman |
| **Co-Authors:** | Tshering Sherpa, Pete Meighan, Tamara Davies, Michael Varnum | | |
| **Major** | Psychology, Neuroscience, CAS, CVM | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

Exposure to alcohol in adults and during development is known to lead to many types of degenerative visual impairments, such as those associated with age-related macular degeneration and fetal alcohol spectrum disorders. Despite the large-scale consequences of alcohol abuse on visual function, little is known about the biological mechanisms leading to ethanol-related blindness. One potential explanation is that photoreceptors exposed to ethanol experience a disruption of their ubiquitin-proteasome system (UPS), a major protein-turnover pathway that disposes of normal and improperly-folded proteins, and thus maintains cell homeostasis. Ethanol-mediated changes in protein turnover pathways previously have been observed in liver and brain, but this issue has not yet been examined in the retina. The UPS is thought to be particularly important for photoreceptors due to their massive protein production and turnover demands; as a result, disturbances of UPS function may promote photoreceptor degeneration. Our central hypothesis is that UPS impairment contributes to ethanol-mediated vision loss. Zebrafish larvae present working color vision after five days post fertilization (dpf), providing an excellent model for studies of cone photoreceptor pathology. Here we show that ethanol exposure disrupts visual function in zebrafish larvae, as determined using the optomotor response (OMR) visual behavior test. In addition, we find that ethanol induces accumulation of a fluorescent reporter for UPS impairment, both in transfected mouse cone photoreceptor-derived cells and in transgenic zebrafish cone photoreceptors, consistent with an effect of ethanol on UPS function. Furthermore, transgenic expression of a dominant-negative (defective) ubiquitin in cone photoreceptors increased susceptibility to intense light damage, a model for age-related macular degeneration, but not ethanol-mediated disruption of visual function at 6-12 dpf. Together, these results suggest a potential link between alcohol abuse, blindness, and impairment of the ubiquitin system.

Presentation Number **181**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Development of Prosocial Observation Protocol and Inter-rater Reliability in the Classroom** | | |
| **Presenter:** | Kiera McMenimen | | |
| **Mentor:** | Andy Cavagnetto | **Campus:** | Pullman |
| **Major** | Psychology - CAS | | |
| **Category:** | Social Sciences | | |

Forming a concrete understanding of content, as well as cooperation, is a critical part of early education; but the later is less emphasized in classrooms. To combat this, the development of new resources to enhance cooperation in classrooms is essential. Through the use of Elinor Ostrom's eight core principles, the development of The Prosocial Observation Protocol was created to do just that. The eight principles are as follows: Clearly defined boundaries, graduated sanctions, conflict resolution, minimal recognition of rights to organize, and for groups that are part of larger social systems, there must be an appropriate coordination among relevant groups. (Ostrom 1990). Wilson, Ostrom, and Cox expanded upon these eight core principles to allow for generalizability across many disciplines outside of their original focus. This generalizability allowed for the application of the core design principles to be used in the discipline of education. From the expanded core principles of Wilson, Ostrom, and Cox; five of the eight core design principles were adapted and utilized to develop the Prosocial Observation Protocol being presented here. It is the intended goal for this protocol to enhance prosocial interactions in the classroom that help foster social and emotional development of students. A second goal is to foster an environment that allows students to have ownership of learning. This, in turn, allows students the opportunity to understand the presented content on a deeper level, develop unique ideas, and discover effective ways of group management. To measure the effectiveness of this newly developed observational protocol, two coders watched a series of prerecorded, whole classroom discussion videos from three separate teachers. Then, each coder scored the videos using the observational protocol, and these scores were used to conduct inter-rater reliability to determine consistency between the scores and ensure the protocol is sound.

Presentation Number **182**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Family Support and Campus Climate Relevance to URIM Experiences in a Pre-Medical Program** | | |
| **Presenter:** | Yadira Oregon | | |
| **Mentor:** | Dr. Jeffrey Milem | **Campus:** | Pullman |
| **Major** | Political Science – CAS. Honors | | |
| **Category:** | Social Sciences | | |

The purpose of this study is to understand family support and campus climate relevance to Underrepresented Minorities in Medicine (URiM) and their experience participating in a pre-medical program. A cohort of ten URiM from a pre-medical program were utilized to participate in yearlong semi-structured interviews held at the start of the program, during the middle, and at the end; for the purposes of this study only three participants and their first and second interviews were selected based on the diversity of these participants experiences. The data was then analyzed through Atlas.ti software with open coding formulated through general themes found in literature. Family support was a prominent theme that proved to be of high importance for the interviewed URiM students throughout their participation in the pre-medical program. Campus climate on the other hand was a theme that gradually seemed to increase in prominence and importance from the first interviews and the second interviews. This could be as result of actual exposure to the pre-medical program and their gained knowledge about the campus climate that is being exhibited throughout time. Further research, should focus on targeting students who don't receive any type of familial support in order to create a comparison between those who do receive support. This will allow pre-medical programs to further understand and formulate a curriculum that addresses the needs of URiM and non-traditional students.

Presentation Number **183**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Gut Brain Communication and Food Addictive Behaviors** | | |
| **Presenter:** | Julianna Brutman | | |
| **Mentor:** | Dr. Jon Davis | **Campus:** | Pullman |
| **Co-Authors:** | Arriel VanCleef; Sunil Sirohi; Jon Davis | | |
| **Major** | Neuroscience – CVM, Honors | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

Over two-thirds of the adult population and roughly one third of the youth population in the United States are considered obese or overweight. Health risks associated with obesity include, but are not limited to, heart disease, type 2 diabetes, strokes, some forms of cancer, and high blood pressure. Healthcare costs related to obesity approximate $147 billion US dollars annually. WHO partially accredits the rapid acceleration of obesity worldwide to dietary changes. Therefore, in recent years, a greater importance has been placed on understanding the processes that regulate food intake and energy balance. In this context, pathological feeding behaviors such as binge eating are now recognized as addictive behaviors [DSM-V]. This highlights gut-brain communication as a biological process with the capacity to influence addiction. Importantly, the gut communicates with the brain to control feeding, a process regulated by feeding peptides that target the hypothalamus to control both food intake and body weight. Interestingly, feeding behavior itself leads to genetic regulation of feeding peptides and their receptors in the brain. Presumably, these genetic changes represent a powerful means to control feeding behavior. To investigate this concept, our lab uses a preclinical rodent binge eating model. In this model, rodents display alternating patterns of caloric overconsumption and voluntary caloric restriction. Rodents exposed to this feeding regimen display increased release of feeding peptides from the gut, increased motivation, attention, risk-taking for palatable food, and central genetic changes in brain regions that regulate feeding and executive function. These data indicate that unhealthy patterns of feeding induce neuroendocrine, behavioral, and genetic changes that favor food addicted behavior.

Presentation Number **184**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **The Flexible Nature of Cognitive Control** | | |
| **Presenter:** | Darian Sidebottom | | |
| **Mentor:** | Cristina Wilson | **Campus:** | Pullman |
| **Co-Authors:** | Cristina Wilson | | |
| **Major** | Neuroscience, Psychology – CVM, CAS | | |
| **Category:** | Social Sciences | | |

Cognitive control, the ability to regulate cognition in order to achieve a goal, is an essential component of decision making. The best decision makers show cognitive flexibility, the ability to switch between two modes of control: (1) proactive control, sustained attention to information needed for an upcoming decision, and (2) reactive control, retrieving information at the last moment before a decision. Proactive control is effective at minimizing conflicts between choices but at the cost of having to maintain more information in the focus of attention. Reactive control is less cognitively demanding but at the cost of having to resolve response conflicts. Individual differences in cognition can cause a preference for one form of control. To determine the conditions under which control preferences occur, techniques are needed to switch individuals between control modes. The current study analyzed two switching techniques using a standardized measure of cognitive control, the Continuous Performance Task – AX version (AX-CPT). This task consists of a cue (A or B) followed by a probe (X or Y). The goal is to make one response on target trials (AX), and on non-target trials (AY, BX, BY) make a different response. The use of proactive control results in good performance on BX trials in which maintaining the cue allows for preparation of the required response. Reactive control results in good performance on AY trials in which the probe is indicative of the required response. To switch participants to proactive control, hypothetical monetary rewards were awarded for each trial in which their response was faster than their average response time. To switch participants to reactive control, hypothetical monetary punishments occurred every time they failed to withhold a response on "No-Go" trials, which were flagged at the beginning of the task. The results show that the switching techniques were effective: monetary rewards resulted in increased proactive control and monetary punishments resulted in increased reactive control. Therefore, these techniques can be used in future research to better understand individual differences in control mode preferences. For instance, they could be used to determine whether trait anxious people can overcome a preference for reactive control.

