

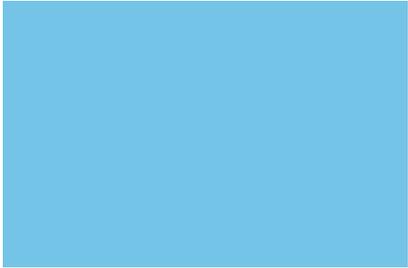
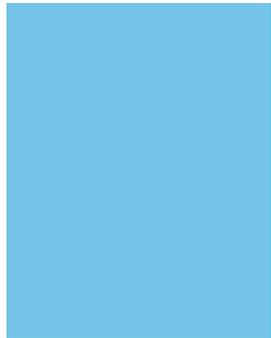


19TH
ANNUAL
WHITMAN
COLLEGE
UNDERGRADUATE
CONFERENCE



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Humanities & Arts



Natural Sciences & Mathematics




Social Sciences



Each year the Whitman Undergraduate Conference celebrates the scholarship and creativity of Whitman students over the course of a day devoted entirely to their accomplishments.

The 19th Annual Whitman Undergraduate Conference brings together students from every academic area of the college to share their research and creative projects with the campus community. The conference is noteworthy for its variety of presentations, which take the form of talks, poster presentations, musical performances and special exhibitions.

The projects in this program attest to the original work that Whitman students produce in their courses, senior theses, summer internships and study abroad.



WHITMAN COLLEGE

**UNDERGRADUATE
CONFERENCE
APRIL 11, 2017**

MUSICAL PERFORMANCES

MORNING INTERMISSION

10:15–10:45 a.m.

Hall of Science Atrium

WUC chamber ensembles

Ensemble I

Gioachino Rossini: Duet for Cello and Bass
(Andante molto)

Erin Cunningham, cello

James O'Brien, bass

Ensemble II

David Balakrishnan: Alex in A Major
Gweneth Walker: Short Set for String Quartet
(“A Splash of Cold Water”)

Robby Boyer, violin

Rose Heising, violin

Brad Kline, viola

Chris Dailey, cello

NOON INTERMISSION

Noon–1:00 p.m.

Reid Coffeehouse

WUC jazz ensembles

Jazz Ensemble I

GARY HEMENWAY, DIRECTOR

Jake Barokas

Isaac Berez

James Bogley

Hunter Dunn

Collin Faunt

Kevin Getty

Alex Ihle

Lukas Koester

Claire McHale

Thomas Meinzen

Takashi Olds

Peter Ramaley

Perth Sethapanichsakul

Hillary Smith

Tyee Williams

AFTERNOON INTERMISSION

3:15–3:45 p.m.

Reid Coffeehouse

Jazz Ensemble II

GARY GEMBERLING, DIRECTOR

Nate Miller: TRUMPET

Zeyu Liu, Clara Wheeler,

Alie Zagata: alto SAXOPHONE

Emma Saas: tenor SAXOPHONE

Griffin Cronk: baritone SAXOPHONE

Evan Alexay, Jake Barokas, Cory Cogley,

Maria Setyoyudo: GUITAR

Bassel Jamali: BASS

Angie Mead: DRUMS





SCHEDULE

Tuesday, April 11, 2017

8:15 a.m.
BREAKFAST
Reid Campus Center

9–10:15 a.m.
SESSION 1

10:15–10:45 a.m.
MORNING INTERMISSION
Hall of Science Atrium

10:45 a.m.–Noon
SESSION 2

Noon–1 p.m.
LUNCH, ALL-CAMPUS
Reid Campus Center

1–2 p.m.
POSTER SESSION
Cordiner Hall Foyer

2–3:15 p.m.
SESSION 3

3:15–3:45 p.m.
AFTERNOON INTERMISSION
Reid Campus Center

3:45–5 p.m.
SESSION 4



	MAXEY 104	OLIN 138	OLIN 129	
S1	SESSION 1	Culture & Care	Tiny Living	Art Theory & Critique
	9:00 AM	Caroline Bauwens	Caroline Ashford Arya Dani Schlenker Spencer Mueller Margo Heffron*	Delaney Hanon
	9:15 AM	Paige Organick		Maia Watkins
	9:30 AM	Lin Luo		Alicia Burr
	9:45 AM	Wenjun Gao		Philip Stefani
	10:00 AM	Emma Rust Jamie Friedman*		John Reed*
	Coaches	Chris Cahoon	Ben Caldwell	Dana Matsunami
S2	SESSION 2	Race & Representation	Discrimination & Incarceration	Literary Criticism
	10:45 AM	Brenna Two Bears	Dennis Young	Esther Ra Henry Carges
	11:00 AM	Elise Frank	Cameron Conner	Erin Kirkpatrick
	11:15 AM	Chris Cahoon	Dana Matsunami	Henry Carges*
	11:30 AM	Forrest Arnold*	Meghan Ash*	
	11:45 AM			
	Coaches	Arthur Shemitz	Michelle Christy	Ben Caldwell
S3	SESSION 3	Motivating Influences	Power & Politics	Japanese Language & Culture
	2:00 PM	Hunter Pluckebaum Jaidyanne Podsobinski Zach Hartzell	Caroline Burnett	Matthew Hirano
	2:15 PM	Eric Conte Elyse Laurin Emma Onstad-Hawes	Holly Smith Miriam Zuniga	Celia Langford
	2:30 PM	Ian Becker	Emma Bishop Joseph Zimmer	Skye Goedert
	2:45 PM	Jack Eiford	Aly Counsell*	Jesse Moneyhun*
	3:00 PM	Cherokee Washington*		
	Coaches	Gordon Kochman	Alex Pitts	Michelle Christy
S4	SESSION 4	Development & Economics	Public Health	
	3:45 PM	North Bennett	Haley Case	
	4:00 PM	Michelle Christy	Stephanie Reamy	
	4:15 PM	Gambhir Kunwar*	Jess Faunt*	
	4:30 PM			
	4:45 PM			
	Coaches	Ye He	Isabel Mills	

PANEL SCHEDULE

SCIENCE 159	SCIENCE 100 BRATTAIN AUDITORIUM	KIMBALL THEATRE	REID G02
Geology & Climate	Animal Behavior	Composer's Studio I	Identity, Ethics & Memory
Gabby McGann	Lauren Benedict	Lindsay Armstrong	Uma Trivede
Molly Coates Alex Ihle*	Hannah Alverson Eva Geisse	Milo Cantor Thomas Meinzen	Linnea Valdivia Catherine Fisher Daniel Whalen Alex Pitts
	Mitchell Cutter Sammi Clute Aaron Williams Zoey Kapusinski*	Calvin Brigham*	Emma Dulaney*
Isabel Mils	Hallie Barker	Arthur Shemitz	Elise Frank
Disease & Cures	Secrets of the Deep I	Environmental Humanities	Doors of Perception
Sean Terada	Stacie Bellairs Alina Nakano	Tim Morris	Zoey Watts Marianne Kellogg
Cora Amundson	Laurel Field	Ryan Garrett	Taylor Berntson Hannah Bouwman Pascale Carpentier
Paal Nilssen	John DeBuysser	Lindsey Hammer	Josie Furbershaw Samantha Fata Olivia Coackley
Danielle Wieck*	Nina Finley*	Jack Bynum*	Ana Rodriguez Maddy Seltzer Katrina Kerrigan
Hannah Alverson	Cora Amundson	Jordan Miller	Anna Melville Erin Coffey* Chris Cahoon
Micro-Science	Secrets of the Deep II	Rhetoric Studies: American Narratives	
Noah Schlenk	Devon Yee	Logan Schmidt Anna Middleton	
Austin Shaff	Connor Welty Matt Sousa	Kendra Winchester	
Lindsay Schwartz Lizzi Wong	Isabel Christy	Collin Faunt	
Ally Bogisich*	Alex Waheed*	Hanna Greenberg*	
Joshua Ward	Hallie Barker	Gordon Kochman	
Heavens & Earth	Plant Wars	Composer's Studio II	Ethical Considerations
Riley Jordan Hallie Barker Teddy Pierce	Mary Brady Chris Dailey Anne Vonada	Talea Shupe Hunter Dunn Jeffrey Maher*	Erick Franklund Paul Minor Richard Farman
Susan Nichols Marra Clay* Ally Bogisich	Sammi Clute Mitchell Cutter* Hannah Alverson	Dana Matsunami	Arthur Shemitz* Alex Pitts

* moderator

2017_WUC_7

POSTER SESSION

1-2p.m., Cordiner Hall

JOE ABBOTT, *Inhibiting Y-Secretase in Myeloma Tumor Cells to Improve Killing by Chimeric Antigen Receptor T Cells*

Recently, researchers in cancer biology have engineered T cells, which play a critical role in the body's immune response, to express receptors specific for proteins on cancer cells. These specialized T cells, termed chimeric antigen receptor T cells, have been shown to have a higher specificity and killing capability for corresponding tumor cells. In 2016, through an internship at the Fred Hutchinson Cancer Research Center in Seattle, I participated in a project to determine whether CAR T cell technology could be applied to myeloma, a cancer of plasma cells. The target protein on these cancerous plasma cells is the B cell maturation antigen (BCMA), and a primary objective of my work was determining whether BCMA could be upregulated on myeloma cells by inhibiting γ -secretase. I report the successful upregulation of BCMA using γ -secretase and the subsequent enhanced killing of myeloma cells by BCMA-specific CAR T cells.

Faculty Sponsor: Matt Craig

JOHANNA BAILEY, *Spatial Variation of Pteropod Diel Vertical Migration Along the Eastern Coast of New Zealand*

As the world's oceans adjust to climate change, organisms in the oceans must also adapt. Pteropods, a pelagic sea snail, are a major marine food source and a principal contributor to the biological carbon pump. However, their calcium carbonate shells are susceptible to damage from increasingly acidic oceans such as the Southern Ocean. If pteropods adapt their diel vertical migration patterns while acclimating to ocean acidification, their contribution to the carbon sink and food web might also shift. Along the eastern coast of New Zealand, pteropods were collected significantly more often during night sampling than day sampling, supporting known DVM patterns. Light, temperature, pH, salinity and chlorophyll-a levels all showed weakly positive correlations with DVM; light showed the strongest correlation of the five and pH the second strongest. This data suggests that along the eastern coast of New Zealand pH plays a minor role in influencing DVM in pteropods.

Faculty Sponsor: Paul Yancey

CASSIDY BREWIN, *Changes in Number of Multi-Saccade Gaze Shift as an Indicator of Mild Traumatic Brain Injury*

Mild Traumatic Brain injury (mTBI, or concussion) is a complex pathophysiological process that affects the brain and cognitive function. Sports-related concussions affect roughly 3.8 million individuals every year within the United States. Many of these concussions go undiagnosed and untreated — sometimes leading to life threatening conditions and further deficits — because there

are currently no clinical devices to diagnose concussion. Our study examined whether assessing Multi-Saccade Gaze Shifts can be a useful tool in diagnosing concussions. MSGS occur when the eyes exhibit multiple rapid movements (also known as saccades) along with a head movement in order to shift gaze to inspect a visual stimulus. We used video-oculography (an eye tracker) to assess MSGS by measuring eye and head movements of collegiate soccer players before and after concussion. We observed a greater number of MSGS following concussion, and suggest that assessing MSGS may serve as a quantitative diagnostic for concussion.

Faculty Sponsor: Thomas Knight

JO CANINO, *Disease Prevalence: Pedigree Pups Versus Mutts*

The domestic dog, *Canis familiaris*, is the most morphologically diverse mammalian species. The drastically different phenotypes of dogs result from slight variations between genotypes. Selective artificial breeding encouraged by the American Kennel Club has maintained standards for conformation of the 189 currently recognized purebred dog breeds. Recently the AKC has been criticized for enforcing breed standards because each of the 50 most popular breeds is predisposed to at least one inherited disorder, many of which are directly related to conformation. To assess this phenomenon locally, I conducted an observational study using data from Animal Clinic East in Walla Walla. Medical records of over 900 dogs were evaluated and categorized for eight common breeds and eight common diseases (hip dysplasia, diabetes, etc.). Distinct correlations were found between specific pedigree breeds and associated diseases. A review of the literature corroborated the local study results.

Faculty Sponsor: Kate Jackson

SAMMI CLUTE, *School-Based Sex Ed in Walla Walla's Lincoln High School*

Whitman students attended a training seminar with The Health Center's staff to gain the necessary communication skills to educate students at Lincoln High School about safe sex and relationships. After, these Whitman students worked with Lincoln High School's girls, guys and senior groups to facilitate discussion around sex education. The curriculum covered birth control and STI resources and allowed students to anonymously ask any questions that were then discussed with the group. This ongoing project has helped connect Whitman students with the greater Walla Walla community, and promoted the dissemination of the "Whitman bubble." The kids that we educate come from disadvantaged backgrounds; bridging that cultural divide has been beneficial for everyone involved. In Denmark, a similar program has been shown to reduce STI transmission rates and



Performance Outcomes

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Methods

Results

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Design of Biocatalytic

Abstract

Introduction

Methods

Results

Conclusion

Can a gene regulator enhance viability in the "broad-host" *Shigella*?

Abstract

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Evaluating the expression of adhesive proteins in host-derived

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Introduction

Methods

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Conclusion

Detecting Variable Stars Using Low-Cost Hardware and Open Source Software

Abstract

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Whitman College

Biosynthetic Mn-Cu Model Complexes of Carbon Monoxide Dehydrogenase: Computational Design and Synthesis

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The University of Iowa

Expanding the *Bcr* c-di-GMP-responsive regulatory circuit controlling swarming and sticking *Vibrio parahaemolyticus*

Abstract

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teen pregnancy and increase sex positivity among its participants.
Faculty Sponsor: Noah Leavitt

KATHLEEN DALY-JENSEN, *Measuring Cytogenetic Aberrations Induced by Accelerated Helium Ions*

Galactic cosmic radiation poses a cancer risk for astronauts assigned to long-term missions because the radiation encountered in space can damage DNA. Our lab is analyzing the effects of helium radiation on the epithelial cells of intact mouse kidneys at 0cG (centigrays), 21cG, 42cG, and 168cG. The amount of aberrations is expected to increase as the dose increases. Our results confirm that a higher dose of helium ion radiation increases chromosomal aberrations within the cells. The difference in percent of cells with aberrations in the 0cG and the 168cG cells was found to be statistically significant by the Fisher's Exact Test. A significant difference was also found between the average aberration per cell and average chromosome break per cell at 0 cG and 168cG. These results help quantify the risk posed to cells by

one type of radiation encountered during space exploration.
Faculty Sponsor: Arielle Cooley

SHYAM DAS-TOKE, *Quantitatively Analyzing the Geomorphic Characteristics of Beaver Meadows to Predict Suitable Habitat Locations in the Adirondack Mountains*

Beaver are ecosystem engineers that dramatically shape their environments through dam construction. They choose habitat locations that can accommodate changes in channel gradient and resulting pond environment. This study determines the geomorphic parameters that govern where beavers build dams along a first order stream in New York. Gradient, shear stress, sediment size, channel width and bank depth are the stream characteristics used to determine stream reaches that are suitable beaver habitat. Initial results show that shear stress values at beaver ponds range from 0-50 Pa, increasing to 1060 Pa in steep channels. The beaver ponds also have median sediment sizes of 0.5 cm-1.2 cm and tend to be much flatter than elsewhere along



the stream. Other streams in the Adirondacks that have these characteristics are likely to have hosted beaver in the past or have the potential to currently host beaver.

Faculty Sponsor: Lyman Persico

JANE DUNCAN, *Characterization of MnpC: A Novel Hydroquinone Ring-Cleaving Dioxygenase*

PcpA, isolated from the pentachlorophenol metabolizing bacterium *Sphingobium chlorophenicum*, is a member of the mononuclear non-heme Fe(II)-dependent hydroquinone ring-cleaving dioxygenases. It is structurally and mechanistically related to the much better characterized catechol extradiol dioxygenases. While there are hundreds of genes homologous to PcpA widely distributed among bacteria, virtually nothing is known about any of them. MnpC, isolated from *Cupriavidus necator* JMP134, is one such homolog of PcpA. It is believed that its native substrate is aminohydroquinone. After optimization of the expression and purification of this protein, MnpC has been found to show ring-cleaving activity with hydroquinone substrates. The further characterization of this novel hydroquinone ring-cleaving dioxygenase will further illuminate the substrate specificity of this little-studied class of enzymes.

