SURCA

SHOWCASE FOR UNDERGRADUATE RESEARCH AND CREATIVE ACTIVITIES

March 27, 2017

SURCA.WSU.EDU

SURCA is hosted by the Office of Undergraduate Research part of WSU Undergraduate Education.

Office of
Undergraduate Education
WASHINGTON STATE UNIVERSITY

SURCA 2017

TABLE OF CONTENTS

SURCA 2017

SCHEDULE OF EVENTS

Monday, March 27, 2017

Posters: M.G. Carey Senior Ballroom, Compton Union Building (CUB)

Awards: CUB Auditorium (Room 177)

Noon – 2 p.m.	Student presenters hang their own posters
2:00 - 2:45 p.m.	Informal judging (no students present)
2:45 – 3:45 p.m.	Formal judging (only judges and presenters in room until 3:30 p.m.)
3:30 – 5:00 p.m.	Public viewing
5:00 – 5:45 p.m.	SURCA Awards Ceremony (all welcome to attend)
5:45 p.m.	Presenters remove posters and pick up judges' feedback sheets

SURCA 2017

COMMITTEE

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

2017 Showcase for Undergraduate Research and Creative Activities (SURCA)

Alphabetical Listing of Judges

Office of Undergraduate Education
Washington State University

Guest Judges

Brackney, Kevin, *Nez Perce Tribe*
Braun, Rob
Buehler, David, *Schweitzer Engineering Laboratories, Inc. (SEL)*
Buehler, Martin, *METER Group, Inc. (formerly Decagon Devices, Inc.)*
Campbell, Colin, *METER Group Inc.*
Church, Michael, *Pullman Education Association*
Dhaliwal, Amandeep, *Geneshifters LLC*
Fauci, Mary, *Nez Perce Tribe, Air Quality Program*
Gentry, Paul, *SEL*
Gubba Ravikumar, Krishnanjan, *SEL*
Hoesman, Bill, *Clearwater Paper Corp.*
Needham, Shane, *Alturas Analytics, Inc.*
Robichaud, Peter, *Rocky Mountain Research Station*
Shrope, Nancy, *OGRD (ret.)*
Simpson, Julie, *Nez Perce Tribe - ERWM Air Quality Program*
Spalinger, Susan, *TerraGraphics Environmental Engineering, Inc.*
Stannard, Mark, *USDA Plant Materials, CSS (ret.)*
White, David, *University of Idaho*
Woods, Robin, *Alturas Analytics, Inc.*

WSU Faculty, Staff, and Post-Doctoral Students

Adams Progar, Amber
Adesanya, Adekunle
Alldredge, Rich
Allison, Donald
Andersen, Kim
Asaki, Tom
Austin, Steve
Bailey, Rachel
Barclay, Jenifer
Barry, Tammy
Benson, Margaret
Benson, Scott
Berim, Anna
Berliner, Yvonne
Biswas, Nandita
Blubaugh, Carmen
Bond, Robin
Bond, Trevor
Boyd, Ashley
Bretthauer, Ali
Brinkworth, Amanda
Cady, Patricia
Call, Douglas
Carlson, BJ
Coffey, Todd
Coleman, Elijah
Cox, Anne
Crespi, Erica
Crossler, Robert
Cummings, Lara
Daffin, Lee
Dernell, William
Dickinson, Tom
Dotson, Jo Ann
Dubey, Anamika
Dueben, Rebecca
Dybdahl, Mark
Ebbini, Genell
England, Erica
Erdman, Phyllis
Fahy, Deirdre
Faunce, Ken
Fricke, Suzanne
Fuchs Lokensgard, Rita
Gerber, Lydia
Giordani, Lourdes
Gloss, Lisa
Goetz, Tami
Gomulkiewicz, Richard
Goodman, Alan
Goodman Elgar, Melissa
Hampton, Stephanie
Harcy, Victoria
Herrera, Raymond
Hmielowski, Jay
Hoard, Season
Hutchens, Myiah
Hutchinson, Robert
Hvizdak, Erin
Irlbeck, Nancy
Jewell, Jeremy
Johnson, Corey
Kahn, Michael
Kaur, Ramanjot
Khot, Lav
Kim, Kwanhee
Kimble, Lindsey
Kirk, Max
Knodler, Leigh
Kostyukova, Alla
Labou, Stephanie
Lahiri, Amrita
Lazo, Ryan
Leachman, Jacob
Lee, David Y.
Lee, Pamela
Li, Shuai
Lin, David
Liu, Hang
Lofgren, Eric
Maddison, Lisette
Madsen, Sue Lani
Mancini, Rock
Manzo-Robledo, Francisco
Maquivar, Martin
Martinez, Stephanie
Mazur, Amy
Mazur, Ursula
McFarland, Carol
McLaughlin, Ryan
Miller, Cheryl
Mixter, Phil
Mohan, Amita
Moroz, Natalia
Nanivadekar, Ruta
Nicola, Anthony
Nielsen, Amy
O'Connor, Roberta
O'English, Lorena
Offerdahl, Erika
O'Loughlin, Levi
Olsen, Robert
Oneal, Gail
Ong, Norman
Padowski, Julie
Paul, Narayan
Pendry, Patricia
Peschel, Jason
Phoenix, Karen
Poch, Susan
Posey, Donelle (Dee)
Quam-Wickham, Nancy
Quinlan, Marsha
Quock, Raymond
Ritchie, Sian
Rodgers, Kathleen
Russell, Eric
Ryan, Kathleen
Rynearson, Sheri
Ryu, Young Jay
Sala, Edward
Sanad, Marwa
Sanchez, Rachel
Schneider, Sheilah
Schultz, Joanna
Schwabl, Hubert
Scudiero, Louis
Sena, Leslie Jo
Shah, Devendra
Shil, Niraj
Shringi, Smriti
Smertenko, Andrei
Snider, Denise
Snider, Frederick
Sorensen, Eric
Sprint, Gina
Subbiah, Murugan
Sullivan, Tarah
Swamy, Prashant
Swanson, Mark
Tanaka, Kiwamu
Tolkatchev, Dmitri
Tripathi, Diwaker
Wang, Li-Ju
Ward, Kelly
Watts, Kate
Weathermon, Karen
Whitman, Kara
Willoughby, Jessica
Winuthayanon, Joy
Wong, John
Wu, Di
Yang, Zhengxian
Zambriski, Jenni
Zhang, Kun
Zhang, Renqin
Zhang, Zhiwu
Zhu, Lihong
Zhu, Meijun

SURCA 2017

JUDGES

SURCA thanks the more than 200 judges who donated their time and expertise to evaluate and give valuable feedback to student presenters. In addition to WSU faculty, staff, retirees, and post-doctoral students, the judging pool included representatives from:

Alturas Analytics, Inc.

Aramark Corp.

Baron Telecommunications

Clearwater Paper Corp.

Geneshifters, LLC

METER Group, Inc. (formally Decagon Devices, Inc.)

The Nez Perce Tribe

Pullman Education Association

Schweitzer Engineering Laboratories, Inc.

TerraGraphics Environmental Engineering, Inc.

The University of Idaho

USDA Forest Service, Rocky Mountain Research Station

JUDGE'S RUBRIC

ELEMENT	**CRITERIA** (check ✓ an appropriate box **in *each row***)	Excellent	Very Good	Good	Partial	Absent
1. Student Position The perspective, thesis, hypothesis, idea, or claim that inspired the project.	Articulates or proposes clearly the position (perspective, thesis, hypothesis, idea, or claim) that inspired project					
	Locates position within larger disciplinary context (i.e. the big picture)					
	Analyzes complexity of position; synthesizes other points of view; and evaluates limitations of project					
2. Novel Contribution / Innovative Thinking Novelty or uniqueness of idea, claim, question, form, etc.	Creates a novel or unique idea, question, format, creative work, or approach to address the position					
3. Process / Method Discipline-specific approach to addressing the idea, question, claim, or hypothesis.	Identifies a process or approach to accomplish an end product					
	Explains why the specific process or approach was chosen					
	Examines and investigates the relationship between disciplinary practice(s) and the approach used					
4. Conclusion / Outcome / Creative Product A synthesis of key discoveries drawn from evidence or the creative process. How results or creations apply to larger context or real world.	Presents evidence gathered or elements of creative process leading to the end product (or conclusion)					
	Clearly articulates and effectively defends clearly the conclusion/outcome/creative product with evidence (data, discoveries, theories, creative work)					
	Illustrates significance and analyzes implications of conclusion/outcome/creative product					
5. Presentation / Display Visual presentation of project materials.	Displays research or creative activity in a visually compelling manner with attention to detail and precision in visual presentation					
	Skillfully presents a complete, well-organized display of research or creative activity					
6. Presenter Oral presentation of the content of the project.	Engages audience actively and effectively with confidence					
	Communicates skillfully about the full project					
	Answers inquiries knowledgeably					
	Exhibits a professional demeanor in appearance and communication					

Judge's Rating

Based on your past and current experience as a SURCA judge, check only one box to right that best represents the OVERALL QUALITY of this project and presentation.

☐ A+ ☐ A ☐ A- ☐ B+ ☐ B ☐ B- ☐ C+ ☐ C ☐ C- ☐ D+ ☐ D ☐ F

SURCA 2017

SPONSORS

SURCA thanks these exceptional individuals, companies, and organizations for their generous support of the SURCA 2017 awards to top undergraduate research presenters:

Alturas Analytics, Inc.

BOEING

METER

Robert H. ('77 Engineering & Honors) and Mary L. Rieck

WASHINGTON STATE OPPORTUNITY SCHOLARSHIP

Office of the Provost and Executive Vice President

SURCA 2017

WINNERS ANNOUNCEMENT in WSU NEWS

March 30, 2017

MEDIA: Shelley Pressley, Director, Office of Undergraduate Research in WSU Undergraduate Education, 509-335-1252, spressley@wsu.edu

Beverly Makhani, Director, Communications for WSU Undergraduate Education, 509-335-6679, makhani@wsu.edu

WSU SURCA poster event leads to 54 awards to 61 undergraduate researchers

PULLMAN, Wash.—Of Washington State University's 225 students presenting 205 posters at the sixth annual Showcase for Undergraduate Research and Creative Activities (SURCA) on March 27, 61 received a total of 54 awards for their exceptional presentations.

There were 21 winners of 20 crimson awards, the highest; 23 winners of 19 gray awards, the second-highest; 12 recipients of 10 novice awards, for students who worked up to two semesters on their research and who show exceptional promise; and, 5 recipients of 5 early career awards, given to freshmen and sophomores only. One student won two awards.

Mary Sanchez Lanier, assistant vice provost, described SURCA as the only WSU-wide venue to offer all undergraduates in all majors from all campuses the opportunity to share their mentored research and results.

"Every SURCA student participant learned something new through their research as well as contributed knowledge to their field," said Mary F. Wack, vice provost for undergraduate education. "They also demonstrated considerable effort and had the confidence to deliver a high-quality SURCA presentation to their peers and the public.

"We are inspired by each and every one of those students, and proud that SURCA goes a great distance every year to advance research and help WSU deliver transformational educational experiences to undergraduates in every way."

Donors for awards

"Thanks to support from generous supporters, the total amount presented to the award recipients at SURCA 2017 came to $11,300," said Shelley Pressley, director of the Office of Undergraduate Research, event host and a unit of WSU Undergraduate Education.

Sponsors for the sixth annual event include: Alturas Analytics, Inc., The Boeing Co., Meter Group (of which the former Decagon Devices is now part), Richland alumnus Robert H. ('77 Engineering and

Honors) and Mary L. Rieck, the Washington State Opportunity Scholarship program, and the WSU Office of the Provost and Executive Vice President.

The awards spanned all eight categories of SURCA, which are designed to encompass the type of research, scholarship, and creative activities—collectively referred to as research—that might be conducted in every major in all disciplines at WSU. The number of awards possible in each category is determined by the number of presenters in that category that year.

SURCA 2017 awardees

By SURCA category, the 2017 awardees, mentors, and winning research topics are:

Applied Sciences (6 awards to 6 students)

Crimson awards (2): **Aaron Appleby**, mentor John Reganold, on "Efficacy and Economic Viability of Organic Herbicides in a Young, High-Density Apple Orchard;" and **Megan Miller**, mentor Catherine Daniels, on "Developing High-Quality, Low-Cost Online Training Materials for Adult Learners."

Gray awards (2): **Alexander Haase**, mentor Travis Alexander, on "Analyzing Dry Matter Content as a Selective Metric for Cider Apples;" and **Brennan Hyden**, mentor Amit Dhingra, "Effects of Potential Chemical Germination Stimulants on Legume and Grass Cultivars."

Novice Researcher award (1): **Kimberly Cirillo**, mentor Amber Adams Progar, on "Evaluation of Wild Bird Species Populations on Washington Dairy Farms."

Early Career award (1): **Jessica Hartman**, mentor Megan Lewien, on "Drought Stress: Improving Wheat for the Future."

Arts and Design (6 awards to 11 students)

Crimson awards (2): **Jake Kargl**, mentor Scott Blasco, on "Tempting Time;" and **Kirill Polyanskiy**, mentor Scott Blasco, on "Subharmonics on the Acoustic Violin."

Gray awards (2): **Hamidreza Esmaeillou, Quinton Lum, Victoria Page,** and **James Reyes**, mentor Kathleen Ryan, on "Co-Design of a Bus Shelter: Reviving Community;" and **Maria Tatum**, mentor Kathleen Ryan, on "Rural Revival: The Spirit of a Small Washington Community."

Novice awards (2): **Philip VanDevanter**, mentor Kathleen Ryan, on "Sauk-Suiattle Cultural Center: Co-Designing a Meaningful Place;" **Melanie Laws, Shelby Ruiz,** and **Kelli Young**, mentor Kathleen Ryan, on "Design to Experience."

Computer Science, Mathematics, Statistics, and Information Sciences (1 award to 1 student)

Crimson award (1): **Ryan Summers**, mentor Zhiwu Zhang, on "Parallel Computing for Genome Wide Association Studies." This is the second year Summers won this award in this category.

Engineering and Physical Sciences (8 awards to 10 students)

Crimson awards (2): **Chia-Ling Kang**, mentor Nehal Abu-Lail, on "The Effect of Starvation on Bacterial Survivability in Sand and Evolution of Biofilms: Macro-Scale Study;" **Madison Newberry**, mentor Mia Kiamco, on "Electrical Conductive Hydrogel Coating for Electrochemical Scaffold."

Gray awards (4): **Chia-Ling Kang, Brian Miller,** and **Sinclair Wilson**, mentor Nehal Abu-Lail, "Design of an Effective Biochar-sand Water Filtration System for Rural Countries;" **Bryan Heer**, mentor Amit Bandyopadhyay, on "Novel 3D Printing of Metal Composite Aerospace Structures;" **Travis Holloway**, mentor Paul Benny, on "Asymmetirc [2+1+1] M(CO)2 (M = Re, 99mTc) Fluorescent Radiopharmaceuticals;" **Matthew Waldrip**, mentor Brian Collins, on "Time Delayed Collection Field Experiments for Organic Solar Cells."

Novice Researcher award (1): **Austin Blake**, mentor Arda Gozen, on "Drop on Demand Inkjet Printed Electronics Using Graphene Based Inks."

Early Career award (1): **Dylan Blair**, mentor Arda Gozen, on "3D Printed Composites with Shape Memory Behavior."

Humanities (3 awards to 3 students)

Crimson award (1): **James Whitbread**, mentor Shiv Karunakaran, on "Use of Neurocognitive Measures to Evaluate Cognitive Load During the Mathematical Proving Process."

Gray award (1): **Sydney Robertson**, mentor Ashley Boyd, on "Young Adult Historical Fiction and Social Studies Textbooks: An Integrative Approach."

Novice Researcher award (1): **Casey McNicholas**, mentor Lydia Gerber, on "Peking, the Boxers, and the Multinational Response."

Molecular, Cellular, and Chemical Biology (8 awards to 8 students)

Crimson awards (3): **Samantha Beck**, mentor Shantel Martinez, on "Identification of a Locus Corresponding to the Enhanced Response to Abscisic Acid, ERA8, Gene of Wheat (*Triticum aestivum L.*);" **Brendon Myers**, mentor Daniel Lunn, "Co-Expression of Castor LPCAT with Castor DGAT2 Leads to a Reduction of Hydroxy-Fatty Acid Accumulation in Arabidopsis Seeds;" **Shi Min Tan**, mentor Rita Fuchs Lokensgard, on "Endocannabinoid Mechanism of Cocaine Memory Reconsolidation."

Gray awards (3): **Sierra Bishop**, mentor Cliff Berkman, on "Extracellular Vesicle Biomimetics: A New Means of Tissue Specific Drug Delivery;" **Lindsey Morey**, mentor Michael Varnum, on " Disruption of Cone Photoreceptor Cyclic Nucleotide-Gated Channels in Zebrafish Using CRISPR/Cas9 Genome Editing;" **Collin Warrick**, mentor Ryan McLaughlin, on "Role of Endogenous Cannabinoid Signaling in the Medial Prefrontal Cortex in Cognitive Flexibility."

Novice Researcher award (1): **Marie Andresen**, mentor Michael Court, on "Pharmacogenomics of Propofol Metabolism by Cytochrome P450 Enzymes in Dogs."

Early Career award (1): **Ryan McLaughlin**, mentor Anthony Nicola, on "Effect of Bovine Serum Concentration in Growth Medium on Herpes Simplex Virus Titers."

Organismal, Population, Ecological, and Evolutionary Biology (10 awards to 11 students)

Crimson awards (4): **Chloe Erikson**, mentor Brendan Walker, on "Alcohol Dependence is Associated with Altered *Oprk1* Gene Expression in the Bed Nucleus of the Stria Terminalis and Kappa-opioid Receptor-mediated Escalation of Alcohol Self-administration;" **Kenny Haak** and **Ryan Meech**, mentors Alla Kostyukova and Dmitri Tolkatchev, on "Engineering of a Stable Myosin Neck Fragment for Understanding of the Energy Consumption in Resting Muscle;" **Ashley Hunyh**, mentor Omar Cornejo,

on “Characterizing the Oral Microbiome of East Africans in Association with Their Dental Health Status;” **David Navarro**, mentor Lisa Shipley, on “Determining Deer Behavior Patterns from Different Accelerometer Settings.”

Gray awards (3): **Madison Armstrong**, mentor Mark Dybdahl, on “Phenotypic Plasticity as an Explanation of Invasive Success;” **Carlie Knox**, mentor Rebecca Craft, on “Sex Differences in Opioid-Cannabinoid Interactions on Chronic Inflammatory Pain;” **Angela Rocchi**, mentor Joseph Harding, on “The Effect of Chronic Dihexa Exposure in a Healthy Rat Model.”

Novice Researcher awards (2): **Angeliqua Montoya**, mentor Stephanie Porter, on “Natural Variation for the Presence or Absence of a Symbiosis Island in a Mesorhizobia Population;” and **Connor Osterlund**, mentor Ryan Boylan, on “Buffer Impact on Macro-Invertebrates.”

Early Career award (1): **Abigail Cate**, mentor David Crowder, on “Can Farming Save Wild Bee Species?”

Social Sciences (12 awards to 12 students)

Crimson awards (5): **Ana Barnes**, mentor Jesse Spohnholz, on “A Marriage of Cultures: The Gradual Process of Cultural Integration in a German Immigrant Community;” **Rebecca Podszus**, mentor Lee Daffin, on “Nature Relatedness as a Facilitator to Utilizing the Natural World as a Coping Strategy to Reduce Stress;” **Mia Ryckman**, mentor Carrie Cuttler, on “Don’t Call Me Delusional: The Effect of Noun Labels on Stigmatizing Attitudes and Perceptions of People with Mental Disorders;” **Zachery Schramm**, mentor Melissa Goodman-Elgar, on “Familial Factors Contributing to the Behavioral Expression of Male Homosexuality;” **Sara Van Natta**, mentor Janessa Graves, on “Suicide Prevention Education: Policies for Health Care Professionals Across the United States.”

Gray awards (4): **Kelsey Dammeyer**, mentor Maureen Schmitter-Edgecombe, on “Aiding Everyday Activities with Prompting Technology: A Qualitative Analysis of Dementia Participants’ Experiences;” **Aria Petrucci**, mentor Carrie Cuttler, on “Stretch Your Mind: An Examination of the Effects of Yoga on Executive Functioning;” **Halle Schulz**, mentor Janessa Graves, on “Concepts and Perspectives of Health and Housing Among Homeless and Low Income Adults in Spokane: A Photovoice Project;” **Claire Thornton**, mentor Lydia Gerber, on “The GI Bill at WSC: An Understanding Through Oral Histories.”

Novice Researcher awards (2): **Davin Fladager-McCullough**, mentor Lydia Gerber, on “China in Africa: African Perspectives (2015);” **Kaelin Hamel-Rieken**, mentor Sonia Hall, on “Visualizing the Columbia River Basin: Where’d the Water Go?.”

Early Career award (1): **Heather Heidenreich**, mentor Lydia Gerber, on “Maternal Models in Early China.”

Visit the https://SURCA.wsu.edu website to read all presenters’ full abstracts on their projects.

2017
SHOWCASE FOR UNDERGRADUATE RESEARCH AND CREATIVE ACTIVITIES
ENTRIES
ALPHABETICALLY BY PRESENTER

Poster No.	Presenter	Category	Title of Abstract
227	**Samuel Adera** Mentor: Alan Goodman	Organismal, Population, Ecological, and Evolutionary Biology	Effect of Zika Virus Strains on the Mortality Rate of *Drosophila melanogaster*
229	**Justin Allen** Mentor: Ursula Fittschen	Engineering and Physical Sciences	Incorporating X-ray Fluorescence into Undergraduate Chemistry Curriculum
239	**Said Al-Shidhani** Mentor: Genell Ebbini	Arts and Design	VR Architecture: A Novel Approach to Experiential Design
57	**Jenna Anderst, Sarah Beatty, Ellen Benetti, Melissa Joseph** Mentor: Mark Vandam	Social Sciences	Analysis of a very Large Database of Natural Speech using Machine and Human Methods
192	**Marie Andresen** Mentor: Michael Court	Molecular, Cellular, and Chemical Biology	Pharmacogenomics of Propofol Metabolism by Cytochrome P450 Enzymes in Dogs
123	**Brenda Aparicio** Mentor: Thomas Power	Social Sciences	Individual Differences in College Students Appraisal Styles
59	**Aaron Appleby** Mentor: John Reganold	Applied Sciences	Efficacy and Economic Viability of Organic Herbicides in a Young, High-Density, Apple Orchard
196	**Madison Armstrong** Mentor: Mark Dybdahl	Organismal, Population, Ecological, and Evolutionary Biology	Phenotypic Plasticity as an Explanation of Invasive Success
50	**Raul Arroyo** Mentor: Karen Sanguinet	Applied Sciences	Response of Weed Roots to the Cellulose Biosynthesis Inhibitor Herbicide Indaziflam (Alion)

Poster No.	Presenter	Category	Title of Abstract
122	**Noah Austin** Mentor: David Ernst	Engineering and Physical Sciences	Modeling the Gösgen Neutrino Oscillation Experiment in Order to test for a Fourth Neutrino
1	**Kelly Bakko** Mentor: Jessica Fales	Social Sciences	Do Childhood Peer Victimization Experiences affect Physical and Mental Health Outcomes in Young Adulthood?
14	**Ana Barnes** Mentor: Jesse Spohnholz	Social Sciences	A Marriage of Cultures: The Gradual Process of Cultural Integration in a German Immigrant Community
57	**Sarah Beatty, Jenna Anderst, Ellen Benetti, Melissa Joseph** Mentor: Mark VanDam	Social Sciences	Analysis of a very Large Database of Natural Speech using Machine and Human Methods
190	**Samantha Beck** Mentor: Shantel Martinez	Molecular, Cellular, and Chemical Biology	Identification of a Locus corresponding to the Enhanced Response to Abscisic Acid, ERA8, Gene of Wheat (*Triticum aestivum L.*)
210	**Rebecka Bence** Mentor: Allyson Beall King	Applied Sciences	Sustainable use on the Palouse: Improving the Understanding and Education of Sustainability through a Water Resources Perspective in the Palouse Region
57	**Ellen Benetti, Jenna Anderst, Sarah Beatty, Melissa Joseph** Mentor: Mark VanDam	Social Sciences	Analysis of a very Large Database of Natural Speech using Machine and Human Methods
9	**Marissa Bernhofer, Sara Nogueiro, Devin Noto** Mentor: 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
124	**Sierra Bishop** Mentor: Cliff Berkman	Molecular, Cellular, and Chemical Biology	Extracellular Vesicle Biomimetics: A New Means of Tissue Specific Drug Delivery
167	**Alexander Blackburn** Mentor: Kulvinder Gill	Molecular, Cellular, and Chemical Biology	Genetic Mapping of Seedling Emergence Trait in Bread Wheat
26	**Dylan Blair** Mentor: Arda Gozen	Engineering and Physical Sciences	3D Printed Composites with Shape Memory Behavior

Poster No.	Presenter	Category	Title of Abstract
133	**Austin Blake** Mentor: Arda Gozen	Engineering and Physical Sciences	Drop on Demand Inkjet Printed Electronics Using Graphene Based Inks
237	**Andrew Bleasdale** Mentor: Gary Collins	Engineering and Physical Sciences	Predicting an Impurity Atom's Site Preference in an Intermetallic Compound using Miedema's Method
109	**Megan Block** Mentor: Lee Daffin	Social Sciences	The Controversies Surrounding The Diagnosis of Dissociative Identity Disorder
95	**Catherine Booker** Mentor: Alla Kostyukova	Engineering and Physical Sciences	Reducing the size of POx, a Good Candidate for Biofuel Cells
140	**Hannah Booth** Mentor: Raymond Quock	Organismal, Population, Ecological, and Evolutionary Biology	Effects of Hyperbaric Oxygen (HBO_2) on Morphine-Induced Conditioned Place Preference and Aversion in Mice
158	**Sarah Borgnes** Mentor: Alan Goodman	Molecular, Cellular, and Chemical Biology	*Coxiella burnetii* Nine Mile Phase II Clone 4 Pathogenesis in *Drosophila melanogaster*
173	**Taylor Bruchet** Mentor: Tarah Sullivan	Organismal, Population, Ecological, and Evolutionary Biology	Establishing Cover Crops for Soil Health Improvement in Low-Rainfall Areas of North Central Washington
119	**Julianna Brutman** Mentor: Jon Davis	Molecular, Cellular, and Chemical Biology	Detailing Hypothalamic Epigenetic Events in Rats Exposed to a High Fat Diet
94	**Anna Buzzell** Mentor: Kathleen Ryan	Arts and Design	Merging the Fast and Slow Lanes: Design within the Fast-Food Servicescape
208	**Daniel Cain** Mentor: Cigdem Capan	Engineering and Physical Sciences	RF Modulation Interference at LIGO Hanford
214	**Gilberto Camarillo** Mentor: Matthew Whiting	Applied Sciences	Deficit Irrigation and the Effects on Vegetative Growth and Fruit Quality within Jazz Apples
20	**Kaelin Campbell** Mentor: Nicole Tautges	Applied Sciences	Comparisons of Green Manure Crop attributes in Dryland PNW

Poster No.	Presenter	Category	Title of Abstract
37	**Andrew Cannon** Mentor: Jeffrey McMahon	Engineering and Physical Sciences	Inside Ice Giants from First Principles
13	**Antonio Cardenas, Grace Shinn** Mentor: Brendan Walker	Organismal, Population, Ecological, and Evolutionary Biology	Alcohol Self-administration in Non-dependent and Alcohol-dependent Transgenic TH-Cre Rats.
161	**Grace Carrell** Mentor: Alan Goodman	Molecular, Cellular, and Chemical Biology	Gene Discovery in *Drosophila melanogaster* is used to Study Innate Immunity to West Nile Virus
129	**Morgan Casey** Mentor: Peter Larson	Engineering and Physical Sciences	Hydrothermal Fluid Compositions controlled by Plagioclase Reactions under Hydrothermal Conditions
224	**Abigail Cate** Mentor: David Crowder	Organismal, Population, Ecological, and Evolutionary Biology	Can Farming Save Wild Bee Species?
198	**Hailey Cates** Mentor: Anne Cox	Social Sciences	Examining the Impact of Mindfulness on Physical Activity Enjoyment
10	**Parth Chandak** Mentor: Kelvin Lynn	Engineering and Physical Sciences	Standardizing the Accelerated Crucible Rotation Technique (ACRT) Furnace Setup using a Mechanical System Design Approach
202	**Elaine Chumley** Mentor: Charles Weller	Social Sciences	War on Drugs
54	**Grace Chung** Mentor: Carlos Suarez	Molecular, Cellular, and Chemical Biology	Recognition of Diverse Porcine Reproductive and Respiratory Syndrome Viruses by T-Lymphocytes Induced in Pigs after Infection with a Type-2 PRRSV Strain
45	**Kimberly Cirillo** Mentor: Amber Adams Progar	Applied Sciences	Evaluation of Wild Bird Species Populations on Washington Dairy Farms
68	**Emily Coder** Mentor: Lisa Fournier	Social Sciences	Bucket! I'll Do It Now!
143	**John Combs, John Lawrentz, Christina Lopatin, AJ Schock** Mentor: Michael Rabby	Social Sciences	Utilizing the "Impact Equation" as a Tool for Measuring Social Media Effectiveness

Poster No.	Presenter	Category	Title of Abstract
137	**McKenzie Corpron** Mentor: Martin Maguivar	Organismal, Population, Ecological, and Evolutionary Biology	Can Fertility in Cattle be characterized by Behavior, Ovarian Follicles and Reproductive Maturity? Influence of Follicle Size and Estrus Intensity on Fertility in Beef Cattle following 7-day CO-Synch + CIDR Estrus Synchronization Protocol
29	**Krisandrah Crall** Mentor: Kathleen Ryan	Arts and Design	Information Settlements: And Their Contributions to the Cities They Exist In
181	**Krisandrah Crall, Rattanak Leng** Mentor: Kathleen Ryan	Arts and Design	Fast Growing City with a Plan for the Future, City of Mattawa, WA
51	**Zachary Croft** Mentor: Jeffrey McMahon	Engineering and Physical Sciences	Metallic Hydrogen: A Liquid Superconductor?
17	**Camille Culbertson** Mentor: Carrie Wohleb	Organismal, Population, Ecological, and Evolutionary Biology	Enhancing the sustainability of potato farming operations in the Columbia Basin by providing insect management support
228	**Brittany Cummings** Mentor: R. Charles Weller	Social Sciences	The Effects of Immigration and Tourism on Hawaii's Unique Culture, Economy, and Ecosystem
197	**Jordana Dahmen** Mentor: Christopher Connolly	Applied Sciences	Step-Count Accuracy of Physical Activity Monitors during Pregnancy in Free-Living Conditions
89	**Kelsey Dammeyer** Mentor: Maureen Schmitter-Edgecombe	Social Sciences	Aiding Everyday Activities with Prompting Technology: A Qualitative Analysis of Dementia Participants' Experiences
16	**Lindsey Dearmin, Amy Edmondson** Mentor: Amber Adams-Progar	Applied Sciences	The Impact of Hoof Lesions on Dairy Cow Behavior
191	**Daniel Delgado** Mentor: Chrisopher Connolly	Social Sciences	Exercise Intervention Study on First Generation Students

Poster No.	Presenter	Category	Title of Abstract
209	**Kyle Dorosh** Mentor: Erica Crespi	Organismal, Population, Ecological, and Evolutionary Biology	Effects of a High Stress Environment during the Larval stage on Post-metamorphosis Behavior in Wood Frogs (*Lythobates sylvaticus*)
16	**Amy Edmondson, Lindsey Dearman** Mentor: Amber Adams-Progar	Applied Sciences	Impact of Hoof Lesions on Dairy Cow Behavior
160	**Chloe Erikson** Mentora: Brendan Walker	Organismal, Population, Ecological, and Evolutionary Biology	Alcohol Dependence is associated with Altered *Oprk1* Gene Expression in the Bed Nucleus of the Stria Terminalis and Kappa-Opioid Receptor-Mediated Escalation of Alcohol Self-Administration.
33	**Hamidreza Esmaeillou, Quinton Lum, Victoria Page, James Reyes** Mentor: Kathleen Ryan	Arts and Design	Co-Design of a Bus Shelter: Reviving Community
207	**Tabitha Farthing** Mentor: Lydia Gerber	Social Sciences	The Role of Women among Barefoot Doctors
48	**Jason Fernandez, Samantha Gottlieb** Mentor: Arig Aboulenein	Social Sciences	The Manipulation of Learning Strategies in Experiential Decision Making
205	**Jordan Fernandez** Mentor: Zachariah Heiden	Engineering and Physical Sciences	The Synthesis of Glow in the Dark Amino Acid Organic Dyes
67	**Trisha Fernandez, Hannah Heizer** Mentor: Kathleen Rodgers	Social Sciences	Parent-Teen Closeness and Teen Dating Violence
79	**Davin Fladager-McCullough** Mentor: Lydia Gerber	Social Sciences	China in Africa: African Perspectives (2015)
97	**Rachel Foster** Mentor: Cynthia Corbett	Applied Sciences	Goal Setting & Interventions In a Care Planning Context

Poster No.	Presenter	Category	Title of Abstract
34	**Cristen Frieszell** Mentor: Girish Ganjyal	Applied Sciences	Impacts of Extrusion on Saponin Content of Quinoa
141	**Karen Fritch** Mentor: Kiwamu Tanaka	Molecular, Cellular, and Chemical Biology	Development of Aequorin Luminescence-Based Cytosolic Calcium Measurement in Potato
111	**Alexis Fuller** Mentor: Maureen Schmitter-Edgecombe	Social Sciences	The Night Out Task: Everyday Functioning Assessment of Older and Younger Adults
146	**Corydon Funk** Mentor: Melba Salazar-Gutierrez	Organismal, Population, Ecological, and Evolutionary Biology	Analysis of Statistical Correlations between Weather Values and Wine Grape Harvest Qualities
101	**Crystal Galvan** Mentor: Kim Potowski	Social Sciences	Afro-Mexicans: Representations of Blackness and the Fight for Recognition
118	**Guadalupe Garnica** Mentor: Stacey Hust	Social Sciences	Virginity Loss and Sexual Debut in the Media
38	**Tanya Garnica** Mentor: Cheryl Maxson	Social Sciences	Do Civil Gang Injunctions impose Identification between Associates and Street Gang Members
80	**Jennifer Glover** Mentor: James Peters	Molecular, Cellular, and Chemical Biology	Mechanisms of Oxytocin Activation on Vagal Afferent Neurons
170	**Alex Gollersrud** Mentor: Yujung Nam	Computer Science, Mathematics, Statistics, and Information Sciences	The Social Media Myth Debunked: Why Social Networking Sites are not for Millenials only
48	**Samantha Gottlieb, Jason Fernandez** Mentor: Arig Aboulenein	Social Sciences	The Manipulation of Learning Strategies in Experiential Decision Making
150	**Madeline Gray** Mentor: Allyson Beall King	Applied Sciences	Understanding the Values and Preferences of Stakeholders to Inform Education and Outreach Priorities

Poster No.	Presenter	Category	Title of Abstract
103	**Savannah Griff** Mentor: Charles Weller	Social Sciences	Correlations of Diet and Cancer Around the World
195	**Kyle Groden** Mentor: Jean-Sabin McEwen	Engineering and Physical Sciences	Exploration of the Site-Pairing Preference of Framework Aluminum in ZSM-5 from its Reaction with Trimethylgallium
116	**Kenny Haak, Ryan Meech** Mentors: Alla Kostyukova and Dmitri Tolkatchev	Organismal, Population, Ecological, and Evolutionary Biology	Engineering of a Stable Myosin Neck Fragment for Understanding of the Energy Consumption in Resting Muscle
25	**Alexander Haase** Mentor: Travis Alexander	Applied Sciences	Analyzing Dry Matter Content as a Selective Metric for Cider Apples
53	**Joseph Hall** Mentor: David Lin	Organismal, Population, Ecological, and Evolutionary Biology	Changes in Gait Patterns on Sand versus Solid Surfaces
64	**Kaelin Hamel-Rieken** Mentor: Sonia Hall	Social Sciences	Visualizing the Columbia River Basin, Where'd the Water Go?
55	**Daejha Hare** Mentor: Sarah Ullrich-French	Social Sciences	The Psychological Effects of Exergaming on Overweight Youth
77	**Veronica Harris** Mentor: Cheryl Miller	Molecular, Cellular, and Chemical Biology	The Brucella effector protein BspA binds to MARCH6 which influences host protein secretion
169	**Jessica Hartman** Mentor: Megan Lewien	Applied Sciences	Drought Stress: Improving Wheat for the Future
206	**Katie Hayward** Mentor: Camille Steber	Molecular, Cellular, and Chemical Biology	To have your Cake and Eat it too: Preventing Damage from Preharvest Sprouting in Wheat
178	**Bryan Heer** Mentor: Amit Bandyopadhyay	Engineering and Physical Sciences	Novel 3D Printing of Metal Composite Aerospace Structures
193	**Heather Heidenreich** Mentor: Lydia Gerber	Social Sciences	Maternal Models in Early China

Poster No.	Presenter	Category	Title of Abstract
67	**Hannah Heizer, Trisha Fernancdez** Mentor: Kathleen Rodgers	Social Sciences	Parent-Teen Closeness and Teen Dating Violence
132	**Dalia Hernandez Farias** Mentor: Brenda Barrio	Social Sciences	Teacher Perception and Implementation of Tribal Education
165	**Kathleen Hickey** Mentor: Andrei Smertenko	Molecular, Cellular, and Chemical Biology	Peroxisome Abundance as Drought-Tolerance Marker in Spring Wheat
177	**Chelsea Hill** Mentor: Lee Kalcsits	Applied Sciences	Using Thermal Imaging on Apple Fruit to Assess Sunburn Potential from Solar Radiation under Colored Netting Treatments
63	**Keith Hillaire** Mentor: Brian Collins	Engineering and Physical Sciences	Hierarchical Morphology to Control Energy and Charge Transfer in Polymer Blend Light Emitting Diodes
92	**Ariel Hoffman** Mentor: Ryan Higginbotham	Applied Sciences	Evaluation of Seeding Rates in Soft Durum Wheat
106	**Anneleisce Holleman** Mentor: Ruth Gregory	Social Sciences	User Experience Study of the Student Homepage on the WSU Global Campus Website
217	**Travis Holloway** Mentor: Paul Benny	Engineering and Physical Sciences	Asymmetric [2+1+1] $M(CO)_2$ (M = Re, ^{99m}Tc) Fluorescent Radiopharmaceuticals
15	**Zachary Howard** Mentor: Alan Goodman	Molecular, Cellular, and Chemical Biology	*Coxiella burnetii* Infection in *Drosophila melanogaster*: Key Factors in Pathogenesis
52	**Christina Hubbard** Mentor: Erik Johnson	Social Sciences	Effects of Poverty on Sentencing for Environmental Offenses
147	**Keena Hudson** Mentor: Debbie Christel	Social Sciences	The Thin Ideal: The Role of Social Physique Anxiety and Weight Bias Among Future Fashion Designers
18	**Brianna Humphreys** Mentor: Jennifer Thigpan	Humanities	From Androgyny to Girl Power: A Look at Female Punk Icons

Poster No.	Presenter	Category	Title of Abstract
234	**Stephanie Hust** Mentor: Joseph Hewa	Social Sciences	"The Past is the Future": Availability and Access to Fresh Food in Whitman County
185	**Grant Hutchings** Mentor: Nikolaos Voulgarakis	Computer Science, Mathematics, Statistics, and Information Sciences	Mathematical Modeling of Nano-capacitors
107	**Ashley Huynh** Mentor: Omar Cornejo	Organismal, Population, Ecological, and Evolutionary Biology	Characterizing the Oral Microbiome of East Africans in Association with their Dental Health Status
60	**Christine Huynh** Mentor: Erika Offerdahl	Social Sciences	Tell Me how I am Learning: Characterizing Formative Assessment and Feedback Cycles in Active Learning Classrooms
184	**Brennan Hyden** Mentor: Amit Dhingra	Applied Sciences	Effects of Potential Chemical Germination Stimulants on Legume and Grass Cultivars
136	**Karleanne Iseman** Mentor: Kathleen Ryan	Arts and Design	Uncovering the Character of Rosalia
65	**Lindsey Jackson** Mentor: Kathleen Ryan	Arts and Design	Bringing Rosalia to Life
27	**Cole Jacobson** Mentor: Yujung Nam	Social Sciences	Com 475 Research Project
99	**Jayda Jessie** Mentor: Candis Carraway	Social Sciences	Supervised Agricultural Experience (SAE) Practices of Washington Agriculture Teachers
96	**Grace Jones** Mentor: Sergey Lapin	Computer Science, Mathematics, Statistics, and Information Sciences	Summarization of *Cryptosporidium parvum* Infection in Calves (Single Dose Response)
57	**Melissa Joseph, Jenna Anderst, Sarah Beatty, Ellen Benetti** Mentor: Mark VanDam	Social Sciences	Analysis of a very Large Database of Natural Speech using Machine and Human Methods

Poster No.	Presenter	Category	Title of Abstract
102	**Sabrina Judson** Mentor: Bill Snyder	Organismal, Population, Ecological, and Evolutionary Biology	Do Diverse Plant and Prey Communities Support Predator Diversity on Organic Farms?
6	**Mariah Julson** Mentor: Janet Schmidt	Humanities	Universal Design of Learning in 4H Camps
32	**Chia-Ling Kang, Brian Miller, Sinclair Wilson** Mentor: Nehal Abu-Lail	Engineering and Physical Sciences	Design of an Effective Biochar-Sand Water Filtration System for Rural Countries
138	**Chia-Ling Kang** Mentor: Nehal Abu-Lail	Engineering and Physical Sciences	The Effect of Starvation on Bacterial Survivability in Sand and Evolution of Biofilms: Macro-Scale Study
199	**Hyeongyu Kang** Mentor: Yujung Nam	Humanities	Facebook and Food Advertisement
8	**Jake Kargl** Mentor: Scott Blasco	Arts and Design	Tempting Time
49	**Estifanos Kassa** Mentor: Rey Carabeo	Molecular, Cellular, and Chemical Biology	Developing a Fluorescence Based Approach to Monitoring Nutritionally Regulated Gene Expression during Prokaryotic Development
125	**Christopher Keller** Mentor: Kevin Gray	Molecular, Cellular, and Chemical Biology	The Role of Tmod2's First Actin Binding Site in Actin Dynamics and Neuron Morphology
114	**Paige Kershaw** Mentor: Bruce Williamson Benavides	Molecular, Cellular, and Chemical Biology	Optimizing Transient Transformation in Peas using *Agrobacterium tumefaciens* with a GUS Reporter Gene
238	**Jake Klees** Mentor: Jennifer Thigpen	Humanities	Reading Fashion: Interpreting Women's Status in the United States from Fashion Magazines
135	**Jonathan Klopfstein** Mentor: Hyun Lee	Molecular, Cellular, and Chemical Biology	Occurrence of Ochratoxin A (OTA) in Commercial Dog Foods from the United States

Poster No.	Presenter	Category	Title of Abstract
28	**Carlie Knox** Mentor: Rebecca Craft	Organismal, Population, Ecological, and Evolutionary Biology	Sex Differences in Opioid-Cannabinoid Interactions on Chronic Inflammatory Pain
166	**Cheyenna Krone** Mentor: Alla Kostyukova	Molecular, Cellular, and Chemical Biology	Effect of a Cardiomyopathy-Associated Mutation in Tropomyosin on the Protein's Structure
56	**Deepika Kubsad, Margaux McBirney** Mentor: Michael Skinner	Molecular, Cellular, and Chemical Biology	Atrazine Induced Epigenetic Transgenerational Inheritance of Disease and Lean Phenotype
186	**Marilyn Kulper** Mentor: Markus Flury	Organismal, Population, Ecological, and Evolutionary Biology	Earthworms: The Tireless Workers Beneath our Feet
85	**Holly Lane** Mentor: Michael Neff	Molecular, Cellular, and Chemical Biology	Finding Edgetic Mutations in a Plant DNA-Binding Protein
143	**John Lawrentz, John Combs, Christina Lopatin, AJ Schock** Mentor: Michael Rabby	Social Sciences	Utilizing the "Impact Equation" as a Tool for Measuring Social Media Effectiveness
78	**Melanie Laws, Shelby Ruiz, Kelli Young** Mentor: Kathleen Ryan	Arts and Design	Design to Experience
159	**Alijah Lee** Mentor: Yujung Nam	Computer Science, Mathematics, Statistics, and Information Sciences	Research Paper
181	**Rattanak Leng, Krisandrah Crall** Mentor: Kathleen Ryan	Arts and Design	Fast Growing City with a Plan for the Future: City of Mattawa, WA
62	**Leandro Lessin** Mentor: Daniel Thornton	Organismal, Population, Ecological, and Evolutionary Biology	Activity Patterns of Sympatric Carnivores With and Without Anthropogenic Disturbances

Poster No.	Presenter	Category	Title of Abstract
218	**Jacob Lizarraga** Mentor: Wipawee Winuthayanon	Molecular, Cellular, and Chemical Biology	Epithelial Estrogen Receptor Alpha: Critical for Vaginal Squamous Cell Differentiation
143	**Christina Lopatin, AJ Schock, John Combs, Christina Lopatin** Mentor: Michael Rabby	Social Sciences	Utilizing the "Impact Equation" as a Tool for Measuring Social Media Effectiveness
240	**Adriana Lopez Ayala** Mentor: Amber Adams-Progar	Humanities	The Key to Animal Welfare: Communication
82	**Kenji Lota** Mentor: Michael Goldsby	Humanities	Do We have a Duty to Feralize Formerly Domesticated Animals?
33	**Quinton Lum, Hamidreza Esmaeillou, Victoria Page, James Reyes** Mentor: Kathleen Ryan	Arts and Design	Co-design of a Bus Shelter: Reviving Community
225	**Taylor Lynch** Mentor: Kathleen Ryan	Arts and Design	Cultural Heritage Integrated into Home Design for the Sauk-Suiattle Indian Tribe
182	**Elizabeth Magill** Mentor: William Snyder	Organismal, Population, Ecological, and Evolutionary Biology	The Influence of Plant Volatiles on Parasitoid Oviposition Behavior
46	**Prianka Maharaj** Mentor: Raymond Quock	Organismal, Population, Ecological, and Evolutionary Biology	Possible Role of Tumor Necrosis Factor Alpha (TNFα) in Hyperbaric Oxygen (HBO_2) Suppression of opioid Withdrawal in Morphine-Dependent Mice
69	**Rebekah Mars** Mentor: Michael Konkel	Molecular, Cellular, and Chemical Biology	*Campylobacter jejuni* Localizes with the Trans Golgi Network after Uptake by an Epithelial Cell
100	**Marina Martin** Mentor: Alan Goodman	Molecular, Cellular, and Chemical Biology	Drosophila STING Mediates the Host Defense Response during Listeria Infection

Poster No.	Presenter	Category	Title of Abstract
153	**Holly Matteson** Mentor: Ashley Boyd	Humanities	The Power of PROGRESS: The Memorable Critical Literacies Framework for Social Justice
149	**Keesha Matz** Mentor: Alan Goodman	Molecular, Cellular, and Chemical Biology	Role of the Nipah Virus Fusion Protein and Glycoprotein on Innate Immune Responses
56	**Margaux McBirney, Deepika Kubsad** Mentor: Michael Skinner	Molecular, Cellular, and Chemical Biology	Atrazine Induced Epigenetic Transgenerational Inheritance of Disease and Lean Phenotype
183	**Ryan McLaughlin** Mentor: Anthony Nicola	Molecular, Cellular, and Chemical Biology	Effect of Bovine Serum Concentration in Growth Medium on Herpes Simplex Virus Titers
35	**Casey McNicholas** Mentor: Lydia Gerber	Humanities	Peking, the Boxers, and the Multinational Response
116	**Ryan Meech, Kenny Haak** Mentors: Alla Kostyakova and Dmitri Tolkatchev	Organismal, Population, Ecological, and Evolutionary Biology	Engineering of a Stable Myosin Neck Fragment for Understanding of the Energy Consumption in Resting Muscle
2	**Brett Merritt** Mentor: Hua Tan	Engineering and Physical Sciences	High-Speed Imaging of Micrometer-Sized Droplets
32	**Brian Miller, Chia-Ling Kang, Sinclair Wilson** Mentor: Nehal Abu-Lail	Engineering and Physical Sciences	Design of an Effective Biochar-Sand Water Filtration System for Rural Countries
213	**Kaitlin Miller** Mentor: Arron Carter	Molecular, Cellular, and Chemical Biology	Development of a Chromosome-Wide Genetic Linkage Map for *Puccinia striiformis* QTL in a Doubled-Haploid Wheat Population
242	**Megan Miller** Mentor: Catherine Daniels	Applied Sciences	Developing High-Quality, Low-Cost Online Training Materials for Adult Learners
24	**Joshua Min** Mentor: Sara Humphreys	Molecular, Cellular, and Chemical Biology	Isotope Effect of Phthalazine on Enzyme Mechanism for Drug Metabolism
3	**Angeliqua Montoya** Mentor: Stephanie Porter	Organismal, Population, Ecological, and Evolutionary Biology	Natural Variation for the Presence or Absence of a Symbiosis Island in a Mesorhizobia population

Poster No.	Presenter	Category	Title of Abstract
112	**Jonathan Moore** Mentor: Michael Kessler	Engineering and Physical Sciences	Shear Aligned Carbon Nanotube Sheets
72	**Todd Mordhorst** Mentor: Yujung Nam	Social Sciences	Does Social Interaction on Strava lead to Greater Fitness Levels?
108	**Lindsey Morey** Mentor: Michael Varnum	Molecular, Cellular, and Chemical Biology	Disruption of Cone Photoreceptor Cyclic Nucleotide-Gated Channels in Zebrafish Using CRISPR/Cas9 Genome Editing
233	**Brendon Myers** Mentor: Daniel Lunn	Molecular, Cellular, and Chemical Biology	Co-expression of Castor LPCAT with Castor DGAT2 leads to a Reduction of Hydroxy-Fatty Acid Accumulation in Arabidopsis Seeds.
58	**Karina Myers** Mentor: Yujung Nam	Computer Science, Mathematics, Statistics, and Information Sciences	The Effects of Social Media
179	**Richard Myles** Mentor: Cliff Berkman	Molecular, Cellular, and Chemical Biology	Development of α-gal for Linkage to the TG97 Inhibitor of PSMA on Prostate Cancer
126	**David Navarro** Mentor: Lisa Shipley	Organismal, Population, Ecological, and Evolutionary Biology	Determining Deer Behavior Patterns from Different Accelerometer Settings
41	**Eric Navarro** Mentor: Erica Crespi	Organismal, Population, Ecological, and Evolutionary Biology	Retention of Learning through Life Stages in *Xenopus laevis*
115	**Madison Newberry** Mentor: Mia Kiamco	Engineering and Physical Sciences	Electrical Conductive Hydrogel coating for Electrochemical Scaffold
236	**Lambert Ngenzi** Mentor: Alex Fremier	Applied Sciences	Quantifying the Accuracy of Landsat in estimating Reservoir Water Surface Area
9	**Sara Nogueiro, Marissa Bernhofer, Devin Noto** Mentor: 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

Poster No.	Presenter	Category	Title of Abstract
128	**Katie Nordlie** Mentor: Yujung Nam	Computer Science, Mathematics, Statistics, and Information Sciences	Computer-mediated Voice
9	**Devin Noto, Marissa Bernhofer, Sara Nogueiro** Mentor: 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
189	**Cassondra Noyen** Mentor: Yujung Nam	Humanities	Do Health Apps on Mobile Devices Really Work?
163	**Natalee Nunes, Ye Eun Park** Mentor: Kathleen Rodgers	Social Sciences	"How Parent and Teen relationships and Communication Shape Teens' understanding of Romantic Relationships"
130	**Keven Ortega** Mentor: Sara Serra	Applied Sciences	CAHNRS Summer Internship: Manchurian Crabapple Pollinizer Replacement
180	**Connor Osterlund** Mentor: Ryan Boylan	Organismal, Population, Ecological, and Evolutionary Biology	Buffer Impact on Micro-Invertebrates
33	**Victoria Page, Hamidreza Esmaeillou, Victoria Page, James Reyes** Mentor: Kathleen Ryan	Arts and Design	Co-design of a Bus Shelter: Reviving Community
74	**Victoria Page** Mentor: Kathleen Ryan	Arts and Design	Animal Shelter Design: Establishing Positive Connections between Humans, Animals and Design
163	**Ye Eun Park, Natalee Nunes** Mentor: Kathleen Rodgers	Social Sciences	"How Parent and Teen Relationships and Communication Shape Teens' Understanding of Romantic Relationships"
81	**Justin Parker** Mentor: John Wolff	Engineering and Physical Sciences	Tephrochronology of Eastern Washington Ash Fallout Deposits