Presentation Number **185**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Characterization of Novel Regulator of Cell Division in Plants** | | |
| **Presenter:** | Rafal Kacprzyk | | |
| **Mentor:** | Andrei Smertenko | **Campus:** | Pullman |
| **Co-Authors:** | Andrei Smertenko, Deirdre Fahy | | |
| **Major** | Biochemistry - CVM | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

Plant cells divide by partitioning the cytoplasm and cellular organelles of mother cells in a process known as cytokinesis. Microtubules are an important component in cytokinesis; they form a dynamic scaffold called the phragmoplasts, which facilitates delivery of building blocks required for construction of cell plate, a partition between daughter cells. The cell plate consists of lipid membrane and oligosaccharide cell wall material. The phragmoplast first constructs the cell plate in the center of mother cells. Then it expands to reach mother cell wall and disappears once cell plate synthesis is finished. During expansion the phragmoplast consist of three zones: the leading edge, transition zone and the lagging edge. The leading edge is dominated by growing microtubules forming ahead of the cell plate and facilitate phragmoplast expansion toward the mother cell wall. The transition zone contains stabilized microtubules, which govern delivery of vesicle cargo carrying cell plate material. Microtubules in the lagging zone undergo depolymerization and then repolymerize at the leading edge. How depolymerization of microtubules is coordinated with the cell plate synthesis remain unknown. Here we characterize a novel cell plate protein kinase (CPK), that controls the microtubule stability in the phragmoplast. Advanced cell imaging was used to demonstrate localization of CPK to the growing cell plate. Measuring dynamics on intracellular localization of CPK revealed stronger association with the edge of expanding cell plate, than with regions where cell plate synthesis has been accomplished. Understanding IMK2 impact on cytokinesis can further our knowledge on dynamics mechanisms in plant morphogenesis.

Presentation Number **186**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Predicting Site Preferences of Impurity Atoms in Intermetallic Compounds Using the Miedema Model** | | |
| **Presenter:** | Andrew Bleasdale | | |
| **Mentor:** | Gary S. Collins | **Campus:** | Pullman |
| **Co-Authors:** | Gary S. Collins | | |
| **Major** | Physics - CAS | | |
| **Category:** | Engineering and Physical Sciences | | |

Intermetallic compounds exist in definite arrangements of atoms or "lattices". The atoms are arranged to minimize the sum of bond energies of all the atoms. This minimal sum is known at the cohesive energy. An impurity, or solute, atom entering this arrangement settles to the lattice site that minimizes the total energy of the modified system. Atoms in contact with each other have a chemical interaction that depends on properties of the two atoms. Compared with the metal atom that it replaces, a solute atom has different chemical interactions with host atoms that it contacts, and also a strain interaction when the solute is larger or smaller than the host atom it replaces. Depending on local surroundings, chemical interactions with neighbors, and volumes of the sites, a solute atom might occupy any of the lattice sites in the compound.

In the 1970's Andries R. Miedema developed a semi-empirical model to calculate cohesive energies of intermetallic compounds. His model has been widely used to determine cohesive energies of compounds and other quantities, including formation energy of vacancies, the energy to place an atom on a wrong site in a compound, and the energy of an isolated solute in a pure metal host. In the present work, his model was extended to make semi-quantitative determinations of energies of solute atoms at different sites in intermetallic compounds.

The extended model was applied to about 100 combinations of host systems and solutes. Surprisingly, comparison of the predicted and observed site preferences, where possible, showed a success rate little better than chance. Many modifications to the site preference model were made, but resulted in no improvement to the success rate. Checks of the algorithms revealed no mistakes in methodology. Given the intuitive, appealing nature of the Miedema model and its successful use in many applications over 3-4 decades, this was a complete surprise. We are at a loss to explain why our application of the Miedema approach does not work better.

Presentation Number **187**

# ABSTRACT:

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|---|---|---|---|
| **Abstract Title:** | **Research Collaboration Networks and Work-Family Conflict: Gender Differences** | | |
| **Presenter:** | Maira Birrueta | | |
| **Mentor:** | Christina Falci | **Campus:** | Pullman |
| **Co-Authors:** | Christina Falci, Ph.D. | | |
| **Major** | Psychology, Spanish, CAS | | |
| **Category:** | Social Sciences | | |

We examined gender differences in and the effect of family-work conflict on network research collaboration. We hypothesized that women will be more likely to experience work and family conflict. Moreover, work and family conflict would lead women to have more marginalized network positions with faculty collaboration networks. As such, work and family conflict may mediate gender differences in faculty research collaboration network structures. We found that women had both higher work and family conflict and more peripheral positions with faculty research collaboration networks. Work and family conflict, however, did not explain gender differences in the structure of faculty research collaborations.

Presentation Number **188**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Ancient Smelt Fish DNA Species Identification from Northern California Region Archaeological Projects** | | |
| **Presenter:** | Erica Palmer | | |
| **Mentor:** | Brian Kemp | **Campus:** | Pullman |
| **Major** | Biology - CAS | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

This project genetically analyzed numerous fish vertebrae from Northern California archaeological sites across the region to determine the species of fish that prehistoric humans harvested. These data provide an unique glance at the diet and strategies of those that inhabited the sites. The archaeological specimens tested in this project were obtained from Nickel Creek (CA-DNO-14), Humboldt Bay (CA-HUM-321), CA-DNO-335, CA-DNO-13, and CA-DNO-22. DNA was extracted from 147 fish vertebrae DNA samples, which resulted in 35 positive sequences. The majority of species identified from the remains were surf smelt (*Hypomesus pretiosus)*. CA-HUM-321 provided most of the samples that retained well preserved mitochondrial DNA, as well as the outlier species identified, Pacific staghorn sculpin (*Leptocottus armatus)*, and smooth dogfish (*Mustelus canis).* This project demonstrates the importance of smelt, specifically *Hypomesus pretiosus,* harvesting in the Northern California region as well as employs research techniques at the forefront of ancient DNA studies.

Presentation Number **189**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **The Effect of a MnO2-Sulur Composite Cathode on Li-S Batteries for use in Emerging Technologies** | | |
| **Presenter:** | Michael Kindle | | |
| **Mentor:** | Dr. Min-Kyu Song | **Campus:** | Pullman |
| **Co-Authors:** | Younghwan Cha, Dr. Min-Kyu Song | | |
| **Major** | Materials Science and Engineering - CEA | | |
| **Category:** | Engineering and Physical Sciences | | |

Lithium-ion (Li-ion) batteries are the dominant technology for rechargeable batteries used in electric cars, portable consumer electronics and many other technologies. The problem is that current Li-ion batteries are not sufficient for emerging technologies for example, for grid energy storage or more advanced electric cars. The Lithium-Sulfur (Li-S) battery is a potential solution to these problems and could provide the needed storage capacity for these emerging technologies. With Li-ion batteries a large inhibitor to obtaining higher an energy storage capacity is the cathode, which is commonly based on graphite. Sulfur has a theoretical energy capacity more than four times higher than that of graphite, showing that replacing graphite with sulfur with lithium as the anode could significantly increase the performance of a Lithium based battery. One of the main problems with the Li-S battery is that it has poor performance over time, with rapid decay in performance as you charge and discharge the battery. However, an addition of manganese dioxide ($MnO_2$) has been shown to greatly improve the stability of the Li-S battery by inhibiting the process where the higher order lithium polysulfides ($Li_2S_x$ ,$X \geq 4$) dissolve into the electrolyte and move to the lithium anode. The coating of the lithium anode with the higher order lithium polysulfides is what damages the longevity of the battery. The $MnO_2$ helps bind the higher order lithium polysulfides to the cathode instead of letting them dissolve into the electrolyte. It does this through an oxidation reaction where they are eventually turned into surface bound polythionates until they are fully reduced to $Li_2S$ which are not soluble in the electrolyte. The addition of $MnO_2$ and its various crystalline forms (α-,β-,γ-,δ-, and λ-) as well as the addition of activated carbon to improve cathode conductivity has been investigated to show the effect it has on the cell performance of Li-S batteries.

