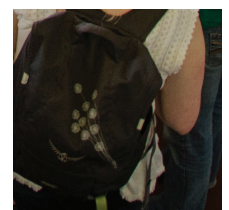
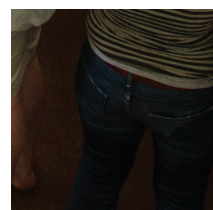
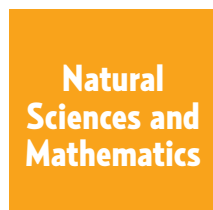
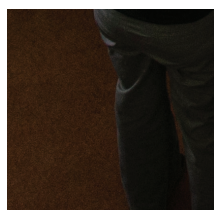
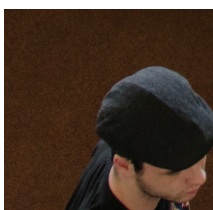
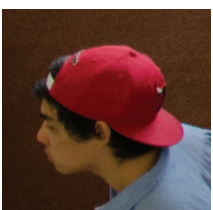
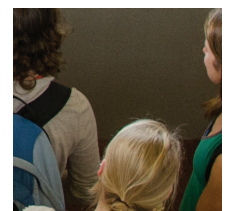
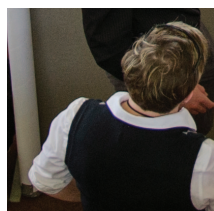
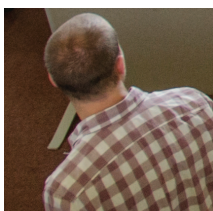
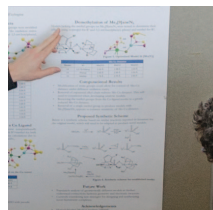
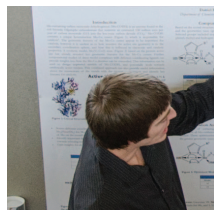
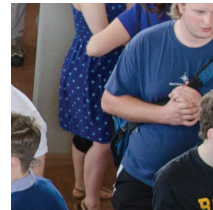
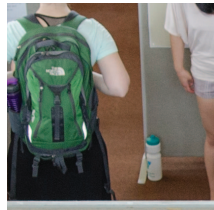
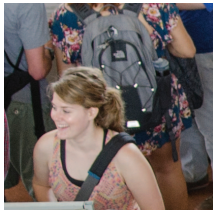
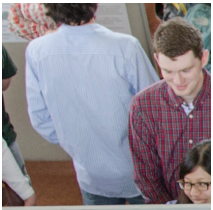
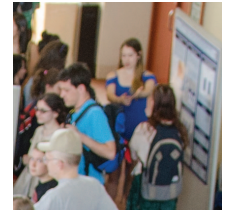
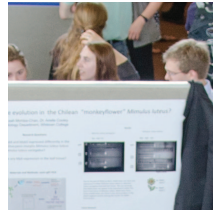
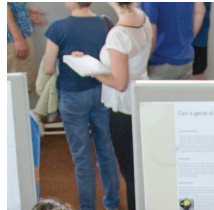
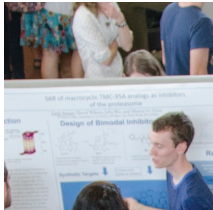
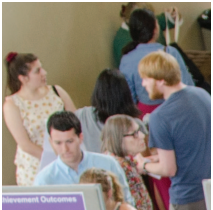


WHITMAN COLLEGE UNDERGRADUATE CONFERENCE WUC 2015



Humanities
and Arts

Social
Sciences

Natural
Sciences and
Mathematics



**UNDERGRADUATE
CONFERENCE
APRIL 7, 2015**



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 17th 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 have produced in their courses, senior theses, summer internships and study abroad.



WHITMAN COLLEGE

MUSICAL PERFORMANCES

MORNING INTERMISSION

10:15–10:45 a.m.

Hall of Science Atrium

WUC chamber ensembles

Ensemble 1

Mozart: String Quartet No. 19 in C Major, K. 465 "Dissonance" (Adagio-Allegro)

Robert Boyer, violin, Anna Brown, violin, Brad Kline, viola, Chris Dailey, cello

Ensemble 2

George Onslow: String Quintet No. 12 in A minor, Op. 34 (Allegro)

Ryan Jacobsen, violin, Lila Stange, violin, Aleida Fernandez, viola, Tess LeNoir, cello, Alex Hardesty, bass

NOON INTERMISSION

noon–1 p.m.

Reid Coffeehouse

Jazz Ensemble I

DOUG SCARBOROUGH, DIRECTOR, SAXES Max Bates, alto, Anya Tudisco, alto, James Leroux, tenor, Peter Ramaley, tenor, Lucas Barry, bari, TRUMPETS Pablo Rivarola, Jeffrey Gustaveson, Daniel Lovato, Mary Adamski, TROMBONES Clayton Collins, Joey Schaffer, Aiyana Mehta, Alex Ihle, PIANO Jason Morrison, Dylan Martin, GUITAR Jake Barokas, BASS Caitlin Foster, Isaac Berez, DRUMS Skye Vander Laan, Steven Aslin, VOCALS Mcebo Maziya, Jessie Austin

AFTERNOON INTERMISSION

3:15–3:45 p.m.

Reid Coffeehouse

Jazz Ensemble II

GARY GERMBERLING, DIRECTOR, Gary Gemberling, trumpet, Zeyu Liu, alto sax, Hillary Smith, alto sax, Jeffrey Maher, trombone, Nicholas Hochfeld, piano, Connor Hargus, bass, John Reed, drums





SCHEDULE

Tuesday, April 7, 2015

8:15 a.m.

BREAKFAST

Olin Hall Foyer,
Hall of Science Atrium,
and Reid Campus Center

9–10:15 a.m.

SESSION 1

10:15–10:45 a.m.

MORNING INTERMISSION

Olin Hall Foyer, Hall of Science
Atrium, and Reid Campus Center

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

	OLIN 130	OLIN 157	SCIENCE 159	SCIENCE 100 BRATTAIN AUDITORIUM
SESSION 1	Reefer Madness	Mind Over Matter	Bioenvironment	Disease and Vaccines
9:00 a.m.	Gordon Kochman, Jonathan Barsky, Zac Parker, Emma Thompson*	Peter Valentine	Meghan Malloy	Emily Ostrove
9:15 a.m.		Wendy Motulsky	Mary Welter	Allison Good
9:30 a.m.		Nicolette Carnahan, Jade Anderson	Erin Campbell	Anuradha Lingappa
9:45 a.m.		Richard Tesmond, Sophie Schouboe	Alberto Santos- Davidson*	Brynn Walund
10:00 a.m.		Sarah Blacher*		Tatiana Kaehler*
Coaches	Andrew Durand	Jonathan Barsky	Emma Thompson	Marlene Anderson
SESSION 2	Dirty Wars I	Ethical Judgments	Ecosystems and Activism	Health and Medicine
10:45 a.m.	Kangqiao Liao	Nicholas Win, Shannon Kelly	Morgan Dienst	Evan Heberlein
11 a.m.	Alanna Woods	Nathaniel Higby	Wesley Sparagon	Brooke Bessen
11:15 a.m.	Dennis Young	Sophia Connelly	Lucia Portman	Sam Curtis
11:30 a.m.	Lachlan Johnson	Mary LeBlanc	Jessie Austin	Kinsey Hohnstein White*
11:45 a.m.	Rhiannon Clarke*	Tim Reed*	Yi Xu*	
Coaches	Kyle Hendrix	Margaret Rockey	Noah Stern	Avery Miller
Noon	All-Campus Lunch, Reid Campus Center			
1:00 p.m.	Poster Session, Cordiner Hall			
SESSION 3	Dirty Wars II	Community Issues and Initiatives	Geology Studies	Disease, Disorder and Cure
2:00 p.m.	Margaret Rockey	Maggie Hickman	Alexandra Bailey	Heather Lovelace
2:15 p.m.	Kyle Hendrix	Ashley Hansack	Emily Tinkler	Chloe Alley-Sarnack
2:30 p.m.	Paul Minor	Helen Brown	Lydia Loopesko	Gregory Dwulet
2:45 p.m.	Kyle Hendrix	Emma Nye	Grayson Carlile	Sarah Debs*
3:00 p.m.	Devyani Gupta*	Brianna Brown, Jenny Gruenberg, Alex Kempler*	Collin Smith*	
Coaches	Chris Cahoon	Emily Aumann	Jessica Van Horne	Ian Becker
SESSION 4	Sexual Violence	Race and Discrimination	Genes: Expression and Therapy	Collaborative Research: A Science Study
3:45 p.m.	Katrina Allick	Kanupria Sanu	Heather Johns	Meaghan Clark, Audrey Denman, Soobin Dokko, Mara Heilig, Jessica Palacios, Lindsey Scott, Groover Snell, Brenda Zarazua, Arika Wieneke*
4:00 p.m.	Emmalynn Dulaney	Dominic Lippi	Nina Kostur	
4:15 p.m.	Corinne Vandagriff	Nathan Fisher	Sarah Krawczak	
4:30 p.m.	Sayda Morales*	Jyotica Barrio, Andrea Horwege*	Philip Cheng*	
4:45 p.m.				
Coaches	Caroline Rensel	Gordon Kochman	Zac Parker	Kyle Hendrix

PANEL SCHEDULE

SCIENCE 151	MAXEY 104	KIMBALL THEATRE	REID G02
Chemical Interactions	Standard Time, Ancient Times	Cultural Markers	Service Trips
Alissa Becerril	Delaney Hanon	Kyra Arnett	Ziyi Su, Sarah Dunn, Andrew Schwartz, Haley Case, George Felton*
Julianna Wetmore MacLean Harned	Groover Snell Nicholas Mori	Elliot Moskat Gordon Kochman	
Chelan Pauly*	Arden Robinette	Anna Sophia Teague	
	Caitlyn Yoshina*	Erik Anderson*	
Lauren Hauck	Felipe Rivera	Emma Newmark	Jesse Moneyhun
Microcosmos, Macrocosmos	Culture Chronicles	Media and Message	The Last Frontier
Elissa Picozzi	Molly Emmett	Madison Munn	Skye Pauly, Grayson Carlile, Tom Whipple, Carl Garrett, Chelan Pauly*
Rose Baunach Jessica Sutter Emma Dahl*	Molly Streeter Lydia Kautsky Elizabeth Clagett Maya Volk*	Nicholas Roberts Tara McCulloch Maria Ptucha Halley McCormick*	
Duy Tran	Joshua Ward	Danica Wilbanks	Caitlin Rooney
Secrets of the Deep	Thought, Deed and Creed	Public Space and Politics	Women and Discrimination
Anna Downing, Chloe Weinstock	Henry Allen	Lauren Hauck	Serena Runyan
Allison Work Lauren Vorona	John Coppinger Emma Thompson	Annabelle Marcovici Riley Foreman	Arika Wieneke Emma Newmark, Marlene Anderson, Lauren Hauck
Nevé Baker Meaghan Clark*	Alissa Becerril Madeline Levy*	Hilary Painter*	Samantha Grainger-Shuba*
Halley McCormick	Molly Emmett	Eli Zavatsky	Andrew Schoenborn
Children and Learning		Music Studio	Gender and Identity
Kelly Chadwick, Ellen Chambron		Maya Abramson	Arthur Shemitz
Serena Sanders, Aislyn Booth Hannah Frankel, Fabiola Ochoa Claire Boyer, Tara Mah		Kamna Shastri Ryan Jacobsen William Hunt	Jesse Moneyhun Evan Griffis Caitlin Rooney
Gabrielle Brosas* Noah Stern		Clayton Collins* Duy Tran	Haley Friel* Jessica Van Horne

POSTER SESSION

1-2p.m., Cordiner Hall

DYLAN MARTIN, *Analyzing Gene, Chromosome and Pathway Relationships through Interactive Visualization*

Visual networks have been implemented for many years in the fields of social media and information science, and recently there have been many applications for networks in the field of computational biology. In this project we used interactive network representations to analyze protein-protein interaction (PPI) information about trisomy for the human chromosome 21 (Hsa21), which is the root of Down Syndrome (DS). The three main challenges we faced in this project were 1) data transformation, which involved converting the interaction data into .json files that could be read by our interactive networks; 2) building the interactive networks using D3 and CoffeeScript; and 3) integrating multiple visualizations into our tool so that cross-chromosomal comparisons could be made. Our research describes how these challenges were overcome, and what sort of possible applications these visual networks can provide. Faculty Sponsor: Albert Schueller

SKYE PAULY, *To Spike or Not to Spike? Intra-individual Variation in Glucose Response*

It is well-known that the body responds to different carbohydrates in different ways. Some are broken down quickly and cause a rapid spike in blood sugar, while others have a slower, more prolonged effect. In all cases, the body uses the hormone insulin to regulate blood sugar. Diabetes is a disease in which the normal insulin-response system is damaged. People with diabetes must anticipate how their body will respond to food in order to maintain a healthy blood sugar. However, there can be considerable variation in an individual's pattern of glucose response to the same food. This long-term study tracked the glucose response of a healthy individual to a single test food in order to better understand the causes of intra-individual glucose response variability. The research suggests that a variety of factors, most notably stress, sleep, and recent physical exertion, may be key causes to the variation in glucose response. Faculty Sponsor: Paul Yancey

KAILEEN KERSTING, MOLLY STREETER, *Aesthetics of Living Space: Elderly Perceptions of Hominess*

As the population of elderly persons in the U.S. grows, so, too, does occupancy of elderly care facilities. Many ECFs are in the process of moving away from institutionalized living spaces toward homier room aesthetics. In light of this transition, we explore further the concept of "hominess," specifically in terms of elderly preferences of homey spaces. In order to understand how ECFs can better serve a growing elderly population, we break down the idea of hominess into some of its component parts: the state (lived-in vs. pristine), content (personal vs.

impersonal) and style (traditional vs. modern) of a room. Furthermore, we investigate whether ideas of hominess transcend generations or change between age groups. The results of our research may have implications for policies detailing the aesthetics of ECFs and could improve the overall quality of life for elderly population in these facilities. Faculty Sponsor: Emily Bushnell

