The COVID-19 pandemic has altered learning, campus life and community at Whitman in a way never experienced in the history of the college. The 22nd Whitman Undergraduate Conference is one of many major annual events canceled for the Spring 2020 term as Whitman transitions to remote learning and social distancing. Yet, as Rumi observed eight centuries ago, “Anything you lose comes round in another form.”

Think of this program, then, as a living chronicle that documents and honors the achievements of the 215 students committed to this year’s Undergraduate Conference. Appreciate the breadth of their work, from “Molecular Matters” to “Race, Identity and Autonomy” to “The Arts and Its Discontents.” Celebrate the 70 poster contributors, a record for the conference.

The Undergraduate Conference is devoted entirely to student achievement. Presenters represent every academic discipline of the college. Their projects attest to the original work that Whitman students produce through their courses of study, study abroad, independent research experiences, fellowships, scholarships, grants and internships.

Whitman College
Schedule
Tuesday, April 7, 2020

Breakfast
Reid Campus Center | 8:15 – 9 a.m.

SESSION 1
9 – 10:15 a.m.

Morning Interlude
Hall of Science Atrium | 10:15 – 10:45 a.m.

SESSION 2
10:45 a.m. – Noon
Noon Intermission & All-Campus Lunch
Reid Campus Center | Noon – 1 p.m.

POSTER SESSION
Cordiner Hall Foyer | 1 – 3 p.m.

DANCE THEATRE
Dance Studio | 2 p.m.

SESSION 3
3 – 4:15 p.m.
Afternoon Encore
Reid Campus Center | 4:15 – 5 p.m.

Music Performances

Chamber Ensembles
10:15 – 10:45 a.m. at Hall of Science Atrium (Morning Interlude)

AMY DOODS, DIRECTOR
Lera Auerbach: “Three Dances in the Old Style” (Andante)
Abby Herrick—violin
Austin Kamin—cello

Reinhold Glière: “Eight Duets for Violin and Cello” (Prelude)
Jack Fleming—violin
Bruce Mackay—cello

Florence Price: “Five Folk Songs in Counterpoint”
III. “Drink to Me With Thine Own Eyes”
V. “Swing Low, Sweet Chariot”
Abby Herrick, Bethany Hermann—violin
Elsa Batten—viola
Liam Dubay—cello

Jazz Ensemble I
Noon – 1 p.m. at Reid Coffeehouse (All-Campus Lunch)
DOUG SCARBOROUGH, DIRECTOR
Daniel Leang, Morgan Rynies—alto sax
Ben Branda, Alex Lamers—tenor sax
Peth Sethapantachakul—baritone sax
Kevin Girty, Claire McHale, James Bogley, Erik Scott—trumpet
Liam Twomey, Doug Scarborough*—trombone
Thomas Harris—euphonium
Finn Henef—bass trombone
Spencer Thulin—piano
Bennett Cooper—guitar
Marco Thompson, James O’Brien—bass
Koby Haigerty, Ronnie Kabongo—drums
Annelle Ellingson—vocals

Jazz Ensemble II
4:15 – 5 p.m. at Reid Coffeehouse (Afternoon Encore)
GARY GEMBERLING, DIRECTOR
Will Wetaz, Emma Beaver—alto sax
Ben Nickman, Jeff Wilson—tenor sax
Ethan Thomas—baritone sax
Erik Scott, Matt Herckiwitz, Katie Watkins, Leander Swan, Zac Bentz, Reza Darvish—trumpet
Oswaldo Rodriguez—trombone
Peter Schane—euphonium
Sam Weiss—piano
Bennett Cooper—guitar
Isayas Bikila, Sean Collier—bass
Jack Allard—drums
Meghan McGolden—vocals

* faculty
## PANEL SCHEDULE

**BREAKFAST | 8:15–9 a.m.** | Reid Campus Center

### PANEL SESSION 1

<table>
<thead>
<tr>
<th>Olin 138</th>
<th>Olin 129</th>
<th>Science 159</th>
<th>Science 100</th>
<th>Kimball Theatre</th>
<th>Reid G02</th>
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</thead>
<tbody>
<tr>
<td><strong>Race, Identity, Autonomy</strong></td>
<td><strong>CS I: Artificial Intelligence, Applied</strong></td>
<td><strong>Molecular Matters</strong></td>
<td><strong>Science &amp; Health</strong></td>
<td><strong>Mythology, Antiquity, Modernity</strong></td>
<td><strong>Life &amp; The Mind</strong></td>
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<tr>
<td>9 a.m.</td>
<td>Holden Gaupo</td>
<td>Madi Crowley</td>
<td>Jack Taylor</td>
<td>Scarlett He</td>
<td>Reeve Boyer</td>
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<td>9:15 a.m.</td>
<td>Georgia Seltzer</td>
<td>Ruling Zhuang</td>
<td>Nick McClellan</td>
<td>Ngan Tran</td>
<td>Leila Hauser</td>
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<td></td>
<td>9:30 a.m.</td>
<td>Yiwen Xiang</td>
<td>Liam Twomey</td>
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<td></td>
<td>Andrew Yeon</td>
<td>Maxwell Brown</td>
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<td><strong>PANEL SESSION 2</strong></td>
<td><strong>Hispanic Culture</strong></td>
<td><strong>CS II: The Match Game, Automated</strong></td>
<td><strong>Bio I: Plants &amp; Animals</strong></td>
<td><strong>The Physical World</strong></td>
<td><strong>The Arts &amp; Its Discontents</strong></td>
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<tr>
<td>10:45 a.m.</td>
<td>Yann Dardonville*</td>
<td>Kimberly Taylor</td>
<td>Perth Sethapanichsakul</td>
<td>Spencer Thulin</td>
<td>Claire Weissman</td>
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<tr>
<td>11 a.m.</td>
<td>Madi Crowley</td>
<td>Robert Qin</td>
<td>Emma Saas</td>
<td>Shian Chen</td>
<td>Hope Giddings</td>
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<td></td>
<td>Tina Dworsh</td>
<td>Charlie Schneider</td>
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<td>Sabrina Jones</td>
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<td>Leila Hauser</td>
<td>Buyski Nystichi</td>
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<td>Whitney Rich</td>
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<td>11:15 a.m.</td>
<td>Christopher Pyles</td>
<td>Olivia Steinmetz</td>
<td></td>
<td>MJ Wilner</td>
<td>Natalie Flaherty</td>
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<tr>
<td>11:30 a.m.</td>
<td>Ian Hawkins*</td>
<td>Calvin Lincoln</td>
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<td>Gustavo Béjar López</td>
<td>Chloe Michaels</td>
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<td></td>
<td>Trung Vu</td>
<td>Silas Miller*</td>
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<td>Henrique Ennes*</td>
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<td></td>
<td>Isaiah Standard</td>
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<td>Heleana Backus</td>
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<tr>
<td><strong>Coaches</strong></td>
<td><strong>Zidane Galant-LaPorte</strong></td>
<td><strong>Jamie Gold</strong></td>
<td><strong>Alex Brockman</strong></td>
<td><strong>Sophie Grossman</strong></td>
<td><strong>Heleana Backus</strong></td>
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### MORNING INTERLUDE | 10:15–10:45 a.m. | Hall of Science Atrium

### POSTER SESSION | 1–3 p.m. | Cordiner Hall Foyer

### DANCE SESSION | 2 p.m. | Dance Studio

### PANEL SESSION 3

<table>
<thead>
<tr>
<th>Cultural &amp; Community Responsibility</th>
<th>Philosophy: Tradition &amp; Adaptation</th>
<th>Bio II: Genes &amp; Phenotypes</th>
<th>Environment: Awareness &amp; Impacts</th>
<th>Great Performances</th>
<th>Outdoor Engagements</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 p.m.</td>
<td>Eli Baez</td>
<td>Sunshine Alvarez De Silva</td>
<td>Madeline Boyle</td>
<td>Alex Izbiky</td>
<td>David Liburn</td>
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<tr>
<td>3:15 p.m.</td>
<td>Tori Londoinger</td>
<td>Andreas Guerrero</td>
<td>Ellen Horn</td>
<td>Chloe Carothers-Lisle</td>
<td>Adam Rooney</td>
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<tr>
<td>3:30 p.m.</td>
<td>Mat Chapin</td>
<td>Tacio Ferrer</td>
<td>Dana Walden</td>
<td>Grant Gallaher</td>
<td>Claire Swierczynski</td>
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<tr>
<td>3:45 p.m.</td>
<td>Cameron Conner</td>
<td>Faye Liu</td>
<td>Jack Taylor</td>
<td>Ronja Mokravskova*</td>
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<tr>
<td>4 p.m.</td>
<td>Grace Dublin*</td>
<td>Mika Nevo*</td>
<td>Owen Davis-Bower</td>
<td>Dylan Seifert*</td>
<td></td>
</tr>
<tr>
<td><strong>Coaches</strong></td>
<td><strong>Zidane Galant-LaPorte</strong></td>
<td><strong>Jamie Gold</strong></td>
<td><strong>Alex Brockman</strong></td>
<td><strong>Sophie Grossman</strong></td>
<td><strong>Heleana Backus</strong></td>
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### AFTERNOON ENCORE | 4:15–5 p.m. | Reid Campus Center
Neurons, the cells of the brain, perform their normal functions through connections between each other. The process of growing connections is associated with learning, memory and general cognitive ability and is implicated as an important factor in understanding neurological disorders related to these processes. Examining videos of neurons growing in culture, we observed a structure called a lamellipodium whose appearance was associated with growth and branching. We hypothesized that this structure was a precursor to neuronal branches and predicted that it would appear at sites of future branch formation. We developed working definitions for other morphological features that also appeared to be associated with the branching process and tested whether there was a predictable sequence of events that could predict a new neuronal branch. Quantification showed that 98% of the time, new branches were preceded by lamellipodia, suggesting this could be an essential intermediate step in branch formation.

**Faculty Sponsor: Ginger Withers**

**ESTELLA BASTIAN**

**Terazosin and Pgk1: Enhancing Enzyme Activity to Reduce Mitochondrial Dysfunction and Cell Death in Neurodegeneration**

Energy impairment and oxidative stress are fundamental agents involved in the pathology of many diseases including Parkinson’s, a neurodegenerative disease characterized by the loss of dopaminergic neurons. High levels of oxidative stress can lead to mitochondrial energy failure and ultimately cell death. Developing a therapeutic strategy that can augment glycolysis may counteract mitochondrial dysfunction and therefore prevent neuronal death. Terazosin, a widely used hypertension drug, was found to activate Pgk1, a key energy-generating enzyme in glycolysis. By activating Pgk1 and therefore increasing mitochondrial energy production, terazosin is able to prevent neuronal cell death in animal models. I performed an in vitro assay to investigate Pgk1’s activity under the presence of potential activators that closely resemble terazosin in structure. Current therapies for Parkinson’s treat symptoms, but terazosin is the first to prevent the disease’s progression.

**Faculty Sponsor: Michael Coronado**

**JAMES BENT**

**1H-qNMR Analysis Reveals New Trends in Substrate Specificity of Benzoate Dioxygenase in Ralstonia eutropha B9**

Biocatalysis leverages the power of enzymes to carry out complex reactions that can provide novel approaches to the synthesis of chiral molecules. Ralstonia eutropha B9 is a mutant soil bacterium that expresses benzoate dioxygenase (BZDO). BZDO specializes in the cis-dihydroxylation of benzoate at the 1,2 position as the first step in its metabolic degradation. The metabolites derived from this transformation have proven to be excellent chiral precursors for the synthesis of epoxyquinoid natural products, compounds which have been shown to be potent inhibitors of angiogenesis. My research uses quantitative proton nuclear magnetic resonance (1H-qNMR) to characterize the activity of BZDO on new substrates of this enzyme system, allowing us to draw new conclusions concerning the effects of size and electron-drawing character on the rate of metabolic activity.

**Faculty Sponsor: Jon Collins**
BENNY JEAN CTYRNYBAUM, Evaluating the Calcium Carbonate Budget of a Coral Reef in South Caicos

The Turks and Caicos Islands in the Caribbean are home to many coral reef ecosystems. As a result, monitoring the health of these ecosystems is important for assessing their status and aiding conservation efforts. Given that reefs are built of calcium carbonate, this study established a calcium carbonate budget for a protected area in the Turks and Caicos Islands. Such an analysis allows researchers to determine if a coral system is growing (healthy) or eroding (less healthy). I found a negative budget for the site, indicating an unhealthy and eroding system. To prevent several ongoing practices that may have contributed to this situation, along with possible remedies. Such studies are critical in this rich but relatively unexplored area.

Faculty Sponsor: Delbert Hutchinson

MICHAEL DANIEL, Measuring the Spin of Sagittarius A* with the Event Horizon Telescope

The Event Horizon Telescope (EHT) provides the necessary angular resolution to observe nearby black holes, including the Galactic Center’s Sagittarius A* (Sgr A*), closely enough to infer their spin. I examined simulated EHT observations of the Galactic Center’s Sagittarius A* to determine whether they can be used to measure its spin. I simulated observations of infalling gas clouds embedded in a realistic accretion disk, then used shot analysis and the power spectrum density method to determine whether the EHT could detect and measure the rotation of these black holes. I confirmed that results from the shot analysis and power spectrum density method are consistent. The capacity for these processes to extract spacetime information shows promise for measuring black hole spin.