Presentation Number **190**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Effects of Intercropping on Aphid Mobility and Density.** | | |
| **Presenter:** | Akaisha Charlton | | |
| **Mentor:** | Dr. David Crowder | **Campus:** | Pullman |
| **Co-Authors:** | Paul Chisholm; Dr.David Crowder | | |
| **Major** | Agricultural Biotechnology - CAHNRS | | |
| **Category:** | Organismal, Population, Ecological, and Evolutionary Biology | | |

In the pea industry, *Acrythosiphon pisum*, or the pea aphid is a key pest. This aphid effects pea and other legume production by transmitting virus and spreading disease in the Palouse and all throughout the country. The purpose of this study was to find ways to limit pea aphid movement and overall density within a system. We hypothesized that in an intercropped system aphid density and vitality would be decreased. To test this assumption, we developed an experiment using two legume species that are hosts to the pea aphid: peas, *Pisum sativum*, and hairy vetch, *Vicia villosa*. In this experiment, aphids were released in cages and allowed to colonize either a pea monoculture, a vetch monoculture, or a mixed pea-vetch system. Our results suggest that in an intercropped system, aphid density is decreased when compared to a system that solely contains peas. Results also suggest that the movement of aphids is reduced in an intercropped system. From these results we conclude that aphid density and movement are decreased in an intercropping system, but additional research is needed to observe

Presentation Number **191**

# ABSTRACT:

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|---|---|---|---|
| **Abstract Title:** | **Modern Medieval Collection** | | |
| **Presenter:** | Jessica Ulmer | | |
| **Mentor:** | Carol Salusso | **Campus:** | Pullman |
| **Major** | Apparel Design - CAHNRS | | |
| **Category:** | Arts and Design | | |

**Inspiration and Purpose:** The energy and style features fondly associated with the middle ages inspired this modern collection. Style feature include bishop sleeves, corsets, handkerchief hems, full length and bodied skirts, pleating, and gathering. Modernization came through quirky features added like pants with sheer panels, dresses with an open back styles and edgy style lines. This collection allows women to channel their sexy inner medieval wench who is flaunting her new garb. These brocade, lace, and satin woven textiles were used in the middle age. The looks get rejuvenated through using these fabrics in daring ways like adding sheer and iridescent fabrics as well as layering to forge mesmerizing effects.

**Process:** Various approaches were used across this collection. The pattern for the corset and pant look was designed using a CAD program. The handkerchief look dress was created through flat patterning using basic pattern blocks are manipulated into a new design. The last two designs were made through draping fabric on a dress form prior to developing the final pattern. This was achieved from marks made while on the form on fabric being transferred into a flat pattern. After patterning each of the garments, prototyping in similar textiles enabled mentor guidance for revisions to improve the final versions.

**Technique:** All looks were sewn together using a basic straight stitch and over-edge seam finish. The corset look had boning added to support the structure and cotton lining added to the pant to provide support to the brocade and prevent distortion in shape. Due to the flowy nature of the design, the first dress look had lining added to avoid body exposure. To add sparkle to two of the designs, lace was layered over satin and outer skirts were had hems trimmed with ribbon.

**Contribution:** These ensembles were created to illustrate that design features no matter how dated can be revitalized into modern looks to create new, innovative designs that support the wearer in re-inventing her visual style.

Presentation Number **192**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Centromeric Behavior and Morphology of Chromosome 16** | | |
| **Presenter:** | Kristin Scott | | |
| **Mentor:** | Terry Hassold | **Campus:** | Pullman |
| **Major** | Genetics and Cell Biology, Japanese – CVM, CAS | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

Numerical chromosome abnormalities are the leading known cause of spontaneous abortions and congenital defects, affecting 15-20% of all pregnancies. Nondisjunction during maternal meiosis is responsible for about a third of all miscarriages, causing mental impairment among survivors, the most common being Down syndrome. Increased maternal age indisputably correlates with an increased incidence of aneuploidy, and extensive information has been collected to further understand the effects and frequency of numerical chromosome abnormalities however, the causation has yet to be entirely discovered. The tendency of individual and groups of chromosomes to experience an abnormal zygotene stage during maternal meiosis varies; centromeric stacking and bubbling was seen to occur most frequently in group C chromosomes. Chromosome 16 has the second highest rate of becoming aneuploid, but despite their similarities in size, chromosome 16 mal-segregates much more frequently than 17 or 18. Chromosomes 16 was seen on average to have wider DNA loops than 17, possibly explaining the increased tendency of chromosome 16 nondisjunction. The frequency of individual chromosomes to become aneuploid varies drastically suggesting different mechanism may be responsible for nondisjunction of individual chromosomes.

Presentation Number **193**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Examining Variation in Plastic Responses to Different Selective Agents in the Least Killifish** | | |
| **Presenter:** | Juan Ramirez | | |
| **Mentor:** | Erica Crespi | **Campus:** | Pullman |
| **Co-Authors:** | Eve Culbreth, Erica Crespi, Joseph Travis | | |
| **Major** | Biology, CAS | | |
| **Category:** | Organismal, Population, Ecological, and Evolutionary Biology | | |

Most studies that examine adaptive phenotypic plasticity focus on one environmental gradient; however, natural populations face combinations of multiple selective agents. Here we tested whether phenotypic responses of female least killifish depended on the long-term environmental conditions of their population: one of high predation risk/low conspecific density and one of low predation risk/high conspecific. We predicted that populations would have evolved a diminished response to the dominant selective agent to maintain fitness in these environments. First, we exposed female fish to either a caged warmouth sunfish for 30 min. or no predator. After 30 additional min. all fish were snap frozen and analyzed for whole-body corticosterone (CORT). In another experiment, we housed females from each of these populations in 114 l aquaria at two densities (3 or 15), and measured reproductive output, growth, and whole-body CORT at the end of the experiment. As predicted, fish with historical exposure to high predation threat exhibited a reduced CORT response to the predator than those from the population with high exposure. In the density experiment, only females from the low-density population had a dramatic reduction of offspring in the crowded conditions relative to those at low density; yet there were no differences in body weight or CORT between densities in fish from either population. Although females from historically high-density conditions maintained fitness as predicted, the reduction in fecundity in females from the low-density population was not mediated by changes in CORT secretion. We are currently determining whether the difference in the reproductive response to density between these two populations is associated with changes in reproductive hormones or gene expression profiles at the level of the ovary/placenta.

Presentation Number **194**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Mathematical Predation Models** | | |
| **Presenter:** | Chris Marshall | | |
| **Mentor:** | Sergey Lapin | **Campus:** | Pullman |
| **Co-Authors:** | Sergey Lapin | | |
| **Major** | Mathematics - CAS | | |
| **Category:** | Computer Science, Mathematics, Statistics, and Information Sciences | | |

This project is focused on agricultural intensification and its impacts of pest outbreaks and losses yielded in crop systems. While intuitively it may seem that producing more crops per unit area would effectively increase yield, this is not the case. Agricultural intensification researches the interactions between crops, their pests, and yields. Agricultural intensification has received little attention in the past, however human population is expanding rapidly and one of the largest challenges for society is sustainable food practices. Agricultural intensification intends on creating solutions for farmers by eliminating pests and increasing crop yield. Our goal mathematically is to find a way to model the interactions between pests and crops that best describes their relationship. When this is achieved, Farmers will know precisely how much crop they can yield for the specific predators they interact with and will know how often they should harvest. This will lead to greater efficiency for the agricultural community and will overall improve the lives of many Americans. I am excited to move forward on this project and progress mathematics and biology to better many people's lives.