Poster No.	Presenter	Category	Title of Abstract
162	**Mariah Petersen** Mentor: Crystal Lederhos Smith	Applied Sciences	Examining Context Based Barriers to Patient Self-Identified Health Care in Patients with Multiple Chronic Conditions
66	**Aria Petrucci** Mentor: Carrie Cuttler	Social Sciences	Stretch Your Mind: An Examination of the Effects of Yoga on Executive Functioning
139	**Anna Pettyjohn** Mentor: Rachel Dannay	Applied Sciences	What's the Buzz?
226	**Cassandra Phillips** Mentor: Doerte Blume	Engineering and Physical Sciences	Quantitative Comparison of Classical and Quantum Mechanical Random Walks of Non-interacting Particles
148	**Rebecca Podszus** Mentor: Lee Daffin	Social Sciences	Nature Relatedness as a Facilitator to Utilizing the Natural World as a Coping Strategy to Reduce Stress
244	**Kirill Polyanskiy** Mentor: Scott Blasco	Arts and Design	Subharmonics on the Acoustic Violin
61	**Jessica Puente Arroyo** Mentor: George Vandemark	Molecular, Cellular, and Chemical Biology	Genetic Diversity of *Rhizobium leguminosarum* and *Mesorhizobium ciceri* from Pea and Chickpea Fields in the Palouse
121	**Karla Rabadan** Mentor: Yujung Nam	Applied Sciences	COM 475 – Abstract
204	**Mirza Rachmat** Mentor: Stephanie Smith	Applied Sciences	Food Safety Knowledge and Food Handling Practices Assessment across Washington State
212	**Olivia Ranft** Mentor: Bernard Van Wie	Engineering and Physical Sciences	Design of a Rapid, Inexpensive Sensor for Biomarker Molecules
86	**Tyler Reid** Mentor: Kathleen Ryan	Arts and Design	Flexibility: Facilitation Co-Design Community Workshop
33	**James Reyes, Hamidreza Esmaeillou, Quinton Lum, Victoria Page** Mentor: Kathleen Ryan	Arts and Design	Co-design of a Bus Shelter: Reviving Community

Poster No.	Presenter	Category	Title of Abstract
241	**Jameshia Rice** Mentor: Bernard Van Wie	Engineering and Physical Sciences	Low-cost Desktop Learning Modules (DLMs)
144	**Elizabeth Rice-Reynolds** Mentor: Steven Roberts	Molecular, Cellular, and Chemical Biology	Characterizing Modifiers of APOBEC-Induced Mutagenesis
235	**Camren Richards** Mentor: Darrin Griechen	Arts and Design	EnCity - WSU Solar Decathlon
134	**Sydney Robertson** Mentor: Ashley Boyd	Humanities	Young Adult Historical Fiction and Social Studies Textbooks: An Integrative Approach
156	**Patrick Robichaud** Mentor: Tom Jobson	Engineering and Physical Sciences	Lewiston-Clarkston Valley Formaldehyde Study
154	**Angela Rocchi** Mentor: Joseph Harding	Organismal, Population, Ecological, and Evolutionary Biology	The Effect of Chronic Dihexa Exposure in a Healthy Rat Model
211	**Christaldo Rodriguez** Mentor: Charles Weller	Humanities	A Clash of Cultures: The West vs. Islam
216	**Alfredo Rosas** Mentor: Kathleen Ryan	Arts and Design	Community Efforts to Improve People Walking in a Small Town
78	**Shelby Ruiz, Melanie Laws, Kelli Young** Mentor: Kathleen Ryan	Arts and Design	Design to Experience
151	**Mia Ryckman** Mentor: Carrie Cuttler	Social Sciences	Don't Call Me Delusional: The Effect of Noun Labels on Stigmatizing Attitudes and Perceptions of People with Mental Disorders
93	**Tyler Sabin** Mentor: Lynne Carpenter-Boggs	Organismal, Population, Ecological, and Evolutionary Biology	Nitrogen Dynamics of Cover Cropping in an Organic System

Poster No.	Presenter	Category	Title of Abstract
19	**Hayley Sandberg** Mentor: Yujung Nam	Social Sciences	Mind over Media: The Internet's Effect on Mental Health
88	**Jenna Schafer** Mentor: Amber Adams-Progar	Organismal, Population, Ecological, and Evolutionary Biology	Behavioral Indicators of Illness in Jersey Calves during Cold Weather
175	**Seth Schneider** Mentor: Anthony Nicola	Molecular, Cellular, and Chemical Biology	Combatting Herpes Simplex Virus with the Multiple Myeloma Drug Bortezomib
143	**AJ Schock, John Combs, John Lawrentz, Christina Lopatin** Mentor: Michael Rabby	Social Sciences	Utilizing the "Impact Equation" as a Tool for measuring Social Media Effectiveness
84	**Zachery Schramm** Mentor: Melissa Goodman-Elgar	Social Sciences	Familial Factors Contributing to the Behavioral Expression of Male Homosexuality
155	**Halle Schulz** Mentor: Jenessa Graves	Social Sciences	Concepts and Perspectives of Health and Housing among Homeless and Low income Adults in Spokane: A Photovoice Project
4	**Autumn Segner** Mentor: Jennifer Thigpen	Social Sciences	The Invisible Struggle: Understanding the Stigma of Mental Illness and Its Roots
13	**Grace Shinn, Antonio Cardenas** Mentor: Brendan Walker	Organismal, Population, Ecological, and Evolutionary Biology	Alcohol Self-administration in Non-dependent and Alcohol-dependent Transgenic TH-Cre rats
91	**Justin Slayton** Mentor: Yujung Nam	Social Sciences	Teams, Guilds and Clans: The Effects of Social Influence on User Behavior and Attitudes in Video Games
171	**Joshua Smith** Mentor: Steven Saunders	Engineering and Physical Sciences	Hydroamination of Alkynes using Gold Nanoparticles Encapsulated in Silicone Dioxide
131	**Pierce Spencer** Mentor: Rebecca Craft	Organismal, Population, Ecological, and Evolutionary Biology	Reversal of Pain-Induced Place Aversion by Morphine and THC

Poster No.	Presenter	Category	Title of Abstract
30	**Gabrielle Struve** Menter: Carrie Cuttler	Social Sciences	Don't Forget Downward Dog: An Examination of the Effects of Yoga on Prospective Memory
159	**Andaya Sugayan** Mentor: Yujung Nam	Social Sciences	Mediated Personalities in the 2016 Election
113	**Ryan Summers** Mentor: Zhiwu Zhang	Computer Science, Mathematics, Statistics, and Information Sciences	Parallel Computing for Genome Wide Association Studies
201	**Allegra Sundstrom** Menter: Joanna Kelley	Organismal, Population, Ecological, and Evolutionary Biology	Phylogenetic Comparisons and Genetic Variation in Brown Bears (*Ursus arctos*)
87	**Kathryn Sutherland** Mentor: Lindsay Welfelt	Organismal, Population, Ecological, and Evolutionary Biology	Predictive Relationship between Chest Girth and Weight in Washington Black Bears
200	**Keila Tam** Mentor: Wipawee Winuthayanon	Molecular, Cellular, and Chemical Biology	Isolating Secretory Cells from the Female Reproductive Tract using Tamoxifen on Female Mouse Model
39	**Shi MinTan** Mentor: Rita Fuchs Lokensgard	Molecular, Cellular, and Chemical Biology	Endocannabinoid Mechanism of Cocaine Memory Reconsolidation
76	**Matthew Tanoeihusada** Mentor: Melito Joyner	Applied Sciences	The Impact of Processing Parameters and Formulation on the Development of Free Whey in Yogurt
187	**Maria Tatum** Mentor: Kathleen Ryan	Arts and Design	Rural Revival: The Spirit of a Small Washington Community
176	**Leslie Taylor** Mentor: Lee Daffin	Social Sciences	The Impact of Ethical Priming Statements on Online Test-Taking Behavior
145	**Claire Thornton** Mentor: Lydia Gerber	Social Sciences	The GI Bill at WSC: An Understanding through Oral Histories
5	**Maria Torres** Mentor: Mohammed Noor-a-Alam	Engineering and Physical Sciences	Plane Wall Thermal Conductivity

Poster No.	Presenter	Category	Title of Abstract
172	**Chasity Trammell** Mentor: Alan Goodman	Molecular, Cellular, and Chemical Biology	Dropping Like Flies: Innate Immune Responses of *Drosophila melanogaster* During West Nile virus Infection
110	**Oscar Ulloa** Mentor: Meijun Zhu	Applied Sciences	Listeria monocytogenes Intervention on Fuji and Granny Smith Apples with a Novel Sanitizer
215	**Sara Van Natta** Mentor: Janessa Graves	Social Sciences	Suicide Prevention Education: Policies for Health Care Professionals across the United States
40	**Philip VanDevanter** Mentor: Kathleen Ryan	Arts and Design	Sauk-Suiattle Cultural Center: Co-Designing a Meaningful Place
127	**Adilenne Villanueva** Mentor: Linda Heidenreich	Humanities	Impacts of Teachers on Undocumented Students in Secondary and Postsecondary Education in the Pacific Northwest
152	**Nhi Vu** Mentor: Marianne Elliott	Applied Sciences	Movement of *Phythopthora ramorum* Inoculum in the Soil Profile
243	**Tuong Vu** Mentor: Douglas Collins	Applied Sciences	Soil Nitrate Quick Test to Optimize Nitrogen Management on Organic Farms
83	**Mitchel Wagner** Mentor: Jim Cooper	Organismal, Population, Ecological, and Evolutionary Biology	Developmental Mechanisms and the Evolution of the Functional Morphology of Feeding in Danionine Minnows, including the Zebrafish
73	**Matthew Waldrip** Mentor: Brian Collins	Engineering and Physical Sciences	Time Delayed Collection Field Experiments for Organic Solar Cells
168	**Collin Warrick** Mentor: Ryan McLaughlin	Molecular, Cellular, and Chemical Biology	Role of Endogenous Cannabinoid Signaling in the Medial Prefrontal Cortex in Cognitive Flexibility
31	**Nicholas Webb** Mentor: Rock Mancini	Molecular, Cellular, and Chemical Biology	Pyrimido[5,4-b]indole Immunostimulant Homodimers through Solid Phase Peptide Synthesis
47	**James Whitbread** Mentor: Shiv Karunakaran	Humanities	Use of Neurocognitive Measures to Evaluate Cognitive Load During the Mathematical Proving Process

Poster No.	Presenter	Category	Title of Abstract
44	**Essence White** Mentor: Erica Crespi	Organismal, Population, Ecological, and Evolutionary Biology	Effects of Elevated Corticosterone on Limb Regneeration in *Xenopus Laevis*
32	**Sinclair Wilson, Chia-Ling Kang, Brian Miller** Mentor: Nehal Abu-Lail	Engineering and Physical Sciences	Design of an Effective Biochar-Sand Water Filtration System for Rural Countries
75	**Sydney Wirkkala** Mentor: Cristina Wilson	Social Sciences	Trait Anxiety Impacts the Ability to Attend to Information in the Environment in the Absence of any Threat
194	**Heather Young** Mentor: Amber Adams-Progar	Organismal, Population, Ecological, and Evolutionary Biology	Comparison of Two Housing Systems and Dairy Calf Physiological Responses during Hot Weather
78	**Kelli Young, Shelby Ruiz, Melanie Laws** Mentor: Kathleen Ryan	Arts and Design	Design to Experience

Presentation Number 1

ABSTRACT:

Abstract Title:	**Do Childhood Peer Victimization Experiences Affect Physical and Mental Health Outcomes in Young Adulthood?**		
Presenter:	Kelly Bakko		
Mentor:	Jessica Fales	**Campus:**	Vancouver
Major:	Psychology- CAS		
Category:	Social Sciences		
Co-Authors:	Rice, S. and Fales, J.L.		

Objective: Childhood bullying can adversely affect the well-being of its victims well into adulthood; however, little is known about the impact of childhood peer victimization on physical pain and its correlates. Further, the majority of bullying related studies are conducted in high school and college student samples and neglect to capture students who are frequently absent, who have dropped out, or who did not pursue secondary education. This study aims to determine rates of peer victimization among non-degree seeking young adults as compared to rates among their degree-seeking peers, and to examine health risk and protective factors associated with a history of bullying.

Methods: 37 young adults currently pursuing college degrees (42 planned) and 10 non-degree seeking young adults (42 planned) completed online surveys assessing their past and present peer victimization experiences, current physical and mental health symptoms, and resilience factors (i.e., optimism, coping strategies).

Results: Inconsistent with expectations, there was no difference between groups in terms of their childhood peer victimization experiences (61.8% of college students, 44.4% of non-degree seeking young adults; $t = .89$, $p = .39$); among the total sample, 58.1% reported experiencing bullying that was both frequent and severe during childhood. In both groups, a history of peer victimization was associated with more physical and mental health symptoms. For example, victim-status was moderately correlated with many pain-related variables, including pain intensity ($r = .49$, $p = .002$), pain-related distress ($r = .50$, $p = .001$), pain-related disability ($r = .34$, $p = .038$), and chronic pain status (i.e., experiencing a pain condition lasting 3 months or greater; $r = .40$, $p = .009$). In addition, young adults with a history of victimization reported higher symptoms of depression ($r = .46$, $p = .002$), loneliness ($r = .33$, $p = .036$), fear of negative evaluation ($r = .42$, $p = .006$), and lower levels of optimism ($r = -.40$, $p = .009$) than their non-bullied peers.

Conclusions: The outcomes of this study have the potential to inform researchers, educators, health-care providers and policy-makers regarding the relationship between childhood victimization status and health outcomes in youth adulthood.

Presentation Number 2

ABSTRACT:

Abstract Title:	**High-speed Imaging of Micrometer-sized Droplets**		
Presenter:	Brett Merritt		
Mentor:	Hua Tan	**Campus:**	Vancouver
Major:	Mechanical Engineering- CEA		
Category:	Engineering and Physical Sciences		

Interactions between fluid droplets and powder particles are important in industries ranging from pharmaceuticals to additive manufacturing. Factors such as droplet composition and velocity, droplet and powder particle size, and degree of powder compaction can all affect the resulting fluid-powder impact and absorption events. Relatively little has been published on the absorption of micrometer-sized droplets into powder substrates. At this reduced scale, flow is largely dominated by viscous and surface tension forces and can be difficult to predict. This remains a fruitful area of inquiry, and this project seeks to develop a high-speed imaging system to help study these phenomena. A 30 µm piezoelectric inkjet was used to produce droplets on demand. Two methods were used to visualize droplets. First, snapshots were captured using a CCD camera and a high-speed LED light source capable of 100 ns pulses. A pulse delay generator was used to deliver trigger signals to the inkjet, camera, and light source. The second method used a constant LED light source and a high-speed CMOS camera to capture video in real time. The drop ejection process was repeatable, so composite videos were created by combining snapshots from separate ejection events. Practical frame rates in the range of 100 kHz to 1 MHz were possible with this method. The high-speed camera offered a convenient way to observe individual droplet events with frame rates in the hundreds of kHz, but data extracted was less reliable given the lower resolution of its sensor. Using the composite video method, it was possible to accurately measure the diameter of oscillating droplets and generate plots of the diameter versus time to determine the oscillation period and damping time. This is significant in that it provides a way to determine fundamental fluid properties such as viscosity or surface tension from visual data. Initial droplet-powder tests show that a consistent method of compacting and preparing the powder surfaces under test will be necessary for repeatable results. A more powerful light source may also be necessary to make up for light absorbed and blocked by the powder surface.

Presentation Number 3

ABSTRACT:

Abstract Title:	**Natural Variation for the Presence or Absence of a Symbiosis Island in a Mesorhizobia Population**		
Presenter:	Angeliqua Montoya		
Mentor:	Stephanie Porter	**Campus:**	Vancouver
Major:	Biology- CAS		
Category:	Organismal, Population, Ecological, and Evolutionary Biology		
Co-Authors:	Stephanie Porter, Emily Helliwell, and Amanda Khosravifar		

Rhizobia are soil bacteria that can form nodules in the roots of leguminous plants, to initiate a mutualistic relationship, by fixing atmospheric nitrogen for the plant in exchange for carbohydrates. These rhizobia are important in agriculture and natural ecosystems, to provide the limiting nutrient nitrogen to the soil. Non-fixing rhizobia that stow away in nodules and use plant resources but do not fix nitrogen can be highly problematic for agricultural production. Knowing the potential for cooperative nitrogen fixers to evolve into uncooperative ones is beneficial in developing strategies to maintain or increase biologically fixed nitrogen, rather than using fertilizer in an agricultural context. The presence of symbiosis related genes on a Symbiosis Island (SI) or plasmid in the bacterial genome is necessary for a symbiotic association to occur. The SI contains all the genes that enable rhizobia to fix nitrogen and sustain the symbiotic interaction. In the rhizobium genus, *Mesorhizobia,* the SI may be ejected in a single mutation, under the control of a genetic pathway, as a response to population density that coordinates gene expression. The loss of the SI turns a cooperative strain into a commensal or pathogenic strain unable to fix nitrogen. This research investigates if natural *Mesorhizobium* strains from legume nodules differ in whether they carry the SI. A Polymerase Chain Reaction (PCR) assay was developed, consisting of two sets of primers specific to the SI region, *nodB* and *noeJ,* to indicate whether the SI is present or absent. Of the twelve strains sampled, four stains completely lacked the SI, and the other eight contained the SI as confirmed by *nodB* and *noeJ* primers. Therefore, we demonstrate natural variation for the presence and absence of the SI among different genotypes in the *Mesorhizobia* population. Continued research will evaluate if there is heritable variation among different *Mesorhizobia* strains for the rate of loss of the SI, which would show evidence that this trait can evolve by natural selection.

Presentation Number 4

ABSTRACT:

Abstract Title:	**The Invisible Struggle: Understanding the Stigma of Mental Illness and Its Roots**		
Presenter:	Autumn Segner		
Mentor:	Jennifer Thigpen	**Campus:**	Global
Major:	Social Sciences: General Studies- CAS		
Category:	Social Sciences		

This research project was conducted to investigate the historical causes of a prominent modern issue: the stigma against mental illness. The project draws on information from a combination of books written by experts and historical documents. Examining views on mental illness as far back as prehistoric times, this paper concludes that the stigma was partly due to the common belief in possession as the cause of mental illness. It was also found that institutionalization of the ill caused a decrease in their visibility and also contributed to this stigma. Finally, the designation of the mentally ill as "other" and subhuman had lasting effects on the way we see those struggling with mental illness today. This project promotes an understanding of the past as a way to shed these beliefs and work toward dismantling stigma in the future.

Presentation Number 5

ABSTRACT:

Abstract Title:	**Plane Wall Thermal Conductivity**		
Presenter:	Maria Torres		
Mentor:	Mohammed Noor-A-Alam	**Campus:**	Tri-Cities
Major:	Mechanical Engineering- CEA		
Category:	Engineering and Physical Sciences		

Plane Wall Thermal Conductivity

Analyzing heat transfer is broad and applicable to many scenarios and projects. In this research we will analyze temperature distributions to reduce the thermal conductivity in the materials of a wall plane. This will contain the inside temperature from the environment temperature to reduce thermal conductivity. In the research we will analyze the thermal conductivity of a wall material, then, apply a new method of construction material using simulations on ANSYS. When the minimum thermal conductivity is reached we can change the required elements in the present wall material to design and construct if possible.

Presentation Number 6

ABSTRACT:

Abstract Title:	**Universal Design of Learning in 4H Camps**		
Presenter:	Mariah Julson		
Mentor:	Janet Schmidt	**Campus:**	Pullman
Major:	Agricultural Education- CAHNRS		
Category:	Humanities		

In my internship with the Whitman County 4H office, I taught youth in Whitman County and neighboring counties how to create robots using Legos. Students that I had the opportunity to teach were between the ages of 7 and 12 to span it from elementary school to middle school aged students. Students were enrolled in the 4H day camps throughout the summer and in different counties. I was able to implement skills that I had learned the previous school year in my education classes in order to teach students in effective and memorable ways and introduce new topics that are not normally taught in school. By implementing Universal Design for Learning I could ensure that students who were on different age, grade, and skill levels could fully participate and learn something new while at the camps. Students are introduced to the idea of creating functioning robots with Legos so that they are more engaged in STEM (science, technology, engineering, and mathematics) classes and ideas not only in school, but in 4H programs as well. We had students take a survey at the end of each of the camps to see which areas of the camp the enjoyed the most, which were the most challenging, and what they were able to learn. Students also had opportunities to work together as a group to grow their communication skills and teamwork skills during the camps in fun and engaging ways.

Presentation Number 8

ABSTRACT:

Abstract Title:	**Tempting Time**		
Presenter:	Jake Kargl		
Mentor:	Scott Blasco	**Campus:**	Pullman
Major:	Music Composition- CAS		
Category:	Arts and Design		

Tempting Time is a musical composition that I began writing during the summer of 2016. The piece is for seven percussionists and has a duration of approximately seven minutes. The title is in reference to rhythmic passages within the piece as well as the concept of real world time itself. While time moves linearly, there are moments in our lives where it feels as if time is speeding up or slowing down. The tempo, rhythms, and instrumentation of various sections within the piece were written to replicate these feelings of inconsistent time flow. Inspired by progressive rock music, the goal was to write a musical composition with an array of transformations that challenges an audience's ability to predict where the music would go next.

Presentation Number 9

ABSTRACT:

Abstract Title:	**The Effects of Permethrin Exposure on Developing Common Quail (*Coturnix coturnix*) Embryos Through Use in Nesting Material**		
Presenters:	Marissa Bernhofer, Sara Nogueiro, and Devin Noto		
Mentor:	Erica Crespi	**Campus:**	Pullman
Majors:	Bernhofer (Zoology and Animal Sciences- CAS), Nogueiro (Zoology- CAS), and Noto (Zoology- CAS)		
Category:	Organismal, Population, Ecological, and Evolutionary Biology		
Co-Authors:	Sydney Schneider and Erica Crespi		

Recently the use of the permethrin, a highly effective and commonly used pesticide in poultry agriculture, has been applied to conservation efforts to protect mangrove finch hatchlings from an invasive ectoparasite in the Galápagos islands. Although permethrin is considered safe for adults, pesticides can have health consequences when animals are exposed during early life stages. The few studies that examined permethrin effects in embryonic chicks and rats have shown hydrocephaly, anencephaly, reduced cellular energy conversion, and disruption of developing heart muscle. To test whether *in ovo* exposure of permethrin affects early development in birds, we exposed common quail (*Coturnix coturnix*) eggs to cotton treated with 1% permethrin that was incorporated into nests in two amounts (0.2, 0.8 g), each with a paired untreated cotton control group. Heart rates were measured on incubation day 15, after which eggs were cracked and body mass feature lengths were measured. Hearts were dissected, and mass, length, width, and depth were measured. We did not find differences in mortality among treatments, nor were there differences in eye radius or beak length; however we found smaller body mass, heads (microcephaly), and shorter tarsus and third-toe lengths in permethrin-treated groups compared to controls. Permethrin-treated embryos also had slower heart rates and less developed cardiac muscle and vasculature, although hearts did not differ in size. Reduced skeletal features may indicate energetic deficits, as growth of skeletal elements typically slow in favor of shunting resources to more important structures for survival. As shown in embryonic rats, permethrin treatment seemed to have specific effects on cardiac development. While permethrin had similar effects in both nest types, embryonic quail were larger in the 0.8g cotton nests, suggesting that these nests were higher quality did not show a dose-response effect. Future studies are needed to further examine the mechanisms of these permethrin effects and to determine if these effects persist after hatching to affect offspring health, but this study provides evidence that permethrin can cross egg shells to cause non-lethal but negative effects on embryos, and studies should look beyond hatching rate when monitoring the efficacy of permethrin on wild bird populations.

Presentation Number 10

ABSTRACT:

Abstract Title:	**Standardizing the Accelerated Crucible Rotation Technique (ACRT) Furnace Setup Using a Mechanical System Design Approach**		
Presenter:	Parth Chandak		
Mentor:	Kelvin Lynn	**Campus:**	Pullman
Major:	Mechanical Engineering- CEA		
Category:	Engineering and Physical Sciences		
Co-Authors:	Jedidiah McCoy and Kelvin Lynn		

ACRT is a modified vertical Bridgeman process of crystal growth in which forced melt convection is promoted to obtain better epitaxial substrates. It has been shown that ACRT can increase volume of single crystals as compared to non-rotational techniques thereby increasing substrate yield and quality. At the Center for Materials Research (CMR), ACRT is set up for growth of Cadmium Telluride (CdTe) and Cadmium Zinc Telluride (CZT) crystals. A critical goal in this project is that of achieving accuracy between modelling and experimental results. However, results may vary due to instabilities within the current set up which requires a lot of human verification for its functionality. These instabilities include the lack of a fixed support for the ACRT actuator, an inadequate leveling strategy, and misalignment between the crucible axis of rotation and the furnace bore. Any wobble, tilt, or asymmetry in the system during rotation not only represents a disagreement with the model which could potentially interrupt predicted melt flow patterns but also represents an increase in the risk of ampoule breakage. Cadmium is a carcinogenic material which is highly volatile at CZT growth temperatures, meaning ampoule breakage could be catastrophic in terms of lab personnel safety. Thus, standardizing the system would result in better theoretical agreement and increased safety. Standardization of this setup is achieved via implementation of an aluminum frame assembly to which the ACRT actuator is affixed. The assembly allows for in situ leveling and vibration dampening. A lead ballast secures the assembly against actuator torque. Additionally, incorporation of a two axis linear stage allows for precision alignment. This system will leeway the ability to parametrize the results based on the type of system setup.

Presentation Number 13

ABSTRACT:

Abstract Title:	**Alcohol Self-administration in Non-dependent and Alcohol-dependent Transgenic TH-cre Rats.**		
Presenters:	Antonio Cardenas and Grace Shin		
Mentor:	Brendan Walker	**Campus:**	Pullman
Majors:	Cardenas (Biology- CAS) and Shinn (Zoology- CAS)		
Category:	Organismal, Population, Ecological, and Evolutionary Biology		
Co-Author:	Brendan Walker		

An important regulator of the dopamine (DA) neurotransmitter system, which is involved in motivation, emotion and executive function, is the kappa-opioid receptor (KOR) that has dynorphin (DYN) as an endogenous ligand. Our laboratory and others have identified that alcohol dependence dysregulates DYN and the KOR in a manner that promotes escalated alcohol self-administration and our KOR gene expression data suggest that these neuroadaptations involve mesocorticolimbic DA projections originating in the ventral tegmental area (VTA). Understanding these neuroadaptations is a key component in pharmacological development efforts to aid in the rehabilitation and prevention of further abuse; not only involving alcohol but other commonly abused substances as well. To ultimately test the hypothesis that KOR dysregulation occurs in VTA DAergic neurons to increase alcohol self-administration, we will utilize transgenic rats that have Cre (causes recombination) inserted into tyrosine hydroxylase (TH; one of the DA synthetic pathway enzymes) positive neurons (TH-Cre rats). First, to confirm that these transgenic rats are an appropriate model system, we tested the hypothesis that TH-Cre rats (male and female) would demonstrate normal non-dependent self-administration of alcohol, as well as normal dependence-induced escalation of self-administration when exposed to our alcohol dependence protocol. The TH-Cre rats were trained using an operant paradigm to self-administer a 10% ethanol solution until stable self-administration levels were achieved. Subsequently, TH-Cre rats were exposed to intermittent alcohol vapor or air for two months to induce dependence. Following the alcohol dependence induction period, the TH-Cre rats were again reintroduced to the self-administration chambers during acute withdrawal and their alcohol self-administration measured. The results showed that both male and female TH-Cre rats expressed normal non-dependent self-administration and normal dependence-induced escalation in the operant alcohol self-administration paradigm. These results position us to utilize the transgenic TH-Cre rats to test whether over-expression of the gene for the KOR recapitulates phenotypes of alcohol dependence using inducible and conditional Cre-Lox gene manipulation strategies.

Presentation Number 14

ABSTRACT:

Abstract Title:	**A Marriage of Cultures: The Gradual Process of Cultural Integration in a German Immigrant Community**		
Presenter:	Ana Barnes		
Mentor:	Jesse Spohnholz	**Campus:**	Pullman
Major:	History- CAS		
Category:	Social Sciences		

During the sixteenth century, war forced thousands of refugees from their homes and into immigrant communities scattered throughout northern Europe. One such community was the town of Frankenthal, located in the German Rhineland near the borders of France and the Netherlands. The town was built by and for exiles, and as a result served as a place of refuge for those fleeing political and religious tensions from France, Germany and the Netherlands. These different nations had very little in common, and the people in Frankenthal were isolated by factors of language, history and culture. One of the few things that connected them was religion; all refugees were connected to Reformed (Protestant) churches and shared similar doctrines to one another. The sharing of a town and a religion created a tenuous connection that the people of Frankenthal could either strengthen or destroy. Rather than accept and integrate with their neighbors, citizens of Frankenthal might have isolated themselves and remained strictly within their own cultural circles.

One way to measure the level of integration the community of Frankenthal experienced is through marriage. During the later sixteenth-century, marriage was not an emotional decision but rather one carefully considered by both parties and their families. A marriage created bonds between families, social groups and economic levels. Most marriage records from Frankenthal in this era contained a combination of information regarding the occupation of the husband, the father of the bride, or the location of origin of both families. A rigid community would resist integration between different groups through, particularly those from different regions. Frankenthal was not a rigid community. From the period of 1580-1612, the social structure of Frankenthal was flexible, as over time the city became accepting of cross-cultural marriages between German and Dutch refugees. Despite the fact that early modern European marriages faced many difficulties in Frankenthal, particularly when exacerbated by issues of cultural differences or religious discord, the increase in cross-cultural marriages in Frankenthal shows that differences between location of origin for spouses became less important, creating a blended community of different cultures.

Presentation Number 15

ABSTRACT:

Abstract Title:	***Coxiella burnetii* Infection in *Drosophila melanogaster*: Key Factors in Pathogenesis**		
Presenter:	Zachary Howard		
Mentor:	Alan Goodman	**Campus:**	Pullman
Major:	Genetics and Cell Biology- CVM		
Category:	Molecular, Cellular, and Chemical Biology		
Co-Authors:	Reginaldo Bastos, Aoi Hiroyasu, and Alan Goodman		

Coxiella burnetii is a gram-negative obligate intracellular bacteria and the causative agent of Q fever, a zoonotic disease that threatens both human and animal health. Due to the low infectious dose and potential for lethal chronic infection, *Coxiella* has been categorized by the CDC as a Select Agent. This assignment restricts research to Bio-Safety Level (BSL) 3 facilities making research difficult and expensive. Consequently, research aimed at dissecting the host and bacterial factors involved in pathogenesis has been impeded. An attenuated strain of *Coxiella* known as the Nine Mile Phase II clone 4 strain (NMII) has been demonstrated to be non-pathogenic in mammals and designated suitable for BSL2 facilities. However, there remains a paucity of experimental animal models with which to study *Coxiella* infection. Here we used *Drosophila melanogaster*, in conjunction with the attenuated BSL2 Nine Mile phase II (NMII) clone 4 strain of *Coxiella*, as a model to investigate host and bacterial components implicated in infection. *Drosophila* have often been used to model infection due to evolutionarily conserved immune responses which can be observed and extrapolated to better understand the mammalian immune response. We demonstrated that NMII *Coxiella* is able to replicate and induce mortality in wild-type adult *Drosophila* despite an immune response. While loss of immune pathway components exacerbates infection, we observed no increase in bacterial load. We also show that *Drosophila* lacking a cell signaling protein Eiger, homologous to the tumor necrosis factor class of signaling proteins in humans, exhibit reduced mortality. Finally, we revealed bacterial components involved in the secretion system are critical for *Coxiella* replication and pathogenesis. Altogether, our data revealed critical host and bacterial factors involved in *Coxiella* infection. Our work also demonstrates the overall utility of this BSL2 model to further investigate both host and *Coxiella* components implicated in infection.

Presentation Number 16

ABSTRACT:

Abstract Title:	**Impact of Hoof Lesions on Dairy Cow Behavior**		
Presenters:	Lindsey Dearmin and Amy Edmondson		
Mentor:	Amber Adams-Progar	**Campus:**	Pullman
Majors:	Dearmin (Animal Sciences- CAHNRS) and Edmondson (Animal Sciences-CAHNRS)		
Category:	Applied Sciences		
Co-Author:	Amber Adams-Progar		

On average, 15% of lactating dairy cows have hoof lesions. These lesions lead to lameness, declines in milk production, and negatively impact dairy cow well-being. The objectives of this study were: 1) determine if the presence and size of hoof lesions influences dairy cow behavior and 2) compare the efficacy of a conventional footbath product (copper sulfate) and an alternative product (Advantage®). All lactating dairy cows at the WSU Knott Dairy Center were equipped with CowManager® ear tags to record cow behavior (rumination, lying, active, and eating) daily. Hoof health (presence and size of hoof lesions) information was recorded monthly by direct observation. The size of hoof lesions were classified into three categories: 1) small (< ¼ inches); 2) medium (¼ ≥ ½ inches); or 3) large (> ½ inches). Use of footbath products alternated between the two products where copper sulfate was used for four months, followed by the use of Advantage® for four months and so forth. Data were analyzed using Pearson correlations and mixed model ANOVAs with repeated measures in SAS. The percent of cows with active or digressing lesions was not affected by the footbath products (P = 0.36 and P = 0.46, respectively). Furthermore, the size of active hoof lesions was also unaffected by the footbath products. Preliminary results show that the severity (whether active or digressing) and size of hoof lesions does not impact cow rumination (P = 0.65; P = 0.21), eating (P = 0.58; P = 0.32), lying (P = 0.47; P = 0.35), or active (P = 0.86; P = 0.89) behavior. The preliminary results of this study indicated no differences in the prevalence of hoof lesions between the two footbath products and no relationship between hoof lesion size and cow behavior. However, the next steps of this study will compare these results to behavior demonstrated by cows with no hoof lesions.

Presentation Number 17

ABSTRACT:

Abstract Title:	**Enhancing the Sustainability of Potato Farming Operations in the Columbia Basin by Providing Insect Management Support**		
Presenter:	Camille Culbertson		
Mentor:	Carrie Wohleb	**Campus:**	Pullman
Major:	Neuroscience- CVM		
Category:	Organismal, Population, Ecological, and Evolutionary Biology		
Co-Author:	Carrie H. Wohleb		

Understanding how to manage insect populations is critical to potato growers in the Columbia Basin of Washington. Insects, both pest and beneficial, have the ability to cause a significant economic impact on potato crops, and understanding population dynamics as well as the lifecycles of common insects is crucial in managing their impact. At WSU Grant Adams County Extension, an effort is made to aid potato growers by monitoring populations of pests, such as potato psyllids, beat leaf hoppers, aphids, potato tuberworms, and beneifical insects, such as big-eyed bugs, lacewings, minute pirates, and damsel bugs. Every week, approximately 50 commercial fields are sampled for the aforementioned insects, and a report is prepared regarding the size and location of important insect populations. Fields are sampled through a combination of taking bucket samples to determine number of insects per plant, and setting traps, primarily for psyllids, beat leaf hoppers, and potato tuberworms, to track their population over one week's time. Some of this information in then included in an email containing an e-newsletter titled *WSU Potato Pest Alerts*. This newsletter is sent to somewhere around 700 subscribers. The potato pest alert includes monitoring results, information and education of both beneficial insects and pests, and how they should be managed with pesticides. This serves to help growers manage current problems, as well as to help them anticipate future problems. Not only does this information educate growers about what is happening in their fields, but produces a significant economic impact by reducing unnecessary pesticide treatments.

Presentation Number 18

ABSTRACT:

Abstract Title:	**From Androgyny to Girl Power: A Look at Female Punk Icons**		
Presenter:	Brianna Humphreys		
Mentor:	Jennifer Thigpen	**Campus:**	Pullman
Major:	History- CAS		
Category:	Humanities		

My research explores the role of women in the American punk music scenes of the 1970s, 80s, 90s and it demonstrates their effect on the women in their societies over time. The women that starred in these scenes fought to be taken seriously as musicians and did everything in their power to improve the lives of all women. I argue that women in punk challenged what it meant to be a woman and a musician by publically and overtly defying traditional gender roles through their abrasive lyrics and appearances. They fought for the rights of women by speaking actively about issues that effected women directly. In so doing, they created a new and safe environment with their music that allowed women to feel liberated and empowered. I used song lyrics, interviews, concert flyers, and quotes to stress both the issues they faced and how they fought back. Women like the 1970s punk leader Patti Smith and Kathleen Hanna of the Riot Grrrl band Bikini Kill, exemplified very different aspects of feminism, but were ultimately fighting for the same thing; equality. These women are often overlooked as examples of feminist leaders, but they are a worthy group to keep in mind when discussing women's rights.

Presentation Number 19

ABSTRACT:

Abstract Title:	**Mind Over Media: The Internet's Effect on Mental Health**		
Presenter:	Hayley Sandberg		
Mentor:	Yujung Nam	**Campus:**	Pullman
Major:	Communication and Society- COM		
Category:	Social Sciences		

Social networks and technology are quickly grabbing attention and becoming primary mediums for communication. However, despite the Internet's increasing effect on self-worth and/or loneliness, the subject of mental health continues to be neglected. Technology impacts people psychologically every time they use it. They are elated to see that someone "liked" their photo or they are morose when they find that they lost a follower. This paper asks if a) the number of "friends" or "likes" on social media impact a person's self-esteem and if b) online media can significantly influence mental health. While mental health itself cannot be observed or measured, social media has had both negative and positive effects on people's self-esteem. I believe that it can make people dependent on the Internet for self-verification and create addictive, self-degrading behaviors in people, but it can also provide a safe place to share experiences with similar others and provide unlimited resources to build online friendships, get health information, and more. I aim to answer my research questions by conducting a web survey on Facebook and Reddit, an online forum, so that it can reach a wide range of users, primarily between the ages of 13 and 30. I will ask questions relating to both mental health and Internet use, such as how frequently they check social media or if they have a profile and if they have been diagnosed with a mental disorder or if they believe they have one. For Reddit, I will most likely post on a popular "subReddit," such as "AskReddit," or a subsection directed at mental health. The main objective for this study is to shed more light on the psychological effects of Internet activity and figure out methods of reducing harmful behaviors and thoughts resulting from certain online content.

Presentation Number 20

ABSTRACT:

Abstract Title:	**Comparisons of Green Manure Crop attributes in dryland PNW**		
Presenter:	Kaelin Campbell		
Mentor:	Nicole Tautges	**Campus:**	Pullman
Major:	Agricultural Biotechnology- CAHNRS		
Category:	Applied Sciences		
Co-Authors:	Nicole Tautges and Ian Burke		

Green manure crops are of growing interest to organic farmers in the dryland Pacific Northwest due to their ability to produce biomass for ground cover, diversify residue quality inputs to soil, and to fix nitrogen. To investigate the value of dryland-adapted legume crops as green manures, four legume species, spring pea (*Pisum sativum)*, hairy vetch (*Vicia villosa)*, red clover (*Trifolium pretense)*, and sweet clover (*Melilotus officinalis)* were sampled at regular intervals throughout the growing season and measured for root length, above- and below-ground biomass production, and root nodule number. Soil moisture was also measured over the growing season. We hypothesized that above- and below-ground biomass allocation would differ among legume species, with sweet clover producing the longest roots and hairy vetch producing the greatest above ground biomass. We also hypothesized that sweet clover would form the greatest number of nodules per root. Sweet clover produced the greatest root biomass per plant (1.7 g) and per hectare (1630 kg ha^{-1}), and also had the longest root length (18.0 cm) but contained the least nodules per root (n=3.7). Red clover produced the greatest shoot biomass per plant (4.0 g), but the lowest aboveground biomass per hectare (775 kg ha^{-1}) of all legume crops, likely as a result of low plant densities per unit area. Hairy vetch produced the greatest aboveground biomass per hectare (5740 kg ha^{-1}), and also contained the most nodules per root (n=16.7), compared to other legume species. Spring pea produced the shortest roots (13.7 cm), and the second greatest aboveground biomass per hectare (4925 kg ha^{-1}). Red clover biomass production per plant indicates it is a potentially viable green manure crop; however, red clover establishment was challenging in this region and warrants future work. Our results suggest that hairy vetch and sweet clover may be the most successful green manure crops in this region in terms of total biomass production and potential enhancement of soil quality.

Presentation Number 24

ABSTRACT:

Abstract Title:	**Isotope Effect of Phthalazine on Enzyme Mechanism for Drug Metabolism**		
Presenter:	Joshua Min		
Mentor:	Sara Humphreys	**Campus:**	Pullman
Major:	Chemistry- CAS		
Category:	Molecular, Cellular, and Chemical Biology		
Co-Author:	Sara Humphreys		

Aldehyde oxidase (AO) is an important drug-metabolizing enzyme, yet its catalytic mechanism is not well understood. Here, we investigate the deuterium kinetic isotope effect (KIE) in conjunction with oxygen consumption rates for the interaction between AO and its substrate, phthalazine, to gain insight into the rate-limiting step of the reaction. Saturation kinetics determined the KIE ratio between phthalazine and its deuterated derivative to be 2.00 for the V_{max}/K_m effect and 1.37 for the V_{max} effect. Multiple time-dependent experiments were analyzed using a sum of exponents and second order polynomial equation to determine the rate of enzyme inactivation and initial rate, respectively. The rate of enzyme inactivation ratio was 1.83 and the initial rate of reaction was 2.04. Oxygen consumption experiments reported similar values, with an oxygen consumption ratio of 1.79 and magnitude change rate ratio – in-line with the V_{max} effect – of 1.26. Together, these results show that the breaking of the C-H bond at the molybdenum cofactor is the rate-limiting step, and that the oxygen consumption is correlated with these results. Studying deuterated drug substrates helps highlight the importance of better understanding the catalytic mechanism of AO and its contribution to metabolic drug clearance.

Presentation Number 25

ABSTRACT:

Abstract Title:	**Analyzing Dry Matter Content as a Selective Metric for Cider Apples**		
Presenter:	Alexander Haase		
Mentor:	Travis Alexander	**Campus:**	Pullman
Major:	Landscape, Nursery, and Greenhouse Management- CAHNRS		
Category:	Applied Sciences		
Co-Author:	Travis Alexander		

From May 20 to July 29, 2016, I worked at the Mount Vernon Washington State University Northwestern Research Extension Center as an undergraduate research intern under the guidance of my mentor Travis Alexander. While working with Travis, I was responsible for managing the cider orchard. I would go out into the orchard every day to thin excessive fruit, trim wild branches, train branches into trellising systems, and apply nutrients whenever needed. Throughout the duration of the internship experience, I was also responsible for collecting data for two varieties of cider apple trees, the Tom Putt and Yarlington Mill varieties every week. I collected a variety of measurements for different aspects of the processed cider, such as the sugar content, acidity and tannins. I would also measure the dry matter content (DMC) of the fruit itself prior to processing. DMC is essentially the measure of the apple fruit without the juice, so you are left with starches and other solids. A recent study was conducted at WSU by Jamie Coggins in which the relationship between DMC and quality of dessert apples was observed, the findings implied that "DMC could be used as a selection trait for the WSU Apple Breeding Program." (Coggins, 2016). My summer internship applies the use of DMC as a selective metric to cider apples instead of dessert apples, and furthermore observes trends of DMC throughout maturation until the harvest date. The goal of my research internship was thus to provide an objective means for cider orchard managers to determine the quality of the fruit prior to processing. Because we measured DMC as well as the sugars, acids and tannins for cider apples, we can observe the relationships between the various qualities to determine if there is in fact any correlation. We found that there appears to be a direct relationship between DMC and specific gravity, a representative measurement of sugars. We also found that pH tends to increase while tannic acids tends to decrease up until harvest maturity. These results could be used to offer management suggestions and as selective traits for cider processing.

Presentation Number 26

ABSTRACT:

Abstract Title:	**3D Printed Composites with Shape Memory Behavior**		
Presenter:	Dylan Blair		
Mentor:	Arda Gozen	**Campus:**	Pullman
Major:	Mechanical Engineering- CEA		
Category:	Engineering and Physical Sciences		
Co-Author:	Arda Gozen		

In this study, 3D printing was used to construct composite structures of two different polymers, with which we examined a property called shape memory behavior. The goal of this study was to use varying 3D printing parameters to optimize shape memory functions of our structures.

The shape memory behavior implies that the composite can be deformed to change its original shape, which it can recover to by the application of heat. This behavior is a direct result of the polymers used to construct the printed structure. The exterior flexible "shell" material (Filaflex) has a high melting point of 155C relative to the low 70C for the interior rigid "core" material (PCL). When the composite is heated to a temperature between 70C and 155C, it becomes malleable due to the melting of the PCL and high elasticity of the FilaFlex. If the part is reshaped by applying a force at this temperature and the force is maintained until the composite cools down, at room temperature it will maintain its new shape since PCL freezes and is more rigid compared to FilaFlex in its solid state. The original shape is then recovered by heating this composite by softening of the PCL and elastic recovery of FilaFlex.

To optimize the shape memory behavior, we manipulated the outer shell thickness of our structures and subjected each variable thickness to a test of its shape memory recovery. In order to do this, we had 3 different shell thicknesses for a spiral structure. We also tested the recovery of each thickness on a temperature scale from 55C-170C. The data from the experimentation showed the increase in shell thickness caused a loss in % recovery of the deformed structure, and that higher temperatures caused an increase in recovery duration until the shell polymer was subject to melting.

In these tests, we have deduced a reliable ratio for the construction of our 3D printed structures. Applications for shape memory technology lie in the field of soft robotics, where seamless, complex movements can be performed without conventional mechanical actuation which involves use of motors, pneumatics etc.

Presentation Number 27

ABSTRACT:

Abstract Title:	**Com 475 Research Project**		
Presenter:	Cole Jacobson		
Mentor:	Yujung Nam	**Campus:**	Pullman
Major:	Strategic Communication- COM		
Category:	Social Sciences		

Today we live in a world that revolves around social media, social status, and social relevancy. Instant gratification is what fuels social media. This research will explore the elements of human interaction and social media in relation to judging others and ourselves, and politeness. When looking at social media as a platform we can conclude that it can be used as a platform to judge others very easily, but my research will investigate whether the rules from chapter 5 of The Media Equation by Byron Reeves & Clifford Nass applies. The rules relate to judgment of others and computers as well as politeness towards others and computers. Is it possible that the more advanced we become in social media and technology, the less we feel the need for quality interaction? My research will also explore the rules of politeness discussed in chapter 1 of the same text. I plan to investigate a sample's social media usage and relationship significance by using survey questions that I have prepared. The questions will have participants rate their social media usage on a numbered scale and then rate their human social interaction with a numbered scale. The survey will also contain questions that will ask participants to assess their own politeness through social media, as well as assessing how they respond to politeness. I have formed three different hypotheses and plan to ask 3 questions per hypothesis. This will result in there being 9 survey questions in total. I plan to research a sample of 10 different people and then share that research in my results section of my study. I will be interpreting the data using a statistics program that will inform me of the correlation between two variables. The first variable being how often my participants use social media, paired with the second variable being how often they interact with their peers at college. My hypotheses explain that the correlation between the two variables will be significant in showing that the more someone interacts with their social media platforms the less time they spend investing in real human interaction.

Presentation Number 28

ABSTRACT:

Abstract Title:	**Sex Differences in Opioid-cannabinoid Interactions on Chronic Inflammatory Pain**		
Presenter:	Carlie Knox		
Mentor:	Rebecca Craft	**Campus:**	Pullman
Major:	Neuroscience- CVM		
Category:	Organismal, Population, Ecological, and Evolutionary Biology		
Co-Author:	Rebecca M. Craft		

Previous studies in male animals demonstrate analgesic synergy when opioid and cannabinoid drugs are combined. The purpose of this experiment is to determine if there are sex differences in the analgesic effects of the opioid drug morphine when administered with the cannabinoid drug delta-9-tetrahydrocannabinol (THC), in rats experiencing chronic inflammatory pain. The hypothesis tested was that morphine and THC combined would have a stronger analgesic effect in males than in females. Rats were baseline tested for mechanical sensitivity, biased weight-bearing, and thermal sensitivity. After baseline testing, rats were anesthetized and injected with 0.1 mL of Complete Freund's Adjuvant (CFA) in the plantar surface of the right hindpaw, causing persistent pain and swelling. Twenty-four hr later, rats were given morphine (s.c) and THC (i.p.) in doses ranging from 0 to 3.2 mg/kg and then tested on all pain measures again plus locomotor activity at 30, 90, and 180 min after injection. Preliminary results show that female and male rats that received vehicle (0 mg/kg morphine + 0 mg/kg THC) were hypersensitive to touch and to heat, avoided placing weight on the CFA-injected hindpaw, and were significantly less active than pain-free controls (rats injected with vehicle instead of CFA into their hindpaw). When administered alone, morphine and THC were at least partially effective in reducing CFA-induced mechanical hypersensitivity and biased weight-bearing, with peak effects observed at 90 min post-injection. Morphine also completely restored locomotor activity to levels observed in pain-free controls. In contrast, both drugs were ineffective at reducing heat hypersensitivity. When administered together, morphine and THC were more effective than either drug given alone in reducing mechanical hypersensitivity and restoring normal weight-bearing, while having no effect on heat hypersensitivity. However, the drug combinations did not tend to restore locomotor activity to the same extent as the high dose of morphine alone. With 60% of the rats tested thus far, there are no sex differences in the effects of either drug or the combinations. These preliminary results suggest that opioid-cannabinoid combinations may be useful treatments for pain in both females and males, but they may also be highly sedative.

Presentation Number 29

ABSTRACT:

Abstract Title:	**Informal Settlements: And Their Contributions to the Cities They Exist In.**		
Presenter:	Krisandrah Crall		
Mentor:	Kathleen Ryan	**Campus:**	Pullman
Major:	Architectural Studies- CEA		
Category:	Arts and Design		

Informal Settlements have much to offer the concrete city jungles they cling to and provide insight into how future cities can evolve into organisms that will provide a better future for the all its occupants. An informal settlement is defined as; "Areas where groups of housing units have been constructed on land that occupants have no legal claim to, or occupy illegally; or Unplanned settlements and areas where housing is not in compliance with current planning and building regulations (stats.oecd.org)." Informal settlements near Berlin such as Teepee Land, Lohühle and Templehoff offer the opportunity to observe the construction, management, and maintenance of a living community that has no formal infrastructure or design, yet functions as well as the formal city around them.

Direct observations of informal settlements adjacent to Berlin Germany took place over several months in person during a semester long study abroad program. Informal settlements in Berlin consistently have a public access element to them thus allowing non-residents to enter, use the space, and talk with the residents to gain better understanding of the settlement and its complexities. Observations made in Berlin as well as information gathered through communication with other organizations online, revealed that there are global networks connecting these communities to each other. The informal settlements generally have a hierarchy within themselves and between the neighboring settlements. Teepee Land has a leader who stayed in communication with the formal co-housing project who supplied them with electricity and internet, Lohühle organized concerts for their occupants and the area; and several of the occupants of Teepee Land and Lohühle had gardens at Templehof's Stadtteilgarten Schillerkiez. The diversity of informal settlements in Berlin provided a unique insight to the variety of ways these settlements develop and contribute to one another as well as the formal city around them. There is much to be learned from informal settlements, the way they self-organize, self-govern, and generally seek to be self-sustaining. In many large cities of today's modern era these are qualities that are put by the wayside and forgotten. These settlements that are oftentimes seen as dirty, a low form of living, and backward could hold some answers as to how humanity should move forward sustainably together.

Presentation Number 30

ABSTRACT:

Abstract Title:	**Don't Forget Downward Dog: An Examination of the Effects of Yoga on Prospective Memory**		
Presenter:	Gabrielle Struve		
Mentor:	Carrie Cuttler	**Campus:**	Pullman
Major:	Psychology- CAS		
Category:	Social Sciences		
Co-Authors:	Carrie Cuttler, Christopher Connolly, Emily LaFrance, and Aria Petrucci		

Previous research has shown that various forms of exercise, including aerobic exercise (e.g., running, swimming), and resistance training (e.g., weightlifting) improve performance on tests of retrospective memory. Retrospective memory is the ability to recall previous learned facts, information, and events (e.g. remembering information for an exam). Moreover, two previous studies have found that a single session of yoga results in acute improvements in retrospective memory test performance. However, to our knowledge no previous research has examined whether yoga improves prospective memory test performance. Prospective memory refers to the ability to remember to do things in the future (e.g. remembering to hand in an assignment next week or take medication on time). The purpose of the present study is to examine the effect of a single yoga session on prospective memory test performance. Participants in this study are randomly assigned to complete a 30-minute video guided yoga routine or to sit and simply watch an exercise video. Following the video, participants complete a series of neuropsychological tests, including two test of prospective memory. Specifically, to assess the prospective memory, participants are assigned a reminder test, which requires them to remind the researcher to assign their research participation credits immediately after they complete a specific test. Second, participants complete the difficulty ratings test, in which they try to remember to give a difficulty rating immediately after they finish each neuropsychological test. Data are still being collected, but we hypothesize that participants in the yoga condition will perform better on the prospective memory tests relative to participants in the sitting condition (the control group).