Faculty Sponsor: Tim Machonkin

NOAH EDELSON, *Modelling Topography With Drone Photography*

This past summer I researched the optimal UAV parameters to create 3D models of the landscape using structure from motion. Optimization allows for more efficient use of field time and better resolution of geologic structure within a surveyed site. We chose our two study locations, Ankeny Field and the Twin Sisters area in Wallula Gap, because Ankeny is primarily a low-relief location, whereas Twin Sisters is high relief. We concluded that we should fly 10-20m above the highest point in a survey site to achieve optimal resolution; this meant 40m on Ankeny and 80m in Wallula Gap. From this process we were able to achieve average resolutions between 2.5 and 5 centimeters.

Faculty Sponsor: Lyman Persico

RACHEL EGUIA, *Uncovering the Genetic Basis of Floral Pigmentation in a Species of Chilean Mimulus*

Anthocyanins are red and blue floral pigments that provide plants protection against ultraviolet radiation and also attract pollinators. Interestingly, multiple species of *Mimulus* native to central Chile have independently gained these anthocyanins, one of these species being *Mimulus luteus* variety *variegatus*. This system presents a natural comparative study to determine the genetic and molecular basis of how this novel trait evolved. Previous research has identified a transcription factor gene, called Myb5, as the candidate gene likely to be responsible for the gain of anthocyanins in *M. l. variegatus*. My research involved creating transgenic constructs that could then be used to definitively determine whether Myb5 is the gene responsible for activating anthocyanins in *M. l. variegatus*. In the future, these constructs will be used to experimentally alter Myb5 expression in plants with and without floral anthocyanins, yielding new insights into how novel traits evolve.

Faculty Sponsor: Arielle Cooley

JACK EIFORD, *Autonomous Motivation: The Montessori Method and Self-Determination Theory*

Alternative educator Maria Montessori and Ryan and Deci's Self-determination Theory share a basic claim about human nature: that autonomously motivated activity is the best kind of activity because it characterizes optimal psychological health. Autonomous motivation is engaging in an activity because it has been chosen and endorsed through a process of self-reflection. SDT argues that autonomous motivation is associated with a number of positive psychological health outcomes. Montessori's pedagogy aims to cultivate autonomously motivated individuals because she considers these individuals to be psychologically optimal. Further, Montessori and SDT both claim that autonomous motivation is facilitated by the constructs of autonomy, relatedness and competence. This poster provides the conceptual connections that would allow Montessori educators to see how empirically grounded features of SDT can support or help refine Montessori's pedagogy. This project also shows how conceptual distinctions in Montessori's philosophy can support or push SDT research in new directions.

Faculty Sponsor: Patrick Frierson

SAM ERICKSON, DEEPAJ PAWAR, *Investigation of New Mono-Halogenated Substrates of Benzoate Dioxygenase*

The transformation of arenes by microbial dioxygenases represents a powerful method for the production of chiral synthons in organic synthesis. We present an investigation of specific substrates of a benzoate dioxygenase from the bacterial strain *Ralstonia eutropha* B9. Several novel substrates were investigated with specific focus on mono-chloro and bromo substituted benzoates. After initial small volume transformation screening, those substrates that appeared viable were transformed on a larger scale in a bioreactor. We specifically present the conversion rates for the substrates 3-chlorobenzoic acid and 3-bromobenzoic acid, showing that these compounds are viable substrates for the highlighted benzoate dioxygenase. Also presented is a stereochemical proof of the absolute configurations of the presented biotransformation products. It is anticipated that these metabolites will open the door to new approaches to the natural product Epoxyquinol A, a heterodimeric epoxyquinoid that has been shown to inhibit angiogenesis.

Faculty Sponsor: Jon Collins

MARC FOSTER, *Synthesis of Functional Catalysts for the Conversion of Toxic Carbon Monoxide Based on a Bacterial Protein*

An estimated 100 million tons of atmospheric carbon monoxide is removed by the soil bacteria *Oligotropha carboxidovorans*, containing the CO dehydrogenase enzyme. The enzyme catalyzes the conversion of CO and water to carbon dioxide and hydrogen gas, which is analogous to the industrial water-gas shift reaction used for hydrogen gas production. The industrial process requires elevated temperatures and pressures, whereas the bacteria can carry out the reaction under ambient conditions. We aim to understand the structure and function of the CODH enzyme and its ability to carry out this reaction. The reaction center of the enzyme is composed of molybdenum and copper metals surrounded by additional protein components. We are using

computational and experimental techniques to design and synthesize metal complexes similar to this reaction center.

Faculty Sponsor: Dalia Rokhsana

KATIE FOUTCH, *Deficits in Anti-Saccade Eye Movement Metrics Following Mild Traumatic Brain Injury in Female Athletes*

Sport-related concussion continues to be a public health concern in the U.S. Millions of Americans sustain concussions playing sports each year, but correctly diagnosing concussions continues to be a problem. If a concussion goes undiagnosed, an athlete can face much greater risks by continuing to play while still being concussed. Past research has shown that the neural circuits responsible for eye movement are disrupted in concussed patients. In our project we used video-oculography (an eye tracker) to record head and eye movements of Whitman College Women's soccer players on three different visual tasks pre-season, post-concussion and post-season. We focused our analysis on the anti-saccade task, which involves looking in the opposite direction of a visual stimulus. We expect to find increased errors and deficits following concussion and suggest that assessing eye-head movements in the anti-saccade task may serve as a quantitative diagnostic for concussion.

Faculty Sponsor: Thomas Knight

TRAY FOY, *How the PIRL6 Gene Affects Female Gametophyte Development in Arabidopsis Thaliana*

The female gametophyte is a vital structure for angiosperm reproduction that produces the egg cell, central cell and, following fertilization, the seed. Female gametophyte development in the *Arabidopsis* consists of eight morphologically distinct steps that are controlled by a series of genes. The PIRL genes are a family of nine genes that code for proteins similar to animal Ras-group leucine-rich repeat proteins, which are known to take part in developmental cell signaling. Application of the gene silencing method known as RNA interference was applied to the PIRL6 gene in *Arabidopsis thaliana* plants to investigate its possible involvement in the development of the female gametophyte. I report on the isolation of numerous PIRL6-silenced plants and show that decreased PIRL6 expression affects early female gametophyte development, resulting in an increased amount of aborted ovules and stunted developmental growth.

Faculty Sponsors: Dan Vernon, Nancy Forsthoefel

ROSEMARY FREDERICK, *Evaluating Habitat Restoration Efforts for the Bistate Sage Grouse*

Landscape burning in the central highland region of Madagascar has long been a polarizing issue in the country's conservation discourse. A key element of this discourse is the legitimacy of the use of fire as a land management tool. The Namoly Valley in south-central Madagascar relies heavily on landscape burning as an integral part of socio-economic life. I explore how the political structures and socio-cultural institutions, as well as colonial and green neoliberal rhetoric, have constructed the Namoly Valley grassland ecosystem. To investigate this question, I used semi-structured qualitative interviews, community mapping techniques and participant observation. I also used vegetation surveys of post-burn alpine grassland in the nearby Andohariana plateau to examine the ecological response to burning techniques. These results were

analyzed using the sociological theories of critical realism, world systems theory and non-equilibrium ecological theory.

Faculty Sponsor: Alissa Cordner

MAGGIE GOSE, *A Potential Role for the PIRL7 Gene in Plant Pollen Development*

I conducted my summer research on a novel family of genes termed Plant Intracellular Ras-group Leucine Rich Repeat proteins (PIRL's) within *Arabidopsis thaliana*, a model plant species widely used for genome research. I focused on the PIRL7 gene and whether it functions in reproduction, mainly the development of male gametophytes (pollen). Using confocal, light and scanning electron microscopy, I observed the phenotypic effects that a PIRL7 knockout mutation had on pollen development. In addition, I successfully created a gene construct containing the PIRL7 gene attached to the gene for Green Fluorescent Protein, which will be used in future experiments to determine where this gene is expressed. Data taken from pollen counts, viability staining and microscopy suggest that pollen appears to be negatively affected when PIRL7 is inactivated.

Faculty Sponsors: Dan Vernon, Nancy Forsthoefel

KAITLIN HARRISON, QIANSHU WANG, *Optimizing Direct Cryo-Mounting for Native SAD Structure Determination*

Structure determination of a protein via X-ray crystallography using Single-Wavelength Anomalous Diffraction has become relatively common. Cryo-cooled protein crystals are, however, known to be heterogeneous in cell dimensions and crystal order, which might be expected to impact SAD structure determination. To optimize structure determination, we investigated two different approaches of direct transfer of the protein crystal from the growth tray—the conventional approach which rapidly transfers the protein crystal through the ambient air, and a vial-mounting technique designed to preserve the relative humidity local to the crystal until the moment of cooling. Results suggest that the vial-mounting technique can improve SAD efficiency as much as 2x over the conventional approach.

Faculty Sponsor: Douglas Juers

SUNSHINE HAYS-WEHLE, *A Physiological Study of Lymnaea Foot*

Most gastropod molluscs use their foot to locomote despite differences in the substrate over which they crawl. Little, however, is known about the morphological and neural structures of the foot involved in locomotion. The pond snail, *Lymnaea stagnalis*, is a freshwater gastropod that employs both muscular and ciliary waves during crawling. We investigated the morphological characteristics of the *L. stagnalis* foot as well as the distribution of neurotransmitters previously found to be involved in locomotory behavior. To determine the structure of the foot tissue we used histological methods to differentiate tissue and cell type distributions. In addition, we used immunohistological techniques to determine the distribution of putative neuro-active molecules in the foot tissue. Preliminary results showed both extensive subdermal musculature and cells involved in mucus production. These findings, combined with the immunohistochemical labeling, provide a better understanding of the control of crawling in gastropods.

Faculty Sponsor: Shaun Cain



BEN HERNRIED, KRISTINA JACKSON *Developing a Plant Hormone Biosensor That Utilizes Tandem Fluorescent Proteins*

Auxin is a plant hormone that is essential for plant growth and development and is found in all plant species. It is important to further understand how auxin concentrations vary within different plant tissues because the information gives insight to how this hormone is transported, perceived and metabolized. One method for detecting auxin is by biosensor, which enables the hormone to be sensed by harnessing the natural cellular machinery present in plant cells. We have begun pilot studies to develop a novel auxin biosensor that will emit fluorescence in the presence of auxin. We have designed two initial test biosensors that use green and red fluorescent proteins fused together such that exciting one of the proteins excites the other. Using a yeast cell system, our pilot experiments are focused on testing the functionality of these two initial test biosensors.

Faculty Sponsor: Britney Moss

ERIC HSU, *Developing a Multi-Access Key for Identification of West and Central African Snakes*

Dichotomous keys have been the standard tool for identification of taxa for centuries. However, the effectiveness of conventional dichotomous keys is limited by the sequential nature of the couplets. If necessary information in the sequence is unavailable, the key is unlikely to yield a correct identification. Multi-access keys have the potential to overcome this limitation; however, they come with their own set of limitations. We created two multi-access keys for identification of snakes from West and Central Africa to genus level, using data on 62 genera of snakes across 35 morphological characters in an effort to facilitate snake identification. This poster describes the process and mechanics behind development of our multi-access key, and comments on the benefits and shortcomings of multi-access keys — with an emphasis on the digital format — compared with dichotomous keys in particular and specimen identification in general.

Faculty Sponsor: Kate Jackson

MIRANDA HUANG, *Gene Expression of the EGF Pathway in the Nematode *C. elegans**

The Epidermal Growth Factor pathway in the nematode *Caenorhabditis elegans* influences different aspects of physiology, including vulva development, increased lifespan and lipid synthesis. The mechanism by which it controls lipid synthesis is still not completely understood. One aspect yet to be fully explained is the effect of EGF signaling on lipid gene expression. I grew strains with different levels of EGF signaling, from low to high, and conducted a qPCR analysis of lipid gene expression in those strains. I also analyzed lipid gene expression in an *sbp-1* mutant, a key component in the control of lipid synthesis. My research will lead to a broader understanding of the role EGF signaling in lipid synthesis pathways. Given that these metabolic processes are highly conserved in animals, this work has implications for human physiology including potential insights into ways to combat obesity and cancer.

Faculty Sponsor: Matthew Crook

EMMA JONES, *Effects of Timber Harvest on Big Huckleberry (*Vaccinium membranaceum*) Growth in the Umatilla National Forest*

Big huckleberry is native to the Umatilla National Forest and has

a longstanding ethnobotanical history. Not only is it a charismatic shrub, drawing many to the forest every summer to collect its sweet berries, but it is also a culturally significant first food for the local Confederated Tribes of the Umatilla Indian Reservation. To evaluate how forest management has impacted huckleberry populations, I worked with the U.S. Forest Service during the summer of 2016 to evaluate huckleberry growth at nine sites differing in timber harvest severity and history. At each site I collected data on the density and size of huckleberry plants in both logged and control plots and related the findings to patterns in insolation, ground cover and other components of the vegetation. These findings will help the USFS better manage their logging operations in order to minimally disturb populations of the Umatilla big huckleberry.

Faculty Sponsor: Heidi Dobson

HANNAH KLAESER, *The Distribution and Diversity of Symbiotic Microbial Communities Within a Widespread Neotropical Ant Host*

Turtle ants are diverse, arboreal ants unique for their odd anatomy and tree-dwelling lifestyle. One widespread neotropical species, *Cephalotes atratus*, harbors a wide range of microbial groups that greatly affect their biology. Studies have shown that associations among microbial lineages and turtle ant hosts vary geographically, but little is known about *C. atratus*' endosymbiont variation both on the geographic and evolutionary level. My study focuses on the variation within three of the ant's symbionts: Rhizobiales, a mutualistic order of bacteria that plays a crucial nutritional role within turtle ants; Cordyceps, a genus of endoparasitic fungi infecting many arthropod species; and Wolbachia, a genus of bacterial parasite that affects host reproduction. Gene regions were sequenced from these microbial groups to address microbial diversity and distribution within colonies, within populations and across the geographic range of *C. atratus*.

Faculty Sponsor: Arielle Cooley

BRAD KLINE, *A Chemoenzymatic Approach to Total Synthesis of Epoxyquinol A*

Epoxyquinol A is a heterodimeric epoxyquinoid that has been shown to inhibit angiogenesis. I present a novel iodolactonization-based approach to the total synthesis of this representative epoxyquinoid. The route relies on the dihydroxylation of benzoates using benzoate-1,2-dioxygenase (BZDO) expressed in *Ralstonia eutropha* B9 whole cells. The obtained (1S,2R)-1,2-dihydroxycyclohexa-3,5-diene-1-carboxylic acid provides a chiral building block from which to pursue asymmetric syntheses of epoxyquinoid natural products. In this synthesis, the iodolactonization strategy is explored for the challenging step of stereoselective installation of an epoxide on the hexadiene ring.

Faculty Sponsor: Jon Collins

LIA LEIBMAN, *Reproductive Assurance Among Populations of the American Bellflower*

Reproductive assurance is the ability to self-fertilize when little or no outcrossing is available. In certain plant species, it is an adaptive mechanism that allows plants to reproduce in habitats that would otherwise be unsuitable given their lack of pollinators. The American Bellflower (*Campanula americana*) is a beautiful woodland herb with a wide distribution in the eastern United States. It has a mixed mating system, meaning that an individual plant both self-fertilizes and



out-crosses via pollinators. Interestingly, *C. americana* populations at one end of the geographic range tend to self-fertilize more than plants in the rest of the range, a sign that reproductive assurance may be occurring in certain range-edge populations. Through intensive field and lab work that involved pollinator surveys, measurements of several floral traits and selfing rate measurements, we aimed to determine if and how these plants exhibit reproductive assurance.
Faculty Sponsor: Susanne Altermann

AMANDA MERCER, *Surrogate Multidrug Resistance Evolution: Bacillus anthracis Sterne and Yersinia pestis A1122, KIM6, & KIM10*
The dramatic increase in bacterial pathogens acquiring multidrug resistance poses a threat to global health and security, especially when they are intentionally used as biological warfare agents. To mitigate this risk, non-pathogenic MDR surrogates were generated to understand the genomic evolution of MDR. Surrogates permit safe testing of novel candidate drugs without the need for costly

and highly regulated facilities. To generate MDR surrogates, *B. anthracis* Sterne and *Y. pestis* were evolved to be resistant to various antibiotics. Bacteria were subjected to selective pressures on plates containing three times the minimum inhibitory concentration of specific antibiotics. Resistant mutants were isolated and used for subsequent selection rounds with other antibiotics. The MDR surrogate isolates will be sequenced and compared to their parental strains to verify the presence of genes conferring resistance. The MDR strains will form a validated panel that can be used in reference laboratories to test new therapeutics.