Presentation Number **195**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Increasing Aging Services Technologies Awareness through a Video-based Intervention for Caregivers** | | |
| **Presenter:** | Molly Shipman | | |
| **Mentor:** | Maureen Schmitter-Edgecombe | **Campus:** | Pullman |
| **Co-Authors:** | Joyce Tam and Maureen Schmitter-Edgecombe | | |
| **Major** | Neuroscience, CVM | | |
| **Category:** | Social Sciences | | |

Research has shown that aging services technologies (ASTs) can reduce caregiver burden. However, ASTs have been underutilized due to a lack of awareness. This study evaluated the effectiveness of a video-based intervention for caregivers. Thirty-eight caregivers completed a series of questionnaires and an AST knowledge-based tool task before (T1) and after (T2) they viewed videos that discussed memory aids, medication management tools, and daily living aids. The questionnaires assessed AST-related knowledge, attitudes, stigma as well as the overall helpfulness of the intervention. A majority of the participants were female (N=27). Most caregivers indicated that their care-receivers had a hard time doing daily task due to medical conditions (N=31). The highest ranked challenges by caregivers that their care-receiver faced were remembering and managing medications, trouble exercising and completing housework and high fall risk. The biggest group of caregivers lived with their care-receiver (N=15). Compared to pre-intervention (T1), Wilcoxon Signed Ranks tests showed that caregivers were significantly more accurate post-intervention (T2) at correctly identify AST tools (T1 Mdn = 6, T2 Mdn = 10; $p < .001$). Caregivers also self-reported a higher level of perceived AST-related knowledge (T1 Mdn = 3.2, T2 Mdn = 4.4; $p < .001$) and endorsed a lower level of AST-related stigma (T1 Mdn = 3.60, T2 Mdn = 4.00; $p = .041$) after viewing the videos. There were no pre-post differences found in AST attitude (T1 Mdn = 4.83, T2 Mdn = 4.83; $p < .05$), however, attitude scores were highly positive and near ceiling to start. Overall, most participants felt that the intervention was helpful (N=31). The preliminary findings from this study suggested that the video-based intervention was beneficial to caregivers and may have clinical and educational implications.

Presentation Number **196**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Chronic Dihexa Treatment of Normal Rats creates Potential Treatment for Reart Failure** | | |
| **Presenter:** | Angela Rocchi | | |
| **Mentor:** | Dr. Joseph Harding | **Campus:** | Pullman |
| **Co-Authors:** | Zach Warmenhoven, Joseph Harding | | |
| **Major** | Neuroscience – CVM, Honors | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

Every year 4.6 million people are diagnosed with dementia, and 1 in 3 citizens over the age of 65 die of neurodegeneration. Current pharmaceuticals available on the market offer only symptomatic relief but the upcoming pharmaceutical—Dihexa—provides a potential for cognitive rehabilitation.
Based on a naturally occurring peptide, Dihexa activates a neuronal growth hormone to counter the premature cell death associated with neurodegenerative diseases. In a rodent model for Parkinson's disease, Dihexa has shown 60% neuronal regrowth. To observe the long-term effects of the drug, a three month study was conducted to analyze how chronic Dihexa treatment behaves in a normal rat model.

Following the treatment period, a visible trend in improved intellect was evident in two separate cognitive tests: one for spatial reasoning and the other for task acquisition. The subjects treated with Dihexa consistently acquired their learning goals at a more rapid and accurate rate than the placebo group. Superficial analysis of the brain, heart and kidneys revealed no significant difference among treatment groups and no differences were observed in blood chemistries, suggesting the metabolic and emotional states of the treated animals went unchanged by the chronic drug exposure.
An unexpected change in tissue was seen in the heart. The hearts of the rats treated with Dihexa were capable of generating a stronger contraction, exhibiting enhanced cardiac muscle activation and pumping more blood with each heartbeat. This behavior suggests Dihexa acts directly on the contractile proteins of heart muscle, a previously unknown quality of the pharmaceutical. More importantly, this proposes a second therapeutic use as a treatment for congestive heart failure, a disease that kills more than two hundred and fifty thousand Americans per year and leads the fore stated top ten causes of death. Introducing Dihexa into a healthy body resulted in a physiological improvement both inside and outside the nervous system without adverse effects. These results not only support the movement of Dihexa to clinical trials, but unexpectedly widen the scope of viable disease targets to include heart disease.

Presentation Number **197**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **The Role of Thyroid Hormone in the Development of the Functional Morphology of Feeding in the Zebrafish** | | |
| **Presenter:** | Mitchel Wagner | | |
| **Mentor:** | Dr. Jim Cooper | **Campus:** | Tri-Cities |
| **Co-Authors:** | Casey Carter, Demi Galindo, Dr. Elly Sweet, Elinor Lake, Dr. Jim Cooper | | |
| **Major** | General Biological Sciences w/ emphasis in Chemistry, CAS | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

Many thousands of fish species possess mechanically dynamic feeding mechanisms that employ protrusion of the upper jaw. This motion is driven by the downward rotation of the mandible during mouth opening. Such functional integration between the upper and lower jaws requires the morphological integration of these structures. The developmental mechanisms that establish this integration are unknown. An immense number of fishes metamorphose from a distinct larval stage into a juvenile stage. It is after this metamorphosis that jaw protrusion typically appears. Since metamorphosis is strongly associated with a sharp increase in thyroid hormone levels, we sought to investigate the role of the thyroid hormone thyroxine (T4) in establishing jaw integration in the zebrafish (*Danio rerio)*. To this end we examined two genetically modified lines: transgenic fish in which the thyroid gland can be ablated at a chosen stage; and the mutant line *opallus*, which has elevated levels of T4 (hyperthyroid treatment). We compared the cranial morphology and feeding kinematics of hyperthyroid fish with transgenic fish in which the thyroid gland had been ablated (hypothyroid treatment), non-ablated transgenic fish (control) and two strains of wild-type zebrafish (AB and TL). We found that manipulating T4 levels had a strong effect on both craniofacial morphology and feeding kinematics. Upper jaws were highly reduced in hypothyroid fish and they exhibited little to no protrusion during feeding. They were forced to rely heavily on hyoid driven suction feeding. Hyperthyroid fish tended to have enlarged lower jaws, but exhibited less pronounced changes in feeding kinematics. Feeding by hypothyroid fish more closely resembles that of pre-metamorphic zebrafish. This preliminary data suggests that T4 may play and important role in establishing the functional integration of fish jaws.

Presentation Number **198**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Mental Health Assessment in Zero Tolerance Education Policies** | | |
| **Presenter:** | Jan Yochim | | |
| **Mentor:** | Dr. Dana Baker | **Campus:** | Vancouver |
| **Major** | Public Affairs, concentration in Justice Studies - CAS | | |
| **Category:** | Social Sciences | | |

Attention to the mental health of school age children is key to a safe learning environment in the public education policy subsystem. Schools are often the first institution where mental health support is received, which can eliminate long term mental health manifestations associated with a lack of support. Mental health disorders in youth, often mirror behaviors that are considered disruptive, and potentially harmful in a classroom environment. One method K-12 schools use to ensure a safe learning environment is through zero tolerance discipline policies. These policies remove students from the classroom by suspending or expelling them, which in turn increases referrals to the juvenile criminal justice system, where children with disabilities are overrepresented. Federal policies, like the Individuals with Disabilities Education Act (IDEA), give school districts guidelines to follow when suspending or expelling a student with an Individualized Education Plan (IEP), in the form of modified discipline and includes a behavior manifestation review. However, this is not available for the general population of students, nor is an assessment during the discipline process. What (if any) consideration of mental health diagnosis is written into zero tolerance policies articulated at the local level? This study focuses on an analysis of zero tolerance and mental health assessment policies based on stratified random sampling of 200 school districts in the United States. The findings of this study revealed that the majority of districts sampled had publicly available mental health policy. While 70 of those districts with mental health policy had referenced mental health assessment, only 24 of those districts referenced assessment during the suspension, expulsion discipline process. Of those that referenced the mental health assessment during the discipline process, 1 district included this process in their zero tolerance policy.