Faculty Sponsor: Andrea Dobson

HAYVEN DICK-NEAL, Small Organic Acids Inhibit Semijunctive Nickel Transfer Between Ligand Complexes

Metal bioavailability is crucial for plant growth, but nearly a third of all soils are deficient due to the low solubility of many metals. Therefore, metal-ligand complexes (metal with organic compounds attached) dominate metal speciation in aqueous environments. The rate of exchange between these natural complexes controls the bioavailability. Previous research by the Boland Lab found evidence that certain low molecular weight organic acids (LMWOAs) abundant in natural soils catalyze these reactions when they follow a disjunctive pathway; one in which the ligand and metal completely dissociate before ligand exchange occurs. In this research, I hypothesize that these same LMWOAs (ethylenediamine, oxalate and glycine) will inhibit a similar reaction that follows a semijunctive pathway, which involves only partial ligand dissociation. Ongoing experiments to measure these reaction rates between pH 7-10 have found evidence that all LMWOAs studied inhibit the reaction to varying extents.

Faculty Sponsor: Nate Boland

CASEY DOE, PiRL9 Gene Expression in Arabidopsis thaliana Roots and Shoots

Arabidopsis thaliana is a model plant species that has had its whole genome sequenced, leading to the discovery of many novel genes. PiRL9 is one of a family of genes, several of which are important in pollen formation and thus plant reproduction. Previous research has suggested PiRL9 is involved in processes other than pollen, and I hypothesized that PiRL9 may function in other developmental contexts. Using plant lines with PiRL9 promoter DNA attached to the β-glucuronidase (GUS) reporter gene, I characterized PiRL9 gene expression in Arabidopsis leaves and roots. This visual indicator of gene expression revealed that PiRL9 expression was related to the emergence of lateral roots and to the vasculature of the cotyledons, showing a clearly delineated role in an aspect of the plant’s development outside of its function in pollen formation.

Faculty Sponsor: Dan Vernon

LIAM DUBAY, Investigating the Stationarity of Sensing Noise in LISA Pathfinder Data

LISA Pathfinder (LFP), in operation early 2016 through Summer 2017, was a European Space Agency-led technology demonstration mission for space-based gravitational wave (GW) detectors such as the planned Laser Interferometer Space Antenna (LISA) mission. The spacecraft contained two freely-floating test masses to mimic the optical metrology system to measure their relative motion at unprecedented sensitivity. Due to the extreme precision needed for GW detection, robust statistical characterization of instrument noise is a critical ingredient of signal processing algorithms. GW signal processing is primarily done using spectral methods which, to date, have assumed stationary noise. This assumption does not hold true for LFP or LISA. I characterize statistical properties of non-stationary sensing noise from LFP data. In particular, I investigate time-dependent variation in the noise power spectrum in data products for measuring spacecraft recoil due to micrometeorite impacts. This work is generally applicable to the characterization of non-stationary noise.

Faculty Sponsor: Andrea Dobson

NOAH EBERLE, Identification of Burkholderia cepacia Virulence Factors

Burkholderia cepacia is an antibiotic-resistant, pathogenic species of gram-negative bacteria. These organisms are ubiquitous in the soil and can readily infect plants and immunocompromised humans. Infection of onion bulbs by B. cepacia results in “sour skin,” a soft rot characterized by sunken, brown to white wounds on the scales of the onion. Because of the notable damage incurred due to infection, the virulence of B. cepacia is relevant to onion agriculture. Very little is known about key factors used by B. cepacia to cause infection of onions. My investigation aims to isolate specific genes that encode virulence factors contributing to onion infection.
My data suggest that genes encoding metabolic enzymes including aldehyde dehydrogenase, phenylacetate-CoA oxidase/reductase and phosphotransferase are important for promoting infection in our model. Future studies will investigate the deactivation or attenuation of these virulence factors to prevent or disrupt infection of oxons by B. cepacia.

**Faculty Sponsor: Elizabeth Danka**

**SARA FEDERMAN,** Access to Mental Health Care in Walla Walla County

In the United States, half of the 60 million individuals living with a mental health condition receive no treatment. Compared to other forms of care, mental health care remains more difficult to access for the majority of Americans. Mental health stigma, fragmented mental health care delivery systems, inadequate insurance coverage for mental health, lack of culturally competent providers and high costs are among the many barriers to care. In response to this prevalence of unmet mental health needs, Walla Walla County officials have investigated how these factors vary across socio-demographic groups. Based on interviews with individuals who have sought local mental health services, my study compares costs, coverages and attitude-related barriers that limit access to mental health care in Walla Walla.

**Faculty Sponsor: Tom Armstrong**

**LIAN GAMBLE,** Assessing Directional Differences in Gaze Gain in the Saccade Task Relative to Impact Location in Concussed College Athletes

In the United States, mild traumatic brain injuries (mTBI), also known as concussions, impact 3.8 million athletes annually. Concussions may be caused by head or body impact which can result in harmful biomechanical forces and brain acceleration-deceleration patterns. Unfortunately, many concussions go undiagnosed due to limited diagnostic tools. These methods rely on self-reported symptoms and lack consistent, definitive results. However, many quantitative tests for ocularmotor function have recently been used to identify cerebral dysfunction because ocularmotor circuitry is widely distributed in the brain. Using video-oculography (VOG), gaze gain (a measure of accuracy) was shown to be a good marker for mTBI diagnosis. This research expanded on previous studies by examining the effects of concussion on combined eye-head gaze stability. Future studies could help determine if gaze gain could localize the site of brain injury.

**Faculty Sponsor: Thomas Knight**

**NADIA GANJOLOO, DREW CONKIN,** Regiospecificity and Kinetic Measurements of Type II Hydroquinone Ring-Cleaving Dioxygenase PnpC1C2

Macrobios have developed ways to introduce synthetic chemicals into their metabolism as a source of energy. One such compound is p-nitrophenol, which is used in biocides, dyes and drug intermediates. P-nitrophenol is toxic, accumulating in soil and groundwater with insignificant natural degradation. PepC1C2 is an enzyme found in the catalytic pathway of p-nitrophenol in *Pseudomonas putida* DIL-EA. This previously uncharacterized enzyme is a key hydroquinone ring-cleaving dioxygenase, part of the larger category of ring-cleaving dioxygenases. As protein structure determines its function, regiospecificity and kinetic measurements of PepC1C2 breaking down different substrates were taken to investigate the structure of the enzyme. The mechanistic pathway of the substrate becoming the product is dependent on the enzyme’s active site. A better understanding of this mechanism sheds light into the other type II hydroquinone ring-cleaving dioxygenases.

**Faculty Sponsor: Tim Machonkin**

**ALEX GERBER,** The Effects of Solar Radiation on Bluebunch Wheatgrass

Bluebunch wheatgrass (*Pseudoroegneria spicata*) is a perennial bunchgrass native to Eastern Washington. Recently, its numbers have been on the decline. At Spring Gulch in the Wahluca Gap Biological Station, bluebunch is much more common on north-facing slopes compared to south-facing slopes. The lower density of bluebunch on south-facing slopes may be due to a greater exposure to solar radiation and, in turn, higher temperatures. If this is correct, then I expect climate change will further exacerbate the decline in bluebunch populations. To test this hypothesis, my research group erected shaded plots to reduce solar radiation and temperature at the spring facing slope of bluebunch in these shaded plots to those of unshaded control plots. If seedlings are more successful in shaded rather than unshaded plots, this suggests climate change may drive bluebunch toward extinction in the Columbia Basin.

**Faculty Sponsor: Tim Parker**

**KACEY GODWIN,** Macrocyclic Peptides for the Treatment of Multiple Myeloma

The human 20S proteasome is a complex enzyme that serves regulatory and metabolic functions by helping to break down proteins in the body. For that reason, many scientists have focused on investigating therapeutic agents that can inhibit its activity. Unfortunately, many drugs that are used in a clinical setting present serious side effects such as cardiac arrest. My research works toward the goal of developing compounds that do not bind to other enzymes and thereby pose fewer health risks to patients. My molecule of study is a structural hybrid of two proteasome inhibitors: TMC-95A, a natural fungal product and carfilzomib, an FDA-approved drug for treating multiple myeloma. My research demonstrates that this peptide with a macrocyclic framework, in combination with other molecular modifications, is an effective inhibitory design.

**Faculty Sponsor: Marion Götz**

**THOMAS HARRIS,** A Data Science Approach to Signal Processing in Laser Interferometer Gravitational-Wave Observatories (LIGO)

The goal of the Laser Interferometer Gravitational-Wave Observatory (LIGO) detectors is to detect faint ripples in spacetime caused by the merger of massive compact objects, like black holes and neutron stars, using a Michelson interferometer with Fabry-Pérot cavities in the 4-kilometer arms. Each detector site has ~250,000 “channels” that track the state of the interferometer, record data from optical equipment like photodiodes, monitor the physical environment through seismometers/magnetometers and more. Channel records can help us track down sources of unwanted signals that affect the calculated gravitational wave strain and interfere with real gravitational waves. Automated signal processing programs such as FSCan generate an overwhelming amount of information about various channels. I am creating programs to sift through these data to find unusually high long-term coherences between sets of channels and the gravitational wave strain signal. My goal is to support work onsite by identifying mystery noise sources.

**Faculty Sponsor: Frederick Moore**

**ABBY HILL,** Post-Disturbance Analysis of a Semi-Arid Plant Community

The Interior West of North America is dominated by semi-arid grassland ecosystems. Over the past century, these grasslands have experienced an increase in disturbance due to wildfire, livestock grazing and erosion, among other factors. After disturbance, it can be difficult for native perennial species to reestablish themselves, due in part to the encroachment by organic molecules called ligands. Metal bioavailability that limit their bioavailability. Many metals are found bound to reestablish after disturbance.

**Faculty Sponsor: Tim Parker**

**JACLYN HODGSON,** T-Cell Receptor Immunotherapy Targeting Cancer/Testis Antigens in Pediatric Brain Tumors

T-cell immunotherapy provides a method to target cancer cells using immune cells made by the body for the purpose of preventing cancer growth. For this project, I worked to identify amino acid sequences of proteins called cancer/testis antigens, that T-cells with a receptor specific to these sequences would be able to identify and kill cells expressing those amino acids. Using synthetic peptides and patient cancer cells I was able to show that the T-cells could selectively kill cells with the corresponding amino acid sequence, indicating that this could have a potential therapeutic benefit of killing cancer cells in a patient while not damaging healthy tissue.

**Faculty Sponsor: Jim Russo**

**BECCA HOFFMAN,** Small Organic Acids Catalyze Disjunctive Ligand Exchange Reactions

Plants require various micronutrients to survive, including metals. Metals in the natural world are found in many forms that limit their bioavailability. Many metals are found bound by organic molecules called ligands. Metal bioavailability is controlled by transfer reactions between these complexes...
known as ligand exchange reactions. Plants exude weak ligands that we call low molecular weight organic acids (LMWOAs), where NTA and CDTA are ligands. I hypothesize that specific LMWOAs bind to the initial ligand complex in a ternary complex and increase the rate of ligand exchange by weakening the bonds between the ligand and the metal. My research will allow us to further our understanding of each other’s role in the environment.

Faculty Sponsor: Nate Boland

NICK JACUK, Perceived Threat to Subsistence Living Among Indigenous Communities in Southeastern Alaska.

The right to a subsistence lifestyle is paramount in ensuring indigenous sovereignty as well as the physical and spiritual well-being of the Cup’ik, Yup’ik, Alutiiq and Dena’ina communities in southeastern Alaska. At the center of a perceived risk to a subsistence lifestyle are three threats: climate change, resource development and legislative authority.

I take a qualitative approach in my research through interviews and evaluation of the literature within a framework of environmental justice in an effort to discover threats or trends that may support or reject the legitimacy of the perceived risk. Through the theoretical lens of world-systems and sociotechnical imaginaries, I investigate the implications of resource rights and decision making as seen peripheral to the rest of the United States, which holds the position of the core. These groups and imaginaries represent the significance and intentions behind the resources within these lands and oceans for different reasons.

Faculty Sponsor: Alissa Corder

DAVID JOHNSON, Generating Novel eTCR T-Cells to Target Cancer

Immunotherapy is a treatment strategy that enhances the function of the immune system to fight diseases. Patient immune cells are genetically manipulated to be more effective at protecting the body against pathogens. Immunotherapies targeting cancer are being developed as drugs and vaccines to be tools able to extend lives. Traditional treatments for cancer include surgery, radiotherapy and chemotherapy, but new treatments are needed to figure out how the kinetics of the reaction influence the formation and isolation of other novel heavily-cyanated boron clusters through similar synthetic methods.

Faculty Sponsor: Mark Juhasz

HARRY KELSO, Fusion For All

Fusion is what powers the sun and other stars, but how can we harness it? My undergraduate research focuses on the synthesis and characterization of boron clusters as potential new electrolytes. We have been able to extend the life of these clusters in the air by developing a method of freezing the clusters. My research team has successfully developed a novel method for the synthesis, isolation and characterization of a boron cluster with a potential to be an excellent catalyst in aqueous solution, salt and water.

Faculty Sponsor: Kurt Hoffman

LOA ZONES, Biochar Amendment Effects on Soil Health, Plant Germination and Plant Growth

Biochar is a soil amendment, made from plant material combusted at low temperatures, that can assist in crop nutrient availability and soil water retention. These qualities can improve plant growth and yield, important under conditions of increased soil degradation globally. Although biochar has shown great promise in maintaining soil health, it has not been demonstrated experimentally, though the reasons for it remain unclear. To better understand the mechanism of this phenomenon, known as the biochar effect, we have been experimenting with different kinds of plant material and biochar amendments to see how they affect the growth of plants.