Presentation Number 31

ABSTRACT:

Abstract Title:	**Pyrimido[5,4-b]indole Immunostimulant Homodimers Through Solid Phase Peptide Synthesis**		
Presenter:	Nicholas Webb		
Mentor:	Rock Mancini	**Campus:**	Pullman
Major:	Chemistry- CAS		
Category:	Molecular, Cellular, and Chemical Biology		
Co-Authors:	Joe Hantho and Rock Mancini		

The field of immunotherapeutics has made many significant advances towards battling cancer in recent years. In order to keep advancing forward, a key understanding of the bodies innate immune system is critical in order to develop effective immunostimulants. In this research experiment, pyrimido[5,4-*b*]indoles were synthesized and subsequently linked to a peptide using solid phase peptide synthesis (SPPS) creating pyrimido[5,4-*b*]indole homodimer peptides with the end goal of creating a cancer vaccine adjuvant. These pyrimido[5,4-b]indoles were chosen to be used as an agonist because recent studies have shown this class of molecule, alongside some substituted derivatives, to be potent NF*k*B activators via the toll-like receptor (TLR) 4 pathway indicating potential use as an adjuvant. Other recent studies have also shown that conjugating multiple agonists belonging to the same toll-like receptor pathway, as well as varying molecular weight ultimately do play a role in innate immune response. Multiple peptides using glycine as a linker were formed where the molecular weight of the peptide was unchanged, but the proximity of the two indole agonists within the peptide were in order to allow for modulated immune responses. As of date, these pyrmido[5,4-*b*]indole peptides have been synthesized with their immune responses expected to be measured and compared within the upcoming month via NF*k*B yellow assays.

Presentation Number 32

ABSTRACT:

Abstract Title:	**Design of an Effective Biochar-sand Water Filtration System for Rural Countries**		
Presenter:	Chia-Ling Kang, Brian Miller, and Sinclair Wilson		
Mentor:	Nehal Abu-Lail	**Campus:**	Pullman
Major:	Bioengineering- CEA		
Category:	Engineering and Physical Sciences		
Co-Authors:	Nehal Abu-Lail, Howard Davis, Marie Mayes, Waled Suliman, and Manuel Garcia-Perez		

Lack of access to clean water is considered the top global crisis based on impact to society. As stated by the Centers for Disease Control and Prevention, an estimated 801,000 children under the age of 5 die from diarrhea stemming from unimproved sanitation and contaminated water. As a result of years of war that has caused significant damage to infrastructure, Afghanistan is a country in which many citizens living in rural communities lack the resources to properly filter bacteria contaminants from the water source. The biochar-sand water filtration system currently being designed aims to aid areas in which water contamination is a threat, specifically, rural parts of Afghanistan. According to previous research, the physical properties of biochar allow it to excel as a filtering agent. To optimize the biochar efficacy for filtration, the biochar properties as a function of pyrolysis conditions were investigated. Biochar was made out of wheat straw, a locally abundant biomass source in Afghanistan. The biochar was pyrolyzed at 300 °C or at 350 °C. Biochar was then mixed with sand at different ratios in columns that mimic subsurface sand. Solutions of common bacterial pathogens present in Afghanistan were fed into the sand-biochar column. Filtrate was collected and the fraction of bacteria retained in the column was calculated. With the data obtained so far, wheat straw biochar made at 350 °C adsorbs at least 94% of *Escherichia coli, Salmonella*, and *Shigella* with biochar to sand mass ratio at 1:4. In order to scale up the filtration system in a way it can serve the drinking water demand of a household, we will use the data obtained to calculate single collector efficiency and collision efficiency. These efficiencies will allow us to size the filter as well as calculate the frequency it which the biochar in the filter should be cleaned for effective clearance of microbes from water. Our current data suggests that wheat straw biochar made at low pyrolysis temperatures can retain waterborne pathogens found in Afghanistan efficiently and cost-effectively.

Presentation Number 33

ABSTRACT:

Abstract Title:	**Co-design of a Bus Shelter: Reviving Community**		
Presenters:	Hamidreza Esmaeillou, Quinton Lum, Victoria Page, and James Reyes		
Mentor:	Kathleen Ryan	**Campus:**	Pullman
Majors:	Esmaeillou (Architectural Studies- CEA), Lum (Electrical Engineering- CEA), Page (Interior Design- CAHNRS), and Reyes (Civil Engineering-CEA)		
Category:	Arts and Design		

Goal: The City of Pullman was interested the redesign of a bus shelter with community input. The community expressed that the bus shelter needs to blend with the ideals of the Palouse. Place theory is important to consider here because it emphasizes the contextual meaning of a space derived from its social, cultural and historical-emotional content.

Background: The idea for a redesign of a bus shelter began with a discussion between Washington State University and the City of Pullman. A design workshop was facilitated with community members. Concerns were taken from the community and then conceptually processed by design, fine arts and engineering students.

Method: A community workshop allowed interested residents to share ideas and concerns about Pullman bus shelters. Following the workshop a cross-disciplinary team of students and faculty mentors in Fine Arts, Engineering, Interior Design, and Architecture gathered to develop ideas shared by the community. The team has also been challenged by transforming the community's ideas into a design language that is understood throughout the cross-disciplinary team. Since the design team is cross-disciplinary, we each approach the design process in a way that is the same but uses different design method language to develop a finalized solution to the design problem. The overall design method between the disciplines could be summed up with discover, define, develop and deliver. Yet each discipline varies in the process of approach. Architecture and interior design consider aesthetics and function, engineering is focused on function and performance, and fine arts approaches through abstract conceptualization to reach a "solution."

Results: Ideas from the community workshop and the weekly design team meetings have generated a design presentation of three different bus shelter designs that were submitted to the City of Pullman for consideration. Once a design has been selected and approved, the cross-disciplinary team will determine final design criteria and ultimately devise a plan on how to fundraise and fabricate the bus shelter.

Presentation Number 34

ABSTRACT:

Abstract Title:	**Impacts of Extrusion on Saponin Content of Quinoa**		
Presenter:	Cristen Frieszell		
Mentor:	Girish Ganjyal	**Campus:**	Pullman
Major:	Food Science- CAHNRS		
Category:	Applied Sciences		
Co-Authors:	Ilce G. Medina-Meza, Nicole A. Aluwi, Kevin M. Murphy, Steven R. Saunders, and Girish M. Ganjyal		

Quinoa (*Chenopodium quinoa* Willd) is an Andean crop with high nutritional value. Quinoa contains between 2-5% of saponins, a class of phytochemicals found in the external layers of quinoa seeds. Saponins are found as a complex mixture of sapogenin glycosides that are derivatives of oleanolic acid, hederagenin, serjanic acid and phytolaccagenic acid. They are generally removed before quinoa consumption, being responsible for an intensely bitter flavor that is not desirable to consumers. Impact of extrusion processing on the content of saponins of quinoa variety Cherry Vanilla (scarified and unscarified) was evaluated. For this purpose, a co-rotating twin-screw extruder with a 3 mm round die was used, and the temperature of the extruder barrel was kept constant at 140 °C. Screw speed (SS) was varied at 100, 150, and 200 rpm, whereas feed moisture contents of 15, 20, and 25% (wet basis) were used. Process responses such as specific mechanical energy (SME), back pressure, and torque, as well as product responses such as expansion ratio (ER), unit density (UD), water absorption index (WAI) and water solubility index (WSI) were evaluated alongside with GC-MS quantification of total saponin content. Results show that increasing SME (78 -172 kJ/kg) led to a reduction of the total saponin content. We speculate that an increase in shear energy can cause a degradation of the triterpenoid structure. Overall, high moisture content (25%) and high screw speed (200 rpm) favored the reduction of saponins up to 80% for the scarified quinoa; however, this result was accompanied with a low ER (0.90) and high UD (0.8). An analogous reduction was achieved for the unscarified quinoa, at low moisture content (15%) and high SS, producing better expanded products with ER (1.28). In conclusion, extrusion processing represents a useful alternative for industry for the reduction of saponin during manufacturing of snacks or breakfast quinoa products.

Presentation Number 35

ABSTRACT:

Abstract Title:	**Peking, the Boxers, and the Multinational Response**		
Presenter:	Casey McNicholas		
Mentor:	Lydia Gerber	**Campus:**	Pullman
Major:	Political Science- CAS		
Category:	Humanities		

In the fall of 1900 through the spring of 1901, Wilbur Chamberlin, d. 1901, wrote a series of personal letters while reporting in China for the *New York Sun*. These letters directly contradicted the narrative of how foreign nations acted while suppressing the Boxer Rebellion as presented in various newspapers, including the *New York Sun*. This qualitative report of Chamberlin's letters and compared them to newspaper articles that appeared in the *New York Times* and the *New York Sun*. By placing the letters into a broader context of how western media reported the foreign intervention, this project argues that stories were intentionally fabricated or slanted in order to appease western readers and justify the intervention. The widespread theft, destruction of property, and death of innocent citizens of Northern China that Chamberlin describes in his letters as the face of the intervention did not make it into the final published reports. Since Chamberlin's original reports are no longer available, it is not clear whether Chamberlin himself, or newspaper editors and owners back home, or both, are responsible for the disparity between Chamberlin's experience as described in his personal letters, and the published reports. But the very glaring difference between both sources demonstrates how much power newspaper staff had in determining what the American reader saw on the front page, and what he or she learned about a distant conflict.

This project contributes to a more complex understanding of the historical roots of media deception. Given current events, where fake news is making headlines, this example of micro-history helps to prove that fabricated news is not a new concept to American culture. It also suggests that Chamberlin did have the need to record and share a more complete account of his experience, even as he recognized that public media were not the appropriate medium for this at the time.

Presentation Number 37

ABSTRACT:

Abstract Title:	**Inside Ice Giants from First Principles**		
Presenter:	Andrew Cannon		
Mentor:	Jeffrey McMahon	**Campus:**	Pullman
Major:	Physics- CAS		
Category:	Engineering and Physical Sciences		
Co-Author:	Andrew Cannon		

Over the past decade, nearly two thousand confirmed exoplanets have been discovered. Many of these are considered ice giants, planets similar in composition to Neptune and Uranus. In order to understand these through modeling, it is necessary to consider their interior composition. There are currently two competing models: one in which the outer hydrogen and interior (water-) ice layers are separated, and another in which they mix. In this presentation, our recent efforts towards resolving these contradictory models with first-principles simulations will be discussed. While the second model is more controversial, our results support its plausibility. These results are expected to greatly improve our understanding of ice giants. The impact on the fields of planetary and high-pressure physics is anticipated to be significant.

Presentation Number 38

ABSTRACT:

Abstract Title:	**Do Civil Gang Injunctions Impose Identification Between Associates and Street Gang Members**		
Presenter:	Tanya Garnica		
Mentor:	Cheryl Maxson	**Campus:**	Pullman
Major:	Criminal Justice & Criminology- CAS		
Category:	Social Sciences		

In America there are roughly over 774,000 individuals that belong to gangs (YGS, 2013). In efforts to regulate gang behavior in public spaces, civil gang injunctions have been put placed in. In this literature review, I will be investigating research on how civil gang injunctions can impact the lives of those subject to them. These crafters of the civil gang injunctions have the discretion to list individuals without notifying them, thus without their knowledge they are being identified to law enforcement as gang associated (Muniz, 2015). Since the goal of these injunctions is to prohibit certain gang behaviors, therefore reducing gang presence and violence in the neighborhood, I will be investigating whether these gang injunctions achieve that goal through a search of existing literature. Through the literature search, I will also explore whether the labeling or association as a gang member through these CGI's might increase police surveillance, and the process whereby one can remove oneself these CGI lists.

Presentation Number 39

ABSTRACT:

Abstract Title:	**Endocannabinoid Mechanism of Cocaine Memory Reconsolidation**		
Presenter:	Shi Tan		
Mentor:	Rita Fuchs Lokensgard	**Campus:**	Pullman
Major:	Neuroscience- CVM		
Category:	Molecular, Cellular, and Chemical Biology		
Co-Author:	Jessica Higginbotham, Jennifer Wang, and Rita Fuchs Lokensgard		

Exposure to a cocaine associated context reactivates and thus destabilizes cocaine-associated long-term memories. In order to be maintained, such labile cocaine-associated memories must be re-stabilized - or reconsolidated - into long-term memory stores. This suggests that interference with memory reconsolidation could potentially weaken maladaptive drug-associated memories and reduce their influence on drug seeking behavior. In the present study, we examined the role of cannabinoid type 1 receptors (CB1R) in cocaine memory reconsolidation and subsequent drug seeking behavior. Furthermore, we evaluated associated changes in the activation or expression of memory function-related proteins at the basolateral amygdala (BLA) and dorsal hippocampus (DH), two brain regions implicated in cocaine memory reconsolidation. Male Sprague-Dawley rats were randomly assigned to a chamber (context A), where they were trained to lever press for cocaine reinforcement (0.15mg/ml per infusion, IV) during a minimum of 10 daily sessions. The rats then received seven daily extinction training sessions in a different chamber (context B), where lever presses were no longer reinforced. Next, rats were re-exposed to the previously cocaine-paired context (context A) for 15 mins in a drug-free state in order to reactivate cocaine memories. Systemic AM251 (CBR1 inverse agonist) or vehicle treatment was administered immediately or 6 h after the memory reactivation session. On the following day or 21 days later, the rats received at least two additional extinction session in context B until they reached extinction criterion (≤25 lever presses/session during two consecutive daily sessions). The rats were then tested for cocaine-seeking behavior (non-reinforced lever presses) in context A. AM251 administration immediately, but not 6 h, after memory reactivation attenuated drug-seeking behavior. Consistent with spontaneous recovery, this effect was not observed in the groups tested after 21 days in the home cage. These findings suggest that AM251 may have produced a temporary retrieval deficit or enhanced lever extinction during the memory reactivation session as opposed to impairing memory reconsolidation. Quantitative Western blotting indicated treatment and time effects and/or interactions in AMPA GluA2 subunit activation, NMDA GluN2b subunit activation, and Arc expression in the DH as well as in CREB activation and NMDA GluN2b activation in the BLA.

Presentation Number 40

ABSTRACT:

Abstract Title:	**Sauk-Suiattle Cultural Center: Co-Designing a Meaningful Place**		
Presenter:	Philip VanDevanter		
Mentor:	Kathleen Ryan	**Campus:**	Pullman
Major:	Landscape Architecture- CEA		
Category:	Arts and Design		

The Sauk-Suiattle Indian Tribe lacks facilities for its growing research, administration, language education, and heritage programs. The tribe, students and faculty from the WSU Rural Communities Design Initiative (RCDI), and WSU extension employees came together for a community master plan workshop at the tribe's Darrington, WA reservation in September 2016. The workshop tested different styles of small group co-design. Co-design departs from the traditional one-way interview of a client by a designer and instead creates a dialogue between two experts: one in design techniques (the designer) and one in community needs and character (the client). The workshop lead to a conceptual cultural center layout that unified diverse activity spaces, assessed essential relationships between the spaces, and resulted directly from the character and passion of the people who will use it. The conceptual design will be further developed as part of a finalized master plan by the WSU RCDI team beginning in Spring 2017.

The small group that co-designed the cultural center employed pieces of paper to explore alternative activity space arrangements. The student facilitator created a cutout for each space identified by community members during the initial discussion. Group members rearranged the cutouts multiple times to test different layouts. This co-design method fostered rich discussion about potential connections between tribal programs. For example, the natural resources unit and the cultural resources unit could collaborate more if they had adjacent office space. In another example, new archival and museum space would allow the Sauk-Suiattle to recollect artifacts currently scattered among Northwest museums. The co-design session showed the value of simple, moveable props in fostering group discussion of essential relationships and encouraging the testing of alternative ideas.

Presentation Number 41

ABSTRACT:

Abstract Title:	**Retention of Learning Through Life Stages in *Xenopus laevis***		
Presenter:	Eric Navarro		
Mentor:	Erica Crespi	**Campus:**	Pullman
Major:	Zoology- CAS		
Category:	Organismal, Population, Ecological, and Evolutionary Biology		
Co-Author:	Erica Crespi		

The environment experienced during early life stages when the brain is developing can affect behavior throughout life, and more recently studies have shown that the quality of the early environment can affect cognitive ability later in life, such as the ability to learn. We tested the hypothesis that experiencing a stressor during early development negatively affects associative learning in the South African clawed frog, *Xenopus laevis*. To do this, we will expose tadpoles to a cue (calf liver) at the time of feeding either with or without a predator cue to determine if this stressor impedes associative learning during this early life history stage. We will also give individuals this cue after metamorphosis to determine whether they remember that this cue is associated with food availability with and without the presence of a stressor. If adverse environmental conditions disrupt associative learning pathways, we predict that tadpoles not exposed to the predator will associate the food cue with feeding faster than those exposed to predator cues. In addition, if the predator cue does not inhibit associative learning as tadpoles, we might find that experiencing the predator cue during associative learning will negatively affect the ability to remember the association between the cue and food availability after metamorphosis. These findings will enhance understandings on the importance of the early environment on later cognitive function in amphibians, but also because neural processes associated with basic forms of learning are evolutionarily conserved across vertebrates, our findings could relate to similar phenomena in humans.

Presentation Number 44

ABSTRACT:

Abstract Title:	**Effects of Elevated Corticosterone on Limb Regneeration in *Xenopus laevis***		
Presenter:	Essence White		
Mentor:	Erica Crespi	**Campus:**	Pullman
Major:	Zoology- CAS		
Category:	Organismal, Population, Ecological, and Evolutionary Biology		
Co-Authors:	Erica Crespi and Marietta Easterling		

The tadpoles of the South African clawed frog (*Xenopus laevis)* have the ability to regenerate an injured tail and limbs, although they gradually lose this ability as they near metamorphosis. Glucocorticoids (cortisol in humans, corticosterone, CORT, in amphibians) are hormones released in the blood when an animal is injured, which enhances wound healing by inhibiting inflammation; however chronically elevated CORT due to prolonged exposure to environmental stressors might be detrimental to regeneration. To test these hypotheses about how chronic, acute and delayed stress would affect tail regeneration, which involves the regrowth of muscle, skin, blood vessels and nerves, we treated aquarium water with 100 mM CORT three ways: 1) 5 d prior to amputation, 2) 24 hr prior to amputation, and 3) from the time of amputation through 5 d afterwards. Because CORT needed to be dissolved in ethanol, we also added an equal volume of ethanol (i.e., vehicle) as a control group. We anesthetized tadpoles with 0.01% benzocaine prior to excision of ~5 mm of the tail tip, and we allowed regeneration to occur for 6 days. At that time animals were euthanized and the area of tail regeneration was photographed under a stereoscope and the area was measured with ImageJ software. We found that no animals recovered from anesthetic and amputation when treated with CORT 5 d prior to tail amputation, suggesting that CORT treatment affected the sensitivity tadpoles had to the anesthesia, but all other tadpoles revived after anesthesia and amputation. As predicted, we found that 5 d of CORT treatment after amputation suppressed tail regeneration, and surprisingly, the 24 hr CORT treatment also suppressed tail regeneration relative to the control group. We suspect that even though we changed the aquarium water after the amputation for this group, tadpoles had sustained elevated CORT levels for a longer period of time. Generally, our findings support our hypothesis that elevated CORT has negative effects on tissue regeneration in *X. laevis*, and future experiments will be conducted to clarify the specific timing and mechanisms of this suppression.

Presentation Number 45

ABSTRACT:

Abstract Title:	**Evaluation of Wild Bird Species Populations on Washington Dairy Farms**		
Presenter:	Kimberly Cirillo		
Mentor:	Amber Adams Progar	**Campus:**	Pullman
Major:	Animal Sciences- CAHNRS		
Category:	Applied Sciences		
Co-Authors:	Amber Adams-Progar, Tyler Caskin, Karen Steensma, Susan Kerr, and Brian Garries		

The invasion of wild bird species, such as Starlings (*Sturnus vulgaris*), on agricultural operations have an unfavorable economic impact; damages and losses incurred by starlings were reported by Washington dairy farmers to range from $1,000–$200,000 per farm per year. Livestock production is susceptible to transmissible pathogens, structural damage, feed damage, and interspecies' competitive behavior as starlings roost within a farm's infrastructure.

The objectives of this study were to: 1) record counts of birds, identify specific bird species, and observe roost sites; and 2) determine if relationships exist among roosting sites, the number of birds present, the presence of native raptors, and environmental temperatures. The hypotheses were that the number of birds would significantly increase as temperatures declined and sightings of starling roosts increased; however, the number of birds present was expected to decrease as more native raptors were sighted. Over the course of four weeks, the number of birds present (including native raptors) and roost counts were collected by direct observation at morning and evening on eleven Washington dairy farms.

Pearson's correlations were used to test the relationships among bird counts, starling counts, week, and environmental temperatures. Significant correlations were detected between week and the number of birds present ($P = 0.008$), week and the number of starlings present ($P = 0.02$), and week and environmental temperatures ($P = 0.008$). A mixed model ANOVA showed the total number of birds present was affected by the time of day ($P = 0.03$), roost sightings ($P = 0.02$), week ($P = 0.004$), and environmental temperatures ($P = 0.06$). However, the only variables to have a significant effect on the total number of starlings present were week ($P = 0.01$) and roost sightings ($P = 0.02$). From these results, the next components of this study will focus on measuring true economic losses from wild birds on dairies across the state, monitoring bovine–avian interactions at feed bunks on dairies, and testing more sustainable bird deterrence strategies.

Presentation Number 46

ABSTRACT:

Abstract Title:	**Possible Role of Tumor Necrosis Factor Alpha (TNFα) in Hyperbaric Oxygen (HBO_2) Suppression of Opioid Withdrawal in Morphine-Dependent Mice**		
Presenter:	Prianka Maharaj		
Mentor:	Raymond Quock	**Campus:**	Pullman
Major:	Psychology- CAS		
Category:	Organismal, Population, Ecological, and Evolutionary Biology		
Co-Authors:	Raymond M. Quock and Abigail L. Brewer		

It has been suggested that TNFα might be a contributing factor in the development of opioid dependence and withdrawal [Hao et al., Neuropsychopharmacol. 36:664-76, 2011]. Since HBO_2 treatment is known to reduce levels of TNFα [Li et al., Anesth. Analg. 113:626-33, 2011], this study was conducted to determine whether HBO_2 might reduce signs of opioid withdrawal through an action on TNFα. Male NIH Swiss mice were rendered dependent on morphine for four days of twice-daily s.c. injections of escalating doses of morphine sulfate. On Day 5, withdrawal was precipitated by i.p. injections of 5 mg/kg naloxone and videorecorded for 30 min. Some groups of mice will be pretreated with 65 mg/kg of the TNFα synthesis inhibitor thalidomide, through i.p. injection, 30 min prior to naloxone injection. Since thalidomide is not water-soluble, the drug must be dissolved in dimethyl sulfoxide (DMSO), requiring the need for vehicle controls for comparison. In morphine-dependent mice, naloxone precipitated a withdrawal syndrome consisting of jumping, forepaw tremors, wet-dog shakes, rearing and defecation. We will determine the ability of thalidomide pretreatment to reduce the expression of naloxone-precipitated withdrawal in morphine-dependent mice.

Presentation Number 47

ABSTRACT:

Abstract Title:	**Use of Neurocognitive Measures to Evaluate Cognitive Load During the Mathematical Proving Process**		
Presenter:	James Whitbread		
Mentor:	Shiv Karunakaran	**Campus:**	Pullman
Major:	Mathematics- CAS		
Category:	Humanities		
Co-Authors:	Shiv Smith Karunakaran and Abigail Higgins		

In the past 20 years, neuroscience has progressed to such an extent that non-invasive, accurate methods of measuring brain activity now exist, allowing for the collection of mental workload even in the presence of noise factors like verbalization and movement. These developments have reshaped neuroscience, but also have implications for all fields of study, including mathematics education. This new access to observing students' mental processes comes with a problem, however, in that there is a disparity in understanding between the behavioral aspect of cognitive workload and the neurocognitive data collected. This study endeavors to bridge this gap by employing neurocognitive monitoring techniques that quantitatively measure mental workload, while also using traditional qualitative techniques to understand how students conceptualize the mathematical proving process. The neurocognitive data is collected by a Functional Near-Infrared Spectroscopy (fNIRS) device which measures the difference between the levels of oxygenated and deoxygenated blood in the prefrontal cortex, or the forehead region of brain, which is a proxy for mental workload. This combined with LiveScribe pen data to record writing on timestamp, video-recording, and post-experiment interviews provides an overall picture of the students' thought processes. Specifically, it allows the comparison of activation patterns with self-report data. In order to accomplish this, participants are hooked up to the fNIRS device and put through a "block designed" experiment, whereby the proof tasks are presented in order of increasing difficulty, and each task is proceeded and succeeded by a baseline. Baselines are important as they lower neuro-activation between tasks to isolate activation of each individual task. Once the experiment is completed, exit interviews are performed where students are asked to rank the tasks in order of increasing difficulty to allow comparison with the original order. Other questions to isolate students' ideas of their own brain activation are also asked. Anecdotally, observed activation increases via the fNIRS devise correspond to the students' self-reported activation. Going forward, the fNIRS data must be run through statistical analysis software to determine what activations are significant, as well as to allow comparison of these significant activations between participants and with the qualitative data.

Presentation Number 48

ABSTRACT:

Abstract Title:	**The Manipulation of Learning Strategies in Experiential Decision Making**		
Presenters:	Jason Fernandez and Samantha Gottlieb		
Mentor:	Arig aboulenein	**Campus:**	Pullman
Majors:	Fernandez (Psychology- CAS) and Gottlieb (Neuroscience and Psychology- CVM)		
Category:	Social Sciences		

Learning from the consequences of previous decisions is key to improving one's decision making over time. The Iowa Gambling Task (IGT), a card-based gambling game originally developed as a neuropsychological test, is now among the most popular tests of decision making from experience. The IGT involves repeated choices from among four simulated decks of cards, two of which are better overall and two are worse overall. Success on the IGT requires learning which choices result in better outcomes. Different researchers have debated the extent to which good performance on the IGT relies on accurate, explicit knowledge of the frequency and magnitude of choice outcomes from simulated decks of cards. We manipulated the information that participants focused on as they received feedback in order to better understand how they acquired and used choice outcome knowledge to improve decision making over time.

A total of 160 participants completed the IGT. Participants in different groups were directed to use one of four learning strategies: standard (control) included only the typical task instructions; rote involved memorizing each outcome and its source deck; gist involved calculating running averages for each deck; and relational involved deciding after each outcome whether its source deck was now better or worse overall than the others. Different groups of participants reported their knowledge of deck outcomes in one of three probe conditions: no probe (control), a recognition probe in which they responded whether they recognized both real and false deck outcomes, or a ranking probe in which they repeatedly compared the advantage of choosing from each deck.

We found that, by the end of the IGT, the rote strategy produced the best choices, while the relational strategy produced the worst. Analysis of errors from the recognition probe, and deck rankings from the ranking probe, indicated that rote participants were correctly using their strategy, and were most successful in applying knowledge to make accurate advantageous decisions. Thus, different learning strategies for task knowledge resulted in differences in decision making performance. Future research could help people to develop specific strategies that could improve their decision making in real-life situations.

Presentation Number 49

ABSTRACT:

Abstract Title:	**Developing a Fluorescence Based Approach to Monitoring Nutritionally Regulated Gene Expression During Prokaryotic Development**		
Presenter:	Estifanos Kassa		
Mentor:	Rey Carabeo	**Campus:**	Pullman
Major:	Microbiology- CVM		
Category:	Molecular, Cellular, and Chemical Biology		
Co-Authors:	Nicholas Pokorzynski, Ana Nogueira, Antonio Pedrosa, and Rey Carabeo		

Chlamydia trachomatis is a highly prevalent sexually transmitted infection and is associated with chronic disease in women. The chlamydial developmental cycle within a host cell is known to be biphasic. *Chlamydia* shifts between two morphological forms, an elementary body (EB) and a reticulate body (RB) with the former being the infectious form of the bacterium and the latter being the replicative form. At multiple points during the developmental cycle, the chlamydial population occupying a single cell is highly heterogeneous in morphology. The shift between the two stages of the bacterium is associated with the differential expression of specific genes. Standard practice within the field of *Chlamydia* research often involves monitoring global gene expression changes in such a way that average expression changes within a population of cells is reported. This study aims to validate a novel reporter to monitor differential expression at the single-cell level. In this study, we used *Escherichia coli* as a model organism to establish a functional reporter system for quantitatively monitoring promoter activity over time. We constructed plasmids to express the fast-fluorescent timer (fFT) protein under the control of *E. coli* promoters known to respond to tryptophan (Trp) availability. As such, we cloned the promoters of the *trpEDCBA* and *aroH* operons upstream of the fFT coding sequence. The fluorescence of the fFT matures over time changing from blue to red, reporting on how recently the protein was translated. This allows us to monitor promoter activity as a ratio of red-to-blue fluorescence. We expect that in the presence of Trp, expression of the fFT will be repressed by *E. coli* TrpR and thus we will observe predominantly red fluorescence. In the absence of Trp, this relationship should be inversed and blue fluorescence should be more prevalent. Expression variations will be monitored by spinning-disk confocal microscopy of live *E. coli* cells. This research represents a novel experimental system as the fFT has not previously been used to report on promoter activity in prokaryotes. These experiments will clarify whether or not this approach is an appropriate experimental system for use with *C. trachomatis*.

Presentation Number 50

ABSTRACT:

Abstract Title:	**Response of Weed Roots to the Cellulose Biosynthesis Inhibitor Herbicide Indaziflam (Alion)**		
Presenter:	Raul Arroyo		
Mentor:	Karen Sanguinet	**Campus:**	Pullman
Major:	Field Crop Management- CAHNRS		
Category:	Applied Sciences		
Co-Authors:	Karen Sanguinet and Thiel Lehman		

Weeds are plants whose undesirable qualities outweigh their good points. Weeds are troublesome in many ways. Primarily because they reduce crop yield by competing for water, light, soil nutrients, and space. Due to this competition with crop plants, weeds need to be managed in order to obtain the most out of a given amount of land. In this particular research, Alion—a cellulose biosynthesis inhibitor will be applied in different concentrations to weeds because not all plants display the same tolerance to commonly-used herbicides. This method will allow further investigation of the differential dose response of hexaploid wheat and its related weeds to the commonly used Alion herbicide. The data obtained will help wheat growers devise a way to control weeds without damaging their crops. This could be a way to help wheat growers save money on expensive chemicals, as well as increasing wheat production and profits.

Presentation Number 51

ABSTRACT:

Abstract Title:	**Metallic Hydrogen: A Liquid Superconductor?**		
Presenter:	Zachary Croft		
Mentor:	Jeffrey McMahon	**Campus:**	Pullman
Major:	Physics- CAS		
Category:	Engineering and Physical Sciences		
Co-Authors:	Craig M. Tenney and Jeffrey M. McMahon		

High- and room-temperature superconductivity and metallic hydrogen have been singled out as two of the top three problems in all of physics. Both of these involve dense hydrogen; it is expected that at high pressures, hydrogen becomes metallic, and a superconductor. Recent calculations suggest that the critical temperature (that at which below a material superconducts) is above room temperature; it is so high, in fact, that it is also above the predicted melting temperature. This suggests that hydrogen may remain superconducting in the liquid phase. In this presentation, we investigate this possibility, using first-principles simulations. Our results show that the critical temperature is reduced significantly in the liquid phase, to below the melting temperature. It is further argued that superconductivity is therefore not possible in a liquid, in general. These results are expected to significantly improve our understanding of fundamental interactions in condensed matter.

Presentation Number 52

ABSTRACT:

Abstract Title:	**Effects of Poverty on Sentencing for Environmental Offenses**		
Presenter:	Christina Hubbard		
Mentor:	Erik Johnson	**Campus:**	Pullman
Major:	Sociology- CAS		
Category:	Social Sciences		
Co-Authors:	Alana Inlow, Erik Johnson, and Jennifer Schwartz		

This research was conducted to improve awareness of the relationship between high poverty areas and serious violations of environmental protection laws enforced by the Environmental Protection Agency (EPA). My central hypothesis is that individuals living in high poverty areas are more likely than those in low poverty areas to be exposed to potential harm from serious environmental offenses. Examining 1,014 federally prosecuted environmental cases from the years 2000-2010, this study analyzes disparities in sentencing for environmental offenders. Measures of offense seriousness are proximal indicators of average fine amount, prison sentence, and restitution amount. Results of U.S. state level correlational analysis revealed a weak, but positive relationship with state level poverty in comparison to fines, prison, and restitution. Although the relationships were weak, they support my initial hypothesis that U.S. states with higher poverty rates tend to be areas in which higher fines, prison time and restitution are charged to the environmental offender. States with higher rates of poverty tend to have a higher presence of serious environmental felonies. A second set of analyses compares across the 10 poorest and wealthiest states. In the ten poorest states, there was a moderately positive correlation between poverty and the fine amount charged to the offender than in the wealthier states, where the correlation was weak. The ten poorest states had much more serious environmental violations then the 10 wealthiest. This study's outcome encourages policymakers to construct regulations that put an emphasis on the importance of human health and to focus enforcement efforts in disadvantaged communities.

Presentation Number 53

ABSTRACT:

Abstract Title:	**Changes in Gait Patterns on Sand versus Solid Surfaces**		
Presenter:	Joseph Hall		
Mentor:	David Lin	**Campus:**	Pullman
Major:	Bioengineering- CEA		
Category:	Organismal, Population, Ecological, and Evolutionary Biology		
Co-Authors:	David Lin and Craig McGowan		

Gait analysis aims to understand how animals locomote efficiently and effectively. One general principle in gait is that animals transition to different patterns, namely walking, trotting, and galloping, to minimize energy consumption as speed increases. Studies have utilized belt-driven treadmills because they enable locomotion at a variety of steady speeds. Although these studies have helped us understand how the methods of locomotion operate under the conditions of a solid surface, little research has been done on how locomotion changes depending on surface, such as sand. My hypothesis was that on sand, the rats would change from a lower energy gait like walking or trotting to a higher energy level gait like running or galloping at a lower speed than on a hard treadmill surface.

Normal treadmills cannot be used with sand because as the surface is inverted, the sand would fall off the belt. To address this, I built a new kind of rotary treadmill that can have surfaces like sand while animals locomote at different speeds. Our longest test ran the rat for a little over a minute, equating to 80 feet of linear distance. I found that on the hard treadmill surface, the rat transitioned from a walk to a walking trot at about 33 cm/s and to a running trot around 45 cm/s. On the sand, the rat transitioned from a walk to a running trot at around 30 cm/s, occasionally resorting to a transverse gallop. These results indicate that more energy is needed to maintain the same speed while running on sand versus a hard surface. Future studies will elucidate whether locomotion on different surfaces with varying speeds follows the same strategy as locomotion on a hard surface.

Presentation Number 55

ABSTRACT:

Abstract Title:	**The Psychological Effects of Exergaming on Overweight Youth**		
Presenter:	Daejha Hare		
Mentor:	Sarah Ullrich-French	**Campus:**	Pullman
Major:	Human Development- CAHNRS		
Category:	Social Sciences		

In 2014, the Center of Disease Control and Prevention (CDC) reported the amount of overweight or obese children ages 6-11 and adolescents 12-19 in the United States is increasing at alarming rates. In the last 30 years, childhood obesity has more than doubled and quadrupled in adolescents (CDC, 2014). In 2012, more than one third of children were overweight or obese in the United States (CDC, 2014). In 2014, the National Institute of Health (NIH) emphasizes the long term effects of being overweight or obese during youth years as it leads to negative implications during adulthood. Some of the physical complications associated with being overweight or obese in childhood or adolescents are: for cardiovascular issue, bone problems, diabetes, and several types of cancer. (CDC, 2014; NIH, 2014). In 2013, the Center of Disease Control and Prevention reported that all states have at least a 20 percent prevalence of obesity among adults (CDC, 2014). Research on youth has created more awareness for educational and political institutions to examine effective strategies on how to decline the rates overweight youth in the U.S (NIH 2014; DPHP, 2014). The physical implications of being overweight in youth are well established by research however, the psychological consequences are left out as potential solutions (Bacon & Amphramor; Gunderson et al., 2011). Overweight youth are often socially isolated from their peers (Datar et al., 2004). Options for exercise are decreasing for overweight youth, as they require an environment to feel comfortable exercising, this project proposes exer-gaming as a method of exercise. This study focuses on the use of exer-gaming as a medium of exercise and to increase psychological well-being.

Presentation Number 56

ABSTRACT:

Abstract Title:	**Atrazine Induced Epigenetic Transgenerational Inheritance of Disease and Lean Phenotype**		
Presenters:	Deepika Kubsad and Margaux McBirney		
Mentor:	Michael Skinner	**Campus:**	Pullman
Majors:	Kubsad (Biology- CAS) and McBirney (Genetics and Cell Biology- CVM)		
Category:	Molecular, Cellular, and Chemical Biology		
Co-Authors:	Stephanie King, Michelle Pappalardo, Elizabeth Houser, Margaret Unkefer, Eric Nilsson, Ingrid Sadler-Riggleman, Daniel Beck, Paul Winchester, and Michael K. Skinner		

Ancestral environmental exposures to a variety of environmental toxicants and other factors have been shown to promote the epigenetic transgenerational inheritance of adult onset disease. The current study examined the potential transgenerational actions of the herbicide atrazine. Atrazine is one of the most commonly used herbicides in the agricultural industry, in particular with corn and soy crops. Outbred gestating female rats were transiently exposed to a vehicle control or atrazine and the F1 generation offspring bred to generate the F2 and F2 generation bred to generate the F3 generation. The F1, F2 and F3 generation control and atrazine lineage rats were aged and various pathologies investigated. The male sperm were collected to investigate DNA methylation between the control and atrazine lineage sperm. The F1 generation offspring (directly exposed as a fetus) derived from the F0 generation exposed gestating female rats were not found to develop disease, but did have less weight compared to controls. The F2 generation (grand-offspring) were found to have increased frequency of testis disease, increased frequency of tumor development in males and females (predominately mammary tumors), early onset puberty in males, and less weight in females compared to controls. The transgenerational F3 generation were found to have increased frequency of testis disease, early onset puberty in females, behavioral alterations and a lean phenotype in males and females involving a reduced adipocyte size, decreased body mass index (BMI) and reduced adiposity. The frequency of multiple diseases was significantly higher in the transgenerational F3 generation atrazine lineage males and females. Observations indicate ancestral exposure to atrazine can promote disease and a lean phenotype transgenerationally. The etiology of disease may be in part due to environmentally induced epigenetic transgenerational inheritance.

Presentation Number 57

ABSTRACT:

Abstract Title:	**Analysis of a Very Large Database of Natural Speech Using Machine and Human Methods**		
Presenter:	Jenna Anderst, Sarah Beatty, Ellen Benetti, and Melissa Joseph		
Mentor:	Mark Vandam	**Campus:**	Spokane
Major:	Speech and Hearing Sciences - MED		
Category:	Social Sciences		

The ability to collect and analyze daylong audio recordings with wearable technology provides opportunity to gain insight into the daily communication interactions of children acquiring language. This work seeks to investigate language development from a unique very large data corpus to improve lives and improve outcomes for patients in the health and clinical sciences.

In this study children wear an audio recording device that fits into a pocket on a specialized shirt. The device records uninterrupted daylong audio from the child's auditory perspective in the natural family environment. The audio is then uploaded into a computer and processed using automatic speech processing (ASP) and automatic speech recognition (ASR) software. The goal of the processing is to identify segment boundaries (in the time domain) and assign one of about 60 apriori labels to each segment using probabilistic pattern matching algorithms. The labels define segments in terms of live human talkers (i.e., child, mother, father, sibling), and non-human auditory events (i.e., television and electronic media, noise, silence). The output of the processing routines are a time-aligned diarization of the auditory events from a daylong audio recording from the child's perspective and the actual audio itself in raw format. This output is further used to estimate other variables of interest including number of words spoken by the child, number of words spoken by the mother and father, and number of conversational exchanges the child engages in, among others.

The raw audio is also analyzed by trained human transcribers and coders to assess the effectiveness of the automated routines. The human transcriptions build upon and strengthen the automatic processing by producing linguistic transcriptions of the audio files which can be used for further analyses. In this presentation we describe the process of transcription and coding, including how we use and compare machine and human output for use in the health and clinical sciences. We explore theoretical and practical consequences of this new approach. The goal of this study is to provide more linguistic data than previously available by utilizing the cost effective combination of machine automated processing and human judgment.

Presentation Number 58

ABSTRACT:

Abstract Title:	**The Effects of Social Media**		
Presenter:	Karina Myers		
Mentor:	Yujung Nam	**Campus:**	Pullman
Major:	Communication and Society- COM		
Category:	Computer Science, Mathematics, Statistics, and Information Sciences		

Overview: We are a generation obsessed with social media platforms. We are contently checking our accounts and find ourselves absorbed into our feeds. Why do we do this so often and why are we so entertained by showing our lives to the world and looking at everyone else? Is it merely for entertainment or to judge others in a negative or positive way. My research paper will focus on the effects social media has on others and us personally. I will be doing research on the Internet through articles and data collected. As well as conducting my own research through surveys and focus groups. My goal is to explain the social media hype and if it is affecting us in a positive or negative way.

Research Questions:

- What do our social media/networking accounts tell about how we view ourselves?
- How do out social media/networking accounts show how we view others?
- Do you judge people off of how popular their social media channels are?

Hypotheses:

- I think that social media makes you feel negative about yourself more than positive feelings because of all the pressure to get people to "like" your content resulting in a low-self esteem and anxiety, even if you are unaware of it.
- I think people are contently judging whatever content you put on social media positive or negative because what you post is a representation of you allowing them to judge your character.

Sources:

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Presentation Number 59

ABSTRACT:

Abstract Title:	**Efficacy and Economic Viability of Organic Herbicides in a Young, High-Density, Apple Orchard**		
Presenter:	Aaron Appleby		
Mentor:	John Reganold	**Campus:**	Pullman
Major:	Organic Agriculture Systems- CAHNRS		
Category:	Applied Sciences		

Organic agriculture is responsible for less greenhouse gases, less erosion, less groundwater contamination, increased biodiversity, and increased soil organic matter compared to conventional agriculture. Organic agriculture, however, has been criticized as having few cost-effective ways to deal with weeds. While many farmers are attracted to organic agriculture due to its low environmental impact and economic benefits, this lack of weed control is a major factor for people considering transitioning into organic production. Little research has been done on certified organic herbicides, with those now available being expensive. Without proper research on the topic, organic farmers are hesitant to spend money on new products that may not work as intended. I tested four organic herbicides, each with a different active ingredient to see if any of them worked as well as hand weeding. Three of the four herbicides were all less effective at removing above ground biomass of weeds when compared to hand weeding, even when applied twice. One herbicide, Suppress, was statistically as effective as hand weeding. The weeds did regrow on the hand-weeded and three less-effective herbicide-treated plots; however, the hand-weeded plots did not need to be re-weeded until the end of the experiment (once in the beginning and once at the end for 2 times total), while the herbicides needed to be applied ever two weeks (totaling three applications). A problem with organic herbicides is that they are contact herbicides and do not translocate within the plant, making it difficult to control perennial weeds. This was particularly troublesome with the two perennial weeds, Canada thistle (Cirsium arvense) and field bindweed (Convolvulus arvensis), in the young, high-density, apple orchard, where the study took place. Thus, more research needs to be done on the potential for organic herbicides to translocate to perennial structures.

Presentation Number 60

ABSTRACT:

Abstract Title:	**Tell Me How I Am Learning: Characterizing Formative Assessment and Feedback Cycles in Active Learning Classrooms**		
Presenter:	Christine Huynh		
Mentor:	Erika Offerdahl	**Campus:**	Pullman
Major:	Bioengineering- CEA		
Category:	Social Sciences		
Co-Author:	Erika Offerdahl		

This project is focused on the intersection of cognitive science, education, and psychology to investigate how students learn biochemistry and molecular biology by applying Bloom's Taxonomy. Bloom's Taxonomy is a hierarchical classification system used to define and to distinguish different levels of human cognition. Through recorded lectures, transcripts, and student interviews, the amount of time teachers spend asking different types of questions that elicit student learning can be determined. Through the analysis of all the data, we can also determine how students benefit from the way certain styles of questions may cause them to think critically. Subgroups are researching mechanisms by which active learning affects student understanding, the role of animations in student learning, and the optimization of classroom assessments and feedback on student learning.

Presentation Number 61

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
Major:	Microbiology- CVM		
Category:	Molecular, Cellular, and Chemical Biology		

Legumes have served as critical components of agricultural production systems for millennia, in part due to their ability to form symbiotic relationships with nitrogen-fixing rhizobacteria. Detecting genetic diversity among rhizobia isolates helps identify strains with improved capacity to fix nitrogen. The objective of this research is to examine genetic diversity among commercial isolates of *Rhizobium leguminosarum* and *Mesorhizobium ciceri* and isolates collected from peas and chickpeas grown in the Palouse region of Washington and Idaho. 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 were determined by DNA sequence analysis across several genes including *nod*C (nodulation), *rec*A (DNA repair), and *GSII* (glutamine synthetase), and phylogenetic trees were constructed. *GSII* sequences were more polymorphic than either *rec*A or *nod*C. Endemic isolates collected from the Palouse often clustered on distinct branches from commercial isolates. These results suggest divergence between endemic and commercial isolates that may impact host.

Presentation Number 62

ABSTRACT:

Abstract Title:	**Activity Patterns of Sympatric Carnivores With and Without Anthropogenic Disturbances**		
Presenter:	Leandro Lessin		
Mentor:	Daniel Thornton	**Campus:**	Pullman
Major:	Wildlife Ecology & Conservation Sciences- CAHNRS		
Category:	Organismal, Population, Ecological, and Evolutionary Biology		
Co-Author:	Daniel Thornton		

Anthropogenic disturbances in nature can have serious effects on wildlife species. Animals are pressured into changing their behaviors in response to human activity, as some species migrate to less-populated areas, whereas others may adopt different hours of activity. We predict that carnivores will adopt a more nocturnal pattern of activity in areas with high human presence. Using camera-trapping technology, we analyzed the activities of species in the Kettles of Washington. We placed camera-traps along trails with high vs. low human presence. Based on data collected, we developed density curves of 24-hour activity patterns and examined differences in activity between trails with different human use levels. The species we focused on are sympatric carnivores such as cougars, wolves, coyotes, bobcats, and black bears. Results have yet to be summarized, but the analysis of the data will be conducted with the use of R software. This research and its results can reveal how carnivores that are important to ecology respond to human exposure, providing further knowledge for the field of wildlife conservation.

Presentation Number 63

ABSTRACT:

Abstract Title:	**Hierarchical Morphology to Control Energy and Charge Transfer in Polymer Blend Light Emitting Diodes**		
Presenter:	Keith Hillaire		
Mentor:	Brian Collins	**Campus:**	Pullman
Major:	Physics- CAS		
Category:	Engineering and Physical Sciences		
Co-Authors:	Thomas Ferron, Michael Pope, and Brian Collins		

With increasing efficiency, flexibility, and facile processing routes, organic light emitting diodes (OLEDs) are en route to replace their inorganic counterparts in lighting and displays. Blends of polymers can be used to enhance their performance and tune emissive colors in OLEDs through energy transfer to respective components. Nanostructure of those components is also important but has not been explored with as much detail. Here we use resonant and diffractive X-ray techniques to reveal the hierarchical morphology present in F8:F8BT polymer blend OLEDs. We find that energy and charge transfer processes resulting in photon emission are highly affected by the specific morphological state of the system, controlled by blend ratio and the concentration of processing additives. Such control over structure in OLEDs via simple processing variations will allow the tuning of optical and electronic performance in these novel devices.

Presentation Number 64

ABSTRACT:

Abstract Title:	**Visualizing the Columbia River Basin, Where'd the Water Go?**		
Presenter:	Kaelin Hamel-Rieken		
Mentor:	Sonia Hall	**Campus:**	Pullman
Major:	Environmental & Ecosystem Sciences- CAHNRS		
Category:	Social Sciences		
Co-Author:	Sonia A. Hall		

The Columbia River and the tributaries that drain into it make up the Columbia River Basin. The water draining into the Columbia River is harnessed and accounted for supply and demand uses, such as agricultural irrigation, municipal uses, instream flow, and hydropower purposes. As a state, we depend upon our water source for normal day-to-day activities. The purpose of this project was to generate a forecast for the water supply in the Basin for 2035. This forecast is important because there is no guarantee that the supply will remain constant as factors alter water supply, like climate change. The purpose of my work was to recreate visualizations of the forecast geography and results, to express the extent of water supply within the Columbia River Basin. Knowing the amount of available water for the future allows for planning and mitigation, to increase the likelihood that the water supply will be sufficient, and in the right time and place, to support the diverse needs of people within Washington. The forecast revealed that changes in climate, economics, and water management would have an impact on water supply and demand over the next 20 years. Knowing these expected changes allows time to alter plans to ensure that the water supply remains sufficient to sustain demand. To generate the visualizations I used ArcGIS to piece together all the needed information to create a visualization that would fully express the needed information in order to show the reader the scope of the project. Previous versions of the visualizations were obscure and lacked impact, which is where my work came in to generate visualizations that were not only concise and clear, but had a lasting impact as well. By revamping the visualizations, it provides readers with a clear understating of scope and potential concerns for the forecasted supply. I did this by including location that is more specific, distinct boundaries, and high-resolution data to ensure that the revamped visualizations succeeded in being clear and impactful.

Presentation Number 65

ABSTRACT:

Abstract Title:	**Bringing Rosalia to Life**		
Presenter:	Lindsey Jackson		
Mentor:	Kathleen Ryan	**Campus:**	Pullman
Major:	Interior Design- CAHNRS		
Category:	Arts and Design		
Co-Author:	Kathleen Ryan		

Problem: Rosalia is a rural town consisting of about 500 people in total which lacks a health care facility within its boundaries. By providing this area with a health center, many residents wouldn't have to travel such a far distance in order to take care of health problems that they face every day.

Background: In this modern age of design it becomes very important to incorporate ideas which not only serve an efficient function, but that benefit the user in psychological, physiological, and spiritual ways. A design concept that is becoming more prominent in design practice is the incorporation of bio-inspired ideas into a building. Biophilia is the design of bringing in natural elements to the interior of a building by utilizing design strategies such as daylighting, incorporating live plants, uplifting color schemes, and nature-based patterns used on walls, flooring, and finishes (Terrapin, 2014).

Method: The design of the Rosalia Health Clinic healing environment, brought in aspects of nature that was much needed through using bio-inspired ideas. The design of this healing environment will provide closer access to health services for this rural town using inspiration from nature.

Outcome: Bio-inspired designs can be seen throughout the entire building starting with when you first walk inside. You are greeted with large floor to ceiling window walls bringing in tremendous light to the place where guests will spend the majority of their time. The walls are painted with blues and greens which studies have shown calm down the nervous system (Terrapin, 2014). Each wall in the interior of the building is curved to provide wayfinding as well as bring in natural curves. A resident of Rosalia who reviewed the project said, "The coloration and layout of the health center makes it a very uplifting design." The Healing Environment design targets the needs of the community as well as brings light into a space that desperately needs it. The design of the Healing Environment Health Clinic successfully takes the needs of Rosalia and makes it a place of comfort and true emotional and physical healing using the theory of bio-inspired design.

Presentation Number 66

ABSTRACT:

Abstract Title:	**Stretch Your Mind: An Examination of the Effects of Yoga on Executive Functioning**		
Presenter:	Aria Petrucci		
Mentor:	Carrie Cuttler	**Campus:**	Pullman
Major:	Psychology- CAS		
Category:	Social Sciences		
Co-Authors:	Emily LaFrance, Gabrielle Struve, Christopher Connolly, and Carrie Cuttler		

Previous research has shown that different types of exercise, including aerobic exercise (e.g., running, cycling), and resistance training (e.g., weight lifting) acutely improve aspects of executive functioning such as planning, problem solving, and inhibition. The purpose of the present study is to extend this body of research by examining the effects of an acute bout of yoga on executive functioning. Moreover, we seek to compare the relative effects of yoga and more traditional forms of exercise (i.e., aerobic, resistance) on executive functioning. Participants in this study are being randomly assigned to complete a 30-minute video-guided aerobic, resistance, or yoga exercise routine at a moderate level of intensity or to sit and simply watch one of these three videos. Following the video, participants complete a battery of neuropsychological tests, including the Tower Test, which assesses executive functioning. This test requires them to build specific towers of blocks using three pegs within a limited amount of time while following restrictive rules (e.g., only one block can be moved at a time and larger blocks can never be placed on smaller blocks). Tower Test scores are determined based upon the total time to make the first move, total number of rule violations, total time to complete the tower, and total number of moves. Data are still being collected but we hypothesize that participants in the yoga condition will perform better on the Tower Test relative to the control group, aerobic exercise group, and resistance exercise group. Support for this hypothesis would extend upon the current literature suggesting that acute bouts of aerobic and resistance exercise benefit executive functioning and may help to guide future research focused on identifying the mechanisms underlying the beneficial effects of exercise on executive functioning.