Presentation Number **199**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **X-ray Absorption Spectroscopy Studies of Structurally Tunable Electronic Materials** | | |
| **Presenter:** | Sarah Kim | | |
| **Mentor:** | Susan Dexheimer | **Campus:** | Pullman |
| **Co-Authors:** | Nathan A Turner, Mathew Marcus, Sirine Fakra, James A Brozik, Susan Dexheimer | | |
| **Major** | Bioengineering - CEA | | |
| **Category:** | Engineering and Physical Sciences | | |


The goal of this project is to characterize the electronic structure of mixed valence metal-halide (MX) linear chain complexes using X-ray absorption spectroscopy. These materials are of interest as model systems for the physics of correlated electron materials because of their structural tunability: the electronic properties of the materials can be systematically controlled by varying their chemical composition.

X-ray absorption spectroscopy is a characterization technique based on the X-ray photoelectric effect and wave nature of electrons. X-ray spectra are unique to the structure around the absorbing atom and its electronic state. Extended X-ray absorption fine structure (EXAFS) is the modulation of an atom's X-ray absorption probability unique to the absorbing atom and its local environment. X-ray absorption near edge structure (XANES) is sensitive to the electronic state of the absorbing atom and its local environment.

We present a comparison of the EXAFS spectra of the MX complex PtCl(en) detected at the Pt $L\text{-}_{I}$ and $L\text{-}_{III}$ absorption edges. The spectra were modeled using FEFF9, an X-ray analysis program that includes electronic structure calculations. The spectra at the two absorption edges are found to contain distinct signal components as a result of the different electronic states contributing to these transitions. We also present a comparison of the XANES spectra of the MX chains with the spectra of the individual monomer sub-units that comprise the chain to assess the contribution of these subunits to the electronic band structure of the chain. Peak fitting of spectra measured at both the Pt and halide absorption edges show contributions from both metal and halide orbitals.

Presentation Number **200**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Larval Zebrafish Lateral Line as a Model for Acoustic Trauma** | | |
| **Presenter:** | Beija Villalpando | | |
| **Mentor:** | Allison B. Coffin | **Campus:** | Vancouver |
| **Co-Authors:** | Phillip M. Uribe and Allison B. Coffin | | |
| **Major** | Neuroscience - CVM | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

Permanent hearing loss caused by excessive noise exposure is a problem affecting over 10 million Americans. Current hearing protective methods, such as ears plugs, are often under utilized and clinical trials using antioxidants to prevent noise-induced hearing loss (NIHL) have provided inconclusive results. Thus, additional efforts are needed to identify noise-specific protective drugs. Larval zebrafish have been used in large-scale drug screens to identify protective drugs for antibiotic-induced hearing loss, because of their easily assessable, externally located hair cells that make up the lateral line. The lateral line consists of clusters of hair cells that are homologous to mammalian inner ear hair cells. My research aims to showcase larval zebrafish as a model organism for the discovery of noise-specific protective drugs. Currently, there is no method that allows larval zebrafish to be exposed to acoustic trauma. Thus, we developed a novel device that stimulates hair cells within the zebrafish lateral line. Larval zebrafish were exposed to excessive noise with varying sound intensities (6-18 W) and durations (20-70 min), and then hair cell survival was assessed at varying time points (24-72 hrs) post-noise exposure. Animals exhibited duration dependent hair cell death with maximum hair cell death occurring 3 days post-noise exposure. Collectively, our research demonstrates that acoustic trauma is experienced by zebrafish in an equivalent manner to mammals. Using this model, a large-scale drug screen is underway to identify drugs that prevent acoustic hair cell death.

Presentation Number **201**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Making a Difference in Disadvantaged Communities** | | |
| **Presenter:** | Jasmine Cheatham | | |
| **Mentor:** | Kimberly Rhoades | **Campus:** | Pullman |
| **Major** | Human Development, Comparative Ethnic Studies – CAHNRS, CAS | | |
| **Category:** | Social Sciences | | |

In disadvantaged neighborhoods, with higher proportions of low-income, lower education levels and minorities residing, there are often few resources available to the members of those communities. There are empirically supported associations between residing in impoverished neighborhoods and behavioral problems such as substance use and delinquency. This study will examine minorities in disadvantaged neighborhoods compared to minorities in non-disadvantaged neighborhoods in Seattle, WA. The goal is to assess associations with neighborhood disadvantage and experiences of substance use and delinquency. Additionally, we will also examine the potential moderating effects that prevention programs and prosocial outlets, in these disadvantaged neighborhoods, have on the members residing. This study will use surveys and interviews to understand the conditions of and influences on people that grew up in these neighborhoods. These tools will allow us to gather information that will allow us to analyze their personal experiences living in these disadvantaged neighborhoods. I will identify my participants by area codes and post flyers in those neighborhoods. Furthermore, this study can help bring awareness of the importance of having resources available in disadvantaged neighborhoods and how the availability of beneficial resources can change the outcome of those residing in impoverished neighborhoods.

Presentation Number **202**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Fruit Height and Shoot Relation to Cherry Fruit Quality** | | |
| **Presenter:** | Gilberto Camarillo | | |
| **Mentor:** | Matthew David Whiting | **Campus:** | Pullman |
| **Major** | Field Crop Management, Fruit and Vegetable Management - CAHNRS | | |
| **Category:** | Applied Sciences | | |

Sweet Cherry (Prunus avium L.) is major crop produced in the United States, with Washington supplying over half of the nation's production. Optimal fruit quality is a main target as the majority of Washington's cherry production is destined for the fresh market. Fruit from 'Skeena' and 'Selah' cherry cultivars which were planted under the V trellis system, were analyzed in the lab for brix content, retention force, firmness, weight of individual cherry, and cherry diameter. Treatments were based upon ten different trees for each cultivar, and a fruit count for each spur. All fruit harvest was done in late June. Analyzations of cherry quality were based upon their height on the tree and whether the fruit spur was located on a shoot or not. Upon testing, lab results showed 'Skeena' cultivar only showed slight increase in brix content and slightly more noticeable increase in stem retention force. 'Selah' resulted with positive increase in only noticeable in brix content. Furthermore, all areas tested showed either a decrease or no differentiation based on height for both 'Skeena' and 'Selah.'

Presentation Number **203**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Examining Omission Errors made by Individuals with Mild Cognitive Impairment and Dementia when Completing Activities of Daily Living.** | | |
| **Presenter:** | Mary Boege | | |
| **Mentor:** | Jenna Beaver, Dr. Maureen Schmitter-Edgecombe | **Campus:** | Pullman |
| **Co-Authors:** | Jenna Beaver, Dr. Maureen Schmitter-Edgecombe | | |
| **Major** | Biology, CAS | | |
| **Category:** | Social Sciences | | |

Older individuals with dementia and with mild cognitive impairment (MCI), a pre-dementia stage, have difficulty completing complex everyday tasks of daily living (e.g. cooking and managing finances). The social and financial cost of individuals with these impairments is high. Researchers are developing technologies to allow impaired individuals to retain their autonomy and successfully remain in their home. The goal of this project was to determine the types of task steps that are left out by dementia and MCI participants when completing tasks of daily living. The following study compared 130 older adult participants (aged 53-94) who were classified as having MCI (n=52), dementia (n=13), or having no cognitive impairment (n=65). To control for age and education, each cognitively impaired individual was matched with a healthy participant of the same age and education level. Participants completed eight everyday tasks of daily living in a campus apartment, including writing out a birthday card, sweeping and dusting, cooking, and operating a DVD. Omissions of activity steps during task completion (i.e. steps not completed) were coded and analyzed by categories as: preparatory (e.g. retrieved broom), action-oriented (e.g. writes a birthday wish), and concluding (e.g. returns DVD to the pile). Across all three categories, the dementia group committed significantly more omission errors than their healthy control counterparts. In contrast, the MCI group committed significantly more errors than controls only in the action-oriented category. Our study suggests that action-oriented omissions errors are most common in MCI, with preparatory and concluding omission errors becoming more prominent in dementia. Information about omission error types can be used in the future to create specific reminders for impaired individuals in their home.