EMMA WOODWORTH, *Willow Restoration in Gooseberry Allotment, Southeastern Utah*

Willows (*Salix* spp.), like other riparian shrub species, are important for providing migratory bird habitat, stabilizing stream banks, decreasing water temperature through shading, and other ecosystem benefits. However, willows on many portions of public land in the United States have been heavily damaged by browsing from both livestock and wild ungulates, thereby weakening their ability to function within the ecosystem. Damage can be visible in an imbalance of height classes of willows within an area, broken leader branches in the crown of the shrub, decreased canopy cover, and death and damage of lower branches of mature shrubs. During the summer of 2014 I assessed these factors at 25 sites within Gooseberry Allotment on the Manti-La Sal National Forest in Utah in an effort to determine which sites are the most degraded. I will use this knowledge to design a willow restoration plan for the area. Faculty Sponsor: Susanne Altermann

MELISSA SHAFFER, COURTNEY LAWLESS, MORGAN LAWLESS, *Considering Personality as a Moderator of Mindfulness Training for Anxiety*

Mindfulness, a technique aimed at focusing attention on the present moment without judgment, has garnered much recent interest in the field of psychology. Previous research has shown that practicing mindfulness can reduce symptoms of anxiety, enhance attentional control, reduce chronic pain and generally improve well-being. At the same time, little research has focused on brief mindfulness interventions and the potential influence that personality can have on the effectiveness of such practices. Our presentation will assess the capacity of brief mindfulness training to reduce anxiety, improve attentional control and increase resilience to a lab-based audio stressor. In addition, we examine how major personality traits might facilitate or hinder the effects of mindfulness training. Understanding the influence of personality on the effectiveness of mindfulness training could help aid clinicians in determining if mindfulness treatment is appropriate for patients with anxiety. Faculty Sponsor: Thomas Armstrong

MARGARET MINUTH, *Giant Gravel Bars of the Missoula Floods, Wallula Gap, Columbia River*



Between 18,000 and 15,000 years ago, near the end of the last Pleistocene glaciation, as many as 100 floods from Glacial Lake Missoula surged through Wallula Gap, a bottleneck or hydraulic dam on the Columbia River (bottom elevation, 90 meters) at the Washington-Oregon border. Each flood lasted a few days, had a velocity of about 100 km/hour, and overtopped the edges of Wallula Gap; icebergs riding the floods deposited erratic granitic boulders as high as 340 meters. Eddies formed as the floods slowed in tributary canyons; huge gravel bars were deposited on both sides of Wallula Gap at elevations up to 275 meters. Fluvial dissection of the gravel bars resulted in large gullies leading down to alluvial fans. Faculty Sponsor: Robert Carson

KATHRYN STEWART, *Pollen Consumption Patterns in Adult Female Alfalfa Leafcutting Bees*

Most bees are solitary and differ from social bees (e.g. honeybees) in that every female bee is fertile and independently maintains her own nest. All bees are important pollinators and depend entirely on flowers for food: pollen provides proteins, lipids and vitamins, while nectar provides energy. To determine when and how much pollen adult female alfalfa leafcutting bees consume, bees collected during the summer flight season were dissected to evaluate the relative quantity of pollen within each of the three major regions of the digestive tract. Bees were found to consume pollen throughout the day and flight season. Furthermore, accumulation of pollen in the crop (before passing into the midgut for digestion) showed patterns intermediate to those of other studied solitary bee species; this suggests that pollen passage through the crop might be associated with bee nesting biology. Faculty Sponsor: Heidi Dobson

HILARY NELSON, *The Explore/Exploit Dilemma*

Most adaptive organisms face a dilemma of either taking a chance on something new (exploration) or taking advantage of a choice they know will result in a desirable reward (exploitation). Using a computer simulated gambling experience, the behavior of 33 students was analyzed in order to determine the strategy used when solving this dilemma. The strategies used specifically in exploration were also analysed based on two existing theories: a directed strategy (choices are made solely with the intent of obtaining more information) or a random strategy (choices are dominated by noise and lead to exploration by chance). The results of this experiment showed two general trends. When participants were given more opportunities to make award-oriented decisions, exploration increased. Conversely, when given fewer opportunities, exploitation increased. Additionally, during exploration trials more information seeking and higher decision noise behaviors were observed, indicating that

both random and directed exploration strategies were used. Faculty Sponsor: Thomas Knight

CARRIE WALKER, *Natural Killer Cells: A New Cancer Therapy?*

Established cancer therapies such as radiation and chemotherapy have been effective in reducing cancer cell growth and metastasis, but often with a high cost to patient health. Immunotherapy, or training immune cells to fight cancer, has been proposed as a new treatment option that reduces risks involved with current therapies. Natural Killer (NK) cells of the innate immune system have been shown to reduce tumor growth. However, tumor microenvironments inhibit NK cell function. To investigate NK cell killing in the tumor microenvironment, a glioma cell line was generated that expresses protein ligands that bind a NK cell activating receptor, NKG2D. If NK cells are transduced with a CD122 chimeric antigen receptor (CAR) lentivirus they will proliferate via the IL-2 pathway. The upregulation of NKG2D and CAR-induced proliferation will allow NK cells to overcome the immunosuppressive effects of the tumor microenvironment and increase tumor cell killing. Faculty Sponsor: Ginger Withers

EMILY HUNTER, *Aza-peptidyl Michael Acceptor Synthesis*

Asparaginyl endopeptidase is a member of a family of cysteine proteases that is often part of a proteolytic network present in protozoa, such as those responsible for Chagas disease, and bacteria, for example those responsible for Lyme disease. This protease has been linked to the digestion of the host blood protein, hemoglobin. Previous research has indicated that this mechanism is vital to the survival of the infectious agent, so a logical step in the treatment of such an infection would be the chemical inhibition of the protease. Aza-peptidyl Michael acceptors have been presented as potential inhibitors and are currently in pre-clinical trials. This research presents the synthesis of one such inhibitor. Faculty Sponsor: Marion Götz

ELLIOT BURCH, CELINA HENELSMITH, *Quantum State Measurement of Single Photon Entangled States*

We have performed quantum-state tomography, the process of reconstructing quantum states, of several different single-photon entangled states, that is, states in which a single photon is shared between two possible paths. We use the interference of these two paths to reconstruct specific quantum states. We are able to verify that our states exist in a single-photon subspace by measuring the degree of second-order coherence, $g(2)(0)$. A perfectly created state has a purity of one, and we were able to successfully create states with purities consistently above 0.93. These measured states also had high fidelities, indicating they were the states we intended to prepare. Our results are independent

of photon polarization which will allow for future measurements on photons that are entangled in polarization. Faculty Sponsor: Mark Beck

JANNI CONRAD, *The Influence of a Metal Oxide Surface on Ligand Exchange Reactions Between Strong Chelating Agents*

Agricultural, pulp and paper mill, and medical industries use molecules called chelating agents to bind metal ions and control metal ion concentrations. These chelating agents often make their way into the environment where they can influence the chemical form of metal ions. One process that is affected is the exchange of the metal ion between chelating agents. Our research examines how mineral surfaces, such as rutile (a titanium dioxide, TiO₂, mineral), influences the exchange of nickel between CDTA and EDTA, two common chelating agents. As a first step to understanding the influence of the mineral surface on the exchange reaction, we characterize the mineral surface through various methods including measuring nickel adsorption, the number of reactive surface sites, and adsorption of CDTA, EDTA, NiCDTA, and NiEDTA at varying pH using capillary electrophoresis and atomic absorption spectroscopy. Faculty Sponsor: Nathan Boland

ELENA ARAGON, *The Size of Male Reproductive Organs Across the Flight Season in the Solitary Alfalfa Leafcutting Bee*

All bees, solitary and social, are dependent exclusively upon flowers for their sustenance. Males of the alfalfa leafcutting bee (*Megachile rotundata*), a solitary bee species, have been shown to consume pollen throughout the flight season which poses the question of whether feeding and mating habits correlate. Given that little is known about the reproductive organs of male solitary bees, I recorded male mating activity in the field and measured scrotal sac and accessory gland size across the season. Mating occurrences were most frequent in the early part of the season (first two weeks). The size of the scrotal sac and of the accessory gland were generally consistent, with the greatest variations occurring in the first week. Furthermore, the dimensions of the two organs tended to follow opposite trends, which is consistent with their known functions. These data suggest that males might be fertile throughout their adult lives. Faculty Sponsor: Heidi Dobson

MORGAN EINWALLER, *Choosing to Report Sexual Violence: The Effects of Individual Factors and Social Support*

In the U.S. there is a high prevalence of sexual violence toward women. College women are especially vulnerable and are unlikely to report it. Women often choose not to report because of the perceived stigma associated with sexual assault. My presentation identifies protective factors that encourage women to report despite these barriers. Participants in my study first completed a survey

measuring social support, self-esteem, self-efficacy and the level of control perceived control in various situations. They then read a scenario describing a college woman in the process of deciding to report an incident of sexual violence. The participants were asked to consider two measures of perceived stigma and their likelihood to report the incident if they themselves had experienced it. I hypothesize that social support, self-efficacy, external loci of control and self-esteem are all factors associated with overcoming perceived stigma, and all encourage reporting sexual violence. Faculty Sponsor: Brooke Vick

CARLY BUSCH, *Nursery Habitat Usage by Lemon Sharks in the Turks and Caicos Islands*

Understanding the habitat usage patterns of the ecologically important lemon shark is necessary in order to protect their environment, especially with growing tourism in the Caribbean. Lemon sharks return to the same nursing grounds to breed year after year, including many areas around the Caicos Bank in Turks and Caicos. By understanding how lemon sharks utilize the shallow water habitats around these islands, conservation plans can consider the needs of this species and ultimately contribute to their preservation. While working at the School for Field Studies research station on South Caicos I studied the correlation between lemon shark abundance and abiotic water conditions. My results indicate that lemon sharks prefer the high salinity, low oxygen conditions similar to those of mangrove habitats, which may provide the newborns with protection and plentiful food. These results can help focus attention on these areas as important for conservation of the species. Faculty Sponsor: Delbert Hutchison

JACOB O'CONNOR, *Designing a Synthetic Complex for Toxic Carbon Monoxide Conversion*

A protein found in soil bacteria is responsible for converting an estimated 100 million tons of toxic carbon monoxide (CO) per year to less toxic carbon dioxide (CO₂). This conversion occurs at a reaction center composed of molybdenum and copper metals. These metals are held together in a specific conformation by a network of weak interactions originating from different parts of the protein molecule. This creates a unique pocket where CO can bind and be converted to CO₂. To date, there is no synthetic complex which can do similar chemical conversions using these metal centers. Our research focuses on developing complexes which can mimic this reaction by using computational simulations and then attempting to synthesize these complexes in our lab. Our research has the potential to assist in the development of alternative energy sources as the byproducts of the reaction are the components of hydrogen fuel. Faculty Sponsor: Dalia Rokhsana



HELEN MARSHALL, *Beauty Practices, Choice and Denying Discrimination*

Women negotiate cultural beauty standards daily, but is that participation a simple choice? By framing their participation with beauty practices as a choice, many women are able to engage with cultural beauty practices in healthy ways. Yet, this practice ignores social pressures and potential consequences. Using a choice framework may blind individuals to structural discrimination, potentially leading to the perpetuation of that discrimination.

My presentation is based on research in which I asked women about their beauty practices and well-being, and manipulated other participants' exposure to language of choice in the context of an advertisement for beauty products. I hypothesized that women who considered their participation to be a choice would show higher well-being, and that a choice framework would be associated with decreased recognition of inequality. My research has implications for a greater understanding of the meaning of choice as well as discussions of gender inequality and beauty ideals. Faculty Sponsor: Walter Herbranson

SAMUEL HINKLE, *Use of CYCLAM and Other Tetraamines to Probe the Mechanism of Influence of Surfaces on Ligand Exchange*

Metal pollutants in the environment interact with both sediment surfaces and organic molecules. However, the role sediments play in the exchange of metal pollutants between organic molecules is poorly understood. This research uses a cyclic molecule called CYCLAM and linear versions of this molecule to probe the mechanism(s) by which sediments affect the exchange of metals between molecules. The exchange of nickel, Ni, from CYCLAM to another organic molecule (Y) was monitored by an instrumental technique called capillary zone electrophoresis (CZE). The formation of NiY was monitored both with and without the presence of a surface. NiCYCLAM is also present in two forms: One that forms quickly and is less stable and another that forms more slowly but is more stable in the long run. These forms interact differently with sediments. Considering all these variables together, this research aims to identify pathways by which surfaces influence metal exchange reactions. Faculty Sponsor: Nathan Boland

SHANNON BLAIR, *Unearthing the Origin of the Powder River Volcanic Field, OR*

The Columbia River Basalt Group (CRBG), a large igneous province that covers much of Washington and Oregon, is attributed to magma from a hot mantle upwelling. Mantle plume magmas typically are high in magnesium and have visible olivine minerals. Most CRBG lavas lack these characteristics bringing into question their origin. Some contemporaneous lavas of the Powder River Volcanic Field (PRVF) near La Grande, OR, have these characteristics but are also unusually high in sodium. The oldest sodium-

rich, olivine-bearing PRVF lava, potentially a parent to younger lavas, exhibits crustal xenoliths, embedded foreign fragments in the rock. Whitman's Scanning Electron Microscope was used to take images and analyze the composition of a xenolith and the contact with surrounding magma. Ultimately, understanding the influence of the granitic xenoliths on the compositions of PRVF lavas can help determine the source of CRBG and PRVF magmas and their evolution. Faculty Sponsor: Kirsten Nicolaysen

LUCAS BARRY, *Analysis of E-liquids Used in Electronic Cigarettes for Forensic Investigation*

Since the first electronic cigarette (e-cigarette) was patented in 2003, many people have used them as a tobacco alternative. Currently, the Food and Drug Administration does not regulate the contents of e-liquids, and there is no official database of the components of e-liquids. E-cigarettes could potentially be exploited for the consumption of illegal drugs. Having no database obstructs forensic scientists from thoroughly investigating the crime scene for potential drug violations involving e-cigarettes. We have established a precursory baseline of various brands and flavors of e-liquids, and the results from this study will be used to generate a library that can be used by crime labs when analyzing unknown substances. This project was completed in an internship with the Kennewick branch of the Washington State Patrol Crime Laboratory. Faculty Sponsor: Dalia Rokhsana

VICTORIA DAVIDSON, *Historical Comparisons Indicate Declines in Mussel Abundances in the Gulf of Maine*