Presentation Number 67

ABSTRACT:

Abstract Title:	**Parent-teen Closeness and Teen Dating Violence**		
Presenters:	Trisha Fernandez and Hannah Heizer		
Mentor:	Kathleen Rodgers	**Campus:**	Pullman
Majors:	Fernandez (Psychology- CAS) and Heizer (Human Development and Comparative Ethnic Studies- CAHNRS)		
Category:	Social Sciences		

Introduction: Teenage years are a time for evaluating one's values and views about romantic relationships (Temple-Smith, Moore, & Rosenthal, 2016). 1/4 teens involved in a romantic relationship experiences dating violence (Halpern, Young, Waller, Martin, & Kupper, 2004). Family sexuality communication has shown to reduce teen sexual-risk taking behavior (Grossman & Richer, 2015). But little is known about parent-teen communication about dating violence. In this mixed-method study, we will examine parent-teen communication about content seen in the music video "Love The Way You Lie" (artists: Rihanna and Eminem). This video contains dating violence and has shown to elicit discussions about this topic. We will analyze 10-minute parent-teen conversations about the video to determine how and if parents and teens demonstrate emotional closeness when talking about violence in relationships. We will also examine the relationship between parent-teen communication and participants' self-reported experiences and/or knowledge about dating violence.

Research Questions:

- How do parents and teens talk about dating violence when prompted with a music video?
- Do participants who have experience with intimate partner violence/dating violence communicate differently than those with no dating or intimate partner violence experience?

Methods: We will use data from the "Parent-Teen Dyad Communication" study conducted by PIs, Kathleen Rodgers and Stacey Hust. 50 participants were recruited from rural communities in Southeastern Washington and urban communities in Spokane. Participants ranged from teens that were beginning high school to recent graduates, and their parents. Surveys were given to assess participants' relationships, dating, media use, and violence experiences. These parent-teen dyads then watched the music videos and were recorded using two video cameras and tripods in a laboratory setting.

As trained research assistants, we transcribed all audio and videotapes verbatim. We will code and analyze 5-10 transcriptions to answer RQ1, and compare the quantitative self-report data with the analyzed transcriptions to answer RQ2.

Implications : From this analysis, we will identify the different ways that parents and teens talk about the sensitive topic of dating violence. Knowing how parents and teens talk about dating violence will help us devise possible solutions and preventions regarding the issue of dating violence among adolescents.

Presentation Number 68

ABSTRACT:

Abstract Title:	**Bucket! I'll Do It Now!**		
Presenter:	Emily Coder		
Mentor:	Lisa Fournier	**Campus:**	Pullman
Major:	Psychology- CAS		
Category:	Social Sciences		
Co-Authors:	McKenna E. Keng, Kristi L. Rieker, Franklin J. Ramirez, Olivia R. Snow, Ezana F. Taddese, and Lisa R. Fournier		

Historically, research shows that the alternative that requires the least amount of physical effort is typically chosen when both alternatives lead to equal rewards (Botvinick et al. 2008). However, recent research suggests otherwise. For example, in a forced, two-choice task in which one of two buckets had to be transported to a platform at the end of a corridor, participants preferred to pick up the bucket closer to their start position versus the bucket closer to their end position. This bias occurred even though the bucket closer to their start position (which was often heavier) had to be carried over a longer distance. This bias is referred to as "pre-crastination", and is defined as "the hastening of sub-goal completion, even at the expense of extra physical effort" (Rosenbaum et al. 2014). We asked whether pre-crastination generalizes to choices regarding the *order* in which we complete sub-goals necessary to achieve an end goal. Participants were instructed to retrieve two buckets, located at different distances along a corridor, and return them both to a table located at their start location. The distances of the two buckets from the participant's start location, the ratio of balls across the two buckets, and the overall weight of the buckets were manipulated. We measured the frequency in which the bucket located closer to the participant's start position was picked up first. Results showed a significant bias (~80%) to pick up the bucket closer to the start position first, consistent with pre-crastination. Moreover, this bias occurred independent of bucket distance, ball ratio, and weight. This suggests that pre-crastination generalizes to choices regarding the *order* in which we complete sub-goals, even though these choices may require more physical energy. Although pre-crastination appears suboptimal, the possibility that pre-crastination may be optimal in terms of conserving cognitive energy is discussed.

Presentation Number 69

ABSTRACT:

Abstract Title:	***Campylobacter jejuni* Localizes with the Trans Golgi Network after Uptake by an Epithelial Cell**		
Presenter:	Rebekah Mars		
Mentor:	Michael Konkel	**Campus:**	Pullman
Major:	Microbiology- CVM		
Category:	Molecular, Cellular, and Chemical Biology		
Co-Authors:	Nicholas Negretti and Michael Konkel		

Campylobacter jejuni, a microorganism that colonizes the intestinal tract of poultry, is one of the leading bacterial causes of human food-borne illness in the United States. Infection with *C. jejuni* results in severe gastrointestinal illness (diarrhea) and may cause Guillain-Barré syndrome. During disease development, *C. jejuni* becomes internalized within intestinal epithelial cells and resides within a modified endosome, termed the *Campylobacter*-containing vacuole (CCV). Previous studies have shown that the CCV acquires host-derived markers including Rab7 and LAMP-1 and avoids delivery to the lysosome. However, little information is known about what host markers the mature CCV acquires. We hypothesized that *C. jejuni* manipulates the host cell to acquire a vacuole with host-derived markers for both survival and replication. To further define the CCV, we labeled *C. jejuni* and specific host cell proteins with antibodies and examined the *C. jejuni*-infected INT 407 cells with a confocal microscope. Consistent with previous work, we have found that the CCV acquires the late-endosomal marker LAMP-1. However, we have also found that the CCV then acquires a new marker associated with the Trans-Golgi Network (TGN). In comparison to the other cell components investigated, the TGN was the only component that showed extensive co-localization. Further experiments are needed to determine the specific *C. jejuni* and host proteins that are needed for CCV trafficking and association with the TGN. Ultimately, the identification of bacterial proteins that manipulate host cell components could be used as targets in the development of therapeutic treatments for *C. jejuni* infections.

Presentation Number 72

ABSTRACT:

Abstract Title:	**Does Social Interaction on Strava Lead to Greater Fitness Levels?**		
Presenter:	Todd Mordhorst		
Mentor:	Yujung Nam	**Campus:**	Pullman
Major:	Communication- COM		
Category:	Social Sciences		

Strava is a fitness-tracking mobile application billed as a social network for athletes. It is most popular among runners and cyclists. Individuals can record their workouts on Strava, add friends, like and comment on other athletes' workouts and compare their workouts to friends, or even professionals. There are many sub-cultures and nuanced relationships within the Strava community. There are norms and unwritten rules within the Strava community, and there are several ways to derive motivation, entertainment and utility from the app.

This project will delve into why and how athletes use Strava. What aspect of the app are most motivating to them? Is it getting, "Kudos!" from a friend after a tough workout? Is it beating a friend's time on your local three-mile loop? Is it clocking a half-mile time as fast as a famous pro athlete on Strava? It's likely a combination of the above factors, and varies wildly depending on the person, but there are likely prevailing trends and patterns among Strava users that this study will explore.

Many of the existing studies conducted using Strava are aimed at identifying popular routes for running/cycling to inform city and recreation planning. There are existing studies exploring motivation and fitness trackers. This study will tap into the social interaction and social norms associated with Strava in particular. For this study, I will conduct an online survey of runners who use Strava, asking about how users derive motivation from Strava, how often Strava users compare their workouts to others', how FOMO (fear of missing out) motivates them to work out, and how fastest known times, or course records, serve as motivation.

Research Question: How does social interaction on Strava lead to fitness motivation?

Hypotheses:

- Most users are primarily concerned with tracking their personal progress.
- Comparisons with other Strava users serve as a secondary motivation.
- Only a small segment of Strava users take particular interest in course records/King of the Mountain/Fastest Known Times (primarily due to the fact that they consider those times personally unattainable).

Presentation Number 73

ABSTRACT:

Abstract Title:	**Time Delayed Collection Field Experiments for Organic Solar Cells**		
Presenter:	Matthew Waldrip		
Mentor:	Brian Collins	**Campus:**	Pullman
Major:	Physics- CAS		
Category:	Engineering and Physical Sciences		
Co-Author:	Michael Pope, Thomas Ferron, and Brian Collins		

Organic solar cells (OSCs) are a promising technology to provide an economical and adaptable source of renewable energy. They are made from non-toxic polymers (plastics) that can be printed from inks. However, production organic solar cells are not efficient enough to compete with inorganic cells. Intense research is being done to identify efficiency loss mechanisms, and consequently, how to 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 create positive and negative electric 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 OSCs. For TDCF, the device is stimulated with a laser pulse, creating a plethora of electric 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 their technique requires specialized devices. This project is unique in that TDCF is performed on standardized devices. A variety of tests can be performed on a single standardized device, allowing us to correlate trends. This breakthrough in TDCF is achieved through a novel means of applying the electric field.

To create electric charges, two materials are required: a donor (which “donates” an electron) and an acceptor (which “accepts” the electron). We have applied TDCF to study how different concentrations and structures of the donor/acceptor mix affect efficiency.

Presentation Number 74

ABSTRACT:

Abstract Title:	**Animal Shelter Design: Establishing positive connections between Humans, Animals and Design**		
Presenter:	Victoria Page		
Mentor:	Kathleen Ryan	**Campus:**	Pullman
Major:	Interior Design- CAHNRS		
Category:	Arts and Design		

Goal: An animal shelter is in many cases seen as uninspiring and dreary. There is a sensory overload from the moment you enter the space. To improve the experience of both humans and animals, the goal is to design a reception area within the animal shelter setting, that is responsive to the needs, health, safety and welfare, and environmental aesthetics of humans and animals alike. This design was influenced by the intersection of place theory through hospitality and healthcare design, Maslow's Hierarchy of Needs and environmental perception of humans and animals.

Background: Using Maslow's Hierarchy of Needs, a space was designed to integrate the needs of humans and animals within a built environment. Maslow's Hierarchy of Needs synthesizes human behavior into categories of psychological needs. These psychological needs must be satisfied on the basic level before the needs of a higher level can be met. Environmental perception explores the uses of external senses within the built environment. These two theories and the intersection of hospitality and healthcare design will generate a positive reception experience for an animal shelter.

Method: Research was established through case studies, observations and Evidence-based design analysis of animal shelters. The reception area is an important aspect of the design experience because it is the first initial point of communication and interaction between staff and guest. This area sets the tone for the rest of the experience. Place theory is important to consider here because it emphasizes the contextual meaning of a space derived from its social, cultural and emotional content. The needs to satisfy the function of an animal shelter reception area are: spatial layout, circulation functionality, defined transitions, staffing support area, ambient conditions, and a welcoming positive messages.

Results: A proposal for a reception area was designed and reviewed by a local animal shelter. The design was influenced by place theory in the built environment to invoke a positive connection between humans and animals at the shelter. Maslow's Hierarchy of Needs and the environmental perception of humans and animals guided the design to create an authentic experience.

Presentation Number 75

ABSTRACT:

Abstract Title:	**Trait Anxiety Impacts the Ability to Attend to Information in the Environment in the Absence of Any Threat**		
Presenter:	Sydney Wirkkala		
Mentor:	Cristina Wilson	**Campus:**	Pullman
Major:	Psychology- CAS		
Category:	Social Sciences		
Co-Authors:	Cristina Wilson, Paul Whitney, and John Hinson		

Anxiety can be beneficial, such as when it motivates a student to study for an upcoming exam, but when experienced at high levels it can impair performance on a variety of tasks. Some people experience consistently high levels of anxiety (known as trait anxiety) and these individuals perform poorly on some cognitive tasks but not others. A common assumption in this research is that people with high trait anxiety have fewer attentional resources available to them. However, attention is comprised of many different processes, some of which operate automatically, and some of which use extensive mental resources. For example, orienting to your professor when called on in class occurs automatically and without effort, but shifting attention between the professor's demonstration and taking notes is deliberative. At present, it is unclear whether automatic and deliberative sub-processes of attention are similarly impacted by high levels of trait anxiety. This study addresses that gap by examining anxiety-differences in automatic and deliberative sub-processes of attention using two tasks: the Attention Network Task (ANT) and the Friend or Foe task (FoF). Both tasks require speeded responses to target stimuli. The ANT measures automatic sub-processes of attention such as alerting (change in reaction time resulting from a warning signal) and orienting (changes in reaction time that accompany cues indicating where the target will occur). The FoF measures deliberative sub-processes of attention such as inhibition (changes in accuracy resulting from incongruent stimuli flanking the target). If automatic and deliberative processes of attention are both impaired by trait anxiety, high anxiety participants will perform worse on the ANT and the FoF task relative to low anxiety participants. If, however, impairment is selective, high anxiety participants will perform worse on some components of the tasks, but not others.

Presentation Number 76

ABSTRACT:

Abstract Title:	**The Impact of Processing Parameters and Formulation on the Development of Free Whey in Yogurt**		
Presenter:	Matthew Tanoeihusada		
Mentor:	Melito Joyner	**Campus:**	Pullman
Major:	Food Science- CAHNRS		
Category:	Applied Sciences		
Co-Author:	Joyner Melito H.S.		

Free whey occurs naturally in commercially sold yogurt. The appearance thin-clear layer of whey may reduce consumer perception on the product itself. This research is aimed to explore the processing parameter such as formulation and external factor such as packaging materials and packaging shapes to reduce the occurrence of free whey in commercial yogurt. Glucono Delta Lactone (GDL) is used to create acid milk with pH of 4.50 to mimic yogurt. Polypropylene (PP) and Polylactic acid (PLA) plastic will be used for packaging materials while three different yogurt cup shapes: Wide mouth, straight, and narrow mouth will be utilized and compared to. The yogurt will be cured in the respective package for 2 weeks and whey will be weigh. Stress in form of vibration will also be assessed using orbital shaker as stress source to see how it will affect the development of free whey. The orbital shaker will be run for 24 hour at two hundred rotation per minute (RPM) and sample will be cured for 2 weeks followed by whey weighing. Tribology is also done to see the effects of smooth packaging contact with the yogurt on free whey development. Siliconized beaker will be used as comparison. Result shows that the usage of siliconized beaker shows more whey being produced compared to non-siliconized beaker while PLA cups produce the least whey compared to the PP cups. The smooth surface results also supported by tribology result where the coefficient of Friction value is smaller when siliconized beaker is used. Across the packaging shapes, narrow mouth yogurt cups produce the least free whey while straight yogurt cups produce the most whey. When orbital shaker is used to generate stress for the yogurt, it releases a huge amount of free whey and produce yogurt that did not set. The same result can be seen on every cup that are exposed to this stress. The experiment shows that narrow-mouth PLA plastic cups reduce the free whey the most, thus further experimentation using complete yogurt recipe and discovering a way to reduce stress on the yogurt when transporting could be initiated.

Presentation Number 77

ABSTRACT:

Abstract Title:	**The Brucella Effector Protein BspA Binds to MARCH6 which Influences Host Protein Secretion**		
Presenter:	Veronica Harris		
Mentor:	Cheryl Miller	**Campus:**	Pullman
Major:	Microbiology- CVM		
Category:	Molecular, Cellular, and Chemical Biology		
Co-Authors:	Cheryl Miller and Jean Celli		

Brucella abortus is a Gram negative bacterium that causes brucellosis, one of the leading zoonotic diseases with an estimated 500,000 human cases annually. *B. abortus* is responsible for chronic infections in humans as well as sterility and miscarriages in livestock. This condition is incurable in cattle and other animals, which can be expensive due to the cost of vaccinations for prevention as well as the loss of product. *B. abortus* is an intracellular pathogen with a Type IV Secretion System (T4SS) whose effectors are not well-known. These effectors do not have a definite number or function inside the cell, but are altogether responsible for the growth of *Brucella* in the host cells like macrophages, epithelial and reproductive cells in animals. BspA is a *Brucella* secreted protein that localizes in the Endoplasmic Reticulum (ER) of the cell where it inhibits the secretion of host proteins. In order to find a host protein interaction for BspA, a library screen for mammalian targets was utilized to identify $MARCH6_{166\text{-}325}$. MARCH6 is an E3 ubiquitin ligase, which targets ER proteins for degradation by polyubiquitinating proteins to send them to the proteasome for degradation into amino acids. MARCH6 and BspA protein interaction was confirmed in the yeast two-hybrid system, BspA and full-length MARCH6 showed direct interactions with each other. In another method, BspA was found to co-immunoprecipitate with MARCH6, confirming the interaction of these two proteins. When ectopically expressed in HeLa cells, both proteins localized to the ER. When MARCH6 function is knocked down, Secreted Embryonic Alkaline Phosphatase (SEAP) proteins show inhibition of secretion outside of the host cell. This implies that the interaction of MARCH6 and BspA negatively influences the secretion of host proteins, which can contribute to bacterial growth. Understanding the relationship between *Brucella* and host proteins could lead to the development of drugs that prevent this interaction.

Presentation Number 78

ABSTRACT:

Abstract Title:	**Design to Experience**		
Presenters:	Melanie Laws, Shelby Ruiz, and Kelli Young		
Mentor:	Kathleen Ryan	**Campus:**	Pullman
Majors:	Laws (Interior Design- CAHNRS), Ruiz (Interior Design and Construction Management- CAHNRS), and Young (Interior Design-CAHNRS)		
Category:	Arts and Design		

The proposed design for the Amazon Rainforest Education Headquarters is to perform as a working part of the mission to save the forest. The Amazon rainforest is the single greatest carbon sink we have to offset CO2 emissions globally, however factoring in the current rate of deforestation, the Amazon rainforest is capturing 30% less carbon than it was just ten years ago. With carbon emissions continuing to rise exponentially, it is important that what's left of the Amazon rainforest be protected. The ultimate goal is to design a memorable and retainable education center by utilizing experiential design to create an immersive educational environment that fosters connection to educational material and therefore high information retention.

Experiential design in this case is the intentional design of an interior environment to create a specific learning experience for visitors. The design approach the Amazon Rainforest Educational Center takes is a narrative style, processional experience. Story driven learning experiences are almost always memorable because a visitor is able to place themselves inside the story to truly understand what information is being presented. For centuries information has been passed down by means of storytelling, typically stories with a specific message or lessons. To use this age-old approach in interior design, creating an immersive environment is one specific method of experiential design.

The design incorporates an immersive education approach to best educate visitors interested in making a significant difference in the longevity of the Amazon Rainforest. The proposed learning spaces are divided into four components; one to represent each Rainforest layer. The experience is designed with a processional flow starting on the forest floor and moving up to the emergent canopy layer. The circulation that flows from space to space is where visitors learn about the Amazon River through interactive exhibits. Each zone will tell its story using the timeline of specific species of plants and animals from that part of the forest. By using a narrative style of presenting information that is easy to form personal connection to, visitors will leave with maximum information retention and a new found appreciation for the Amazon Rainforest.

Presentation Number 79

ABSTRACT:

Abstract Title:	**China in Africa: African Perspectives (2015)**		
Presenter:	Davin Fladager-McCullough		
Mentor:	Lydia Gerber	**Campus:**	Pullman
Major:	Asian Studies- CAS		
Category:	Social Sciences		

China has made large investments in education, infrastructure, and transnational projects such as railways and ports throughout Africa for more than two decades. Much has been written about China's significant investment and engagement in Africa, but it is difficult to gain a perspective how ordinary people in Africa view these developments. The purpose of this research project is to provide a preliminary sense of the thoughts and experiences of individual Africans with the continued involvement of China within their respective countries. This project is based on a qualitative assessment of contributions to a recent (2015) roundtable discussion forum *The Stream* offered by the media network *Al Jazeera* on the topic of China in Africa. It examines both the contributions of the roundtable participants and the tweets sent in response to the program by viewers from different African countries. Neither the participants chosen for the roundtable, nor the mostly male tweeters with access to technology can be considered representative of all countries and demographic groups within Africa. Yet taken together the *first person* voices examined in this project suggest a more nuanced understanding of how Chinese involvement has impacted individuals and some local communities across Africa.

The relationship between China and Africa is undoubtedly complex, and participants continue to speculate about China's true intentions. This project argues that African *first person* perspectives on China allow for a better understanding of both the challenges and the opportunities inherent in this massive economic investment, first and foremost for the African people, but also for China and the West.

Presentation Number 80

ABSTRACT:

Abstract Title:	**Mechanisms of Oxytocin Activation on Vagal Afferent Neurons**		
Presenter:	Jennifer Glover		
Mentor:	James Peters	**Campus:**	Pullman
Major:	Neuroscience- CVM		
Category:	Molecular, Cellular, and Chemical Biology		
Co-Authors:	James H. Peters and Jonathan E. M. Lindberg		

The neuropeptide oxytocin is produced in the hypothalamus, released from the pituitary gland, and impacts many behavioral and physiological processes. Tonic circulating secretion of oxytocin coordinates social interactions, stress-related disorders, along with gestation and labor; while phasic secretion of oxytocin in the brain impacts key autonomic reflex pathways. Afferent neurons from the vagus are the first step in these reflex pathways and are central in the control of autonomic balance including coordinated cardiovascular and gastrointestinal functions. Previous studies have shown that oxytocin administrations impacts behaviors and physiological responses known to be controlled by vagal afferents neurons suggesting oxytocin may directly influence signaling on vagal afferents. This study aims to explore distribution of oxytocin sensitive neurons from vagal ganglia as well as categorize the responses. Cells were cultured from nodose ganglia and fluorescent calcium imaging techniques were used to examine the effects of varying concentrations of oxytocin. Doses ranging from 100pM to 10uM were run over cultured cells with periods of wash in between to determine an oxytocin dose-response relationship. The selective TRPV1 agonist capsaicin was tested over the cells at the end of each run to determine the neuronal subtype and a brief dose of elevated potassium chloride was used to determine if the cell was a neuron, glia, or not viable. We found a large subpopulation of neurons which were oxytocin-responsive as well as capsaicin-responsive. Surprisingly, the concentrations of oxytocin required to activate the cells were significantly higher than expected to activate the oxytocin receptor and suggest an additional cellular target mediating the acute effects of oxytocin. Taken together these results provide advances in understanding oxytocin signaling in vagal afferent neurons and their potential to control cardiovascular, gastrointestinal, and autonomic reflex pathways.

Presentation Number 81

ABSTRACT:

Abstract Title:	**Tephrochronology of Eastern Washington Ash Fallout Deposits**		
Presenter:	Justin Parker		
Mentor:	John Wolff	**Campus:**	Pullman
Major:	Geology- CAS		
Category:	Engineering and Physical Sciences		
Co-Author:	John Wolff		

Tephrochronology is a research process by which geologists analyze volcanic ash layers and synchronize them based on genetic/topographic similarities in order to establish a framework of spatial-temporal correlation. Employing this process locally, we present chemical data for seven different volcanic ash fallout deposits sampled in the vicinity of Lewiston, ID.

Ash samples are collected and powdered, and then purified using an ultrasonic bath. They are then mounted in epoxy for analysis using several different tools including an electron microprobe, and LA-ICP-MS (*Laser Ablation* Inductively Coupled *Plasma Mass Spectrometry).* If the sample is too hard to disaggregate, it is thinly sliced by a rock saw and analyzed as a "thin section".

The aforementioned devices reveal unique chemical information about the ash that serves as a "fingerprint" of each sample's composition. The chemical data can then be cross-compared, and useful stratigraphic/genetic links between samples can be discovered. This process serves to establish a more expansive "tephrostratigraphic framework" of the local geology, which broadens our knowledge of the field as a whole.

Presentation Number 82

ABSTRACT:

Abstract Title:	**Do We Have a Duty to Feralize Formerly Domesticated Animals?**		
Presenter:	Kenji Lota		
Mentor:	Michael Goldsby	**Campus:**	Pullman
Major:	Philosophy- CAS		
Category:	Humanities		

This paper argues that feralization or the rewilding of domesticated animals meets animal rights activists' demands while maintaining biodiversity. From the animal rights perspective, total abolition of animal agriculture is necessary to meet our moral obligations to animals. Others hold that factory farming should be abolished, but argue for raising animals under better conditions. This is not in congruence with the animal rights view given that sentient animals are still used merely as means for human consumption. Additionally, concerns over global climate change mitigation and the desire to avoid environmental impacts associated with animal agriculture provide further reasons to phase out animal agriculture. There are, however, repercussions, including reduced biodiversity through the possible eventual extinction of domesticated animals because caring for these animals would no longer be sustainable. Feralization is, however, an option in which exploitative animal agriculture might be discontinued and biodiversity, as species richness, might be maintained. To conclude, this paper will briefly examine the moral motivation and ethical implications behind feralization as well as survey how this maybe done given current technology such as artificial selection and advanced genetic engineering (CRISPR-Cas9).

Presentation Number 83

ABSTRACT:

Abstract Title:	**Developmental Mechanisms and the Evolution of the Functional Morphology of Feeding in Danionine Minnows, Including the Zebrafish**		
Presenter:	Mitchel Wagner		
Mentor:	Jim Cooper	**Campus:**	Tri-Cities
Major:	General Biological Sciences- CAS		
Category:	Organismal, Population, Ecological, and Evolutionary Biology		
Co-Authors:	Demi Galindo, Jim Cooper, Adrian DeLeon, and Elly Sweet		

The minnows (family Cyprinidae) are a very successful lineage, with over 3,000 living members. These fishes have evolved a complex biomechanical ability that allows them to protrude their upper jaws forward from the face during feeding. This allows some species to rapidly close the distance to a prey item during the last microseconds of a feeding strike, while others use protrusile jaws to suction small invertebrates into their mouth from the water. The tribe Danionini represents a single branch of the minnow family. These fishes include among them the zebrafish *(Danio rerio*), which is one of the most widely used model organisms in developmental research. This project seeks to test the following hypotheses: 1) that jaw protrusion ability has undergone adaptive evolution in the Danionini; 2) that upper jaw morphology determines maximum jaw protrusion distance; and 3) that jaw protrusion does not arise until post-metamorphic development. We have collected biomechanical data from high-speed video recordings of fish feeding using 9 species of danionine fishes, including the zebrafish. We have also used shape analyses to quantify differences in their skull morphology. Preliminary results support hypothesis two, in that the evolution of jaw protrusion ability and the length of the ascending arm of the premaxillary bone in the upper jaw have undergone significantly correlated evolution. We are currently fitting adaptive evolutionary models to our skull form and function data in order to determine if the evolution of these characters has followed an adaptive pattern. Developmental form and function data from the zebrafish also support hypothesis three, because upper jaw protrusion is not presented until post-metamorphic development in this species. Furthermore, we have strong experimental evidence that thyroid hormone signaling, which is heavily involved in coordinating vertebrate metamorphosis, is critical to determining protrusion ability. We suggest that changes in thyroid hormone signaling may have played an important role in the evolution of bite mechanics among the danionine minnows.

Presentation Number 84

ABSTRACT:

Abstract Title:	**Familial Factors Contributing to the Behavioral Expression of Male Homosexuality**		
Presenter:	Zachery Schramm		
Mentor:	Melissa Goodman-Elgar	**Campus:**	Pullman
Major:	Anthropology- CAS		
Category:	Social Sciences		

In a climate of social movements and improved scientific technology scholars in biology and social sciences are seeking factors that may contribute to the behavior of male homosexuality. Original studies by Camperio-Ciani et al. (2004,2012) focused on the role of family environment as a catalyst for the expression of male homosexuality. These studies focused on the family size differences of a male homosexuals' mother's family and father's family, while also finding a significant association between the number of female relatives related to male homosexuals through their mother. However additional factors may influence the expression of homosexual behavior such as parental investment (time spent with child, emotional attachments to either both, one, or neither parents, and breastfeeding), and environment of childhood (urban, rural, suburb) as a reflection of culture. The present study is aimed to test the findings of Camperio-Ciani in a different sample population, and also to assess the validity of other questions aimed at environmental and cultural factors that may influence homosexual behavior in men. This study was conducted as an IRB human subjects approved anonymous online questionnaire with 63 questions. The respondents include 52 self-identified American male homosexuals ranging in ages 18 to 66 who provided demographic information and data on their immediate family size, their father's family size, and their mother's family size in. Through the use of similar non-parametric statistical analysis test use by Camperio-Ciani, this study will determine if similar associations between family size and number of female relatives of American male homosexuals occurs in a different human population. Finally, this study will progress ideas of epigenetic approaches to address the human sexual expression.

Presentation Number 85

ABSTRACT:

Abstract Title:	**Finding Edgetic Mutations in a Plant DNA-binding Protein**		
Presenter:	Holly Lane		
Mentor:	Michael Neff	**Campus:**	Pullman
Major:	Agricultural Biotechnology- CAHNRS		
Category:	Molecular, Cellular, and Chemical Biology		
Co-Authors:	Michael Neff, Eugenio Gómez, and Miguel Blázquez		

The AT-Hook Containing Nuclear Localized (*AHL*) gene family encodes proteins with two conserved domains: the AT-Hook and the PPC domains. At its most basic level, AT-hook-containing proteins are considered to be evolutionarily ancient transcription factors, which bind DNA based on structure as opposed to on specific sequences. In bacteria and archea, the PPC domain is found on its own as an entire protein of unknown function. When crystalized from bacteria, the PPC forms a trimer of PPC proteins. In plants, this domain facilitates AHL-AHL protein interactions and is also involved in AHL-transcription factor interactions. In *Arabidopsis thaliana,* there are 29 *AHL* genes contained within the genome, and studies have shown a significant amount of genetic redundancy within this family.

I will utilize mutagenic PCR to create random mutations in an AHL, namely Escarola (ESC), creating a "prey library" for interactions with three separate transcription factors used as "baits." I learned this mutagenesis technique studying abroad in Spain last summer.I will test the strength of the protein interaction between ESC and these transcription factors to determine if they are good candidates for discovering "edgetic mutations," or mutations that disrupt one of the protein's interactions without altering others. I will test these initial interactions using a Yeast 2 Hybrid (Y2H) screen. In this test, yeast will live if the two proteins expressed physically interact. After determining whether the candidate offers a strong enough interaction, I will proceed with a reverse screen using the mutation library.

In a reverse Y2H screen, the yeast will die when ESC interacts with the transcription factor. The mutant genes that do not interact with the transcription factor will then be put through a different Y2H screening approach, where yeast live in the presence of an AHL-AHL interaction. The mutations that survive both screenings will then be sequenced to identify the protein region that has been modified. In the case where more than one location has changed, site-directed mutagenesis will be utilized to isolate single mutations, which will then be assayed as above to determine which of the specific mutations was edgetic in nature.

Presentation Number 86

ABSTRACT:

Abstract Title:	**Flexibility: Facilitation Co-design Community Workshop**		
Presenter:	Tyler Reid		
Mentor:	Kathleen Ryan	**Campus:**	Pullman
Major:	Landscape Architecture- CAHNRS		
Category:	Arts and Design		

Problem: Working with the public on community projects as a designer is challenging but rewarding. The challenges come from the fact that communities are not the same. Each community has different, dynamics, goals, vision, and demographics. Designers have to be versatile in one's approach, communication, and interaction with the community (Spinoza, 2005). Participation of those that will use the place to be designed results in a sense of ownership (Sanoff, 1993). In 2016 the Rural Community Design Initiative (RCDI) worked on three projects with differing community dynamics.

Background: RCDI begins working with communities in co-design workshops where community members engage in the design process. Information and ideas are gathered during the workshop. Ideas range from their priorities with the proposed idea, to how they want the idea physically laid out. This information is analyzed and categorized to develop possible design solutions that will meet the needs and wants of the community. The proposed design is presented to the community for their feedback.

Methods: The experience with working with these different communities shows the need for flexibility in one's approach. In the first project the community was excited about the project and had enthusiastic input and expressed the same vision.

The second project presented more challenges. The excitement for the proposed idea was not shared with everyone in the community. There was a need for listening, documentation and negotiation to understand the concerns and developed ideas. By looking at both perspectives, the design team was able to come up with ideas to move forward with.

The third project was a proposal to relocate a village away from active natural disasters. Community members were quick to share and sketch out their ideas. During the workshop, there was a difference in opinion but as a whole participants were excited and willing to work together.

Conclusion: Looking at these three different experiences one can see the need to be able to approach community members differently based on the dynamics and attitude. Opposing points of view are imperative in design. Sharing potential problems or challenges is important to develop a good outcome.

Presentation Number 87

ABSTRACT:

Abstract Title:	**Predictive Relationship Between Chest Girth and Weight in Washington Black Bears**		
Presenter:	Kathryn Sutherland		
Mentor:	Lindsay Welfelt	**Campus:**	Pullman
Major:	Microbiology- CVM		
Category:	Organismal, Population, Ecological, and Evolutionary Biology		
Co-Author:	Lindsay Welfelt		

Measuring the weight of wild black bears is crucial to understanding their general health, eating habits, and ability to reproduce and carry viable offspring. However, an accurate weight cannot always be obtained while researchers are working in the field: the bear may be too large to obtain an accurate measurement in a scale, or a scale may not be available. Several models exist to estimate a bear's weight based on other body measurements; including chest and neck circumference, shoulder height, and total length. Since these measurements are correlated, we calculated weight model outputs for male and female black bears using their chest circumference, which is the body measurement that most closely correlates to weight. The chest circumference was measured on anesthetized bears with a tape measure, and measurements were taken just behind the shoulders during an exhale. The equations for male and female bears are weight = $-22.7198 + 0.0257(CC)^2$ and $-8.9081 + 0.0224(CC)^2$, respectively (r^2=0.9093). All data collected was part of an ongoing Washington Department of Fish and Wildlife (WDFW) project which includes 272 bears captured over a 4-year period. Our results provide more accurate models for predicting bear weight from a relatively easily-obtained chest measurement.

Presentation Number 88

ABSTRACT:

Abstract Title:	**Behavioral Indicators of Illness in Jersey Calves During Cold Weather**		
Presenter:	Jenna Schafer		
Mentor:	Amber Adams-Progar	**Campus:**	Pullman
Major:	Zoology- CAS		
Category:	Organismal, Population, Ecological, and Evolutionary Biology		
Co-Authors:	Amber Adams-Progar and Xiaoyu Wen		

Morbidity and mortality rates are highest during a calf's first two weeks of age. Jersey calves, in particular, are more susceptible to illness during cold weather because of their small body frame. The objectives of this study was to determine if calf jackets minimize the effects of cold weather on calf health and if changes in calf behavior may assist with the detection of calf illnesses. Twenty Jersey heifer calves were randomly assigned to one of two treatments: 1) wear a calf jacket from ages 1 - 14 days or 2) not wear a jacket during the study. During the first two weeks of age, calf behavior was recorded using a time lapse video camera at 5-minute intervals during daylight hours. Calf health treatment records which included body temperature, type of treatment, and number of treatments per calf were collected at the end of the study. Types of treatments were categorized by severity based on the dairy's medical chart. Behavioral observations were documented at 1-hour intervals and classified as lying, standing, eating, drinking, or non-nutritive sucking. Data were analyzed using Pearson correlations and mixed model ANOVAs with repeated measures in SAS. Of the twenty calves, eight demonstrated non-nutritive sucking behavior, half of them with a jacket and half without a jacket. All calves that demonstrated non-nutritive sucking behavior became ill and received treatment. The use of jackets did not affect calf licking behavior ($P = 0.91$), number of treatments ($P = 0.96$), severity of illness ($P = 0.64$), or lying behavior ($P = 0.83$). Calves diagnosed with an illness ($73.69 \pm 2.48\%$) spent more time lying than healthy calves ($62.79 \pm 4.22\%$; $P = 0.03$). More lying behavior was also observed in calves that demonstrated non-nutritive sucking ($71.41 \pm 3.32\%$) than calves that did not demonstrate this behavior ($65.07 \pm 2.48\%$; $P = 0.08$). Calf jackets did not appear to influence the health of Jersey calves; however, lying and non-nutritive sucking behaviors were identified as potential indicators of illness in calves.

Presentation Number 89

ABSTRACT:

Abstract Title:	**Aiding Everyday Activities with Prompting Technology: A Qualitative Analysis of Dementia Participants' Experiences**		
Presenter:	Kelsey Dammeyer		
Mentor:	Maureen Schmitter-Edgecombe	**Campus:**	Pullman
Major:	Psychology- CAS		
Category:	Social Sciences		
Co-Authors:	Brooke Robinson, Rachel Braley, Roschelle Fritz, and Maureen Schmitter-Edgecombe		

Older adults with declining cognition have a harder time completing instrumental activities of daily living (IADLs), such as cooking and managing finances. Prompting technologies, which include in-home devices that can assist older adults in completing these activities, help to prolong independent living. This study aims to understand how persons with dementia respond to voice prompting delivered within a smart home environment. Seventeen older adults with dementia were filmed while completing eight scripted IADLs in a smart home environment (e.g., wash countertops, change a light bulb). Upon making a mistake during task execution, the examiner provided a pre-recorded prompt to assist the individual with completing the task. Prompts provided an increasing amount of direction, starting with a less directive verbal prompt (i.e., a suggestion orienting the individual back to the task). If the indirect prompt did not result in successful task completion, then a more directive verbal prompt (directly telling the individual what to do) was provided. If the more directive verbal prompt failed, a multimodal prompt, which consisted of the direct verbal prompt displayed simultaneously with a short video showing how to complete the activity, was provided on a nearby computer. Two students viewed the footage of participants attempting the eight IADLs and made detailed observations of what was happening in the videos and how the individuals with dementia were responding to the prompting. In this way, the experience of each individual with dementia with the prompts was portrayed through the unique views and interpretation of each student. Qualitative descriptive analyses were used to produce themes that reflected how people with dementia responded to smart home voice prompts when completing everyday activities. The findings revealed that confusion and apprehension occurred prior to a prompt being delivered. Varying degrees of frustration and positive and negative attitudes were observed following the prompt. Prompts were found to be most helpful during non-complex tasks. An overall sense of unease was also exhibited by the participants experiences with the prompts within the smart home. These results will contribute to further improvement in prompting assistive technology for older adults with dementia.

Presentation Number 91

ABSTRACT:

Abstract Title:	**Teams, Guilds and Clans: The Effects of Social Influence on User Behavior and Attitudes in Video Games**		
Presenter:	Justin Slayton		
Mentor:	Yujung Nam	**Campus:**	Pullman
Major:	Strategic Communication- COM		
Category:	Social Sciences		

In many video games, users are presented with the ability to connect with others and join in-game social groups with varying goals and functions. In video games like *World of Warcraft* and *Call of Duty*, guilds and clans are used to organize people of similar interests and personalities and create a sense of community or branding, while other games like *Rust* and *The Forest* utilize these social groups as means of gaining capital to perform better in the game. The goal of this research is to examine the effects that these social groups may have on the video game user. Investigated aspects of this research include several items: How do these social groups function to influence the user's attitudes towards the video game? Also, is there a correlation between social group interactivity and time consumption playing the game? To hypothesize, I predict that users who are actively engaged with their social group during game play will have more positive attitudes towards the game. Also, I believe these users who are engaged will consume more of the medium and have more addictive tendencies. To accomplish this, surveys will be conducted across several platforms including social media like Facebook and forum websites like Reddit.

Presentation Number 92

ABSTRACT:

Abstract Title:	**Evaluation of Seeding Rates in Soft Durum Wheat**		
Presenter:	Ariel Hoffman		
Mentor:	Ryan Higginbotham	**Campus:**	Pullman
Major:	Field Crop Management- CAHNRS		
Category:	Applied Sciences		
Co-Authors:	Ryan Higginbotham and Craig Morris		

Durum is a class of wheat that is grown and milled into a coarse flour called semolina, which is used to make pasta. The kernels of durum wheat are very hard. This hard kernel is a hallmark of durum wheat and the reason the flour is not milled into fine particles. The process of milling such hard kernels through a commercial flour mill requires specialized equipment and more energy than milling traditional bread wheat. Soft durum has all the same quality characteristics as traditional durum, but possesses a much softer kernel. This softer kernel allows for mills to expend less energy generating flour and allows them to use the same equipment they use on other types of wheat. Soft durum can also be milled into a finer flour and used in other culinary products.

Because soft durum is a new market class of wheat, basic agronomic work must be carried out to determine best management practices for growing the crop. One of the questions that needs to be answered is: At what seeding rate should soft durum be planted? One hypothesis is that because durum tends to tiller less than traditional bread wheat, soft durum should be seeded at a higher rate. The purpose of this study was to determine the optimum seeding rate for soft durum.

A study was established in the spring of 2016 at four separate locations using two soft durum cultivars and three seeding rates. Cultivars planted were Soft Alzada and Soft Svevo. Seeding rates varied by location and consisted of a standard rate used for wheat at that location (1X), one and a half times the normal rate (1.5X), and two times the normal rate (2X). Preliminary data indicate an increase in tillers per unit area with an increased seeding rate. However, the increase in tillers did not appear to translate to an increase in yield.

Presentation Number 93

ABSTRACT:

Abstract Title:	**Nitrogen Dynamics of Cover Cropping in an Organic System**		
Presenter:	Tyler Sabin		
Mentor:	Lynne Carpenter-Boggs	**Campus:**	Pullman
Major:	Organic Agriculture Systems- CAHNRS		
Category:	Organismal, Population, Ecological, and Evolutionary Biology		

Nitrogen deficiency reduces crop yield on many organic farms due to a dearth of affordable and concentrated fertilizers that are registered for organic use. Cover crops are grown not for harvest but for their many benefits for soil health, which can include adding nitrogen to the soil and altering nitrogen dynamics of the soil. In this study we conducted two experiments on the WSU Eggert Family Organic Farm, which is a certified organic farm. First, we compared an unplanted area (control) to four species of cover crops including brown midrib sorghum-sudangrass hybrid, Pacific Gold brown mustard, common buckwheat and Ianto's fava bean. In a second experiment, field peas and spring oats were intercropped in three different seeding ratios (75% pea / 25% oat, 50% pea / 50% oat, 25% pea / 75% oat) based on the proportion of the monocrop seeding rate for both crops. Growth and biomass of the cover crops, weed growth, carbon and nitrogen content of cover crops were analyzed at multiple stages of maturation. Soil tests were taken after cover crops tilled into the soil to study effects on nitrogen dynamics. Inorganic nitrogen in the soil was measured by ammonium and nitrate content. Short-term and seasonal supply of inorganic nitrogen were estimated using a soil incubation test. Brown midrib sorghum sudangrass greatly reduced growth of weeds, particularly Canada thistle. It was expected that the 75% pea / 25% spring oat treatment would yield the most short-term inorganic nitrogen supply. However, based on the analyses brown midrib sorghum sudangrass supplied the most short-term inorganic nitrogen, while the 25% pea / 75% oat mix would supply the most inorganic nitrogen during the next crop season. This suggests that this mix stored the most long term nitrogen in organic complexes. This study highlights that different cover crops can provide different benefits, and can be selected and mixed according to the greatest needs of a given farm, field, and time.

Presentation Number 94

ABSTRACT:

Abstract Title:	**Merging the Fast and Slow Lanes: Design Within the Fast-food Servicescape**		
Presenter:	Anna Buzzell		
Mentor:	Kathleen Ryan	**Campus:**	Pullman
Major:	Interior Design- CAHNRS		
Category:	Arts and Design		

Problem: Design of the fast-food environment is normally characterized as a harsh and hurried experience. The emerging slow-food industry uses third place theory to promote social engagement. There are opportunities within the fast-food industry to integrate slow-food concepts into the design. How can the trend in slow-food be positively achieved in the fast-food industry? The designed environment of the servicescape (color, materiality and space planning), influences customers' physically and psychological behavior. Multiple theories were explored that demonstrate how design elements can transform the fast-food servicescape into a social hub.

Background: Color theory, environmental psychology, proxemics, place theory and biophilia were key components in exploring this issue. Our psychological and physical behavior is influenced by the design environment which draw from the above theories. Environmental psychology evolves around the interactions between humans and their surrounds. The applications of color, spatial arrangements and bio-inspired design are the modes in which designers create the experience to meet the needs of the user, and customers' perception of place.

Method: Evidence based design will be the crux in understanding the problem. Observation and analysis of three global fast-food chain restaurants in the region were completed. Through interviews and personal observation, information on how the different designs influence customer behavior were discovered. This field research, along with delving into the fast-food chain design intent, sheds light on how the fast food servicescape can be designed to balance the intent of fast service, while accommodating for the desire to linger in a slow-food environment.

Results: Consolidating observations and research have guided an experiential design that can be applied to improve this fast-food chain in Pullman. Application of color theory, environmental psychology, proxemics, place theory and biophilia to design a positive customer environment that seeks to provide a flexible servicescape that is relevant to current market trends.

Presentation Number 95

ABSTRACT:

Abstract Title:	**Reducing the Size of POx, a Good Candidate for Biofuel Cells**		
Presenter:	Catherine Booker		
Mentor:	Alla Kostyukova	**Campus:**	Pullman
Major:	Chemical Engineering- CEA		
Category:	Engineering and Physical Sciences		
Co-Authors:	Shuozhen Hu, Su Ha, Dmitri Tolkatchev, and Alla Kostyukova		

Biofuel cells are an increasingly important source of alternative energy. In enzymatic biofuel cells, an oxidation reaction serves as the source of electrons. Pyranose oxidase (POx), a tetrameric enzyme that catalyzes the oxidation of glucose, may be a good candidate for biofuel cells, however it has low electrochemical activity. We hypothesized that reducing the distance between the active site and the surface of the enzyme will increase the electrochemical activity of POx, which will be achieved by selectively reducing parts of the enzyme. Reducing the distance will improve electron transfer to electrodes. As a first step to test this hypothesis, we digested POx using limited proteolysis by trypsin and prepared tryptic fragments for functional activity assays and electrochemical tests. The purpose of digesting the enzyme was to remove external disordered regions, and after this tests were run on the enzyme to determine how the activity was affected. We showed that limited proteolysis did not drastically affect the enzymatic activity, and activity was ~90% of the original one. By cross-linking with glutaraldehyde, we demonstrated that tryptic fragments of POx still form tetramers. These experiments are the first step in engineering a reduced enzyme that will power a biofuel cell.

Presentation Number 96

ABSTRACT:

Abstract Title:	**Summarization of *Cryptosporidium parvum* Infection in Calves (Single Dose Response)**		
Presenter:	Grace Jones		
Mentor:	Sergey Lapin	**Campus:**	Pullman
Major:	Mathematics- CAS		
Category:	Computer Science, Mathematics, Statistics, and Information Sciences		
Co-Author:	Sergey Lapin		

Because this is still ongoing research, I have put together a summary of the work done so far. This project is about a parasite that usually infects humans and cattle, causing dehydration, diarrhea, and fever. Our data is from a study on 9 calves who were each dosed with Cryptosporidium Parvum once at the beginning of the study. We have found odd spikes in the amount of oocysts (how the parasite spreads) shed throughout the study which could suggest some of the calves are re-infecting themselves. Each calf was monitored twice a day, so we know the duration, length, and secession of infection and the daily scores of fecal consistency, mood, hydration, and appetite which gives a clear idea of how the infection progresses. At this stage, our data is represented with correlations between the number of oocysts shed per day and the score of a symptom per day, and through numerical summaries of symptoms and shedding amounts. Through the correlations and graphs we are looking for symptom onset and how that may give signs of an impending infection before it becomes seriously infectious. The end goal of this research is to use this type of study and data (single dose at the beginning) to represent the real-world risk of infection, where calves are not isolated and are more likely to be re-infected. By comparing symptom onset and the amount of oocysts being shed per day, we can try to figure out how serious the infection is at various times throughout, and check for the possibility of the initial oocyst shedding being leftover oocysts from the initial dose.

Presentation Number 97

ABSTRACT:

Abstract Title:	**Goal Setting & Interventions in a Care Planning Context**		
Presenter:	Rachel Foster		
Mentor:	Cynthia Corbett	**Campus:**	Spokane
Major:	Psychology- CAS		
Category:	Applied Sciences		
Co-Authors:	Crystal Lederhos, Cynthia Corbett, and Mariah Petersen		

Background: Many aging adults with chronic conditions are challenged by the U.S. healthcare system, experiencing low treatment satisfaction, sub-optimal outcomes, and high costs of care. Due to these difficulties, there is a great need to test the efficacy of preventative home visiting strategies such as chronic care management (CCM) with this population.

Aims: Identify and summarize the common social worker (SW) and nurse practitioner (GNP) interventions used to promote individual participant goals, using the CCM applied to aging adults with multimorbidity with a high baseline acute care use and have a federally qualified healthcare home. Intervention techniques will form greater categories (ex: emotional support, education, dietary logs) from which goals will fall under (ex: decrease depression, manage diabetes).

Methods: Analyze SW and GNP notes regarding interactions with the participants during in-home visits. Categorized individual goals made by participants and intervention techniques implemented. Future analyses include describing relationships between interventions and participant goals.

Results: Data will be analyzed throughout spring 2017 and will be finished for poster presentation. Preliminary analyses indicate that SW and GNP interventions are consistent with participant goals and fall into a few significant categories.

Conclusion: Identifying participant goals and subsequent interventions may help health providers in finding trends in how interventions are implemented and whether or not they are beneficial for those in need.

Presentation Number 99

ABSTRACT:

Abstract Title:	**Supervised Agricultural Experience (SAE) Practices of Washington Agriculture Teachers**		
Presenter:	Jayda Jessie		
Mentor:	Candis Carraway	**Campus:**	Pullman
Major:	Agricultural Education- CAHNRS		
Category:	Social Sciences		
Co-Author:	Candis Carraway		

Effective agricultural education programs must incorporate all three components of the agricultural education program: classroom/laboratory instruction, FFA, and Supervised Agricultural Experience (SAE) (Phipps, Osborne, Dyer, and Ball, 2008). The conceptual framework of this study was rooted in the "teacher responsibilities" related to SAEs. These responsibilities include teaching students about SAEs, helping students plan a SAE program, and supervising SAEs (Phipps et. al, 2008). In order to understand the status and quality of SAEs in Washington, this study sought to describe the teacher practices related to SAE. Qualtrics was used to distribute a researcher developed survey which was reviewed by a panel of experts for validity. A response rate of 42% was achieved. Results showed Washington agriculture teachers on average provided 6.27 hours of SAE instruction for introductory level classes and 4.51 hours for non-introductory level classes. Survey items indicated fifty-five of the agriculture teachers require students to create a written plan before beginning their SAE. All fifty-five said both students and the agriculture teacher have input into creating the plan. Sixty-seven participants indicated they require short-term goals, but only 19 indicated they required students to set long-term goals. Ninety-two participants indicated they supervise SAE projects. Results showed 77 participants require students to keep SAE records. Sixty-four participants provide a record keeping system for students to use and 41 of those 64 provide an electronic record keeping system. Forty-four participants indicated they provide students with class time to work on their SAE records. Seventy-three participants indicated they provide instruction about record keeping. Finally, when asked how they encourage students to receive recognition for their SAEs, the highest amount of participants indicated local/county fairs and FFA degrees. Thirteen participants stated means of recognition other than those provided. When looking through lens of this study's conceptual framework, it appears that some Washington teachers are fulfilling their SAE responsibilities while others are not, due to either the lack of knowledge or resources to fulfill their SAE duties. Additional research should explore what resources and professional development will assist agriculture teachers in fulfilling their SAE duties.

Presentation Number 100

ABSTRACT:

Abstract Title:	**Drosophila STING Mediates the Host Defense Response During Listeria Infection**		
Presenter:	Marina Martin		
Mentor:	Alan Goodman	**Campus:**	Pullman
Major:	Biochemistry- CVM		
Category:	Molecular, Cellular, and Chemical Biology		
Co-Authors:	Alan Goodman and Aoi Hiroyasu		

While the innate immune system is important for defense against bacteria and microbes, the immune response must be regulated to avoid autoimmune disease. One component of the innate immune system is the cytosolic protein Stimulator of Interferon Genes (STING). During Listeria infection, cyclic dinucleotides are secreted as part of the bacterial life cycle. These molecules are sensed by STING, which leads to activation of the NF-kB transcription factor and interferon induction. However, the STING response must be kept in check. Mutations in STING resulting over-expression lead to 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, we have identified a homolog in the fruit fly, Drosophila melanogaster, termed DmSTING. 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 DmSTING. We used Listeria monocytogenes, an invasive Gram-positive bacterium, to study DmSTING function following thoracic injection of Drosophila. Through knockdown and overexpression of DmSTING, the magnitude of the innate immune response was comparable to the ability of the flies to combat infection. Together, we show that DmSTING has evolved from Drosophila to function as a host defense mechanisms against pathogenic infections.