Faculty Sponsor: Matt Craig

NATALIE MCBRANCH, *Climate Change and Southwestern Conifers: How Resilient Are They?*

Climate change is already having a marked impact on the lifespan and growth range of many plant species. In the high-altitude desert climate of northern New Mexico, warming temperatures and diminishing rainfall have contributed to widespread and striking die-off of two conifer species: *Pinus edulis* ("piñon pine") and *Juniperus monosperma* ("juniper"). Yet some individual trees are proving to be surprisingly resilient. My research aimed to uncover a mechanism for this resiliency: Are these trees able to alter their leaf area to sapwood area ratios (Al:As) in order to adapt to the increased temperature and diminishing precipitation? For 60 trees from an experimental site at Los Alamos National Laboratory, the answer is no. The trees do not alter their Al:As in response to induced climate change conditions, suggesting that the trees are reliant on another adaptation mechanism.

Faculty Sponsor: Susanne Altermann

AIDAN MCCORMICK, *Quantum SPAM: Adventures in Uncorrelation*

Quantum state tomography, the process of characterizing a quantum optical system, can be laborious and demanding. QST involves two steps: the state is prepared; then it is measured. No correlated errors between these steps can occur for successful results. State-preparation-and-measurement tomography is a way of detecting these correlations. We use waveplates to independently control quantum state settings and detector settings for individual photons. Without making assumptions about either state or detector settings, we can systematically vary them to determine whether there are any correlations between state settings and our measurements. If we show that they are consistently uncorrelated, then QST can be used to reveal information about any given quantum state or detector setting, provided we know about the other. We've been able to experimentally demonstrate that SPAM is indeed capable of detecting correlated SPAM errors, which opens the door for further refinement and development.

Faculty Sponsor: Mark Beck

NEHA NAIDOO, *Esal Inhibition: Suppressing Virulence of *Pantoea stewartii* Through Quorum Sensing*

My research involved the bacteria *Pantoea stewartii*, which uses an enzyme called Esal in order to produce signaling molecules. The bacteria are able to use these signaling molecules to measure the population density of neighboring bacteria. Once the population of bacteria reaches a particular threshold, it can target the expression of specific genes that promote the spread of infection.

The primary goal of my research is to study how inhibiting Esal may prevent *Pantoea stewartii* from being able to produce signaling molecules, in turn hindering the bacteria from expressing virulence genes. Since Esal produces signaling molecules using a highly unstable native substrate, I helped synthesize alternative substrates that would enable the lab to conduct further studies on Esal inhibition. The compatibility between Esal and each synthesized substrate was compared to that of the native substrate in order to identify which synthesized substrates are viable alternatives to the native substrate.

Faculty Sponsor: Britney Moss

NURIDIA NULLINER, *Utilization of *Caenorhabditis elegans* as a Model to Study Infection by *Bartonella bacilliformis**

I studied the use of *Caenorhabditis elegans* as a model organism for the infection by *Bartonella bacilliformis*. *Bartonella bacilliformis* is an infectious bacteria that affects South American populations and especially Peru. It causes Carrion's disease or Oroya fever in an acute phase and can also cause the chronic phase of *Verruga peruana*, or Peruvian warts. In my study, I explored methods of feeding *B. bacilliformis* to *C. elegans* to induce a phenotype in *C. elegans*. The best media to induce a disease phenotype in *C. elegans* was discovered after many trials: the Heart Infusion Broth with sheep blood (HIB-B) media inoculated with *B. bacilliformis*. *C. elegans* successfully infected with *B. bacilliformis* developed a Deformed Anal Region (DAR), a bump on the tail. I showed that *C. elegans* was a potential model organism to study mechanisms of *B. bacilliformis* infection as well as future vaccines.

Faculty Sponsor: Matthew Crook

SALLY PAUL, *Energetic Condition of Young-of-the-Year Pacific Cod (*Gadus macrocephalus*) in the Southeastern Bering Sea*

Pacific cod (*Gadus macrocephalus*) is an ecologically and economically important groundfish species in the northern Pacific Ocean. Recent studies that measured abundances of young Pacific cod in the southeastern Bering Sea documented several different types of important nursery habitats occupied by these fish. The purpose of this study was to determine the energetic condition of young-of-the-year Pacific cod from each of these main nursery habitats, by measuring and comparing the mean energy densities (kJ/g) of the fish. Determining the relative energy densities gives insight into how Pacific cod in each habitat are allocating energy stores, and provide a basis for predicting the overwinter survival and recruitment success of the populations. These projections are important to consider when establishing conservation practices and commercial fishing regulations.

Faculty Sponsor: Susanne Altermann

LAURA REA, *Influence of Calcium on Ligand Exchange Pathways*

The presence of chelating agents affects the bioavailability of both toxic and nutrient metals in aqueous environments. When metal ions are dissolved in water, they are coordinated to water molecules or other molecules with Lewis base groups called ligands. A chelating agent is a single ligand molecule that can bind multiple metal ion coordination sites simultaneously. Metal ion speciation in the presence of chelating agents is often controlled

by the rates of ligand exchange reactions, where one ligand replaces another. To predict metal behavior in the environment, we need to understand the rates of these reactions. However, little is known about how the presence of common ions (calcium, magnesium, etc.) affects ligand exchange pathways. We used capillary electrophoresis to measure the rates of disjunctive ligand exchange reactions in the presence of calcium. By varying reactant concentrations we are able to propose a mechanistic pathway to model reaction rates.

Faculty Sponsor: Nate Boland

ROBIN ROUNTHWAITE, *Using Antibodies to Study Where Proteins Bind Together: A Preliminary Analysis of BEX-1 and EPRS Binding Domains*

My lab studies BEX-1, a little-understood protein that may be related to heart disease. Recently, we learned that BEX-1 might bind with another protein called EPRS. This protein plays an important role in both constructing protein building-blocks and in inhibiting protein synthesis. This binding interaction suggests that BEX-1 and EPRS affect the activity of each other in the cell. By learning where these two proteins attach, we can begin to ascertain how they would affect each other. To do this, I grew cells that expressed certain parts of BEX-1 and EPRS. I then used antibodies to isolate proteins and co-detect any other proteins bound to it. This technique is called a co-immunoprecipitation. My work helped verify protein sizes, overcome cell expression problems and bring the lab several steps closer to characterizing how BEX-1 and EPRS interact.

Faculty Sponsor: Ginger Withers

JOE STEWART, *The Role of *lin-35*, *cdc-25*, and *cul-1* in LET-23 Mediated Suppression of Cell Death*

Cell signaling pathways involved in the suppression of cell death play an important role in understanding human cancer. Learning the mechanisms behind these pathways can provide important insights into how and why tumors form. LET-23 is the receptor in the epidermal growth factor signaling pathway, which is critical for development in *C. elegans*. Recent studies have also found that LET-23 can play a role in suppressing cell death, but the specific mechanisms controlling the suppression are still largely unknown. CDK-2, a cyclin dependent kinase that helps control the cell cycle, is necessary for LET-23 mediated suppression. Using RNAi, we knock down the expression of *lin-35*, a downstream target gene of CDK-2, and two upstream regulators, *cdc-25* and *cul-1*. Studying the effect of RNAi knockdown on these three genes will help us gain a better understanding of the LET-23 pathway and how it suppresses cell death.

Faculty Sponsor: Matthew Crook

ALEX VESSELLE, *The Heating Dilemma: Designing a Low-Cost, Low-Resource Thermal Molecular Diagnostic Tool for HIV and HPV*

Microfluidic devices have emerged as a leading contender in point-of-care diagnostics for specific diseases in resource-limited settings. These small plastic devices pass extremely small quantities of liquid through micro-channels to perform many different cellular-based experiments. The Chiu research group at the University of Washington has been investigating microfluidic devices for the diagnosis of HIV and HPV in low-resource settings. My research

looked at the usage of a phase change material to control heating of isothermal DNA amplification to detect viral DNA. The results yielded promising heating data that demonstrated the designed heating device could indeed maintain the proper operating temperature for isothermal DNA amplification. Combined with other modules, the final diagnostic device could give healthcare providers a critical tool in the fight against the morbidity and mortality caused by these two infectious diseases.

Faculty Sponsor: Britney Moss

EMILY VOLPERT, *Barriers for Investigating Sexual Assault on the Whitman Campus*

In the 2012-2013 academic year at Whitman College, there were seven reported cases of sexual assault made to the Title IX administrator. Only one was investigated. In 2013-2014, there were nine reported cases, and six were investigated. In 2014-2015, there were 20 reports, and four cases were investigated. In 2015-2016, there were 32 reports filed, and only eight were investigated. Through survey data collected from survivors of sexual assault, I explore the discrepancy between reports of sexual assault on the Whitman campus and the number of Title IX investigations. I aim to discover why some claimants decide not to report their assault and/or go forward with an investigation.

Faculty Sponsor: Michelle Janning

MAIA WATKINS, *Visual Vocabulary of Epson Perfection v750 and v850 Scanners*

My presentation examines the relative differences between two models of scanners (Epson Perfection v750 and v850) available in the Digital Arts Lab at Whitman. I use SilverFast AiStudio 8 scanning software to determine the visual vocabulary available with each scanner. I present observed differences and quantitative data, analyzing dynamic range, optical resolution color management and overall image quality, as well as printed images from the test scans completed in the course of my research.

Faculty Sponsor: Charly Bloomquist

ZOEY WATTS, JAMIE FRIEDMAN, MARIANNE KELLOGG, *#ImWithHer: Predictors of Support for Female Candidates*

Hillary Clinton's status as the first female major-party nominee for president of the U.S. was salient to many throughout her campaign. Although some were excited by the possibility of a woman being elected, others felt that Clinton's gender was not important in their decision making. To better understand this divide, during the primary season of the summer of 2016, we surveyed 387 women about their knowledge of gender inequality and sexism, their endorsement of sexist beliefs, their experiences with sexism and their support for Clinton and female candidates. Results indicate that women's experiences with sexism, opposition to sexist beliefs and knowledge of gender inequality were positively related to support for Hillary Clinton and female candidates. These results suggest that increasing individuals' awareness of current gender inequalities may impact their views of candidates and, in the end, lead the country to achieve greater gender equality among political leadership.

Faculty Sponsor: Erin Pahlke

SESSION 1

9-10:15a.m.

CULTURE AND CARE

MAXEY 104

Jamie Friedman, moderator
Chris Cahoon, coach

CAROLINE BAUWENS, *The Fundamentals of Caring*, 9:00a.m.
A stigma among young adults surrounds “caring too much.” People tiptoe around “commitment” and will sometimes complicate things in an effort to keep them “simple.” Hook-up culture and aversion to labeling offer escape from the confines of a relationship. Popular media, specifically romantic movies, reinforce this culture through the dark image they paint of relationships. Why are people of our generation so afraid of caring? Why is it so bad to love and be loved? In my presentation, I explore connections between our generation’s mindset about ambition and barriers to pursuing meaningful emotional connection. As we pursue opportunity and our desire to attain economic success, we diverge from what makes us human: emotional and cognitive connection. I believe love and success can coexist, and I argue that, while this balance is hard to find, it is worthwhile to try.

Faculty Sponsor: Kaitlyn Patia

PAIGE ORGANICK, *Til Death Do We Part: Elderly Relationships, Autonomy, Well-Being and the Assisted Living Facility*, 9:15a.m.

As people enter assisted living facilities, they experience a loss of physical and cognitive capabilities, rendering them less capable of taking care of themselves. This diminishes their quality of life significantly. Additionally, widowhood and loneliness through separation from family increases the likelihood for depression. Romantic relationships at times can alleviate the sense of loss or isolation. I conducted in-depth interviews with elderly residents in an assisted living facility to examine how autonomy and romantic relationships influence the elderly’s quality of life. In my presentation, I demonstrate the need for and ways in which assisted living facilities can encourage resident’s sense of autonomy and enhance the elderly’s quality of life while the forces of aging work against them.

Faculty Sponsor: Michelle Janning

LIN LUO, *Culture, Family and Feelings of Closeness*, 9:30a.m.

Empirical studies show that a sense of belonging and closeness are important to social satisfaction and mental health. Similarly, feeling lonely can compromise life satisfaction and even impair global motor function. My study, designed on a series of questionnaires, investigates feelings of loneliness and closeness

as they occur in students from either one-child family or multiple-child family homes of Chinese or American culture. I hypothesize that culture is the most important source of any individual differences, and that family configuration will have different effects within Chinese or American culture. I predict that cultural emphasis on collectivism as in China will be strongly associated with higher closeness and loneliness, while emphasis on individualism as in the United States will show the opposite pattern. The results of my study may enhance our understanding of how culture and family shape a person’s relationships with others.

Faculty Sponsor: Emily Bushnell

WENJUN GAO, *Marriage and Childbirth in Contemporary China*, 9:45a.m.

My presentation examines the evolution of Chinese population policy (e.g., the original one-child policy replaced by a two-child policy in 2016) and family culture. My goal is to understand how these changes in population policy and intergenerational differences have affected decision-making by Chinese citizens about marriage and childbirth. I conducted 21 semi-structured interviews with Chinese citizens in the summer of 2016 in China. I share the results of this research in my presentation.

Faculty Sponsor: Michelle Janning

EMMA RUST, JAMIE FRIEDMAN, *Play for Success: An Intervention to Boost Problem-solving in Low-Income Infants*, 10:00a.m.

There is a significant achievement gap between low socio-economic status and high SES children. Precursors to this gap can be seen by 6 months of age; low-SES infants demonstrate less object exploration, which is linked to delayed problem-solving. Problem-solving, otherwise known as goal-setting, is a critical component to executive functioning, another criteria in which low-SES infants show deficits. These findings are especially concerning because problem-solving is a predictor for later academic achievement. In our study, we implement an intervention called Play for Success to boost object exploration and problem-solving, in the hope of minimizing gaps in early cognitive development. Preliminary findings from 16 babies indicate that this intervention may be an effective way to promote problem-solving for low-income infants.

Faculty Sponsor: Melissa Clearfield

TINY LIVING

OLIN 138

Margo Heffron, moderator
Ben Caldwell, coach



CAROLINE ASHFORD ARYA, DANI SCHLENKER, SPENCER MUELLER, MARGO HEFFRON, *Tiny Living at Whitman*, 9:00a.m.

With the financial crisis of 2007-2008, the Tiny House movement attracted great attention because it offered housing that was affordable and sustainable. Tiny houses help people live simply with fewer materials. In some cities, communities of tiny houses are used to help homeless people transition toward self-sufficiency. Tiny houses offer a frugal alternative to the typical American home. However, tiny houses come with challenges such as zoning permits and issues with land and socio-economic accessibility. Tiny houses could be a future living option for Whitman graduates, but living in such a tiny physical space is not for everyone. Nonetheless, the concept of tiny living can motivate people to reduce their impact on natural resources and be conscientious about materials they use. Our presentation introduces the Whitman community to the wide world of tiny living possibilities and simple lifestyles through a potential tiny house demonstration project on campus.

Faculty Sponsor: Amy Molitor

ART THEORY AND CRITIQUE

OLIN 159

John Reed, moderator

Dana Matsunami, coach

DELANEY HANON, *'The Whitman Legend,'* 9:00a.m.

"The Whitman Legend" was painted by Danish artist Kay Nielsen in the mid-20th century. Though the work was originally meant to hang in Penrose Library, it instead was installed outside the Office of the President in Memorial Hall. In 2007, the painting was taken down for restoration and moved to its current location in a classroom in Maxey West. Its glorified depiction of the missionaries Marcus and Narcissa Whitman have made the painting a source of controversy. At the same time, the work continues to be an important historiographical artifact for a modern understanding of the Whitmans and their history. My presentation examines each part of the painting. I discuss the history that the painting intends to represent as well as how honorific depictions like this affected the way the Whitmans were remembered throughout the 20th century.

Faculty Sponsor: Nina Lerman

MAIA WATKINS, *Sinister Seduction: An Exploration of the Contemporary Sublime* in Las Musas Inquietantes, El Prolongado Sueño de Sr. T, and Alumbramiento, 9:15a.m.

The theory of the sublime describes an aestheticization of horror, a reconciliation of visceral and opposing themes, a marriage of the terrifying and the beautiful. Unlike other art historical theories, the sublime does not describe the manifesto of an artistic movement but rather a psychological tool that provokes a response in the spectator/reader/audience in the presence of the art. In describing a work as "sublime," ones refers not only to a material art but also to an experience. Because the theory has been explored for centuries, my presentation provides a brief historiography of the theory and proceeds to investigate the appearance and use of the sublime in three contemporary visual narratives.