Presentation Number **204**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **The Battle of the Sexes: Billie Jean King v. Bobby Riggs 1973** | | |
| **Presenter:** | Ryan McCartan | | |
| **Mentor:** | Jennifer Thigpen | **Campus:** | Pullman |
| **Major** | History, Political Science - CAS | | |
| **Category:** | Humanities | | |

In 1973, Billie Jean King defeated Bobby Riggs in a highly publicized "Battle of the Sexes" tennis match. King became the first woman to defeat a male competitor in professional tennis history. The Battle of the Sexes tennis tournament consisted of a series of matches that took place between 1973 and 1992, pitting various male and female tennis players against one another for many reasons, including entertainment value, increasing tennis' popularity, and proving which gender was superior. The most famous of those match ups was between King and Riggs, with King beating Riggs in three sets. The Battle of the Sexes match put women's rights and equality into the national spotlight because King was a powerful women's rights activist, advocating for women's rights, equal prize money for women tennis players, and equal exposure for women athletes.

The match between King and Riggs was one the most important tennis matches for women in modern history because it not only increased the popularity of women's tennis in the United States but also brought attention to the feminist movement of the 1970s. The 1970s was an important period for women's rights and, ultimately, for women's athletics, the feminist movement, and the creation of Title IX. My research, conducted under the guidance of Professor Jennifer Thigpen, explores this period, when questions about women's equality were in the national spotlight. The publicity leading up to the match demonstrated that there was much excitement around the match and opinions about who would win. In addition, there was a lot of controversy surrounding the match, including accusations of Riggs losing on purpose and some certainty that Riggs would win, according to the popular media. After the Battle of the Sexes tournament, King became an icon for women's equality. My paper explores this tournament, within the much broader social and political context of the 1970s to understand its meaning and significance.

Presentation Number **205**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Ion Channel Profiling in Vagal Afferent Neurons** | | |
| **Presenter:** | Forrest Shaffer | | |
| **Mentor:** | James Peters | **Campus:** | Pullman |
| **Co-Authors:** | Christine Wu, James Peters | | |
| **Major** | Neuroscience - CVM | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

Vagal afferent neurons arising from cell bodies in the nodose ganglia (NG) relay endogenous information from the visceral organs (including the heart, lungs, and gastrointestinal tract) to the central nervous system and initiate key autonomic reflexes. Vagal afferents contain a variety of ion channels which contribute to their sensory communication. Transient receptor potential (TRP) ion channels have been highly studied for their role in somatosensation and many of the voltage-gated sodium ($Na_v$) channels, and voltage-dependent calcium ($Ca_V$) channels are known to be involved with several sensory modalities, yet the systematic comparison of these groups of ion channels have remained unexplored in vagal afferent neurons. We predict the presence and abundance of specific ion channel types will determine the neurophysiological profile and signaling ability for each neuron. We used quantitative RT-qPCR to investigate and compare relative mRNA expression of 22 TRP channels, 9 $Na_V$ channels and 10 $Ca_v$ channels in whole isolated rat nodose ganglia. At the mRNA level, 10 of the 22 TRP channels studied had high abundance and 3 of the 9 $Na_V$ channels showed high abundance. $Ca_V$ channels have yet to be analyzed, however we expect relatively high expression due to the importance of calcium in cell signaling. These findings provide preliminary data suggesting vagal afferent neurons collectively express a diversity of ion channels which contribute to the specific functioning of individual cells.

Presentation Number **206**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Thermal Compression Assist for Cryogenic Fuel Cell Busses** | | |
| **Presenter:** | Jose Ramos | | |
| **Mentor:** | Jacob Leachman | **Campus:** | Pullman |
| **Co-Authors:** | Jacob Leachman | | |
| **Major** | Mechanical Engineering- CEA | | |
| **Category:** | Engineering and Physical Sciences | | |

My advisor and I have developed a novel concept on a hydraulic accumulator that is assisted in compression with a cryogenic fluid. Liquid hydrogen expands nearly 780 times at room temperature and holds a significant amount of potential energy. Containing this pressure on rooftop accumulators on hydrogen fuel cell busses, we can utilize this expansion pressure to assist in hydraulic power take-off. Initial calculations of the system show that pressures of expansion in an accumulator can reach as high as 10,000 psi; with pressures this high, a substantial fraction of the take-off power can be derived from the regenerative braking system. With the concept and calculations in progress, we are filing an invention disclosure and discussing our system with interested partners.

Presentation Number **207**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Behavior and Disease Recognition of Wood Frog (Lithobates sylvaticus) Juveniles** | | |
| **Presenter:** | Molly Diamond | | |
| **Mentor:** | Erica Crespi | **Campus:** | Pullman |
| **Co-Authors:** | Emily Hall, Erica Crespi | | |
| **Major** | Zoology – CAS, Honors | | |
| **Category:** | Organismal, Population, Ecological, and Evolutionary Biology | | |

Ranavirus is a recurrent epidemic that has caused large die-offs in certain populations of cold-blooded species in the United States. Wood frogs (*Lithobates sylvaticus*) are one such species affected by this disease. Not many studies have been performed on wood frogs during their juvenile, metamorph stage. We exposed lab raised wood frog metamorphs to ranavirus and observed their behavior individually and in pairs at WSU. We hypothesized that diseased frogs would move less than healthy frogs, and that healthy frogs would recognize diseased frogs and try to avoid them. We setup 54 gridded arenas and trialled metamorphs for several days periodically checking the positions of the individual or the pair. We found that whether metamorphs were diseased or not, they followed the same diurnal pattern of movement and were equally active. Wood frogs in mixed pairs on average were spaced a greater distance apart than frogs in control groups or diseased frogs with another diseased frog. This distancing pattern was observed within the first hour of observation. Our results indicate that there is some form of recognition and avoidance occurring in the mixed pairs. This study could help us understand wood frog disease ecology. These behavioral observations if carried out in the wild have an impact on the nature of this species. Currently we are working on DNA extractions to confirm infection since none of the frogs displayed visible symptoms of disease. We will also analyze videos of contact rate trials for mixed and control groups.

Presentation Number **208**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Autonomous Rover** | | |
| **Presenter:** | Kayl Coulston | | |
| **Mentor:** | Matt Taylor | **Campus:** | Pullman |
| **Major** | Computer Science - CEA | | |
| **Category:** | Engineering and Physical Sciences | | |


The goal of this research is to improve the modern process of counting individual trees in a nursery, which at the moment is inefficient, costly, and inaccurate. Multiple times a year employees must walk down every row in a tree nursery and count each tree in order to have an estimate of the nurseries stock. This tedious and time consuming job could be replaced by an autonomous rover, creating the opportunity to save time and money, as well as to both get a more accurate estimate of the number of trees and to record the diameters of the different trees.

My research project designs, builds, programs, and tests an autonomous rover that can be placed in a tree nursery and successfully navigate through each row. Although this has been done before by other universities and companies, such systems run $50,000 or more. We currently are operating under a total budget of a $1,000.

In order to stay under budget we decided to create a low-cost LIDAR system to accurately estimate the position of the trees in relation to the robot. This custom LIDAR system maps the surrounding unknown environment and plots each data point. We then use various algorithms to cluster the data into 4 points, 2 points on each row. These points are used to create lines that symbolize the left and right rows of trees. The rover then determines its position in the row and calculates the movement needed to drive down the middle of the row.

This semester we have been working on testing our algorithms and changing small details. We have been able to successfully navigate down a row and now we are finalizing our changing rows algorithm. After we are finished with this task we will begin testing consecutive rows. While our rover was designed to navigate tree nurseries our low-cost platform could be used in various other agricultural environments and tasks.