Faculty Sponsor: Elizabeth Danka

KATY LALIOTIS, Observing Qatari-1b Exoplanet Transits

I confirm orbital properties of the exoplanet Qatari-1b and, in so doing, demonstrate our ability to perform high-precision transit photometry for moderately bright planetary systems using a relatively small telescope at a low-elevation observing site. Qatari-1 is a magnitude 12.6 metal-rich K dwarf star in the constellation Draco. In 2011, Alsubai et al. announced the existence of a planet orbiting Qatari-1: a “hot Jupiter,” which has a mass slightly larger than that of Jupiter and an orbit period of 1.42 days. I observed a transit of Qatari-1b on July 26, 2019, using the 0.77-meter Hoch telescope at the Pacific Northwest Regional Observatory at Wallula Gap, Washington.

Using the Astrolmage data analysis package, I analyzed these data together with observations made by colleagues in March 2019 at Lowell Observatory in Flagstaff, Arizona, demonstrating the potential for future transit observations and a transit depth of 2.4% using the Johnson-Cousins R filter.

Faculty Sponsor: Andrea Dobson

KYLE LEVIN, Conceptions of Time and Social Stratification: A Phenomenological Approach

A subject on which humans have ruminated for ages, yet, not until the past century has sociologists taken an active interest in time. My study examines the temporal experience of the individual in a social context and how the perspective of the observer changes over time. I focus on the relationship between the individual and society, specifically, how the observer's position influences knowledge production.

My research team I joined at Stanford University expands on this knowledge to consider preferred emotional expression in leaders across cultures and whether preferences depend on how well the group is doing (growth vs. crisis). Three cultural groups were selected: Taiwan, Hong Kong and Chinese. These findings were expected to be useful in guiding future research.

Faculty Sponsor: Lauren Berger

JESSIE MANO, Influence of Ideal Affect and Group Status on Leadership Choice

During growth, people chose leaders that reflected their ideal affect whereas no preference for (vs. calm) candidates was observed in other contexts. These findings were expected to be useful in guiding future research.

Faculty Sponsor: Lauren Berger
In this final portion of the project, extensive interviews and field sampling were conducted to assess the validity of the model. My team found that the model is functional, providing useful predictions of infestations. These results are intended for immediate applicability for growers. The model will allow growers across the Napa Valley to stay ahead of vine mealybug populations, prioritizing locations for selective pesticide application before infestations take hold and spread.

Faculty Sponsor: Michael Coronado

RUDO NDAMBWA, PRL3 Participates in the Formation of the Male Germ Unit in Pollen

The leucine-rich repeat protein (LRR) superfamily is found across all domains of life. PRLs are a family of nine LRR-encoding genes identified in the genome of the plant Arabidopsis. PRL proteins are structurally related to Ras-related group LRRs, which act in animal development. Some PRL genes function in pollen formation and male germ unit (MGU) development. To investigate possible functional redundancy between PRL1 and PRL9, I constructed PRL1/3 double mutants and assessed the sensitivity of mutant plants to mild heat stress, which was applied as a way of exacerbating phenotype. I used Alexander staining to quantify the percentage of viable pollen and confocal microscopy to observe irregularities in the MGU in each mutant. I found that the PRL1/3 double mutants had higher rates of abnormal and dead pollen and also showed more significant changes in MGU morphology than PRL3 or PRL9 mutants.

Faculty Sponsors: Dan Vernon and Nancy Forsthoefel

SHARON NDAYAMBAGE, Anomalous Crystalline Cobbles on Olympic Beaches, Washington

No granitic or high-grade metamorphic bedrock crops out on the Olympic Peninsula; local valley glaciers transported mostly basalt and sandstone toward the coast. However, the Cordilleran ice sheet carried crystalline clasts to the northern and eastern flanks of the Olympics. During the Lillooet “F,latirvangs” glaciation, the Juan de Fuca lobe of the Cordilleran ice sheet deposited limited granite and gneiss erratics as far south as La Push. How did crystalline cobbles reach Olympic beaches south of La Push? If fission transported these erratics, tectonic uplift and/or isostatic rebound is required because sea level was >100 meters lower during glaciations. An alternative explanation is fluvial and marine transport in the last 6,000 years (with sea level close to present height) of tree roots with crystalline rocks from the upper Columbia River system. Other possible factors include marine currents, longshore drift, waves, tsunami, kelp and shipwreck ballast.

Faculty Sponsor: Bob Carson

ALEXANDRA MOORE, When Mitochondria Can’t Breathe: Exercise Stress and Cardiac Hypoxia in Ischemic Injury Conditions

The energetic demands of the work that the heart must perform to be constantly pumping means that cardiomyocytes have a large population of mitochondria. When these essential organelles undergo changes, there are major implications for healthy heart function. After a myocardial infarction occurs, there is an onslaught of cell and tissue damage in the heart. The process of mitochondrial fission that occurs due to these hypoxic conditions results in cell death, toxin production, inflammation and reduced mitochondrial function. Although fission can be highly pathological, it has also been shown to be beneficial in another condition of oxidative stress: exercise. In this context, exercise-induced fission improves mitochondrial oxygen consumption and energy production, leading to an overall increase in exercise capacity. My project explores how this same fission process occurs during a heart attack and exercise, but with different outcomes.

Faculty Sponsor: Leaena Knight

MICAL MEHLMAN, High-Performance Liquid Chromatographic Method for the Detection of N-Acetyl Aspartate in Saliva

N-acetyl aspartate (NAA), a metabolic intermediate found highly concentrated in nervous tissue, serves as a useful biomarker of many neurodegenerative diseases, including but not limited to Canavan disease, dementia, schizophrenia, stroke and brain cancer, as well as brain injury. NAA quantification, however, requires time-intensive measurement techniques such as magnetic resonance imaging (MRI). For this reason I sought to develop a technique for quantifying NAA concentrations in human saliva, which will allow for rapid, non-invasive measurements that may serve as a diagnostic tool for nervous tissue health. Specifically, I analyzed the saliva of student athletes from a variety of sports at the beginning and end of their athletic seasons or following a head injury, using high-performance liquid chromatography. My project to quantify NAA through saliva analysis will help researchers develop robust and inexpensive techniques to assess alterations in brain health that can aid in the rapid diagnosis of head injury.

Faculty Sponsor: Leena Knight

MIKA NEO, Mapping and Characterization of the Ibr4 Mutant in Maize Reveals Potential Role for Endocytosis in Auxin-Related Tassel Development

An understanding of reproductive development is crucial for maximizing crop yields. A powerful strategy for identifying genes that govern development is by the study of mutants with developmental defects. I sought to identify tassel-less 9 (tl9), a gene required for the development of tassels, the reproductive organs in maize that produce pollen. I used genetic mapping and DNA sequencing to pinpoint a candidate gene that is involved in endocytosis. Cells of tl9 mutant plants were found to have potential endocytosis defects, supporting my hypothesis. The phenotype of tl9 mutants also suggests the presence of a defect in the transport of auxin, a hormone that regulates organ development. By identifying a promising candidate gene for tl9 and suggesting a role for endocytosis in auxin-mediated reproductive development, my research expands our understanding of the auxin genetic network. This work will aid in developing maize plants with modified tassels to maximize crop yield.

Faculty Sponsor: Dan Vernon

MARY NOYES, Combined Head and Eye Gaze Shift Indices as a Potential Diagnostic for Concussion

Mild traumatic brain injury (mTBI), or concussion, is a pathophysiological cascade of neurological impairments that are the result of a direct or indirect impact on the brain; as many as 20 million concussions may occur per year in the United States alone. Unfortunately, an objective diagnostic to determine concussion does not exist. Using an advanced eye tracker, I examined the effect of sport-related concussion on combined eye and head gaze (CEHG) shifts (and therefore its effect on underlying brain function coordinating these movements), testing CEHG metrics (e.g., peak gaze velocity, latency) in individuals before and after mTBI to determine whether an injured subject showed differences due to the concussion. More specifically, I tested whether comparing multivariable indices was more consistent in determining differences related to concussion than were single metric comparisons. Preliminary results support this approach, suggesting a role for gaze movement testing as a diagnostic for concussion.

Faculty Sponsor: Thomas Knight

BUYAKI NYATICHI, “Just Not Sorry”: Persuasive Technology, Value-Sensitive Design and Feminist Perspectives

“Just Not Sorry” is a Gmail plug-in that underlines words and phrases such as “just” and “sorry” that might undermine the sender’s message. Hoving over the highlighted words produces a motivational quote as a tool tip. The plug-in was developed by tech industry CEO Tami Reiss to help women hedge less and appear more confident in their emails. The app has attracted tens of thousands of users. My collaborative research project analyzed “Just Not Sorry” in three ways: as a persuasive technology — a program designed to change people’s attitudes or behaviors — as a system with implications for human values and as an artifact of feminist activism. While my study reveals tensions between opposing values in feminism, it does not resolve them. It does show that persuasive technology can play a role in activism.

Faculty Sponsor: Janet Davis
THYS REYNOLDS, Concussed Athletes Show Impaired Metrics in Neurocognitive Eye Tracking Tasks

Concussion is a serious health epidemic and can result in lasting negative cognitive and somatic health effects that seriously impact an athlete. Prevalence is increasing, but not limited to, college athletes who play high-intensity contact sports. Diagnosing concussions is vital to preventing serious recurrent injuries, but many concussions go unreported. Further, many diagnostic measures are imperfect, relying on frequently inaccurate symptom surveys or computerized test batteries. One methodology that holds promise as a diagnostic tool for concussion and detection. This experiment examined the effect of concussion on combined eye-bead gaze movement metrics in college athletes. In particular, I asked whether mild traumatic brain injury (mTBI) causes serious impairments in a cognitively demanding eye-tracking task. Initial analysis, along with prior results, indicate that performance on more complex tasks may serve as a reliable indicator of diffuse structural impairment caused by mTBI.

Faculty Sponsor: Thomas Knight

LAUREL RICHARDSON, Leaf-Litter Arthropod Composition Relative to Disturbance in a Tropical Cloud Forest

Leaf-litter arthropods play essential roles in leaf litter nutrient cycling but are understudied in the tropics. To address this gap and evaluate impacts of disturbance caused by a dirt road, I investigated the abundance and species richness of leaf-litter arthropods in a Costa Rican cloud forest at the end of the dry season. Leaf litter samples were collected on three days, at five sites along a 180-meter transect extending from the road into undisturbed forest. Arthropods, isolated using Berlese funnels, were identified to morphospecies. A total of 1,150 specimens were collected, representing 155 morphospecies. Arthropods fell into four major groups, with mites comprising the majority of specimens (~70%), followed by insects (~25%). Interestingly, abundance and species richness changed each day along the transect. Mite abundance increased multifold on the sampling day that followed rain, suggesting higher sensitivity to humidity than to distance from the human disturbance caused by the road.

Faculty Sponsor: Heidi Dobson

MICHAEL RUBSAMEN, BRENNA DONOHUE, Undergraduate Laboratory of a Low-Cost Plate Reader for UV-Vis-NIR Spectroscopy in an Undergraduate Laboratory

The plate reader was built at low cost and to be automated, we constructed a plate reader that can be automated tools used with spectrometers to scan many and plasmonic nanomaterials. Plate readers are common and richness changed little along the transect. However, mite abundance contributed ~25%. Interestingly, abundance and species richness changed each day along the transect. Mite abundance increased multifold on the sampling day that followed rain, suggesting higher sensitivity to humidity than to distance from the human disturbance caused by the road.

Faculty Sponsor: Thomas Knight

RHEA SABLANI, Application of Paper-Based Isotachophoresis (ITP) for Characterization and Detection of White Blood Cells

Early detection is a vital aspect of point-of-care testing because it facilitates better disease diagnosis and improved patient care. Exosomes, the extracellular vesicles which can move proteins, DNA and RNA between cells, can be used as biomarkers for early cancer diagnosis. However, current isolation methods are laborious and lack sensitivity and reliability. Paper-based analytical devices are advantageous because they enable the fabrication of cost-effective and environmentally friendly diagnostic tools. Furthermore, electrophoretic techniques can randomly concentrate and isolate biomarkers at low physiological concentrations. This study used paper-based anionic isotachophoresis (ITP) to separate malignant cell-derived exosomes from healthy cell-derived exosomes. The plate consists of a three-dimensional printed cartridge, a nitrocellulose membrane and discontinuous buffer. Concentrated bands are analyzed by a fluorescence microscope. This research paves the way for exosome cargo assay in point-of-care testing and demonstrates how paper-based ITP is a viable method for detecting multiple analytes with high sensitivity.

Faculty Sponsor: Jim Russo

ALEC SALVINO, Developing Single-Domain Antibodies as Modular Immunohistochemistry Secondary Reagents

Antibody-based imaging of tumors, or immunohistochemistry (IHC), is a valuable tool for cancer diagnosis and research. In IHC, researchers target antigens on specific cells using labeled antibodies, creating images of the cells present in tissue. Single-domain antibodies (sdAbs) are a unique class with the potential to improve IHC techniques. sdAbs are produced by extant members of the Camelidae (camels, llamas, alpacas) and have numerous advantages over conventional antibodies, including ~100 the size with similar binding affinities, increased stability and solubility and facile cloning due to a simpler structure. I aim to identify sdAbs that bind to the Fc domain of mouse immunoglobulin G (IgG). Using yeast surface display, flow cytometry and DNA sequencing, colleagues and I identified 80 different sdAbs, linking the binding phenotypes of the complex. We next characterized isotype specificities and affinities for a subset of sdAb clones. These isotype-specific sdAbs will be used as modular IHC detection reagents.