Faculty Sponsor: Janis Breckenridge

ALICIA BURR, *The Issue of 'Timelessness': Psychoanalysis and Queer Theory at the Ruth Fluno Retrospective*, 9:30a.m.

My presentation focuses on the Sheehan Gallery's recent exhibition, "Today Will Be Yesterday: A Ruth Fluno Retrospective." I consider the position of both spectator and artist in the gallery space, questioning how and when an artist's work can be "timeless." Through a discussion of display choices such as the retrospective format, use of wall text and inclusion of documentary footage, I examine how the exhibition encourages a psychoanalytic reading of Fluno through her work. I then suggest that a more productive mode for encouraging active viewer engagement with Fluno's work might come from applying queer theory to its display. I ultimately demonstrate how examining exhibitionary techniques through different art historic theories illuminates the capacity for objects to continue living and changing within and between communities.

Faculty Sponsor: Lisa Uddin

PHILIP STEFANI, *Critique of Jacob Hashimoto's 'When Nothing Ends, Nothing Remains,'* 9:45a.m.

The artist Jacob Hashimoto has recently enjoyed an increase in fame and critical attention accompanying his numerous site-specific permanent installations. Whitman College commissioned its own Hashimoto installation for Penrose Library in 2014, a project that came to fruition in 2016 with the completion of "When Nothing Ends, Nothing Remains." This piece recalls aspects of Hashimoto's traditional oeuvre, though it also departs from his signature aesthetic in significant ways that speak to his own career trajectory and the interests of Whitman College. In my presentation I use a Marxist frame and read the work of Walter Benjamin against the Hashimoto installation. I also consider the formal aspects of the sculpture and explore the ways in which this Hashimoto piece may reflect Whitman's interest in the artist's notoriety more than the demonstrated aesthetic concerns of the artist himself.

Faculty Sponsor: Lisa Uddin

JOHN REED, *Is It a Kite if It Doesn't Fly?*, 10:00a.m.

My presentation attempts a critical discussion about the new Jacob Hashimoto artwork in Penrose Library titled "When Nothing Ends, Nothing Remains." As international popularity increases for Hashimoto, more businesses (including Whitman) are asking the artist for permanent art pieces to decorate their facilities. However, Hashimoto's signature kites are mostly made of ephemeral materials such as rice paper, bamboo and string. To meet the requirements of permanent installations, Hashimoto has begun using resin, aluminum and stainless steel instead of traditional kite-making materials. I argue that this shift from functional kites to durable "kite-like" objects undermines the meaning Hashimoto associates with the kites and the process of kite-making, and thus signifies his shift from artist to businessman. Hashimoto's career trajectory mirrors that of other internationally famous artists whose art is initially imbued with personal meaning but, with success, becomes an aesthetic brand to be flexibly deployed in the art market.

Faculty Sponsor: Lisa Uddin

GEOLOGY AND CLIMATE

SCIENCE 159

Alex Ihle, moderator

Isabel Mills, coach

ANIMAL BEHAVIOR

SCIENCE 100

Zoey Kapusinski, moderator

Hallie Barker, coach

GABBY MCGANN, *Magnetic Susceptibility of Loess Paleosol Sequences at Clyde: A Proxy for Paleoclimate?*, 9:00a.m.

The Palouse loess is an extensive region of windblown silt that covers up to 50,000 square kilometers of southeastern Washington and parts of Oregon and Idaho. Around the world, the magnetic susceptibility of similar loess paleosol sequences has been successfully used to reconstruct past climate. However, this technique has not been tested in the Palouse area. We measured the magnetic susceptibility of the loess paleosol sequences at the Clyde outcrop and compared it to published records to determine if trends in magnetic susceptibility correspond to local trends in climate conditions. Using SEM and EDS, we analyzed samples from the outcrop to determine whether the magnetic phases were mineralized during soil formation. I share the results of this research in my presentation.

Faculty Sponsor: Nick Bader

MOLLY COATES, *Magnetic Susceptibility of the Palouse Loess as a Paleoclimate Indicator*, 9:15a.m.

Loess is silt-sized, windblown sediment that can form thick deposits such as the Palouse loess north of Walla Walla. The magnetic susceptibility of sediment in these loess deposits has been used to reconstruct past climate for hundreds of thousands of years of history. However, this technique has not been used in the Palouse loess. We measured the magnetic susceptibility of loess from a previously studied outcrop northwest of Walla Walla and compared it to published paleoclimate data. Magnetic susceptibility of the sediments changes consistently and measurably with time. We measured grain size to test the hypothesis that changes in grain size influence magnetic susceptibility. If these variables are correlated, grain size may be a useful proxy for paleoclimate in the Palouse.

Faculty Sponsor: Nick Bader

ALEX IHLE, *Geochemical Analysis of Columbia River Basin Vineyard Soils*, 9:30a.m.

Soil mineralogy and chemistry along with climate and geomorphology are major environmental factors that affect vineyard health, wine production and flavor. My presentation focuses on the mineralogy and chemistry of vineyard soils in the Columbia River Basin. The vineyards in this region are in a unique geologic setting, with iron-rich basaltic bedrock overtopped by silica-rich sediments. The chemistry of local vineyard soils, which are developed within these silica-rich sediments, shows elevated iron levels similar to those in basalt, but the mineralogical data does not show abundant iron-bearing minerals. A better understanding of how soil chemistry and mineralogy are connected will help grape growers better target specific soils for desired properties such as iron content, a key nutrient for plants.

Faculty Sponsor: Bryn Kimball

LAUREN BENEDICT, *From Dawn to Dusk: A Behavior Study of the American Pika*, 9:00a.m.

As global and regional climates warm, heat-sensitive species might shift certain behaviors to cooler times of day. The American pika is a small, alpine mammal that sheds heat by finding cool microclimates within its rocky, mountainous habitat. Already flagged as a sentinel species for climate change, pikas might also be a good model for studying temporal shifts in behavior as a response to increased heat stress. My presentation focuses on observations conducted at two sites in the Colorado Front Range during July-August 2016. I found that pika behavior was the same at dawn and dusk, even though both sites are significantly cooler at dawn. This data is consistent with previous midday behavioral observations and suggests a consistency in pika surface activity from dawn through dusk.

Faculty Sponsor: Susanne Altermann

HANNAH ALVERSON, *Frogs of the Forest: Monitoring Anuran Populations in Bosque Protector Cerro Candelaria*, 9:15a.m.

Climate change is more pronounced in the Ecuadorean Andes than anywhere else in the world. Amphibians are particularly susceptible to climate change due to their inability to cross human barriers and because they can only tolerate a narrow window of ambient temperature. As part of the study abroad program SIT Ecuador: Comparative Ecology and Conservation, I surveyed frog populations in the cloud forest around a private nature reserve, Bosque Protector Cerro Candelaria, in central Ecuador. The primary goal of my research was to determine current frog population and diversity in order to compare the data to results from similar studies performed in April 2014 and April 2015. The results of this investigation, which I share in my presentation, suggest that frog population and species diversity have increased in the study sites.

Faculty Sponsor: Kate Jackson

EVA GEISSE, *A Study of the Endangered Grey Crowned Crane in Ngorongoro Crater, Tanzania*, 9:30a.m.

Once considered the most secure species of crane on the African continent, the grey crowned crane is now experiencing a rapid decline. Grey crowned cranes rely entirely for survival on wetlands, a habitat that is increasingly threatened across East Africa. Grey crowned cranes are considered an indicator species, whose presence reflects the health of an ecosystem. The greatest concentration of grey crowned cranes in East Africa is found in northern Tanzania's Ngorongoro Crater. The goals of this study were to learn the distribution, abundance and density of grey crowned cranes within Ngorongoro Crater during the rainy season as well as investigate correlations between habitat characteristics and crane presence. Results will contribute vital information to the ongoing management of the population of grey crowned cranes in Tanzania and the rest of East Africa.

Faculty Sponsor: Delbert Hutchison

MITCHELL CUTTER, SAMMI CLUTE, AARON WILLIAMS,

The Role of Cell Cycle Control Genes in Gonad Development in the Roundworm Caenorhabditis elegans, 9:45a.m.

How does a single cell develop through a series of cell divisions into a multicellular organism, complete with nervous, reproductive and digestive systems? Many of the steps along this developmental journey have been elucidated, but one of the hardest to study is organogenesis, the formation of organs. We are using the model organism *Caenorhabditis elegans* to study the control of gonad development. We have characterized four cell cycle genes; cdk-1, plk-1, bub-1 and wee-1.3 that are required for different stages of gonad development. We are working to connect these genes to other members of their pathways and to fully understand their individual roles in gonad development. Our work is the beginning of our journey to understand gonad development in *C. elegans* and organogenesis in general. We will present our latest understanding of the complex process leading to the successful development of the *C. elegans* gonad.

Faculty Sponsor: Matthew Crook

ZOEY KAPUSINSKI, *To Bee or Not to Bee: The Potential for Beehive Fences as a Crop Protection Method in Northern Tanzania*, 10:00a.m.

As human development encroaches on East Africa's natural lands, conflict between wild animals and humans is increasing. This conflict severely reduces the quality of life for both populations. Specifically, human-elephant conflict poses a serious threat to subsistence farmers and migrating elephants in northern Tanzania. My presentation investigates the potential effectiveness of beehive fencing in reducing human-elephant conflict. Through interviews with villagers near Ngorongoro Conservation Area, I found that nearly two-thirds of respondents are willing to try beehive fences despite concerns about lack of efficacy and potential harm from bee stings to children and livestock. To assess the effectiveness of beehive fencing in this region, I recorded elephant-inflicted damage on trees within Manyara Ranch. I observed that sites with beehives had less tree damage than sites without beehives, lending legitimacy to beehive fences as a mitigation method.

Faculty Sponsor: Susanne Altermann

COMPOSER'S STUDIO 1

KIMBALL THEATRE

Calvin Brigham, moderator

Arthur Shemitz, coach

LINDSAY ARMSTRONG, *'A Suite of Toys'*, 9:00a.m.

"A Suite of Toys" is a three-movement work for cello and piano that brings childhood toys to life. The first movement, "Soldiers," is a playful march. Its opening theme emphasizes the instruments' percussive qualities, using cello pizzicato and staccato in the piano. After a brief fanfare, a contrasting lyrical theme is introduced and used in counterpoint to the initial theme. "Teddy Bear," the second movement, is a waltz whose lyrical melody soars in the cello above the piano's jazz-inflected harmonies. Falling motifs and grace notes imitate a yawning bear as it falls asleep. The final movement, "Spinning Top," is in a minor key and has runs and

arpeggios that mimic the toy's motion. Mixed meter and changes in tempo depict the top as it wobbles and crashes. Before this suite is performed, I will share its conception and my process of composition.

Faculty Sponsor: John David Earnest

MILO CANTOR, *Fantasia in G minor*, 9:15a.m.

I will perform an original composition for solo piano titled *Fantasia in G minor*, so named because of the sweeping gestures, arching right-hand melodies, lush harmonic language and loosely structured formal plan typical of the form. In composing the piece, I employed traditional technical devices which characterized the keyboard fantasia form of the 17th, 18th and 19th centuries, including episodic structure, rhythmic flexibility and focus on melodic figuration. The atmosphere of the piece is dark and romantic, dynamically augmented by passages requiring great virtuosity. The melodic gestures will be accompanied by capricious rhythmic outlays and rich harmonic structures. My composition is dedicated to Susan Pickett, chair of the Department of Music, on the occasion of her retirement from Whitman.

Faculty Sponsor: John David Earnest

THOMAS MEINZEN, *'Boundless': Theme and Variations for Cello, Clarinet and Piano*, 9:30a.m.

My composition, "Boundless," is a theme and variations for cello, clarinet and piano. The piece is structured around a two-part theme. After an introduction, the theme's first part is reshaped into three variations and its second part into two variations, each exploring modification of rhythm, harmony and articulation. The sixth and seventh variations further modulate the original theme, building a harmonic blending of its two parts and employing a piano solo that combines their melodies in asymmetrical meter. Variation eight restates the original theme in cello and clarinet, providing a brief period of calm before the essence of each variation is layered, one upon another, to escalate the trio to a climactic finish. "Boundless" refers to the limitlessness of the imagination, which I aim to embody through the creativity and complexity of this composition. I will speak briefly before the performance about the conception and development of this work.

Faculty Sponsor: John David Earnest

CALVIN BRIGHAM, *Exploring Meter and Mode: A Musical Piece for Oboe and Piano*, 9:45a.m.

My piece is written for oboe and piano. In it, I play with traditional techniques of solo instrument and piano repertoire by incorporating the Dorian mode as well as a quickly changing metrical structure. To balance these two non-traditional techniques, my piece is arranged in a simple three-part ABA structure. The opening and closing A sections present a theme of longing in the oboe (an instrument well-suited to the expression of yearning) and play with raising and lowering the sixth degree of the key. The B section contrasts the A by demonstrating a contrapuntal interplay between oboe and piano, effectively equalizing the two instruments before returning again to the original melody. I will present brief analytical remarks about my composition before it is performed.

Faculty Sponsor: John David Earnest



IDENTITY, ETHICS AND MEMORY

REID GOZ

Emma Dulaney, moderator

Elise Frank, coach

UMA TRIVEDE, *Digital Nomads: The New Age of Migrants*, 9:00a.m.
In this age of technology there is a rise in virtual mobility which allows people to connect with one another and their homeland, regardless of their physical location. Since the late 20th century, digital nomads have represented a new classification of migrants who lead a “location-independent” life by moving from place to place, using new media and technology to sustain their livelihoods. My presentation focuses on how new identities are created by digital nomads and what assumptions they represent both in and out of their communities in comparison to existing migrant identities. Digital nomads show a high level of privilege and ability to exercise freedoms that are not as accessible to other categories of migrants. Drawing on anthropological theories of migration, belonging and representation, I propose that digital nomads represent a counterculture based in the mainstream culture they claim to leave behind.
Faculty Sponsor: Rachel George

LINNEA VALDIVIA, *Enter the Body: Performance, Identity and Body Representation in Contemporary Theatre*, 9:15a.m.

There may be no better place to discuss identity performance than the theatre, one of the most body-oriented art forms. Taking a body-oriented approach, I explore the ways body types and identities are represented on stage, especially with regard to race, body morphology/weight and gender identity (queerness in all forms, but especially in the context of non-binary gender comportment). While representation of “non-normative” body types is based in part on casting practices, it also falls to playwrights and directors to include these types in their works and for producers to support works that do not rely on cis-straight and WASP-oriented plotlines and characters. I explore how modern-day theatre addresses these themes and the ways that practices can be altered to support non-normative performing artists and other individuals.

Faculty Sponsor: Lydia McDermott

CATHERINE FISHER, DANIEL WHALEN, ALEX PITTS,

Judith Butler, Ethics, Poetics and Freedom, 9:30a.m.

Judith Butler's significant influence on feminism and queer theory is widely known. However, Butler's work as a critical reader of the philosophical canon is less widely received. Our presentations explore three essays connecting Butler's appropriations of philosophical thinkers such as Michel Foucault, Emmanuel Levinas, Friedrich Nietzsche and Baruch Spinoza to real-world problems of ethics, poetics and political rhetoric. Catherine Fisher considers the ethical poetics and political possibilities of Paul Celan's poetry. Alex Pitts addresses the possibility of ethics in oppressive political situations. Daniel Whalen connects current anti-Semitic rhetoric to a Jewish ethics of non-violence. Together, our presentations argue for the influence of Butler's work in addressing current, practical problems.

Faculty Sponsor: Julia Ireland

EMMA DULANEY, *Framing the Grievable/Ungrievable American Citizen:*

Visual Representations on Behalf of Katrina Event Survivors, 9:45a.m.

My presentation attempts to make sense of the contested public memory of Hurricane Katrina by analyzing "Telling Their Stories," a curation of 53 news images and an introductory text that convey a specific narrative of the event. The photos are coded into categories of apocalyptic imagery, hypervisibility, citizenship, militarization and class voyeurism to highlight patterns of subjectivity that certain bodies are placed within. Judith Butler's theories of precarity and framing, Nicole Fleetwood's hypervisibility and iconicity and Wendy Brown's neoliberalism examine the rhetorical significance of these photos and the public memory they provide for a mediated audience. I argue that the photo collection further embeds iconic visual frames of black precarity and white exceptionalism into the event's memory through neoliberal rationality.