Presentation Number 101

ABSTRACT:

Abstract Title:	**Afro-mexicans: Representations of Blackness and the Fight for Recognition**		
Presenter:	Crystal Galvan		
Mentor:	Kim Potowski	**Campus:**	Pullman
Major:	Sociology- CAS		
Category:	Social Sciences		

The 16th century slave trade brought an estimated 200,000 Africans to present-day Mexico. African and African-descended people had offspring with people of European and indigenous origin, creating an elaborate colonial racial caste system with sixteen hierarchically ranked categories. However, after Independence, the legal notion of race was eliminated, and in 1925 Vasconcelos' *La raza cósmica* erased notions of blackness from a generalized Mexican *mestizo* identity that was considered a combination of only indigenous and European origins. Today's estimated 1.4 million Afro-Mexicans, mostly in the coastal areas of Veracruz, Guerrero and Oaxaca, have been largely invisible to the mainstream. Yet in 2015, activist groups won the inclusion of the category *afro-descendiente* in the Mexican Census. My project explores the history of representations of blackness in Mexico and asks whether the new Census category might have an effect on both representations and perceptions of afro-mexicanidad. It also documents recent efforts by Afro-Mexican organizations to gain acknowledgement, develop a positive Afro identity, and fight injustices in their communities.

Presentation Number 102

ABSTRACT:

Abstract Title:	**Do Diverse Plant and Prey Communities Support Predator Diversity on Organic Farms?**		
Presenter:	Sabrina Judson		
Mentor:	Bill Snyder	**Campus:**	Pullman
Major:	Mathematics- CAS		
Category:	Organismal, Population, Ecological, and Evolutionary Biology		

Organic farmers rely on natural controls, such as pest-eating predatory insects, to suppress herbivorous insects. These predators might be enhanced on farms where more non-pest prey are present, or when diverse plantings provide predators with places to hunt and hide. Higher densities of collembola, small arthropods that eat dead plant material, might be one important source of prey for predators. Likewise, weeds can provide predators with shelter. To examine the roles of habitat structure and alternative prey on predator communities, we surveyed over 50 organic farms in the Pacific Northwest, measuring weed cover, and the abundance of predators, non-pest alternative prey, and pest insects. Complex interactions were observed between collembola densities and weed cover that predicted generalist predator evenness and diversity across the organic farms. While more research is needed to investigate the mechanisms behind the correlations, this information could help organic farmers to identify potential pest infestation risks. Increasing collembola food sources to encourage population growth as well as maintaining a manageable weed cover may provide organic farmers with another means of natural pest suppression.

Presentation Number 103

ABSTRACT:

Abstract Title:	**Correlations of Diet and Cancer Around the World**		
Presenter:	Savannah Griff		
Mentor:	Charles Weller	**Campus:**	Pullman
Major:	Entrepreneurship- BUS		
Category:	Social Sciences		

The goal of my independent study is to comparatively analyze the correlations and connections between diet and cancer rates in the US and China, with reference as needed to other nations. Giving due consideration to the main counterarguments which are offered, I will defend my own stance on the international issues facing us today. My research will cover how food is grown and manufactured and how this process and added ingredients have adversely impacted our health. This study will employ various methods of research from the disciplines of nutritional sciences, history, domestic and global cultural studies, food manufacturing science and industry policy, and medical sciences, utilizing both primary and secondary sources. Using research from these disciplines, this study will highlight the history of cultural diets and cancer rates, past and present. Based on cross-cultural comparisons of select national data, the social, health/medical, economic and political impact on these nations will be thoroughly investigated. In the end, this study will argue that diet is directly correlated to the types of cancer which manifest within the respective nations.

Presentation Number 106

ABSTRACT:

Abstract Title:	**User Experience Study of the Student Homepage on the WSU Global Campus Website**		
Presenter:	Anneleisce Holleman		
Mentor:	Ruth Gregory	**Campus:**	Pullman
Major:	Digital Technology and Culture- COM		
Category:	Social Sciences		
Co-Author:	Ruth Gregory		

This UX (User Experience) study focuses on WSU online students' experiences on the Global Campus student homepage (https://online.wsu.edu/CurrentStudent/Default.aspx). Usability tests are tests performed on the target audience of website users and reveal important information about their habits on a website. The data gathered allows testers to understand a variety of behaviors of users of a website in order to optimize the design with their audience in mind. The data collected from this study was gathered from two UX methodologies: a survey and a closed card sort. Card sorting is where the user organizes a larger set of topics into a set of specified categories and helps to evaluate the information architecture of a website. Analysis of the data collected provided insight into future design improvements that best serves WSU online students and will increase their success while using the student homepage.

Presentation Number 107

ABSTRACT:

Abstract Title:	**Characterizing the Oral Microbiome of East Africans in Association with Their Dental Health Status**		
Presenter:	Ashley Huynh		
Mentor:	Omar Cornejo	**Campus:**	Pullman
Major:	Biology- CAS		
Category:	Organismal, Population, Ecological, and Evolutionary Biology		
Co-Authors:	Corey Quackenbush and Omar Cornejo		

The oral microbiome plays a significant role in the health status of an individual and is a key element in a variety of oral diseases. Existence of a 'healthy core microbiome' is thought to contribute to this symbiotic state, impacted by host factors including genetics, immune status, health status of the oral cavity, age, and overall health of the host. Using full metagenome sequencing techniques, this study characterized the oral microbial communities of individuals from East Africa, specifically from Congo and Uganda, and assessed if their differences can be explained by the degree of buccal health status among patients. Volunteering with a dental NGO, we collected oral plaque samples and health surveys from Ugandan and Congolese dental patients at the UN Rwamwanja refugee settlement. Plaque samples were taken from consenting adult patients during an initial oral assessment, and the surveys were completed prior. Uganda and Congo were selected as populations of interest in order to include typically underrepresented populations in regards to studies of this manor as well as a population that is in dire need of dental care. Volunteering with a dental NGO, we collected oral plaque samples and health surveys from Ugandan and Congolese dental patients at the UN Rwamwanja refugee settlement. Plaque samples were taken from consenting adult patients during an initial oral assessment, and the surveys were completed prior. Samples were shipped to the United States, Pullman, where we performed DNA extractions using QIAGEN microbiome kits to reduce host DNA in the sample. DNA WAS quantified and we prepared full metagenomic libraries for Illumina sequencing using True kits. The quality of individual libraries was assessed using a Bioanalyzer. We finally pooled the samples according to their DNA concentrations to ensure equimolar representation of individual samples and after final quality control of the samples using the Bioanalyzer, they were sent to be sequenced in a single lane of Illumina HiSeq 2500. The reads were obtained and quality controlled and trimmed using FastQC and TrimGalore. We created an updated database for all microbial genomic information and perform analysis to identify species in the samples via a k-mer recognitiin algorithm implemented in RTG-metagenomics. Our initial analyses show that we a can successfully captured the species composition typical of the human oral flora (after comparing with previous studies). We find no difference within individual diversity of males and females, but we detect a remarkable difference in the diversity in older people (larger species richness and less evenness as evidenced by the Shandon diversity index). Although a trend in reduction of diversity was detected along a gradient of overall dental health status, the difference was not statistically significant. The results of this study will be used as a pilot to initiate more extensive studies and research with the goal of improving global dental and overall health. The results of this study support individuals with poor oral health status are associated with less diverse oral communities and higher abundance of particular key taxa, including Neisseria, Veillonela, and Streptococcus.

Presentation Number 108

ABSTRACT:

Abstract Title:	**Disruption of Cone Photoreceptor Cyclic Nucleotide-gated Channels in Zebrafish Using CRISPR/Cas9 Genome Editing**		
Presenter:	Lindsey Morey		
Mentor:	Michael Varnum	**Campus:**	Pullman
Major:	Genetics and Cell Biology- CVM		
Category:	Molecular, Cellular, and Chemical Biology		
Co-Authors:	Tshering Sherpa, Pete Meighan, and Michael Varnum		

Cone photoreceptor cyclic nucleotide-gated (CNG) channels help convert light responses into electrical signals that can be interpreted by the brain. These channels are essential for vision and retinal health, as mutations in the genes encoding them are implicated in many visual disorders, including inherited macular degeneration. We have previously used CRISPR/Cas9 genome editing to disrupt the gene encoding *cnga3a*, one of the subunits of cone CNG channels in zebrafish. Disruption of *cnga3a* caused a dramatic decrease in visual performance, as demonstrated using optomotor response (OMR) behavioral tests and electrophysiological electroretinogram (ERG) recordings, as well as structural disturbances in the retina. More recently, we have disrupted the *cnga3b* gene encoding another subunit of cone CNG channels in zebrafish, to determine its role in retinal function. We injected zebrafsh embryos at the single-cell stage with Cas9 mRNA and two sgRNAs targeting *cnga3b*. To determine if *cnga3b* editing occurred, we isolated genomic DNA and performed PCR to amplify the target region, followed by the T7 endonuclease I (T7EI) assay to detect mismatches in heteroduplex DNA due to insertions or deletions. The *cnga3b* editing was found to be over 90% effective. Editing of *cnga3b* also was confirmed by DNA sequencing. Preliminary OMR test results suggest that disruption of *cnga3b* produced a less debilitating effect on larval vision compared to disruption of *cnga3a*. We plan to perform ERG recordings on the mutated fish to further characterize the phenotypic affect of disrupting *cnga3b*, and we predict that these results will support the results gathered from OMR tests. Once the disruption of *cnga3b* is fully characterized, we plan to knock out both *cnga3a* and *cnga3b* and examine the phenotypic effects. These studies offer novel models for human mutations leading to blindness, and provide insight into the importance of specific zebrafish CNG channel subunits for cone photoreceptor function.

Presentation Number 109

ABSTRACT:

Abstract Title:	**The Controversies Surrounding The Diagnosis of Dissociative Identity Disorder**		
Presenter:	Megan Block		
Mentor:	Lee Daffin	**Campus:**	Pullman
Major:	Psychology- CAS		
Category:	Social Sciences		

Dissociative identity disorder is a diagnosis that continues to spark controversy in the field of psychology. There are many theories that attempt to explain the manifestation of dissociative identity disorder. A wide variety of articles that report the results of previous research on this topic will be explored. A brief overview of dissociative identity disorder and the controversies that surround the diagnosis will be followed by how repressed or recovered memories play a role in the development of the disorder and memory transfer between alternate personalities. Additionally, the role played by childhood trauma in the development of the disorder and the exploration of whether the development of dissociative identity disorder is influenced by suggestion by a clinician will be presented, and finally whether or not childhood trauma plays a role in vulnerability to suggestion by a clinician. After summarizing most research done to date, an answer to the question of whether it is truly possible for individuals who suffer from dissociative identity disorder to develop alternate personalities in order to cope with trauma will be approached. An alternative explanation will be proposed, in that these individuals suffer from not dissociative identity disorder, but another form of psychopathy such as borderline personality disorder or schizophrenia. Lastly, future directions will be offered.

Presentation Number 110

ABSTRACT:

Abstract Title:	**Listeria monocytogenes Intervention on Fuji and Granny Smith Apples with a Novel Sanitizer**		
Presenter:	Oscar Ulloa		
Mentor:	Meijun Zhu	**Campus:**	Pullman
Major:	Food Science- CAHNRS		
Category:	Applied Sciences		
Co-Authors:	Lina Sheng and Meijun Zhu		

Listeria monocytogenes is a pathogen that can cause listeriosis, an illness that mostly affects pregnant women. Listeriosis can cause miscarriages, premature labor, and stillbirth. *L. monocytogenes* is listed by the U.S. Food and Drug Administration as a 'pathogen of concern'. Recent multistate outbreaks associated with caramel apples and multiple recalls associated with fresh apples have brought the attention of apple safety to the public. The state of Washington produces ~2.9 million tons of apples each year. They are sold throughout the United States and around the world. This highlights the importance of controlling *L. monocytogenes* in apples. However, there is no public data regarding control of the potential growth of surviving *L. monocytogenes* during apple storage in commercial apple packing facilities.

The purpose of this study was to evaluate the antimicrobial efficacy of JC9450, a novel sanitizer that has not been reported before, against *L. monocytogenes* on fresh apples. Apples (Fuji and Granny Smith) were dipped inoculated with *L. monocytogenes* for 10 minutes and left to dry for 24 and 48 hours at room temperature to establish 10^6 CFU/apple with different attachment times. At each different time point, the inoculated apples were washed with water, 100-ppm chlorine (pH 6.8), and JC9450 (0.125%, 0.25%, 0.5%, and 1.0%) for 2 minutes. *L. monocytogenes* was recovered from both the apples and wash solutions. Immediately after inoculation, there was ~6.3 Log_{10} CFU/apple on Granny Smith apples. After 24 or 48 hours drying, there was ~6.2 Log_{10} CFU/apple. The water wash did not show significant reduction with ~0.2 Log reduction on apples.100-ppm chlorine wash reduced bacterial count by 0.8-1.3 Log. 0.125% JC9450 showed similar antimicrobial efficacy with chlorine. The antimicrobial effect strengthened with the increase of sanitizer concentrations. 0.25% JC9450 wash resulted in 2.1-2.7 Log reduction. 0.5% and 1.0% JC9450 decreased *L. monocytogenes* population on apples by 3.5-4.6 Log and there was no significant difference between these two concentrations. The 1.0% and 0.5% concentrations effectively eliminated *L. monocytogenes* in the wash solution as well. JC9450 exhibited similar antimicrobial efficacy on Fuji apples. Collectively, JC9450 is an effective sanitizer to reduce *L. monocytogenes* on fresh apples.

Presentation Number 111

ABSTRACT:

Abstract Title:	**The Night Out Task: Everyday Functioning Assessment of Older and Younger Adults**		
Presenter:	Alexis Fuller		
Mentor:	Maureen Schmitter-Edgecombe	**Campus:**	Pullman
Major:	Psychology- CAS		
Category:	Social Sciences		
Co-Author:	Reanne Cunningham		

Across the aging spectrum, cognitive functioning varies as a result of a number of genetic and environmental factors. As a general trend, however, there is a positive association between increasing age and decline in specific cognitive abilities (e.g., executive functioning, speeded processing). A decline in cognitive functioning can negatively impact the way older adults complete tasks in everyday life, making strategies that can deter this decline vital as the senior population continues to grow larger. This study aims to evaluate age-related performance differences on a laboratory task that focuses on capacity to engage in more real-world complex planning, problem-solving and multitasking. To examine this, younger (ages 18-40) and older (ages 60+) adults will complete the Night Out Task (NOT). The NOT requires participants to complete eight different tasks to prepare for a night out (e.g., determine movie start time, prepare a thermos of tea, gather a snack for the movie, etc.). The NOT assesses the ability to follow instructions, plan a complex task, interweave and multitask, all while completing the task as efficiently and accurately as possible. A limited number of testing measures are designed to evaluate everyday functioning while taking place in a laboratory setting, which as a result makes the NOT an important addition into the neuropsychology field. It is expected that the results will demonstrate a significant difference in the younger adult's ability to complete the task more efficiently and accurately than the older adult group. By gaining a better understanding of the process of aging and cognitive decline, the information from this study can be used to encourage future research on assistive technologies that aim to increase the longevity of healthy cognitive functioning.

Presentation Number 112

ABSTRACT:

Abstract Title:	**Shear Aligned Carbon Nanotube Sheets**		
Presenter:	Jonathan Moore		
Mentor:	Michael Kessler	**Campus:**	Pullman
Major:	Materials Science Engineering- CEA		
Category:	Engineering and Physical Sciences		
Co-Authors:	Mitch Rock and Michael Kessler		

In recent years, polymer matrix composites have seen a large increase in use across various industries. Due to their exceptional mechanical properties at a very low weight they are especially useful in the aerospace industry. Currently, the leading reinforcement material used in aerospace composites is carbon fiber. Carbon nanotubes (CNTs) have been shown to have excellent mechanical properties at the nanoscale, leading to a large amount of research in their use as a stronger reinforcement than carbon fiber. A major obstacle to overcome in creating CNT composites is the processing difficulties that arise when working on the nanoscale. One processing difficulty is overcoming CNT agglomeration to create composites with a high CNT loading. Our process creates sheets of carbon nanotubes, called “buckypapers” for use as a polymer matrix reinforcement. Aligning reinforcement fibers in composites allows for greater strengths in certain directions. This anisotropic strength gives the ability to construct composite parts matching the expected stress state. The alignment of carbon nanotubes in buckypaper has also offered a great challenge. In our work, we have developed a shear alignment apparatus that can deposit nanotubes onto filter paper. We are investigating the use of a micelle forming surfactant system to disperse and align carbon nanotubes while creating buckypaper in our apparatus. In this study, we produce these solutions with a varying concentration of surfactant. We also compare buckypapers made from single-walled and multi-walled nanotubes, both pristine and oxidized. The alignment of the carbon nanotubes within the buckypaper are then characterized.

Presentation Number 113

ABSTRACT:

Abstract Title:	**Parallel Computing for Genome Wide Association Studies**		
Presenter:	Ryan Summers		
Mentor:	Zhiwu Zhang	**Campus:**	Pullman
Major:	Computer Engineering- CEA		
Category:	Computer Science, Mathematics, Statistics, and Information Sciences		
Co-Author:	Meng Huang		

Genome wide association studies (GWAS) are a tool used by statistical geneticists to correlate genetic mutations to their phenotypic response. With the introduction of efficient tools for sequencing genetic information, the amount of data freely available online has expanded drastically. However, complex GWAS experiments can take weeks to complete when working with large datasets. Through the utilization of graphics processing units (GPUs), the time intensive operations within GWAS can be accelerated. Because many of the operations conducted within GWAS involve vector and matrix products, many operations can be parallelized by spreading computation across the cores available on a GPU. This project demonstrates that GPU parallelization within GWAS drastically reduces computational time requirements relative to traditional, sequential processing. Initial implementations of GPU acceleration have demonstrated a factor of speedup of 52 times over sequential processing for data-intensive calculations within GWAS. By significantly reducing the computation time necessary in matrix and vector operations, GWAS tools can be accelerated to provide more information for statistical geneticists.

Presentation Number 114

ABSTRACT:

Abstract Title:	**Optimizing Transient Transformation in Peas Using *Agrobacterium tumefaciens* with a GUS Reporter Gene**		
Presenter:	Paige Kershaw		
Mentor:	Bruce Williamson Benavides	**Campus:**	Pullman
Major:	Microbiology- DV		
Category:	Molecular, Cellular, and Chemical Biology		
Co-Authors:	Bruce Williamson Benavides and Amit Dhingra		

Peas (*Pisum sativum*) are an integral part of feeding the growing population and therefore need to be protected from common threats. Peas are constantly being assaulted by different bacteria, fungi, and viruses as well as various other environmental threats that the plant cannot evolve fast enough on its own to survive and produce better yields. In order to overcome these obstacles, peas can be genetically transformed in a laboratory to introduce desirable traits. With an efficient way to transform peas, we will be better able to keep up with the threats as they present themselves. The process for genetic transformation is lengthy and may not always yield a transformed product. In order to establish a more efficient way to obtain transformed peas, we have assessed different methods of transformation using transient expression. We used *Agrobacterium tumefaciens* mediated transformation to introduce the GUS gene. The GUS gene is a reporter gene that allows for visual detection of transformed cells. The cotyledons were co-cultured with *A. tumefaciens* in nutrient media with hormones to stimulate plant cell transformation, development, and growth. Through the use of different concentrations and time of co-cultivation, along with treatments of vacuum infiltration, an efficient protocol for pea transformation is being developed. Preliminary results show that high *A. tumefaciens* concentrations (.8-1.6 OD) over 1 hour period co-culture, as opposed to lower concentrations (.001 OD) over a two day co-culture period, yielded more favorable results. Using GUS Staining we ascertained that maximum transformation occurred within the high concentration and low time period treatments. Through continual research and improvements in the process of transforming peas with *A. tumefaciens* we hope to generate plants that are high yielding even in the face of disease. After additional experiments, we expect to establish a platform for precise and efficient transformation of pea.

Presentation Number 115

ABSTRACT:

Abstract Title:	**Electrical Conductive Hydrogel Coating for Electrochemical Scaffold**		
Presenter:	Madison Newberry		
Mentor:	Mia Kiamco	**Campus:**	Pullman
Major:	Bioengineering- CEA		
Category:	Engineering and Physical Sciences		

An electrochemical scaffold (e-scaffold) capable of generating localized, low concentration of hydrogen peroxide that inhibits pathogenic wound biofilms have been currently under study. The device utilizes a conductive carbon fabric as the material for the scaffold. However, carbon fabric is an irritant to the human body. The goal of my research is to develop an electrical conductive hydrogel that will coat the e-scaffold allowing the device to be bio-compatible. Initial experiments consisted of combining Medline Skintegrity© Hydrogel with phosphate-buffered saline (PBS). A series of different concentrations of PBS were added to the hydrogel and left overnight for absorption. The new mixtures were coated on the e-scaffolds and underwent cyclic voltammetry (CV) to verify the success of the hydrogel as an electrolyte for the electrochemical reaction. Initial results have shown that the addition of the PBS is thinning the hydrogel and causing the gel to lose its original consistency.

Presentation Number 116

ABSTRACT:

Abstract Title:	**Engineering of a Stable Myosin Neck Fragment for Understanding of the Energy Consumption in Resting Muscle**		
Presenters:	Kenny Haak and Ryan Meech		
Mentors:	Alla Kostyukova and Dmitri Tolkachev	**Campus:**	Pullman
Majors:	Haak (Physics- CAS) and Meech (Chemical Engineering- CEA)		
Category:	Organismal, Population, Ecological, and Evolutionary Biology		
Co-Authors:	Thu Ly, Mert Coplan, Samantha Grover, Dimitri Tolkatchev, and Alla Kostyukova		

Myosin is an important protein component of muscle cells which works in conjunction with actin to allow muscles to relax and contract. Myosin consists of three regions, head, neck and tail. There is a relation between the conformation of the neck and relaxed, active, or super-relaxed states of myosin. Super-relaxed myosin has reduced energy consumption. The neck fragment we plan to study contains two molecules of the regulatory light chain RLC and two fragments of the heavy chain (HCF), which forms a coiled coil. The engineered fragment was to maintain the three-dimensional structure observed in the full length protein. In the full length protein one molecule of RLC binds one molecule of HCF. Two of these HCF/RLC complexes dimerize via a coiled coil formed by HCF chains, altogether resulting in a functional tetramer complex. We subcloned RLC and introduced two point mutations into the HCF amino acid sequence that increased its ability to form a coiled coil. Engineered RLC and HCF were co-expressed and co- purified on a Ni-NTA resin using the histidine tag located on HCF. This allowed for a 1:1 stoichiometry between the RLC and HCF in the purified RLC/HCF protein complex. Using mass-spectrometry, we have confirmed the presence of both RLC and HCF in the purified protein complex. Circular dichroism (CD) spectra of the purified protein complex indicated the coiled coil formation. Using the glutaraldehyde cross-linking reaction we have also shown that a tetramer complex was formed. Therefore, by engineering these fragments we were able to reconstruct a stable myosin neck fragment, small in size and amenable for further studies.

Presentation Number 118

ABSTRACT:

Abstract Title:	**Virginity Loss and Sexual Debut in the Media**		
Presenter:	Guadalupe Garnica		
Mentor:	Stacey Hust	**Campus:**	Pullman
Major:	Sociology- CAS		
Category:	Social Sciences		
Co-Author:	Guadalupe Garnica		

Research regarding virginity loss has found that there are vast differences in how virginity is portrayed in media according to gender and culture, and the ways that media influences the significance of the status of being a virgin. The aim of this study is to further understand how college-aged students make sense of virginity loss narratives in the media, and to discover the influence media narratives have on perceptions of real-life sexual occurrences. This study will use secondary data analysis of data from a set of focus groups that were conducted at a university located in the Pacific Northwest. In these focus groups, participants viewed several popular media portrayals of first-time sexual encounters, and discussed their opinions about the portrayals, their experiences, and other themes related to virginity and romantic relationships among their peers. Our findings suggest that participants use media narratives to make sense of complicated scenarios even if those scenarios contradict one another.

Presentation Number 119

ABSTRACT:

Abstract Title:	**Detailing Hypothalamic Epigenetic Events in Rats Exposed to a High Fat Diet**		
Presenter:	Julianna Brutman		
Mentor:	Jon Davis	**Campus:**	Pullman
Major:	Neuroscience- CVM		
Category:	Molecular, Cellular, and Chemical Biology		
Co-Authors:	Xiang Zhou, Sunil Sirohi, Bastian Stark, Arriel VanCleef, Jon F. Davis, and Zhihua Jiang		

Obesity can only arise when caloric intake exceeds caloric expenditure. Hyperphagic feeding describes a form of food intake where an individual consumes more calories than required to maintain a stable body weight. Notably, hyperphagic feeding is a precursor to feeding psychopathologies such as binge eating disorder (BED) that provoke obesity. Presently, the behavioral and neurobiological mechanisms that contribute to BED are largely unknown. ***We hypothesized that exposure to a nutritionally complete high fat diet (HFD) would induce hyperphagic feeding behavior, increased body weight gain, and altered genetic expression of the hypothalamic transcripts that signify an enhanced drive to feed.*** To investigate this concept, two studies were completed. First, we utilized a pre-clinical rodent binge-like feeding model that consisted of restricted and intermittent access to HFD. In the second study, epigenetic expression changes were investigated using a novel Next Generation Sequencing (NGS) approach that allows for simultaneous monitoring of every known gene in the rodent, a process referred to as "transcriptome profiling". With this approach, we assessed epigenetic changes in the hypothalamus of rats maintained on *ad libitum* HFD. Results indicate that rodents exposed to binge-like feeding displayed repeated bouts of voluntary caloric over-consumption and restriction, increased motivation for sucrose, and increased compulsive-like feeding behavior. Rats exposed to HFD on a restricted access schedule gained significant body weight relative to controls. Furthermore, we observed hyperphagia and the emergence of an obese phenotype in the rats maintained on *ad libitum* HFD. Interestingly, our novel NGS results suggest that HFD exposure produced epigenetic changes in transcripts that regulate gene transcription, mRNA stability, synaptic plasticity, dopamine receptor signaling, and glutamate receptor signaling. Importantly, synaptic plasticity in the central nervous system is controlled by dopamine and glutamate signaling and this process is hypothesized to be a behavioral adaptation that promotes drug-seeking behaviors. In this regard, BED is now recognized as an addictive disorder based on the shared neuroanatomical and behavioral features common to drug or alcohol addiction. Collectively, these novel data suggest that neurobiological adaptations in the hypothalamus may reflect excess body weight gain secondary to prolonged exposure to high calorie foods.

Presentation Number 121

ABSTRACT:

Abstract Title:	**COM 475 - Abstract**		
Presenter:	Karla Rabadan		
Mentor:	Yujung Nam	**Campus:**	Pullman
Major:	Communication- COM		
Category:	Applied Sciences		

In recent years, the advancements of technology have changed many of the traditional ways humans have done things since the beginning of time. Unlike before, the internet now allows you to shop online, pay bills, go to school, amongst many other things, but most importantly, it allows you to connect with people; without even having to look at them. Today, the increase in technology usage has noticeably affected human to human interaction. In order to understand how technology has impacted human interactions, a survey and field observations were conducted to understand the level of engagement students have with their technology devices and with others humans. The results of the survey indicated that people are becoming more and more reliant on communicating with others through technology rather than in person, even when in the presence of others.

Presentation Number 122

ABSTRACT:

Abstract Title:	**Modeling the Gösgen Neutrino Oscillation Experiment in Order to test for a Fourth Neutrino**		
Presenter:	Noah Austin		
Mentor:	David Ernst	**Campus:**	Pullman
Major:	Physics- CAS		
Category:	Engineering and Physical Sciences		

Neutrinos are elementary particles with extremely low masses that interact only through the weak nuclear force, so they very rarely react with ordinary matter. There are three known types, or flavors, and they can change flavor as they travel, in a phenomenon called neutrino oscillation. In the 1980s and 1990s a series of experiments seeking to observe neutrino oscillations were conducted in which the fluxes of one flavor of neutrino from nuclear reactors were measured by nearby detectors. The analyses of these experiments used a now outdated theoretical flux number, and the new number places the measured flux at 6% lower than expected. This may be explained by oscillations into a fourth, sterile flavor of neutrino. An analysis of the world's neutrino data could provide evidence for or against this, and it requires computer models that can replicate the original experiment analyses as well.

The model of the Gösgen Reactor experiment at first made the simplifying assumptions that the reactor and detector were points, and the detected energy was the same as the neutrino energy. The analysis examined chi-squared values to create an exclusion region for the oscillation parameters, and the model had the option of minimizing them with respect to the systematic errors of the experiment. This minimization was needed. By replacing the assumptions of point-like distance and energy distributions with approximations for distance variation and energy detection errors, found through Monte Carlo integration and analysis of a graph respectively, the model's analysis became much closer to the experimentalists' one. A Monte Carlo data simulation program was also made in an attempt to determine the threshold for the exclusion region, but it has not yet produced a result that can be used to match the experimentalists' results.

Presentation Number 123

ABSTRACT:

Abstract Title:	**Individual Differences In College Students Appraisal Styles**		
Presenter:	Brenda Aparicio		
Mentor:	Thomas Power	**Campus:**	Pullman
Major:	Psychology- CAS		
Category:	Social Sciences		

Recent studies suggest that the way individuals appraise stressful events contributes to how successfully they cope with stress. Although there has been research on specific appraisal styles, we know very little about how individual differences in appraisal styles come about. Current measures of appraisal styles are long and complex, making large-scale administration difficult. Having a shorter, more efficient way to measure individual's appraisal styles can make these measures easier. Knowing these differences can help make programs in which children can develop healthier appraisal styles. The questions under investigation are: 1) what is the relationship between individual differences in the ways that college students appraise stressful events (their appraisal styles) and their adjustment and 2) can a short version of these styles be developed that captures the important individual differences in appraisal styles? Participants will be exposed to ten moderately stressful scenarios before completing a self-report to determine which of the four appraisal styles they fit under. Then differences in psychological adjustment between individuals showing different appraisal styles will be examined. Results will be used to design interventions to change appraisal styles that are associated with negative physiological outcomes.

Keywords: Appraisal Styles, Stress, Individual Differences, Psychological Adjustment

Presentation Number 124

ABSTRACT:

Abstract Title:	**Extracellular Vesicle Biomimetics: A New Means of Tissue Specific Drug Delivery**		
Presenter:	Sierra Bishop		
Mentor:	Cliff Berkman	**Campus:**	Pullman
Major:	Materials Science Engineering- CEA		
Category:	Molecular, Cellular, and Chemical Biology		

Prostate cancer (PCa) is a severe disease that modern day medical research has yet to develop a reliable method of treatment for, resulting in PCa to prevail as the leading origin of cancer-based fatalities for men in the United States. PCa patients who are diagnosed with metastatic prostate cancer undergo radical therapies to various efficacies, and consequently, 25% of post-treatment patients 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 a 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 a need for extensive bioengineering.

With the successful development of a proof-of-concept, we will package the FDA approved prodrug, DHA-Paclitaxel, into tumor derived synthetic exosomes. We will then test the *in vitro* cytotoxicity against PCa cells and cellular specificity of internalization against non-tumorigenic prostate cells. In support of our research approach, a phase I study of Dexosome (exosomes secreted from dendritic cells) immunotherapy previously demonstrated the safety and efficacy of using autologous dendritic cells derived exosomes. The study was conducted in patients with advanced non-small cell lung cancer, and used 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*.

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, creating a seek-and-destroy delivery system, thus improving chemotherapeutic vitality, and reducing extraneous side effects on the patient.

Presentation Number 125

ABSTRACT:

Abstract Title:	**The Role of Tmod2's First Actin Binding Site in Actin Dynamics and Neuron Morphology**		
Presenter:	Christopher Keller		
Mentor:	Kevin Gray	**Campus:**	Pullman
Major:	Chemical Engineering- CEA		
Category:	Molecular, Cellular, and Chemical Biology		
Co-Authors:	Kevin T. Gray, Alla S. Kostyukova, Thu Ly, and Gary Wayman		

Tropomodulins (Tmods), a family of proteins that can cap actin filament pointed ends, are expressed in the brain and have altered expression in some neurological diseases. Of three Tmod isoforms found in the brain, Tmod2 has been shown to be a regulator of both neuronal morphology and long-term potentiation; however, its role in neurological diseases remains unclear. This study focuses on the role of Tmod2's first actin binding site in neuronal development. To investigate this relationship, we developed a Tmod2 mutant, Tmod2[L73D], which we expected would have a disrupted first actin binding site. We performed several in vitro assays to characterize the interactions of the mutant with actin. Our in vitro studies indicate Tmod2 requires its first actin binding site for F-actin nucleation but not for the actin-pointed end capping. We next generated an overexpression vector for our mutant using The Gateway Cloning System. We transfected primary hippocampal neurons with dendritic markers and either wild type Tmod2 or Tmod2[L73D]. The number of primary dendrites, dendritic termini, and total dendritic length of fluorescing neurons was quantified. Tmod2 overexpression increased the complexity of the dendritic arbor; however, overexpression of the mutant had no impact on dendritic complexity. Our results indicate that Tmod2 requires its first actin binding site to modulate dendritic development. Our data continues to uncover the mechanism by which Tmods regulate neuronal morphology.

Presentation Number 126

ABSTRACT:

Abstract Title:	**Determining Deer Behavior Patterns from Different Accelerometer Settings**		
Presenter:	David Navarro		
Mentor:	Lisa Shipley	**Campus:**	Pullman
Major:	Wildlife Ecology & Conservation Sciences- CAHNRS		
Category:	Organismal, Population, Ecological, and Evolutionary Biology		
Co-Author:	Lisa Shipley		

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 and where they are doing it, and for how long. This study will determine the balance between acquisition rate and the accuracy of accelerometer data for predicting deer behavior, and the effect of collar attachment on accuracy. By determining the best acquisition rate and collar fit for accelerometers, we can improve the ability of biologists to measure animal behavior remotely. For this study we attached four accelerometers to two collars (one attached snugly and one loosely) worn by each deer. Each collar carried two accelerometers, one programmed to collect data at 30-second intervals and one at 60-second intervals. Individual deer behavior was observed and recorded for a total of eight hours. Behavior categories included walking, feeding, running, standing, and bedding. Mean and standard deviation were calculated for the accelerometer readings for each behavior observed. Then, by calibrating the accelerometers using mean, standard deviation, and histograms we assigned each behavior a range of accelerometer readings. Finally, we determined the proportion of time intervals that were correctly assigned a behavior using the accelerometer readings. Preliminary analysis on two of the four deer suggest that 60-second intervals were more accurate than 30-second intervals, and that accelerometers are best able to distinguish bedding (least active) and running (most active) behaviors.

Presentation Number 127

ABSTRACT:

Abstract Title:	**Impacts of Teachers on Undocumented Students in Secondary and Postsecondary Education in the Pacific Northwest**		
Presenter:	Adilenne Villanueva		
Mentor:	Linda Heidenreich	**Campus:**	Pullman
Major:	Human Development- CEA		
Category:	Humanities		

This case study examines the effects that teachers have on undocumented students, and their decisions to pursue higher education in the Pacific Northwest. The study will be conducted at the institutions of Washington State University, Eastern Washington University and the University of Idaho. By examining these universities, I will clarify the importance of understanding undocumented student's struggles, and also the role that teachers, educators, and parents have in the student's life. Data will be collected through qualitative research methods, such as in-depth interviews with faculty mentors and students at these institutions. The goal of this study is to understand factors that determine why some undocumented students are more likely to pursue a college education than others. Preliminary research indicates that support from teachers, and counselors are key factors. The study also focuses on the challenges that undocumented students face at these institutions that prevent them from pursuing higher education. The findings will help, support, and advocate for students to continue their education despite the struggles they encounter.

Presentation Number 128

ABSTRACT:

Abstract Title:	**Computer-mediated Voice**		
Presenter:	Katie Nordlie		
Mentor:	Yujung Nam	**Campus:**	Pullman
Major:	Marketing- BUS		
Category:	Computer Science, Mathematics, Statistics, and Information Sciences		

Computers, smart phones, GPS, and other computer-mediated devices tend to be heard in a higher pitch tone of voice that everyone recognizes as female. The primary purpose of this topic choice is to take a deep look into why computer-mediated communication systems prefer a female default. Men have been the creators of these devices that use female computer-mediated voices even though there is a controversial debate about why the default voice is not male. After conducting studies among Washington State University students, I will survey and experiment about their opinions and interactions with their understanding of this phenomenon. After gathering and analyzing the information, it will outline any implications or recommendations indicated by the findings of millennials and their reactions.

Presentation Number 129

ABSTRACT:

Abstract Title:	**Hydrothermal Fluid Compositions Controlled by Plagioclase Reactions under Hydrothermal Conditions**		
Presenter:	Morgan Casey		
Mentor:	Peter Larson	**Campus:**	Pullman
Major:	Geology- CAS		
Category:	Engineering and Physical Sciences		

The Tertiary San Juan volcanic field is known for its mines and hydrothermal ore deposits. Here, the London Mine near Silverton, CO, is the field area for this research. All the rocks in the area of the London Mine are hydrothermally altered. Intermediate feldspars are the most abundant minerals in the host rocks, and this draws me to the question: do feldspar alteration reactions control major cation concentration in the hydrothermal fluid? This question is addressed by comparing feldspar electron microprobe analyses to theoretical mineral stability diagrams that represent the fluid composition.

Thesis Statement: If feldspar reactions control major cation concentration in fluids, the feldspars will show alteration because the fluid interacting with the feldspars in the rocks will control specific element concentrations in the hydrothermal fluid.

Data have been collected by electron microprobe elemental analyses coupled with petrographic interpretations. The microprobe allows the analyst to pin point a specific phenocryst in the sample and collect the exact chemical constituents of a micron-scale point on the crystal. The analytic data was compared with theoretical chemical activity diagrams based on five equilibrium mineral reactions: albite-orthoclase, albite-muscovite, albite-kaolinite, orthoclase-muscovite, and orthoclase-kaolinite. The diagrams show the stability fields for each mineral as a function of major ion concentrations in the hydrothermal fluid.

The results of the electron microprobe data show that the primary intermediate plagioclase feldspars have been altered to nearly pure albite and orthoclase. The data plots on the theoretical chemical activity diagrams confirming the hypothesis. These data show that the concentrations of Na+ and K+ ions in the hydrothermal fluid were controlled by fluid saturation with these phases of mineral alteration.

Presentation Number 130

ABSTRACT:

Abstract Title:	**CAHNRS Summer Internship: Manchurian Crabapple Pollinizer Replacement**		
Presenter:	Keven Ortega		
Mentor:	Sara Serra	**Campus:**	Pullman
Major:	Fruit and Vegetable Management- CAHNRS		
Category:	Applied Sciences		

My summer internship was supervised by Dr. Musacchi and Dr. Serra at the WSU Tree Fruit Research and Extension center in Wenatchee, Washington. My duty as an intern was to help in a variety of daily research tasks for the project aiming to find a replacement for the Manchurian crabapple pollinizer in an apple orchard. This pollinizer has been the standard genotype for the Washington apple industry since the last twenty years. Few years ago the Manchurian has been discovered to be highly susceptible to certain pathogens e.g. Bull's eye rot, Speck rot, Sphaeropsis rot, and Phacidiopycnis rot which can cause post-harvest diseases and significant fruit loss further are quarantine diseases in China. In fact in 2014 China temporarily decided to close import from Washington State for this reason which resulted in millions of apple boxes to be rejected, a major loss to the apple industry. Throughout that summer I was involved in different activities focused on identifying possible crabapple genotypes resistant to the specific diseases listed above and with desirable characteristics such as consistent flowering and columnar growing habits. I helped in taking care of potting, measures in the field, and checking irrigation daily. During this internship I also had the opportunity to learn other agriculture practices such as planting, fertilizing, thinning, training, and pruning in both apple and pear orchards. My mentors also taught me how to use special tools such as the SPAD chlorophyll meter in order to measure chlorophyll leaf content as a diagnostic assessment for leaf health and the light bar (Q2850 LiCOR) and a Li-1500 data logger to obtain canopy light interception. I was also involved assessing pollen germination rate of the genotypes previously screened to disease resistance. This methodology is based of several steps from preparing the media to count under the microscope germinated pollen grains.

Presentation Number 131

ABSTRACT:

Abstract Title:	**Reversal of Pain-Induced Place Aversion by Morphine and THC**		
Presenter:	Pierce Spencer		
Mentor:	Rebecca Craft	**Campus:**	Pullman
Major:	Neuroscience- CVM		
Category:	Organismal, Population, Ecological, and Evolutionary Biology		
Co-Author:	Rebecca Craft		

With the increasing legalization of medical and recreational marijuana and its popularity as a treatment for pain, it is important to understand the effects of THC on affective pain. Affective pain is the emotional aspect of pain -- how bothersome or distressing the pain is -- as opposed to sensory aspects of the pain (how it feels physically). We may associate affective pain with where that pain took place, and a place conditioning test in the rat can be used to model this pain-place association. The purpose of this study is to determine if THC can reverse the affective component of pain associated with hindpaw formalin injection using the conditioned place aversion (CPA) test, and if THC works as well as the standard opioid analgesic morphine. CPA was assessed in a four-day test using a three-compartment apparatus. On Day 1 rats were placed into the center chamber and then the partitions were removed, allowing access to both sides of the apparatus; time spent on each side was recorded. On Day 2 rats were treated with vehicle or THC. After 30 minutes, formalin was injected into the right hind paw and rats were restricted to the black or white side of the apparatus; number of rears and bouts of licking the injected paw were counted. The Day 3 procedure was identical to Day 2 except rats were given the opposite injection to what they received on Day 2. Day 4 followed the same procedure as Day 1. Control rats avoided the chamber associated with formalin, and morphine dose-dependently prevented formalin pain-induced CPA with no sex differences (Morphine Dose: $F(6,106)=2.89$, $p=0.012$). This result agrees with previous CPA studies in male rats showing that morphine is an effective analgesic, and suggests that both sexes are equally sensitive to morphine's pain-relieving effects. Collection of THC data is underway. Because THC has been shown to be more potent in females than males when tested using standard measures of sensory pain, I predict that females will show greater analgesic effects with a lower dose of THC than male rats will, using the CPA test.

Presentation Number 132

ABSTRACT:

Abstract Title:	**Teacher Perception and Implementation of Tribal Education**		
Presenter:	Dalia Hernandez Farias		
Mentor:	Brenda Barrio	**Campus:**	Pullman
Major:	History- CAS		
Category:	Social Sciences		

In 2015, the Washington State Senate passed Bill 5433, a legislation which now mandates the implementation of Native American curriculum in all public schools. The passing of SB 5433, also known as *Since Time Immemorial* (STI), shifted tribal education from encouraged to required. This shift brought a large change in the preparation of pre-service and in-service teachers in K-12 education, as they need more information on how to integrate and implement this curriculum into their teaching. Importantly, STI outlines that Washington school districts shall be encouraged to work with a federally recognized tribe and incorporate tribal education in their social studies curricula. With a great need to better understand the implications in practice of this newly adopted curriculum, the purpose of this research study is intended to explore three areas regarding the implementation of the Native American curriculum: (1) secondary education teachers' perceptions and concerns; (2) the resources and training gathered; (3) and how these resources are or will be incorporated in their curriculum. This research is viewed through a culturally responsive theoretical framework lens in order to draw from different teachers' strategies to effectively implement Native American curriculum. The methods will consist of semi-structured interviews and classroom observations. Moreover, this research will serve as information to better understand the necessary support pre-service and in-service teachers need to effectively and appropriately implement Native American curriculum in K-12 classroom curriculum at this state and beyond.

Presentation Number 133

ABSTRACT:

Abstract Title:	**Drop on Demand Inkjet Printed Electronics Using Graphene Based Inks**		
Presenter:	Austin Blake		
Mentor:	Arda Gozen	**Campus:**	Pullman
Major:	Mechanical Engineering- CEA		
Category:	Engineering and Physical Sciences		
Co-Authors:	Kent Evans and Arda Gozen		

Printed electronics are becoming increasingly desirable due to their simplicity, ease of production, and inherent design and substrate flexibility which allows for their use in applications such as wearable electronics. Among conductive additives used in inks for printed electronics, graphene is an excellent choice due to its low density and favorable mechanical and electrical properties. A current limitation to printed graphene electronics is the difficulty of achieving a stable dispersion suitable for printing due to the use of volatile solvents and stringent rheological requirements. Graphene oxide (as opposed to graphene) can be easily dispersed in water, eliminating the need for the volatile solvents, and then chemically reduced to regain electrical properties of pristine graphene. In this study, we demonstrate simple aqueous inks using graphene oxide for use in standard desktop inkjet printers to fabricate conductive patterns. Inks are prepared by the dispersion and sonication of graphene oxide powder and a surfactant (triton) in water. The ink is printed onto a flexible polyimide substrate (Kapton), and chemical reduction is accomplished using a photonic sintering device (Sinteron-2000). The printed patterns showed a conductivity of approximately 5kΩ/cm, which shows the possibility of graphene oxide's use in printable electronics.

Presentation Number 134

ABSTRACT:

Abstract Title:	**Young Adult Historical Fiction and Social Studies Textbooks: An Integrative Approach**		
Presenter:	Sydney Robertson		
Mentor:	Ashley Boyd	**Campus:**	Pullman
Major:	English- CAS		
Category:	Humanities		

The interdisciplinary possibilities between English and History fields of study have been of increasing interest in scholarship and at institutions of higher education. This creative project researched and developed a way for teachers to utilize the strengths of each discipline in conjunction with one another at the middle school level. Six specific examples were created to show how a young adult historical fiction (YAHF) novel and the traditional social studies textbook could be used in tandem to enhance student learning without sacrificing any state requirements. Each example is centered around a time period in history and contains the historical context, a synopsis of the complementary novel, examples of specific goals within the unit, potential discussion questions, and project ideas for evaluating the defined goals.

The project includes specific references to the newly developed College, Career, and Civic Life (C3) Framework for the Social Studies State Standards which is a guide to help prepare students for the responsibilities related to becoming a democratic citizen. The dimensions of the C3 framework are Civics, Economics, Geography, and History; these dimensions are intended to illustrate what students should learn at each level of their K-12 education in order to be prepared for college, for their career, and to live a civic life. Integrating YAHF with textbooks will engage students with the de-personalized nature of what is offered by the framework and will enhance the historical material through authentic narratives of characters of that time and place.

This claim is founded in the research conducted regarding newly developed social studies methods that are beginning to emphasize the importance of the integration of didactic, analytical, and affective assessment in the classroom. YAHF plays a pivotal role in making history more relatable by allowing students to connect with people instead of only facts. The process of humanizing history involves not only teaching students about the facts of history, but helping them understand what those facts mean in relationship to the past, present, and future. Thus, this project provides teachers with a method for enriching history within the standards that govern learning and assessment in middle grade classrooms.

Presentation Number 136

ABSTRACT:

Abstract Title:	**Uncovering the Character of Rosalia**		
Presenter:	Karleanne Iseman		
Mentor:	Kathleen Ryan	**Campus:**	Pullman
Major:	Interior Design- CAHNRS		
Category:	Arts and Design		
Co-Author:	Kathleen Ryan		

Problem: Rosalia, WA is a small, rural farming community home to 550 people. The community has a passion for reviving their historic buildings. The community is actively seeking economic revitalization and their downtown shows great opportunity. The Pythian building has been repurposed over the years from a grocery store to a club's quarters and is now slated to become a community center. However, the building's current state does not meeting the needs of the community.

Methods: A group of interior design students worked with the community to create plans for how to redesign the building into a functional, updated space that the community will be proud to work in. During a community meeting, ideas were shared to implement a commercial kitchen to spark local artisans' talents and create economic opportunity. The community also expressed the need for a large community space for town events and family gatherings, as well as a small meeting space. Ideas and concerns from the community participants were collected for use in the design process.

Outcome: Maintaining the historic character of the town through renovating previous storefront changes will bring this building back to it's former dignified aesthetic. The community center design encompasses four main aspects: revival, family, character and place. Place theory was a decision factor in the design choices made for the Rosalia Community Center. The building was built in 1902 with locally sourced red brick that will be maintained as part of the character of downtown Rosalia. Re-opening the storefront is important for the visual economic perception of the community and will bring a presence to the main street. Large arched windows will be reopened to allow daylight into the main space. A commercial kitchen with upgraded appliances will be installed to accommodate artisan and craft entrepreneurs.

Results: The renovation of the building and development of unique community resources in this historic building will create an economic boost and pride of ownership. Overall, the building will uphold the aesthetics and character of the community with modern amenities desired by the Rosalia community.

Presentation Number 137

ABSTRACT:

Abstract Title:	**Can Fertility in Cattle Be Characterized by Behavior, Ovarian Follicles and Reproductive Maturity? Influence of Follicle Size and Estrus Intensity on Fertility in Beef Cattle Following 7-day CO-synch + CIDR Estrus Synchronization Protocol**		
Presenter:	McKenzie Corpron		
Mentor:	Martin Maquivar	**Campus:**	Pullman
Major:	Animal Sciences- CAHNRS		
Category:	Organismal, Population, Ecological, and Evolutionary Biology		
Co-Authors:	Richard Griffiths, Anna Hoover, and Kevin Turek		

Fertility in beef cattle can be significantly improved by implementation of estrus synchronization and fixed time artificial insemination (FTAI) protocols. Variables that contribute to fertility include sexual behavior (estrus), duration and intensity of estrus and ovulatory follicle size at FTAI. The goal of the present study was to identify the relationship between these variables and fertility in beef cattle. Heifers (n=38) and cows (n=117) were synchronized using a 7 day CO-Synch + CIDR protocol followed by FTAI. Estrus behavior was observed after CIDR removal until FTAI. Ovarian follicle size was determined at FTAI via ultrasonography. Estrus, both passive (animal receiving a behavior) and active (animal conducting the behavior) was characterized by display of sexual behaviors (mounting, attempted mounting, sniffing or licking of genitalia, head butting, chin resting, flehmen, and following with sexual intent). An animal was not considered in estrus if they displayed fewer than 3 behaviors. Peak of estrus was determined when behaviors per hour (#behaviors/hr) were the highest. Conception rates were 47.4% (18/38) for the heifers and 58.9% (69/117) for the cows. Overall, estrus expression occurred in 86.8% (33/38) of heifers and 59% (69/117) of cows. On average, heifers exhibited a quicker ($P< 0.001$) onset of passive and active estrus (43.7± 9.2 hrs. and 37.7 ± 6.4 hrs. after CIDR removal) than cows (52.9 ± 7.1 hrs. and 49.7± 6.8 hrs.), peaked faster (52.2 ± 7.2 hrs.) compared to cows (57.7 ± 5.8 hrs.), and had fewer mounts/hr. (0.99 ± 0.8) compared to cows (3.43 ± 2.4). It was observed that heifers exhibited longer ($P<0.001$) sexual behavior (active =20.0± 9.4 hrs. or passive=14.6 ± 7.2 hrs.) compared to cows (active= 12.1 ± 6.2 hrs. or passive =8.9 ± 5.0 hrs.). Average ovulatory follicle size was also different ($P=0.02$) for heifers (12.01 ± 2.5 mm) compared to cows (13.1 ± 2.6 mm). It is concluded that under the influence of FTAI protocol sexual maturity greatly influences the timing of the onset of heat, estrus response, intensity of estrus, and ovulatory follicle size at the time of insemination that ultimately regulate the reproductive success in beef cattle.

Presentation Number 138

ABSTRACT:

Abstract Title:	**The Effect of Starvation on Bacterial Survivability in Sand and Evolution of Biofilms: Macro-scale Study**		
Presenter:	Chia-Ling Kang		
Mentor:	Nehal Abu-Lail	**Campus:**	Pullman
Major:	Bioengineering- CEA		
Category:	Engineering and Physical Sciences		
Co-Authors:	Somayeh Ramezanian and Nehal Abu-Lail		

Formation of biofilms in soil offers the potential to sustainable solutions for many geotechnical problems such as soil erosion and contamination. However, little is known regarding how bacteria grow as biofilms in soil environments with low nutrient availability. In addition, in processes where a large concentration of bacteria is to be augmented to develop biobarriers, knowing the concentration of nutrients needed to maintain biofilm growth for long periods of time is important and facilitates the design of effective upscale processes. Here, the effect of nutrients' starvation on the growth and biofilm formation of *Pseudomonas putida* in sand porous medium was investigated at the macro- scale. Bacterial growth kinetics and the quantity of extracellular polymeric substances (EPS) formed by the bacteria in sand columns under rich or poor nutrients' conditions were examined over the course of 90 days. EPS quantification of carbohydrates and proteins present in the biofilms as a function of kinetics as well as amounts of nutrients available to them was performed. Our macroscale results show that under starvation conditions, bacterial cell count and the carbohydrate content of EPS dropped significantly compared to when bacteria were fed with nutrient-rich medium. Our results will help us step towards designing up-scale processes in which long-term formation of biofilm is used to solve soil problems.