Faculty Sponsor: Thomas Knight

SOREN SANDENO, Phase Control of Copper Sulfide Nanocrystal Synthesis

Transition metal nanocrystals have an expansive list of applications ranging from solar energy conversion to cellular imaging. Factors that control their physical and electronic properties of nanocrystals, which are influenced by their crystalline phase. However, current methods to control the phase of the crystal are few in number and poorly understood. In my research, I am attempting to understand the impacts of ligand structure and precursor conversion kinetics on the phase of copper sulfide nanocrystals and, having done so, designing a mechanism that can be controlled by a single phase. Using powder X-ray diffraction, I have identified different phases of copper sulfide that correlate with the length of their alkylamine ligands. Currently, I am studying how precursor structure affects the final crystalline phase via experimentation with various sulfur sources.

Faculty Sponsor: Mark Hendricks

NICK SEKITS, The Striped Beaked Snake Is Really a Skaapsteker

The beaked snakes (Rhamphophis) are large, diurnal snakes with reinforced snouts adapted for digging. The skaapstekers (Psammophylax) are generalist, terrestrial snakes. Both genera belong to the primarily African lamproid subfamily, Psammophiline. The striped beaked snake (Rhamphophis acutus) was originally considered a member of the genus Rhamphophis. However, molecular evidence suggests it is more closely related to Psammophylax. If this phylogenetic placement is correct, the “beak” of P. acutus must have evolved independently of that seen in the “true” beaked snakes. Using micro-CT scanning, I undertook a detailed study of the cranial morphology of P. acutus in addition to representative species of both Psammophylax and Rhamphophis for comparison. I found that, despite the adaptations to fossorial life, P. acutus retains cranial features that reveal its true origin amongst the skaapstekers; its evolutionary history can be told not only by its genes but also by its morphology.

Faculty Sponsor: Kate Jackson

ALLIE SERACUSE, The EED Binder Modulates PRC2 Requirements in Zebrafish Embryogenesis

All of the cells in our bodies contain the same DNA, with the same genes. What allows each cell to take on specialized forms and functions? The answer is gene regulation. Gene regulatory mechanisms silence parts of the genome so that each cell will use only the parts that allow it to complete its cellular function. I studied the PRC2 complex, a key epigenetic regulator, in zebrafish during embryonic development. PRC2 is a protein complex made of several different subunits, including the binding protein, an inhibitor, restricts PRC2 activity by competing with other subunits. I observed fish with the EED binding protein throughout their development. Fish expressing the EED-binding protein exhibited changes in genotype and protein expression, but few to no morphological differences were noted.

Faculty Sponsor: Dan Vernon

ELLERY SHORE NELSON, ANISSA HUGHES, ALISSA ANTILLA, The Curious Tale of Julie and Mark Revisited: Does Sexual Arousal Inhibit Sociomoral Disgust?

Although disgust and sexual arousal may seem to be separate entities, they have a close, oppositional relationship. Evidence shows that sexual arousal and disgust are mutually inhibitory. However, the effect of sexual arousal on moral disgust is missing from psychological research. Sex involves the exchange of bodily fluids, which is disgusting — yet people seemingly overcome disgust toward these stimuli to satisfy sexual desires. This may not be the case for everyone. Research indicates that people of certain ideologies may be more susceptible to being offended by taboo and potentially disgusting stimuli and behavior. In response, they may be more likely to condemn these acts and people who participate in them on moral grounds. Our study also considers how socionormatively conservative individuals may have more difficulty overcoming disgust as it pertains to sexual acts. We hope our results will inform the treatment of sexual dysfunctions in the future.

Faculty Sponsor: Tom Armstrong

KATIE STAHL, Pseudomonas aeruginosa Is a Gram-Negative Bacterium that May be Found in Infections of Wounds and Sites of Inflammation, Pu is Becoming Increasingly Resistant to Antibiotics, and Pu is Virtually Non-Pathogenic in Humans. One Cause of this Is the Presence of Filamentous Pseudomonas PN, a Gram-Negative Bacterium that Isolated from the Bacterial Genome and Subsequently Infected Pu Bioloids and, in Turn, the Mammalian Immune Response. Pu Causes Inflammation, Toxicity, and Severe Response, Preventing the Bacterial Infection from Being Cleared. A Vaccine Could Potentially Offer a Solution by Clearing the Virus and Inducing a Strong Immune Response Against the Bacteria. My Work Begins the Vaccine Production Process by Testing a Viral Protein (Gp) to Be Able to Be Used as an Antigen in the Vaccine.

Faculty Sponsor: Elizabeth Danka

ALI STILLER, Not a Surprise: Female Salamanders (Plethodontidae: Ambystoma) Communicate to Males During Courtship as Evidenced by Dorsal Courtship-Like Glands

The tail-straddling walk of plethodontid salamanders is a stereotypical courtship behavior that ensures spermatophore uptake by the female. Female participation during courtship has typically been described in passive terms. With the recent description of the circular tail-straddling walk in Aneides ferreus, it became clear that females are more active in this part of courtship ritual. I examined the tailbase region of male and female A. ferreus for pheromone-producing (modified granular) glands that have been described primarily in male salamanders. I found that, while the presence of these glands is not sexually dimorphic,
Burkholderia cepacia

In efforts to assist the Confederated Tribes of the Umatilla Indian Reservation with management practices for artificial propagation and culturing of Entomophthora tridentata (Pacific lamprey), I investigated the burrowing capability of wild-type and lab-reared larval ammocoetes. Burrowing behavior was assessed by measuring the number of attempts to burrow, burrow time, rest time, and swim time. I observed six populations of hatchery ammocoetes and one population of wild-caught ammocoetes from the Umatilla River in July 2019. I hypothesized that fish reared in standard conditions (12-16 °C, with substrate and mesh mat) will have a faster average burrowing time than fish reared at room temperature (18-25 °C) or with no substrate available. I also hypothesized that wild-type fish will have a faster average burrowing time than lab-reared ammocoetes of the same size. Between lab-reared ammocoetes, I anticipate that wild-reared ammocoetes will have faster burrowing times than younger larvae.

Faculty Sponsor: Kate Jackson

ALLYSSA SULLIVAN, Identifying Virulence-Related Genes in Burkholderia cepacia

Burkholderia cepacia is a gram-negative bacterium known to cause severe skin disease in onions, including the sweet onions grown in the Walla Walla Valley. While the disease was first described in the 1950s, virulence factors that contribute to its pathogenesis in onions have not been identified. I sought to identify genes related to virulence by creating bacterial mutants using transposon mutagenesis and selecting mutants of interest through screening on an onion model of infection. Mutants that expressed smaller disease wounds were analyzed through bioinformatics to identify the disrupted gene. I hypothesize that these genes are involved in aspects of pathogenesis related to virulence. I am interested in the enzyme aldehyde dehydrogenase encoded by B. cepacia with a large genome consisting of three different plasmids. My poster presents a graphic representation of the differentiation of pathogenicity genes involved in B. cepacia pathogenesis is the first step in developing a method of control against onion skin disease. Faculty Sponsor: Elizabeth Danka

KIMBERLY TAYLOR, Does Household Income Matter? An Examination of an After-School Program Targeting Resilience and Academic Achievement

Resilience is the ability to thrive in the face of significant adversity. Growing up in poverty exposes children to considerable stressors and has been linked to negative academic outcomes. After-school programs that target resilience can help improve outcomes for at-risk populations. In my study, students preparing to attend an after-school program correlated with a 27% improvement in resilience, which included contextual (community, family) and individual (self-regulation, goals) protective factors. Scores were linked with household income and academic achievement. I hypothesized that resilience would increase from pre-test to post-test. I also hypothesized that changes in resilience would be positively correlated with academic achievement. Finally, I examined whether community type may play an important role in at-risk children due to low household income. My research will improve resilience interventions and outcomes for students by providing guidance about the protective factors that programs should target.

Faculty Sponsor: Stephen Michael

WALTER TUNNELL WILSON, Insights into the Evolutionary History of Lamprophid Snakes from Vertebral Morphology Using Computed Tomography

Understanding snake vertebral evolution is essential to understanding snake evolution. Molecular techniques can uncover evolutionary relationships between modern lineages, but further understanding of the extinct ancestors of living snakes comes from the fossil record, which consists primarily of vertebrae. Examinations of the morphology of living snakes in an evolutionary context has the potential to illuminate how similar transformations occurred in the fossil history of snakes. The Lamprophididae is a large and diverse family of primarily African snakes whose phylogenetic relationships have only recently started to be resolved through molecular phylogenetics. We examined vertebrae from 24 species representing 10 main lineages within Lamprophididae along with four species from a different family for comparison. We used micro-computed tomography scanning to make virtual models of vertebrae and described them using a synthesis of characters used by snake paleontologists to provide insight into these previously undescribed or under-described taxa and their vertebral morphology.

Faculty Sponsor: Kate Jackson

ELIZA VAN WETTER, Every Pebble Counts: A Reconstruction of the Fluvial History of Blacktail Deer Creek, Yellowstone National Park

Blacktail Deer Creek drains the northern flank of the Washburn Range in Yellowstone National Park. This summer, I spent four weeks collecting data and measuring the size of pebbles found in this creek. My poster presents a graph which represents the distribution of different-sized pebbles throughout the stream and a map of the stream’s movement within its floodplain over the past 70 years. These data are essential to understanding whether this stream is actively moving sediment and migrating across its floodplain or whether it has remained stable throughout the Holocene. This poster includes a particularly well-studied test site for determining the degree to which the removal and reintroduction of wolves in Yellowstone National Park has affected the greater ecosystem. The debate surrounding the concept of trophic cascades has lacked data that relates directly to floristic processes. My research will provide more robust data to determine the effects of the H2A/1 mutation in circulating H1N1 influenza viruses prior to the flu H1N1 pandemic in 2009. Several of these mutations have now fixed in the pandemic H1N1 lineage, creating the potential for re-emergence of oseltamivir resistance. I hypothesized that the permissive mutations may buffer the effects of H2A/1 by increasing the melting temperature (Tm) of NA. To test this, I measured the Tm of wild-type and mutant NAS. I conclude that while some permissive mutations increase the Tm, they do not counteract the effects of H2A/1 through an alternative mechanism.

Faculty Sponsor: Jim Russo

JOA YUN, Characterization of Burkholderia cepacia Virulence Factors

Burkholderia cepacia is a gram-negative bacterium with a large genome consisting of three different chromosomes. While this organism was first identified as a plant pathogen, causing “sour skin” in onion bulbs, it has recently been recognized as an opportunistic pathogen affecting cystic fibrosis patients. It is uncommon for bacterial pathogens to infect both plant and animal hosts. My research aims to understand this complex phenotype by studying virulence factors encoded by B. cepacia, as currently only a few genes have been identified that contribute to infection. I am characterizing mutant bacterial strains that have altered infection phenotypes in sweet onions to identify the genes and pathways that are responsible for such changes. Currently, I am interested in the enzyme aldehyde dehydrogenase and its suspected effect on infection wound size and pigmentation. Characterization of B. cepacia virulence factors will further our understanding of its infection pathway and consequently help prevent plant disease.

Faculty Sponsor: Elizabeth Danka

ALLIE ZAGATA, Vines, Wines and Wellness: Cultural Perspectives on Health Care Through the Lens of the Walla Walla Wine Industry

Southeastern Washington is home to a burgeoning wine industry, an industry so robust that it allowed the region to ride out the national recession in 2008. The region is also home to a large community of migrant laborers whose lives are caught in the confluence of geographical seclusion and a heightened state of immigration reform. My poster presents the discrete relationships that exist between wine drinkers and the wine industry. I examine these relationships through the lens of health and wellness, paying careful attention to the ways in which these distinct groups perceive sickness from a sociocultural point of view.

Faculty Sponsor: Suzanne Morrissey

JOSEPH WILLIAMS, The Evolution of Non-Alcoholic Fatty Liver Disease in Response to Dietary Fats and Sugars Since first being described in 1980, non-alcoholic fatty liver disease (NAFLD) has become an increasingly prevalent chronic disease that is now present in approximately 30% of the world's population. NAFLD consists of a spectrum of progressive metabolic abnormalities referred to as a "fatty liver" all the way to liver inflammation and cirrhosis. Despite its global prevalence, the molecular mechanisms involved in the progression of NAFLD are still poorly understood. Here, I set out to explore the pathogenesis of NAFLD in response to high fructose and high fat diets. With this, I sought to gain a better understanding of an ordered time course of molecular events during disease progression. To achieve this, I treated liver cells with fructose and palmitate and measured fat accumulation, reactive oxygen species production and changes in protein expression.

Faculty Sponsor: Jim Russo
9 a.m. HOLDEN GAUPO, Understanding Contemporary Police Killings Through Lynchings

Contemporary police killings are part of a larger culture of police violence that disproportionately results in the death of black men and boys in the United States. In the United States, black men and boys are at least 2.5 times more likely to be killed by police than white men and boys. This is no coincidence; police killings are intertwined with white supremacy and the racial structure of society. My presentation aims to highlight and better understand the racial nature and significance of contemporary police killings and therefore the racial structure of society, by exploring the question: What are the similarities and differences between lynchings of black men and contemporary police killings of black men? This comparison will focus on the acts of police killings and lynchings and their broader effect on and significance for the racialized structure of society in the United States.