Faculty Sponsors: Heather Hayes, Lydia McDermott



SESSION 2

10:45a.m.-Noon

RACE AND REPRESENTATION

MAXEY 104

Forrest Arnold, moderator
Arthur Shemitz, coach

BRENNA TWO BEARS, *Indigenous Representation*, 10:45a.m.

My presentation complements an exhibit at Maxey Museum about the representation of indigenous people. My talk will cover three areas: curation as narration, relations between indigenous communities and Maxey Museum, and decolonizing museum spaces and displays. I will share images of historic objects installed in the display case on the first floor of Maxey Hall (near Maxey 104). These objects include rose water given to Maxey Museum by the Confederated Tribes of the Umatilla Indian Reservation for protection from powerful objects; implements used to archive and keep track of objects; and a copy of the Native American Graves, Protection, and Repatriation Act. The purpose of my presentation and the complementary exhibit is to emphasize the importance of the museum in the college's current efforts to build a relationship with CTUIR.

Faculty Sponsor: Krista Gulbransen

ELISE FRANK, *Why Are They Always White Children? An Analysis of Racial Representation in American Children's Literature*, 11:00a.m.

Experiencing children's literature — being read to, looking at illustrations and absorbing common narratives — is a key source of socialization in American society. Arguably, the representation of race in children's literature molds children's understanding of the role that race plays in social dynamics in society. Through scholarly literature and primary analysis of select children's books, my presentation examines how children's literature influences how we think, talk and understand racial dynamics in the United States. How is the consumption and production of "the other" racialized and politicized in the text and illustrations of American children's literature? How does children's literature contribute to the socialization of children in areas of racial and ethnic discourses?

Faculty Sponsor: Suzanne Morrissey

CHRIS CAHOON, *Whiteness at Whitman: A Discursive Study*, 11:15a.m.

The last significant study of whiteness discourse in rhetorical studies occurred in the work of Nakayama and Krizek in 1995. In my presentation I provide an updated analysis of whiteness discourse, using Nakayama and Krizek's theory of whiteness. Through ethnographic interviews with Whitman College

students, I examine how whiteness functions as a discursive strategy at Whitman, and I demonstrate how whiteness is no longer invisible in the university setting. Whitman students talk about race primarily in terms of "diversity," "understanding," "comfort" and "privilege." The ways students discuss race, and as a result conceive of whiteness, strategically maneuver around the challenge to white student dominance. By discussing whiteness in non-disruptive ways, students reinforce the racial hierarchy in the academic community.

Faculty Sponsor: Heather Hayes

FORREST ARNOLD, *Engaging Ferguson: An Effective Exploration of Uncivil Disobedience*, 11:30a.m.

Ferguson, Missouri continues to be a focal point in the national dialogue on protest. There have been countless attempts to account for what happened there in 2014. I analyze the discourse of one zine, *Dispatches from Ferguson, Vol. 1*, in order to open up a broader field of conversation about the scope of public engagement. How can we better understand unruly, violent or illegal forms of public protest? Can we understand such uncivil disobedience as a form of public engagement? Rather than consider actions such as looting and rioting within the discourse of criminality, foreclosing urgent conversations about the politics of social change, I consider them as affective modes of resistance that allow protesters to respond to oppression when other tactics have failed. Ultimately, I argue for a new focus on affect within the discourse theory of citizenship in order to expand the scope of public protest.

Faculty Sponsor: Heather Hayes

DISCRIMINATION AND INCARCERATION

OLIN 138

Meghan Ash, moderator
Michelle Christy, coach

DENNIS YOUNG, *When Refugees Are Terrorists: Racialized Statelessness and the Constitution of the Racial State*, 10:45a.m.

With 11 million Syrians forcibly evicted from their homes, the image of brown bodies begging for entrance into other countries is ubiquitous. At the same time, the racial bodies of Syrian refugees are assigned specific meanings: terrorist, national security threat, barbarian, antithetical to the West. This discursive construction is visible at the level of state formation; the conversations around the United States Security Against Foreign Enemies Act worked to further amplify security

measures brought to bear against these “potential terrorists.” The racialized stateless person represents a site at which the United States, as a racial state, operates in a specific way. My presentation explores how understanding the racial logic of statelessness informs our conceptualization of the racial state. The question of racialized statelessness provides a unique lens for addressing how racial states constitute themselves in relation to those outside a system of states.

Faculty Sponsor: Arash Davari

CAMERON CONNER, *Are Refugees Guests?*, 11:00a.m.

On March 9, 2016, the Macedonian government closed its borders to all but a small number of asylum seekers entering from the Greek border. As a result, more than 55,000 individuals were unable to complete the journey along the Balkan Peninsula and into central Europe. Many such groups put up camp where they could, only to be forcefully evacuated from these refugee sites to government-authorized facilities. One month before evacuations began, the Greek Ministry of Interior released a statement to one such camp informing its residents of the approaching evacuation. In analyzing this statement, I argue that the Greek Ministry’s use of signification to constitute asylum seekers as “guests” expropriates the agency and power of those individuals to whom the statement is addressed. This expropriation occurs through the Ministry’s constitution of asylum seekers into the mold of “guests” within Greece, a role subject to certain expectations and obligations.

Faculty Sponsor: Heather Hayes

DANA MATSUNAMI, *Executive Order 9066: Mass Incarceration of Japanese Americans During WWII*, 11:15a.m.

On Feb. 19, 1942, President Franklin D. Roosevelt signed Executive Order 9066, which authorized the evacuation and incarceration of more than 110,000 Japanese Americans on the West Coast of the United States. Japanese American families were torn from their homes, forbidden to speak Japanese and relocated to shoddy barracks behind barbed wire, watched at all times by armed guards in towers. The government categorized all Japanese Americans as enemy aliens and denied them the basic rights of citizenship for the duration of WWII. Despite all this, no Japanese American or Japanese national residing in the United States was ever found guilty of sabotage or espionage. Based on research and training conducted during an internship at the Smithsonian National Museum of American History, my presentation documents the history of Japanese American incarceration, the subsequent national narrative constructed around “internment” and the process of developing a complex exhibit in a tumultuous climate.

Faculty Sponsor: David Schmitz

MEGHAN ASH, *Turning Points: From Addiction and Incarceration to Diversion and Healing*, 11:30a.m.

My presentation examines the Law Enforcement Assisted Diversion program as response to mass incarceration resulting from the U.S. “War on Drugs.” LEAD, a pre-booking, harm-reduction diversion program that operates through the Seattle Police Department, redirects chronic drug users and drug-

related criminal activity and addresses three major areas of life to encourage behavioral change among clients: personal relationships and support, housing and changes in individual-police relations. Using in-depth interview and participant observation data, I mine LEAD client narratives to identify and describe turning points in users’ lived experiences of addiction, homelessness and recovery, and consider their perspectives on harm-reduction services broadly.

Faculty Sponsor: Suzanne Morrissey

LITERARY CRITICISM

OLIN 129

Henry Carges, moderator
Ben Caldwell, coach

ESTHER RA, HENRY CARGES, *Irony, Shame, and Generosity: The Complexity of Whitney’s The Copy of a Letter*, 10:45a.m.

Early women writers have often been dismissed by 20th- and 21st-century critics for the limits of their literary skills or feminism. Isabella Whitney, for example, was accused of emotionless didacticism as well as a self-demeaning and typically moral stance. In our attempt to disrupt traditional stereotypes, however, it has been tempting to focus on women with confrontational rhetoric at the cost of women whose subversion was more subtle. In my presentation on Whitney’s *The Copy of a Letter*, I examine the ways in which Whitney used the very personae society had assigned to her — such as the languishing female lover of the Ovidian tradition — and recreated them in a way that can be both assertive and deeply moving.

Faculty Sponsor: Theresa DiPasquale

ERIN KIRKPATRICK, *Powers of Attraction and Repulsion: The Ambivalence of the Poet in Propertius’ 4.7*, 11:00a.m.

Propertius’s last book of elegies, composed circa 16 BCE, departs from the prior three books composed over the preceding 12 years. In 4.7, the character of the poet is berated by the ghost of his newly-deceased lover, Cynthia. Cynthia’s character functions as metonymy for Propertius’ body of poetry and the genre of elegy as a whole, and the poem’s narrative is a means for Propertius to explore his ambivalence towards his work. 4.7 is a retrospective poem that references the first three poems of Propertius’s first book, composed around 28 BCE. Cynthia’s ghost has the same hair, eyes and acerbic speech as her living counterpart, and these elements represent aspects of writing the love elegy that still attract the poet. However, the changed aspects, such as the ghost’s charred jewelry and clothes, represent over-adornment becoming repulsive to the poet and contributing to his decision to move away from the love elegy.

Faculty Sponsor: Dana Burgess

HENRY CARGES, *‘The Needle, as the Eye, Guides It About’: Women’s Imagination in Margaret Cavendish*, 11:15a.m.

Margaret Cavendish’s debut volume, *Poems and Fancies* (1653), covers atomist science and the nature of simile in the same breath, often combining seemingly incongruent themes. The primary response to her work chalked up her engagement with

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disparity to feminine aristocratic eccentricity, branding her “Mad Madge”— a derisive nickname that still plagues much of the critical response to Cavendish’s work. This dismissive reaction masks the complicated, proto-feminist brilliance of an intensely original work, as the book refuses the strictures of a largely masculine poetic tradition in its content, form, and structure. By studying her inventive use of needles and eyes in the text, I show that Cavendish prioritizes a specifically feminine imagination, one that stems from the very bodies of women as well as their lived experience, and in doing so opens up new modes of expression all her own.

Faculty Sponsor: Theresa DiPasquale

DISEASES AND CURES

SCIENCE 159

Danielle Wieck, moderator

Hannah Alverson, coach

SEAN TERADA, *Associations Between the Ankle-Brachial Index and Markers of Arterial Dysfunction and Non-Classical Monocytes in HIV-Infected Individuals*, 10:45a.m.

Prevalence rates of peripheral arterial disease, a common vascular disease indicative of plaque buildup, have been reported in HIV-infected populations to be as high as 20.7 percent. Although the direct cause is still unknown, many factors have been attributed to this increased risk, including persistent inflammation and immune activation, as well as treatment side effects. Peripheral arterial disease is commonly diagnosed using the ankle-brachial index, which measures a ratio of blood pressures in the limbs. My presentation investigates potential associations between the ankle-brachial index and measurements

of arterial dysfunction as well as non-classical monocytes. Results of our research showed that abnormal ankle-brachial index scores were significantly associated with lower levels of non-classical monocytes and increased carotid artery intima-media thickness. This research provides further understanding of the potential role that non-classical monocytes play in the progression of atherosclerosis in HIV-infected individuals.

Faculty Sponsor: Matt Craig

CORA AMUNDSON, *Analyzing Immune Cells in Chronic Graft-Versus-Host Disease*, 11:00a.m.

High-risk leukemias are very difficult to successfully treat in both children and adults. Stem cell transplants are one treatment method that can cure patients. However, transplantation can cause chronic graft-versus-host disease, a serious and potentially life-threatening side effect. In cGVHD, the transplanted donor immune cells attack the patient’s healthy tissue. Naive T cells are immune cells that have not been activated to target a specific antigen and are implicated in attacking healthy tissue in cGVHD. We analyzed immune cells from patients who received a naive T cell-depleted transplant as a strategy to prevent cGVHD. We sought to identify the proteins that were more highly expressed on immune cells in patients who later developed cGVHD. Our goal was to determine if it is possible to predict which patients are at high risk of cGVHD before its onset for the purpose of treating future transplant recipients prophylactically.

Faculty Sponsor: Matt Craig

PAAL NILSSEN, *Searching for the Cure: A Promising HIV Strategy Unlike Any Currently Being Pursued*, 11:15a.m.

For more than three decades, Human Immunodeficiency Virus

has posed a challenge for retroviral drug discovery. Despite previous palliative measures to treat the chronic disease, the morbidity of HIV still prevails significantly and will likely continue to increase as the survivors age. Enormous progress has been made in recent decades to uncover how HIV attaches to blood cells, enters inside, replicates and then leaves the cell. However, large gaps remain when it comes to how the virus disassembles itself. Conventional drug discovery platforms approach antiviral therapeutics directly by preventing HIV particles to bind to the host cell. I used an alternative, more indirect approach, one that includes approaching HIV from multiple mechanistic angles, specifically through HIV disassembly. This approach allows one to determine the rippling effects after an initial inciting event has occurred and the following effects it has on all aspects of body regulation.

Faculty Sponsor: Britney Moss

DANIELLE WIECK, *Delineating the Path Through Which Fibroblast Growth Factors Produce Remission from Type 2 Diabetes*, 11:30a.m. Since the discovery of insulin in 1921, therapies for *Diabetes mellitus* focus on pancreatic islets in an attempt to normalize blood glucose levels and stall disease progression. However, in the 19th century, the central nervous system was implicated in the pathology and potential therapy of diabetes. This presentation focuses on a return to the CNS as a way of treating diabetes via the family of Fibroblast Growth Factors. FGFs, specifically FGF1, 19 and 21, have been implicated in the prolonged lowering of blood glucose levels in rodent models, offering a potential CNS-focused therapy. This study aims to delineate the FGF1 signaling cascade by looking at effects of a mutant FGF, R50. We found that by comparing the effects of FGF1 and R50 on rodent models of diabetes we could further delineate the mechanism by which FGF1 works to produce remission.

Faculty Sponsor: Paul Yancey

SECRETS OF THE DEEP I SCIENCE 100

Nina Finley, moderator
Cora Amundson, coach

STACIE BELLAIRS, ALINA NAKANO, *Pteropods at Risk: Effects of Ocean Acidification on Pelagic Mollusks*, 10:45a.m.

Increasing levels of carbon emissions in the atmosphere have direct effects on ocean chemistry and marine habitats. Anthropogenic carbon emissions increase levels of dissolved CO₂ in ocean waters, causing ocean acidification. Pteropods are pelagic mollusks with calcium carbonate shells that are vulnerable to corrosion in acidic waters. Our presentation examines the relationship between ocean pH and shell damage of the pteropod *Limacina helicina* off the eastern coast of New Zealand. Sampling of water pH in this region varied from 7.98 to 8.10. However, global ocean pH is expected to decrease a further 0.3- 0.4 units by the end of the century, given current emission projections, and these changes may prove more challenging for animals with calcium-based shells. Our research

contributes to the growing field of the effects of carbon emissions on marine ecosystems and economies.

Faculty Sponsor: Shaun Cain

LAUREL FIELD, *Genetics of Sea Star Wasting Disease*, 11:00a.m.

Sea Star Wasting Disease is a highly lethal, widespread marine virus that has devastated sea star populations on the West Coast since 2013. A harmful mutation exists in a gene in sea stars that appears lethal to individuals that have two copies of the mutation (homozygous genotype). Previous studies suggest that individuals with only one copy (heterozygous) have an advantage in dealing with SSWD, implying that surviving heterozygotes would pass the mutation along at higher frequencies, thus preserving the mutation. This hypothesis was tested by surveying recovering, sick and healthy individuals along the central Oregon coast. Our data did not statistically support the hypothesis; nor did we find differences in genotype frequency between healthy and diseased sea stars. Thus, we found no support that selection due to SSWD is affecting this mutation.

Faculty Sponsor: Delbert Hutchison

JOHN DEBUYSER, *Catch Them if You Can: Assessment of Invasive Lionfish (*Pterois volitans*) Behavior on Little Cayman, Cayman Islands, to Aid Control Efforts*, 11:15a.m.

Control of the invasive lionfish (*Pterois volitans*) is a high priority throughout the Caribbean to aid in the protection of coral reefs against the effects of increased predation. Due to few predators, competitors, parasites or disease, culling programs have been the primary means of removal and management. Concerns have been raised that increased culling pressure selects for more cryptic, wary individuals, making spearing increasingly difficult. To assess this concern, over the summer of 2016 about 400 lionfish were surveyed on coral reefs around Little Cayman, an island in the Caribbean south of Cuba. Preliminary analysis revealed an increase in wary behavior of lionfish at culled sites during the day. Interestingly, regular culls on Little Cayman have not affected the behavior of lionfish at dusk. This study found that evening culls provide greater accessibility to the lionfish population and should be employed whenever possible for enhanced spearing efficiency.

Faculty Sponsors: Amy Molitor, Paul Yancey

NINA FINLEY, *How to Spend an Alaskan Solstice: Sea Star Wasting Disease and Environmental Education in the North*, 11:30a.m.