Human activities, including climate change, have impacted intertidal communities and may have contributed to the northward range contraction of blue mussels in the western North Atlantic. This contraction at the southern edge of the blue mussel's range suggests that changes might also be occurring at other locations within the species' current range. The Gulf of Maine (GOM) is historically home to the peak of blue mussel abundances, and changes to mussel populations in this area could lead to changes in populations of other species, as mussels are important foundation species. Historical data describing mussel abundances over the last forty years were compared to contemporary abundance data at four sites in the GOM. Our results support the hypothesis that mussel abundance has declined over the last forty years in the GOM, and continued declines could have a major impact on the intertidal community. Faculty Sponsor: Paul Yancey

PETER CARMICHAEL, *Structural Insights of a Reaction Center in a Bacterial Protein Using Computational Simulation*

Pentachlorophenol (PCP) is a highly toxic, chlorinated, aromatic chemical that has been used as a wood preservative and biocide. Because PCP can cause kidney

and liver damage and cancer in humans, its use has been restricted in the United States. Unfortunately, PCP dissolves in water, making it exceedingly difficult to remove from an environment. However, a soil bacterium has developed a novel method to degrade PCP using a series of protein molecules. One of these utilizes iron at a reaction center to break down the PCP's highly stable ring structure. The iron center is held in a particular conformation by a network of weak interactions essential for the function of the protein. Very little is known about these weak interactions and how they contribute to breaking down PCP. Our research is focusing on obtaining a better understanding of the reaction center and these weak interactions using computational simulation. Faculty Sponsor: Dalia Rokhsana

MARIJKE WIJNEN, *Heat and Drought Stress Responses in Chilean Mimulus*

Climatic instability makes understanding the diverse physiological responses of plants to environmental stresses increasingly important. This study documented the effects of heat and drought stress on five varieties of Chilean *Mimulus*. Both stress conditions resulted in decreased overall mass as compared to control conditions, but other physiological responses were distinctly different between the heat and drought stressed plants. The heat treatment resulted in an increased proportion of deformed flowers – possibly as a result of heat shock proteins. Drought but not heat stress induced high levels of vegetative anthocyanin production. Anthocyanins are pigment molecules that play a role in ultraviolet protection and may be a key defense against other types of environmental stresses as well. Understanding the complex physiological responses of plants to heat versus drought stress provides a tool to read the environmental condition of ecosystems more closely in the future. Faculty Sponsor: Arielle Cooley

KELSEY SMITH, *Pollen Digestion in Adult Solitary Bees*

All bees depend on flowers for their sustenance: nectar and pollen. However, little is known about pollen digestion in solitary bees. Solitary bees differ from social bees, like honeybees, in that every female bee is fertile and independently cares for her own nest. To determine how quickly pollen moves through the digestive tract of adults, females were collected of two local species, the alkali bee and alfalfa leafcutting bee. They were acclimated to a new environment and then starved for 2-12 hours. This allowed for the feeding habits to be better controlled. After feeding for distinct periods of time, each bee was killed and dissected, and the pollen contents in the different parts of the digestive tract were recorded. Preliminary data analysis suggests that the two bee species differ in the rate at which pollen moves from the crop (pollen storage) into the midgut (pollen digestion). Faculty Sponsor: Heidi Dobson

ANASTASIA GREELEY, *Saponin-Induced Gastric Cancer Cell Death*

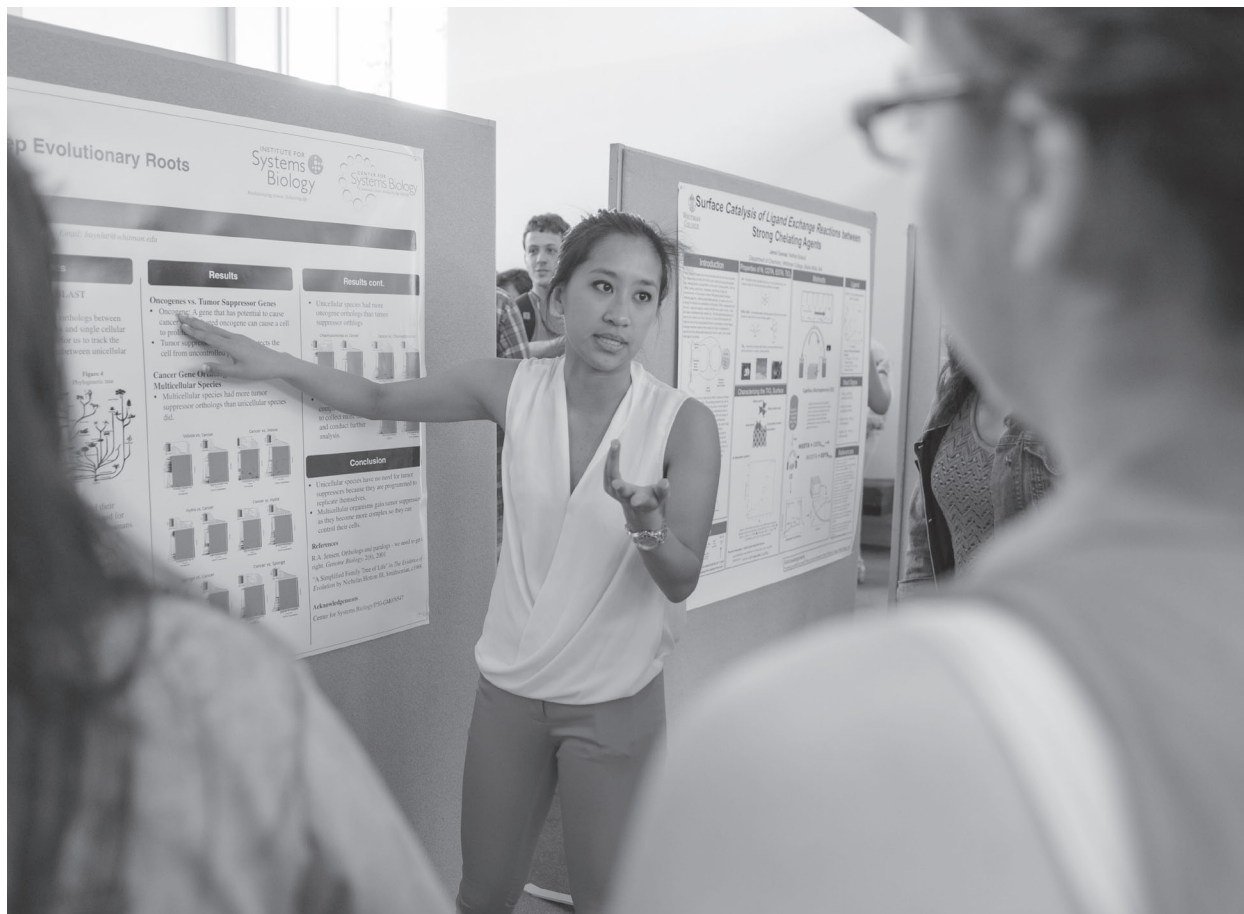
Gastric cancer is the seventh largest cause of death in Chile, and thus finding more effective treatments is paramount. Recently this has spurred an increase in the investigation of traditional remedies as treatment. My work specifically focused on testing the efficiency of different plant extracts called saponins from the native Chilean quillay tree *Quillaja saponaria* in inducing gastric cancer cell death. The quillay has traditionally been used to help heal chronic skin infections and as other plant sources of saponins have been effective in cancer treatment, the quillay's saponins represent an area of great research potential. My work involved determining the quantities of saponin extracts necessary to cause gastric cancer cell death and identifying the particular cellular mechanism inducing said death. Quillay saponins were found to be deleterious to gastric cancer cells by leading to the degradation of DNA that characterizes apoptotic cell death, opening the gates for further investigation. Faculty Sponsor: Matthew Crook

HELEN SHEFFER, *Late Quaternary Glaciation of the Naches River Drainage Basin, Washington Cascades*

The Naches River drainage basin is east of Mt. Rainier in the Washington Cascades tributary valleys of the Little Naches, American, Bumping, and Tieton Rivers. Investigations of surface boulder frequency, weathering rind thicknesses, and soil development on moraines in these valleys identified two stages of Pleistocene glaciations: older Hayden Creek Glaciation and younger Evans Creek Glaciation. Thick forest cover, limited road cuts, and widespread post-glacial landslides hamper efforts to determine the maximum extent of glaciation. The lack of evidence of ice in the Little Naches drainage, and the systematic northward decrease in glacial length are likely due to the precipitation shadow northeast of Mt. Rainier. In contrast, the source of glacial ice for the Tieton drainages is the Goat Rocks peaks southeast of Mt. Rainier's rain shadow. Ground-based study of Neoglacial moraines and analysis satellite imagery show rapid retreat of the remaining Goat Rocks glaciers following the Little Ice Age. Faculty Sponsor: Robert Carson

JOHN BROOKSBANK, *The Equilibrium of Aqueous Iodine in Micellar Environments*

Elemental iodine has many possible applications as an inexpensive disinfectant. However, on its own iodine's effectiveness is limited as it is not very soluble in water. Iodine also complexes with water to form several species, some of which are less effective. A possible solution is the use of micelles. Micelles are structures formed by molecules called surfactants, which have both a polar head group and a long nonpolar tail. Surfactants can aggregate by overlapping the tail groups, forming a



cluster with the tail groups on the interior and the polar head groups on the outside. As both the exterior head groups and the interior are capable of interacting with solute molecules in different ways than the solvent, micelles can stabilize certain species more than water alone. In our research we have investigated the equilibrium between the different chemical species of iodine in environments both with and without micelles present. Faculty Sponsor: Allison Calhoun

JOSEPH TILLMAN, WILL WECKEL-DAHMAN, *A Study of Analyte Recovery Using Headspace Solid-Phase Microextraction*
 Headspace Solid-Phase Microextraction (HS SPME) has been shown to effectively extract pesticides and PCBs from aqueous samples at the expected ultra-trace levels (parts per quadrillion) of alpine lakes. Several variables of the HS SPME technique have been adequately evaluated including water temperature and length of fiber exposure, but surprisingly, analyte recovery as a function of analyte concentration and storage time has not been included in previous studies. This investigation evaluates the recovery of chlorinated hydrocarbons, such as DDT, in concentrations from parts per quadrillion to parts per billion in lake water samples. The HS SPME technique was further used to determine the concentration of chlorinated

pesticides in Pacific Northwest alpine lakes. Faculty Sponsor: Frank Dunnivant

KATHARINE JENIKE, *Altering Epigenetic Abnormalities in Bladder Cancer to Increase Chemotherapeutic Effectiveness*

Patients with muscle invasive bladder cancer face limited treatment options and poor survival. Cisplatin-based chemotherapy is a standard treatment but yields low success rates because tumor cells often develop resistance to the drug. Cancer growth and resistance to chemotherapy is frequently associated with mutated tumor suppressor genes. However, our lab identified epigenetic abnormalities (rather than DNA mutations) at a specific tumor-suppressing gene—p73—associated with bladder cancer. Previous research suggests that epigenetic effects, specifically abnormal methylation, can sometimes be reversed using the demethylating agent Decitabine. We tested this in relation to invasive bladder cancer and found that combining Decitabine and Cisplatin reduced cancer cell survival. Further work showed a change in p73 expression correlated with the Decitabine treatment. Thus, invasive bladder cancer treatments may be improved by combining the demethylating drug, Decitabine, with the traditional chemotherapeutic, Cisplatin. Faculty Sponsor: Matthew Crook

UMAIR MEREDIA, *Hippocampal Insulin Expression After a Ketogenic Diet*

Treatments for epilepsy are severely limited to brain surgery or anti-epileptic drugs (AED) thus far and promising cases of the Ketogenic Diet as an epilepsy therapy have given hope to a less invasive solution. This diet consists of a 4 to 1 to 1 ratio of fat to carbohydrates to sugars, and since this diet greatly diminishes the two primary sources of energy, a unique state of ketosis occurs after prolonged use of the diet. We looked to the area of largest action potentials (hippocampus) to find evidence of modulatory functions caused by this diet, and more specifically we looked for insulin receptor expression in the CA3 region of the hippocampus for such evidence. Understanding the varying degrees of insulin receptor expression during and directly after the diet can elucidate the mechanism by which insulin receptors modulate or reduce epileptic seizures. Faculty Sponsor: Leena Knight

ANDREA CHIN, *The Effect of Stress on the Serotonin System*

Individuals have varying stress sensitivity which can affect their physiological response to stress. Further, these responses to stress-induced neurochemical differences can lead to stress-related disorders. The serotonin system is one determinant of how stress affects an individual. A cynomolgus macaque primate model was created to measure the neurochemical variation of serotonin in stress sensitive and stress resilient individuals after the absence or presence of stress. The hypothalamic serotonin interactions were visualized using immunohistochemistry and the resulting images were analyzed for the extent of the neurochemical response to stress. Synaptic serotonergic innervations in the hypothalamus were robust, and high stress resilient animals have significantly more serotonin axon terminals than stress sensitive animals regardless of stress treatment. This suggests that an individual's neurochemical responses to stressful stimuli can affect their physiology. Faculty Sponsor: Hilary Lease

ANDREW WILDMAN, *Influence of Low Molecular Weight Acids on Rates of Ligand Exchange Between Strong Chelating Agents*

Chelating agents are compounds which strongly bind with metals in solution. One chelating agent bonded to a metal can be replaced with another chelating agent under the right conditions. This process is how plants obtain metal nutrients from the environment. In this study, the effect of a third molecule on the exchange between two was investigated. The presence of a third molecule, oxalate, sped up the exchange between two molecules: nickel-NTA and CDTA, and the presence of hydrogen ions sped up the reaction as well. We propose a reaction pathway and discuss future research objectives. Faculty Sponsor: Nathan Boland

MOLLY OLMSTED, ALEXANDRA SCHNABEL, *Combined-Eye-and-Head-Movements as Indicators of Mild Brain Trauma*

Increasing evidence over the past decade indicates that mild head trauma such as minor concussions cause acute brain damage and that these traumas, if not allowed to properly heal can cause chronic brain damage. Additionally it has been shown that eye movements, referred to as saccades, can be indicators of brain damage to varying degrees and can be used to more precisely indicate an appropriate time for return-to-play. Since combined eye and head gaze shifts (CEHG) use more brain circuitry than simple saccade shifts, this study focuses on whether CEHG provide a superior indicator of head trauma. Working with varsity athletes at various points throughout their seasons, an EyeSeeCam was used to measure CEHG speed, acceleration, and accuracy following various stimuli. Overall this study could provide a significant breakthrough in the sports medicine world as a more precise way to quantitatively measure brain trauma and appropriate return-to-play timing. Faculty Sponsor: Thomas Knight