Presentation Number 139

ABSTRACT:

Abstract Title:	**What's the Buzz?**		
Presenter:	Anna Pettyjohn		
Mentor:	Rachel Dannay	**Campus:**	Pullman
Major:	Field Crop Management- CAHNRS		
Category:	Applied Sciences		
Co-Authors:	Rachel Dannay and Karen Sanguinet		

Due to a constantly changing climate plants have to adapt to varying stresses. Abiotic factors are largely influenced by the changes in the atmosphere and climate. Soil structure and composition as a whole do not make rapid changes, however as the climate changes the interaction between plants and the soil does change more quickly. Most cereal grain breeding and research programs have neglected to study root systems and their interaction with abiotic stress. This project attempts to understand the importance of root hairs and root length on the success of grasses when impacted by abiotic stresses. This study was conducted on the model grass plant Brachpodium distachyon. Through an EMS screening a mutant phenotype was identified with no root hairs and an average root length twice as long as the wild type. Although the roots are different than the wild type, the above ground biomass and seed yield showed no impact from the mutation. Findings from this study will aid in breeding efforts in wheat. This mutation if beneficial will allow breeders to select for differences in the root systems while maintaining the above ground biomass and grain yield. The studies conducted were designed to generate data regarding abiotic stresses and bulk the mutant phenotype. The study focused on drought and salt tolerance; these are two of the most critical factors influencing the Pacific North West. Research in this grass model plant will allow for data to be applied to cash crops such as wheat and barley.

Presentation Number 140

ABSTRACT:

Abstract Title:	**Effects of Hyperbaric Oxygen (HBO_2) on Morphine-induced Conditioned Place Preference and Aversion in Mice**		
Presenter:	Hannah Booth		
Mentor:	Raymond Quock	**Campus:**	Pullman
Major:	Neuroscience- CVM		
Category:	Organismal, Population, Ecological, and Evolutionary Biology		
Co-Authors:	Abigail L. Brewer and Raymond M. Quock		

Hyperbaric oxygen (HBO_2) has been reported to suppress physical signs of naloxone-precipitated withdrawal in morphine-dependent mice [Nicoara *et al.*, *Brain Res.* 1648:434-7, 2016]. HBO_2 treatment is a medically approved treatment with a long track record of safe use for non-addiction indications that has yet to be part of the national strategy for reducing dependence on opioid and prescription painkillers. The present research was conducted to analyze behavioral effects of HBO_2 in morphine-treated mice. Male NIH Swiss mice were assessed in a conditioned place preference/aversion (CPP/CPA) paradigm. In the CPP study, affective effects of morphine (20 mg/kg, subcutaneous.) were paired with a distinct compartment. Treatment with HBO_2 (60 min @ 3.5 ATA) failed to affect the preference of the mice for the morphine-paired compartment. In the other study, mice were treated with morphine (20 mg/kg, subcutaneous) followed 60 min later by an injection of naloxone (5.0 mg/kg, i.p.). HBO_2 was administered as a pretreatment before the experimental runs on either Day 0 or Day 5 to determine its influence on CPA. However, the mice demonstrated a natural aversion to the floor pattern in one of the compartments, which compromised the CPP/CPA paradigm. The behavioral effects of HBO_2 on morphine preference and aversion will be re-examined upon refinement of the model.

Presentation Number 141

ABSTRACT:

Abstract Title:	**Development of Aequorin Luminescence-Based Cytosolic Calcium Measurement in Potato**		
Presenter:	Karen Fritch		
Mentor:	Kiwamu Tanaka	**Campus:**	Pullman
Major:	Civil Engineering- CEA		
Category:	Molecular, Cellular, and Chemical Biology		
Co-Authors:	Natalia Moroz and Kiwamu Tanaka		

Potatoes are the world's most important vegetable crop and United States' leading vegetable crop. Despite their significance, there are currently limited resources for studying the mechanism of potato disease due to lack of available methods for measuring its performance in response to various environmental stresses. These limitations lead to a knowledge gap for crop vulnerabilities and represent a real obstacle to address a potential food security crisis in the future. This represents a clear need for developing new tools to aid in potato disease research. Transgenic plants have been shown to be an invaluable biotechnology tool to facilitate our understanding of plant function and the resulting knowledge can be applied to many areas in plant science. Our focus in this study is to develop a transgenic potato to monitor early stress responses. Cytosolic free calcium concentration in plant cells changes rapidly in response to a variety of stresses. This calcium response is an essential early event for plant defense, but, at the same time, the most valuable indicator of defense response. To monitor dynamic changes of cytosolic calcium elevation, we generated transgenic potato plants expressing a luminescence-based calcium sensor aequorin (AEQ), which fused with Yellow Fluorescent Protein (YFP) to verify the protein expression. The transformed plantlets went through several screening processes based on the transgenes' expressions, e.g., antibiotic-resistance marker and YFP fluorescence. The candidate transformants were further screened based on AEQ expression level. The final candidates were used for studying the defense response in the presence of known elicitors (pathogen-derived plant defense inducers). The result showed a positive elevation in the cytosolic calcium level in response to chitin elicitor, a characteristic component of the cell wall of fungal pathogens. Our result indicates that the transgenic potato we developed is a useful tool for detection of early defense response as well as for expanding our knowledge in the mechanism of potato-pathogen interactions.

Presentation Number 143

ABSTRACT:

Abstract Title:	**Utilizing the "Impact Equation" as a Tool for Measuring Social Media Effectiveness**		
Presenters:	John Combs, John Lawrentz, Christina Lopatin, and AJ Schock		
Mentor:	Michael Rabby	**Campus:**	Vancouver
Majors:	Combs (Digital Technology and Culture- CAS), Lawrentz (Digital Technology and Culture and Psychology- CAS), Lopatin (Digital Technology and Culture- CAS), and Schock (Digital Technology and Culture- CAS)		
Category:	Social Sciences		
Co-Author:	Kate Palermnin		

In a world inundated with social media, it can be difficult to discover an effective use of a specific platform. What are the essentials necessary to communicate a brand or identity in online spaces? Brogan and Smith argue in their book *The Impact Equation* that the "impact equation" is a tool by which a social media strategy or endeavor can be built and measured. The "impact equation", $Impact = C \times (R + E + A + T + E)$, consists of six areas: contrast, reach, exposure, articulation, trust, and echo (2012, p. 10-11). The study sought to determine whether a Twitter account could be measured for effectiveness using the "impact equation" tool.

The study collected and coded Twitter accounts in seven different categories: celebrity, musician/band, social media marketer, politician, large company, small company, and professor/academic to include data on the Twitter user. Findings determined that successful Twitter accounts embodied all aspects of the "impact equation." Best practices include creating posts that promote others, quickly responding to questions, and interacting with others across the medium. The most successful accounts capitalized on the conversation between the account and its followers. The accounts sending replies to their followers and other Twitter users provided a valuable exchange. Personal interaction in the digital age is highly rewarding and scales a profitable return on investment.

Presentation Number 144

ABSTRACT:

Abstract Title:	**Characterizing Modifiers of APOBEC-Induced Mutagenesis**		
Presenter:	Elizabeth Rice-Reynolds		
Mentor:	Steven Roberts	**Campus:**	Pullman
Major:	Genetics and Cell Biology- CVM		
Category:	Molecular, Cellular, and Chemical Biology		
Co-Authors:	Tony Mertz and Steven Roberts		

Mutations that arise in the human genome are the fundamental cause of human genetic disease and cancer. Understanding how these mutations occur will allow researchers and clinicians to better prevent, detect, and treat associated human disease. The Roberts lab at WSU is focused on determining how single-stranded DNA specific enzymes, APOBECs, induce mutations within the human genome. These APOBEC enzymes have been shown to be the primary cause of mutations in many human cancers.

Cancers acquire many mutations that inactivate key genes that control the cell cycle and DNA metabolism. These genetic deficiencies have the strong potential to interact with deregulation of APOBECs, causing very high amounts of mutagenesis. My research is centered around specific genes that, when deleted from the genome, increase APOBEC mutagenesis. Currently, I am working with the yeast *Saccharomyces cerevisiae* as a model system to determine the mechanism(s) by which these defects increase APOBEC specific mutations. I am focusing on characterizing the role that defects in proteins that modify the packing of chromosomes (also known as chromosome remodeling complexes) have on APOBEC-induced mutations. Additionally, I am determining if over-expression of *SPT2*, a gene which has a similar sequence and function to the previously identified human cancer gene *HMG1*, increases APOBEC-induced mutation frequency. I predict that both *SPT2* overexpression and these chromosome remodeling complex defects will increase APOBEC-induced mutagenesis. In the future, I will extend these experiments to a human cell culture model. This research will provide insight into mechanisms responsible for generations of mutations in a subset of human tumors.

At this point in my research, I have created strains needed to quantify the effect that *SPT2* overexpression and chromatin modifying defects have on APOBEC mutagenesis. We anticipate having results of these experiments, including mutation frequencies, in 1-2 weeks, well before SURCA. Results from these experiments will help define possible genetic modifiers of APOBEC-induced mutations in human tumors.

Presentation Number 145

ABSTRACT:

Abstract Title:	**The GI Bill at WSC: An Understanding Through Oral Histories**		
Presenter:	Claire Thornton		
Mentor:	Lydia Gerber	**Campus:**	Pullman
Major:	History- CAS		
Category:	Social Sciences		
Co-Author:	Claire Thornton		

The Servicemen's Readjustment Act of 1944, commonly known as the GI Bill, offered returning World War II veterans paid post-secondary education opportunities. Millions of veterans took advantage of these benefits, creating an enrollment boom in colleges across the nation. In 2014, I began a project called "The GI's of Washington State College." Using university archival sources, I was able to piece together quantitative data (like enrollment numbers) and qualitative data (archived oral history transcripts) to present an extensive depiction of WSC in the post-World War II era as it faced the challenges of the enrollment boom. However, I wanted to do more to bring to life the stories of veterans who attended WSC at this time and write about the impact this piece of legislation had on individual lives. With a solid understanding of this time period, I was able to develop informed interview questions for a small sample of five individuals who lived in Pullman during this time. I travelled to their houses and interviewed them in person, except for one veteran in Vancouver, WA whom I spoke with over the phone. Despite the seven decades that had passed, these men and women possessed an exuberance for life that made their stories of these events I had read about truly come alive. As I collected information about a number of topics (living situations, financial matters, social life, PTSD, and assimilation) about their life at WSC, I compared and contrasted those findings with those of my original project. Sometimes my findings were corroborated, while in other instances the oral histories simply added another perspective or dimension to the overall picture. Ultimately, the project brought life to an important era of university history, created new information for potential future use of historians, and recorded these stories for posterity. Their humorous and heart-warming stories are capable of bridging generation gaps in making their lives real and relatable, especially to current students. That is the power of oral history.

Presentation Number 146

ABSTRACT:

Abstract Title:	**Analysis of Statistical Correlations Between Weather Values and Wine Grape Harvest Qualities**		
Presenter:	Corydon Funk		
Mentor:	Melba Salazar-Gutierrez	**Campus:**	Tri-Cities
Major:	Viticulture and Enology (Winemaking)- CAHNRS		
Category:	Organismal, Population, Ecological, and Evolutionary Biology		
Co-Authors:	Melba Salazar-Gutierrez, Bernardo Chaves, Rick Hamman, Bill Riley, and Gary Grove		

There are only a handful of studies that have directly correlated wine grape harvest quality and bioclimatic indices. However, wine grape qualities rely on the climatic range of the grape producing region. In this study four grape varieties were analyzed: Cabernet Sauvignon, Merlot, Chardonnay, and White Riesling. Harvest and weather data were collected for four locations from 2009 to 2016 for different Washington Vineyards. The weather data included daily minimum, maximum, and average temperature, and daily precipitation. Following data collection, the weather data were correlated to three wine grape qualities: pH level, titratable acidity, and Brix degrees. The indices used to interpret climatic variability included three temperature indices, i.e., the Winkler Index, the Huglin Index, and the Cool Night Index. The Cool Night Index was broken down into four different time periods: July, September, October, and September and October conjoined. The Branas, Bernon, and Levadoux Hydrothermic Index utilized the temperature and rainfall in estimating mildew susceptibility. The indices were correlated using spearman correlation, and the qualities were also compared to the data using a multidimensional preference analysis (MPA) biplot. The Winkler Index and the Huglin Index had significant correlations to all three wine grape qualities. The Cool Night Index related significantly to all qualities for July, and both October and September. In contrast, the Branas Bernon and Levadoux index showed a possible relationship with lower Brix degrees. The biplot showed evidence of the relationship between the yearly data and wine grape quality. Some years had different weather extremes reflected in the wine grape qualities, as shown by the red varieties approaching brix degrees and pH while the white varieties more closely followed the TA trend line. Locations could be broadly grouped by influences from temperature or precipitation for specific years utilizing the MPA. The biplot also showed a relationship between the grape qualities, location, and cultivar. Further study into the use of an MPA for interpretation of the results is required. A larger data set would provide a more in-depth analysis. In summary, this study established temperature's importance in wine grape development for different time portions of the growing season.

Presentation Number 147

ABSTRACT:

Abstract Title:	**The Thin Ideal: The Role of Social Physique Anxiety and Weight Bias Among Future Fashion Designers**		
Presenter:	Keena Hudson		
Mentor:	Debbie Christel	**Campus:**	Pullman
Major:	Apparel Merchandising Textiles- CAHNRS		
Category:	Social Sciences		

Plus-size consumers are marginalized and classified as a niche market even though the majority of American women wear plus-size clothing. This indicates the need to further examine those who provide clothing for plus-size consumers. It is known that individuals, such as fashion designers, who have high interest in aesthetics typically have high levels of social physique anxiety (SPA). Another known factor is that fashion designers have higher levels of weight bias and prefer to design for thin consumers. However, the effect of SPA and weight bias on fashion design students' consumer preference has not been examined. The research methods that are used to complete the study include the use of online surveys of student's SPA, weight biases, and preferred body figure to design clothing for. More specifically to administer and analyze the online surveys systems like Qualtrics and Microsoft Excel will be used. The theoretical frameworks used to guide this research include the self-efficacy theory, and the self-presentation theory. There is an expected outcome for the design students to have majority design preference for the thin body type because of the lack of education on plus size design. This research is an important stepping stone in exploring the role of SPA and weight bias among fashion designers, and how educational interventions may help resolve the inequalities that plus-size women face. Most importantly the purpose of this research is to encourage others to take action towards equality for all body types because regardless of what shape, size or weight, all humans should have equal access to clothing.

Presentation Number 148

ABSTRACT:

Abstract Title:	**Nature Relatedness as a Facilitator to Utilizing the Natural World as a Coping Strategy to Reduce Stress**		
Presenter:	Rebecca Podszus		
Mentor:	Lee Daffin	**Campus:**	Global
Major:	Psychology- CAS		
Category:	Social Sciences		
Co-Author:	Lee W. Daffin Jr.		

Previous research demonstrated that exposure to the natural world is positively correlated with both physiological and psychological measures of stress reduction. This study investigated whether participants who scored highest on a nature relatedness scale also utilized nature as a stress-reduction coping strategy at higher rates than their non-nature related peers. College students completed an online survey measuring their perceived stress, common stress coping strategies, and extent of nature relatedness. Preliminary analysis of the survey data suggests there is a moderate positive correlation between nature relatedness and utilizing nature to reduce stress.

Presentation Number 149

ABSTRACT:

Abstract Title:	**Role of the Nipah Virus Fusion Protein and Glycoprotein on Innate Immune Responses**		
Presenter:	Keesha Matz		
Mentor:	Alan Goodman	**Campus:**	Pullman
Major:	Microbiology- CVM		
Category:	Molecular, Cellular, and Chemical Biology		
Co-Authors:	Alan Goodman and Hector Aguilar-Carreno		

Nipah Virus (NiV) is an RNA virus with a 40-90% mortality rate. Since there are no approved vaccines or cures for NiV we are working to understand the immune response to infection, which could aid in antiviral approaches to NiV. By invoking unique mechanisms to evade the host immune response, NiV can increase its infectivity potential, replicate to higher levels, and spread from one host to another. The innate immune response is the first line of defense for infected hosts to combat viral infection. Thus, viruses increase their infectivity through mechanisms that inhibit the innate immune response. Two proteins of NiV have been shown to inhibit immune responses and we investigated the potential role of two other NiV proteins, the fusion protein (NiV-F) and glycoprotein (NiV-G), in modulating the innate immune response of infected host cells. We hypothesized that NiV-F and NiV-G would modulate innate immune responses of the host cell through inhibition of intracellular proteins, RIG-I and MDA5, that are known to initiate innate immune response signaling upon recognition of viral RNA. Through an *in vitro* luciferase assay we quantified innate immune responses in the presence and absence of NiV-F and NiV-G. Results indicated that there was a statistically significant decrease in innate immune response when NiV-F and NiV-G were present. There was also a decrease in RIG-I and MDA5 expression in the presence of NiV-F or NiV-G. Thus, NiV-F and NiV-G may degrade or inhibit the on-demand expression of the intracellular proteins by an unknown mechanism. This, in turn, would result in impairment to initiate a strong innate immune response. These results suggest that NiV utilizes NiV-F and NiV-G to evade innate immune responses. In the future, we would like to investigate the mechanism of how NiV-F and NiV-G are mediating the inhibition of the innate immune responses.

Presentation Number 150

ABSTRACT:

Abstract Title:	**Understanding the Values and Preferences of Stakeholders to Inform Education and Outreach Priorities**		
Presenter:	Madeline Gray		
Mentor:	Allyson Beall King	**Campus:**	Pullman
Major:	Environmental & Ecosystem Sciences- CAHNRS		
Category:	Applied Sciences		
Co-Authors:	Melanie Thornton and Allyson Beall King		

Education and outreach are critical to improve public awareness and understanding of water resources. Stakeholder participation in the development of education and outreach strategies allows for local knowledge and stakeholder needs to be integrated. Within stakeholder groups, eliciting and analyzing mental models is one approach that is used to inform education and outreach priorities. Water resource education and outreach in the Spokane River Basin is important to the conservation of the region's water resources. This research study's objective is to analyze survey data from the participants at the Spokane River Forum in 2013, 2014 and 2016 to understand the values and priorities of stakeholders in the region. Statistical analysis was conducted to evaluate participants values and preferences within the regional water system and assess whether those have changed over time. Results show that the overall values of the stakeholders stay the same by prioritizing water quality and water quantity throughout the regional water system. Analyzing individuals' mental models can indicate what aspects of a system are important to the individual in respect to his or her implied values and preferences. Understanding stakeholders' mental models will inform water resource priorities for education and outreach in the region. This study aims to understand how stakeholder participation and mental model analysis can better inform education and outreach strategies to improve public understanding of local water resources.

Presentation Number 151

ABSTRACT:

Abstract Title:	**Don't Call Me Delusional: The Effect of Noun Labels on Stigmatizing Attitudes and Perceptions of People with Mental Disorders**		
Presenter:	Mia Ryckman		
Mentor:	Carrie Cuttler	**Campus:**	Pullman
Major:	Biology- CAS		
Category:	Social Sciences		
Co-Author:	Carrie Cuttler		

Nearly 50% of Americans will experience a mental disorder at some point in their lives. Nevertheless, a great deal of stigma continues to be attached to mental disorders. This is problematic because the stigma associated with these disorders can exacerbate symptoms and cause people to avoid seeking treatment. The present study focused on the stigmatizing effect of psychological labels. More specifically, the purpose of this study was to examine the effects of noun labels on stigma and perceptions of individuals with mental disorders. Noun labeling refers to the tendency to use "to be" to describe someone, for instance, referring to someone as "delusional" instead of stating "she has delusional disorder." Noun labeling holds a global, pervasive, and permanent connotation, implying that an individual is defined by their disorder. A sample of 450 community-living adults was recruited from Amazon's Mechanical Turk for the present study. Participants completed an online survey that required them to read five scenarios describing hypothetical characters and then to rate each character on 10 traits using a 11-point scale ranging from not at all to extremely. A between groups experimental design was used in which each participant was randomly assigned to one of three conditions: a condition where the character was referred to with a noun label (e.g. "Jessica is delusional"), a condition where the possessive form of the label was used (e.g. "Jessica has delusional disorder"), and a control condition with no label (e.g., "Jessica"). Other than the label used to describe the character, the scenarios used in the three conditions were identical. The results revealed that characters identified as having a mental disorder were rated significantly more poorly (e.g., more aggressive, unreliable, and volatile) than those who were not given a psychological label (controls). Moreover, characters identified with a noun label were rated significantly more poorly than those identified with a possessive form of a label). These findings demonstrate that the use of noun labels to refer to individuals with mental disorders has stigmatizing effects and that one way to reduce stigma is to use possessive forms of the labels.

Presentation Number 152

ABSTRACT:

Abstract Title:	**Movement of *Phythopthora ramorum* inoculum in the soil profile**		
Presenter:	Nhi Vu		
Mentor:	Marianne Elliott	**Campus:**	Pullman
Major:	Agriculture and Food Security- CAHNRS		
Category:	Applied Sciences		
Co-Authors:	Gary Chastagner and Marianne Elliott		

Phytophthora ramorum, the causal agent of Sudden Oak Death, is a fungus-like plant pathogen. In the US, *P. ramorum* has been detected mostly in California, Oregon and western Washington nurseries and has spread to forests in California and South Western Oregon, due to favorable environmental conditions (moist, humid) and the presence of susceptible host species. The pathogen infects a great number of plant species in native forests and ornamental nurseries, and could potentially cause devastating losses to forestry, agriculture and horticultural industries. Proper management is needed to prevent economic and ecological losses. Steaming has been used as a means to eradicate *P. ramorum* from infested soil. This study aimed to determine how deep *P. ramorum* would move in the soil profile, and give some suggestions about the depth of steaming treatment that should be utilized to effectively eradicate the pathogen and potentially reduce energy use. Fine sandy loam soil was used in the experiment. In each treatment, 4 columns (10-cm-dia. x 60-cm-high) were filled with 3 different soil heights (5 cm, 15 cm or 30 cm). The soil in each treatment was also mixed with various levels of organic matter: none (0%), low (1%), medium (5%) and high (10%). Soil columns were kept saturated with water during the experiment. Colonized Rhododendron 'Nova Zembla' leaves were placed on top of the soil columns. 1 cm of water was added in the column to cover the leaves. After one week, 2 litters of water were added in each column, and let flow down through the soil. Flow-through water was collected and tested for the presence of *P. ramorum* by baiting methods. There was no significant different in movement of *P. ramorum* between treatments of different level of organic matter. *P. ramorum* was not found in the flow-through water in the 30 cm-soil columns, and rarely found in the 15 cm-soil columns. The result suggested that 30 cm steaming depth may not be needed to eradicate *P. ramorum*. However, additional studies should be conducted with different soil types, environment conditions, soil compaction levels.

Presentation Number 153

ABSTRACT:

Abstract Title:	**The Power of PROGRESS: The Memorable Critical Literacies Framework for Social Justice**		
Presenter:	Holly Matteson		
Mentor:	Ashley Boyd	**Campus:**	Pullman
Major:	English- CAS		
Category:	Humanities		
Co-Author:	Ashley Boyd		

In this presentation, the presenter will share how using an original critical literacies framework entitled PROGRESS—which evaluates how characters are **P**ositioned in texts, representations of **R**ace, sexual **O**rientation, and **G**ender; how dynamics of **R**elationships unfold; factors of context and **E**nvironment that influence characters' perspectives; issues of **S**ocial class that are present; and manifestations of **S**tereotypes— can apply across a critical unit incorporating three different texts. The hope is that instructors will adapt and utilize the framework in order to advocate for and engage students with issues of social justice connected to various genres, including young adult literature, canonical works, and film. The hope is that instructors will adapt and utilize the framework in order to advocate for and engage students with issues of social justice connected to various genres, including young adult literature, canonical works, and film.

Utilizing *The Absolutely True Diary of a Part-Time Indian* by Sherman Alexie, William Shakespeare's *The Tempest*, and the film *Avatar* directed by James Cameron, the presenter will unite these texts under the themes of colonialism and imperialism. *The Absolutely True Diary of a Part-Time Indian* reflects elements of PROGRESS, for example, when discussing **R**ace and **S**ocial Class in relation to Junior's experiences with white people. Reading PROGRESS onto the play *The Tempest* provides students avenues to explore **G**ender dynamics, noting how Miranda is dominated by her father. Finally, using PROGRESS when assessing *Avatar* leads to an analysis of the power in the **P**ositionality of Jake, who struggles between the promises made to him in the human-world for completing the mission and the growing sympathy and relationships he builds with the moon's original occupants. Although other social justice instances are throughout all three texts, this presentation shares a method that ensures they will appear explicitly for the purposes of advocating and facilitating students' social justice dispositions and critical readings.

Presentation Number 154

ABSTRACT:

Abstract Title:	**The Effect of Chronic Dihexa Exposure in a Healthy Rat Model**		
Presenter:	Angela Rocchi		
Mentor:	Joseph Harding	**Campus:**	Pullman
Major:	Neuroscience- CVM		
Category:	Organismal, Population, Ecological, and Evolutionary Biology		
Co-Authors:	Angela Rocchi, Brett Vanderwerff, Zach Warmenhoven, and Joseph Harding		

Since 2002, dementia has advanced 23 positions on the list of "global causes of death." As its impact grows, so does the need for treatment options. The pharmaceutical, Dihexa, offers a potential solution.

Dihexa activates hepatocyte growth factor (HGF), a neurotrophic agent which mediates nervous system development as well as lifelong maintenance and repair. By galvanizing HGF in the brain, Dihexa counters the death of neurons and synaptic connections characteristic of dementia. In addition to its restorative capabilities in the brain, excess HGF in non-neural tissues has been linked to multiple cancers. This study investigates the effects of chronic Dihexa exposure in a healthy rat model to determine if the pharmaceutical's mechanism of action is carcinogenic.

Following 10 weeks of treatment, a trend in improved intellect was evident in two separate tests for intelligence: one for spatial reasoning (Morris Water Maze) and one for task acquisition (Bussey Box). A significant improvement in grip strength was also observed.

The only significant physiological change—observed via histochemical analysis—was seen in heart muscle. The hearts of the rats treated with Dihexa were capable of generating a stronger, more sustained contraction. This behavior leads us to believe that Dihexa acts directly on the contractile proteins of heart muscle, enhancing cardiac muscle activation and improving efficiency. These results do not support the prediction that Dihexa is carcinogenic, but unexpectedly widen the scope of potential disease targets to include heart failure which is ranked first on the fore mentioned "global causes of death."

Presentation Number 155

ABSTRACT:

Abstract Title:	**Concepts and Perspectives of Health and Housing among Homeless and Low Income Adults in Spokane: A Photovoice Project**		
Presenter:	Halle Schulz		
Mentor:	Janessa Graves	**Campus:**	Spokane
Major:	Nursing- CON		
Category:	Social Sciences		
Co-Authors:	Janessa M Graves, Victoria Sattler, Susan Tyler-Babkirk, and MaryLou Sproul		

Homelessness is a public health concern in cities across the US. Quantitative data is available about homeless populations including statistics and census. However, these statistics do not tell us much about the diversity of the homeless population and the challenges they face on a daily basis. This project aims to get an inside look at homelessness, unstable living situations and coping with health problems to gain a better understanding of the complexities of homeless and low-income women living. Photovoice methodology was used to allow participants to express themselves and reflect upon their experience while providing a look at the day-in-the-life of these women to better understand their needs, resources they use and gain a new perspective on this population. Photovoice methodology involves participants taking photographs, discussion of photographs to identify problems and advocate change. Five women were recruited through the photography class at Women's Hearth in Spokane to participate in this project. Human subject approval was obtained from the WSU Institutional Review Board. Participants were provided cameras and an assignment related to health and home. Participants came to photography class and shared, discussed, and interpreted their photos in a small group setting. Two rounds of photography and discussion were done. Each discussion was recorded using a digital audio recorder and facilitated using structured and open-ended questions. Audio recordings were reviewed and transcribed verbatim. Dedoose software was used to code transcription and photographs. Fifteen themes were identified and categorized into concepts, perspectives and actions. This study is relevant to public health outreach to the homeless and low income population of Spokane, gaining a better understanding of this population. The Stages of Change Model can be applied to the transition from homelessness to being housed as well as implementing positive lifestyle changes among homeless and low-income women. Examining the perspectives of health among homeless and low income women, we have identified a potential approach to address behavior change among people at risk for homelessness. Motivational interviewing may provide a useful platform when counseling or working with this population, due to its goal-centered approach and focus on individual autonomy.

Presentation Number 156

ABSTRACT:

Abstract Title:	**Lewiston-Clarkston Valley Formaldehyde Study**		
Presenter:	Patrick Robichaud		
Mentor:	Tom Jobson	**Campus:**	Pullman
Major:	Civil Engineering- CEA		
Category:	Engineering and Physical Sciences		
Co-Authors:	Tom Jobson, Shelley Pressley, Miao Wen, and Yibo Huangfu		

Air quality in the Lewiston-Clarkston Valley (L-C Valley) suffers from higher than expected levels of formaldehyde and other volatile organic compounds (VOCs) compared with similar sized cities. Because formaldehyde is a carcinogen, a two-year air quality study, which began in 2016, is being led by the Nez Perce Tribe, Idaho Environmental Protection Agency, and Washington State University. The purpose of the study is to determine the concentration of these compounds and to investigate the sources of formaldehyde and other VOCs in the L-C Valley. Meteorological data and air pollution data were collected from three monitoring sites located throughout the valley. The Mobile Atmospheric Chemistry Laboratory (MACL) was deployed at the City of Lewiston's Sunset Park. The other satellite sites were located at the Asotin County landfill and at Hatwai. These sites collected continuous meteorological data in addition to 12-hour grab samples for VOC and aldehyde analysis. The study ran from June 27 to July 25, 2016, and consisted of an analysis of the meteorological and air pollution data collected to determine primary sources of formaldehyde pollution. Wind rose plots were used to determine if elevated formaldehyde levels were associated with a particular wind direction and to identify the role of the paper mill in producing elevated formaldehyde in the LC-Valley.

Presentation Number 158

ABSTRACT:

Abstract Title:	***Coxiella burnetii* Nine Mile Phase II Clone 4 Pathogenesis in *Drosophila melanogaster***		
Presenter:	Sarah Borgnes		
Mentor:	Alan Goodman	**Campus:**	Pullman
Major:	Biochemistry- CVM		
Category:	Molecular, Cellular, and Chemical Biology		
Co-Authors:	Alan Goodman, Aoi Hiroyasu, and Zachary Howard		

Coxiella burnetii is a gram-negative obligate intracellular bacterium characterized by its low infectious dose, environmental stability, and causation of Q fever in both human mammalian animal hosts. By primarily dispersing via inhalation of contaminated aerosols, *Coxiella* has been categorized as a Category B pathogen by the NIAID biodefence research agenda. An attenuated strain of *Coxiella* known as the Nine Mile Phase II clone 4 strain (NMII), has been shown to cause pathogenesis in wild-type *Drosophila melanogaster,* yet it is non-infectious to immunocompetent mammalian animals. NMII clone 4 strain of *Coxiella burnetii* induces activation of the immunodeficiency (IMD) pathway specific to gram-negative bacterial infection within *Drosophila melanogaster*. By infecting *Drosophila* originating from the fully sequenced inbred lines of the *Drosophila* Genomic Reference Panel (DGRP), we hypothesize that enough genetic variance will be present to identify genetic complexes that contribute to the susceptibility or resistance to infection of *Coxiella burnetii*. Furthermore, genome-wide association studies (GWAS) analyze the DGRP mortality to elucidate any putative genetic elements contributing to resistance or susceptibility to infection. The genes identified by the strongest association, lowest P-value, will be validated as genetic variants coupled with susceptibility or resistance to infection of *Coxiella*. Considering that nearly 75% of human genes implicated in disease have a functional homolog in flies, our preliminary data suggests that the use of a *Drosophila* model to screen for factors involved in *Coxiella* pathogenesis can be applied to mammalian species.

Presentation Number 159

ABSTRACT:

Abstract Title:	**Research Paper**		
Presenter:	Alijah Lee		
Mentor:	Yujung Nam	**Campus:**	Pullman
Major:	Communication- COM		
Category:	Computer Science, Mathematics, Statistics, and Information Sciences		

Computers have been an intricate part of the human society for many years. On the other hand, computers haven't always had the access to personal information they have now. Computers weren't created for personal usage in it's early stages. Technology has drastically changed over the years, creating a more realistic connection between the computer and human. Humans understand other human personalities quickly. They determine whether or not they can identify how a human is by their personality. On the other hand, computers have been programmed to understand human personalities as well. Computers learn more about human personalities because of the increase of personal information social networks.

This research study will identify how computers have improved to understand human personalities. I want to know if the relationship between humans and computers are similar to humans-humans. My proposition is that social media and other programs on computers allow the computer to be more familiar with humans. That is how they ultimately understand the personalities of humans. The goal of my research paper will focus on human and computer relationships through personalities. I'll ultimately look to see if humans choose to work with computers that they feel more of a connection with.

Presentation Number 160

ABSTRACT:

Abstract Title:	**Alcohol Dependence Is Associated with Altered *Oprk1* Gene Expression in the Bed Nucleus of the Stria Terminalis and Kappa-opioid Receptor-mediated Escalation of Alcohol Self-administration**		
Presenter:	Chloe Erikson		
Mentor:	Brendan Walker	**Campus:**	Pullman
Major:	Neuroscience- CVM		
Category:	Organismal, Population, Ecological, and Evolutionary Biology		

Alterations in the genetic code are thought to be responsible for up to half the risk of developing alcohol dependence, and in recent years, differences in *Pdyn* (gene for dynorphin/DYN) and *Oprk1* (gene for the kappa opioid receptor/KOR) expression have been increasingly regarded as contributing to that risk. Recent data heavily implicates the DYN/KOR system in the extended amygdala, more specifically the bed nucleus of the stria terminalis (BNST), as contributing to escalated alcohol self-administration and the emergence of negative affective states in dependent organisms during acute withdrawal. To test this hypothesis, micro-punches of the BNST from 6-month vapor- and air-exposed Male Wistar rats were analyzed using reverse transcriptase quantitative polymerase chain reaction (RT-qPCR) to quantify dependence-induced changes in *Pdyn* and *Oprk1* gene expression. In addition, a separate cohort of animals were bilaterally cannulated in the BNST and trained to self-administer alcohol, then were subjected to an alcohol dependence induction procedure using intermittent alcohol vapor exposure (14h alcohol exposure / 10h alcohol withdrawal daily) or control air-exposure for 2 months. Following alcohol dependence induction, animals were allowed to self-administer alcohol during acute withdrawal until stable responding was achieved then received an intracranial infusion of a KOR antagonist into the BNST. The results revealed that alcohol vapor exposure significantly upregulated *Oprk1* mRNA expression in the BNST of alcohol self-administering animals. Furthermore, infusion of a KOR antagonist into the BNST of 2-month vapor treated animals was shown to dose-dependently ameliorate escalated self-administration during acute withdrawal without altering non-dependent alcohol self-administration. This research confirms an important role for DYN / KOR system dysregulation in the BNST in alcohol dependence at the genetic and receptor level, further illustrating the therapeutic potential of targeting this system in the treatment of alcohol dependence.

Presentation Number 161

ABSTRACT:

Abstract Title:	**Gene Discovery in *Drosophila melanogaster* is used to Study Innate Immunity to West Nile Virus**		
Presenter:	Grace Carrell		
Mentor:	Alan Goodman	**Campus:**	Pullman
Major:	Microbiology- CVM		
Category:	Molecular, Cellular, and Chemical Biology		
Co-Authors:	Laura R.H. Ahlers and Alan G. Goodman		

Arthropod-borne viruses, or arboviruses, can be detrimental to the health of people all over the world. These viruses are transmitted by an arthropod vector, such as a mosquito, and include viruses such as yellow fever virus, dengue virus, and West Nile virus. These diseases cause fever, headache, rash, muscle and joint pains, and in extreme cases, death. Since its arrival in the United States in 1999, West Nile virus has made a debut in every state and is endemic to the United States. At this time there are no treatments, only limited prevention methods such as avoiding mosquito bites. New methods of prevention and treatment are needed to treat viruses like West Nile virus. We propose to study the innate immune response to Kunjin virus, a naturally attenuated West Nile virus subtype, using *Drosophila melanogaster* as a model organism. The *Drosophila* Genetic Reference Panel (DGRP) is an inbred panel of fly lines with fully sequenced genomes derived from a natural population that is used as a living library to test how polymorphisms affect fly survival to Kunjin virus. We hypothesize that the DGRP lines present sufficient genetic diversity to reveal genetic variants in immune-related genes associated with the ability to restrict Kunjin virus. Data shows that certain fly lines from the DGRP have either enhanced or reduced susceptibility to Kunjin virus. We conducted a genome-wide association study (GWAS) using the mortality data from the infected DGRP lines to identify variants with genome-wide significant association with susceptibility to Kunjin virus. This data can be used to reveal novel innate immune response components and the pathways involved to Kunjin virus infection. Our analysis has identified significant gene variants in *Mustard*, *Pecanex*, and *Thisbe*, and we hypothesize that these genes are utilized in the innate immune response to Kunjin virus. The mechanism of action for these genes in the immune response to Kunjin virus will be the focus of our future studies. This research can lead to developing breakthrough treatments that will help those who suffer from West Nile virus.

Presentation Number 162

ABSTRACT:

Abstract Title:	**Examining Context Based Barriers to Patient Self-identified Health Care in Patients with Multiple Chronic Conditions**		
Presenter:	Mariah Petersen		
Mentor:	Crystal Lederhos Smith	**Campus:**	Spokane
Major:	Nursing- COM		
Category:	Applied Sciences		
Co-Authors:	Crysal Lederhos Smith and Cynthia Fryhling Corbett		

Purpose: The purpose of this study is to identify the context based barriers to patient self-identified goals within a sample of people with multiple chronic conditions (MCC). The first aim is to identify the three most common barriers to patient self-identified health care issues. The second aim is to examine the frequency of the three most common barriers for the four most common patient identified goals.

Rationale: Aging adults with MCC have increased health needs, however, they face context based barriers. Patients with MCC are treated by disease-specific guidelines, and goals are often not defined by the patient. This study provides knowledge regarding the contextual barriers, which allows healthcare providers to let patients-self-identify their own goals.

Methods: Patients were included if they had a MCC and were 45 years of age or older. Patients were randomized to receive 12 months of either home-based, person-cantered care management or an attention control. Patient charts were reviewed and summative qualitative analysis was used to find preliminary results. An exploratory analysis will also be performed regarding the frequency of barriers for the top patient identified goals.

Results: Preliminary result of aim one identified three common barriers, these consisted of low economic status, lack of resources, and having multiple comorbidities. Data analysis is still in progress in this section. Aim two has yet to be addressed, however, a final analysis will be reported on the presented poster.

Conclusion: Understanding specific contextual barriers to patient self-identified goals may inform health care providers and nurses regarding the importance of addressing barriers and setting attainable patient identified goals for their patients. With this knowledge providers can further plan and prevent know barriers before patients set their goals.

References:

Boeckxstaens, P., Willems, S., Lanssens, M., Decuypere, C., Brusselle, G., Kuehlein, T., De Maeseneer, J., & De Sutter, A. (2016). A qualitative interpretation of challenges associated with helping patients with multiple chronic diseases identify their goals. *Journal of Comorbidity, 6*(2), 120-126. doi: http://dx.doi.org/10.15256/joc.2016.6.64

Presentation Number 163

ABSTRACT:

Abstract Title:	**How Parent and Teen Relationships and Communication Shape Teens' Understanding of Romantic Relationships**		
Presenters:	Natalee Nunes and Ye Eun Park		
Mentor:	Kathleen Rodgers	**Campus:**	Pullman
Majors:	Nunes (Human Development and Sociology- CAHNRS) and Park (Human Development- CAHNRS)		
Category:	Social Sciences		

Introduction: Teens' understanding of romantic relationships is fostered by multiple factors including culture within the core family and parental involvement. The way communication is made within the family influences teens psychologically, which later on contributes to development of autonomy and self identity. Previous studies have found that how parents and children communicate depends on the child's gender and parental beliefs (Mauras, Grolnick, & Friendly, 2012). We believe the way communication is established throughout daily conversations could also affect teens' conceptualized idea about sexuality. We plan to analyze transcriptions of observed ten-minute parent-teen conversations about romantic relationship in a music video, and self-reported survey data in order to identify the parenting behaviors of warmth, hostility, dominance, and active listening. As adolescents grow older, conceptions of parental authority and moral issues shift so that teens and parents may not agree on what topics parents have legitimate authority over (Smetana & Asquith, 1994). For example, teens might think that romantic relationships are personal issues, whereas parents might feel they have a right to inquire because of concerns about safety. We will examine whether parents' or teens' perceptions of parental authority influences their teens' disclosure and discussion about romantic relationships (either as prompted by the music video or in real life).

Research Questions:

- How do perceptions of parents' legitimate authority influence teens' level of discussion about romantic relationships?
- Does family demographics and structure affect how parents communicate with teens related to sexual relationships?

Methods: We will use data that were collected from transcriptions of recorded conversations between 50 parent and teen participants, and surveys that participants completed. Our mentor for this project is Dr. Kathleen Rodgers, a co-investigator with Dr. Stacey Hust.

Implications: Through this analysis, we will see how families have unique ways of discussing the topic of romantic relationships, paying attention to parent communication style and adolescent disclosure. In addition, we would like to design solutions to risk-taking sexual behaviors by emphasizing family communication. By specifically looking at the way communication is made, we hope to construct solutions that could benefit the whole family, not just teens.

Presentation Number 165

ABSTRACT:

Abstract Title:	**Peroxisome Abundance as Drought-tolerance Marker in Spring Wheat**		
Presenter:	Kathleen Hickey		
Mentor:	Andrei Smertenko	**Campus:**	Pullman
Major:	Agricultural Biotechnology- CAHNRS		
Category:	Molecular, Cellular, and Chemical Biology		
Co-Authors:	Marwa Sanad and Andrei Smertenko		

Drought reduces productivity in over a quarter of agricultural systems worldwide. Consequences of drought include overproduction of reactive oxygen species (ROS) in cells. Accumulation of ROS causes oxidative damage to cellular components and compromises stress recovery. ROS concentration in cells is controlled by numerous scavenging mechanisms, including peroxisome abundance. We hypothesize that peroxisome abundance under drought stress can be used as a proxy for more efficient ROS scavenging and drought- tolerance. In this study, we used a spring wheat Nested Association Mapping (NAM) population "Elite" of 33 founder landraces. This population has been sequenced and therefore can be utilized for identification of novel genetic markers of peroxisome abundance. The drought was induced by withholding the watering during tillering stage. Phenotypic data including stomatal conductance, plant survival, and peroxisomes abundance were measured below 0% of soil moisture content. Plant height, tiller number, awn length, and grain yield per spike were collected at harvest and compared with the non-stressed plants. The drought caused a decline of following parameters: volumetric water content, electrical conductivity (EC), stomatal conductance ($P>0.0001$) and yield ($P>0.05$) relative to watered control. In general, no significant difference was found in plant height, tillers number, days to flowering, and awn length. A total of 16 genotypes showed contribution of peroxisomes to drought-tolerance mechanism: 11 genotypes were considered to be tolerant and 5 genotypes were susceptible. Among the tolerant genotypes, the peroxisomes abundance negatively correlated with ROS. Furthermore, peroxisome proliferation was accompanied by transcriptional upregulation of peroxisome biogenesis genes *PEX11-A* and *PEX11-C*. The principal component analysis revealed a correlation between peroxisome abundance and drought adaptation. Our findings demonstrate that peroxisome abundance can be exploited for capturing drought-tolerant genotypes. Our future work will focus on characterization of molecular mechanisms underlying contribution of peroxisomes to drought-tolerance.

Presentation Number 166

ABSTRACT:

Abstract Title:	**Effect of a Cardiomyopathy-associated Mutation in Tropomyosin on the Protein's Structure**		
Presenter:	Cheyenna Krone		
Mentor:	Alla Kostyukova	**Campus:**	Pullman
Major:	Bioengineering- CEA		
Category:	Molecular, Cellular, and Chemical Biology		
Co-Author:	Thu Ly and Alla Kostyukova		

Tropomyosin (Tpm) is a coiled-coil protein important for structure and dynamics of actin cytoskeleton in eukaryotic cells. Mutations in the genes that encode Tpm can have serious medical consequences. Recently, a mutation R21H in striated muscle-associated tropomyosin, Tpm 1.1, has been found in patients with hypertrophic cardiomyopathy (HCM). HCM is a genetic cardiovascular disease that commonly leads to sudden cardiac arrest in young people, including young athletes. We hypothesized that the R21H mutation affects the Tpm's alpha-helical coiled-coil structure because it replaced the amino-acid residue responsible for local salt bridge formation. To study this mutation, we designed a tropomyosin chimeric peptide, αTM1azip28[R21H]. This peptide was expressed in *Escherichia coli* as a fusion protein and purified using different chromatography methods and enzymatic digestion. The secondary structure of the peptide was studied using circular dichroism (CD) spectroscopy. CD data showed that αTM1azip28 [R21H] lost the coiled-coil structure characteric to the wild-type Tpm and became less stable. Our data offer insight on how the structure of Tpm is affected by the mutation R21H in HCM patients.

Presentation Number 167

ABSTRACT:

Abstract Title:	**Genetic Mapping of Seedling Emergence Trait in Bread Wheat**		
Presenter:	Alexander Blackburn		
Mentor:	Kulvinder Gill	**Campus:**	Pullman
Major:	Genetics and Cell Biology- CVM		
Category:	Molecular, Cellular, and Chemical Biology		
Co-Authors:	Gaganjot Sidhu and Kulvinder S. Gill		

Washington State ranks number five in terms of wheat production valued around $715 million and each year, poor seedling emergence and flourishing weeds result in economic losses of 11-50% that can be translated to $78 million-358 million. Crop stand establishment depends on quick seedling emergence along with robust early growth. Currently used Rht containing cultivars grown extensively are not adequate for PNW and similar regions where deep-planting is practiced, resulting in compromised crop stand establishment. Therefore, the goal of this study is to improve the emergence trait in new and existing PNW cultivars through genetic dissection of this trait.

A bi-parental mapping population was constructed using the best emerger, KSG-219, and the worst emerger, KSG-288, previously identified in our study. Following DNA extraction from leaves of F_2 progeny along with parents; polymorphism between the two parents was identified, which resulted in a total of 191 SSR markers. Each F_2 individual was genotyped using the polymorphic markers. Further, an emergence test was performed at the Washington State University Dryland Research Center during fall, 2016 season to collect emergence data using F3. The F_3 seed was also used to determine coleoptile length.

A linkage map containing 55 markers has been constructed and the addition of remaining markers to this map is underway. The data collected from both the field test and coleoptile length test is currently being utilized for QTL mapping. To closely associate the marker with the trait, a high density SNP map will also be constructed using Genotyping-by-Sequencing. The associated alleles or markers identified from this study will be useful for breeding cultivars tolerant to deep planting. Successful deployment of these alleles will result in crop's capacity to compete with weeds and early nutrient uptake concomitant with rapid seedling growth.

Presentation Number 168

ABSTRACT:

Abstract Title:	**Role of Endogenous Cannabinoid Signaling in the Medial Prefrontal Cortex in Cognitive Flexibility**		
Presenter:	Collin Warrick		
Mentor:	Ryan McLaughlin	**Campus:**	Pullman
Major:	Neuroscience- CVM		
Category:	Molecular, Cellular, and Chemical Biology		

The prefrontal cortex (PFC) is the center for executive functioning, overseeing cognitive strategies according to changing environmental demands. The endogenous cannabinoid (ECB) system is expressed throughout the PFC contributing to numerous PFC-mediated behaviors. However, the extent to which ECB signaling in the PFC influences cognitive flexibility has yet to be evaluated. Our study investigates whether pharmacological blockade of ECB signaling within the medial PFC (mPFC) alters cue discrimination learning and cognitive flexibility in a strategy-shifting task. Male adult rats were trained to press a lever in response to illuminated visual cues to obtain a food reward. To determine the involvement of mPFC ECB signaling in acquiring visual cue discrimination, rats received microinfusions of the CB_1 receptor antagonist rimonabant (0.3µg/0.2µL/side), or an equivalent volume of vehicle before testing. Subsequently, rats were tested in the strategy-shifting task, which required them to disregard the previously learned strategy in favor of an egocentric spatial learning strategy (i.e., always press left lever regardless of the cue). Rats again received counterbalanced microinfusions prior to testing, and the number of trials to criterion and errors were tabulated. Contrary to our hypothesis, preliminary results indicate that intra-mPFC CB_1 receptor inactivation does not significantly alter visual cue discrimination learning or strategy shifting performance. Although, the number of rats per group should be increased before firm conclusions can be drawn, these pilot data indicate that ECB signaling at CB_1 receptors in the mPFC is not necessary for learning or switching behavioral strategies in this cognitive flexibility task.

Presentation Number 169

ABSTRACT:

Abstract Title:	**Drought Stress: Improving Wheat for the Future**		
Presenter:	Jessica Hartman		
Mentor:	Megan Lewien	**Campus:**	Pullman
Major:	Earth Sciences- CAS		
Category:	Applied Sciences		
Co-Authors:	Megan Lewien		

Water shortage is one of the most significant factors limiting wheat (*Triticum aestivum L*) production worldwide, even in the most productive agriculture regions. Food security in the twenty-first century relies on improved drought tolerant varieties with high yield stability across growing cycles and environments. Providing breeders with a high throughput method to select for drought tolerance, and yield stability would mean decrease the amount of time to release new varieties that are stable-yielding under low-water or drought conditions. A panel of 750 spring wheat lines from 30 families were evaluated for plant water status using canopy spectral reflectance, water use efficiency using carbon isotope discrimination and individual plot yield data under rain-fed conditions in 2014 to 2016. Correlation analysis was used to identify connection between phenotypic characteristics and yields. The hypothesis was that higher drought tolerance, and higher water use efficiency would correlate to a higher yield. What was actually found was that high water use efficiency lead to lower yields, while plant water status measured through canopy spectral reflectance correlated to a higher yield. Further research, correlating phenotypic characteristics to genomic regions, will allow for the selective breeding of cultivars with high water use efficiency, providing breeders with an accelerated timeline to adapt to environments with growing water shortage.

Presentation Number 171

ABSTRACT:

Abstract Title:	**Hydroamination of Alkynes Using Gold Nanoparticles Encapsulated in Silicone Dioxide**		
Presenter:	Joshua Smith		
Mentor:	Steven Saunders	**Campus:**	Pullman
Major:	Chemical Engineering- CEA		
Category:	Engineering and Physical Sciences		
Co-Authors:	Trent Graham and Steven Saunders		

The hydroamination of alkynes is widely used to produce imines for application in the pharmaceutical industry due to their biologically active nature. The reaction requires catalysts to lower the energy barrier and the donation of hydrogen molecules to produce the imines. We hypothesized that heterogeneous catalyst performance would be improved by the colocalization of support-grafted hydrogen donors to the catalytically active surface. We explored different methods of producing gold catalysts with support-grafted hydrogen donors. We found a reproducible method to synthesize gold nanoparticles supported by silicone dioxide functionalized with silylamines. Silylamines can donate hydrogen molecules. The formation of a hollow, porous silicon dioxide shell with encapsulated gold nanoparticles was validated with transmission electron microscopy. The chemical structure of the grafted hydrogen donors on the catalyst surface was characterized with solid-state magic angle spinning nuclear magnetic resonance spectroscopy and Fourier-transform infra-red spectroscopy. We quantified the amount of grafted hydrogen donors with thermogravimetric analysis and chemical transient kinetics. After validating the production of heterogenous catalyst with donatable hydrogen molecules, we began to investigate our hypothesis. We conducted hydroamination reactions to compare our catalysts to catalysts that had the donatable hydrogen molecules removed. The conversion of reactants to products was monitored with high-performance gas chromatography and mass spectrometry and nuclear magnetic resonance spectroscopy. We determined that the colocalization of hydrogen donors does improve catalyst performance. Future work is underway to apply the catalyst system to emerging reactions of interest that also necessitate hydrogen molecule donation in other industries such as the petroleum industry.