On the summer solstice in Homer, Alaska, the sun provides light for 21 hours and 44 minutes. What's a person to do with all that time? As the Naturalist Intern with the Center for Alaskan Coastal Studies, I lived at a semi-remote field station where my jobs ranged from guiding tourists around tide pools and rain forests to "raking the cone" in the world's most northern composting toilet to collecting tube-feet from diseased sea stars for genetic analysis. In my presentation, I take you on a 12-minute journey to experience a slice of what you would enjoy as a visitor to the Peterson Bay Field Station. My name is Nina, and I'll be your guide today. Rubber boots optional.

Faculty Sponsor: Delbert Hutchison

ENVIRONMENTAL HUMANITIES

KIMBALL THEATRE
Jack Bynum, moderator
Jordan Miller, coach

TIM MORRIS, *Kurt Vonnegut and a (Lack of) Love for Nature*, 10:45a.m.
 Kurt Vonnegut's novels are consistently quirky and fun. They also deal with common themes of societal criticism. My presentation focuses on the way Vonnegut's works reflect on the relationships between humans and the natural world. By using an ecocritical approach to read *Cat's Cradle*, *Galapagos* and *God Bless You Mr. Rosewater* I attempt to shed light on the way the books contribute to our understanding of environmental sustainability, environmental disaster and human connection to the environment. I read Vonnegut's novels to promulgate ideas, such as the power of society's basic understanding of environmental value, that are similar to more mainstream environmental writers.

Faculty Sponsor: Emily Jones

RYAN GARRETT, *A Cartesian Approach to Environmental Ethics*, 11:00a.m.
 Environmental ethicists have attacked the philosophy of René Descartes for supposedly being pivotal in preventing the formulation of proper environmental concerns and attitudes. In my presentation, I argue that Descartes' philosophy is effective in developing a proper environmental ethic. Descartes believed God created two kinds of substances, mental and physical; humans are composed of a mental and physical substance, plants and animals of only a physical substance. Descartes argued that humans, animals and plants, despite their difference in substance, share the same status of creatures and interact with one another. The interactions between humans and physical substances, i.e., animals and plants, can be pleasurable. Morally, Descartes argued that humans properly serving God receive theistic pleasure from promoting the welfare of their communities. Humans, animals and plants exist in an ecological community with one another. Thus, Descartes' philosophy naturally develops a theocentric environmental ethic.

Faculty Sponsor: Patrick Frierson

LINDSEY HAMMER, *Rhetorical Strategies of the 1994 Cordova Fishermen's Blockade*, 11:15a.m.
 The 1989 Exxon Valdez oil spill was the largest and most devastating manmade environmental disaster in U.S. history. In its aftermath, the fishermen of Cordova, Alaska, one of the most affected populations, were deprived of any restitution or recovery aid. In 1993, these fishermen took to their vessels to blockade the Valdez Narrows, preventing Exxon's tankers from entering or exiting the Valdez port. This forced Exxon into settlement talks with fishermen and prompted the federal government to grant \$21 million for research and restoration in Prince William Sound. In my presentation, I argue that the Cordovan fishermen were able to accomplish their blockade through the use of multiple rhetorical tools.

Faculty Sponsor: Heather Hayes

JACK BYNUM, *Ask the Forest About War: Environmental Peace-Building in Post-Conflict Nepal*, 11:30a.m.

In today's world only 10 countries can be considered truly free from violent conflict. Forty percent of violent conflicts are directly linked to disputes over natural resources. My presentation asks: Can we take environment — a frequent source of conflict — and switch the paradigm towards a space for common ground? I will examine the environmental impact of Nepal's 10-year civil war (1996-2006) and the role of Community Forest User Groups in rebuilding peace before, during and after the conflict as well as the potential for community forestry to rebuild peace in war-torn areas around the world. In an increasingly unknowable conflict-prone globe, community forestry can provide the roots to grow resilient forests, resilient communities and resilient and lasting spaces for peace.

Faculty Sponsor: Don Snow

DOORS OF PERCEPTION

REID GOZ
Erin Coffey, moderator
Chris Cahoon, coach

ZOEY WATTS, MARIANNE KELLOGG, *The Pretty Project: Exploring the Mechanisms Through Which Girls Learn About Prettiness*, 10:45a.m.

In our society girls often learn that appearance is important and that they should strive for unrealistic body standards. Gender socialization theory suggests that messages from mothers may be particularly impactful on girls' developing views of attractiveness. Indeed, mothers' dieting practices and views about weight have been closely linked to their daughters' views of their own bodies. However, little scholarship has examined how girls view other aspects of their appearance, such as prettiness. Our lab-based study examines the ways in which mothers' self-views and socialization strategies are related to their young daughters' views of attractiveness and endorsement of gender stereotypes. We are studying these issues among girls ages 3-6 since little is known about early development of this age group's attitude and behavior about appearance. We present the results of this study and the implications for the different mechanisms through which daughters learn about prettiness.

Faculty Sponsor: Erin Pahlke

TAYLOR BERNTSON, HANNAH BOUWMAN, PASCALE CARPENTIER, *The Effect of Paternal Relationships on Adolescent Girls' Self-Objectification*, 11:00a.m.

In today's society, women suffer from persistent objectification of the female body in the media and everyday interactions. This constant objectification leads women to self-objectify by adopting a third-person perspective of their body. While the effects of mother-daughter relationships on self-objectification have been studied, there is minimal research examining the effects of father-daughter relationships on self-objectification. We examine the effects of both paternal closeness and paternal benevolent sexism on adolescent girls' self-objectification. Paternal closeness has been shown to protect women against self-



objectification. However, paternal benevolent sexism reinforces the idea that women are incapable of taking care of themselves, which may contribute to their self-objectification. Our research aims to highlight the importance of a healthy father-daughter relationship during adolescent identity formation by examining the potentially harmful effects of benevolent sexism on daughters' levels of self-objectification.

Faculty Sponsor: Erin Pahlke

JOSIE FURBERSHAW, SAMANTHA FATA, OLIVIA COACKLEY,

The Tritone Paradox and the Simon Effect: A Study of Pitch Perception, 11:15a.m.

Many people are familiar with ambiguous images, such as an image that may be seen as either a duck or a rabbit. Perception of these ambiguous visual stimuli can often be manipulated. It is unclear if this is also the case for ambiguous aural stimuli. Our study considered the tritone paradox, an illusion of auditory perception, in which a pair of notes can be interpreted as either ascending or descending. We hypothesized that the listener's interpretation of the tritone could be influenced based on whether the immediately preceding tone pair was ascending or descending, and whether the response was congruent with the presentation of the tone pair. The capability, or lack thereof, to manipulate perception of a tritone has important implications for current theories of pitch perception, as well as for the study of ambiguous auditory stimuli.

Faculty Sponsor: Wally Herbranson

ANA RODRIGUEZ, MADDY SELTZER, KATRINA KERRIGAN,

Emotionality and Gender of a Third-Party Reporter on Memory Distortion, 11:30a.m.

Memory is considered a trusted and reliable source, yet it continues to be proven fallible. The misinformation effect is one such weakness in which post-event misinformation distorts a memory of an original event. We investigate how the gender

and emotionality of a third-party informant influence a viewer's susceptibility to memory distortion. Participants are tested on memory from a video after viewing a third-party report of the video in which facts of the original event are either reinforced or altered. There are four testimony conditions: male/emotional, female/emotional, male/neutral and female/neutral. We hypothesize that emotional testimonies will lead to greater memory distortion than neutral testimonies, and that female participants will be more persuaded (show greater memory distortion) by female testimony than by male testimony. This research is particularly important given that the majority of our information comes from third-party sources (newscasts, media, courtroom testimonies, etc).

Faculty Sponsor: Emily Bushnell

ANNA MELVILLE, ERIN COFFEY, *Objectification of the Female Body: Humanization as a Moderator*, 11:45a.m.

Our presentation seeks to better understand variables that moderate the objectification of women. Objectification is when an individual is seen as an object and treated as less than human. More specifically, she is viewed as a body or set of body parts for the pleasure and consumptions of others. The consequences of objectification for the sufferer are numerous and harmful: anxiety, depression, body shame, eating disorders. Previous studies have shown that providing humanizing information based on attributes of warmth and competence can reduce levels of objectification. The purpose of our study is to measure the extent to which humanizing information framed within the Stereotype Content Model interacts with objectification of women. The SCM proposes four distinct social categories composed of differing levels of warmth and competence. Measuring the levels of objectification targeted at women from each category will help us better understand who is most at risk of objectification.

Faculty Sponsor: Erin Pahlke

SESSION 3

2-3:15p.m.

MOTIVATING INFLUENCES

MAXEY 104

Cherokee Washington, moderator
Gordon Kochman, coach

HUNTER PLUCKEBAUM, JAIDYANNE PODSOBINSKI, ZACH HARTZELL, *Are Pigeons Better at Making Decisions Than You?*, 2:00p.m.

Have you ever wondered why humans are cognitively superior to other animals? Well, guess what? We're not! Our presentation addresses several ways in which humans are poor decision-makers as well as several strategies to improve selection outcomes. From our research, we highlight the key differences between humans and pigeons on a decision-making task called the Secretary Problem. This famous problem uses Optimal Stopping Theory to predict when decision-makers should make a final selection from a finite list of choices. We modified this study to test pigeons' performance on this task, at which humans are notoriously bad. We explain how our study provides additional context for interpreting humans' use of response biases in decision-making tasks.

Faculty Sponsor: Wally Herbranson

ERIC CONTE, ELYSE LAURIN, EMMA ONSTAD-HAWES, *The Effect of Motivational and Instructional Self-Talk on Precision and Endurance Performance Tasks*, 2:15p.m.

In our sport psychology study, we examined the relationship between motivational and instructional self-talk on precision and endurance performance tasks. Self-talk is the practice of talking to oneself, either silently or aloud, during competition. Motivational self-talk emphasizes goal achievement, increased effort and desire to succeed, while instructional self-talk uses word cues to enhance technique and skill in a task. Our sample consisted of players from the men's and women's varsity soccer teams. Participants completed endurance and precision tasks before and after two motivational, instructional or control self-talk interventions. We expect to find that participants in the IST group will perform best on the precision task, while the MST group will perform best on the endurance task. These results suggest that self-talk can make a tangible difference in athletic performance and different types of tasks require distinct types of self-talk.

Faculty Sponsor: Wally Herbranson

IAN BECKER, *The Impact of Motivation on Selective Attention as Mediated by Consciousness of Goals*, 2:30p.m.

Students are constantly asked to attend to work. Being able to selectively attend and ignore often interesting distractions is important for learning. Yet, little psychological research has

explored factors that help students selectively attend. I propose that understanding differences in motivation is key to understanding selective attention. Motivation is a willingness to participate in an activity and may thus describe a willingness to selectively attend. However, it is possible that motivation can help students in other ways as well. Differences in motivation may impact students' ability to put aside other demands on cognitive resources, affecting selective attention in the moment. In my presentation, I explore the hypothesis that differences in motivation impacts selective attention and that this relationship is mediated by consciousness of goals. My study has important implications for both educators and policy makers.

Faculty Sponsor: Erin Pahlke

JACK EIFORD, *Eudaimonia is Actualized by Intrinsically Motivated Work: Using Aristotle and Montessori to Develop a New Account of Eudaimonia*, 2:45p.m.

Aristotle identified a highest good for humans (eudaimonia), and rightly asserted that examining this good improves our ability to live a good life. In my presentation, I use Aristotle's and alternative educator Maria Montessori's accounts of eudaimonia to develop my own account. I argue that eudaimonia is actualized by intrinsically motivated work, i.e. effortful activity engaged in for its own sake. Working from this central claim, I consider three features of intrinsically motivated work: that it has an internal standard of excellence, proper content and that the highest kind of pleasure supervenes on it. I then examine the role of material goods in my account of eudaimonia. I also argue that eudaimonia should be taught by allowing children to engage in intrinsically motivated work without interference from rewards and punishments. I conclude by suggesting that my account of eudaimonia has important implications for modern society.

Faculty Sponsor: Patrick Frierson

CHEROKEE WASHINGTON, *The Role of Flow in Athletic Competition: An Investigation Through Whitman College Athletes*, 3:00p.m.

In the 1970s, psychologist Mihaly Csikszentmihalyi established the concept of "flow," a universally applicable phenomenon defined as "an optimal psychological state that occurs when there is a balance between perceived challenges and skills in an activity" (Csikszentmihalyi, 1990). In "flow," individuals experience "intrinsic motivation, perceived ability, concentration on task, loss of self-consciousness, altered sense of time and autotelic (self-rewarding) experience" (Pain, 1999). Today, many athletes strive to attain flow in order to achieve excellence in competition. My presentation explores flow within athletics as a promoter of good performance in competition. I examine whether or not flow is responsible for optimal performance or, conversely, if good



performance stimulates flow. Through an experiment involving Whitman College athletes, several pre- and post-game surveys and performance data from a targeted competition, I suggest the overall function of flow in athletics.

Faculty Sponsors: Emily Bushnell, Brooke Vick

POWER AND POLITICS

OLIN 138

Aly Counsell, moderator
Alex Pitts, coach

CAROLINE BURNETT, *Shari'a in U.S. Courts*, 2:00p.m.

For many years, especially in the aftermath of Sept. 11, 2001, a prejudiced view of Muslims and the religion of Islam has existed in the United States. One aspect of the religion that is continually attacked is Shari'a, or Islamic law. I analyze the presence of Shari'a in the American legal system and how it is handled in the courts in light of this prejudice against Muslims. I examine court cases and legal documents in seeking to answer the question: What does the presence of Shari'a in the U.S. and, more specifically, in our legal system say about religious tolerance in a society that prides itself on diversity?

Faculty Sponsor: Lauren Osborne

HOLLY SMITH, MIRIAM ZUNIGA, *Malleability of Political Attitudes*

Surrounding the 2016 Presidential Election, 2:15p.m.

Frustrated with their political disagreement, John Stewart replied to Rick Santorum, "Ultimately, you end up getting to this point, where literally we can't get any further. I don't think you're a bad dude, but I literally can't convince you." Inspired by interactions like this, we sought to explore psychological differences in politics. We examined the malleability of political attitudes in the context of the 2016 presidential election. Negative political advertisements and the Fear of Death Scale (creating mortality salience) were used. Participants' explicit political attitudes were measured before and after the election, as were their implicit political attitudes through sensitivity to deviance. In our presentation, we hypothesize that political ads and mortality salience create a shift toward conservatism, as might the subsequent election of Trump. These shifts may differ according to people's initially declared political affiliations. With this past year's controversial election, these issues are more salient than ever.

Faculty Sponsor: Emily Bushnell

EMMA BISHOP, JOSEPH ZIMMER, *Counterinsurgency in the Vietnam and Iraq Wars*, 2:30p.m.

Counterinsurgency began during the early 1960s under President John F. Kennedy in Vietnam and continued to be utilized by the U.S. military during America's commitment in Iraq under President George W. Bush. We examine how and why Kennedy and Bush implemented counterinsurgency and the many parallels between the reasons the United States took action in Vietnam and Iraq. We argue that both interventions were justified through the ideologies of American exceptionalism. In order to uphold national credibility, the U.S. invested energy into building nations and fighting wars of liberation. Counterinsurgency was designed

to work with local populations and produce less of a financial or moral burden on American society. However, both the Vietnam War and Iraq War are entrenched in controversy due to the circular and prolonged nature of the U.S.'s involvements.

Faculty Sponsor: David Schmitz

ALY COUNSELL, *French, Wolof and the Politics of National Language in Postcolonial Senegal*, 2:45p.m.

Language is an agent of power with an immense capacity to structure the way that people think. Designations of national language reveal information about the political values and power structures of a society, which can be particularly complicated in previously colonized nations. In 1960, Senegal became an independent country after nearly two centuries as a colony of France. Though French remains Senegal's official national language, it is most often associated with politicians, business people, tourists and the urban elite. It is almost exclusively spoken by those with a formal education. In contrast, local languages such as Wolof, Serer, Pulaar and Jola are spoken as first languages among various ethnic groups throughout Senegal. Tensions between speakers of French and local languages, particularly Wolof, Senegal's most widely spoken language, have led to ongoing conversations among Senegalese scholars and activists about the future of language recognition in the country. My presentation addresses these issues.

Faculty Sponsors: Rachel George, Adeline Rother

JAPANESE LANGUAGE AND CULTURE

OLIN 129

Jesse Moneyhun, moderator
Michelle Christy, coach

MATTHEW HIRANO, *Wasei Eigo: Japanese Words Lost in*

Translation, 2:00p.m.