Faculty Sponsor: Jack Jackson

9:15 a.m. GEORGIA SELTZER, Relational Autonomy and Sexual Rights for Individuals with Down Syndrome

What part does relational autonomy play in sexual rights for individuals with Down syndrome? Coined by Jennifer Nedelsky, “relational autonomy” refers to the idea that our inevitable interdependencies should be taken into consideration in practicing our autonomy. By asking questions about one’s right to autonomy, one’s ability to give consent and the dangers of grouping people together under labels, I hope to articulate what value relational autonomy holds for sexual rights. Research on autonomy for individuals with Down syndrome focuses mainly on housing and employment options while largely ignoring sexual issues. At the same time, current literature remains useful in understanding the ways in which techniques of relational autonomy may inform sexual considerations.

Faculty Sponsor: Susanne Beechey

9:30 a.m. REE ROBSON, From “Closet” to “Bubble”: LGBTQ+ Experiences at Whitman

As a fairly new field, LGBTQ+ history has gaps; stories from many places remain to be collected and told. Institutions of higher education, for one, have largely been left out of accounts despite their importance for many LGBTQ+ youth as a space to explore their identity and imagine their future. With the emergence of widespread LGBTQ+ activism in the 1970s, queer issues were introduced on college and university campuses. Since then, many schools have garnered reputations as accepting and inclusive places for LGBTQ+ students. To study how communities of higher education fit into the broader, national narrative around LGBTQ+ issues and acceptance, I investigate Whitman College. Using oral histories, I unpack Whitman’s transformation from a school with a handful of isolated, closed off students to the more inclusive space it is today. I discuss the challenges that arose and the paths that were available to change this small community.

Faculty Sponsor: Nina Lerman

9:45 a.m. NOAH DUNN, Flower Songs: The Nationalist Politics of Robert Schumann’s "Myrthen"

At their wedding in 1840, Robert Schumann presented a gift to his wife, Clara. The gift was a song cycle, “Myrthen” (“Myrtles”), composed at the height of a nationalist movement which would culminate in the creation of the first German state. Two of the cycle’s poets, Friedrich Rückert and Heinrich Heine, were vocal advocates for German nationhood. “Myrthen” also features German translations of Robert Burns, the quintessential voice of Scottish independence. My presentation analyzes selections by these poets to argue that, rather than being a benign ensemble of love songs, “Myrthen” was directly implicated in the political project of German nationalism. I posit that Heine and Rückert actively destabilize the conventional bounds of the individual self through their invocation of the natural world, an act seemingly at odds with the creation of a bounded political entity. My presentation explores the tension between these two goals.

Faculty Sponsor: Emily Jones

10 a.m. LIV STARYK, Gender and Frank Lloyd Wright’s Neil’s House

From 2006 to 2011, my family resided in one of Frank Lloyd Wright’s Usonian houses: the Henry J. and Frieda Neil’s House (1950) in Minneapolis. Drawing on my experience in the Neil’s House, supplemented by an archive on its design and construction, research on Wright’s Usonian ideology and theoretical scholarship on the built environment’s formation and reproduction of gender relationships, I critically analyze my connection to the Neil’s House and situate the house within broader sociospatial frameworks. My presentation considers the Neil’s House through the social, cultural and spatial construction of gender. Using Judith Butler’s theories of gender as performance, I ask: How are Wright’s Usonian designs, and the Neil’s House in...
CS I: Artificial Intelligence, Applied
OLIN 129
Andrew Harvey, moderator
MiraLaFond, coach
9 a.m. MADI CROWLEY, RUILONG ZHUANG, WYVEN XHANG, ANDREW YEOING, Building an Automated Crossword Solver
How long would it take you to solve the New York Times crossword puzzle? Are there some clues that you could easily solve with a computer? To solve the puzzle you could use algorithms from AI! In our presentation, we explain our approach and algorithms behind building an automated crossword puzzle solver. Understanding and finding answers to the clues in a crossword puzzle requires broad and specific knowledge on a variety of topics, which makes it challenging for both humans and computers. While several advanced automated crossword puzzle solvers exist, none is able to surpass its human counterparts. In our presentation, we explain our approach and algorithms for filling a crossword grid given the constraints imposed by words and our process of training the computer to understand crossword clues.
Faculty Sponsor: Andy Exley and John Stratton

Science and Health
SCIENCE 100
Audrey Benner, moderator
Sophie Grossman, coach
9 a.m. SCARLETT HE, Comparison of Diclonization Rates of Dental Restorative Materials with Bovine Dentin
Restoration is the most prevailing procedure in dentistry today; however, it is very prone to failure. To increase the life of dental restorations, researchers and manufacturers try to mimic a tooth's natural demineralization and remineralization in the restorative materials. Although many types of restoratives exist, their ion exchange properties have never been compared with real dentin. I aim to compare the fluoride and calcium exchange rates of dental restorative materials with those of bovine dentin in order to determine the synthetics’ demineralization and remineralization capacities. I incubated freshly collected bovine dentin and five restorative materials in deionized water, measuring weekly for calcium and fluoride release. I found that glass ionomer has a significantly higher fluoride deionization rate than other materials. I also determined that there is no synthetic material releases calcium at a rate as high as bovine dentin. My findings can help dentists and patients make informed decisions when preparing treatment plans.
Faculty Sponsor: Michael Coronado and Frank Dunnivant

Molecular Matters
SCIENCE 159
Ethan Raffman, moderator
Bella Rivera, coach
9 a.m. JACK TAYLOR, NICK MCCLELLAN, A Comparison of Exact Stochastic Simulation Algorithms for Chemical Reaction Networks
Exact stochastic simulation methods are a class of algorithms that can be used to model randomly occurring chemical reactions. There are many approaches to accomplishing this task, so it is hard to determine which algorithm is suited for a particular model. In our presentation, we shall introduce the most modern exact stochastic simulation algorithms and evaluate their merits and shortcomings. Through the experimental analysis, we will identify key features of the model being simulated that affect the efficiency of the different algorithms. We will then present data that demonstrate exactly how each of the algorithms is affected by these features.
Faculty Sponsor: John Stratton

DGT Techniques
9:15 a.m. LIAM TIWOMEY, MAXWELL BROWN, Enzymatic Biomethylation of Toxic Carbon Monoxide
Biochemical systems offer chemists unique opportunities to learn from the accumulated wisdom of nature. Certain organisms have evolved to produce specialized proteins which perform specific chemical reactions at much higher efficiency than possible by traditional laboratory methods. Our focus is the soil bacteria Olethropsia carboxidovorans that detoxifies the air as part of its metabolic process by converting toxic carbon monoxide to less toxic carbon dioxide. In particular, this process is facilitated by the molybdenum- and copper-containing enzyme carbon monoxide dehydrogenase (CODH). Because this enzyme is fragile when isolated, the metabolic intermediates of all steps are, unfortunately, difficult to observe experimentally. Hence, we seek to better understand its reaction mechanism via computational modeling of the enzyme’s structure, with the intention of determining a robust approach for modeling other poorly-understood molybdenum enzymes.
Faculty Sponsor: Delta Biswas

9:30 a.m. ISABEL GOUGH, Nickel Adsorption Rates Through the Uterus
Do you want to sound like Selena Gomez? You can! Almost all artists today use autotuning to some degree. AutoTune is built using an algorithm called the fast Fourier transform (FFT), a process that works similarly to the way ears process acoustic sounds in a wave in order to manipulate them without altering the speed. Our presentation will give a high-level description of the way that ears process pitch detail, our algorithm and include a live demonstration of our user-friendly application that can help anyone sound like an A-List music star.
Faculty Sponsor: Andy Exley and John Stratton

The DGT or diffusive gradients in thin film technique provides information about how readily metals and other chemicals can be taken up by organisms. The rate of uptake of metal ions passing through a gel barrier gives an estimate of metal bioavailability and may reveal the pathway of metal uptake. I worked with creating different gels to vary the rate of nickel diffusion in the presence of various chelating reagents. Nickel and other trace metals are often introduced into the environment as waste from mines, smelters and paper mills. When these metals are in the environment, they become potential toxins to living organisms. Accurate models of nickel bioavailability in the environment are important to understanding its toxicity to living organisms.
Faculty Sponsor: Nate Boland

9:45 a.m. ETHAN RAFFMAN, Mystery 185: An Unexpected Acatelion Reaction for Carboxenones
Carboxenones are small clusters of boron and carbon atoms with unusual properties due to their highly delocalized electronic structure. While they have potential uses in medicine and various materials, as inorganic molecules their properties are not as well understood as those of similar organic structures. Metal-catalyzed cross-coupling reactions are a potentially powerful tool to add relevant carbon-based functional groups to the clusters, but few reactions are known for the CB3 cluster. When nickel was used as a catalyst, a phenyl group to the cluster, we instead discovered a bizarre reaction to add an acyl (carbonyl) group to the cluster. I believe this proceeds through an unusual mechanism, with a suspected anhydride intermediate formed in situ. In my presentation I describe both the findings of my presentation and our related findings.
Faculty Sponsor: Mark Juhasz

ISO) in an acute setting (30 minutes and 1 hour), β-AR-induced mitochondrial fission resulted in hyperpolarized membrane potential, indicating that β-AR signaling enhanced mitochondrial fusion; chronic stimulation led to a depolarized membrane and thus deficiency.
Faculty Sponsor: Michael Coronado

9:30 a.m. MICHAEL WIU, Development of MERS-Specific Antibodies
MERS (Middle East Respiratory Syndrome), an illness caused by a coronavirus, is easily transmitted between people in close contact. SARS has a pronounced cough and shortness of breath; the observed mortality rate is approximately 35%. MERS treatments can only attempt to relieve symptoms because there is no MERS-specific antiviral treatment. Thus, it is crucial to develop a more effective treatment that can be used in future MERS outbreaks. Antibodies, proteins produced by our immune system, use multiple mechanisms to protect us from pathogens. I am working on the expression of MERS-specific antibodies and the determination of their binding affinity to virus antigens. I cloned and sequenced antibody fragments, then expressed and purified the resulting proteins. Finally, I tested the binding affinity of these antibodies to MERS antigens. My research helps to identify antibody sequences that specifically bind MERS, laying the groundwork for clinical trials.
Faculty Sponsor: Elizabeth Danka

9:45 a.m. SEX HUNG, Sex-Specific Mitochondrial Adaptations to Endurance Exercise
Mitochondria are a big deal in the realm of aerobic exercise. Previously thought of as static organelles, they actually undergo cycles of fission and fusion in order to generate the energy needed for a marathon runner to cross the finish line. However, while it is generally accepted that mitochondria are the powerhouse of the cell, sex-specific differences in mitochondrial dynamics during aerobic exercise are largely unexplored. I provide evidence that sex-specific differences in exercise-induced mitochondrial dynamics seem to be responsible for disparities in aerobic exercise performance between males and females. My lab has shown that mitochondria isolated from mouse hearts utilize sex-specific mechanisms and adaptations in response to acute and chronic aerobic exercise.
Faculty Sponsor: Michael Coronado

10 a.m. AUDREY BENNER, Assessing Proteoglycan in Female Athletes to Explore its Potential in Neuroprotection
Female athletes experience the highest rate of sports-related concussion events and are likely to experience more severe outcomes following trauma. Research suggests that hormonal fluctuations associated with the menstrual cycle may exacerbate recovery from head injury. To interrogate this possibility, I investigated the sex hormone proteoglycan to evaluate its potential neuroprotective properties. I analyzed salivary proteoglycan levels in female athletes at the beginning and end of their athletic
SESSION 1

Mythology, Antiquity, Modernity
KIMBALL THEATRE
Sarah Fassio, moderator
Holden Gaupo, coach

9 a.m. REEVE BOYER, Crossing the Boundary: Journey Myths in Ancient Greece

to traveled the world to become Isis. Jason sailed the Argo to find the Golden Fleece. Odysseus wandered and endured to find home. I analyze by comparison the journey myth as a representation of how ancient Greeks saw the world and how the hero’s journey depicts a broader understanding of a relationship with the divine. As the hero leaves “civilization” behind and reaches the end of the maps, what then? Beyond the edge of a map, I argue, lies a lack of knowledge, an irrationality that can be associated with the inhuman and godly. These stories provide a new window into this boundary. The myth of the voyage and the end of our culture and structure how we think, yielding a view of what the world is and how we fit in it.

Faculty Sponsor: Kate Shea

9:15 a.m. LEILA HAUSER, Unearthing the Legacies: Sex, Women and Power in Ancient Greece and Rome

My presentation explores the dynamic of women and sex in ancient Greece and Rome, focusing on the power differentials behind and reaches the end of the maps, what then? Beyond the edge of a map, I argue, lies a lack of knowledge, an irrationality that can be associated with the inhuman and godly. These stories provide a new window into this boundary. The myth of the voyage and the end of our culture and structure how we think, yielding a view of what the world is and how we fit in it.

Faculty Sponsor: Kate Shea

10 a.m. SARAH FASSIO, Collapsing Time: Memory and Monuments in Rome's Campus Martius

The physicality of a landscape and its architecture has the powerful ability to serve as a tangible source of collective memory. Such is the case with Rome’s Campus Martius (or, “Field of Mars”), a space filled with monuments, temples, theaters and columns located at the city’s northern edge. My research analyzes how these enduring physical structures perpetuate ideologies that influence a collectively remembered “Roman identity.” To this end, the impact of Roman military culture is considered, as are traditions of public dedications and sacred rituals. By evaluating monuments existing in both the Republican and Imperial periods and in the twentieth century moving forward, a fluid perspective of time is captured, diverging from traditional historical differentiations between “antiquity” and “modernity.” The Campus Martius embodies the multifaceted nature of Roman memory, stabilized and perpetuated via its monuments and topography.