THOMAS KUBAIL KALOUSDIAN, *Spectroscopic Characterizations of Erbium Centers in Er@C60*

Discovered in the early nineties, metallofullerenes are endohedral carbon structures that envelop a rare earth compound. They belong to the same class of carbon compounds as nanotubes, and exhibit promising optical properties. Due to the chemical similarity between fullerene structures of various sizes, and the low yield of endohedral fullerenes by current production methods, we seek to establish a new purification method for Er@C60 through toluene solubility and temperature dependent sublimation. The C60 cage is of interest due to its relative abundance in production methods to other fullerenes, and the small cage size that is able to envelop a rare earth ion. We performed spectroscopic characterization of the material through its emission spectra in the near infrared regime, and lifetime measurements of the erbium sites in order to establish the interaction between the fullerene cage and the trapped erbium. Faculty Sponsor: Kurt Hoffman

CLINT VORAUER, *Investigations of the Halogenation, Radiohalogenation and Functionalization of CB9 Carborane Clusters*
Derivatives of carba-closo-decaborate(1-) carborane anion (closo-CB9) have potential uses in nuclear medicine, medical imaging, and other pharmaceutical applications. The carbon in the cluster can be functionalized by a variety of groups, making this site an ideal attachment point for proteins and other biomolecules. The boron vertices in CB9 readily undergo iodination to give highly iodinated species that have potential uses as X-ray contrast agents. This strategy could likewise be used with radioiodine or astatine-211 to give useful imaging agents or therapeutic compounds. The preparation of derivatized CB9 clusters and investigations of conditions for efficient

halogenation of these clusters will be discussed. Faculty Sponsor: Marcus Juhasz

NIKOLOS CONTOS, *The Role of the EGF Receptor LET-23 on Lipid Biosynthesis in Caenorhabditis elegans*

The let-23 receptor, which is an EGF (Epidermal Growth Factor) receptor, controls multiple developmental pathways. In humans, EGF receptor mutations are implicated in a large number of cancers due to excess signaling promoting cell growth and cell division. Recent work has shown that let-23 may also affect lipid production, specifically the phospholipid phosphatidylcholine, an essential cell membrane component. SBP-1, a transcription factor, activates lipid production in the absence of lipids by translocating to the nucleus. To investigate the role of the let-23 receptor on lipid production, I have examined the cellular location of a fluorescent-tagged SBP-1 marker under different levels of let-23 activity and from these inferred levels of lipid production. I will discuss my results and their impact on our understanding of EGF signaling, lipid biosynthesis and cancer biology. Faculty Sponsor: Matthew Crook

YI XU, *Scanning Electron Microscope Analysis of Columbia River, Chesapeake Bay, Lake Hartwell and Mississippi River Sediment Suspensions*

The release of hydrophobic pollutants sorbed to sediment particles after sediment resuspension events such as dredging, violent storms, or bioturbation is today one of the largest sources of these pollutants in aquatic systems. While the equilibrium partitioning and kinetic rates of releases of pollutants such as DDT have been extensively investigated, information on the nature of the actual sediment particle releasing these pollutants is lacking. This investigation used manual inspection of SEM micrographs to determine the distribution of particle types in each suspension. Particles were divided into individual particles, particle aggregates, and “other” mostly consisting of organic matter (individual cells and organic detritus). The most important finding of this research was that organic detritus may dominate the total organic mass in typical sediment suspensions and may account for most of the pollutant sorption sites. Faculty Sponsor: Frank Dunnivant

CATHERINE MAIER, *Behind the January 25th Revolution: Power to the Workers*

The January 25th Revolution in Egypt was a congregation of millions of protesters from myriad backgrounds. Though attention to the event by Western powers has focused on youth and social networking, Egyptian workers—in particular, the Mahalla strike movement—played a large part in the uprising. The Mahalla movement was crucial because it created independent organizations and unions and revealed

the power of assembly, protest, and free speech that had been suppressed by ruling regimes. Labor activism was the result of Ahmed Nazif’s economic policies. Economic growth produced tremendous social inequality, and plans for privatization and the abrogation of rights provoked workers to action. During the Revolution, the strike called by the Egyptian Federation of Independent Trade Unions paralyzed the economy and demonstrated the power of workers as a collective. Faculty Sponsor: Elyse Semerdjian

GREGORY EICKHOFF, *Altered Location and Concentration of NK1 Receptor and Substance P in an Animal Model for PTSD.*

Post-traumatic stress disorder (PTSD) is an anxiety disorder that can develop after a traumatic experience. It is characterized by symptoms of hypervigilance, reliving past trauma, and avoidance of trauma reminders. The most effective pharmacological treatment for PTSD symptoms is prazosin, which functions on the norepinephrine system. However, there is currently no cure for PTSD, and we have an insufficient understanding of the factors involved in PTSD development. Animal models have been developed in order to more closely study the neurological basis of PTSD. This study examined Substance P, a neuropeptide that is thought to modulate norepinephrine signalling, and its receptor, NK1R. Brain sections of susceptible, resilient, and control animals were compared in order to determine how the location and concentration of Substance P and NK1 differed between groups. This study lends support to the idea that Substance P signalling is involved in the pathogenesis of PTSD. Faculty Sponsor: Leena Knight

NINA FINLEY, *Four Fish, Five Fish, Dead Fish, Live Fish: A Comparison of Jaws in Five Species of Salish Sea Sculpin*

Dozens of sculpin species coexist in the Salish Sea. Their heads range from short and squat to long and sleek to lumpy and oblong. My presentation focuses on the gearing, or mechanical relationship, between muscle movement and jaw movement, in five sculpin species. In our study, we measured 37 anatomic and five movement variables describing form and function in the jaws, and phylogenetically corrected our data to track how jaws evolve. Anatomic gearing was measured in dissected specimens, and motion gearing in live feeding fish. The data revealed that evolutionary shifts to higher gearing correlated with shifts to shorter muscles. This co-evolution of gearing and muscle length allow diverse jaw structures to maintain similar muscle strain magnitudes and preserve high feeding performance. This co-evolutionary relationship may help explain how sculpin species are able to maintain distinct head morphologies and coexist in the Salish Sea. Faculty Sponsors: Kate Jackson and Timothy Parker

SESSION 1

9-10:15a.m.

REEFER MADNESS

OLIN 130

Emma Thompson, moderator

Andrew Durand, coach

GORDON KOCHMAN, JONATHAN BARSKY, ZAC PARKER, EMMA THOMPSON, *Marijuana: Legalization, Policy and Activism*, 9 a.m.

Our presentation focuses on research stemming from a debate topic this year: the legalization of marijuana. The issues we examine and discuss include the comparative advantages and disadvantages of decriminalization and legalization, and how legalization affects U.S. participation in international drug treaties. We will also discuss activism around legalization, focusing on queer activists' approaches and the racial implications of marijuana legalization. We intend to present a wide range of arguments around a timely subject and provide insights into how these arguments are being received, in Washington, D.C. and locally. Faculty Sponsor: Kevin Kuswa

MIND OVER MATTER

OLIN 157

Sarah Blacher, moderator

Jonathan Barsky, coach

PETER VALENTINE, *Flow and Nutrition: How Diet and Personal Traits Affect an Individual's Experience of Flow*, 9 a.m.

When people are performing optimally, they are in a state of "flow." "Flow" is a positive experiential state, a state of happiness, that occurs when an individual takes action to focus his or her awareness on an objective. The person feels both a sense of control and loss of self-consciousness, and feels challenged but not to the point of futility. Most people think of flow simply as a state of mind. However, as the brain is a biological organ, our behavior, emotions, thoughts and other cognitive processes are influenced by physical factors such as nutrition. Thus, improving one's nutrition may increase "flow state" accessibility, optimizing performance more often. My presentation examines the relationship between diet and flow. Faculty Sponsor: Walter Herbranson

WENDY MOTULSKY, *Over the River and through the Woods: To Wilderness Therapy We Go*, 9:15 a.m.

Gender construction and performativity, Foucauldian disciplinary power and nature constructivism are not new objects of academic inquiry and discourse. Yet, wilderness therapy, an emerging field of both therapeutic practice and academic scholarship, remains a largely unexplored topic. My presentation first defines wilderness therapy. It

then covers the basic theoretical principles that guide the current discourses surrounding gender, power and nature. By grounding my presentation in these interdisciplinary themes as well as in interviews from graduates of wilderness therapy programs, I will investigate how and why (or not) wilderness therapy is gendered and what the implications of that gendered experience are. I conclude by suggesting the possibility of an interdisciplinary discourse that fully considers the nuanced aspects of wilderness therapy, and nature itself, as socially constructed spaces. Faculty Sponsor: Suzanne Morrissey

NICOLETTE CARNAHAN, JADE ANDERSON, *The Effect of Peer Influence on Attraction to Potential Partners*, 9:30 a.m.

Peers influence the people we are attracted to and who we choose as dating and sexual partners. At the same time, the criteria used to select romantic partners can vary by gender. Men emphasize physical attractiveness in their preference of long-term partners. Women prefer this in short-term partners. In our presentation we examine the effect of peer influence on perceptions of potential dating and sexual partners across gender in college students. Men and women undergraduates were shown a series of pictures representing potential romantic partners and were asked to rate them on physical attractiveness and desirability as a sexual or dating partner. Each picture was accompanied by peer ratings of attractiveness. We expected that women shown potential partners deemed highly attractive by peers would deem them to be a more desirable short-term sexual partner than long-term dating partner, while men would prefer highly attractive potential partners as long-term dating partners. Faculty Sponsor: Brooke Vick

RICHARD TESMOND, SOPHIE SCHOUBOE, *Mindset and Stress: The Effect of Abstract and Concrete Thinking on Situational Stress*, 9:45 a.m.

Everyone has to deal with stressful situations and the negative mental and physical repercussions brought on by stress. Therefore, we need to be equipped with better, more effective ways to deal with stress. Our presentation examines how an individual's mindset impacts stress-coping abilities. Abstract mindsets focus on broad descriptions, while concrete mindsets focus on smaller details. In our study, participants were given a cue to elicit either an abstract or concrete mindset in relation to the task. Participants gave a five-minute speech while researchers ostensibly evaluated their performance. The participants then completed surveys to evaluate mood, stress levels and self-esteem. We hypothesized that participants who confront situational stress with an abstract mindset will experience less stress than



individuals who used a concrete mindset. Understanding how these mindsets influence situational stress levels could be useful to help people cope with stressful situations and face fewer psychosomatic symptoms of stress. Faculty Sponsor: Brooke Vick

SARAH BLACHER, *Effects of Self-Esteem on Memory Perspectives*, 10 a.m.

When you visualize an event from your past, do you see yourself participating in it from a third-person point of view, as though you were watching someone else, or is the event replayed in first-person, as though you were watching the scenario unfold through your own eyes once more? Recent psychological research is interested in why the answer to this question varies depending on the person and the memory. This study investigated the role of self-esteem in determining the particular memory perspective utilized in a given situation. Participants' self-esteem was measured, and the visual perspective they employed for each of four autobiographical memories was recorded. Significant effects of self-esteem on memory perspective were found. This finding suggests that self-esteem has important effects on the formation of identity, since personal memories are the foundation upon which individuals build a sense of self. Faculty Sponsor: Erin Pahlke

BIOENVIRONMENT SCIENCE 159

Alberto Santos-Davidson, moderator
Emma Thompson, coach

MEGHAN MALLOY, *Impacts of Several Different Pesticides on a Beneficial Predatory Mite in Commercial Strawberry Production*, 9 a.m. The two-spotted spider mite is a major pest that, if left untreated, causes serious economic damage to strawberries. Some farmers address these mites by combining pest control methods, also known as integrated pest management (IPM). One IPM approach involves a limited use of pesticides, followed by releases of biological control agents, such as predatory mites that feed on the spider mite. I evaluated the toxicity of nine pesticides to determine if they negatively impact the predatory mite, *Phytoseiulus persimilis*. My study examined mortality (immediate and delayed), egg production, and fertility over time by placing the predatory mites on pesticide-treated strawberry leaves. The data show that the pesticides vary in their adverse effects on fertility and lethality. The results will be used to produce strawberry IPM guidelines for determining when it is safe to release predatory mites onto crops following pesticide application. Faculty Sponsor: Heidi Dobson

MARY WELTER, *Effect of Pollen Consumption on Sperm Transfer During Mating in Solitary Bees*, 9:15 a.m.

Many flowering plants depend on bees for pollination and, in turn, bees rely on flowers for nectar (energy) and pollen (proteins, fats, and vitamins). In solitary bees, larvae eat pollen and recently adults were shown to do so as well, possibly for sexual maturation. This study examined whether pollen consumption by adult males affects the number of sperm transferred during copulation. A method was developed to count sperm in the female spermatheca (sperm storage organ) and sperm counts were made on two bee species collected in the field (with access to flowers). Field-bee sperm counts varied within and between the two species. Sperm counts were also made on lab-reared females mated with males that either did or did not have access to pollen. Sperm counts show that pollen consumption had no impact on the quantity of sperm transferred during mating, but did impact male vigor in terms of mating behavior. Faculty Sponsor: Heidi Dobson

ERIN CAMPBELL, *The Effect of Plant Size on Bluebunch Wheatgrass Survival in an Arid Environment*, 9:30 a.m.

Native ecosystems throughout the Inland Northwest are in decline. Bluebunch wheatgrass (*Pseudoroegneria spicata*), a native perennial bunchgrass, has recently declined in correlation with overgrazing and competition from invasive species such as cheatgrass (*Bromus tectorum*). In the arid environments of the Northwest, soil moisture competition from cheatgrass may be especially detrimental to bluebunch wheatgrass survival, particularly in young plants whose shorter roots have difficulty accessing deep moisture. Over three summers we monitored bluebunch wheatgrass plants on sites of high and low soil moisture and experimentally manipulated soil moisture at another site. We analyzed survival rates of bluebunch wheatgrass as a function of individual plant size at each of these sites and identified the relationship between plant size and survival over two subsequent years. We then identified the size threshold that bluebunch wheatgrass plants must reach at each site such that soil moisture no longer limits survival. Faculty Sponsor: Timothy Parker

ALBERTO SANTOS-DAVIDSON, *How's the Soil?: Environmental Risk from Wheatfield to Vineyard*, 9:45 a.m.