Traveling in Japan, someone accustomed to the often single-language culture of the United States might be surprised by the common appearance of English words in Japanese media and literature, and across many registers of Japanese speech. *Wasei eigo* means "Japanese-made English," and refers to words or phrases that may have some origin in English but have been incorporated into Japanese usage with a new meaning. Words frequently cross the language barrier into (and out of) the Japanese lexicon. With the particular example of mistaken English translations on official signs outside Kyoto Station, one can begin to see the charm, flexibility and new interpretations that come with the adapted usage of *wasei eigo*.

Faculty Sponsor: Ron Takemoto

CELIA LANGFORD, *Lenses on Bishōnen: Artistic Representations of 'Beautiful Men' in Contemporary Japanese Manga*, 2:15p.m.

The *manga*, or Japanese graphic novel, is a pop culture medium that appears in a variety of genres and often serves as a platform for discourse on topics otherwise frowned upon in the context of Japanese societal norms. My interest lies in the artistic representation of gender in *yaoi*, a genre of *manga* defined by its depiction of homosexual relationships between men. *Yaoi manga* artists regularly bend traditional definitions of masculinity by



drawing their characters as *bishōnen*, or “beautiful boys” — with long hair, jewelry and fine features. My presentation features images of *bishōnen* seen in various *yaoi manga* and contrasts them with Japanese representations of beautiful boys from other mediums. I am interested in the ways in which a *bishōnen* can be represented. If the image of a “beautiful man” travels through the right lens, can that image begin to shift standards of masculinity?
Faculty Sponsor: Ron Takemoto

SKYE GOEDERT, *Okinawa: The Hawaii of Japan?*, 2:30p.m.
 My presentation provides a background that may shed light and understanding on Okinawa’s problematic relationship with both Japan and the United States. In the U.S., people may remember the Battle of Okinawa, or they may know that Okinawa serves as the home for 75 percent of U.S. military bases in Japan. Few in Japan realize that, until 1879, Okinawa was known as the Ryūkyū Kingdom. Today, people in Japan consider Okinawa a tropical paradise for tourists. The name Okinawa means “rope in the open sea,” which aptly describes a long stretch of 150 islands between Japan and Taiwan. But Okinawa has a unique language and culture. Today, the people of Okinawa are at once “Okinawans” and Japanese. Thus, the question of Okinawa as a prefecture within Japan and the question of Okinawan identity remains a complex and highly debated topic.
Faculty Sponsor: Ron Takemoto

JESSE MONEYHUN, *Kyūdō: The Tools and Practice of Japanese Archery*, 2:45p.m.
 Most people translate the word *kyūdō* as “the way of the bow,” but I want to avoid making the easy association with zen and the art of archery. Instead, my presentation provides a historical context for *kyūdō* in traditional and modern Japan. I draw on my experiences with bows and arrows and other tools as a student of Japanese language and culture at the Associated Kyoto

Program Center. In particular, I share an encounter that led me into a training hall for *kyūjutsu* or “the practice of using a bow with skill.” In the beginning, I did not shoot arrows. I learned how to sit and stand. I also learned how to put on a *kaki* (glove), how to hold a *yumi* (a bow) and how to notch a *ya* (arrow). I demonstrate these techniques in my presentation.
Faculty Sponsor: Ron Takemoto

MICRO-SCIENCE
 SCIENCE 159
Ally Bogisich, moderator
Joshua Ward, coach

NOAH SCHLENK, *Immunostaining for p300 and CBP*, 2:00p.m.
 My presentation focuses on research I conducted using immunohistochemistry to identify proteins in insulin-stimulated pathways. My research contributed to our lab’s ability to analyze p300 and CBP proteins for their use of acetylation. Phosphorylation has long been seen as the primary driving force of downstream signaling. Our lab examined the importance and underestimation of acetylation. Initially, the lab used Western Blotting to look for protein presence, but the results we obtained were faint and difficult to analyze. I was assigned the task of troubleshooting a protocol for the staining of these two proteins. I sliced tissue, plated it, stained it and calculated the changes between knockout- and wild-type tissue. I was ultimately successful in identifying p300 but statistically unsuccessful in identifying CBP due to a technical error.
Faculty Sponsor: Paul Yancey

AUSTIN SHAFF, *Microwave Assisted Syntheses of CB11- Carborane Derivatives*, 2:15p.m.
 Derivatives of the 1-carba-closo-dodecaborane(-1) carborane anion (CB11-) have a variety of potential applications which include

use as therapeutic agents, catalysts, medical imaging agents and weakly coordinating anions. A new microwave assisted synthesis of the undecachlorinated derivative (CHB11Cl11-) has been developed. This compound has synthetic application as a weakly coordinating anion for cationic catalytic processes, but currently its accessibility is limited by a lengthy synthesis. A novel synthesis of the monoesterified derivative, 12-COOCH₂CH₃-CHB11H10 has also been developed from the previously established carboxylic acid derivative. With this synthesis carboxylic acid derivatives can be readily converted into a variety of esterified products. Reaction with select biomolecules could be a delivery mechanism of B10 to cancer cells for Boron Neutron Capture Therapy.

Faculty Sponsor: Mark Juhasz

LINDSAY SCHWARTZ, LIZZI WONG, *Effect of SBP-1 Signaling in the Synthesis of Lipids in C. elegans*, 2:30p.m.

We share our study of the Epidermal Growth Factor receptor let-23 in *C. elegans*, an excellent model organism for examining fundamental questions in genetics. We hypothesize that an overactive EGF signaling suppresses lipid synthesis through different signaling pathways. However, the pathways are poorly understood. To better understand them, we study whole animal fat levels under different EGF signaling levels and the effect of EGF signaling on the activation of the sole *C. elegans* lipid transcription factor, SBP-1. We use mutant strains with different levels of EGF signaling to determine whole animal fat levels and SBP-1:Green Fluorescent Protein fusion location using phase and fluorescent microscopy. We also use this approach to look at other downstream and upstream pathways connected to lipid synthesis, which will further our understanding of the role lipid synthesis plays in human cancer development.

Faculty Sponsor: Matthew Crook

ALLY BOGISICH, *How Does Overactive EGF Signaling Affect C.elegans Lipidome?*, 2:45p.m.

Epidermal Growth Factor signaling is critical to animal development; it is also a hallmark of many cancers. Recent research in the nematode *Caenorhabditis elegans* has shown a role for EGF signaling in the control of lipid synthesis, via the lipid transcription factor SBP-1. This role led us to the question: How do different levels of EGF signaling affect the spectrum of lipids produced? I used mass spectrometry to assay the entire *C. elegans* lipidome under normal and overactive EGF signaling. To do so, I carried out a whole fat extraction, separated the lipids by TripleTOF, then analyzed the results for distinct lipid species and their relative quantities. I found that polyunsaturated lipids are widely trending up vs. normal, while mono-/saturated lipid production is trending down. Other emerging results suggest that lipid trends in overactive EGF signaling and sbp-1 mutants aren't as tightly correlated as we had hypothesized.

Faculty Sponsor: Matthew Crook

SECRETS OF THE DEEP II

SCIENCE 100

Alex Waheed, moderator

Hallie Barker, coach

DEVON YEE, *Modeling Optimal Oyster Reef Placement in Chesapeake Bay*, 2:00p.m.

Oysters, nitrates and filtration, oh my! As part of an NSF-funded mathematical modeling group at St. Mary's College (Maryland), I explored the following research prompt: Determine strategic locations for oyster reefs in Chesapeake Bay such that they mediate nitrate and nitrite pollution. We developed a simplified tank model to approximate fluid flow and describe salinity, nitrates and nitrites in the bay. Additionally, we created a second model describing nitrate and nitrite pollution as point sources using an exponential decay function. In my presentation, I discuss mathematical modeling, describe and analyze our two models of the Chesapeake, and share ongoing research.

Faculty Sponsor: Douglas Hundley

CONNOR WELTY, MATT SOUSA, *Heavy Metal Analysis of Fish Inhabiting Varying Ocean Depth Zones*, 2:15p.m.

The pollution of heavy metals into the ocean from many different sources is bio-accumulating into the marine food chain and is consequently spreading into deeper ocean zones. While there are studies analyzing heavy metal and other element concentrations in fish in various locations, none have specifically investigated how the isotopic ratios of these elements in fish differ through ocean depth zones. Our study used an FAAS and an ICP-MS to determine the concentrations of arsenic, barium, cadmium, chromium, cobalt, copper, lead, mercury, nickel, selenium, zinc and their respective isotopes in fish ranging from the epipelagic (<2,000 m) to the hadalpelagic (7,000-11,000 m) zones of the ocean.

Faculty Sponsor: Frank Dunnivant

ISABEL CHRISTY, *The Effect of Mg and Ca in Seawater on the MRI Contrast Agent Gd-DTPA*, 2:30p.m.

The concentration of gadopentetic acid (Gd-DTPA), an MRI contrasting agent, has increased in urban waterways over the past three decades. While Gd-DTPA is so stable in freshwater that toxic Gd³⁺ is unlikely to be released, little is known about the stability of this complex in marine environments. At high salinity, Mg and Ca may reduce the concentration of free DTPA and release Gd³⁺ into the environment. In my study, the stability constants for complexes of DTPA with Ca and Mg were measured at seawater ionic strength by potentiometric titration to better understand the behavior of Gd-DTPA in marine environments. A side-reaction coefficient for DTPA in seawater was calculated from these constants to predict the speciation and complexation of DTPA in marine environments. I conclude that Gd-DTPA largely dissociates in seawater, releasing toxic Gd³⁺ to marine ecosystems.

Faculty Sponsor: Frank Dunnivant

ALEX WAHEED, *Heavy Metal Concentrations and Subfossil Assemblages as Indicators of Environmental Quality in Selected Wisconsin Lakes*, 2:45p.m.

The environmental history of lake ecosystems in the United States is broadly defined by a slow increase in contamination triggered by the Industrial Revolution and urbanization beginning around 1850, a sharper increase around 1950 and a general decrease following environmental legislation in the 1970s. This collaborative study examines sediment cores taken from three Wisconsin lakes spanning a range of human influence: Lake Monona (impacted),



Sparkling Lake (relatively pristine) and Shadow Lake (remediated). I and several other students collected and analyzed data from these lakes to create a comprehensive picture of environmental quality using radiometric dating, sediment analysis, geochemistry and live/dead records of subfossil assemblages. Sediment cores were analyzed for heavy metal concentrations using X-ray fluorescence. Our data will be correlated to other students' biologic and geochemical data, which together can be used to assess the consequences of both pollution and remediation on lake ecosystems.

Faculty Sponsor: Pat Spencer

RHETORIC STUDIES: AMERICAN NARRATIVES

KIMBALL THEATRE

Hanna Greenberg, moderator

Gordon Kochman, coach

LOGAN SCHMIDT, ANNA MIDDLETON, *American Mass*

Incarceration, 2:00p.m.

Our presentation focuses on the links between civic engagement, rhetoric, citizenship and incarcerated populations. Drawing from the works of Michelle Alexander, Angela Davis and Douglas Blackman as well as our personal experiences, we assess the state of our current prison system, outline the importance of prison reform and suggest models for improvement. Our personal experiences stem from our time in a "Rhetoric and Incarceration" course at the Washington State Penitentiary and from further findings from our independent study with Heather Hayes.

Faculty Sponsor: Heather Hayes

KENDRA WINCHESTER, *Selma: The Rhetorical Body as a Collective*, 2:15p.m.

I evaluate photography, particularly in the ways it works as a distinct tier of visual rhetoric that motivates emotion in an audience. I do this through a still photograph from Ave DuVernay's film, *Selma*. The use of body rhetoric within the still photograph allowed me to understand the culture constraints of blackness during the Civil Rights Movement and how those

constraints were demolished while marching. I also use these parts to construct how photography from the Civil Rights Movement achieved its iconicity and power while also changing views of African Americans during this period.

Faculty Sponsor: Heather Hayes

COLLIN FAUNT, *Donald Trump's Rise to the Presidency*, 2:30p.m.

If he's "#notyourpresident," whose president is he? "Political Campaign Rhetoric," a course I took in the midst of the presidential campaign leading to the election, led me to research why half of the American electorate voted for Donald Trump. My research focused specifically on voters from the working class who supported Trump and on the political climate that led to his election as president. My study was especially enlightening in the context of a liberal campus and the frustration of much of the student body. Understanding why voters elected Trump gave me a greater awareness and understanding of Republican views, a process that I will discuss in my presentation.

Faculty Sponsor: Heather Hayes

HANNA GREENBERG, *The Perpetuation of the 'Criminal' in Black Athletes*, 2:45p.m.

Over the past 20 years, mainstream magazines have featured dominant African American athletes depicted in a light that reinforces implicit racial biases. Through analysis of a 1996 Rolling Stone cover featuring Dennis Rodman, a 2002 Sports Illustrated cover featuring Charles Barkley, a 2008 Vogue cover featuring LeBron James and a 2010 Vanity Fair cover featuring Tiger Woods, we can see how photographers and publishers have the ability to shape meaning and a consequent discourse of their choice. These images influence the terministic screens through which viewers interpret their daily lives as well as depict racial biases which subsequently connect black men to crime. I explore the notion of deep-rooted implicit readership bias and how photographers and publishers have the capability to reinforce the omnipresent fear of black men within white culture.

Faculty Sponsor: Heather Hayes

SESSION 4

3:45-5p.m.

DEVELOPMENT AND ECONOMICS

MAXEY 104

Gambhir Kunwar, moderator
Ye He, coach

NORTH BENNETT, *Behind Olive and Dingo: Telling the Story of Portland's Favorite Clowns*, 3:45p.m.

Portland, Oregon is in the midst of an affordable housing crisis. Many residents are being pushed out of the city by rent hikes and a booming population. While real estate data abounds in the media, coverage often ignores the cultural effects of such change. *Olive and Dingo*, a short documentary I produced with Lindsey Smith (Macalester College '16) through the Media Institute for Social Change, tells the story of Portland's favorite clowns as they struggle to stay true to their punk roots while still earning enough money to afford staying in a fast-gentrifying Portland. In addition to showing the film, I discuss the tension between our subjects' interpretation of their story and our own, and how we attempted to deal with that tension through the film's narrative. I also address the representational and journalistic concerns we encountered during the production process.

Faculty Sponsor: Chas McKhann

MICHELLE CHRISTY, *ChengZhongCun: Borderlands of Urban Development in China*, 4:00p.m.

ChengZhongCuns are an urban development phenomenon specific to China. CZCs are villages in the middle of Chinese cities. Because of China's dual land system, a large city can surround a small village. Although the village is completely encompassed by the city, it remains autonomous. CZCs become enclaves within Chinese cities that are home to primarily low-income migrants looking to gain access to the wealth and job opportunities that only cities can provide. I examine these cities through sociological understandings of borders and borderlands. CZCs occupy a very precise position between Chinese understandings of urban versus rural. Although CZCs are an essential part of the Chinese rental market, they are constantly being destroyed to make way for new upscale development.

Faculty Sponsor: Donghui He

GAMBHIR KUNWAR, *When Governments Gamble: Liquidity and Insolvency Crises in a Classroom Experiment*, 4:15p.m.

Through a Perry Summer Research Award, I collaborated with a faculty member to design an experiment in international

finance. Our experiment helps students understand the role of an international lender of last resort such as the International Monetary Fund. We show how the IMF can help a government in a liquidity crisis. This crisis occurs when the government cannot convince enough lenders to roll over their short-term debt. The problem is that the infrastructure (an airport, for example) the government built with these loans cannot immediately generate the cash to repay lenders. Through participation in the experiment and an analysis of results, students see how the IMF can help the government overcome this short-term funding gap. Students also come to understand that the IMF's lender-of-last resort role gets more complicated in cases where the airport has some chance of failing, thereby sparking an insolvency crisis.

Faculty Sponsor: Denise Hazlett

PUBLIC HEALTH

OLIN 138

Jess Faunt, moderator
Isabel Mills, coach

HALEY CASE, *'The City is Another World': Historical Trauma and Depression Among Mapuche Peoples in Santiago, Chile*, 3:45p.m.