Faculty Sponsor: Sarah Davies

10:30 a.m. ELLI HOLIDAY, Age of the Last First Citizen: The Neronian Period

The death of Nero in 69 C.E. left a monumental power vacuum in the highest levels of Roman government and society. The Julio-Claudian dynasty had ruled Rome for nearly 100 years with little interruption. Under Julio-Claudian stewardship, Rome was transformed from a republic to an imperial dictatorship. Its system of rule—the “principe” (by law, “first citizen”; in practice, emperor)—had become such a powerful and entrenched position that it survived the cruelties of Titus, the purported insanity of Caligula and the tyranny of Claudius. The death of Nero marked the end of the dynasty, a potential turning point, possibly even a chance for Romans to reconstrue their government. Such reform did not take place. Instead, the system hurtled forward under a new dynasty and, sadly, the fascinating (and pertinent) Neronian period was consigned to the dustbin of history.

Faculty Sponsor: Sarah Davies

9:45 a.m. W.EAST BALES, Unearthing Imperial Classicism: The Power of Aesthetics in 18th-Century English Estates

My presentation analyzes “classical” imagery as a powerful aesthetic in English estates and landscapes. It sheds light on the ways authority was asserted via visual claims to Britain’s roots in the Roman Empire. At the same time, it demonstrates how notions of the “classical” became the mode for performing virtuous refinement. Through their estates, elite Englishmen blended their civic and personal lives, thoroughly inscribing classical ideals into both public and private realms. My paper seeks to become a provocative study of British (and “Western”) style and carry their message of imperial superiority in a warped appropriation of Greco-Roman “origins.” What continues today to convey status and power? Is the meadowed marble and column still by asking how British elites were so successful in establishing an aesthetic of power and supremacy, can we look beyond the estates themselves and engage in what scholar Ariella Azoulay refers to as “unlearning imperialism.”

Faculty Sponsor: Sarah Davies

9:15 a.m. NIKKI DELGADO, LEAH MORTIMER, Effects of Maternal Stress on Fetal and Child Brain Development

Research has shown that elevated maternal cortisol levels as a result of a maternal history of childhood maltreatment or life stress, can negatively impact fetal brain development. Cortisol exerts its effects via the hypothalamic-pituitary-adrenal (HPA) axis, which controls stress on the human body. The adverse functioning of the HPA axis can lead to many negative physical, emotional and social consequences for the developing child. Furthermore, a history of maternal childhood maltreatment can potentially affect perceived parental self-efficacy, which could negatively impact the development of neural systems in childhood, specifically due to poor parenting behavior. Our research examines the effects of elevated maternal cortisol levels on fetal HPA axis development, as well as how a maternal history of childhood maltreatment may influence perceived self-efficacy as a future parent. Thus, we hope to emphasize how maternal childhood maltreatment is a public health problem with various consequent repercussions for children.

Faculty Sponsor: Laureen Berger

9:30 a.m. SAMARAH URIBE MENDez, CAM SIPE, BECCA LIm, Does Classroom Diversity Matter? Racial/Ethnic Identity and School Belonging

School belonging is a critical component of adolescent development that has been linked to positive outcomes. Classroom composition can impact feelings of belonging among students. Our research examines the relationship between classroom diversity, school belonging and an individual’s racial/ethnic identity. Students from three area high schools were invited to participate in our study. We find that classroom diversity in the classroom helps students develop their racial/ethnic identity and that a more positive racial/ethnic identity is associated with a sense of school belonging. Our study will provide greater understanding of the role that schools play in the well-being and academic success of ethnic/racial minority students. Our findings may better inform the decisions made in American classrooms as they grow more diverse.

Faculty Sponsor: Stephen Michael

9:45 a.m. BELLAL BLAnco, Role of Facial and Contextual Cues on Racial and Ethnic Categorization of Mixed-Race Individuals

The mixed-race population is the fastest-growing racial group in the United States, but our understanding of how multiracial are perceived by others is limited. Previous research on racial categorization has focused on the dynamic interactive theory (model) of person construal, which suggests that perceptions of others involve interactions between low-level processing of facial, vocal, and body cues and high-level cognitive states (social categories and stereotypes). I examine how the theory applies to categorizing mixed-race individuals. While the general process of racial categorization works quickly with facial cues, categorizing mixed race faces may be more difficult due to lack of exposure to mixed-race people and the incompatibility of ambiguous faces with pre-existing racial schemas. I examine how facial cues or contextual cues are more predictive of racial categorization of monoracial and mixed-race individuals. My study also considers how familiarity with certain ethnic minority populations may influence accuracy and confidence of categorization.

Faculty Sponsor: Lauren Berger

10 a.m. BRYANNA SCHEBREI, JESSIE MANO, The Effect of Mental Toughness and Mood on Performance in Athletes and Non-Athletes

Mental toughness is the psychological edge that enables people to better handle adverse situations and remain focused on achieving their goals. Research suggests that athletes who possess high levels of mental toughness exhibit more perseverance under adversity, potentially due to their ability to effectively regulate emotions in challenging situations. Our presentation is based on a study examining how mental toughness influences perseverance on a difficult task in a non-athletic setting when paired with mood. We measure participants’ mood and mental toughness, then present images to induce the mood, examine their perseverance with a task and then measure mood and demographics. We expect those with higher mental toughness levels to persevere longer than those with lower levels, especially when in a negative mood. Our research will add to the literature by aiding in the conceptualization of mental toughness.

Faculty Sponsor: Stephen Michael
Session 2
10:45 a.m. - Noon

Hispanic Culture
OLIN 138
Yann Dardonville, moderator
Zidane Galant-LaPorte, coach

10:45 a.m. YANN DARDONVILLE, MADI CROWLEY, TINA DILWORTH, LEILA HAUSER, WHITNEY RICH, Memory, Gender, Trauma: Considering the Complexities of Hispanic Culture

Our group presentation showcases the culminating work of Whitman's Hispanic Studies majors, demonstrating the breadth of our research and highlighting the numerous connections between our projects. Hispanic Studies seniors were tasked with an original research project based on the critical analysis of an aspect of Peninsular, Latin American and/or U.S. Latina narrative, verse, performance and/or visual culture, all examined through one or multiple theoretical lenses/methodological approaches. Collectively, these projects represent a diversity of geographic spaces (Argentina, Peru, Mexico, Spain) and a variety of historical periods (from 17th-century Baroque to the 21st century). They explore the social, political and cultural implications of various works of literature, film and theater and engage with themes of indigeneity, memory, the commodification of culture, gender identity and societal trauma. Together, they exhibit the power of literary analysis as a vehicle to understand the complexities of the Hispanic world.

Faculty Sponsor: Nico Parmley

CS II: The Match Game, Automated
OLIN 129
Ian Hawkins, moderator
Jamie Gold, coach

10:45 a.m. KIMBERLY TAYLOR, ROBERT QIN, CHARLIE SCHNEIDER, BUYAKI NYATICHI, Automating Mentor-Mentee Matching

The Whitman Mentor Program is a community service program offered through the Student Engagement Center that builds supportive mentor-mentee relationships between Whitman students and students from Walla Walla elementary schools through weekly meetings. Our project automates the mentor-mentee matching process, allowing program interns to better utilize their limited on-the-job hours. We streamlined the mentor and mentee information-entry process using Google Forms and Google Sheets. Eligibility criteria for matching mentor-mentee pairs include gender, language, transportation and availability, all of which complicate the matching process. Because of the types of these constraints, we found that eligible matches could be modeled in a bipartite graph. We wrote a modified bipartite matching algorithm to solve the problem and created a plugin that uses Google Apps Script to extract data from Google Sheets, build potential matches and formulate the best possible matching scenario.

Faculty Sponsor: John Stratton

Bio I: Plants and Animals
SCIENCE 159
Silas Miller, moderator
Alex Brockman, coach

10:45 a.m. PERTH SETHAPANICHSAKUL, Reconstruction and Pairing of Mamenchisaurid Dinosaur Lower Jaws from Thailand

Dinosaur fossil excavation often yields misshapen or scattered specimens that can be difficult to study. In recent years medical technology has been applied to paleontology to help work around these obstacles. Methods such as computed tomography (CT) scans are very popular for their ability to reveal the inner structure of fossils and help separate bone fragments from sediments that cannot be removed. My study aims to build on these
Age of Climate Change

Two Species of Redstarts in the Tilarán Mountains of Costa Rica in an Age of Climate Change

The narrow elevational ranges of tropical montane species are typically used to track the elevational range of climate change. As these species move upward in elevation; the population in the Monteverde cloud forest of Costa Rica.

11:15 a.m. OLIVIA STEINMETZ, Yellowtail Fisheries, Inc., to assess altitudinal shifts in their populations in the Monteverde cloud forest of Costa Rica. The slate-throated redstart may be replacing the collared redstart as these species move upward in elevation; the collared redstart, a highland endemic, is in danger of being pushed off the top of the mountain as a result of increasing temperatures and rising cloud banks, a defining feature of this fragile ecosystem. I found that between 1998 and 2019 the mean elevation of the slate-throated redstart rose, while in recent years the collared redstart was notably absent from the lower elevations where it was previously observed. Long-term data will help researchers better elucidate these range shifts.

Faculty Sponsor: Tim Parker

Estimating Rockfish Fecundity

I investigated novel methodologies for estimating fecundity, a key biological parameter, for rockfish (Sebastes) fisheries management plans; however, the amount of existing lower jaw specimens from mamenchisaurid dinosaurs uncovered from a single locality in northeastern Thailand. Every year, ocean conditions and available energy resources fluctuate, resulting in varying egg production. Fecundity estimates are important for sustainable fisheries management plans; however, the amount of time required to estimate fecundity by manually counting eggs leads to less available biological data. To improve fecundity data availability, I used an efficient auto-diametric method to develop calibration curves for estimating fecundity of three rockfish species, Roxy rockfish (S. roxseus), Yellowtail (S. ruberrimus) and Chilipepper (S. goodei). Each curve used the relationship between mean egg diameter and egg density to estimate fecundity. Once a calibration curve is developed, fecundity is quickly estimated by semi-automated imaging and measurements of mean egg diameter. I found that curves must be species-specific.

Faculty Sponsor: Michael Coronado

Study the Plant Hormone Auxin

The plant hormone auxin plays a key role in growth and development, activating a wide range of genes involved with functions such as responding to light and lateral root and bud formation. To detect this hormone, a biosensor was designed that glows when auxin is present, allowing researchers to quantitatively measure auxin’s concentration and location in plants. However, pilot testing in yeast caused sickly cells, likely due to over-expression of the biosensor. My research focused on lowering expression to healthier levels. One approach involved re-coding the gene’s DNA sequence, which resulted in healthier cells but a dim fluorescent signal. Another method, tweaking the regulatory DNA sequences preceding the gene, yielded a strong signal and maintained healthy cells. My findings suggest the latter approach could be optimized for a viable final biosensor design. Once additional components of the biosensor have been optimized in yeast, the biosensor will be implemented in plants.

Faculty Sponsor: Britt Moss

The Physical World

11:45 a.m. SILAS MILLER, Designing New Biological Tools to Study the Plant Hormone Auxin

Auxin is a plant hormone that is crucial for nearly every aspect of plant growth and development. Understanding how this hormone works could open new doors for agricultural scientists to maximize crop efficiency in the face of climate change and accelerating population growth. However, existing tools for studying auxin are not ideal for use in plants. I am working to help build and test a new auxin biosensor, ShadowAuxin, capable of accurately measuring auxin in live plants. The fluorescent biosensor relies on two proteins that are dark when close together but emit light when separate. Early experiments in yeast cells have shown that this phenomenon is measurable and have revealed specific aspects that require troubleshooting. Next, I will test different methods of attaching the proteins together for maximum efficiency. Ultimately, this fluorescent system will be coupled with an auxin-sensing domain to create a biosensor that reports auxin by producing light.

Faculty Sponsor: Brit Moss

The Magmatic Processes That Shaped the 1870 CE Eruption of Ceboruco Volcano, Mexico

We noted that light-induced ion migration can have both a beneficial and a detrimental impact on the stability of the material, as long-living carrier traps of halide defects induce defect healing while at the same time promoting bimolecular reactions of neutral iodine (I0) to form I2.

Faculty Sponsor: Barbara Sanborn

11:15 a.m. MJ WILNER, The Role of Pore-Fluid Pressure on the Stability and Form of Faulting of Ocean Island Volcano Flanks

Volcanoes are known to expand laterally when their flanks slip outward along faults or when they catastrophically collapse. This study of Kilauea’s south flank used a two-dimensional, finite-difference model to examine the characteristics of movement and faulting in response to physical parameters including volcanic slope, sea level, frictional strength, pore-fluid pressure and magmatic intrusions. The basal layer, representing buried oceanic sediments, is likely to be weaker than the volcano itself and it was modeled with varied parameters. Models indicate that the presence of a shoreline and water trapped in the pores of the rock, which causes a high pore-fluid pressure, tend to destabilize the flank. The model produced shallow faults when both the interior of the volcano and the base had low internal frictional values and high pore pressures and slip along the base occurred when the basal layer was weaker than the rest of the volcano.