The impacts of environmental risks such as global climate change are far-reaching and observable at the local level. At the same time, research shows that even individuals with close and frequent interactions with their natural surroundings may underestimate or downplay such risks. The Walla Walla area is an ideal location for investigating what farmers think about the environment and how they respond to environmental risks, including those associated with climate change, pesticide drift and erosion, because all of these issues are present in the same valley. My presentation aims to explore why individuals in rural areas tend to believe less

in climate change than do individuals in urban areas, even while contributing to a growing body of literature on stakeholder responses to climate change and other environmental risks. Faculty Sponsor: Alissa Corder

DISEASE AND VACCINES
SCIENCE 100, BRATTAIN AUDITORIUM
Tatiana Kaehler, moderator
Marlene Anderson, coach

EMILY OSTROVE, *Evaluating Water-in-Oil-in-Water Emulsions for Vaccine Delivery*, 9 a.m.

Effective vaccines are composed of an antigen, the protein providing the immunological adaptive response, and an adjuvant, a compound that signals an enhanced immune response so that immunity is remembered to combat future infection. Water-in-oil-in-water (WOW) emulsions induce long term immune responses and are a promising vaccine formulation candidate for antigen and adjuvant distribution. My project at the Infectious Disease Research Institute was to produce WOW emulsions and evaluate them based on their chemical stability, and antigen and adjuvant encapsulation efficiencies. Chemical stability was determined by measuring particle size distribution via dynamic light scattering and monitoring WOW sample particle sizes over time. SDS-PAGE and high performance liquid chromatography were used to quantify antigen and adjuvant concentrations. Stable WOW emulsions were able to encapsulate both the adjuvant and antigen. Such vaccine development will help aid impoverished global communities and help reduce the spread of infectious diseases. Faculty Sponsor: Allison Calhoun

ALLISON GOOD, *Optimizing Adjuvant Encapsulation in Liposomes for Use in Vaccines*, 9:15 a.m.

Adjuvants are substances that are added to vaccines in order to improve the immune response and broaden vaccine protections. Adjuvants can be encapsulated in liposomes, a nanoparticle which is widely used in drug delivery systems. Liposomes are an attractive tool due to the versatility of their physiochemical properties. My project at the Infectious Disease Research Institute was to develop liposomes to maximize the encapsulation of an adjuvant and minimize adjuvant loss. I manufactured liposomes of various physiochemical properties and determined the effect on adjuvant encapsulation and other physical properties of the formulation (pH, osmolality, particle size, and visual appearance). Future efforts will need to determine an in-vivo activity profile of these formulations. These vaccine development efforts aim to contribute to the goal of preventing infectious diseases that are particularly problematic in the poorest regions of the world. Faculty Sponsor: Allison Calhoun

ANURADHA LINGAPPA, *The Next Generation of Anti-Malarial Drugs*, 9:30 a.m.

Malaria, a mosquito-borne infectious disease responsible for at least 630,000 deaths annually, is caused by protists in the genus Plasmodium. Plasmodia use a PLP synthase complex to create pyridoxal 5'-phosphate (PLP), the active form of Vitamin B6. PLP is critical for Plasmodia survival, making PLP synthase an ideal target for the next generation of anti-parasite drugs. We used cell-free protein synthesis to examine how Pdx1 and Pdx2, the two proteins that constitute PLP synthase, interact directly with other proteins to form the complex. Our results suggest that catalytic steps in the PLP synthase assembly pathway are being reconstituted by assembly machines, providing promising candidates for antimalarial drug discovery. Faculty Sponsor: Daniel Vernon

BRYNN WALUND, *Modeling Oral Transmission of HIV from Mother to Child in Primates*, 9:45 a.m.

Transmission of HIV from mother to child through breastfeeding is the most common way that children are infected with the deadly virus. As Sub-Saharan Africa is home to 91% of the world's HIV infected children, this region is crucial to decreasing HIV infections worldwide. There, the BCG vaccine (tuberculosis vaccine) is traditionally administered to infants, which increases immune activation. This immune activation may increase the susceptibility of infants to HIV transmissions. We hoped to monitor this susceptibility in a primate based study. I updated and utilized a PCR-based procedure in order to detect the virus in eight Rhesus Macaque monkeys. With my research and updated protocol, I was able to detect the amount of virus to orally expose the primates to in order to model the human rate of transmission. This work will act as the foundation for the final goal of decreasing the rate of infected children. Faculty Sponsor: Daniel Vernon

TATIANA KAEHLER, *Process Monitoring During Vaccine Production: Developing a Reversed-Phase HPLC Assay*, 10 a.m.

Each vaccine candidate undergoes specific multi-step processes, including expression, fermentation and purification. These steps can be modified to increase the yield and purity of the protein candidate, which leads to the development of more vaccines. My project at the Infectious Disease Research Institute was to develop a reversed-phase High-performance Liquid Chromatography (HPLC) assay to quantify and assess the purity of a protein during the fermentation and purification processes. Reversed-phase HPLC is used to separate components of a mixture for the purpose of evaluating the purity and quantity of each component. Therefore, it is an ideal method for in-process quantification. I injected a protein candidate into the

HPLC at various temperatures and chemical gradients in order to maximize separation of the protein of interest from other contaminants. These efforts aim to improve the development process of vaccines for infectious diseases that afflict some of the world's most impoverished populations. Faculty Sponsor: Leena Knight

CHEMICAL INTERACTIONS SCIENCE 151

Chelan Pauly, moderator
Lauren Hauck, coach

ALISSA BECERRIL, *El AMIGO de Neurons: Using Biophysics to Discover How a Friendly Protein Helps with Neuron Signaling*, 9 a.m. Similar to electrical wires in a computer, neurons gather and transmit signals extremely fast. In wires, charge flows through the movement of electrons, while in neurons the signal flows with the movement of ions like potassium through pores called ion channels. The potassium ion channels involved in transmitting electrical impulses across a neuron are almost always closed, except when a stimulus causes them to open. Upon the opening of the channel, the potassium flows into the neuron and eventually causes other connecting neurons to receive and transmit the electrochemical impulse. Previous research that studied these potassium ion channels assumed that such channels essentially work independently of other proteins nestled in the neuronal membrane. My NSF-funded research exposed a transmembrane protein (called AMIGO) that changed the ability of these potassium channels to open in response to signals. This provides significant information about how auxiliary proteins regulate the ion channel activity. Faculty Sponsor: Ginger Withers

JULIANNA WETMORE, *Xenon-129 NMR of Aqueous Micelle Solutions*, 9:15 a.m.

Surfactants, the molecules that make up soap solutions, aggregate in water to form structures called micelles. Xenon-129 nuclear magnetic resonance (NMR) spectrometry was used to study these aqueous solutions to gain insight into the molecular properties of different surfactant systems. The drop weight method was used to make surface tension measurements, which allows the determination of the concentration at which micelles begin to form. By using these two tests, we can develop a better understanding of the different conditions under which micelles form and their structures. In this work we focused on mixed micelles, a micelle composed of two different types of surfactants. A nonionic solution, Triton-X-100, was mixed with various concentrations of an anionic solution, sodium heptyl sulfate, and the properties were studied. Faculty Sponsor: Allison Calhoun

MACLEAN HARNED, *Influence of pH on Ligand Exchange Rate with Phosphonate-Containing Chelating Agents*, 9:30 a.m.

The geochemical speciation of transition metals and chelating agents ultimately determines bioavailability, solubility and the transport of nutrient or cytotoxic metals. There is wide use of phosphonate-containing chelating agents as herbicides, corrosion inhibitors and detergent builders. Their presence in the environment necessitates a geochemical understanding of their behavior. Our research focuses on determining the reaction kinetics of ligand exchange reactions involving phosphonate-containing chelating agents and nickel. Capillary electrophoresis with ultraviolet spectrophotometric detection was used to monitor nickel(II) cyclohexaneethylenediaminetetraacetate (NiCDTA) production following the addition of CDTA to N,N-bis(phosphonomethyl)glycinenickel(II) (NiBPMG) solution. Initial rates were determined over a pH range and at varying chelating agent concentrations. A pathway for the ligand exchange reaction is proposed. Faculty Sponsor: Nathan Boland

CHELAN PAULY, *Biofilm Formation on Plastic Marine Debris*, 9:45 a.m.

Biofilm is a dynamic, three-dimensional structure predominantly composed of bacteria and small protists covered by a matrix of extrapolymeric substance. Biofilm grows in many environments, including on plastic debris found in the ocean. Plastic samples exposed to the marine environment were collected on a Sea Education Association research vessel sailing through the Atlantic Ocean from San Juan, Puerto Rico, to New York. Three types of plastic (polypropylene, polyethylene and certified compostable Mater-Bi plastic) were analyzed along a time series from 1 hour to 28 days. Confocal microscopy was utilized to examine auto-fluorescence as well as fluorescence from nano-orange and DAPI stains to compare chlorophyll, protein and DNA concentrations between samples. This research furthers our understanding of biofilm formation on plastic, a relatively new anthropogenic substrate in the marine environment, and is part of a larger NSF grant studying the Plastisphere at the Marine Biology Laboratory in Woods Hole, MA. Faculty Sponsor: Sara Belchik

STANDARD TIME, ANCIENT TIMES MAXEY 104

Caitlyn Yoshina, moderator
Felipe Rivera, coach

DELANEY HANON, *Setting the Nation's Watch: The Waltham Watch Company and the Adoption of Standard Time*, 9 a.m.

At noon on Nov. 18, 1883, clocks across the United States rang in the new Standard Time, establishing the four continental time zones still used today.



Previously, towns set their time individually, according to the sun, which meant that cities a few miles apart maintained different temporal realities. To standardize their schedules, railroad companies established the new Standard Time, which changed the culture of the United States by binding the ever-expanding country. My presentation examines the importance of the Waltham Watch Company, long overlooked, in the adoption of Standard Time. Waltham, the first company to industrialize watch production, mass-produced the instruments at a lower cost than European companies,

increasing the availability of watches in the U.S. I conclude that without Waltham, the railroads would not have been able to adopt Standard Time as they did in 1883. Faculty Sponsor: Laura Ferguson

GROOVER SNELL, *Diverging Disciplines: Science and Philosophy in the Hellenistic Age*, 9:15 a.m.

The Hellenistic period, lasting roughly from the death of Alexander to the rise of Rome, saw much scholarly output and advancement in science and technology. Suddenly, inventors were developing devices with great

sophistication, from steam-powered engines to pistons to water clocks to, most surprisingly, the Antikythera mechanism, an ancient “computer” that predicted eclipses and other astronomical phenomena. However, much of the practical potential of these innovations was never fully explored, and advanced devices remained mere curiosities. Modern scholars have tended to offer an economic explanation for this stagnation. However, an examination of the Hellenistic period’s greatest thinkers and achievements suggests that it was the intellectual attitudes of the time that caused the underdevelopment of applied science. The intellectual elite favored theoretical insight over practical application, and viewed inventions that catered to the necessities of life as subordinate to the lofty Platonic ideals of proper philosophic or scientific aspiration. Faculty Sponsor: Sarah Davies

NICHOLAS MORI, *Antony and Octavian: Establishing the East–West Metanarrative, 44–30 BCE*, 9:30 a.m.

Since the first century BCE, historians have framed the civil war between Mark Antony and Octavian as an epic battle between East and West. Though this war-of-worlds might seem true in terms of Mediterranean geography, the cultural implications do not hold. Because of his eventual victory, Octavian framed Antony’s emulation of Hercules, Dionysus and Osiris as abandoning Rome and the West for Eastern “barbarism.” I argue that this propagandized view is false. Antony’s divine associations were instead a bridge between worlds, uniting a populist base of Roman support with the new, Greek-speaking denizens of the empire. The divide, therefore, was not geographic but rather political and economic. By defining “proper” Roman behavior according to his own chosen precedents, Octavian established a rift between East and West that eventually split the Roman world, creating what would become the Byzantine Empire. The effects are still visible today. Faculty Sponsor: Sarah Davies

ARDEN ROBINETTE, *Marriage, Motherhood and Murder: Royal Women and Political Power in the Macedonian Argead Dynasty*, 9:45 a.m.

Ancient history has traditionally focused on “great men,” an approach that greatly minimizes the importance of many groups, especially women. At best, powerful women are ignored; at worst, they are demonized. The Argead women of the ruling dynasty of Macedon represent an exceptional and intriguing case of ancient women in power, but the focus consistently remains on their male relatives (e.g., Alexander the Great). Yet Argead women were able to attain and exercise a great deal of authority, exploiting traditional institutions of marriage and motherhood to their advantage. When threatened, Argead warrior-queens entered the male-dominated sphere of political

violence, using military might and committing gruesome murders to secure their status and establish a female dynasty. My presentation aims to elevate the Argead women to their rightful place among the “great men” of ancient history, and to show that these women were formidable rivals to their male contemporaries.

Faculty Sponsor: Sarah Davies

CAITLYN YOSHINA, *How the Ancients Taught Racial Identity: Busy Romans and Backward Egyptians*, 10 a.m.

What is to be gained from studying a foreign culture? In the fifth century BCE, the Greek historian Herodotus wrote a spectacular narrative of the Egyptians’ bizarre reversal of the rest of the world’s practices. Four centuries later, the Roman poet Virgil published the *Georgics*, a didactic, or instructional poem, on the subject of farming in which the author tackles the subject of beekeeping and presents bees as an anthropomorphized community. Virgil’s ethnographic discussion of bees is at once an allusion to his literary predecessor Herodotus and a subversion of Herodotus’ authority as “the father of history.” While Herodotus gawks at the Egyptians’ “otherness,” Virgil celebrates the bees for their similarities to Romans. My presentation will examine each author’s intentions and will seek to answer the question: What is the didactic value of presenting a foreign culture in comparison with one’s native culture? Faculty Sponsor: Dana Burgess

CULTURAL MARKERS

KIMBALL THEATRE

Erik Anderson, moderator

Emma Newmark, coach

KYRA ARNETT, *The Readymades of Marcel Duchamp: “There is no solution because there is no problem,”* 9 a.m.