Presentation Number **209**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Creating a Model System for Characterizing APOBEC3A and APOBEC3B Induced Mutagenesis in Human Cells** | | |
| **Presenter:** | Anthony Sader | | |
| **Mentor:** | Steven Roberts | **Campus:** | Pullman |
| **Co-Authors:** | Tony Mertz, Steven Roberts | | |
| **Major** | Genetics and Cell Biology, CVM | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

Mutation analysis indicate that expression of APOBEC cytidine deaminases cause mutations in breast, bladder, cervical, head and neck, and lung tumors. Recently, our lab has shown that APOBEC3A (A3A) and APOBEC3B (A3B), which are the most likely mutators of cancer genomes, target and mutate the single-stranded template of the lagging strand during DNA replication. We hypothesize that genetic and environmental factors that perturb replication, increase unrestricted A3A- and A3B- mutagenesis in human cells. In order to test this hypothesis, we cloned A3B and A3B into Lentiviral vectors for expression in human cells. Once we created stable cell lines expressing A3B and A3A, expression of these enzymes was confirmed using a western blot. In the future, we will use these transformed cells to create a defined system in order to quantify and analyze A3A and A3B induced mutations in human cells. This system will be used to determine if chemicals and cancer associated mutations, that cause DNA replication defects, will increase A3A- and A3B- induced mutagenesis.

Presentation Number **210**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Making Sense of Virginity Loss and Sexual Debut in the Media** | | |
| **Presenter:** | Guadalupe Garnica | | |
| **Mentor:** | Stacey Hust | **Campus:** | Pullman |
| **Co-Authors:** | Stacey Hust | | |
| **Major** | Sociology, Human Development – CAS, CAHNRS | | |
| **Category:** | Social Sciences | | |

Since the increase of criminalization of school disciplinary policies in public schools, Latinos have experienced a higher rate of expulsion and suspension than ever before. The criminalization of disciplinary policies contributes to the racial disproportion found in evidence when examining which students are more likely to be suspended or expelled. Policies such as zero tolerance, are part of the "get tough" approach to bringing down school violence. This "get tough" approach includes procedures such as expulsion, suspension, and referrals to alternative schools. The study is to examine how Latinos are directly impacted in their education as a result of "get tough" school disciplinary policies and how they become hyper-criminalized as a result. Hyper-criminalization can be defined as the process of punishing students for actions or behaviors in schools and other youth oriented institutions that then bleed over into the criminal legal system and produce criminal labeling. This can produce a negative self-image in those students as well as derailing their education. This study is an examination of expulsion, suspension, and academic achievement through a series of surveys of students at two different high schools in Washington State. Student participants will be drawn from all specific classrooms including honors courses, students not on track to graduate, a mandatory general course , and an alternative school class. By understanding the mechanisms and extent to which expulsions and suspensions can disrupt the education of students, we can add data from affected students to help determine if these forms of discipline are of any benefit to the student or school.

Presentation Number **211**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Factors for Long-Term Volunteer Participation in Environmental Stewardship Programs** | | |
| **Presenter:** | Mariah Sterner | | |
| **Mentor:** | Bob Simmons | **Campus:** | Pullman |
| **Co-Authors:** | Matthew Paul Brincka Jr, Bob Simmons | | |
| **Major** | Wildlife Ecology and Conservation Science, CAHNRS, CAS | | |
| **Category:** | Social Sciences | | |

The Washington State University (WSU) Extension for the College of Agriculture, Human, and Natural Resource Science (CAHNRS) conducted an evaluation of the various environmental stewardship extension programs operating within the Puget Sound region. An investigative survey was constructed to solicit information regarding volunteer objectives, experiences, ideas, and personal motivations to assist coordinators in the efficient management of these programs. Volunteer responses supplemented the information collected from previous program evaluations and outside literature reviews in order to develop a comprehensive understanding of the program methods and outcomes. A second comparative survey was developed and distributed to the various program coordinators for the collection of professional staff perspectives and recommendations. Accordingly, this information may be used to improve current WSU Extension programs and support the development of future environmental stewardship programs. Recommendations include increasing communication and feedback, promoting volunteer leadership roles, developing additional program value, and presenting strong, manageable, and organized program goals. The completion of this study contributes to the understanding of all environmental based volunteer organizations and provides both a record and model for the success of similar future projects or initiatives.

Presentation Number **212**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Elevated Testosterone Levels in Mice Deficient in the Chromatin Remodeling Enzyme Kdm5c** | | |
| **Presenter:** | Halle Weimar | | |
| **Mentor:** | Dr. Jun Xu | **Campus:** | Pullman |
| **Co-Authors:** | Kevin Lewallen, Dr. Kwanhee Kim, Dr. Yang Shi, Dr. Jun Xu | | |
| **Major** | Neuroscience – CVM, Honors | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |


The X-chromosome gene, *Lysine (K)-specific demethylase 5c* (*Kdm5c*), encodes a histone demethylase involved in epigenetic regulation. By removing methyl groups from lysine 4 on histone H3, the Kdm5c enzyme suppresses the transcription of its targeted genes. When the *Kdm5c* gene is mutated, its protein products are either absent or function poorly, which results in up-regulation of genes normally repressed by Kdm5c. Studies have shown that mutations of *Kdm5c* result in many disorders, including male infertility, aggression, and intellectual disability. The goal of this ongoing project is to uncover the molecular cascade of events responsible for these disorder phenotypes.

This experiment utilized mice with a germline-transmitted, body-wide deletion of *Kdm5c*. The behavior of these *Kdm5c* deficient (also referred to as $Kdm5c^{Def}$) mice was compared to that of wild–type (WT) mice. $Kdm5c^{Def}$ mice displayed higher levels of aggression, reduced sociability, and decreased memory compared to WT mice. Consistent with the finding of elevated aggression, the serum and testicular concentrations of testosterone were higher in the $Kdm5c^{Def}$ mice compared to WT. This elevation of serum testosterone was likely related to the up-regulated expression of androgen responsive genes in the brain as revealed by RNA-seq. To investigate the possible cause of the elevated testosterone levels, the expressions of several genes related to testosterone synthesis were tested in testes with RT-qPCR, and were found to be either decreased in $Kdm5c^{Def}$ mice or similar between the two genotypes, making them less likely to be responsible for this change. Only one steroidogenic gene, *Srd5a1*, showed higher levels of expression in $Kdm5c^{Def}$ mice, which was consistent with higher levels of H3K4 methylation at its promotor in the mutant mice. Histological examination of seminiferous tubules revealed fewer testosterone producing Leydig cells in the $Kdm5c^{Def}$ mice as well as irregularities in spermatogenesis.

The findings of this study provide a better understanding of the role of *Kdm5c* and epigenetic chromatin remodeling in steroid production with direct relevance to spermatogenesis and male infertility. Ultimately, this knowledge could provide better treatments rooted in epigenetics for male infertility as well as symptoms, like aggression, related to abnormal testosterone levels.

Presentation Number **213**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Numerical Determination of Resonance States of Quantum Mechanical Few-body Systems.** | | |
| **Presenter:** | Keith Pearson | | |
| **Mentor:** | D. Blume | **Campus:** | Pullman |
| **Co-Authors:** | D. Blume | | |
| **Major** | Physics, Mathematics, CAS | | |
| **Category:** | Engineering and Physical Sciences | | |

Few-body physics is a rapidly growing area of study concerned with the interaction of a small number of quantum mechanical particles. Of particular interest are parameter windows in which the physics can be said to be "universal." That is, the physics of one system can be understood from the physics of potentially wildly different system, such that the details of the interaction do not matter. Many few-body systems exhibit what are called resonant states, or unstable groupings of particles. A particularly famous resonance is the Hoyle state, which is involved in the stellar nucleosynthesis of carbon. The present work focuses on the development of computational methods to investigate and deepen our understanding of resonances in universal few-body systems. Encouraging progress has been made using a combination of the stochastic variational method, the complex scaling method, and parameter learning algorithms.