Faculty Sponsor: Kirsten Nicolaysen

Volcanoes draw our attention through their usually explosive surface behavior. Yet, there is a suite of processes that are not visible occur in the hidden magma bodies prior to volcanic events. These processes shape the nature of eruptions and can be interpreted with detailed analyses of the petrology and geochemistry of resulting volcanic rocks. I investigate the lavas of the 1870 CE eruption of Ceboruco, a volcano in Nayarit, Mexico, to understand which pre-eruption processes took place in this system. Bulk and mineral compositions, textural observations and phase equilibrium estimates provide us with a picture of different phenomena that took place prior to the eruption, such as magma mixing. These methods can also be applied to deduce the spatiotemporal relations of the lava flow and volcanic domes that belong to this event. Understanding these processes is important in order to enhance our preparedness toward future hazards associated with this volcano.

Faculty Sponsor: Kirsten Nicolaysen

11:45 a.m. HENRIQUE ENNES, Is Quantum Mechanics That Weird? A Study of the Classical Limit Through Atoms

Pop culture, passing through the universe of “The Avengers” and the adventures of James Bond, has adopted quantum mechanics to “scientifically” any weird plot trend that seems implausible to the general public. Even scientists use the term “quantum weirdness” to explain why some natural behaviors...
are so different from our intuition, born and raised in the realms of classical physics. Such awkwardness of the very small world has been used to suggest the very trendy argument that there are two distinct kinds of physics, depending on the scale in which the science is happening. Is such an idea true? Is quantum physics indeed so different that it requires the study of a whole new description of nature, or is there any place where it agrees with what we think it should be?

Faculty Sponsor: Barbara Sanborn

The Arts and Its Discontents
KIMBALL THEATRE
Bryn Carlson, moderator
Helene Backus, coach

10:45 a.m. CLAIRE WEISSMAN, Mirror of Frustration: Shakespeare’s “Tempest” and Césaire’s “A Tempest”

Aimé Césaire’s “A Tempest” presents an inverted mirror of Shakespeare’s “The Tempest.” In Shakespeare’s play, Caliban’s and Ariel’s stories lack conclusions. Caliban’s story ends when he is sent to Prospero’s cell; it’s unclear where he proceeds after that. Ariel’s story stops when Prospero says, “Be free and fare thou well,” which draws no reaction. From there, Prospero pivots directly to his epilogue. Conversely, Césaire focuses on Prospero’s treatment of his slaves, eventually showing us that Prospero’s desire to rule over them is stronger than his desire to rule over the people of Milan. I maintain that this strategy creates frustration for the audience, which matches the frustration we should have felt (but perhaps didn’t) at the egregious oversight Shakespeare makes by neglecting to provide an actual ending for Caliban and Ariel. Césaire’s mirror reveals Shakespeare’s gaps by making the once invisible visible.

Faculty Sponsor: Jennifer Mouat

11 a.m. HOPE GIDDINGS, Kansas City Plays Itself

Much has been made of the relationship between the city of Los Angeles and the films that are filmed on location there. Significantly less has been made of Kansas City and its film legacy. In 1995, Robert Allman shot the eponymously titled “Kansas City” in the heart of the city’s downtown. Set in the 1930s, the film explores Kansas City’s seedy past through events that have become an important part of the way the public understands its past and present 25 years after the film’s release. My research examines the relationship between film and place through a discussion of “Kansas City” that incorporates a formal analysis of the film with ideas about the role popular culture plays in the retelling of history and the formation of public memory.

Faculty Sponsor: Lisa Uddin

11:15 a.m. NATALIE FLAHERTY, Race Through Time: Wendy Red Star’s “Exit”

Concepts of time inform our sense of the world as well as the art we make and consume. In my presentation, I examine how time informs our feel and see race in Wendy Red Star’s 2010 lithograph, “Exit.” I place “Exit” in conversation with the colonial renditions of Native American subjects in portraiture from the late 19th and early 20th centuries. Through line, color, textiles and subject, Red Star draws attention to time in “Exit.” In doing so, she redirects and challenges colonial concepts of time, depicting Native American subjects simultaneously in the here and now and nowhere specific at all. This nuanced treatment of her subjects complicates long-standing representations of the “noble savage” and orients viewers toward a different, sensory understanding of Native American experience.

Faculty Sponsor: Lisa Uddin

11:30 a.m. CHLOE MICHAELS, The Hunger for Representation: Mexican-American Food in Paul Valadez’s “Songbook”

“Selections from the Great Mexican-American Songbook” is a series of collages created by Mexican-American artist Paul Valadez that visually represent the pressures and challenges of existence as a Mexican-American in mid-20th century U.S. society. The collages juxtapose images of racial violence with popular imagery and references to music and traditional Mexican food. In my presentation, I consider how Valadez’s work rewrites historical memory that has excluded (or reduced) Mexican-American experiences from its purview. I focus on Mexican cuisine as a racially charged hunger for representation that parallels a white-American hunger to consume Mexican-American food and culture. Invoking and critiquing hunger, all of it with a strong current of humor, Valadez’s “Songbook” moves between the Americanization of Mexican food and the experience of racial suffering.

Faculty Sponsor: Lisa Uddin

11:45 a.m. BRYN CARLSON, Unfinished Business: Mobility and Genealogy in “Midnight’s Children” and “The Satanic Verses”

My presentation focuses on the ways depictions of mobility and speed indicate ethical arguments in Salman Rushdie’s “The Satanic Verses” and “Midnight’s Children.” I use Homi Bhabha’s arguments about “double inscriptions” and Edward Said’s argument for the destabilization of colonial power to examine “Midnight’s Children” as an account of how genealogies move. I argue that the hybridity Rushdie embraces in “The Satanic Verses” makes possible certain kinds of mobility. I define and discuss an ethic of mobility, demonstrating how Rushdie’s novels indicate that mobility creates possibilities for relations. Addressing hybridity and movement as literary themes, I discuss how Rushdie’s narrative techniques themselves reflect possibilities through mobility.

Faculty Sponsor: Gaurav Majumdar

Media and Message
REID GOZ
Claire Garrett, moderator
Jonathan Falk, coach

10:45 a.m. CAMILLA TARPEY-SCHWED, “Pride”: An Ideograph

Many Americans have attended a gay Pride parade or have seen images of rainbow-themed celebrations on television. Accordingly, many individuals associate the word “pride” with a celebration. I complicate this narrative by rhetorically analyzing pride as an ideograph and situating pride in multiple historical contexts within the gay rights movement. An ideograph, in this context, is a higher-order abstraction representing collective commitment to a particular ambiguous normative goal. I argue that Pride as an ideograph has evolved to represent both the historical battles and the continuing political commitment of the LGBTQ community to equal rights and acceptance in society. The meanings associated with the Pride movement today are different from what Pride represented in the past. Today’s celebrations commercialize Pride, minimizing its message and perpetuating the false narrative that the gay community has achieved all it can.

Faculty Sponsor: Kaitlyn Patia

11 a.m. NICK QUAZZO, Effects of Positive Psychology on Social Media Addiction

My presentation distills a group study examining the degree to which social media activity exacerbates the anxiety of individuals who use it. Existing research generally shows an increase in anxiety when users cannot access social media. Our study adds to this area of focus by establishing conditions for participants that reduce social media interaction. The study implements an intervention to counter the anxiety experienced by participants as a result of reduced access to social media. The study is based on previous research that demonstrates the negative effects of social media usage on an individual’s self-esteem. Our intervention utilizes a method from positive psychology, a subset of psychology that has gained traction over the past few decades. If successful, our study will show that positive psychology strategies are effective in countering anxiety produced by engagement with social media.

Faculty Sponsor: Nancy Day

11:15 a.m. CLAIRE GARRETT, EMILY GOLDFARB, ADDISON SCARFF, Effects of Choice-Based Ads on Perceived Ad Intrusiveness and Effectiveness

Research shows that interactive advertisements are more effective than non-interactive advertisements, but the underlying mechanism remains unclear. Based on theories of control and cognitive dissonance, our study examines the relationship between ad choice (vs. no choice) and perceived ad intrusiveness and effectiveness. We hypothesize that choice-based advertising will be perceived as less intrusive and more effective than no-choice advertisements. We also hypothesize that perceived ad intrusiveness will mediate (i.e., partially explain) the relationship between choice and perceived effectiveness. In our study, participants watched a 12-minute video clip with either a choice-based (experimental condition) or no-choice (control condition) ad in the middle. If results support our hypotheses, our study fills a gap in advertising research and proposes a psychological mechanism to help explain the effectiveness of choice-based interactive advertisements. Our research may inform future advertising strategies, justifying the current trajectory toward increased ad interactivity while simultaneously improving user experience.

Faculty Sponsor: Lauren Berger
Session 3  
3 - 4:15 p.m.

Cultural and Community Responsibility  
OLIN 138
Grace Dublin, moderator  
Zidane Galant-LaPorte, coach

3 p.m. ELI BAEZ, Hybrid Forms, Concepts and Solutions: Navigating Increased Western Influences on the Indonesian Traditional Textile Ulos  
The Toba Batak sub-ethnic group in Indonesia is well-known for its weaving of the traditional textile ulos. At the same time that they uphold ancient Batak traditions of textile weaving, the Toba Batak people are at the nexus of a growing textile industry on national and international scales. As Western interests further influence Indonesia’s economy—the textile industry in particular—Indonesian concerns about the production of ulos become more and more urgent to address. The concern that ulos will be replaced by modern, Western styles of clothing and production gives rise to a more pressing fear that weaving traditions will fade from cultural awareness entirely. In my presentation, I share the uniquely Indonesian strategies utilized by the Toba Batak people to conserve their cultural knowledge and traditional weaving practices, all while adapting to shifting trends in the textile industry in order to keep ulos relevant yet authentic.  
Faculty Sponsor: Krista Gulbransen

3:15 p.m. TORI LONDRIGAN, Legal Responsibilities of Citizens for Solid Waste Management in Siem Reap, Cambodia  
Cambodia is one of the fastest-growing economies in the world, but developing infrastructure needed to support this growth can be a challenge. One example is in the management of solid waste. Although Cambodia has established regulations for solid waste management, public participation in the private collection service, Global Action for Environment Awareness (GAEA), is low and trash is often dumped or burned in empty lots. I aim to understand how citizens’ legal responsibilities for solid waste management are communicated, encouraged and enforced in Siem Reap, Cambodia’s second-largest city, through the analysis of legal documents and interviews with key stakeholders (citizens, city commune leaders, GAEA representatives). Results indicate that citizen participation varies depending on efforts of their commune-level government to raise awareness and enforce the law. Recommendations inform the development of Siem Reap’s 2020 waste management plan, with considerations for economic accessibility of collection services and other observed barriers to participation.  
Faculty Sponsor: Heidi Dobson

3:30 p.m. MAT CHAPIN, TRICIA FERRER, Visibility of Homelessness in Seattle: A Historical Critique  
Seattle residents are increasingly concerned about the visibility of homelessness in their neighborhoods. Yet, large-scale homelessness in the city is not new; nor is the rhetoric surrounding it. Our research aims to compare responses to homelessness by the middle/upper class during the Depression and in the present. We identify the effects of visible shantytowns (or “Hoovervilles”) in the past to contextualize the current homelessness issue in Seattle. Comparing these eras, we critique the fight against homelessness, past and present, as a beautification campaign rather than an initiative of humanitarian aid and argue that mainstream approaches to the homelessness epidemic are fundamentally flawed. Our sources—official documents, letters and records from the Seattle Municipal Archives—contain arguments for and against the destruction of homeless encampments. Other sources include newspaper articles about Seattle’s Hooverville, modern public policy, media coverage of homelessness and recent activist movements.  
Faculty Sponsor: Nina Lerman

3:45 p.m. CAMERON CONNER, Creating an Inclusive Commons: Navigating Exclusion in a Community-Based Political Economy  
Since Elinor Ostrom’s groundbreaking text, “Governing the Commons,” earned the Nobel Prize for Economics in 2009, “commons theory” has come to be an increasingly important instrument for academics and activists alike who seek to disrupt systems of capitalist dispossession and exploitation. In practice, the political economy of the “commons” is based on a belief that individuals can come together to hold in common the elements most necessary for their collective well-being. Yet, theorists of this system often ignore a central conflict: the tendency for community to be built on shared characteristics that produce prejudice, discrimination and subjugation. My presentation explores and analyzes this tension, suggesting how
the inherent reliance of the commons on the power of the community also creates exclusion. My research is an attempt to better integrate equitable structures of inclusion into the commons and, in so doing, help it survive as an aspirational post-capitalist political economy.

Faculty Sponsor: Susanne Beechey

4 p.m. GRACE DUBLIN, Whitman College and the Washington State Penitentiary

The Washington State Penitentiary and Whitman College are only 2 miles apart, yet the interactions between these two cornerstone sites of the Walla Walla community in 130 years of co-existence are limited. Why is it that these two institutions do not interact more frequently in meaningful, mutually beneficial ways? In my presentation, I explore the historical relationship between these two institutions in order to examine the nature and the purpose of their interactions and the benefits and risks of this relationship. I also speculate about why the relationship has not expanded over time. Finally, I hope to illustrate the many benefits that might result from colleges and prisons creatively and thoughtfully working together in a symbiotic, less institutional way.

Faculty Sponsor: Keith Farrington

Philosophy: Tradition and Adaptation
OLIN 129

Mika Nevo, moderator
Jamie Gold, coach

3 p.m. SUNSHINE ALVAREZ DE SILVA, Could We Rest?

In “Avengers: Endgame,” before risking all that he holds dear, Tony Stark is asked by Pepper Potts if he could rest if he doesn’t do what he thinks is right. In Plato’s “Apology,” Socrates raises a potential question that he imagines the jury and audience at his trial could pose to him: Is he not ashamed of engaging in a practice that puts his life at risk? To this hypothetical question, Socrates replies that one should not consider the risk of life or death but rather if the action that one carries out is just or not, the work of a good man or a bad man. These two questions and the actions taken to address them, resonate with each other. What does this mean? Should we consider Socrates’ answer as the right one? Could we rest if we didn’t do the work of good people?