In 1917, Marcel Duchamp submitted a porcelain urinal, signed with the pseudonym “R. Mutt,” to an exhibition in New York. Conventional interpretation in art history holds that Duchamp turned a mass-produced urinal into art by placing it in an art context. The urinal, titled *Fountain*, is one of Duchamp’s readymades: a collection of seemingly mass-produced items ranging from snow shovels to coat racks. Since the revival of Dada in the 1950s, the readymades have revolutionized the way modern and contemporary artists approach art and art production by demonstrating art’s reliance on intention and context. My presentation explores recent scholarship that challenges conventional characterization of the readymades and reveals how emerging interpretations conflict with Duchamp’s legacy in art history. How can we understand the readymades in light of these new and varied interpretations? What would it mean if everything

we know about the readymades is wrong? Faculty Sponsor: Dennis Crockett

ELLIOT MOSKAT, *The Social and Cultural Transcendence of Kanye West*, 9:15 a.m.

Despite being arguably the most successful rap artist of the past decade, Kanye West has been in and out of news headlines for much more than the millions of albums he has sold. West wants to be larger than just music, and I argue that he not only tries but also succeeds in his quest to transcend the persona that made him so famous prior to the release of his 2013 album “Yeezus.” I call this recording West’s “first persona.” I introduce West’s desire to transcend his first persona, explain how this transcendence occurs in “Yeezus” and his life outside music, and demonstrate why I think this transcendence is a success for West. I conclude that, although associated with rappers like Jay-Z or Snoop Dogg, West is in a category of his own as a social and cultural icon. Faculty Sponsor: Heather Hayes

GORDON KOCHMAN, *Highway Patrol: Legal Driving on Cannabis*, 9:30 a.m.

With the advent of legalized marijuana, the legal question of driving under its influence has surfaced. Laws are ill-defined. While alcohol levels are readily measured by breathalyzer tests, the current method to determine intoxication by cannabis is a field sobriety test and/or general observation. Drug tests can be refused and are difficult to administer in the field. Case files suggest that driving while “high” is increasingly difficult to monitor and will only become more blurry to measure in the coming years as legalization and decriminalization become the norm. My presentation examines state regulations on driving while impaired by cannabis and cases where it has come into play in determining the legal parameters of driving “high.” Faculty Sponsor: Kevin Kuswa

ANNA SOPHIA TEAGUE, *Narratives of Intimate Partner Violence in Romance Novels as Discussed in Online Reader Communities*, 9:45 a.m.

Romance fiction, one of the most popular literary genres (averaging \$1 billion a year in sales), has an 84 percent female readership and primarily female authors. However, despite the genre’s dominantly female demographics, romance novels contain narratives that normalize and value violence against women as desirable in romantic relationships. In my presentation, I present research on how (female) content creators on romance novel review websites handle the narratives of intimate partner violence in the books they review. Using audience and consumption theories, I investigate whether romance novel readers notice these narratives and how they justify, reject, interrogate or identify

with these depictions of intimate partner violence. Finally, applying theories behind feminist debates on pornography as empowering or exploitative, I explore the idea that these narratives of violence can be read as coping mechanisms to navigate the violence of patriarchy. Faculty Sponsor: Michelle Janning

ERIK ANDERSON, *What Do Video Games Have to Do with Nature?* 10 a.m.

The field of environmental criticism has traditionally focused on “high literature,” yet this privileging of the rarefied written word ignores many contemporary media developments. The academy has a long tradition of ignoring popular mediums, and video games are no exception. Although much has been accomplished recently in the burgeoning field of digital humanities, scholars are still struggling to define the vocabulary and scope of their projects. In my presentation, I will first situate my analysis in the current state of environmental criticism. From there, I will provide a brief environmental interpretation of the popular video game “Journey” (2012), focusing on the cinematic effects of the game’s point of view, setting and unique gameplay on the human interaction with the built and natural environment. The groundbreaking multiplayer interactions in “Journey” depend on the sense of intimacy and distance of the game’s barren landscape. Faculty Sponsor: Emily Jones

SERVICE TRIPS

REID G02

George Felton, moderator
Jesse Moneyhun, coach

ZIYI SU, SARAH DUNN, ANDREW SCHWARTZ, HALEY CASE, GEORGE FELTON, *Service Trips: Research and Reflections*, 9 a.m.

Participants in service trips expand their education beyond campus through study, work, and direct engagement in communities across the country. Over spring break, 54 Whitman students and staff participated in four trips, researching and experiencing a wide variety of issues. Participants from each of the trips will share their experiences in this session moderated by George Felton. Service trips included in the discussion are Urban Education, Portland, Ore. (multiple educational models and student challenges in an urban environment); Environmental Sustainability, Eugene, Ore. (sustainability initiatives); Community Renewal, Detroit, Mich. (economic crisis and revitalization efforts); and Youth Initiative with the CTUIR, Pendleton, Ore. (community initiative with the Youth Council of the Confederated Tribes of the Umatilla Indian Reservation). Staff Sponsor: Abby Juhasz

SESSION 2

10:45a.m.-Noon

DIRTY WARS I

OLIN 130

Rhiannon Clarke, moderator

Kyle Hendrix, coach

KANGQIAO LIAO, *Originality and Autonomy: China's Postcolonial Transformation Through the May Fourth Movement*, 10:45 a.m.

The May Fourth Movement—which took place on May 4th, 1919—signaled the peak of political, cultural and social momentum in the long process of China's transformation to modernity. This process began with the Western invasion of China during the Opium War of 1840. Throughout this process, Chinese revolutionary society struggled to find accommodation with the West. As major postcolonial theorists such as Edward Said have argued, there is no easy way for a postcolonial nation state to find its own path toward modernity; the process requires substantial originality. My presentation examines how the originality and autonomy of the major revolutionary leaders of the May Fourth Movement initiated the fashioning of a modern China. Faculty Sponsors: Jeanne Morefield and Charles McKhann

ALANNA WOODS, *'Summer Flower' and Atomic Bomb Literature in Japan*, 11 a.m.

In August 1945, the United States dropped atomic bombs on the Japanese cities of Hiroshima and Nagasaki that killed approximately 129,000 people. In the aftermath of this attack, historians, writers and poets in Japan and the United States chronicled, analyzed and reflected on it. The stories of survivors have been told in a number of ways. In my presentation, I will introduce a short story by Tamiki Hara titled "Summer Flower," a fictional, first-person narrative about a middle-aged man who witnesses and survives the bombing and who observes the chaos immediately following the blast. I demonstrate how Hara invites readers to become involved in this story and helps them to understand how people in Hiroshima died or survived and suffered after the bomb called "Little Boy" fell from the sky. Faculty Sponsor: Akira Takemoto

DENNIS YOUNG, *The Rise of ISIS*, 11:15 a.m.

In early 2014, a previously little known Islamic militant group known as the Islamic State of Iraq and Syria managed to gain control over a large swath of territory in Iraq and Syria. Yet, there are more factors at play in the group's meteoric rise to power than simply the brutal tactics that have become the group's trademark. In my presentation, I examine the conditions in Iraq leading up to the ISIS incursion that allowed them to gain control so quickly of such a large expanse of territory. I argue that, since the U.S. invasion of Iraq, the Iraqi government has

worked to concentrate power in the hands of the Shi'a elite at the expense of the country as a whole. This has perpetuated sectarian divisions between Shi'a and Sunni populations and weakened the central government, which has allowed ISIS to gain control over large portions of Iraq. Faculty Sponsor: Elyse Semerdjian

LACHLAN JOHNSON, *Facing the Past: Influences on Attitudes Toward Reparation for Genocide*, 11:30 a.m.

What factors influence attitudes toward reparations for the nation's genocidal history? Past research suggests that national attachment, national glorification, moral disengagement, collective guilt and collective shame may all play a role. Participants who grew up in California participated in an online survey, reading descriptions of genocide committed by American invaders against the native peoples of California in the 19th century, and completing a series of measures. Consistent with prior work done in other countries, I found national attachment to be positively related with moral disengagement. However, when national glorification was controlled, the relationship between national attachment and moral disengagement was not significant. In addition, national glorification was related to moral disengagement which, in turn, predicted less willingness to provide reparations. Finally, both collective guilt and collective shame were found to be related to willingness to provide reparations. In my presentation I discuss implications for priorities when advocating social justice. Faculty Sponsor: Erin Pahlke

RHIANNON CLARKE, *Visualizing the Unseen: Percepticide and Testimony in 'Dirty War' Comics*, 11:45 a.m.

My presentation examines how Diana Taylor's theory of percepticide within Argentina's "Dirty War" is manifested visually in graphic narratives pertaining to the era of the country's last dictatorship (1976-1983). Three works are analyzed (Buscavidas, Perramus and a selection from Parque Chas), both separately and with an eye to the trajectory that can be drawn between them. Percepticide, as carried out by the military dictatorship, entailed public spectacles of violence that witnesses were forced both to watch and to pretend that they they did not see. Although percepticide requires a kind of self-blinding, the result of the experience is auditory, namely silence. My presentation investigates how percepticide is represented visually in these graphic works, particularly in the interplay between seeing and speaking and the individual as representative of the larger society. I conclude that narration and shared testimony are what ultimately break down percepticide. Faculty Sponsor: Janis Breckenridge

ETHICAL JUDGMENTS

OLIN 157

Tim Reed, moderator
Margaret Rockey, coach

NICHOLAS WIN, SHANNON KELLY, *What is Morality? The Effects of Emotions on Moral Decision-Making*, 10:45 a.m.

Would you act to save five strangers from a runaway trolley, even if those actions would kill another stranger? This classic philosophical question, known as the “trolley problem,” is used to investigate how people make moral decisions. It has long been assumed that people rely primarily on reason when choosing how to act in a moral dilemma. However, recent research has shown that emotion also plays an important role in how we make these decisions. Our study relied on a recently discovered emotional state known as “flow” to further elucidate this connection between emotion and moral decisions. People experience flow when they are challenged by a task just enough that they find it exciting and rewarding. We examined the effects of flow and two other related emotions (anxiety and boredom) on moral decision-making. The results could provide insight into how to encourage better moral decision-making. Faculty Sponsor: Walter Herbranson

NATHANIEL HIGBY, *Ethnocide of Deafness: The Cochlear Implant Controversy*, 11 a.m.

When the cochlear implant was invented, the culturally deaf, or profoundly deaf individuals who communicate in sign language, condemned it as a modern-day manifestation of eugenics. The device, used to restore hearing in individuals with severe hearing loss, enables recipients to communicate orally. Seeing this as a rejection of their culture and complex language, the culturally deaf argue that support for the device needs to cease in order for their culture to survive. Still the center of controversy today, the cochlear implant debate exemplifies the disharmony that can exist between cultural and medical ideologies. My research analyzes how variables such as educational attainment, income and age influence how culturally deaf individuals perceive the cochlear implant. I also evaluate whether the threat of ethnocide is not just an argument launched against the device but also a genuine fear shared by the members of deaf culture. Faculty Sponsor: Keith Farrington

SOPHIA CONNELLY, *The Ethics of Eating Meat*, 11:15 a.m.

The consumption of meat is a defining aspect of culture in many areas of the world. Yet, a question of ethics



remains. An examination of the ethics of eating meat asks us to determine to what extent nonhuman creatures are worthy of our moral consideration. Through a study of several philosophical works from utilitarian, individual-based animal rights and environmental points of view, I consider the various reasons that support the belief that it is unethical to eat meat. While these philosophers disagree on the correct way to approach animal ethics, my analysis of their differing perspectives reveals that their beliefs are, in fact, compatible. Regardless of our approach to the ethics of eating meat, we are obligated to recognize that animals, as sentient beings, have moral standing and are worthy of our moral consideration. Faculty Sponsor: Patrick Frierson

MARY LEBLANC, *An Investigation of Forgiveness*, 11:30 a.m.
In “The Human Condition,” Hannah Arendt presents forgiveness as a solution to the intrinsic difficulties attached to action and speech. Forgiveness is an event that ameliorates the irreversibility of the past through the human capacity to begin anew, thereby generating a new sense of possibility. If the irreversibility of the past can be alleviated through forgiveness, then why does it present itself as a counter-intuitive course of action? The common understanding of forgiveness is informed by several hidden assumptions that preclude us from seeing the underlying nature that its appearance actually signifies. There are three predominant misconceptions functioning: forgiveness is a one-sided performative; forgiveness is only applicable in a religious context; and forgiveness is an unconditional event that only concerns two people. Investigating these misconceptions strips away the distortion of forgiveness and reveals the event itself as a necessary interaction within the context of human relations. Faculty Sponsor: Thomas Davis

TIM REED, *Ethics in Economics*, 11:45 a.m.
While lawmakers and others who enact policy are engaged in an explicitly normative process—determining what we should do in a given situation with no easy choices—they often rely on the positive, “value-less” science of mainstream economic theory to inform their decision-making. Proponents of neoclassical economic theory such as Milton Friedman argue that this positive economic theory can be used effectively toward any normative goal, believing positive economics to be only concerned with how the world is, and not how it ought to be. I contend that this claim is false, and I argue that neoclassical economic theory is both normatively defined and normatively inclined towards particular ethical goals. In particular, neoclassical economic theory is poorly suited for pursuing the normative goal of environmental conservation. As a result, policy-makers should be wary of using neoclassical economic theory, as the outcome may be unexpected and undesirable. Faculty Sponsor: Patrick Frierson

ECOSYSTEMS AND ACTIVISM

SCIENCE 159

Yi Xu, moderator
Noah Stern, coach

MORGAN DIENST, *Toxic Carbon Monoxide Removal by the Soil Bacteria *Oligotropha carboxidovorans*: Insights from in silico Models*, 10:45 a.m.

The Mo-Cu containing carbon monoxide dehydrogenase (CODH) from the aerobic soil bacteria *Oligotropha carboxidovorans* is an important enzyme in the global carbon cycle, converting toxic carbon monoxide into less toxic carbon dioxide. The active state and the intermediates involved during catalysis are not yet clearly understood and several aspects of the active site remain in question. To gain further insights, computational models were systematically developed. Using our converged model, the role of the important second sphere residues were evaluated using in silico point mutations. Our results revealed that several of these residues are critical to maintaining the functionality of a realistic model. These models are currently being evaluated by comparing spectroscopic and redox properties with the available experimental results. To assess the effects of the larger protein environment on the active site, we are implementing integrated quantum mechanics and molecular mechanics (QM/MM) models. Faculty Sponsor: Dalia Rokhsana

WESLEY SPARAGON, *Friends with Benefits: Bacterial Symbionts and Salamander Pathogen Resistance*, 11 a.m.