Presentation Number 172

ABSTRACT:

Abstract Title:	**Dropping Like Flies: Innate Immune Responses of *Drosophila melanogaster* During West Nile virus Infection**		
Presenter:	Chasity Trammell		
Mentor:	Alan Goodman	**Campus:**	Pullman
Major:	Microbiology- CVM		
Category:	Molecular, Cellular, and Chemical Biology		
Co-Authors:	Laura R.H. Ahlers and Alan G. Goodman		

Insects are one of the most prevalent organisms that transmit vectorborne viruses, particularly flaviviruses such as West Nile virus (WNV), dengue virus (DENV), and Zika virus (ZIKV). With rising global temperatures, mosquitos, the most prominent vector of such viruses, are beginning to move beyond their traditional environments to historically more temperate locations. With such a movement comes the rise of outbreaks such as WNV in Texas in 2012, DENV in Hawaii in 2015-16, and ZIKV in Brazil in 2016. Even though there are preventative measures in place to minimize the spread of flaviviruses, there is no approved vaccine or specific treatment post-exposure. Because of this unmet need in public health, research is being directed into understanding how mosquitos tolerate arboviral infections, which could ultimately be used to develop an effective therapeutic. Due to the versatility that *Drosophila melanogaster* has as a model in immunological studies and the similarities of their innate immune systems to humans, we utilize them as a model organism to understand immunity in an insect. In our study, we use Kunjin virus (KUNV), a naturally attenuated subtype of West Nile virus, to probe an immune response in *Drosophila* and determine which components of the immune response are critical in the antiviral response to KUNV. We infected flies carrying mutations in genes required for immunity, including *Vago*, *Dicer-2*, *Hopscotch*, or *Relish,* and measured survival and viral load of these lines. We hypothesize that the mutants, particularly those with mutated *Vago* and *Dicer-2* genes, will exhibit increased mortality and viral load when exposed to the KUNV due to the importance of these genes in the antiviral innate immune response. This research will help develop an understanding of the genes responsible for the innate immune response to flaviviruses. This research can later be applied in future studies towards treatment and vaccination.

Presentation Number 173

ABSTRACT:

Abstract Title:	**Establishing Cover Crops for Soil Health Improvement in Low-rainfall Areas of North Central Washington**		
Presenter:	Taylor Bruchet		
Mentor:	Tarah Sullivan	**Campus:**	Pullman
Major:	Viticulture and Enology (Winemaking)- CAHNRS		
Category:	Organismal, Population, Ecological, and Evolutionary Biology		
Co-Authors:	Leslie Michel and Tarah Sullivan		

Dryland wheat-fallow production areas in the inland Pacific Northwest suffer from widespread soil degradation from decades of tilling and input intensive practices. Cover crops have been shown to improve soil health and increase crop yield in many other agricultural regions by improving soil moisture and enhancing microbial life. Producers in eastern Washington are interested in growing cover crops to improve soil health and meet long-term production goals. However, growing cover crops in low-rainfall regions can be challenging and the potential benefits have not been proven in the Pacific Northwest. A four-year study was initiated in 2015 in 16 direct-seeded sites in Douglas, Grant, Lincoln, and Okanogan counties to determine the feasibility and effects of cover crops. At each site, four treatments were applied: three cover crop planting times of fall (FA), spring (SP), and summer (SU); and summer fallow control (CO). Soil moisture and microbial enzyme activity were measured to determine the effects of the cover crops on improving long term soil health. The soil microbial enzymes B-Glucosidase (BG), B-N-Acetylglucosaminidase (NAG), and Acid Phosphatase (AP) activity were all analyzed via spectrometric methods. The data collected showed that the control, with no cover crop, had the highest soil moisture content. Enzyme activity was also highest in the no cover crop control which is most likely due to the higher moisture levels which is known to promote soil microbial life.

Presentation Number 175

ABSTRACT:

Abstract Title:	**Combatting Herpes Simplex Virus with the Multiple Myeloma Drug Bortezomib**		
Presenter:	Seth Schneider		
Mentor:	Anthony Nicola	**Campus:**	Pullman
Major:	Genetics and Cell Biology- CVM		
Category:	Molecular, Cellular, and Chemical Biology		
Co-Authors:	Suzanne M. Pritchard, Darin J. Weed, George A. Wudiri, and Anthony V. Nicola		

Acyclovir, an antiviral drug used to treat herpes simplex virus (HSV) infections, is ineffective against resistant strains that arise readily in immune-incompetent and immune-naïve individuals. New methods of responding to acyclovir-resistant strains of HSV are needed. Bortezomib is an FDA-approved drug for treatment of multiple myeloma. Here we show it is also effective in combating HSV in a dose-dependent, non-cytotoxic manner. Bortezomib is an inhibitor of the host cell proteasome, a large multi-subunit proteolytic machine. Since HSV utilizes the proteasome to facilitate incoming nucleocapsid transport to the host cell nucleus and begin replication, this could be the mechanism by which bortezomib inhibits the HSV replicative cycle. Bortezomib inhibited infectivity of wild type and acyclovir-resistant strains of HSV, with effective concentration 50s (EC50s) in the nanomolar range. A clinical isolate of HSV is currently being tested in the same manner. Importantly, bortezomib was not cytotoxic to the Vero cells used in these experiments, even at 1 mM concentration. What is currently needed is an understanding of how HSV utilizes the proteasome during infection and the mechanistic consequences of exposure to bortezomib. This study aimed to narrow down the point in time of HSV infection that bortezomib acts and visually witness its prevention of viral entry to the nucleus. A time-of-addition assay was employed to address the first aim, whereby bortezomib was added to HSV-exposed Vero cells at differing time points in the infection. The drug's effectiveness decreased when added at later times post-infection, suggesting that it worked to inhibit HSV early in its life cycle, before the virus entered the nucleus of the infected cell. Supporting this suggestion are immunofluorescence images depicting viral capsid transport 2.5 hours post-infection in the presence of bortezomib. Relative to the control, these capsids were unable to enter the host cell nucleus, further confirming that bortezomib acts early in infection. By distinguishing the actions of bortezomib and the proteasome with regards to HSV infection, a new addition to the antiviral arsenal can be developed.

Presentation Number 176

ABSTRACT:

Abstract Title:	**The Impact of Ethical Priming Statements on Online Test-taking Behavior**		
Presenter:	Leslie Taylor		
Mentor:	Lee Daffin	**Campus:**	Global
Major:	Psychology- CAS		
Category:	Social Sciences		
Co-Author:	Lee Daffin		

Online learning environments can produce ambiguous results in regards to educators' perceptions of course integrity. Preliminary research on non-proctored versus proctored exams shows a discrepancy between grade and time taken to complete the exam, indicating a difference in test-taking behavior if the exam is not proctored. The purpose of this study is to determine if the impact of honor codes in traditional classroom settings translates to the online environment when an ethical priming statement (honor code) is signed immediately before testing. If ethical priming statements do make a difference, we hypothesize the grade and time gap between non-proctored and proctored exams will decrease. Ethical priming statements were added to non-proctored psychology exams of various degrees of difficulty during the Fall 2016 semester. Data were obtained from 457 Washington State University students and compared to previous research analyzing time and grade percentage differences. Inclusion of ethical priming statements did not seem to change test-taking behavior; there was still a significant difference between proctored and non-proctored exams. Students took roughly 20 minutes longer on non-proctored exams, and achieved a grade more than 10% higher, similar to our previous research. Possible explanations for this trend include students being overexposed to conduct statements during their academic career, cheating, or the fact there is no actual cheating going on and students become nervous when taking exams, as many indicate if asked directly. These possibilities will be explored further.

Presentation Number 177

ABSTRACT:

Abstract Title:	**Using Thermal Imaging on Apple Fruit to Assess Sunburn Potential from Solar Radiation under Colored Netting Treatments**		
Presenter:	Chelsea Hill		
Mentor:	Lee Kalcsits	**Campus:**	Pullman
Major:	Agricultural Tech and Prod Management- CAHNRS		
Category:	Applied Sciences		
Co-Authors:	Lee Kalcsits and Giverson Mupambi		

Washington State is a leader in world apple production, where over half of the fresh apples seen in today's market are grown. Each year growers must navigate long hot summers in Washington. High summer temperatures and light intensity lead to one of of the most troublesome and costly damages to fruit, sunburn. Sunburn damages can result in an average loss of 10% where the cullage rate exceeds over $100 million in damaged fruit each year, (Schrader et al, 2003). Sunburn is a physiological disorder that is caused when excess solar radiation reaches the surface of the apple fruit causing pigment discoloration on the skin, internal fruit quality changes, photosynethic impairment, as well as structural and morphological changes (Racsko and Schrader, 2012). Newly adapted research in the use of colored netting derived from a durable polypropylene fabric with specialized polymer and pigment stabilizers could be the future to sunburn prevention and limit the use of overhead evaporative cooling systems in orchards.

This project compared the effects of solar radiation on apple fruit surface temperature with the use of thermal imaging against black, white and natural backgrounds. The thermal imaging was used to detect hot spots on fruit and leaf surfaces to determine sunburn exposure potentials under different colored netting systems. This research also included how different colored netting and manipulated backgrounds could affect light quality and quantity of incoming solar radiation on fruit and leaf surfaces.

Presentation Number 178

ABSTRACT:

Abstract Title:	**Novel 3D Printing of Metal Composite Aerospace Structures**		
Presenter:	Bryan Heer		
Mentor:	Amit Bandyopadhyay	**Campus:**	Pullman
Major:	Materials Science Engineering- CEA		
Category:	Engineering and Physical Sciences		
Co-Authors:	Bonny Onuike and Amit Bandyopadhyay		

Additive manufacturing has emerged as a prominent manufacturing technique in multiple engineering fields but has gained a lot of interest in the aerospace industry due to its on-demand and property-controllable characteristics. The National Aeronautics and Space Administration (NASA) is particularly interested in creating thinly deposited surface coatings that exponentially enhance the performance of the coated material. This would allow engineers to first design space-grade components with easily processed materials and then apply a high-quality coating to give the components site-specific desirable properties. While there are multiple types of additive manufacturing systems, most are limited to manufacturing of one material type at a time. This directly restricts advancements in developing additively manufactured multi-materials structures, which hold the potential to largely enhance parts currently used in the aerospace field from transitioning properties. Transitioning properties was of interest for this project, where additive manufacturing was used to alter surface properties of Inconel 718 (a material widely used for turbine blades in airplane combustion engines) with the addition of a copper alloy GRCop-84 as a coating. It was hypothesized that if GRCop-84 could successfully be built onto Inconel 718, then the addition of the alloy would improve thermal properties of Inconel 718. 100% GRCop-84 coatings were successfully bonded to Inconel 718 but had a very small bonding zone depth of about 6 µm. The coating cross-section was very porous, which defeated the purpose of adding a coating since Inconel 718 was still exposed to the environment. After a manufacturing redesign, coatings seemed to bond much better with an extra bonding layer between the Inconel and copper alloy coating and had a bonding zone depth of about 300 µm, including an approximately 200 µm bonding layer. Cross-sectional hardness values transitioned well from the top of the coating into the Inconel 718, and coatings seemed to become homogenized. In this poster, I will present the data collected that influenced manufacturing redesigns and how coating qualities progressed from the initial to final builds. These redesigns and observations have a strong correlation with the feasibility of additively manufacturing multi-material structures.

Presentation Number 179

ABSTRACT:

Abstract Title:	**Development of α-gal for Linkage to the TG97 Inhibitor of PSMA on Prostate Cancer**		
Presenter:	Richard Myles		
Mentor:	Cliff Berkman	**Campus:**	Pullman
Major:	Chemistry- CAS		
Category:	Molecular, Cellular, and Chemical Biology		
Co-Authors:	Brian Backer, Richard Myles, and Cliff Berkman		

Modern methods of cancer treatment utilize the immune system for tumor removal via targeted therapy. This method involves a selective inhibitor or binding antibody, a linker molecule or chain, and an antigen responsible for immune response. This method is highly selective and can maintain a relatively low risk of adverse side effects typically seen in chemotherapy. The Berkman lab is currently working on small-molecule probe that binds with high affinity to prostate-specific membrane antigen (PSMA), which is a cell surface protein that is overly expressed during the more aggressive stages of prostate cancer. This molecule consists of several pieces including an inhibitor molecule, TG97, a liner group, azido click group, and the galactose-alpha-1,3-galactose (α-gal) antigen. The primary focus of this paper is the development of the α-gal sugar for its use in the suppression of prostate cancer. This is achieved by selective benzyl and acetyl protection, basic substitutions, and metal-catalyzed coupling of monosaccharides to yield the α-gal scaffold for further coupling to the TG-97 inhibitor of PSMA.

Presentation Number 180

ABSTRACT:

Abstract Title:	**Buffer Impact on Macro-invertebrates**		
Presenter:	Connor Osterlund		
Mentor:	Ryan Boylan	**Campus:**	Pullman
Major:	Environmental & Ecosystem Sciences- CAHNRS		
Category:	Organismal, Population, Ecological, and Evolutionary Biology		

The research that I turned my attention to during my internship was how different temporal scales of buffers affected to levels of water insects (macro-invertebrate). If a buffer has been placed in the Palouse/Pullman watershed than the quantity, as well as quality (indicator species) of the insects, will improve because the buffers will create a barrier from pollutants from flowing into the water and improving the water quality.

The sampling of macro-invertebrates followed the standard procedures the department of ecology followed. This also includes the way the way we interpret the data. Using the EPT index is a standard way to perceive water quality due to the EPT all being bio indicator species. Through this method we noticed that the headwater stream had the highest EPT rating with a drastic compared to the other buffers.

Presentation Number 181

ABSTRACT:

Abstract Title:	**Fast Growing City with a Plan for the Future, City of Mattawa, WA**		
Presenters:	Krisandrah Crall and Rattanak Leng		
Mentor:	Kathleen Ryan	**Campus:**	Pullman
Majors:	Crall (Architectural Studies- CEA) and Leng (Interior Design- CAHNRS)		
Category:	Arts and Design		

The City of Mattawa is a fast growing city along the Columbia River. Government Road is the main road and a major highway that runs east-west connecting most of the residential streets to the agricultural land. Currently, the road is 100 foot wide with mismatched sidewalks, gravel parking, and unclear lane divisions. There is considerable traffic congestion and pedestrian traffic with limited safe crossing areas.

The town is working to improve the condition along the road such as creating a safe path for children walking to school, sidewalks, crosswalks, speed and traffic control. To study and develop an improved street plan, the city worked with the Rural Communities Design Initiative (RCDI) at Washington State University, Gray and Osborne, Inc., consulting engineers, and Berger Partnership, a landscape architecture firm.

The RCDI team of faculty and students in Landscape Architecture, Interior Design, and Architecture worked in a co-design process by facilitating community workshops. RCDI worked with community members to collect data and identify problems concerning traffic in the community. Community members shared their ideas and interests in developing their community as safe and welcoming. After collecting information and perspective during the participatory community workshops, the RCDI team researched and designed a concept proposal and presented it to the community through a second workshop. After community feedback the proposal was revised, then presented to the City of Mattawa. The RCDI student team created a document which included the proposed design plan along Government Road and planning for future growth. The plan included road sections, street light locations, pedestrian safety, traffic calming and lane divisions, parking options, streetscape and storefront character, community arts, and gathering spaces. Locations were proposed for a community centre, city hall, and fire station.

The RCDI conceptual planning document has been used by the City of Mattawa, Gray & Osborne Inc. and Berger Partnership for the refinement of the streetscape character and to prepare a feasibility study. The City of Mattawa is currently working on a community hall design based on interest expressed at the workshops.

Presentation Number 182

ABSTRACT:

Abstract Title:	**The Influence of Plant Volatiles on Parasitoid Oviposition Behavior**		
Presenter:	Elizabeth Magill		
Mentor:	William Snyder	**Campus:**	Pullman
Major:	Zoology- CAS		
Category:	Organismal, Population, Ecological, and Evolutionary Biology		
Co-Author:			

Plants have evolved highly complex defense mechanisms to protect them from herbivore attack. Plant volatiles are herbivore-specific organic compounds, secreted when herbivores are present that can aid in the attraction of beneficial parasitoid wasps. When a plant is attacked by multiple herbivores, it releases a different volatile profile, which may impair the parasitoids ability to find their hosts. Soil characteristics may also influence the growth and abundance of herbivore populations, although evidence is inconsistent. The purpose of this project is to determine how parasitoid host-locating behavior will be affected when confronted with volatiles from non-host chewing herbivores. This project utilized organic and potting mix soil treatments to provide an agriculturally relevant evaluation of biologically active field soil as a possible factor influencing tri-trophic interactions. Parasitoid preference towards aphids in single and dual infestations were evaluated using a y-tube olfactometer and a complementary common garden experiment where we measured aphid parasitism rates on plants in the field. We did not detect parasitoid preferences for single over dual infested plants in the olfactometer, nor in the common garden. While parasitoid preferences were neither affected by caterpillar feeding nor soil type, aphid growth was shown to significantly increase on plants grown in organic farm soil compared with greenhouse potting mix. Nutrient profiles and associated microbial communities of the different soil types may provide a possible explanation for this increased pest growth. This can provide further insight into how soil management on farms may influence vulnerability to pest outbreaks.

Presentation Number 183

ABSTRACT:

Abstract Title:	**Effect of Bovine Serum Concentration in Growth Medium on Herpes Simplex Virus Titers**		
Presenter:	Ryan McLaughlin		
Mentor:	Anthony Nicola	**Campus:**	Pullman
Major:	Biochemistry- CVM		
Category:	Molecular, Cellular, and Chemical Biology		
Co-Authors:	George A. Wudiri and Anthony V. Nicola		

Herpes simplex virus (HSV) is a ubiquitous human pathogen responsible for significant disease burden worldwide. In our laboratory, HSV stock preparations are propagated by adding virus to Vero (African green monkey kidney) cells at a low multiplicity and allowing the infection to progress for 48-72 hours in cell culture medium containing 10% fetal bovine serum (FBS). FBS is a common nutrient additive for mammalian cell culture growth medium. My research project was to determine the effect of reducing FBS concentration to 2% on HSV yields. Keeping the amount of FBS to a minimum will reduce the amount of background protein present in HSV-1 preparations and will be a cost savings to the laboratory budget. Vero cells were cultured in Dulbecco's modified Eagle's medium supplemented with 10% FBS. HSV was then propagated in these cells in medium containing 10% FBS or medium reduced to 2%. Supernatant from infected cells and lysates from infected cells that were propagated with medium containing 10% or 2% FBS were titered by limiting dilution on Vero cells. Plaques were visualized and enumerated at 18 hours postinfection by an immuno-peroxidase staining assay. Reducing the amount of FBS used did not affect virus titer. Virus grown in medium supplemented with 10% FBS yielded a titer of 3.1 $x10^6$ plaque forming units (PFU) per milliliter (mL), while virus grown with 2% FBS yielded 4.4 $x10^6$ PFU/mL. Thus, the laboratory can switch to growth medium with 2% FBS without compromising virus titer, saving money as well as reducing the possibility of excess proteins interfering with experiments.

Presentation Number 184

ABSTRACT:

Abstract Title:	**Effects of Potential Chemical Germination Stimulants on Legume and Grass Cultivars**		
Presenter:	Brennan Hyden		
Mentor:	Amit Dhingra	**Campus:**	Pullman
Major:	Agricultural Biotechnology- CAHNRS		
Category:	Applied Sciences		
Co-Authors:	Bruce Williamson, Ryan Christian, and Amit Dhingra		

Germination rate and early plant growth are critical components in achieving high crop yields with the best efficiency, but many crops are hampered by seed dormancy. There is a pressing need in the turfgrass and forage crop industries for chemical stimulants of early growth to reduce the time to achieve 100% canopy coverage with the least amount of seed possible. This study investigated the effects of three potential chemical germination stimulants (CGS – 1, CGS – 2, CGS - 3) on the germination and growth rate of three genotypes of grass and two genotypes of forage legumes. The three CGSs are hypothesized to aid in shortening dormancy and thereby allow for faster germination and more vigorous early growth. Monocots (grasses) and dicots (forage legumes) were investigated in order to explore if the effect was consistent across divergent evolutionary lineages. Seeds of the five varieties were coated in a mixtures containing each CGS individually at concentrations ranging from 0% to 20% in a base matrix of filler agent. The coated seeds were evenly distributed over the surface of each pot and placed in an automatic misting chamber. Following germination, images were taken daily for 10-15 days and the total shoot area was calculated and analyzed using ImageJ. At the end of the experiment, dry biomass measurements of the shoots were collected. The data indicate increased coverage among the grass cultivars exposed to the CGS – 1 and CGS – 3 treatments and increased coverage among the legume cultivars when exposed to CGS – 2. These results may be used to help identify genetic pathways and create improved germination treatments to be used for forage and turf crops as well as food crops such as corn, wheat, rice, and soybean. Further research is also warranted to explore the effects of these and additional CGSs in combination as well as during different seasons of the year.

Presentation Number 186

ABSTRACT:

Abstract Title:	**Earthworms: The Tireless Workers Beneath our Feet**		
Presenter:	Marilyn Kulper		
Mentor:	Markus Flury	**Campus:**	Other
Major:	Wildlife Ecology & Conservation Sciences- CAHNRS		
Category:	Organismal, Population, Ecological, and Evolutionary Biology		

Earthworms improve soil structure and play an important role in the soil food web. Earthworms eat litter and soil, and mix organic matter into the soil. Plastic left on the ground may be also eaten by earthworms and mixed into the soil. The objective of this study was to determine whether earthworms will eat biodegradable plastic mulches, and whether or not earthworms will pull plastic mulches into their burrows. Earthworms (Lumbricus terrestris) were placed into mesocosms (3cm wide by 30 cm high by 50 cm long) that were filled with soil. The earthworms were fed with three different food sources: (1) lettuce only, (2) lettuce plus biodegradable plastic mulch, and (3) biodegradable plastic mulch only. Lettuce and plastic were cut into pieces of 2 cm by 2 cm and placed on top of the soil in the mesocosms. Mulch pieces were recovered after the experiment and analyzed for surface area to determine whether mulch was eaten by the worms. Our results indicate that the worms indeed pulled the plastic mulch into their burrows, but they did not consume them. Mulch was found up to 20 cm deep in the soil of the mesoscosms, and some mulch was torn. Earthworms thus can contribute to mixing plastic into the soil, but will likely not eat the plastics.

Presentation Number 187

ABSTRACT:

Abstract Title:	**Rural Revival: The Spirit of a Small Washington Community**		
Presenter:	Maria Tatum		
Mentor:	Kathleen Ryan	**Campus:**	Pullman
Major:	Interior Design- CAHNRS		
Category:	Arts and Design		

The changing demographics of rural areas created by the growth of urban centers continues to impose economic challenges on these communities.Rosalia, WA plans to spur economic growth by building a commercial community kitchen available for rent to residents and surrounding communities with the goal of generating income for the city and supporting entrepreneurship within the greater Palouse.

With the increase of urbanization, Rosalia has seen a decrease in economic opportunity for residents as jobs continue to migrate to Spokane and Seattle. The community kitchen was conceived as a way to attract people to the community and inspire entrepreneurial ventures. Adaptive reuse of a downtown building reinforces the cultural heritage and identity of Rosalia residents while implementing responsible design practices.

Meetings with community members informed decisions about which uses to design for such as canning, packaging and, catering. Community members also guided the design process in regards to size, occupancy, equipment and storage needs. Centralizing plumbing to a single area was an answer to the foremost concern, economy, and a response to weather concerns related to freezing pipes. Placement of other features and their proximities to one another were made using evidence-based design. This method was based on research into the typical functions of commercial kitchens and the functions community members wished it to perform. The outcome was a well developed understanding of station and equipment relation within the space.

The aesthetics emerged from the spirit of reuse. Removing gypsum board from brick walls as well as acoustical tiles from a drop ceiling to expose original tongue and groove ceiling planks enhanced the heritage of the building, an important factor to residents, while economically answering the need for code compliant materials and finishes. The next step is to work with the community to refine the design for implementation.

The opportunities for professional development in this study lie in the focus on rural community development and adaptive reuse. Working with the community to create a design conducive to their needs provides a framework for future participation in community development work.

Presentation Number 189

ABSTRACT:

Abstract Title:	**Do Health Apps on Mobile Devices Really Work?**		
Presenter:	Cassondra Noyen		
Mentor:	Yujung Nam	**Campus:**	Pullman
Major:	Communication- COM		
Category:	Humanities		

In this day and age, health applications are becoming more and more prevalent in the lives of many people. While we can keep track of our caloric intake and manage the amount of exercise we complete daily, 20% of smartphone users have one or more health applications that help them track or manage their health. Researchers wonder if people auditing their daily caloric intake and outtake of calories really works. I am curious to know how many people have had successful, healthy weight loss while using a health application. As part of my own research, I have completed a 10 week trial of recording all of the food I had consumed and exercise I had completed. After 10 weeks I had lost 7 pounds going from 150 pounds to 142 pounds. My findings can justify that health applications do work and that weight loss can be accomplished successfully, But does this apply to the majority?

In the next year, 500 million smartphone users worldwide will be using some kind of health application. With their growing popularity it questionable as to whether or not these applications will be beneficial to our health. Some even wonder if they can do more harm than good. This topic is worth researching due to its potential to remarkably change people's health for better or for worse. I am interested in researching more about this topic not only for myself but for the benefit of others. This research project will outline a practical guide for health application users to evaluate the selections and effective available applications.

Presentation Number 190

ABSTRACT:

Abstract Title:	**Identification of a Locus Corresponding to the Enhanced Response to Abscisic Acid, ERA8, Gene of Wheat (*Triticum aestivum L.*)**		
Presenter:	Samantha Beck		
Mentor:	Shantel Martinez	**Campus:**	Pullman
Major:	Agricultural Biotechnology- CAHNRS		
Category:	Molecular, Cellular, and Chemical Biology		
Co-Authors:	Shantel A. Martinez, Oluwaseyi Shorinola, Cristobal Uauy, and Camille M. Steber		

Preharvest sprouting (PHS) is the germination of mature wheat grain on the mother plant when cool and wet conditions occur before harvest. PHS causes severe losses for wheat growers. Lack of seed dormancy accounts for 60-80% of PHS susceptibility. The *ERA8* mutation was selected for increased sensitivity to the dormancy hormone abscisic acid (ABA), resulting in increased seed dormancy and PHS tolerance. The goal was to identify *ERA*8-linked molecular markers for genomic selection during breeding. A backcross (BC) population called Zak/*ZakERA8* and a Recombinant Inbred Line (RIL) population called Louise/Zak*ERA*8 were characterized for sensitivity to the germination-inhibiting hormone ABA. Lines were classified as having either wild type-like (Zak or Louise) or Zak*ERA*8-like ABA sensitivity. Quantitative Trait Locus (QTL) analysis of the Louise/Zak*ERA*8 RIL population was conducted in R/qtl using nucleotide differences identified by genotyping by sequencing (GBS). A total of 56 significant ($p<0.05$) QTLs were identified, and 28 had a logarithm of the odds (LOD) score of 5.0 or higher. It was unclear which locus corresponded to the *ERA8* mutation because multiple loci from both the Louise and Zak genetic backgrounds impacted germination capacity on ABA. Thus, *ERA8* was mapped using bulk segregant analysis of the backcross population, where *ERA8* was the only segregating gene impacting germination on ABA. The Zak*ERA8* line differs from Zak as a result of EMS mutagenesis, which generated G to C transitions that were identified by sequencing of coding region DNA purified by exome capture. The *ERA8* mutation was mapped to one chromosomal region that contained a QTL of LOD 5.71 in the Louise/Zak*ERA8* population. The Louise/Zak*ERA8* RIL population was used to fine map the *ERA8* mutation to a 10.6 centimorgan region using single nucleotide polymorphisms (SNPs) identified in the bulked segregant analysis. *ERA8* has been crossed into wheat breeding lines to increase preharvest sprouting tolerance. The *ERA8* SNP markers identified by this project are currently being used for rapid genomic selection in breeding lines. Future research will need to define the mechanisms by which the *ERA8* mutation increases ABA sensitivity, seed dormancy and PHS tolerance in wheat.

Presentation Number 191

ABSTRACT:

Abstract Title:	**Exercise Intervention Study on First Generation Students**		
Presenter:	Daniel Delgado		
Mentor:	Christopher Connolly	**Campus:**	Pullman
Major:	Sport Science- EDUC		
Category:	Social Sciences		
Co-Author:	Christopher Connolly		

The rise of non-physical activity in society has caused many health problems in the United States and around the world. Individuals who do not exercise regularly or reach the national standards tend to have more health problems ranging from physical and physiological problems. This study intends to target First Generation College students that are not physically active and have an intervention study that helps these students get physically active to the national standard, 150 minutes a week. This study will track the participant's anxiety and physiological stress as well as the student's grades from a physically active semester compared to the non-physically active semester. This study will acquire participants from three different cohorts: freshman, sophomore and junior college students. This study results intend to support that regular exercise will help relive physiological stress and anxiety as well as helping first generation students improve their academics.

Presentation Number 192

ABSTRACT:

Abstract Title:	**Pharmacogenomics of Propofol Metabolism by Cytochrome P450 Enzymes in Dogs**		
Presenter:	Marie Andresen		
Mentor:	Michael Court	**Campus:**	Pullman
Major:	Zoology- CAS		
Category:	Molecular, Cellular, and Chemical Biology		
Co-Author:	Michael Court		

In veterinary medicine, there is much variability in responses of dogs to anesthesia. Some dogs, particularly Greyhounds and other sighthound breeds of dogs, tend to have prolonged recovery to commonly used anesthetics including propofol. The overall goal of this research is to identify the genetic variants causing slower metabolism of propofol in dogs. Propofol is metabolized in the liver primarily by a family of enzymes called cytochrome P450 (CYP) enzymes. These enzymes oxidize propofol, adding a hydroxyl group to the compound and turning it into "4-hydroxypropofol", which is then further converted into metabolites that can be eliminated by the body. It is hypothesized that CYP2B11 is the CYP most responsible for metabolizing propofol to 4-hydroxypropofol, and lower propofol hydroxylation activity in dog liver microsomes is correlated with variant polymorphisms in CYP2B11. Experiments were conducted measuring the rate of propofol metabolism by recombinant cytochrome P450 enzymes and the liver microsomes of 59 different dogs that had been genotyped for the H1 (wild-type), H2, and H3 CYP2B11 alleles. The rate of propofol metabolism was quantified by measuring the appearance of 4-hydroxypropofol peaks in the HPLC after a 10-minute incubation with propofol and an NADPH cofactor in a 37°C water bath. Recombinant CYP2B11 was found to be the most active CYP in the metabolism of propofol. There was a significant difference in the rate of propofol metabolism by dogs with different CYP2B11 haplotypes ($p=0.049$). The absence of the wild-type CYP2B11-H1 allele was associated with a significantly lower rate of propofol metabolism compared to individuals possessing at least one wild-type H1 allele ($p=0.0134$). There was also a significant difference in propofol metabolism by breed, with Greyhounds, mixed breeds, and Hounds having lower rates of metabolism than Labrador Retrievers, Chihuahuas, and Beagles ($p<0.001$). These results indicate that the absence of wild-type CYP2B11 alleles is associated with slower metabolism of propofol in dogs, which can be dangerous during surgical procedures. It is important to understand which genotypes are associated with slower metabolism of anesthesia in order to choose a drug that is better received by the patient, improving surgical outcomes.

Presentation Number 193

ABSTRACT:

Abstract Title:	**Maternal Models in Early China**		
Presenter:	Heather Heidenreich		
Mentor:	Lydia Gerber	**Campus:**	Pullman
Major:	Nursing- CAS		
Category:	Social Sciences		

The central question this research paper addresses is, whether there is a difference between the roles of widowed, married, and single mothers as described in the chapter of Maternal Models in the collection of women's biographies *Exemplary Women in Early China* by Liu Xiang, and what these texts teach us about mothers of China before the Han dynasty? I answered this question by first analyzing in depth three biographies, a biography of a married mother (Ding Jiang a lady of Wey), of a single mother (Jiang Yuan the mother of Qi), and widowed mother (Jing Jiang of the Ji lineage of Lu) that I thought illuminated the best model of each category. I then provided background information on what was expected of Chinese women at the time as described in three traditional texts, The Three Obediences, The Way of the Wives, and The Way of the Mother. I also described how traditional China saw the unique bond between mother and child in order to demonstrate the circumstances these women lived in. By analyzing all this information, I was able to conclude that all these women appeared to be different in regards to circumstance but in reality they were all similar due to their high morals and values that not only improved the lives of the men surrounding them, in particular those of their sons, but also their communities. These women were not only the nameless heroes of this time, but they were ultimately recognized by Liu Xiang, the book's author, for their leadership qualities and actions. These actions not only gave them a unique kind of power over the men in their lives but also allowed them to exceed their expected roles as women in a time where men appeared to dominate society.

Presentation Number 194

ABSTRACT:

Abstract Title:	**Comparison of Two Housing Systems and Dairy Calf Physiological Responses During Hot Weather**		
Presenter:	Heather Young		
Mentor:	Amber Adams-Progar	**Campus:**	Pullman
Major:	Animal Sciences- CAHNRS		
Category:	Organismal, Population, Ecological, and Evolutionary Biology		
Co-Author:	Amber Adams-Progar and Adriana Lopez Ayala		

Dairy calves are susceptible to heat stress when environmental temperatures exceed 68°F. Heat stress conditions cause decreases in feed intake and calf health. The objective of this study was to compare the behavior and well-being of Holstein heifer calves housed in two different housing systems during hot weather. This study was conducted over the course of two summers (Trial 1 and Trial 2). At the age of 24 - 48 hours, calves were assigned to one of two treatments: 1) housed in stalls in a barn (S; n = 14) or 2) housed in hutches placed outside (H; n = 8). Each calf was observed until weaning at 42 d of age. Temperature and relative humidity within the housing systems were recorded at 1-hour intervals using data loggers (HOBO®) and used to calculate the temperature humidity index (THI). Calf body temperatures were measured hourly using temperature recording devices (iButton®). Calf BW were measured weekly and ADG was calculated. Blood samples were collected at 7, 24, and 42 d of age via jugular venipuncture and analyzed for thyroxine concentrations using enzyme-linked immunosorbent assays. Data were analyzed using Pearson's correlations and mixed model ANOVAs with repeated measures. No differences between trials were detected so data was combined. The THI was significantly lower in hutches (63.79 ± 0.20) than in stalls (66.44 ± 0.16; $P < 0.0001$). Calves housed in hutches had higher body temperatures (S: 38.59 ± 0.008 °C; H: 38.92 ± 0.01 °C; P < 0.0001), ADG (S: 0.6 ± 0.04 kg/d; H: 1.1 ± 0.06 kg/d; P < 0.0001), and tended to have higher plasma thyroxine concentrations (S: 15.83 µg/dL; H: 16.37 ± 0.22 µg/dL; $P = 0.08$) than calves housed in stalls. Although the higher THI found in hutches led to higher calf body temperatures, these effects did not negatively impact calf growth. Future studies may investigate how calf behavior is affected by hot weather in these housing systems.

Presentation Number 195

ABSTRACT:

Abstract Title:	**Exploration of the Site-Pairing Preference of Framework Aluminum in ZSM-5 from its Reaction with Trimethylgallium**		
Presenter:	Kyle Groden		
Mentor:	Jean-Sabin McEwen	**Campus:**	Pullman
Major:	Chemical Engineering- CEA		
Category:	Engineering and Physical Sciences		
Co-Authors:	Renqin Zhang, Susannah Scott, and Jean-Sabin McEwen		

ZSM-5 is a zeolite catalyst marked with great versatility in catalytic application as a result of its flexibility in cation incorporation. Due to this property, the structure of ZSM-5 has been under question for its ability to accept divalent cations, implying that the substituted aluminum sites exist in paired configurations at specific locations within the zeolite framework. Trimethylgallium was used to probe these sites, as the dimethyl gallium fragments that exist in these locations following impregnation were thought to bind to nearby fragments via terminal methyl groups. Experimental extended x-ray absorption fine structure (EXAFS) spectroscopy data support this bridging configuration due to the presence of potential gallium-gallium scattering signals. Zeolite cluster models were created containing potential sites for aluminum pairings with dimethyl gallium fragments with optimized geometrical conformations obtained from first principles calculations based on density functional theory (DFT) using the Vienna Ab-initio Simulation Package (VASP)[1,2]. As methyl bridged gallium structures were found to be unfavorable, additional cluster and periodic models were constructed to explore the possibility of carbon-hydrogen bond cleavage due to the reactivity of the methyl groups bound to the gallium centers. This reaction results in a methylene (CH_2) group joining the gallium centers in contrast with the methyl bridges previously hypothesized. X-ray absorption near edge spectra (XANES) were computed using CASTEP[3], another DFT-based program, for many of these configurations for comparison with experimental results. The agreement between the gallium-gallium bond distances and spectral results from our calculations and those measured experimentally imply that paired aluminum sites are indeed present within the ZSM-5 architecture.

References:

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Presentation Number 196

ABSTRACT:

Abstract Title:	**Phenotypic Plasticity as an Explanation of Invasive Success**		
Presenter:	Madison Armstrong		
Mentor:	Mark Dybdahl	**Campus:**	Pullman
Major:	Biology- CAS		
Category:	Organismal, Population, Ecological, and Evolutionary Biology		
Co-Authors:	Mark Smithson and Mark Dybdahl		

Invasive species and populations pose major threats to biodiversity and cause extensive ecological disruption and economic damage (Lee, 2002). The question remains how invasive populations attain their success in so many novel environments, and one prominent explanation is phenotypic plasticity where genetically identical individuals develop varying traits in different environments (Fierst 2011, Lande 2015). Theory suggests plasticity should be greater at early stages of invasion, but there is not empirical evidence about how trait plasticity evolves and varies during invasion. To address this gap in our knowledge, I am studying the New Zealand mudsnail (*Potamopyrgus antipodarum)* and plasticity in shell shape at different stages of invasion. This is a successful invader of the western US and Great Lakes regions, but these populations are genetically uniform (US 1 clonal type). Nevertheless, shell shape is adapted across populations to different environments (water current speed and depth) (Kistner and Dybdahl 2013, 2014), suggesting plasticity. Here, I documented shell shape variation between old populations (Snake River ID) in large fast-flowing rivers and young populations in large fast rivers (MI) and small slow streams (WI). I surveyed phenotypic diversity and shell shape variation within the US 1 clonal type in three different sites: ID, MI and WI. These shell shape differences are quantified with simple measures of shell length, width, and width of the shell opening (aperture). I collected snails from the natural populations (n=30 per population). I will then move into studying how these differences in phenotype can affect an individual's fitness in different environments, as well as how establishment time can affect phenotypic plasticity. My hypothesis is that recently founded populations on the periphery of the core invasion, such as WI and MI, are going to deviate more among individuals of the same genotype in shell shape and size than those from the old population. I expect that variation in water flow will induce greater phenotypic plasticity in young versus old population.

Presentation Number 197

ABSTRACT:

Abstract Title:	**Step-count Accuracy of Physical Activity Monitors during Pregnancy in Free-living Conditions**		
Presenter:	Jordana Dahmen		
Mentor:	Christopher Connolly	**Campus:**	Pullman
Major:	Biology- CAS		
Category:	Applied Sciences		
Co-Authors:	Christopher P. Connolly and Alexander H. K. Montoye		

Previous studies have assessed the validity and reliability of physical activity monitors worn by pregnant women under laboratory conditions. However, physical activity monitors have not been assessed under free-living pregnancy conditions. PURPOSE: 1) Determine the step-count accuracy of four commercially-available physical activity monitors worn by pregnant women under free-living conditions and 2) examine the effect of pregnancy trimester on monitor accuracy. METHODS: Participants were pregnant women (n=28) in their second or third trimesters who were 18-40 years of age and free of contraindications to exercise during pregnancy. Participants wore three consumer-grade activity monitors (FB, OM, NL) and two research-grade activity monitors (AG, SW) for three days of free-living activity during all waking hours. Steps recorded over the three days for the FB, OM, NL, and AG were compared to SW recorded steps (the criterion measure) in order to calculate percentage of actual steps taken ([measured steps / actual steps] x 100). Paired-samples t-tests were performed to determine differences in accuracy between monitors and one-way ANOVAs were utilized to determine whether pregnancy trimester affected monitor accuracy. RESULTS: The analytical sample consisted of 18 women in their second trimester and 10 women in their third trimester with an overall mean gestational age of 23.9 ± 8.19 weeks and a mean daily step-count of 9354.3 ± 3363.9 steps (as determined by SW). Steps taken per day did not significantly differ between second and third trimester women ($F(1, 26)=0.69$, $p=0.42$). The FB and NL were most accurate with mean percentage of actual steps taken recorded at 69.9% and 69.5% respectively. The AG ($t(27)=-3.13$, $p<0.01$) and OM ($t(27)=-6.27$, $p<0.001$) performed significantly worse with 62.7% and 52.1% of actual steps. Trimester did not significantly affect monitor accuracy. CONCLUSION: Compared to the criterion, all other monitors underestimated actual steps taken, with the FB and NL demonstrating smaller underestimations than the AG and OM in a free-living environment. Accuracy of these monitors appears to be worse during pregnancy free-living conditions compared to results of studies performed in controlled laboratory conditions.

Presentation Number 198

ABSTRACT:

Abstract Title:	**Examining the Impact of Mindfulness on Physical Activity Enjoyment**		
Presenter:	Hailey Cates		
Mentor:	Anne Cox	**Campus:**	Pullman
Major:	Sport Science- EDUC		
Category:	Social Sciences		
Co-Authors:	Anne Cox, Madeline Roberts, and Amanda McMahon		

Background:" Physical activity is an important aspect of a healthy lifestyle, yet many individuals do not participate in exercise. One of the reasons for not participating may include negative feelings associated with the interoceptive cues that accompany exercise such as increased heart rate, increased respiration and muscle activation. Research shows that as interoceptive cues become more pronounced an individual has a more associative attentional focus, forcing them to pay attention to their body, which can lead to increased displeasure for those who do not enjoy exercise. Mindfulness has become a new area of research that has shown promising results in increasing enjoyment in moderate physical activities such as yoga. In this study, we investigated the effects of mindfulness to see if overall enjoyment could be increased in low intrinsically motivated participants performing a moderate bout of treadmill walking.

Methods: Participants included thirteen females and one male who reported being moderately active with low intrinsic motivation toward exercise through screening surveys. The individuals completed a graded exercise test to determine 65% of their heart rate reserve (HRR), and then two other exercise sessions consisting of a control and experimental condition. During the experimental condition, participants listened to a mindfulness track engaging them in non-judgmental awareness of their body as they performed ten minutes of walking on an incline. The subjects were asked to report whether their focus was overall more associative or dissociative throughout the exercise, as well as their experience of enjoyment while walking.

Results: One Way ANOVA results showed significantly ($p<0.5$) higher associative attention in the control condition compared to the mindfulness condition (F (1,13) = 34.95), p = .00). Mindfulness of the body (F (1,13)=11.97), p = .00) and overall enjoyment (F (1,13)=7.45), p = .02) were significantly higher in the control condition compared to the experimental condition; mindfulness of the mind (F (1,13)=.09), p = .77) did not differ significantly between the control and experimental conditions.

Conclusion: The results of this study demonstrate that low intrinsically motivated individuals may experience increased enjoyment by practicing mindfulness techniques during exercise.

Presentation Number 199

ABSTRACT:

Abstract Title:	**Facebook and Food Advertisement**		
Presenter:	Hyeongyu Kang		
Mentor:	Yujung Nam	**Campus:**	Pullman
Major:	Communication and Society- COM		
Category:	Humanities		

Facebook is the largest company among social network site companies; about 12 billion people use Facebook in the world. Facebook's typical feature is likes, when a user click like button, the user's friends can see the post in their timeline. Thus, people don't have to read a newspaper because there are many posts caused by people's friends. Some popular posts are images or videos of babies, foods, and celebrities. Furthermore, large number of people accept a post's story unconsciously and even they don't know it was written by a commercial company. Especially food videos have lots of indirect advertisement, it goes to people's awareness automatically when watching the food video. Food is a sort of fundamental desire for people, so Facebook users would stop mostly on food video which fully stimulates people's appetite. In order to understand what makes people have an attention to a food video, a survey will be conducted to investigate what aspects of a video type makes it fascinating. The research question is appearing famous celebrities in a food video, inform you how to make it, and show it is very delicious is more effective to pay attention to people and bring profits for the advertisement company. Hypothesis is that people who feel hungry would like to watch food video via Facebook. They are likely to watch and accept the video more unconsciously without any critical thinking about advertisement.

Presentation Number 200

ABSTRACT:

Abstract Title:	**Isolating Secretory Cells from the Female Reproductive Tract Using Tamoxifen on Female Mouse Model**		
Presenter:	Keila Tam		
Mentor:	Wipawee Winuthayanon	**Campus:**	Pullman
Major:	Microbiology- CVM		
Category:	Molecular, Cellular, and Chemical Biology		
Co-Authors:	Shuai Li and Wipawee Winuthayanon		

The Oviduct is a tubular structure in the female reproductive system that allows for the transport of gametes and provides the site for fertilization. The two major types of cells in the epithelial layer of the oviduct are ciliated and secretory epithelial cells, which are responsible for embryo transport and the production of proteins required to support the embryo development, respectively. The goal of this experiment is to develop a mouse model that will allow researchers to target and isolate secretory epithelial cell populations. Having isolated cell populations would be useful in a variety of applications such as protein isolation or the profiling of RNA transcription in secretory epithelial cells and can improve our overall understanding of the cell biology of the oviduct. To develop this mouse model, secretory cell specific promoter-driven Cre (Ovgp1-tamoxifen inducible Cre) mice were bred with RiboTag (hemagglutinin (HA)-tagged on the ribosomal protein 22) mice to produce a conditional expression of HA-tag in the secretory epithelia cells of the female reproductive tract that was detected by HA antibody. The resulting OVGP1Cre-RiboTag cross expresses the HA-tagged protein in the oviduct secretory cells. Mice are mated during the estrous cycle and the produced litter will be genotyped and selected for the correct genotype. At 2-3 months of age, tamoxifen is injected into the intraperitoneal cavity to activate the Cre. After 3 weeks the oviduct is removed for analysis. Hematoxylin and eosin staining was used to determine the histology and morphology and detect any physical differences between tamoxifen- and vehicle-treated animals. To confirm the HA expression, immunofluorescent staining was used to validate expression of HA by the secretory cells in the oviduct. Histological analysis revealed no difference between the tamoxifen- and vehicle-treated mice, which indicates that tamoxifen did not alter the morphology of mouse oviducts. The IF staining indicated that oviductal secretory cells expressed the HA protein and were abundant in the isthmus region of the oviduct only in the Cre-expressing tamoxifen-treated animals. We concluded that this mouse strain would be useful for isolating secretory cell populations in the oviduct, which will be a great asset for future studies.

Presentation Number 201

ABSTRACT:

Abstract Title:	**Phylogenetic Comparisons and Genetic Variation in Brown Bears (*Ursus arctos*)**		
Presenter:	Allegra Sundstrom		
Mentor:	Joanna Kelley	**Campus:**	Pullman
Major:	Biology- CAS		
Category:	Organismal, Population, Ecological, and Evolutionary Biology		
Co-Authors:	Joanna Kelley and Michael Saxton		

To help preserve heterozygosity in dwindling populations that suffer from severe habitat fragmentation, phylogenetic trees allow us to analyze the genetic similarity between any two individuals to assess genetic diversity. When considering reintroduction, and other management decisions, it is important to consider genetic variation in order to avoid fixation or loss of any particular alleles and maintain polymorphism. Techniques in computational genomics can be applied to genomic data to support conservation and management efforts. We compare RNA-sequencing data from six captive brown bears (Ursus arctos) at the Washington State University Bear Center with sequences from five extant and one extinct bear species. This exploratory study involved assembling and annotating the mitochondrial genome of the six individuals using an assembly pipeline (ARC) a de novo genome annotator (MITOS). Gene sequences for all other bears were collected from the NCBI GenBank database. Using the phylogeny inference package (PHYLIP), we were able to produce phylogenetic trees to analyze the mitochondrial variation between the captive and wild individuals. Combining this comparison with additional genetic diversity measures, including phylogenetic diversity and heterozygosity, will give wildlife managers more information regarding natural variation in wild and captive populations. From a conservation standpoint, it is essential to characterize population differentiation in order to maximize genetic diversity and avoid the elimination of specific alleles.

Presentation Number 202

ABSTRACT:

Abstract Title:	**War On Drugs**		
Presenter:	Elaine Chumley		
Mentor:	Charles Weller	**Campus:**	Pullman
Major:	Psychology- CAS		
Category:	Social Sciences		

In 1971, former President Richard Nixon coined the phrase "War On Drugs" which started a race war within the boarders of the United States of America that continues to this day. This study will focus on how various eras produced a lasting mentality on specific drugs in direct relation to ideas of race and culture. From Britain's opium wars to 1938's *Reefer Madness*, a stigma has been attached to those who use these drugs, not only individually, but racially. When Coca Cola first came out, many important figures supported, and even became spokespeople, for this popular drink. Coca Cola's highly addictive, flavored syrup was in American's homes across the nation. Cocaine didn't seem to be a problem until lower class, black Americans started to use it and created crack. Police started to patrol the black communities in order to maintain order of crack, which had become very popular in these poor communities. This resulted in a higher amount of policing in the area, meaning more and more people of color were being targeted and arrested. Similar trends are observable with marijuana and heroin, which in the process of being targeted by the War On Drugs, became closely tied to black people and communities. Drawing on historical and sociological methodology rooted in primary and secondary source material with a specific focus on cocaine, marijuana and heroin, this study will trace the historical and sociological roots of the connection between the war on drugs, race, and incarceration rates in the U.S. predominately focusing on 1965-Present.

Presentation Number 204

ABSTRACT:

Abstract Title:	**Food Safety Knowledge and Food Handling Practices Assessment Across Washington State**		
Presenter:	Mirza Rachmat		
Mentor:	Stephanie Smith	**Campus:**	Pullman
Major:	Food Science- CAHNRS		
Category:	Applied Sciences		
Co-Authors:	Rachael Beck and Stephanie Smith		

According to The United States Food and Drug Administration (FDA), there are 48 million cases of foodborne illness per year, and 1 in 6 Americans are sickened by foodborne illness each year (FDA 2016a). Recent food recalls, and a steady rate of foodborne illnesses, has led to focusing on consumer food handling practices in an effort to reduce foodborne illnesses. This study was focused on understanding consumer food safety knowledge and food handling practices across the state of Washington. The questions on the survey were developed based on previously published consumer questionnaires, and food safety information websites from FDA, Centers for Disease Control (CDC), and United States Department of Agriculture (USDA). Additional questions were developed to focus on needs specific to consumers within the State of Washington. The survey was conducted at farmers' markets, and state and county fairs across Washington State. We obtained completed surveys from 375 people from 20 different counties across Washington state. Consumers self-reported engaging in safe food handling behaviors 73.74% of the time. However, a large percentage of consumers did not use a meat thermometer (51.48%), defrosted frozen food on the counter (42%), did not pick up chilled foods at the end of grocery shopping (68%), and did not use a refrigerator thermometer (66%), and did not keep food well-spaced in the refrigerator (68.61%). Internet searches and social media were the most preferred source of food safety and handling information. Compared to national surveys, Washington State's consumers have similar lack of key food safety knowledge. These results highlight the need for continued consumer food safety education. The results also indicate that movement towards web-based education may be more effective than traditional methods at improving consumer food handling practices.

Presentation Number 205

ABSTRACT:

Abstract Title:	**The Synthesis of Glow in the Dark Amino Acid Organic Dyes**		
Presenter:	Jordan Fernandez		
Mentor:	Zachariah Heiden	**Campus:**	Pullman
Major:	Chemistry- CAS		
Category:	Engineering and Physical Sciences		
Co-Authors:	Ian A. Kieffer, Robert J. Allen, and Zachariah M. Heiden		

The development of organic fluorescent dyes has become a great interest for biological, industrial, and environmental applications. Organic fluorescent dyes are biologically compatible, offer a wide range of photo-physical properties, and have the ability to act as proton acceptors and donors. The implementation of organic fluorescent dyes is attractive because they also have the potential to conduct oxidation/reduction chemistry. Oxidation/reduction chemistry is essential for many mechanisms in the body. While oxidation/reduction chemistry is important in biological mechanisms, oxidation/reduction chemistry can be harmful as well, such as the generation of free radicals. The accumulation of free radicals is potentially linked to a variety of cancers since the reactivity can damage cell membranes, proteins, and most importantly, DNA. In order to control the concentration of free radicals in biological media, the utilization of an organic boron-based fluorescent molecule will be employed as an "antioxidant." The use of this organic boron-based fluorescent dye is of particular interest because the organic boron-based fluorescent dye is already used as a light activated therapy for cancer and as colorful glowing sensors for harmful anions (e.g. cyanide) and heavy metals (e.g. lead). The synthesis of amino acid derivatives of these organic fluorescent boron-based dyes offers potentially unique reactivity in oxidation/reduction chemistry and photo-physical properties that has never been explored before. This poster will discuss the synthesis, photo-physical properties, and oxidation/reduction chemistry of the amino acid organic boron-based fluorescent dyes.