Faculty Sponsor: Kate Shea

3:15 p.m. ANDREAS GUERRERO, The Philosophy of Caroline of Ansbach

Caroline of Ansbach was a British monarch at the start of the 18th century. She was called the “Champion of Protestantism,” worked with Robert Walpole to govern the British Empire and corresponded with Voltaire. Though she never authored a philosophical treatise, she argued for the many benefits that might result from colleges and prisons creatively and thoughtfully working together in a symbiotic, less institutional way.

Faculty Sponsor: Keith Farrington

Unlikely Realities

3:45 p.m. FAYE LIU, On Miracles, Hume and Sor Juana

David Hume, in “Of Miracles,” delineates several defenses against proofs of miracles. One of his contentions is that miracles are “a violation of the laws of nature.” Sor Juana’s poem, “First Dream,” ends with a depiction of the sun overcoming night as she awakes. (“...the world illuminated and I awake.”) The poem serves as a challenge to Hume’s ideas on miracles. Taking a phenomenological approach, Sor Juana situates the shifts and movements within her dream (her unconscious). In my presentation, I explore miracles in the context of epistemology and political analysis. What does it mean to “demand the impossible”?

Faculty Sponsor: Patrick Frierson

Hume’s definition of miracles establishes them as inherently impossible. He argues that any encounter with an event that is perceived to be miraculous should be rejected on the grounds that it is contradictory to logic and probability. Such an approach to events that challenge our previously held belief systems poses a serious threat to discoveries and progress. In her own search for understanding, Sor Juana repeatedly encounters things that are incomprehensible to her. Her construction of knowledge is grounded in reason but
3 p.m. ALEX ZIBIKY, BLAKE KILLINGSWORTH, Anchoring of Glacial Melt Estimates: How Malleable Are Our Beliefs About Climate Change?

Anchoring is a cognitive bias by which prior exposure to a value affects future estimates by “anchoring” an individual’s estimate to the originally presented value. The anchoring effect has been found to influence decisions in a wide range of important situations, such as in buying a new home, negotiating a salary, or determining a criminal sentence. The influence of anchoring varies, depending on particular conditions. To address contradictions in prior research, we consider how the anchoring effect holds up over a time delay. We also consider how putting more thought into the anchor value impacts the degree of anchoring effect. We anticipate that our research will indicate that people can be effectively anchored even in ways that contradict their own stated belief in climate change. More broadly, our research will inform how we consume data in our everyday lives.

Faculty Sponsor: Wally Herbranson

3:15 p.m. CHLOE CAROTHERS-LISKE, Impacts of Community Economic Identity on Environmental Consciousness in Urban and Rural Washington

My research examines strategies employed by culturally dominant industries in metropolitan Seattle and rural eastern Washington — technology and agriculture, respectively — to achieve cultural significance in their communities and justify their right to pollute and otherwise impact the environment. I also explore how perceptions of and perspective on, environmental issues are shaped by the sociocultural dominance of a direct, land-use-based industry such as agriculture, in one case and an industry — technology — generally divorced from land use in the other case. In my research, I employ a mixed methodology of content analysis and semi-structured interviews. I ask participants a variety of open-ended questions to guide our conversation and allow them the freedom to respond however they see fit.

Faculty Sponsor: Alissa Cordner

3:30 p.m. GRANT GALLAHER, Effects of Climate Change Simulations on Summer sea Surface Temperature and Ecosystem Functioning of the Red Alga Neorhodomela oregona in the Intertidal Zone of Sitka, Alaska

Throughout the 21st century and beyond, anthropogenic climate change will fundamentally alter our oceans and the ecological and social systems that depend on them. I seek to quantify how tide pools and their inhabitants in Sitka, Alaska will be impacted by climatic conditions predicted for the year 2100. Heat and CO2 were artificially added to natural tide pools over a six-month period to illuminate the individual and interacting effects of these factors on intertidal biodiversity and ecosystem functioning. My analyses investigate how these manipulations impact growth cycles of the abundant red alga Neorhodomela oregona (Rhodomelaceae) and its relationship to ecosystem functioning through contributions to net community production and respiration. These insights will enhance efforts to make evidence-based conclusions, models and policy decisions regarding the future of our climate and planet.

Faculty Sponsor: Susanne Altermann

3:45 p.m. BLYTHE EICKERMAN, Nuclear Legacies: The Marshall Islands, Japan and Hanford

The Marshall Islands are the site of 67 nuclear tests conducted by the United States in the 1940s and 50s. This nuclear legacy connects the islands to Japan, the United States and, more specifically, Hanford, Washington. The effects of the nuclear tests are still felt by Marshall Islands communities. Minimal efforts have been made to publicize or fully document health and environmental effects as well as political and cultural implications of radioactivity on the islands. To better understand the nuclear past and present of the Marshall Islands, I conducted research that revealed impacts that are still felt to this day. I also discovered that the nuclear tests are not a stand-alone issue. In fact, the experience of displaced Marshall Islands populations is similar to that of Japanese Hibakusha and Hanford downwinders. My research shows the importance of education about these events, all in support of anti-nuclear advocacy.

Faculty Sponsor: Shampa Biswas

4 p.m. DYLAN SEIDLER, Southern Resident Orcas and Chinook Salmon: The Importance of Historical Context in Addressing Population Crises

Southern resident orcas are a subspecies of Orcinus Orca native to the Pacific Northwest. They rely on Chinook salmon for 80 percent of their diet. Chinook, in turn, connect southern resident orcas to the tribes of the Pacific Northwest, commercial fishermen, federal agencies and environmental organizations. These groups have very different relationships with southern residents and Chinook, thus they propose disparate solutions to the current population crisis. (Only 73 southern resident orcas remain.) My research focuses on the complex histories of Native Americans, commercial fishermen and local communities of the Pacific Northwest and how they interact with Chinook and southern resident orcas. Southern resident orcas did not decline overnight; a combination of historical and environmental changes led to the current crisis. Therefore, any long-term solution must be one of collaboration based on thorough and historical understanding.

Faculty Sponsor: Bina Arch

3:15 p.m. LIAM DUBAY, “Seven Sisters”: Character Piece for Clarinet, Cello and Piano

“Seven Sisters,” composed for clarinet, cello and piano, is a character piece that depicts the Pleiades star cluster. The opening theme, voiced by solo cello, is constructed from two related seven-tone rows that are inverted, retrograded, transposed and otherwise altered throughout the course of the piece. The ensuing material is divided into seven distinct sections, each of which represents one of the Pleiades sisters from Greek mythology. Each brief section attempts to capture the essential character of one of the sisters, incorporating melodic and rhythmic elements from the main theme in the process. The first section, representing the eldest sister, Merope, is composed only of transformations of the main tone rows. The following sections equally employ all seven pitches from the theme, but more loosely than in the first section. Before the work is performed, I will speak briefly about the compositional techniques I employed in each variation.

Faculty Sponsor: John David Earnest

3:30 p.m. RONJA MOKRANOVA, “Different Worlds”: Suite for Flute, Cello and Piano

“Different Worlds,” written for flute, cello and piano, comprises three movements and represents three perspectives on autism. The first movement is based on my father’s fast, rhythmically driven representation of family chaos caused by the unpredictable interactions of a father and his autistic son. A fragmented flute solo and sudden changes of meter augment the feeling of disorientation. The second movement depicts my mother and conveys pain, helplessness and hope. Lyrical themes supported by a gentle rhythmic figure in the piano characterize the opening section; an agitated middle section follows. The movement ends with a return to the lyricism of the opening. The third movement represents my brother: what the world looks like through the lens of autism. A sense of frustration is emphasized by rapid changes in dynamics and rhythmic energy. The purpose of my suite is to raise awareness of autism by sharing my family story.

Faculty Sponsor: John David Earnest
Leadership curriculum at Whitman pairs leadership study with leadership practice to help students grow as leaders. Outdoor Leadership courses introduce students to effective leadership strategies. Two multi-day backcountry trips serve as ideal opportunities to apply leadership skills learned in the classroom. They also provide the time and space for individual reflection and further learning. Multiday outdoor trips require group organization and collaboration. In the experience of a trip, everyone acts as a leader in some way. Students practice teaching, self-reflection and feedback to improve as leaders.

Faculty Sponsor: Stuart Chapman

3:30 p.m. CLAUDS BUERERMANN, Outdoor Recreation on Sacred Sites: History, Tension and Search for Agreement

My presentation examines leadership broadly and in the context of Whitman’s Outdoors Program. The Outdoor Leadership curriculum at Whitman pairs leadership study with leadership practice to help students grow as leaders. Outdoor Leadership courses introduce students to effective leadership strategies. Two multi-day backcountry trips serve as ideal opportunities to apply leadership skills learned in the classroom. They also provide the time and space for individual reflection and further learning. Multiday outdoor trips require group organization and collaboration. In the experience of a trip, everyone acts as a leader in some way. Students practice teaching, self-reflection and feedback to improve as leaders.

Faculty Sponsor: Stuart Chapman

3:30 p.m. CLAUDS BUERERMANN, Outdoor Recreation on Sacred Sites: History, Tension and Search for Agreement

My presentation focuses on research I conducted on the overlap of popular outdoor climbing sites in the Walla Walla Valley and sites deemed sacred or valuable to indigenous peoples in the region. I consider the political tension between outdoor recreation communities and indigenous communities over land use. I explore the history, cultural significance and stories of these areas for all who use them. My research will be compiled in a series of podcasts available to the community.

In considering the treatment of landscapes through two perspectives — as recreational areas or as sacred spaces — I aim to foster mutual understanding across groups about how meaning and value are attached to these lands.

Faculty Sponsor: Suzanne Morrison

Dance Theatre • Tanztheater (German Expressionist Dance)

How is avant-garde dance at an amateur level created, performed and received? As an extension of previous performances in the tradition of Tanztheater (“dance theater”), Whitman students Augusto Drumheller and Sophia Strabo have created a program that explores this performance form, which grew out of the German expressionist dance movement in Weimar and Vienna. Tanztheater combines dance, speaking, singing, chanting, conventional theater and the use of props, sets and costumes, all in an integrated event. This event featuring a performance by Drumheller and Strabo followed by a presentation of research and an open discussion between performers and audience. The choreography, six months in the making, depicts relationships of memory and presence.

Faculty Sponsor: Peter de Grasse
RESEARCH FUNDING SOURCES

Estella Bastian
University of California, San Francisco
Abshire Student Research Scholar Award, Whitman Internship Grant

Gustavo Bejar López
Abshire Student Research Scholar Award, Abshire Student Research Scholar Award, Whitman Internship Grant

James Bent
Faculty-Student Summer Research Award

Zane Boyle
Abshire Student Research Scholar Award, Faculty-Student Summer Research Award

Madeline Boyle
Faculty-Student Summer Research Award

Alex Gerber
Department of Psychology

Addison Scarff
M.J. Murdock Charitable Trust, National Science Foundation

Claire Garrett, Emily Goldfarb and Nadia Ganjoloo and Drew Conkin
Faculty-Student Summer Research Award

Lian Gamble
Faculty-Student Summer Research Award

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Haven Dick-Neal
Faculty-Student Summer Research Award

Casey Dox
Faculty-Student Summer Research Award

Liam Dubay
National Science Foundation

Noah Eberle
Faculty-Student Research Award

Henrique Ennes
Whitman Internship Grant

Faculty-Student Summer Research Award

Sara Federman
Andrew S. Mellon Foundation

Jaey Kim
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Loa Jones
Columbia Basin Agricultural Research Center at Oregon State University

Tori Londrigan
SFS: Cambodia Conservation, Ethics and Environmental Change

Estella Bastian
University of California, San Francisco

Michael Daniel
Abshire Student Research Scholar Award, Whitman Internship Grant, National Science Foundation

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Mika Nevo
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Arnold and Mabel Beckman Foundation, National Institutes of Health

Rudo Ndamba
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National Science Foundation

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Department of History, Whitman College and Northwest Archives

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National Oceanic and Atmospheric Administration

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Jack Taylor and Nick McClaran
Department of Computer Science, Faculty-Student Summer Research Award

Spencer Thulin
Faculty-Student Summer Research Award

Ngan Tran
National Institutes of Health

Walter Tunnell Wilson
Faculty-Student Summer Research Award, Whitman Internship Grant

Liam Twomey and Maxwell Brown
National Science Foundation

Eliza Van Wetter
Keck Geology Consortium

Kristen Wanie
Fred Hutchinson Cancer Research Center, Howard Hughes Medical Institute, National Institutes of Health

Jonathan Williams
Faculty-Student Summer Research Award

MD Wilner
National Science Foundation

Michael Wu
Whitman Internship Grant

Ale Zagata
Whitman Internship Grant

OFF-CAMPUS STUDY PROGRAMS

EI Baez
SIT: Indonesia Arts, Religion and Social Change

Matt Bihire
SEA Semester: The Global Ocean

Benny Jean Gyrnysbaum
SFS: Turks and Caicos Marine Resources Studies

Tori Londrigan
SFS: Cambodia Conservation, Ethics and Environmental Change

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UNDERGRADUATE CONFERENCE VENUES

1. Cordiner Hall
2. Reid Campus Center
3. Hall of Science
4. Olin Hall
5. Hunter Conservatory

- accessible entrance (with power door)
- accessible entrance (without power door)