From humans to termites, scientists have found that symbiotic bacteria are the invisible force that shapes an organism’s form and function. Recent research has revealed that microbial symbionts have special import for amphibians. Amphibians around the world are experiencing massive population declines due to a parasitic fungus, *Batrachochytrium dendrobatidis* (Bd), which infects their skin and impairs key physiological processes. Fortunately, amphibians’ skin hosts an array of bacteria which play a role in immune defense against Bd. My thesis research focused on identifying Bd susceptibility in two previously unstudied California salamanders, *Batrachoseps luciae* and *Aneides lugubris*, and seeing if their Bd susceptibility was correlated with the presence of Bd-inhibitory skin bacteria. This research helps shed insight into how differential Bd susceptibility in two cohabiting salamander species can emerge and how this could impact the spread of the fungus, with the goal of helping better contain and push back this widespread pathogen. Faculty Sponsor: Sara Belchik

LUCIA PORTMAN, *Factors Affecting Vigilance and Foraging Rates of Blue Wildebeest (*Connochaetes taurinus*) in the Tarangire-Manyara Ecosystem of Tanzania*, 11:15 a.m.

The anti-predator adaptations of herbivores are of ecological importance because of their influence on foraging opportunity and population fitness. The purpose of this study was to identify which variables best explain the variance in vigilance and foraging rates of wildebeest. Vigilance and feeding behavior of blue wildebeest (*Connochaetes taurinus*) were assessed across three seasons and three study areas with varying management regimes in the Tarangire-Manyara ecosystem in Northern Tanzania. Using logistic regression, the influence of habitat, group size, individual position, study area, presence of juveniles, time of day, presence of associated species and distance of observer was tested on the likelihood of wildebeest behaviors (feeding and vigilance). Based on our observations, wildebeest altered their feeding and vigilance behavior based on juveniles presence, position of individual, presence of associated species, and time of day. Faculty Sponsor: Hilary Lease

JESSIE AUSTIN, *"An Exchange of Life": Social Impacts of Wildlife Conservation in Chitwan National Park, Nepal*, 11:30 a.m.

What motivates people to save their environment? During my time in Sauraha, Nepal, I learned about community benefits of wildlife conservation in the buffer zone around Chitwan National Park. The local people's relationship with the park has never been an easy or simple one. The formation of the park caused the displacement of people heavily reliant on the land for their livelihood, and made them susceptible to numerous social problems and vulnerable to human-wildlife conflict. However, in recent years an incentive-based program has been instated and local people became directly involved in the management and conservation of wildlife. This paper attempts to explain the motivations of local people who actively participate in wildlife conservation. Additionally, this paper explores how livelihood benefits from wildlife conservation have begun to build a relationship between the local people and the park that could foster dedication and continued participation in wildlife conservation. Faculty Sponsor: Christopher Wallace

YI XU, *Foreign Environmentalists in the Nujiang Anti-Dam Movement: A Case Study*, 11:45 a.m.

The intervention of foreign environmentalists in developing countries is a controversial development. These activists are committed to expose environmental injustice and advocate for environmental awareness. At the same time, they are accused of having a imperialist perspective. In my presentation, I use the movement to stop the Nujiang dams in China as a case study to investigate the ethics behind the intervention of international environmental non-government organizations in China. Taking a pragmatist perspective, I argue that the value of the ecosystem should take precedence over the value of the

dams because the ecosystem serves a crucial supporting role for other values. I further argue that the intervention of the IENGOs is consistent with the interests of Chinese ENGOs and the local people of Nujiang. IENGO intervention adds diversity to the traditional Chinese value system, demonstrating that the intervention of foreign environmentalists is morally justified and beneficial. Faculty Sponsor: Patrick Frierson

HEALTH AND MEDICINE SCIENCE 100, BRATTAIN AUDITORIUM Kinsey Hohnstein White, moderator Avery Miller, coach

EVAN HEBERLEIN, *Tutamboresha Pamoja: Ecology, Water and Public Health in Southern Kenya*, 10:45 a.m.

The degradation of riparian areas along streams in southern Kenya's Amboseli ecosystem is one of the region's most pressing environmental and public health problems. Water availability and quality are decreasing throughout this region due to increased human activities such as agriculture in riparian areas. This urgent issue also reflects greater economic and demographic changes in this historically non-agricultural part of Kenya, as land use is strongly tied to ethnicity throughout East Africa. My SFS research group conducted an assessment of vegetation, farming, and erosion along the river, as well as academic research into water issues in the region. These two distinct research projects produced a holistic picture of the water resource and its impacts on public health. Our results revealed a badly degraded riparian zone, along with a need for improved community education and political institutions to protect this vital community resource and those who depend on it. Faculty Sponsor: Timothy Parker

BROOKE BESSEN, *Conceptions and Treatment of Autism in Indigenous Regions of Chile*, 11 a.m.

Though autism spectrum disorders are rising in prevalence and diagnostic frequency around the world, we have yet to determine a clear cause or cure. The Araucanía region of southern Chile is unique in its health care and medicine system in that it offers both occidental and indigenous medicine to respond to the changing needs of its largely indigenous Mapuche population. My presentation explores and analyzes how occidental as well as indigenous health care professionals conceptualize, diagnose and treat autism spectrum disorders in the Araucanía region. Understanding and effectively implementing intercultural health care systems can lead to further discoveries of medical knowledge and treatment methods for autism spectrum disorders; the advancement and protection of indigenous society and health culture; and, ultimately, increased access to universal and quality care for autism around the globe. Faculty Sponsor: Suzanne Morrissey



SAMUEL CURTIS, *Run, Mouse, Run! Effects of Increased Fatty Acid Oxidation on Endurance Capacity in Mice*, 11:15 a.m.

Endurance exercise relies heavily on the utilization of fatty acids for energy production. In cells, the enzyme, acetyl-CoA carboxylase (ACC2), produces malonyl-CoA, which inhibits the rate at which fatty acids are metabolized in the mitochondria for energy. Therefore, we hypothesized that deletion of the ACC2 protein would increase the oxidation of fatty acids and promote endurance exercise capacity. To test this, mice with the ACC2 deletion and controls were exercised until exhaustion on a motorized treadmill. Contrary to the hypothesis, mice with the ACC2 gene deletion had a significantly reduced endurance capacity compared to controls. The decreased exercise capacity was not associated with changes in blood levels of glucose, fatty acids, lactate or triglycerides. Since ACC2 inhibitors are currently in drug development for the treatment of diabetes and obesity, these results suggest potential negative side effects. Current studies are testing whether

chronic exercise training can reverse the impairment. Faculty Sponsor: Christopher Wallace

KINSEY HOHNSTEIN WHITE, *The Work of Healing: Instigating Health Care Reform One 'Acu-Punk' at a Time*, 11:30 a.m.

My presentation traces an alternative healthcare movement and its resultant cooperative in the context of shifting definitions and experiences of illness, skepticism towards biomedical hegemony and political will to transform the way medicine is practiced. Through metaphorical language, radicalized perspective and aggressive questioning of the current healthcare situation in America, the People's Organization of Community Acupuncture (POCA) constructs a unique representation of what community acupuncture—and the providers who practice it—should value. My presentation poses several questions: What brings these individuals to choose the “punk” path of the acupuncture profession associated with POCA? In a capitalist society in which a self-worth is rooted in financial gain and stability achieved through one's

profession, what brings punks to choose a profession that seemingly lacks upward financial mobility? How does this social movement in alternative medicine challenge the hegemonic biomedical system and conventional acupuncture practice in the United States? Faculty Sponsor: Suzanne Morrissey

MICROCOSMOS, MACROCOSMOS
SCIENCE 151
Emma Dahl, moderator
Duy Tran, coach

ELISSA PICOZZI, *Precision Measurement in Quantum Optics*, 10:45 a.m.

High-precision measurements of a population of atoms that can exist at two different energy levels are important for researching sensors such as high-precision clocks. My research focuses, in particular, on precisely measuring a population of rubidium atoms. Rubidium is an element with only one valence electron. Consequently, rubidium can exist in one of two states: a spin-up and a spin-down state – each at a different energy level. We use an optical cavity that resonates with only spin-up states. When the rubidium is placed in the cavity, the spin-up atoms act like pieces of glass that shift the cavity resonance frequency. The more precisely we can measure this shift in frequency, the more precisely we can measure the number of atoms in the spin-up state. I will present novel methods for using optics to measure the frequency shift. Faculty Sponsor: Moira Gresham

ROSE BAUNACH, *Growth and Characterization of Novel Photocathodes for Particle Accelerator Applications*, 11 a.m.

Particle accelerators are devices that use electromagnetic fields to propel charged particles to high speeds while confining them in well-defined beams. Among their applications, accelerators are used as x-ray sources. These x-rays can be used to characterize properties of matter on an atomic scale. At Cornell University's proposed Energy Recovery Linac—the accelerator effort this research supports—accelerated electrons produced by a photocathode injector gun will be used as x-ray sources. (Photocathodes are materials that emit electrons via Einstein's photoelectric effect when exposed to laser light). To maximize the utility of emitted x-rays, photocathodes that produce large numbers of electrons in colinear beams are desired. This talk will describe the results of my work growing novel gallium arsenide (GaAs) and aluminum-gallium arsenide (AlGaAs) photocathodes via molecular beam epitaxy and measuring their properties such as quantum efficiency, mean transverse energy and lifetime with the hope of engineering optimal photocathodes. Faculty Sponsor: Kurt Hoffman

JESSICA SUTTER, *Using the Hubble Telescope to Search for Galaxies in the Distant Universe*, 11:15 a.m.

Galactic evolution is an exciting topic in the field of extragalactic astronomy. Recent studies indicate that the epoch at redshift $z \sim 2$, about 10 billion light-years away from us, is a pivotal period for determining how massive galaxies in our current epoch, $z \sim 0$, developed. Galaxy clusters contain hundreds of massive galaxies, giving us a useful tool to study galactic evolution, but are increasingly rare in the distant universe. Two new galaxy cluster candidates at redshifts $z \sim 1.6$ – 2.1 , IRC0222A and IRC0222B, were recently imaged by the Hubble Space Telescope. We determined if the galaxies in these distant clusters are similar to massive galaxies in the nearby universe by analyzing the light from the galaxies in these clusters. We found that the candidate cluster galaxies are red and faint, thus they are very likely to be at high redshift and will evolve into the massive galaxies in the current epoch. Faculty Sponsor: Nathaniel Paust

EMMA DAHL, *Discovering Variable Stars in the Open Clusters of Cygnus and Ophiuchus*, 11:30 a.m.

Over summer 2014, we surveyed several open star clusters at the Maria Mitchell Observatory on Nantucket Island in Massachusetts. We were looking for variable stars, which are simply stars whose brightness changes over time. Variable stars can be caused by a number of physical effects, including being eclipsed by other stars or by intrinsic pulsations. Knowing the characteristics of these changes can teach us a great deal about the properties of both the star and the cluster it lives in. After conducting photometry on our candidate variables, we discovered at least 25 variable stars. Faculty Sponsor: Nathaniel Paust

CULTURE CHRONICLES
MAXEY 104
Maya Volk, moderator
Joshua Ward, coach

MOLLY EMMETT, *Alice and Wendy: A Study of Girlhood in British Children's Literature*, 10:45 a.m.

As children's literature emerged in the 19th century, it frequently explored the process of growing up. In the late Victorian and Edwardian periods, male and female writers showed increasing interest in female maturation—perhaps because women's roles were at the center of a national conversation. Focusing on two well-known characters, Alice and Wendy, we see how male authors position maturing girls between sense and imagination. In Wonderland, physical and linguistic transformations force Alice to abandon sense, doubt convention and recognize the validity of her imagination. In Neverland, Wendy escapes into imagination's paradise only to find

herself obliged to be the sensible 'mother.' Ultimately, Lewis Carroll endows Alice with a radical, imaginative independence. By contrast, J.M. Barrie maintains Wendy's sensible transition into maternity. Both versions of girlhood have had lasting influence on the evolution of children's literature and remain important in our present dialogue on women's roles. Faculty Sponsor: Sharon Alker

MOLLY STREETER, *Primitivist Art and the German Ethnographic Museum*, 11 a.m.

From 1873 onward, Imperial Germany saw the rapid rise of ethnographic museums, institutions focused on the collection and study of artifacts from non-Western cultures around the world. Although ethnographic museums were originally created as a scientific tool with which scholars could study similarities between all cultures, by 1905 they were distorted into didactic institutions focused on differences between cultures. Ethnographic museums quickly became entangled with issues of German colonization, furthering the public's fascination with "otherness" and the exotic nature of German colonies. My presentation focuses primarily on exotification within German ethnographic museums, and the museums' pivotal role in the popularity of "primitivist" style in German Expressionist art. The primitivist trend in German Expressionism is inextricably linked to the presence of ethnographic museums in Germany, as both served to perpetuate the exotification of colonized peoples. Faculty Sponsor: Dennis Crockett

LYDIA KAUTSKY, *Identity in the Czech Republic*, 11:15 a.m.

In an age of globalization, national identity is increasingly positioned in conflict with international identity. Specifically in Europe, where the European Union is expanding its power and membership, small countries are forced to reconcile their own identities within a new, broader European identity. Using the Czech Republic as example, I investigate how these two clashing identities can be reconciled in the modern political context. I explain the historical creation and significance of Czech national identity, and how it is manifested now that the Czech Republic is part of the European Union. The debate surrounding adoption of the euro in the Czech Republic illuminates specific tensions between these warring identities. Finally, I explore the implications my research has for the future relationship between the Czech Republic and the European Union. Faculty Sponsor: Susanne Beechey

ELIZABETH CLAGETT, *Turkey's Neo-Ottomanism: Redefining Public Space and Collective Memory through Neoliberal Policy*, 11:30 a.m.