Presentation Number 206

ABSTRACT:

Abstract Title:	**To Have Your Cake and Eat It Too: Preventing Damage from Preharvest Sprouting in Wheat**		
Presenter:	Katie Hayward		
Mentor:	Camille Steber	**Campus:**	Pullman
Major:	Genetics and Cell Biology- CVM		
Category:	Molecular, Cellular, and Chemical Biology		
Co-Authors:	Stephanie Sjoberg and Camille M. Steber		

Farmers suffer from serious losses when the wheat crop is damaged by preharvest sprouting, the germination of mature grain on the mother plant due to untimely rain. Prehavest sprouting causes the induction of alpha-amylase, an enzyme that breaks down the starch stored in the seed to be used as fuel for the germinating seedling. This degradation of starch lowers the quality of the flour for use in baked goods. Alpha-amylase activity was measured using either the Hagberg-Perten Falling Number test or the Phadebas enzyme assay. A lower Falling Number indicates higher alpha-amylase activity. The Falling Number tests is the industry standard for measuring damage from amylase, but requires more material (7 g) than an enzyme assay (0.2g). While many wheat breeding programs base selection for preharvest sprouting tolerance on the appearance of visible sprout in the spike wetting test, spike-wetting test data does not always correlate well with the Falling Number test. Our hypothesis is that some varieties have lower FN/higher alpha-amylase than expected for a low sprouting score because they induce alpha-amylase early in the germination process, before the seedling begins to emerge from the grain. To test this, we examined the induction of alpha-amylase activity over a germination time course in 'Bruehl', a cultivar prone to very low FN despite the fact that it does not germinate rapidly in spike wetting tests. Wheat grains were frozen at time points during the germination process, and their alpha-amylase activity measured using the Phadebas enzyme assay. This will allow us to examine the timing of alpha-amylase induction relative to the timing of germination. Interestingly, alpha-amylase activity was detected within the first eighteen hours of water uptake, before the seed visibly germinated. After eighteen hours, the alpha-amylase activity plateaued. Future work will examine if varieties that tend to have higher FN/lower alpha-amylase activity induce alpha-amylase activity later in the germination process, possibly after visible germination of the grain. This approach should provide a valuable tool to select varieties with a better Falling Number scores following rain events in the field, and thereby protect farmers from losses.

Presentation Number 207

ABSTRACT:

Abstract Title:	**The Role of Women among Barefoot Doctors**		
Presenter:	Tabitha Farthing		
Mentor:	Lydia Gerber	**Campus:**	Pullman
Major:	Nursing- CAS		
Category:	Social Sciences		

This paper examines the barefoot doctors program, which loosely spanned the date range of 1965 to 1983. This policy was implemented by Mao Zedong in order to provide rural areas in China with medical access by educating selected individuals from these communities. I analyzed and synthesized a variety of recent sources, each with a different focus, as well as the program's primary training and reference resource, *A Barefoot Doctor's Manual*. I specifically discuss the role of women in the barefoot doctors program and how it was portrayed in propaganda posters and films. I describe how the movement affected the position of rural women in China and the overall impact it had on China's healthcare system. My project is significant because it contributes to our understanding of this little known program in Chinese history, which temporarily revised the healthcare system, improving health outcomes for female patients in particular, established a model for future generations, and gave rural women an opportunity for leadership and economic advancement.

Presentation Number 208

ABSTRACT:

Abstract Title:	**RF Modulation Interference at LIGO Hanford**		
Presenter:	Daniel Cain		
Mentor:	Cigdem Capan	**Campus:**	Tri-Cities
Major:	Electrical Engineering- CEA		
Category:	Engineering and Physical Sciences		

Background: The Laser Interferometer Gravitational-wave Observatory (LIGO) must monitor many environmental variables to eliminate noise and false positive detections. Radio signals are one of these variables, as they can interfere with LIGO's electronic laser controls. LIGO uses a wideband antenna and four radio receivers to monitor these radio signals. However, because the receivers still output very high frequencies, LIGO cannot accurately digitize their received radio signals, limiting the effectiveness of their radio monitor. To improve this, they requested a circuit that could measure radio signal power and output a signal representing the measurement which could be accurately digitized.

Requirements:

- The power meter should accurately measure all frequencies up to 30MHz
- The meter's output signal should not exceed 8kHz in frequency
- The meter's output voltage should be 0–2V
- The meter's design should use ports and connectors that work with LIGO's existing systems

Results:

After several unsuccessful prototypes, a design using the AD835 voltage squaring chip from Analog Devices showed promising accuracy and reliability. Unlike most Radio Frequency (RF) power meters in the industry, this meter had a non-logarithmic output, because it simply squared and averaged the input, without converting to a logarithmic scale. LIGO was very interested in this feature because it would give them the raw power data from the radio receivers, without requiring any extra data processing. During testing, LIGO's receiving antenna was found to be broken. It was quickly replaced, which LIGO greatly appreciated.

Unfortunately, the ratings of the AD835 limited its dynamic range to the point where it could not detect very small radio signals. Due to time constraints, the original design was put on hold in favor of an existing power meter configuration already being used by LIGO. This configuration had very high accuracy and dynamic range, but produced a logarithmic output, which is why it was not the first choice. Four identical channels of this final configuration were implemented and tested on a custom printed circuit board (PCB); the final design met all above requirements.

Presentation Number 209

ABSTRACT:

Abstract Title:	**Effects of a High Stress Environment During the Larval Stage on Post-metamorphosis Behavior in Wood Frogs (*Lythobates sylvaticus*)**		
Presenter:	Kyle Dorosh		
Mentor:	Erica Crespi	**Campus:**	Pullman
Major:	Zoology- CAS		
Category:	Organismal, Population, Ecological, and Evolutionary Biology		
Co-Authors:	Krysta Dawson, Travis Seaborn, and Erica Crespi		

It is hypothesized that the amount of stress experienced during early life could affect the expression of behaviors during later life stages, as conditions during brain development could affect cognitive function. In our study, we tested whether exposure to a high stress environment during the larval stage had effects on post-metamorphosis behavior in wood frogs (*Lythobates sylvaticus*). We studied animals from four populations that varied in water quality and presence of toxins from nearby oil sands mines in the Athabasca region of northern Alberta. We collected juveniles from each population to assay their behavior, but we also collected eggs from each population and let them develop in artificial ponds of standardized conditions (i.e., "common garden," high water quality, few predators) at WSU. Each field-collected or common garden juvenile was subjected to two behavioral assays: 1) a 15-min open field assay used to assess fearfulness/boldness, and 2) 5-min response to a visual predator cue. In each assay, all behaviors were scored from videos and statistically compared using cluster analysis (to identify personality types) and using ANOVA to detect population-level or field/common garden differences in behavior. In the open field assay, we were able to discriminate between fearful and bold animals by the time they took to first movement, time spent near the edge of the arena, and hopping, but we did not see a higher frequency of either personality types among populations or whether individuals were reared in the field or in artificial ponds. In our predator exposure assay, we found that there was no difference in frequency of behaviors across populations, but animals collected from the field spent more time in open space and waited longer to move when a snake cue was present (i.e., a hold still anti-predator strategy) than in the area without this stimulus. By contrast, animals reared in common garden artificial ponds did not show different behaviors with or without a predator cue. These findings did not support our prediction that water quality would affect post-metamorphic behavior, but exposure to predators as larvae was associated with context-dependent modulation of behavior after metamorphosis.

Presentation Number 210

ABSTRACT:

Abstract Title:	**Sustainable Use on the Palouse: Improving the Understanding and Education of Sustainability through a Water Resources Perspective in the Palouse Region**		
Presenter:	Rebecka Bence		
Mentor:	Allyson Beall King	**Campus:**	Pullman
Major:	Environmental & Ecosystem Sciences- CAHNRS		
Category:	Applied Sciences		
Co-Authors:	Melanie Thornton and Allyson Beall King		

In the Palouse Region, drinking water is provided solely from the Grande Ronde and Wanapum aquifers. The Grande Ronde is a confined aquifer and unsustainable pumping practices have been a concern to both the Pullman and Moscow communities since the 1960s. This region has worked collaboratively to address bi-state water management through the Palouse Basin Aquifer Committee and the Palouse Water Summit. The Palouse Water Summit is a regional forum where members of academia, industry, government, tribes, non-governmental organizations, and interested citizens come together to talk and learn about their regional water resources. This study aims to utilize survey data collected from attendees at the 2013-2016 Water Summits to gain an understanding of local stakeholder perspectives of water and sustainability prospects specific to the region. This study includes a comprehensive literature review to identify what it means to be sustainable in the Palouse Basin. A regional sustainability framework was developed, specifically focusing on Washington State University. Longitudinal participant survey data was analyzed from the Palouse Basin Water Summit from 2013 to 2016 to evaluate and assess attendees' understanding and their values associated with water resources in the Palouse. Statistical analysis was conducted using questions and responses to understand how stakeholders' perspectives and knowledge on hydrologic resources have changed over time related to four categories: security, predictability, knowledge, and social norms. Results show unchanging values and perspectives, yet an increase in understanding. In addition, results show that values and preferences vary by sector, as faculty, students, and NGOs appear to align more closely in values compared to governmental and industry representatives. The findings from this work will aid in the development of recommendations to improve water management, education, and policy in the Palouse Region.

Presentation Number 211

ABSTRACT:

Abstract Title:	**A Clash of Cultures: The West vs. Islam**		
Presenter:	Christaldo Rodriguez		
Mentor:	Charles Weller	**Campus:**	Pullman
Major:	History- CAS		
Category:	Humanities		

Since the existence of man, this world has always been plagued by conflict. In today's time one of the main contemporary issues we have is the conflict between the Western powers (such as the U.S, Britain, and Russia) and Middle Eastern Muslim countries. This issue is mainly due to the subject matter of a clash of cultures/religions. I feel many people are misinformed about Islam which brings out islamophobia into individuals and groups of people which is expected. People are naturally scared/weary of things they have no knowledge about or have been given biased information on. This leads to people painting a broad brush on individuals and groups of people, in this case the religion of Islam. A way we can find peace between the two sides is to better understand each culture and find some common ground. The way I will go about this research is by viewing both sides' opinions/views of one another and pointing out the truths and the wrongful convictions of Islam. Our newly appointed president is only making relations worse and I feel will only get worse unless we try and educate the population. This war has only bred more hatred towards each opposition and will continue to do so. My main goal is to serve as an arbiter and be able to explain the issue so well that it opens people's perspectives and be more accepting towards Islam.

Presentation Number 212

ABSTRACT:

Abstract Title:	**Design of a Rapid, Inexpensive Sensor for Biomarker Molecules**		
Presenter:	Olivia Ranft		
Mentor:	Bernard Van Wie	**Campus:**	Pullman
Major:	Chemical Engineering- CEA		
Category:	Engineering and Physical Sciences		
Co-Author:	Bernard Van Wie		

Within the medical diagnostic field, there is a pressing need for rapid, sensitive assays to detect small concentrations of biomarker molecules indicative of serious conditions such as cancer and coronary artery disease. Current detection methods for cells and proteins generally take hours or days, are labor intensive and/or require expensive equipment. The current research focuses on the development of a dual ionophore ion selective electrode (di-ISE) device, a unique biosensor that produces a rapid, electronic signal in response to a minute concentration of a cell or protein of interest. The device utilizes the principles of ion transport across membranes via carrier molecules called ionophores. The di-ISE has two chambers, each with a separate synthetic membrane and different ionophores. In the presence of an ion concentration gradient, an equilibrium voltage caused by continuous ion transport across both membranes is measurable with an electrode. When a ligand specific to the cell of interest is embedded in one of the membranes and a cell is captured, ion transport across a fraction of the membrane is blocked, leading to a measurable voltage change. This device has already been shown to be effective for the detection of prostate circulating tumor cells (PCTCs) and streptavidin, a common protein, but can be adapted to detect any number of biomarker molecules. The di-ISE provides a response time of about ten seconds, is inexpensive to build and easy is to operate. Therefore, with further development, the di-ISE will be a valuable tool for use in point-of-care diagnostic medicine. This presentation explores current work to optimize the device for detection of PCTCs in whole blood, and envisioned future work to adapt the device for detection of C-reactive protein, a molecule indicative of heart disease and post-operative infection.

Presentation Number 213

ABSTRACT:

Abstract Title:	**Development of a Chromosome-wide Genetic Linkage Map for *Puccinia striiformis* QTL in a Doubled-haploid Wheat Population**		
Presenter:	Kaitlin Miller		
Mentor:	Arron Carter	**Campus:**	Pullman
Major:	Agricultural Biotechnology- CAHNRS		
Category:	Molecular, Cellular, and Chemical Biology		
Co-Authors:	Arron Carter and Yukiko Naruoka		

Yellow rust (*Puccinia striiformis* Westend. f. sp. *Tritici* Erikss.) is an economically important fungal disease of wheat. Wheat production may be affected by the overall weakening of the plants due to the fungal infection, resulting in the production of smaller and fewer kernels per spike. Infections occur annually in the Pacific Northwest, where complete yield losses may result in susceptible cultivars. Some varieties demonstrate resistance to yellow rust; the fungal infection elicits systemically acquired resistance (SAR) responses more rapidly in resistant compared to susceptible varieties. Since resistant varieties are the primary means of control growers favor, introduction of multiple effective resistance genes into cultivars will provide more durable resistance. The objective of this research was to identify molecular markers linked to effective resistance genes in the PNW in a winter wheat doubled haploid population of 136 individuals developed between Bitteroot (resistant) and WA8115 (susceptible). DNA of individual lines was extracted, and 90,000 single nucleotide polymorphism (SNP) markers were assayed on the population. After identifying polymorphic markers which were assigned to specific chromosomal positions, approximately three thousand were used to develop a linkage map using MapDisto version 1.7.7.0.0.1. In addition, the molecular marker used to identify alleles associated with *Yr17* was ran on the population and incorporated in the map. Genotype data was analyzed alongside phenotype data, which included infection severity and incidence derived from field experiments, using Windows QTL Cartographer version 2.5 to identify marker-phenotype associations. It was confirmed through the QTL analysis that *Yr17* is a gene effective against natural field rust races in the Pacific Northwest. It was also determined that markers *IWB17029*, *IWB15227*, and *IWB18107*, also found on chromosome 2A, are associated with genes responsible for rust resistance. While chromosome 2A contained multiple markers associated with resistant phenotypes, significant QTL were identified on chromosomes 3A and 6B associated with field resistance. The results from this project suggest that combining the identified QTL into a single cultivar could enhance its durability to rust under field conditions. Identified markers will assist breeders in introgressing these genes into new breeding material.

Presentation Number 214

ABSTRACT:

Abstract Title:	**Deficit Irrigation and the Effects on Vegetative Growth and Fruit Quality within Jazz Apples**		
Presenter:	Gilberto Camarillo		
Mentor:	Matthew Whiting	**Campus:**	Pullman
Major:	Fruit and Vegetable Management- CAHNRS		
Category:	Applied Sciences		

Apple crops (*Malus domestica*) are the largest commodity crop within Washington State, as they are the crop with the greatest value of production. During a four month research project at an Allan Bros Orchards, three irrigation treatments were given to the Jazz cultivar to determine the effects of water deficit irrigation. The intention of a water deficit irrigation trial is to control vegetative growth while reducing an orchards water usage. Field data began in late May and was collected up until harvest in late October. The deficit irrigation slightly decreased fruit size when compared to control. Shoot growth was noticeably decreased in the water deficit treatments. Post-harvest analysis of the apples was conducted in a lab with their respective treatments. The lab quality analysis depicted similar results between both the control and deficit treatments when looking at Starch Index, Brix (Soluble Solids), Mass, and Firmness. Fruit color was the highest among the control treatments and decreased thereafter. The results from the apple water deficit trials on Jazz apples were similar in terms of fruit quality when compared to the control treatments. In addition, the field results indicated a decrease in vegetative growth among the tree's shoots, while having minimal effects on the fruit size and quality. The results from this study proposes new possibilities for apple growers to reduce water usage on irrigated apple crops.

Presentation Number 215

ABSTRACT:

Abstract Title:	**Suicide Prevention Education: Policies for Health Care Professionals across the United States**		
Presenter:	Sara Van Natta		
Mentor:	Janessa Graves	**Campus:**	Spokane
Major:	Nursing- CON		
Category:	Social Sciences		
Co-Authors:	Janessa Graves and Carrie Holliday		

Over forty thousand people die by suicide across the U.S. each year, and an estimated 90% of suicide cases had been evaluated by a health care professional within three months preceding their death. Suicide is a significant preventable public health concern, and healthcare professionals are in optimal positions to identify at-risk patients. However, healthcare professionals are seldom equipped with the skills to assess, manage, and prevent suicide. To address this gap and reduce suicide rates in the U.S., states have started to establish suicide prevention plans and legislation mandating suicide prevention training for certain healthcare providers.

This aim of this research was to identify and compare statewide policies for suicide prevention training across the U.S. and benchmark the policies against national recommendations set by the Surgeon General and the National Action Alliance for Suicide Prevention. State legislation databases were searched to identify policies, which were then described and characterized by date of enactment, target audience, duration, and frequency of the training. Descriptive statistics were used to summarize results. We constructed national maps using Tableau software to visually depict policies and variation across the country. Across all states, only 7 have passed legislation that mandate healthcare professionals to complete suicide prevention training, 3 states have policies in place that encourage training, and 37 have a state suicide prevention plan that has been revised since 2012. The findings from this research will inform legislation development and can contribute toward catalyzing change for states that lack comprehensive policies for suicide prevention education.

Presentation Number 216

ABSTRACT:

Abstract Title:	**Community Efforts to Improve People Walking in a Small Town**		
Presenter:	Alfredo Rosas		
Mentor:	Kathleen Ryan	**Campus:**	Pullman
Major:	Landscape Architecture- CAHNRS		
Category:	Arts and Design		

Pedestrian-friendly main streets provide many benefits, from health, safety, community engagement, and even revenue. In this community there are issues and concerns that deal with a busy highway bisecting the middle of their city. Designers are able to provide possible solutions to issues such as pedestrian access and vehicular movement in a diverse community.

In the case of Mattawa, Washington; a small growing agricultural city in Grand County, pedestrian-friendly main streets would improve the traffic flow of vehicles to and from work, accommodate for large vehicle bypass, pedestrian access, and student safety to and from school/other activities, and a better connection between businesses and community. To further develop the ideas and address concerns the community had, Berger Partnership PS provided a student designer with professional perspectives through an internship. The internship allowed identification of details of design and broadened visons for the community through professional practice.

Through a co-design process at workshops with the community, the issues, ideas, and vision were displayed. The community expressed concerns orally for all to hear and delegate, and visually through graphic drawings on sketch paper. Business owners, The Mayor, school staff, engineers, and concerned community members allow for a diverse view on all issues affecting the city, allowing issues and concerns with the busy highway to be identified easier. Mattawa, being an agricultural city has a large Chicanx population, and most of the community speaks Spanish. Bi-lingually communicating with the community demonstrates positive feedback, through the sharing of knowledge, concerns, and multiple perspectives.

The project/design began with identifying the concerns and issues the community had with the highway bisecting their town. Through multiple workshops solutions were developed to help the community became more defined. The information was shared with the engineering firm and a landscape architect firm who provided an internship to help further develop the project and identify solutions to the issues presented by the community. Working with a community with diverse ideas is difficult; communicating in a different language to effectively relate and help others understand possible solutions, but also valuing the knowledge and concerns for each member.

Presentation Number 217

ABSTRACT:

Abstract Title:	**Asymmetric [2+1+1] $M(CO)_2$ (M = Re, ^{99m}Tc) Fluorescent Radiopharmaceuticals**		
Presenter:	Travis Holloway		
Mentor:	Paul Benny	**Campus:**	Pullman
Major:	Chemical Engineering- CEA		
Category:	Engineering and Physical Sciences		
Co-Authors:	Benjamin B. Kasten, Laura H. Davies, Charlotte Hepples, Charles L. Barnes, Lee J. Higham, Paul D. Benny		

In diagnostic imaging of clinical disease, imaging probes (radioactive, MRI, X-ray) consist of a single modality that provides either resolution or sensitivity. Combining two or more imaging techniques (multi-modal) into a single imaging probe provides the capability to obtain both resolution and sensitivity. Used in ~90% of clinical Single Photon Emission Computed Tomography (SPECT) scans, the radionuclide ^{99m}Tc ($t_{1/2}$ = 6 hrs, γ = 140 keV) provides a high sensitivity probe but has lower resolution than MRI or optical methods. By combining a highly fluorescent imaging probe that provides resolution with ^{99m}Tc, a new series of multi-modal imaging probes with high resolution and sensitivity could be prepared. A new class of BODIPY fluorophores has been modified to incorporate directly into the complex $^{99m}Tc(CO)_3(OH_2)_3^+$. The photophysical properties of BODIPY display highly fluorescent quantum yields and an excitation range outside of naturally luminescent cells in tissue, thus making it ideal for multi-modal applications.

However, though BODIPY dyes display these traits, many have shown poor *in vitro* stability. Therefore, this study works to show increased *in vitro* stability on a derivative BODIPY ligand by complexion to a metal species.

Two different BODIPY analogues based on ^{99m}Tc and Re were synthesized and examined. The compounds were prepared from a tricarbonyl metal core with the ligands picolinic acid and BODIPY in the 2+1 complex, while the 2+1+1 complex involved picolinic acid, BODIPY, and PPh_3 ligands. A novel photolysis method was utilized to liberate the non-labile carbonyl and allow for coordination of the BODIPY ligand in the 2+1+1 complex. Due to the radioactive nature of ^{99m}Tc, Re analogues were used as models and characterized by NMR, IR, MS, X-Ray Crystallography, UV/Vis, Fluorimetry, and Elemental Analysis. To confirm the formation of ^{99m}Tc species, retention time on a standard HPLC method was utilized against its Re analogue. Amino acid assays were used to test the stability of ^{99m}Tc complexes against cysteine and histidine competing ligands. The test showed that the 2+1 complex had 88% stability after 18h, and the 2+1+1 species had >99% stability after 18h. Thus, the novel BODIPY complexes were proven stable *in vitro*.

Presentation Number 218

ABSTRACT:

Abstract Title:	**Epithelial Estrogen Receptor Alpha: Critical for Vaginal Squamous Cell Differentiation**		
Presenter:	Jacob Lizarraga		
Mentor:	Wipawee Winuthayanon	**Campus:**	Pullman
Major:	Microbiology- CVM		
Category:	Molecular, Cellular, and Chemical Biology		
Co-Authors:	Shuai Li and Wipawee Winuthayanon		

Background: Estrogens are steroid hormones primarily secreted from the ovaries. Estrogens biological effects are exerted through estrogen receptor alpha (ERa) and beta (ERb) proteins, in response to compensate physiological need. The vagina is mainly expressing ERa and one of estrogen targeted tissue. The vagina serves as a passage way for both semen to enter the reproductive tract. Vaginal lumen is lined by non-keratinized stratified squamous epithelium which is lubricated by mucus produced in the cervical glands and aids in the passage of semen through the vagina and into the cervix. It is known that estrogen- mediated actions in the female reproductive system are regulated through the ERa. However, the specific function of ERa in the vaginal epithelial cell during squamous cell differentiation remains unclear.

Goal: The objective of our study was to determine the role of the epithelial ERa in the vagina during squamous cell differentiation after seminal deposition.

Methods: In this study, we used mouse model, in which ERa was specifically ablated from the vaginal epithelial cells (called conditional knockout; cKO) in comparison to their control littermates (called wild-type; WT). We extracted vaginal tissues from cKO and WT females approximately 8 hours after mating. These tissues were then preserved using fixative agents, embedded into paraffin wax, and then cut into 5-µm sections. The tissues were then stained with hematoxylin and eosin and analyzed with a microscope to detect morphological differences. Further staining was performed using immunohistochemistry to validate the ERa deletion. Then, Ki67 antibody staining was performed to determine epithelial cell proliferation.

Results: We found that the cKO mice lacked stratified epithelium while the WT mice had a thick layer of stratified cells. In addition, cKO females had a significantly ($p<.05$) higher ratio of proliferated epithelial cells to basal cells compared to that of the WT mice. However, WT mice had a significantly ($p<.0001$) thicker epithelial layer than that of the cKO tissues. From these findings we were able to conclude that the ERa is crucial for proper squamous cell differentiation and stratification in the epithelium of the vagina.

Presentation Number 224

ABSTRACT:

Abstract Title:	**Can Farming Save Wild Bee Species?**		
Presenter:	Abigail Cate		
Mentor:	David Crowder	**Campus:**	Pullman
Major:	Agricultural Education- CAHNRS		
Category:	Organismal, Population, Ecological, and Evolutionary Biology		
Co-Authors:	Elias Bloom and Rachel Olsson		

An ongoing collection of bee species collected from small urban and rural organic farms in Western Washington have been stored in ethanol over the course of about three years. Previous pollen analysis studies have removed pollen samples from pollinators that have been stored dry, and because of this a different approach to the methodology of pollen extraction for analysis needed to be created. By extracting this pollen from the bee samples, it was then available for further identification of which plant species it originated from. Pollen samples were removed from plant species in order to create a reference library of pollen samples to refer to when deciphering the pollen removed from the pollinator samples. The reference library and pollinator collected pollen can be analyzed and used to visualize differences in pollination based on the landscape context in-which the agro-ecosystem was embedded.

In addition to the aforementioned methods, I looked at plant-pollinator visitation networks which show every interaction between a plant and pollinator, whether or not it resulted in pollination. The visitation network matrix created from the Western Washington farms reflected the number of observed interactions between categorized bee morpho-groups and plant groups. The pollen analysis study will eventually show us a more accurate network matrix on the actual number of pollination services which occurred in these agro-ecosystems than the visitation network. The successful methods developed from this research will aid in future research to finally result in a plant-pollinator network for several urban and rural farms in Western Washington.

Presentation Number 225

ABSTRACT:

Abstract Title:	**Cultural Heritage Integrated into Home Design for the Sauk-Suiattle Indian Tribe**		
Presenter:	Taylor Lynch		
Mentor:	Kathleen Ryan	**Campus:**	Pullman
Major:	Architectural Studies- CEA		
Category:	Arts and Design		

The Sauk-Suiattle Indian Tribe of Darrington, WA is faced with challenges from natural disasters, marginal infrastructure, and a growing population. The goal of Rural Communities Design Initiative (RCDI) is to create a conceptual design for a village expansion that will address their increasing needs. A major part of this project is designing housing that meets cultural and family traditions.

The Sauk-Suiattle Indians were once known as the Sah-ku-mehu. They travelled over mountains to gather food and supplies, and found sustenance on the water, travelling to harvest fish and shellfish. Today, they maintain their heritage by canoeing and fishing in the Sauk River. But the Sauk River also threatens the tribe's sovereign land as yearly floods direct it closer and closer to their homes. They are down to one of the three original longhouses, lack communication resources, are outgrowing their small poorly-built homes, and have a waiting list of families who want to "move home". This expansion will allow the tribe to remedy many of the tribe's long-term challenges.

Tribal members participated in a two-day co-design workshop with design students where they discussed the pros and cons of housing within their community. After concerns were recognized in large group discussions, tribal members worked in smaller groups to discuss their ideas in depth and provide a more thorough understanding in order to detail important issues in design of their homes.

Tribal members were very eager to participate and excited to share ideas about what would work best for the unique needs of their community. Though preference on appearance for new homes varied, tribal members agreed that large homes were of highest priority to address the need for their multi-generational families.

Three main housing requirements were addressed: 1) Transitional housing; 2) Large family homes for multi-generations; and 3) Elder housing. Emphasis was placed on multi-functional community gathering spaces, parks to accommodate varying ages, edible gardens, and walking trails. The information shared was beneficial in directing the next step in creating the housing and community plan for the Sauk-Suiattle Indian Tribe.

Presentation Number 226

ABSTRACT:

Abstract Title:	**Quantitative Comparison of Classical and Quantum Mechanical Random Walks of Non-interacting Particles**		
Presenter:	Cassandra Phillips		
Mentor:	Doerte Blume	**Campus:**	Pullman
Major:	Physics- CAS		
Category:	Engineering and Physical Sciences		

Classical mechanics is deterministic while quantum mechanics is probabilistic. This work compares one-dimensional classical and quantum mechanical random walks. In the classical random walk, the particle either goes left or right at each time step. In the quantum random walk, in contrast, the particle has a 50% chance to go left and a 50% chance to go right. Our simulations confirm that the quantum system spreads faster than the classical system. Since the quantum system can out-perform the classical system, the quantum system can be considered a resource. In a realistic system, decoherence causes a portion of the quantum particle to act classically. This work discusses a simple model to treat the docoherence and compares the spreading of the quantum particle without and with decoherence. A long-term goal of this work is to include interactions between particles. Quite generally, the simulations might be relevant for high-precision measurements conducted in a gravity-free environment, such as NASA's cold atom micro-gravity laboratory on the International Space Station.

Presentation Number 227

ABSTRACT:

Abstract Title:	**Effect of Zika Virus Strains on the Mortality Rate of *Drosophila melanogaster***		
Presenter:	Samuel Adera		
Mentor:	Alan Goodman	**Campus:**	Pullman
Major:	Biochemistry- CVM		
Category:	Organismal, Population, Ecological, and Evolutionary Biology		

Zika virus is an RNA virus that is transmitted through direct blood contact. Zika virus is mainly transmitted through a vector mosquito, Aedes aegypti. Zika virus is well known because it causes microcephaly in infant babies. The main objective of this experiment is to determine if different Zika virus strains have an effect on the mortality rate of Drosophila melanogaster. To accomplish this, control Drosophila melanogaster flies (strain w1118 flies) were injected with three different strains of Zika virus namely MR766, IBH 30656, Paraiba. While the MR766 strain was isolated from a rhesus monkey in Uganda in 1947, the IBH30656 and Paraiba strains were isolated from febrile humans in Nigeria in 1968 and in Brazil in 2015, respectively.

To accomplish the goal of the experiment control D.melanosgaster were age matched to 2-7 days and injected using a nanoinjector. The flies were injected with 23 nL of each Zika virus strain, resulting in 200-4000 injected virions per fly. The flies were then monitored for 30 days and the vials were changed with new food every three days. After the experiment a mortality curve was constructed and the p value was calculated. Since the P-value was greater than 0.05, the null hypothesis was not rejected. That is, different Zika virus strains did not affect the mortality rate of the control w1118 flies.

Since control flies did not succumb to Zika virus infection, we hypothesize that mutant flies lacking important immune regulators may be susceptible to Zika virus infection. It has previously been shown that only mice lacking interferon receptors succumb to Zika virus infection. Since Drosophila melanogaster and Aedes aegypti, a natural Zika virus host, contain genes with similar function and sequence, we can use the results that will be obtained from mutant flies to determine the host genes involved in the immune response that makes them susceptible to Zika virus. Zika virus is a pandemic disease and is currently a serious concern due to the absence of vaccination that makes the experiment significant to society.

Presentation Number 228

ABSTRACT:

Abstract Title:	**The Effects of Immigration and Tourism on Hawaii's Unique Culture, Economy, and Ecosystem**		
Presenter:	Brittany Cummings		
Mentor:	R. Charles Weller	**Campus:**	Pullman
Major:	Wildlife Ecology & Conservation Sciences- CAHNRS		
Category:	Social Sciences		

In the early 1700's the rise of European exploration and the close proximity to Japan brought both European and Japanese immigrants to the islands of Hawaii, followed by the rest of the diverse cultural groups that make up its population today. Since the early 1900's the islands have been heavily advertised as a paradise, home to an indigenous people with a unique culture to be explored. Across the 20th century, the spread of advertising coupled with technological advances in air travel caused an influx of tourists, disrupting and changing life in Hawaii. Because of these developments, there currently are many ill feelings towards both foreign residents and tourists visiting Hawaii today. Although generating most of the income in the state's economy, tourists in particular are producing much of the waste, destroying the ecosystem, and sometimes being disruptive to the society. On the Big Island alone, tourism sectors surveyed for a study done in 2013 account for 21.7% of the island's total energy consumption, 44.7% of the island-wide water consumption, and 10.7% of the island-wide waste generation – just one portion of the 6 million tourists who visit the state annually. This unrest comes from a deep history spanning several centuries but has also created a unique, new culture full of the welcoming "aloha spirit." Employing research methods from the disciplines of history, sociology, economics, political science and environmental science and drawing from both primary and secondary, documentary and non-documentary sources as well as personal experience and interviews, this presentation will highlight the complex history and resulting economic, environmental and social benefits and detriments shaping Hawaii's present and future destiny. Placing this study of Hawaii within the broader global tourist industry, it will argue that the tension between benefit and detriment which hallmarks Hawaii's tourist industry, while ultimately unsolvable, must nonetheless be closely monitored and managed in order to maximize the benefit while minimizing the detriment.

Presentation Number 229

ABSTRACT:

Abstract Title:	**Incorporating X-ray Fluorescence into Undergraduate Chemistry Curriculum**		
Presenter:	Justin Allen		
Mentor:	Ursula Fittschen	**Campus:**	Pullman
Major:	Chemistry- CAS		
Category:	Engineering and Physical Sciences		
Co-Author:	Ursula Fittschen		

In the chemistry field there are many types of chemical analysis methods and instruments that are used. While some techniques such as mass spectroscopy are familiar to undergraduate chemistry students, some are more obscure such as x-ray fluorescence. X-ray fluorescence (XRF) is an elemental analysis technique that utilizes x-rays. XRF analysis has some advantages over other analytical methods and is not a technique most chemistry students are exposed to. Recently the Fittschen research group received an AmpTek Exp-1 x-ray fluorescence instrument and wish to incorporate it and XRF methods into the undergraduate chemistry instrumental courses at Washington State University. The research preformed involves determining the limitations of the instrument and developing a laboratory experiment to be performed by undergraduate chemistry students.The experiment involves using the XRF instrument to determine the qualitative and quantitative composition of metal alloy samples.

Presentation Number 233

ABSTRACT:

Abstract Title:	**Co-expression of Castor LPCAT with Castor DGAT2 Leads to a Reduction of Hydroxy-Fatty Acid Accumulation in Arabidopsis seeds.**		
Presenter:	Brendon Myers		
Mentor:	Daniel Lunn	**Campus:**	Pullman
Major:	Microbiology- CVM		
Category:	Molecular, Cellular, and Chemical Biology		
Co-Authors:	Daniel Lunn and John Browse		

Unusual fatty acids have unique chemical and physical properties of great importance in many industrial applications. Unfortunately, the native species in which these molecules naturally occur are often unsuited for large scale agronomic production. One such modified fatty acid is ricinoleate (hydroxy-fatty acid, HFA), an important lubricant. This lipid, produced in castor (Ricinus communis), is synthesized by hydroxylation of oleate (18:1) at the delta-12 position. After synthesis, HFA is incorporated into lipids, primarily the storage lipid triacylglycerol (TAG) in castor seed, where it is located in the oil bodies. Several attempts to produce HFA in the model plant Arabidopsis or the crop Camelina sativa have achieved accumulation reaching 30% of the total seed oil. However, this is still far short of the 80% produced by castor or the 40% required for commercial viability. Research into the metabolic changes occurring in Arabidopsis expressing the fatty acid hydroxylase enzyme from castor showed that inefficient incorporation of HFA caused feedback inhibition of acetyl-CoA carboxylase, leading to reduction in overall fatty acid synthesis. The principle strategy employed to increase HFA accumulation has centered on identification and expression of co-evolved TAG biosynthesis enzymes from native HFA-accumulating plants. One such target for this co-evolution is LPCAT, an enzyme which cycles 18:1 into phosphophadidylcholine (PC) the site of hydroxylation. Here we show that by co-expressing castor LPCAT with a castor DGAT2 the accumulation of HFA is reduced. These data give crucial insights to the interplay between these enzymes in their native species.

Presentation Number 234

ABSTRACT:

Abstract Title:	**"The Past is the Future": Availability and Access to Fresh Food in Whitman County**		
Presenter:	Stephanie Hust		
Mentor:	Joseph Hewa	**Campus:**	Pullman
Major:	Human Development- CAHNRS		
Category:	Social Sciences		
Co-Authors:	Rayna Sage and Joseph Hewa		

Availability and access to affordable fresh produce is a challenge facing many residents in Whitman County. In an effort to understand the scope of the issue facing those who live in the rural parts of the Palouse region, we collaboratively created a garden group at the food pantry in Colfax, Washington and invited the members to participate in a Photovoice project (Wang & Burris, 1997). Using disposable cameras as a research tool, participants visually documented their efforts related to acquiring fresh produce. Collectively, participants shared their stories related to rural poverty and access to fresh food through photos and captions.

The Photovoice project participants included pantry visitors, organic farmers, and community advocates. Three action themes emerged during the research process:

1) We challenge ourselves to create a better quality of life by growing our own food, despite the difficulties;

2) This is our home. We want to share in the bounty of our region and give back to it by caring for our land;

3) We want to support local individuals and organizations who work tirelessly to bring healthy food to our rural communities.

Hilary, a participant and mother of a child with diet restrictions, shared a photo and described its significance: “This is a picture of a mileage sign on the way to my house. Distances to travel to food sources are a challenge for rural communities.” Captions like Hilary's help tell a unique story of the struggles facing low-income individuals in Whitman County.

This research took place through CAHNRS as a paid internship opportunity that lasted through the 2016 summer semester. Dr. Rayna Sage and Joe Hewa, clinical assistant professors in Human Development, supervised the project and the results of our research are on display at the Colfax Food Pantry. Local organizations that supported our efforts were Washington State University, the Council on Aging and Human Services, Backyard Harvest, the Palouse Fresh Food Project, and Runner Bean Ranch.

References:

Wang, C., & Burris, M. A. (1997). Photovoice: Concept, methodology, and use for participatory needs assessment. Health Education & Behavior, 24(3), 369–387.

Presentation Number 235

ABSTRACT:

Abstract Title:	**EnCity - WSU Solar Decathlon**		
Presenter:	Camren Richards		
Mentor:	Darrin Griechen	**Campus:**	Pullman
Major:	Communication and Society- COM		
Category:	Arts and Design		
Co-Authors:	Timothy Goheen, Michael Perry, and Annalisse Miller		

The need for efficient energy use has become necessary in recent years due to industrial advances, growing world population, and resulting environmental impacts. The U.S. Department of Energy focuses on combating these challenges with efficient energy sources, environmental sustainability, innovative technology and scientific solutions. To better accomplish their goal, they created the Solar Decathlon.

The Solar Decathlon is a collegiate competition that challenges student teams to design and build, solar-powered houses. WSU has been chosen as one of 13 teams to compete in the 2017 competition. As the only university from the Pacific Northwest, we aim to demonstrate how to live efficiently despite limited access to daily sunlight.

EnCity is designed to place multiple tiny homes on a single lot in order to share water, electricity, and other material resources such as a clubhouse and electric vehicle. Community living is an innovative way to efficiently utilize different energy sources that often go to waste in traditional housing developments. A smart grid allows these tiny homes to share energy to account for ebbs and flows in solar generated power. The homes will be constructed from flat packed parts that can be easily installed on urban lots that already exist, reusing settled land instead of further impacting the environment by building developments. Since sunlight is not always a dependable source year-round in the PNW, EnCity will employ a battery system with solar panels and a local grid tie to store energy for the times of the year it might need a boost. The water systems utilized in this design will use rainwater collection and water recycling techniques to ensure water in the home is repurposed in multiple ways on the property.

With events, home walkthroughs, exhibits, and school visits, WSU's team will address energy problems with education. The competition is an opportunity for consumers and homeowners to experience the latest technologies and materials in energy-efficient design, clean energy technologies, smart home solutions, water conservation measures, electric vehicles, and sustainable buildings. The WSU Solar Decathlon team will showcase EnCity in Fall of 2017 in Denver Colorado.

Presentation Number 236

ABSTRACT:

Abstract Title:	**Quantifying the Accuracy of Landsat in Estimating Reservoir Water Surface Area**		
Presenter:	Lambert Ngenzi		
Mentor:	Alex Fremier	**Campus:**	Pullman
Major:	Environmental & Ecosystem Sciences- CAHNRS		
Category:	Applied Sciences		

Water is a crucial resource for food production in semi-arid regions of the world, such as parts of West Africa. Thus, the management of water storage plays a critical role in human well-being. In this research, we are trying to understand the dynamics (temporal and spatial) of water storage in small reservoirs in the Volta Basin by using remotely sensed imagery. We know that Google Earth images are more accurate than Landsat images, but Google Earth has only been collecting data for the last fifteen years. However, the Landsat program has collected more than three million images for about forty years. First, we will assess the accuracy satellite images (Landsat 7 and 8) by comparing them to available aerial photography (Google Earth). We will quantify how accuracy changes with soil color, latitude and size of reservoir for a period of time ranging from 2000-2016. A detailed accuracy assessment will improve our ability to estimate changes in storage across semi-arid regions of the world in an effort to inform water resources management, especially in developing countries such as Ghana and Burkina Faso. In addition, we hope to detect changes in water quantity by assessing the impact of the local communities and their activities in these small reservoirs in the Volta Basin.

Presentation Number 237

ABSTRACT:

Abstract Title:	**Predicting an Impurity Atom's Site Preference in an Intermetallic Compound Using Miedema's Method**		
Presenter:	Andrew Bleasdale		
Mentor:	Gary Collins	**Campus:**	Pullman
Major:	Physics- CAS		
Category:	Engineering and Physical Sciences		
Co-Author:	Gary S. Collins		

Intermetallic compounds exist in definite arrangements of atoms known as "lattices". The atoms arrange to minimize the interaction energies of all the atoms, whose sum is the cohesive energy. When an impurity, or solute, atom enters a compound, it settles at the location that minimizes the total energy of the modified system. The goal of this study was to devise a simple method to predict the preferred site of a given solute in an intermetallic compound.

In the 1970's Andries R. Miedema developed a semi-empirical model to calculate cohesive energies of intermetallics. His model was based on the concept that macroscopic properties of solids derive from atomic properties of the alloy constituents such as atomic volumes and electronegativities. It has been widely applied to determine cohesive energies of compounds as well as quantities such as the formation energy of vacancies (missing atoms in a lattice) and the energy of an isolated solute in a pure metal host. This model is now extended to determine energies of an impurity atom placed at different lattice sites in an intermetallic. The site having the lowest, most negative, energy is the predicted site. As a check on the approach used here, cohesive energies of pure intermetallics were also calculated and found to be in excellent agreement with results obtained by others using a different implementation of the Miedema method.

The computational scheme was applied to 140 combinations of systems for which experimental or computed site preferences are available. The model has been found to correctly predict the preferred lattice site of a solute when the magnitude of the difference in site-energies is greater than ~30 kJ/mole of solute. This is not as accurate as desired, and suggests fundamental limitations of the Miedema model. However, the model is still moderately useful to predict site preferences when the difference in calculated site energies is sufficiently large. An application has been written for Windows personal computers that implements the calculation for rapid prediction of site preferences.

Presentation Number 238

ABSTRACT:

Abstract Title:	**Reading Fashion: Interpreting Women's Status in the United States from Fashion Magazines**		
Presenter:	Jake Klees		
Mentor:	Jennifer Thigpen	**Campus:**	Pullman
Major:	History- CAS		
Category:	Humanities		
Co-Author:	Jake W. Klees		

This research project investigates the relationship between U.S. women's fashion, as displayed in fashion magazines, and women's status in American society and culture. This project examines popular women's fashion from 1920-1960. Over the course of this 40-year span, women's fashion magazines can be used to interpret the *flapper* style of the 1920s, depression *femme fatale* style, the pin-up models in World War II, as well as the New Look of the late 1940s and 1950s, all in the greater cultural context of American society. Fashion ads and popular styles, mainly from Vogue magazine, are compared over the course of each decade in conjunction with secondary source literature on women's status, to discern how these fashion styles implicitly assign women a societal role. This method can always be used to interpret the status of American women in society. Additionally, this research project examines how, as fashion styles change over time, the ideal female form is continually redefined, forcing women to fit into a certain mold that is deemed "beautiful" by society. Specifically, fashion from 1920-1960 displays women's improving status beginning in 1920 until World War II, and the decline of women's freedom and status following World War II until 1960.

Presentation Number 239

ABSTRACT:

Abstract Title:	**VR Architecture: A Novel Approach to Experiential Design**		
Presenter:	Said Al-Shidhani		
Mentor:	Genell Ebbini	**Campus:**	Pullman
Major:	Architectural Studies- CEA		
Category:	Arts and Design		

Architectural design development in the 21st century presents increased complexities as the industry integrates more computer-generated immersive experiences. The incorporation of Virtual Reality (VR) systems in architecture offer an interactive environment and an efficient method of presenting concepts leading to an advanced process of co-exploration and decision making. The resulting project, 'Majlis Beta Version,' showcases modern architecture and interior cultural design in Oman presented in VR to demonstrate the educational benefits of interactive digital environments.

The benefits of VR as a medium to present architecture and interior design is showcased in a computer-generated detailed model of a community center in Oman, called Majlis. The project was developed using Rhinoceros 5 as the design platform and Unreal Engine 4 as the VR development software presented using the Oculus VR headset. To test the feasibility of VR systems in design education, the Alpha version of 'Majlis' demonstrates the ability of the user to change design components and freely move around the project as experienced by design educators, design and non-design students at the School of Design and Construction at Washington State University.

The test group demonstrated higher involvement levels and engagement with more senses being active during the VR presentation session resulting in the realization of more details and the detection of design problems compared to when presented with a physical model of the same project. VR presentations allowed more complex architectural solutions to be presented and experienced early in the design process surpassing the limitations of physical architectural modeling.

Presentation Number 240

ABSTRACT:

Abstract Title:	**The Key to Animal Welfare: Communication**		
Presenter:	Adriana Lopez Ayala		
Mentor:	Amber Adams-Progar	**Campus:**	Pullman
Major:	Animal Sciences- CAHNRS		
Category:	Humanities		
Co-Authors:	Amber Adams-Progar and Pedro Calderon-Hernandez		

Animal welfare is a hot topic in today's society. With the increasing scrutiny farmers face, they are seeking new opportunities to ensure quality animal care on their farms. The first challenge is on-farm communication. Over 50% of the workforce on dairies speak Spanish, which creates communication issues among dairy owners, managers, and employees. Furthermore, it is difficult to address the variety of learning styles among new employees through a single form of training. Most on-farm training programs tell new employees what to do, but do not focus on explaining why they perform specific tasks. The objectives of this project were to: 1) collaborate with a dairy farm owner and herdsmanager to create an outline of milking parlor procedures for dairy employees on their farm; 2) prepare a written script in English and Spanish; and 3) coordinate with videographers and dairy employees to produce a training video for new dairy employees. The video audio was recorded in Spanish, with English text to improve employee knowledge and understanding. The next step in this video development process is to collaborate with an animator to insert animations that further explain why specific tasks are important during milking, especially in regards to animal health, animal welfare, and employee safety. This video will be used for all new milking parlor employees at the cooperating dairy. Pre- and post-survey evaluations were developed and will be distributed during training to document the effectiveness of the video in educating new dairy employees. Training videos such as the one created during this project may greatly improve dairy employee comprehension and, in turn, increase consistency within the employee team and improve animal welfare.

Presentation Number 241

ABSTRACT:

Abstract Title:	**Low-cost desktop learning modules (DLMs)**		
Presenter:	Jameshia Rice		
Mentor:	Bernard Van Wie	**Campus:**	Pullman
Major:	Chemical Engineering- CEA		
Category:	Engineering and Physical Sciences		
Co-Authors:	Jeffrey Laube, Paul Golter, Bernard Van Wie, Thomas Jacroux, Jeffrey Laube, and Connor Appel		

In this project, low-cost desktop modules (DLMs) are being created that will help engineering students with understanding fluid mechanics and heat transfer. Fluid mechanics and heat transfer are areas of engineering science that are studied in many engineering professions like biomedical, chemical, civil and mechanical engineering. One DLM which is the focus of this presentation is the pressure loss system. This helps students to visually see that fluid occurs at a consent rate as it flows down a tube. This is a confusing concept for students ad many believe that wall friction causes the flow to decrease as fluid passes along the length of the tube. However, this would contradict the principle of conservation of mass, one of the fundamental scientific concepts under girding engineering. These DLMs were created by use of molds that were 3-D printing and with a vacuum forming process to shape plastic over the mold. The data that will be gathered in the project is on how effective these tools are inside of the classroom and the benefits it might have as well in the way of student motivation. These low-cost DLMs will help students to understand concepts that are often not easily understood without some visual examples.

Presentation Number 242

ABSTRACT:

Abstract Title:	**Developing High-quality, Low-cost Online Training Materials for Adult Learners**		
Presenter:	Megan Miller		
Mentor:	Catherine Daniels	**Campus:**	Pullman
Major:	Agricultural Education- CAHNRS		
Category:	Applied Sciences		
Co-Author:	Catherine Daniels		

Resources for internal programming are not as plentiful as they once were. One approach to doing more work with less money is to use virtual training through webinars (Vandenberg at al., 2011); another is through asynchronous modules (Robideau & Vogel, 2014). This research reports on the approach we used to refresh existing online training for university employees regarding these specific components outlined by our literature search results: (1) Need to Know—added clear statements of employee liability when working with pesticides during employment at WSU; (2) Self-concept—added a clear explanation of training content; encouraged viewers to pick and choose relevant training materials; (3) Prior Experience—gave a clear explanation of commonly misunderstood concepts; (4) Readiness to Learn—shortened training materials and added more visuals to better engage viewers; (5) Learning Orientation—added short videos, transcripts and podcasts to accommodate all learning styles; (6) Motivation to Learn—gave a clear explanation of how knowing the policy will better inform viewers' on-the-job decision-making.

A new online Pesticide Policy training package was created for Washington State University primarily by using *Adobe Spark*, *Audacity* and *SoundCloud*. These programs are free and can be used by anyone to create high-quality audio and visual forms of communication to educate adult learners. Although this subject matter focuses on a single university's policy, understanding how to refresh existing online content applies across extension programs. The three original modules, created in late 2012 by the WSU Pesticide Coordinator covered just the policy basics: using and recommending pesticides, organic pesticides, and using experimental pesticides. Additionally, links to the written policy were provided, as well as contact information for the Pesticide Coordinator for follow up Q&A. Run time for the three canned-lecture modules totaled approximately 36 minutes. The three updated modules, created in the summer of 2016, now consists of 16 informational posts, eight videos with PDF transcripts and eight podcasts that collectively reflect the same 36 minutes of original training content. Benefits to the viewers are that content is available using three different types of media, and meet ADA requirements.

Presentation Number 243

ABSTRACT:

Abstract Title:	**Soil Nitrate Quick Test to Optimize Nitrogen Management on Organic Farms**		
Presenter:	Tuong Vu		
Mentor:	Douglas Collins	**Campus:**	Pullman
Major:	Organic Agriculture Systems- CAHNRS		
Category:	Applied Sciences		
Co-Author:	Andy Bary and David Sullivan		

Managing nitrogen on organic farms is challenging because nitrogen mineralization from soil organic matter, crop residue, amendments, and fertilizers is a biologically-mediated process affected by temperature, moisture, soil texture, and management history. Nitrogen content and degree of decomposition of organic sources of nitrogen such as cover crops, compost, manure, and fertilizers also affects timing and rate of nitrogen mineralization of these materials. Being able to quickly quantify soil mineral nitrogen to direct mid-season sidedress fertilizer application can assist farmers to efficiently produce profitable harvests while effectively eliminating the leaching of nitrogen to the environment. A study was conducted at 5 organic vegetable farms across Washington State in 2016 to evaluate the efficacy of EM Quant™ quick nitrate test. Soil nitrate was evaluated using both the quick test and a traditional lab test at pre-plant, mid-season, and post-harvest at 5 sites and 5 fertilizer rates with 3 replications at each site (n=225). Quick test and lab test were strongly correlated (r^2=0.79), though Quick test over-estimated nitrate relative to the lab test. The effect of site and fertilizer rate on the relationship between quick test and lab nitrate tests were evaluated with analysis of covariance. Fertilizer rate did not affect the relationship, but site did ($p<0001$). Preliminary analysis suggests that the quick test more grossly overestimated soil nitrate in sites with finer-textured soils (loam and silt loam) than sites with coarser-texture soils (sandy loam and loamy sand). Results suggest that with correction to the quick test estimation, potentially specific to soil texture, these tests could be a great tool to help make mid-season nitrogen fertilizer decisions.

Presentation Number 244

ABSTRACT:

Abstract Title:	**Subharmonics on the Acoustic Violin**		
Presenter:	Kirill Polyanskiy		
Mentor:	Scott Blasco	**Campus:**	Pullman
Major:	Music Composition- CAS		
Category:	Arts and Design		

The physics of the violin indicate that a note only sounds at or above open string-pitch. The four strings on the violin are G3 (IV), D4 (III), A4 (II), and E5 (I) with G3 being the lowest and E5 being the highest. Traditionally, to play notes on the violin, one must either bow a selected open string, or place a finger down on the string for a sounding pitch above the note. The ranges of all four strings overlap going upwards, but not downwards. All pitches on IV are available on III, II, and I however, the color and timbre of the note changes when using a different string for the same pitch. E5 on IV sounds very dark and coarse whereas E5 on I sounds bright and squeaky.

I have written etudes, or technical studies which teach subharmonics to beginners and progress in order of difficulty from least difficult to most. I have also written a movement of a duet for cello and violin exploiting this extra range in order to have a violin play the same notes as a cello as if to mimic it, and at times play in unison below G3. This movement, I. Andante, from my piece with a working title of Duet No. 1 for Violin and Cello, was premiered last semester in the WSU Library Atrium Recital on Friday, Dec. 2 noon.