"La ciudad es otro mundo/The city is another world." These words, spoken by a Mapuche woman living in the urban center of Santiago, reflect the fundamental differences between the Mapuche's native territory in southern Chile and the urban centers that are now inhabited by 80 percent of the Mapuche people due to forced economic migration. The environmental, cultural and spiritual changes in the lives of Mapuche people have given rise to a prevalence of depression in migrants living in cities such as Santiago. My presentation investigates understandings of historical trauma and mental illness in urban indigenous communities and the discord between traditional systems of healing and Chilean-state biomedicine. I address the question: How does neocolonialism continue to shape the well-being of Mapuche people through historical legacies and contemporary medical practice?

Faculty Sponsor: Suzanne Morrissey

STEPHANIE REAMY, *Examining Patient-Provider Race Concordance and Patient Perceptions*, 4:00p.m.

As racial diversity in the nation continues to increase, access to quality health care has become a growing issue. Hispanic immigrants to the United States, especially those from Mexico,



tend to acquire low-wage jobs such as farming. As a result, many Hispanic families have to seek health care at more affordable clinics. Less accessibility to nonprofit clinics may contribute to weaker patient-provider relationships at these clinics. My presentation examines the relationship between patient-physician race and socioeconomic status concordance and patients' trust in their physicians at SOS Clinic. I tested Charles Cooley's "looking-glass self" theory to see if racial minorities take society's perception of themselves into account to shape their self-perceptions more than do other racial groups. Health outcomes were also measured after each patient's visit with a provider to assess the effect of patient's trust on compliance with physicians' recommendations.

Faculty Sponsor: Alissa Cordner

JESS FAUNT, *Managing Abnormality: The Politics of Epidemiology and the Public Health Response to Zika Virus*, 4:15p.m.

My presentation investigates how epidemiological research in response to Zika Virus functions through national and international public health organizations to measure and manage abnormality. I bring together scholarship on epidemiology with scholarship on national population governance to question how the historic practice of using science to justify the discrimination against disabled, non-white bodies and the regulation of reproductive bodies continues in new forms today. I argue that the fears that prompted the World Health Organization to declare Zika Virus a Public Health Emergency of International Concern are deeply political. Yet, epidemiology helps to "depoliticize" the public health response by masquerading under the guise of objectivity. I address the regulation of reproductive bodies and the racialized and ableist messages that become normalized through the language of epidemiology.

Faculty Sponsor: Shampa Biswas

HEAVENS AND EARTH SCIENCE 159 Marra Clay, moderator Ally Bogisich, coach

RILEY JORDAN, *Variable Stars in M92 and M15*, 3:45p.m.

My presentation details the search for variable stars in the Galactic globular clusters M92 and M15, using images collected over a 12-year baseline from April 2003 to September 2015. Globular clusters are dense groups of stars that are old and metal-poor. Variable stars are stars that vary in magnitude or brightness. My research looked for RR Lyrae type variables in M92 and M15 using images collected with a 2.4m telescope. The images were reduced and coded to select the variable stars. New variable stars were found in both clusters, and periods for previously known variable stars were confirmed.

Faculty Sponsor: Nathaniel Paust

HALLIE BARKER, *Isochrone Fitting of Hubble Data in UV-Vis-IR Bands*, 4:00p.m.

Stellar evolution models are an important tool used by astronomers to study star clusters. By plotting stars within a cluster in terms of their color and magnitude, we can fit these highly complex theoretical models to the data and determine important information about the cluster. In our research, we used the Dartmouth Stellar Evolution Program and the PAdova and TRieste Stellar Evolution Code to determine the age, distance and reddening of two globular clusters, M13 and M80, using photometry from the Hubble Space Telescope's Wide Field Camera 3 and Advanced Camera for Surveys. In addition to finding these parameters, we also looked at how the two models compare to one another, and where they seem to have problems. We found that both models have systematic inaccuracies in the

ultraviolet bands, and in particular that PARSEC predicts stellar metallicities that are too high in the UV.

Faculty Sponsor: Nathaniel Paust

TEDDY PIERCE, *Synthesis of Photoactive NaYF₄: Yb, Cr Nanoparticles*, 4:15p.m.

Solar cells are a growing source of renewable energy. However, standard solar cells absorb only visible light, which makes up less than 10 percent of solar radiation reaching earth. By utilizing nanoparticles, it is possible to efficiently convert some of the ultraviolet and infrared radiation to visible light. This is done by inserting pairs of atoms, called dopants, into a nanoparticle lattice. One of these atoms will then absorb a specific wavelength of radiation and transfer the energy to the other atom, which will emit the energy at a different wavelength. Specific dopant pairs allow for the conversion of specific wavelengths of radiation. The NaYF₄ lattice has been found to be an effective host for dopant pairs. By modifying synthesis from the literature for NaYF₄: Yb, Er we hope to create an efficient synthesis for NaYF₄: Yb, Cr, thereby allowing for the conversion of an additional set of wavelengths.

Faculty Sponsor: Mark Juhasz

SUSAN NICHOLS, *Predicting Bond Strength in Transition Metal Species*, 4:30p.m.

The bonding between transition metals and other species is a large part of inorganic chemistry. Central to this is the need to predict these bonds, primarily through comparing bond strength. Unlike the field of organic chemistry, however, there is minimal experimental data for these bonds by which to compare predictions. One approach is based on an empirical model called Pearson's Hard Soft Acid Base Theory. Since the model is experimentally based, this approach attempts to quantify the available data. Comparatively, another approach uses computational methods to create models of the bonds and then compares these models to experimental data for accuracy. My research analyzes both approaches by compiling previous research and determining connections between them.

Faculty Sponsor: Tim Machonkin

MARRA CLAY, *Spatial Determination of Organic Matter on Sediment Particles by Scanning Electron Microscope Analysis*, 4:45p.m.

Natural organic matter is the dominant factor for determining equilibrium and kinetic processes during pollutant sorption and desorption phenomena in sediment and soil experiments. While several models are suggested for predicting these processes, few offer mechanistic interpretations since the spatial location of organic matter on sediment particles is unknown. I examined sediments from multiple locations using SEM-EDX to determine and analyze particles for their elemental composition, specifically the location of carbon. Through a carbon map of the sediment, my investigation shows that organic matter tends to gather in clumps on the aggregates and occasionally on rough edges, and is not spread evenly across a sediment matrix.

Faculty Sponsor: Frank Dunnivant

PLANT WARS

SCIENCE 100

Mitchell Cutter, moderator

Hannah Alverson, coach

MARY BRADY, *Allelopathy in Three Species of Neotropical Ferns in the Cloud Forest of Costa Rica*, 3:45p.m.

Despite their tranquil appearances, plants are at war. They are constantly fighting with their neighbors for light, nutrients and space. One of the weapons some plants deploy are allelopathic chemicals. These chemicals interfere with the growth and development of other plants within range. These chemicals have many potential uses, including natural herbicides and pesticides. Allelopathy can also be used for conservation. For instance, revegetation projects can be impacted by using species that slow or even stop the growth of the other plants. My study focuses on three species of tropical understory ferns and looks for evidence of allelopathy by growing seeds in dirt collected from under the ferns, growing seeds watered with leachate made from the fern fronds, and analyzing the plantlet communities growing underneath the ferns in situ. In my presentation I show that all three species reveal varying degrees of allelopathy.

Faculty Sponsor: Delbert Hutchison

CHRIS DAILEY, *Impact of Competition on the Growth of Pseudoregneria spicata (Bluebunch Wheatgrass) in a Grassland Ecosystem*, 4:00p.m.

Competition plays a significant role in dictating the yearly growth of plants in semi-arid grasslands. Bluebunch wheatgrass is a common perennial bunchgrass native to the grasslands of eastern Washington, where the invasive Eurasian annual cheatgrass is pervasive. To assess the impact of neighboring grasses on BBWG growth, I established 13 experimental plots on both north- and south-facing slopes, which differ in water availability, at the Wallula Gap Biological Station in Walla Walla County. Each plot contained one plant with no competition (all neighboring plants removed), one plant with limited competition (only neighboring annual grasses removed) and one control plant. In June 2014 and 2015, I collected data on the growth of each plant, including number and height of stems and seed production. Comparison of the BBWG plants across treatments and between slopes will help determine how competition under different environmental conditions affects the growth of this important native grass.

Faculty Sponsor: Heidi Dobson

ANNE VONADA, *Analysis of Candidate Genes for Gain and Loss of Anthocyanin Pigmentation in Mimulus cupreus*, 4:15p.m.

What genetic mechanisms have allowed life to evolve such great diversity? One answer to this question is gene duplication, which allows new gene copies to take on novel functions. In the monkeyflower genus *Mimulus*, duplication of an anthocyanin-regulating Myb transcription factor gene has been associated with independent gains of anthocyanin pigmentation in multiple species. My presentation explores which Myb copy is responsible for gain and subsequent loss of anthocyanin pigmentation in *Mimulus cupreus*. Through transcriptome analysis and PCR, I

identified and analyzed candidate Myb copies. One promising candidate was found to have a previously unknown splice variant in the pigmented morph and a large deletion in the unpigmented morph. Future research will include gene silencing and rescue to definitively test the contributions of this duplicated gene to flower color diversity, both within and between species.

Faculty Sponsor: Arielle Cooley

SAMMI CLUTE, *The Living Fossil: A Comparative Analysis*, 4:30p.m.

Many extant taxa that have undergone long periods of evolutionary stasis have been classified as “living fossils” to indicate their similarity to fossil specimens. However, the term is inherently relative; claims of living fossils independent of their relation to the rest of the taxon tell us nothing about the nominal or pronounced uniqueness of these slow evolutionary rates. In my study, I compared fossil data to the equivalent modern data from a wide range of taxa to test the hypotheses that the putative living fossils would have more living fossil characteristics compared to those of their close relatives. Study results provide insight into the scientific relevance of calling something a living fossil; demonstrate the veracity of different criteria attributed to living fossils; and show the feasibility of continuing the investigation into the meaning of this scientific term.

Faculty Sponsor: Delbert Hutchison

MITCHELL CUTTER, *Encountering Resistance: Investigating Immunity of Lodgepole Pine (Pinus contorta) Against Attack by Mountain Pine Beetle (Dendroctonus ponderosae)*, 4:45p.m.

Mountain Pine Beetle (*Dendroctonus ponderosae*) has decimated large swathes of coniferous forest in Western North America in recent years. Correlated with rising temperatures and increased drought-like conditions, the range of these beetles has expanded swiftly into northern latitudes and high elevations, far beyond the historic range of the species. High-elevation trees, not adapted to beetle attack, are killed at even greater rates (90-95 percent). My presentation investigates a small population of Lodgepole pine (*Pinus contorta*) which was subject to an infestation of Mountain Pine Beetle but not attacked. Using genetic markers, I analyzed the genetic diversity of these “survivor” trees in comparison to the general population of the area to find evidence of a heritable pine beetle resistance trait in these survivors. This research may lead to more in-depth study on the gene(s) responsible for this trait and potential future use of this resistance in protecting our forests.

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COMPOSER'S STUDIO II

KIMBALL THEATRE

Jeffrey Maher, moderator

Dana Matsunami, coach

TALEA SHUPE, *'Aviary Suite,'* 3:45p.m.

“Aviary Suite” consists of three movements written for two flutes. Each movement is a character piece depicting one of three different birds. “Hunt of the Hawk” is a dissonant movement intended to describe a hawk hunting for its prey. The hawk

begins its hunt stealthily, spots its prey, swoops to it and finally captures it. “Morning Swans,” a much slower, more melodic movement, depicts swans gently gliding across a pond in the early morning as the fog slowly lifts from the water. My suite concludes with “Hummingbirds,” a short, busy, intentionally entertaining movement depicting the rapid movements and patterns of hummingbirds. Before the performance of this piece, I will speak briefly about its conception and my working process to compose it.

Faculty Sponsor: John David Earnest

HUNTER DUNN, *'Nature Suite,'* 4:00p.m.

“Nature Suite,” a set of three character pieces, is written for flute and piano. The first movement, “Desert Night,” paints the stars of the remote American Southwest with a lilting theme passed from piano to flute before a modulating bridge. The second, “Storm at Sea,” is a loose passacaglia, a form characterized by a repeated “ground” bass line. It depicts a placid ocean soon flecked with raindrops that build into a violent tempest. The storm’s lifting is evoked through an old hymn. The title of the final movement, “Mountain Air,” is an intentional pun — air: a light, lyrical tune; air: the stuff we breathe — the former meant to convey the enervating chill of the latter at altitude. I tried to illustrate the awe felt standing at the mountain’s base, the seemingly endless journey up and the incomparable thrill of cresting the summit ridge.

Faculty Sponsor: John David Earnest

JEFFREY MAHER, *'Sub Terra': Theme and Variations*, 4:15p.m.

Composed last semester, “Sub Terra: Theme and Variations,” uses music to explore subterranean environments. It is written for brass quintet: two B-flat trumpets, horn in F, tenor trombone and bass trombone. The piece is a theme and variations, as the title might suggest; it opens with a few central ideas, which are then developed, warped and re-imagined over the course of several unique sections. These sections take the audience through several tempos and styles, including atonal and jazz music, with each variation focusing on a different facet of the underground. All the while, the theme follows along, fragmenting and re-stitching itself back together, the relatively complex melodic structure worming its proverbial way into every nook and cranny of the piece. Before the performance, I will speak briefly about the origins of the piece and how it took shape during the composition process.

Faculty Sponsor: John David Earnest

ETHICAL CONSIDERATIONS

REID GOZ

Arthur Shemitz, moderator

Alex Pitts, coach

ERICK FRANKLUND, *Convenient Ethics: Picking and Choosing One's Morality*, 3:45p.m.

Ethics is the branch of philosophy that dictates how people should act based on certain moral principles. Debates have raged for millennia over what these principles are and why we should



behave in accordance with them. This uncertainty over ethics has led authors to come to different, sometimes incompatible, conclusions. Does an action's result determine its morality? Or is morality determined by an agent's intent? To address these questions, I draw on my experience as a member of Whitman's Ethics Bowl team. As a team, we utilize a variety of ethical frameworks to answer difficult questions. My presentation will examine these methods, questioning the ethics of picking and choosing one's morality.

Faculty Sponsor: Patrick Frierson

PAUL MINOR, *Decapitated Monarchs, Thermonuclear Monarchs and the Future of Artificial Intelligence*, 400p.m.

In his seminal work *The Structure of Scientific Revolutions*, Thomas Kuhn coined the term "paradigm shift" to describe a fundamental change in a scientific discipline. I use Kuhn's structure of paradigm shifts and apply it to fundamental changes in political subjectivity. Such changes arise due to socio-political events such as the French Revolution, or to technological advances such as the development of the atomic bomb. My presentation takes the prospect of Artificial General Intelligence as a prompt to critically analyze readings of 19th century conservative political theorist Edmund Burke, who offers important ideas for how we should orient ourselves towards this potential and impending paradigm shift.

Faculty Sponsor: Arash Davari

RICHARD FARMAN, *Solving Problems with Computer Science*, 4:15p.m.

My presentation is an overview of computer science, its role at Whitman and its future in our lives and in industry. From my experiences in the classroom to my internship at a tech startup

in Seattle, I trace the journey of a liberal arts student into the tech world and share the exciting possibilities and opportunities that await. Computer Science provides an avenue for immediate change on a vast scale. Companies such as Facebook, Uber, Airbnb and other platforms are reshaping the landscape of our society. With modern tools to solve modern problems, students have all they need to engage in the world and make a difference. I share some of the products I've been working on, including a pet adoption service designed as part of a class, project management software created for enterprising individuals and a campus safety application soon to be released at Whitman.

Faculty Sponsor: Janet Davis

ARTHUR SHEMITZ, *A Theory of Compulsory Humanity*, 4:30p.m.

An emerging field of analysis links animal rights theory and disability studies. Scholars working at the intersection of these fields have focused on questions of embodiment, normalcy and the natural to illuminate how each oppression cannot be understood without the other. In my presentation, I apply insights from feminist and queer theory to critique the association of rationality with humanity. I also criticize legal scholar Steven M. Wise's attempts to win legal personhood for non-human primates due to their supposedly superior cognitive capacity. I ask: How can we develop an animal rights paradigm that does not rely on appeals to rationality, as well as one that does not threaten to exclude some humans with disabilities from legal personhood? Using theorists such as Robert McRuer, Sunaura Taylor and Judith Butler, I ask what animal studies can learn from disability studies and how we can build better coalitions between the movements.

Faculty Sponsor: Lydia McDermott

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- 1** Cordiner Hall
- 2** Reid Campus Center
G02
- 3** Hall of Science
100 (Brattain Auditorium)
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- 4** Olin Hall
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- 5** Maxey Hall
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- 6** Hunter Conservatory
Kimball Theatre



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