Presentation Number **214**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Increasing Titin Compliance Reduces Length-Dependent Force Production and Slows Cross-Bridge Kinetics in Skinned Myocardial Strips from RBM20-/- Mice** | | |
| **Presenter:** | Hannah Pulcastro | | |
| **Mentor:** | Bertrand Tanner | **Campus:** | Pullman |
| **Co-Authors:** | Peter O. Awinda, [King-Lun Li], [Samantha P. Harris], Henk Granzier, Wenji Dong, Bertrand C.W. Tanner | | |
| **Major** | Neuroscience, CVM | | |
| **Category:** | Molecular, Cellular, and Chemical Biology | | |

Titin is a giant protein spanning from the Z-line to the M-line of the cardiac sarcomere. In the I-band titin acts as a molecular spring, contributing to passive mechanical characteristics of the myocardium throughout a heartbeat. RNA Binding Motif Protein 20 (RBM20) suppresses titin splicing, which leads to greater expression of the more compliant N2BA titin isoform in RBM20 knockout mice ($RBM20^{-/-}$) compared to wildtype mice ($RBM20^{+/+}$) that almost exclusively express the stiffer N2B titin isoform. The phenotype of $RBM20^{-/-}$ mice and rats resembles that of dilated cardiomyopathy, similar to naturally occurring RBM20 mutations in humans. Prior studies using $RBM20^{-/-}$ animals have shown that increased titin compliance compromises muscle ultrastructure, attenuates the Frank-Starling relationship, and slows cardiac relaxation. Although our prior computational simulations of muscle contraction suggested that increasing compliance of the sarcomere slows the rate of force development and prolongs cross-bridge attachment, none of these functional changes in $RBM20^{-/-}$ mice have been attributed to varied cross-bridge cycling kinetics. To test the relationship between increased sarcomere compliance and cross-bridge kinetics, we used stochastic length-perturbation analysis in $Ca^{2+}$-activated, skinned papillary muscle strips from $RBM20^{-/-}$ and $RBM20^{+/+}$ mice. We found increasing titin compliance depressed maximal tension, decreased $Ca^{2+}$-sensitivity of the force-pCa relationship, and slowed myosin detachment rate in myocardium from $RBM20^{-/-}$ vs. $RBM20^{+/+}$. As sarcomere length increased from 1.9 to 2.2 µm, length-dependent activation of contraction was suppressed in the $RBM20^{-/-}$ myocardium, even though myosin MgADP release rate decreased ~20% to prolong strong cross-bridge binding at longer sarcomere length. These data suggest that increasing N2BA expression may alter cardiac performance in a length-dependent manner, showing greater deficits in force production and slower cross-bridge kinetics at longer sarcomere length. This study also supports the idea that passive mechanical characteristics of the myocardium influence ensemble cross-bridge behavior and maintenance of force throughout the sarcomere.

Presentation Number **215**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Sex-Trafficking in China: the Politics vs the People** | | |
| **Presenter:** | Alicia Henson | | |
| **Mentor:** | Lydia Gerber | **Campus:** | Pullman |
| **Co-Authors:** | Lydia Gerber | | |
| **Major** | Psychology, Linguistics – CAS, Honors | | |
| **Category:** | Social Sciences | | |

This project examines newspaper reports about China's current sex trafficking problem published in different countries of the world, in order to identify and analyze differences in the way this issue is presented to the public in each of these countries, including China, the United States, South Korea, and two countries from Africa, Rwanda and Angola. I chose these locations from an initially larger pool, since they had the most available sources as well as the most substantial differences. Using a qualitative analysis of the news articles published between 2005 and 2015.

I found in each case, that the reporting was primarily a reflection of each country's politics. US and South Korean sources both challenged China's reputation as a country capable of successfully addressing this issue by presenting grim statistics overall, while Chinese sources attempt to improve its reputation by focusing on its successes against individual cases of sex-trafficking. US sources may have underlying reasons for wanting Communist China to appear as a failure. South Korean news sources, on the other hand, explicitly worry about vulnerable North Korean refugees in China. The two African sources focus more on their own country's problem with sex-trafficking, and as such range between neutral and positive towards China's confrontation with the issue as they mirror their own approaches. I concluded that the political games that are at play demean victims of sex-trafficking.

Sex-trafficking and any other form of human trafficking is slavery, and it is a worldwide problem which humanity must fully cooperate to solve, rather than viewing it from the perspective of competing nation states. Human trafficking is more than just a political issue. It is a humanitarian issue.

Presentation Number **216**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Historical Precipitation Analysis in Relation to the Impact of Climate Change on Regional Dairy Manure Storage and Land Application** | | |
| **Presenter:** | Kaitlin Miller | | |
| **Mentor:** | Joe Harrison | **Campus:** | Pullman |
| **Co-Authors:** | Joe Harrison, Liz Whitefield | | |
| **Major** | Agricultural Biotechnology, CAHNRS | | |
| **Category:** | Engineering and Physical Sciences | | |

There is a need to understand the impact climate change has on manure management. Extreme weather events are indicators of climate change: however, climate change can occur in more subtle ways such as a shift in weather patterns. Increased storm frequency and intensity is projected throughout the United States. However, weather patterns in Western WA are not similar to global, national, or even statewide trends. If precipitation is increasing in frequency and intensity, dairies are at risk regarding manure storage. Manure lagoons are designed to hold manure and waste water from dairy cattle, average precipitation from approximately October through March, and between 7-25 centimeters of excess rainfall in case of a 25 year, 24 hour storm event while including "freeboard". Precipitation data was collected for the time periods of 1950-2000 and 2001-2014 for four sites in Western, WA and one in Eastern, WA site. The data was processed for trends in monthly precipitation as a percent of annual rainfall and its relation to the storage period needed and available days for spring field work. In addition, the number of days it takes to reach a TSUM of 200 degrees C after January 1 of each year (which acts as an indicator of when to spread manure to fields) was calculated, one result being the days to reach a TSUM of 200 in Clearbrook, WA have significantly decreased when comparing 1950-2000 to 2001-2014. It was also determined if storm events are increasing given the historical definition of a 24 hour storm. Dairies in Western WA are required to obtain a fall soil sample for nitrate concentration after September 1 but before 12.7 centimeters (or 5 inches) of rain has accumulated. To evaluate the impact of climate change on this management practice, the 1971-2000 climate normals of various sites were compared throughout Washington and Oregon with the 1981-2000 climate normal. It was determined that the number of days to reach 12.7 centimeters of rainfall (post September 1$^{st}$) has increased in Centralia, WA, Tillamook, OR, Salem, OR and Medford, OR and decreased in Clearbrook, WA affecting the timing of nutrient leaching.

Presentation Number **217**

# ABSTRACT:

| | | | |
|---|---|---|---|
| **Abstract Title:** | **Coeur d'Alene Language Preservation Through Oral Tradition: Cheif Child of the Yellow Root** | | |
| **Presenter:** | Jorden Wilson | | |
| **Mentor:** | Rodney Frey | **Campus:** | Global |
| **Co-Authors:** | Rodney Frey | | |
| **Major** | Psychology - CAS | | |
| **Category:** | Arts and Design | | |


Cultural revitalization for indigenous people or tribes has been on the rise for a number of years. The Schitsu'umsh or Coeur d'Alene Tribe, the author is a registered member of the tribe, have been working on intensive language programs to bring back our indigenous language, part of the Salish family, since there are only 2 native speakers left and seven committed adult members that meet for several hours a day multiple times a week.

Children are taught at the tribal school how to speak the language but when they get home their parents can't practice with them because they don't know the language. Over the years a need has grow to find new and creative solutions to bridge the gap between home and school.

The project involves infusing the Schistu'umsh language through key terms or phrases into an illustrated children's book that closely follows the story "Chief Child of the Root". Originally, the story was recorded, transcribed, and translated by Gladys Reichard for her book *Analysis of Coeur d'Alene Myths* in 1946 from an interview/ session told by Dorothy Nicodemus.

This same story was amended and abridged by Rodney Frey at the University of Idaho in his book *A Landscape Traveled by Coyote and Crane: The World of the Schitsu'umsh* and was titled "Chief Child of the Yellow Root".

Chief Child of the Root is an important story for the Schitsu'umsh because of the unique character "Chief Child of the Root" or "Son of Light" (Sp'ukhwenichelt) who acts as a transformer much the way Coyote functions in other indigenous stories across the northern Americas.

The hope of this project is to bring back the traditions of oral storytelling through keywords in the Schitsu'umsh language, vivid imagery, and to create a sense of place while also helping to reinvigorate tribal interest in old traditions.

Once this project has concluded all of the rights to the story will pass back to the Tribe to allow the Coeur d'Alene Tribal Language Department options for distribution.