The rise of the increasingly authoritarian AK party in Turkey has called into question the assertion that the country is more democratic than its neighbors in the

Middle East. The party, led by Turkish president Recep Tayyip Erdoğan, has vigorously pursued neoliberal economic policies of privatization and foreign investment. These controversial policies have played out through a battle over the redevelopment of public space, particularly in the case of the 2013 Gezi Park protests which made headlines worldwide. Lesser known instances of forced evictions, land privatization and gentrification have constituted a deliberate attempt by the AK to redevelop public land in accordance with a Neo-Ottoman reading of the country's cultural heritage. This identity struggle reveals tension between secular nationalist Kemalists and the Islamist AK party and serves as a microcosmic example of regional trends toward governance through the pairing of Islamism and neoliberal policy. Faculty Sponsor: Elyse Semerdjian

MAYA VOLK, *Breaking the Compound Wall: The Impact of Employment in Tourism on Families in Bali*, 11:45 a.m.

In November 2014 on a study-abroad program in Indonesia, I investigated the effects of the tourism industry on families in Bali. Balinese families live in large, multigenerational compounds, and I observed that these living arrangements were sometimes disrupted when members of the family were employed in the island's billion-dollar tourism industry. My research is based on interviews I conducted with 16 Balinese individuals about four interrelated topics: family living structures, family values, employment in tourism and tourism in general. From their responses, I conclude that tourism is viewed positively by families connected to the industry because they witness its positive impact on the economy and also benefit through increased financial security. I also conclude that the frequency of Balinese rituals, which honor ancestors and stress the importance of filial piety, has generally helped to keep families intact even when living arrangements have been affected by tourism. Faculty Sponsor: Michelle Janning

MEDIA AND MESSAGE

KIMBALL THEATRE

Halley McCormick, moderator

Danica Wilbanks, coach

MADISON MUNN, *Definitions of Adulthood and Coming-of-Age Consumerism in the U.S. and Japan*, 10:45 a.m.

From Hello Kitty to Pikachu, Japan is famous for "cute." Japanese of all ages participate in this kawaii karucha ("cute culture"), an aesthetic which may strike an American onlooker as surprisingly childlike. Why are Japanese adults buying kawaii goods? Why aren't American adults buying them? What is the relationship between the things we buy and our understanding of

what it means to “grow up” in a culture? I consider how cultural definitions of “adulthood” vary between the United States and Japan, with a focus on how adolescents and young adults come to understand what it means to be an “adult.” This cross-cultural analysis of consumer culture, life course and the concept of “cute” contributes to our understanding of how mass media and consumerism can function to both perpetuate and subvert established cultural values, and the ways new generations adapt to the social realities with which they are faced. Faculty Sponsor: Michelle Janning

NICHOLAS ROBERTS, *Tractarian Logic, Allegory and Jean-Luc Godard's 'Alphaville,'* 11 a.m.

My presentation explores how Jean-Luc Godard's 1965 film “Alphaville” uses logic to further the film's central allegory: “Always go straight towards love.” I explore how the ideology that governs Alphaville uses Ludwig Wittgenstein's notions of base-logic as its frame, and how it represses the city's populace by removing the possibility of love. Ultimately, the characters of the film function more as symbols for the allegory than as fleshed-out people. It all comes down to the stasis of “circles,” the progression of “straight lines,” and how they war with one another when intermingled. Faculty Sponsor: Justin Lincoln

TARA MCCULLOCH, *Bound to Please: How 'Fifty Shades of Grey' Dominated the Public Sphere,* 11:15 a.m.

How did an independently published, online erotic Twilight fan fiction become an international best-selling novel and soon-to-be film that we now know as “Fifty Shades of Grey”? How did “Fifty Shades of Grey” simultaneously spark a trend of BDSM-themed “mommy porn” and inspire severe legislative censorship? Furthermore, how did such an erotic storyline even permeate the mainstream public sphere in 2011? By situating “Fifty Shades of Grey” within the historical context of Western female erotica and then analyzing the text through feminist theory and Michel Foucault's concept of biopower, my presentation will answer these questions. I ultimately demonstrate that “Fifty Shades of Grey” is more than just an erotic novel. It is a manifestation of contemporary mainstream discourse on sexual politics in Western culture. Faculty Sponsor: Tarik Elseewi

MARIA PTUCHA, *Where You Lead, I Will Rewatch 'Gilmore Girls,'* 11:30 a.m.

When the arrival of “Gilmore Girls” to Netflix instant streaming was announced on Sept. 10, 2014, fans were thrilled. They expressed their excitement to rewatch the series in person and on Facebook walls. Why, though? Why get into such a flurry over news about

a series they had already seen? The answer lies in the practice of fan labor and the attainment of emotional capital that occurs when rewatching television. Using “Gilmore Girls” on Netflix instant streaming as an example, I illustrate why rewatching television is a popular form of fan labor, what its benefits are and how it is an economic boon to television producers. Faculty Sponsor: Tarik Elseewi

HALLEY MCCORMICK, *One Second per Day: Video and Participation in Truth,* 11:45 a.m.

In September 2013, I began a personal video project in which I took one second of video per day and published the daily diary at the end of every month. The first installment went from Sept. 1 through Sept. 30. A project like this exposes the creator to the public eye and invites participation from viewers. Particularly in a small community, the subjects of the videos become their viewers and critics. The creator appears vulnerable to scrutiny, but simultaneously she retains control over what her audience sees. A video suggests a sense of veracity, but what does it mean when that portrayal is manipulated by the creator? Is it any less of a true representation? Art theory lenses provide us with a way of better understanding the truth of a photographic image and the phenomenon of social media, and how the latter shapes the perception of the former. Faculty Sponsor: Charly Bloomquist

THE LAST FRONTIER

REID GOZ

Chelan Pauly, moderator

Caitlin Rooney, coach

SKYE PAULY, GRAYSON CARLILE, TOM WHIPPLE, CARL GARRETT, CHELAN PAULY, *Alaskan Adventure,* 10:45 a.m.

With Alaska's enticing state tourism motto in our heads, “Beyond your dreams, within your reach,” five Whitman students set out on a ski tour in the White Mountains in north-central Alaska. We went to test personal limits, explore new territory, and appreciate the fantastic world north of the Arctic Circle. But there was a greater cause as well: this area has recently been proposed as a site for hard rock mining. We investigated the delicate balance between the fragile ecosystem and human land use and development. This sort of hands-on exploration and understanding is critical for future scientists and policymakers. After completing this 92-mile loop on backcountry trails we will share our reflections, observations, and stories in the form of a visual presentation. Faculty Sponsor: Robert Carson

SESSION 3

2-3:15p.m.

DIRTY WARS II

OLIN 130

Devyani Gupta, moderator

Chris Cahoon, coach

MARGARET ROCKEY, *Between Cold War and Islamic Revolution: U.S. and Iran in the 1960s*, 2 p.m.

Soon after John Kennedy became president in 1961, he heard Soviet Premier Nikita Khrushchev predict that Iran was headed for revolution because of its governmental corruption and the misery of its people. What Khrushchev's words inspired Kennedy to do in the coming years ultimately turned that forecast into reality in 1978. Kennedy, convinced that economic modernization was the secret to stifling communism in the developing world, pushed Iran to "reform from above" to prevent "revolution from below." Iran's subsequent program, called the White Revolution, seemed to work: land was redistributed, the literacy rate improved, oil revenues swelled and the nation began to industrialize. Pleased, Kennedy ignored Iran's use of Jeeps emblazoned with the American flag to suppress dissidence. These patterns—increasingly repressive politics in Iran and America's willingness to abide dictators in the name of the Cold War—persisted over the next two decades, ultimately leading to Iran's Islamic Revolution. Faculty Sponsor: David Schmitz

KYLE HENDRIX, *U.S.-Israeli Relations and the Six-Day War*, 2:15 p.m.

The connection between the U.S. and Israel is often deemed a "special relationship." I investigate the origins of this unique connection, with specific focus on the Six-Day War in June 1967. I argue that Israel was on relatively good terms with the U.S. in the years leading up to 1967. However, American policy toward the Middle East at large was to try to engage with all willing nations. 1967 fundamentally altered America's relationship with Israel and its neighbors. Following the war, the U.S. was forced to commit itself to one side and predictably chose Israel. This decision was based on a religious connection, the strategic benefit of siding with the victors and Cold War antagonisms with the Soviet Union. While further alignment with Israel would not occur until 1973, the events of 1967 set the stage for what would transpire six years later and ever since. Faculty Sponsor: David Schmitz

PAUL MINOR, *Why the War Will Not End: Presidential Justification for Military Action in Iraq*, 2:30 p.m.

My presentation analyzes the language used in the War on Terror. I focus my analysis on speeches by former President George W. Bush and President Barack Obama before they

increased American military intervention in Iraq. I pay particular attention to the use of terrorism as an ideograph, which Michael McGee defines as "a high-order abstraction representing collective commitment to a particular but equivocal and ill-defined normative goal." I argue that terrorism is equated with evil, producing two primary consequences. First, terrorism acts as a foil to American freedom and liberty, and legitimates America's role as the hegemonic global superpower. Second, because terrorism is equitable to evil, the War on Terror is equitable to a War on Evil. This framing preempts any dissent or debate. The discursive frames employed by both presidents have generated the horrific reality of a war with no end. Faculty Sponsor: Heather Hayes

KYLE HENDRIX, *Traumatism and Vulnerability: Drone Use as Constant War*, 2:45 p.m.

The explosion of U.S. drone use since the advent of the War on Terror in 2001 has signaled a fundamental alteration in how war is fought. I argue that traumatism—evoked in post-9/11 discourse—reproduces trauma not only in what has happened but also in what is yet to occur. The trauma of the unknown of future terror causes an attempt to eliminate what Judith Butler defines as vulnerability. This continual drive to eliminate American vulnerability caused by an indefinable abstraction forces constant war. Drones have become the lynchpin in the production of constant war because they provide distance between Americans and the war zone so as to make the U.S. seemingly invulnerable. Because escaping vulnerability through war is impossible, the only resolution is the acceptance of our own vulnerability. I examine governmental discourse surrounding the drone program to date and contend that drones produce and shape a discourse of perpetual war. Faculty Sponsor: Heather Hayes

DEVYANI GUPTA, *Photographic Expressions of Traumatic Collective Memory after the "Dirty War" in Argentina*, 3 p.m.

My presentation investigates the relationship between traumatic memory and photography. A photograph captures a moment that has already disappeared. The instant the camera shutter closes, the event it portrays has passed, turning the concept of an image into an object that anticipates loss. As a result, the photograph serves to preserve what has disappeared and condenses the memory of a person into something tangible and indexical that can be re-accessed at any given moment. Through the interpretation of the use of blur in the collections "Buena memoria" by Marcelo Brodksy, "Desapariciones" from Helen Zout and Paula Luttringer's "El Matadero y El Lamento de Los Muros," my presentation explores various



perspectives of Argentina’s “Dirty War” to assemble a collective visual narrative of this period: the brother, the photojournalist and the survivor, who communicate the numerosity and random, interchangeable nature of being “disappeared.” Faculty Sponsor: Janis Breckenridge

COMMUNITY ISSUES AND INITIATIVES

OLIN 157

Alex Kempler, moderator
Emily Aumann, coach

MAGGIE HICKMAN, *Music of the ‘Common Man’: FDR, the New Deal and the American Spirit*, 2 p.m.

During the Great Depression, President Franklin D. Roosevelt enacted under his New Deal the Works Progress Administration, a program that stemmed from his “common man” ideology and focused its employment efforts on ordinary, struggling Americans rather than corporations or the wealthy. The Federal Music Project was a subset of the WPA that aimed to create jobs for

unemployed musicians. Because of FMP-sponsored programs, American music during the Great Depression began to reflect Roosevelt’s political ideology in various ways. In my presentation I discuss how FMP programs in New York, the San Francisco Bay Area and New Mexico made classical music more accessible to the masses, and in so doing fostered a new American spirit. This spirit forever changed the way ordinary Americans perceive and experience classical music. Faculty Sponsor: Rachel Chacko

ASHLEY HANSACK, *Urban Renewal or Urban Removal? An Examination of Redevelopment Efforts for the Jordan Downs Housing Projects in Los Angeles*, 2:15 p.m.

In the same way that sustainable development can promote urban renewal, it can also promote urban removal. My presentation examines how local key stakeholders (including residents, community stakeholders, activists, scholars, government officials and representatives of the private developers) speak about the possible environmental and social consequences that may result from the redevelopment of a 700-unit public housing site called

the Jordan Downs Housing Projects in Los Angeles. The redevelopment project aims to implement mixed-income housing and revitalize nearby land contaminated with toxic (brownfield). My presentation investigates whether sustainable practices, products and processes can be integrated into historically disenfranchised neighborhoods without displacing vulnerable populations—homeless, low-income or minority—in the long term. I argue that without extensive and intensive community engagement and without the implementation of policies aimed to protect affordable housing in Los Angeles, low-income residents will be displaced and gentrification will occur. Faculty Sponsor: Alissa Cordner

HELEN BROWN, *America's Lost Demographic: The Power of Sport for Immigrant and Refugee Students in High School*, 2:30 p.m.

Imagine you are in high school trying to work on a math problem in class. It is impossible because you are thinking about your impending deportation court date back to your home country, where you have no living family and joining a gang is the most resourceful way to survive. At Soccer Without Borders in Oakland, Calif., this hypothetical situation is a reality for many of the immigrant and refugee students who participate in its programs. As an intern there this summer, I saw firsthand the power of soccer and positive mentorship in helping this often-ignored demographic of students navigate the complications of succeeding in American schools. Using past research and theory on cultural capital, educational inequality and the role of sports on academic achievement, I examine the inequities these students battle daily, and how soccer is the key to their success. Faculty Sponsor: Michelle Janning

EMMA NYE, *Slacktivists' Changing the World: Internet Activism and Intelligible Politics in the Millennial Generation*, 2:45 p.m.

Internet activism spreads awareness and allows for individual moments of activism. Increased visibility is only a part of creating change, hence the term “slacktivism.” Author Jodi Dean argues “slacktivism” is necessarily ineffective, simultaneously dismissing discourse as disengagement. Yet, the Millennial Generation continues to spread awareness through digital activism, generating discourse around social and political issues. One example I explore is the ongoing discourse surrounding legitimized violence on black bodies. Through discourses such as this, Millennials engage in what author Judith Butler terms “reconstitution.” They work to expand norms to include discourse and Internet activism as intelligible politics. Faculty Sponsor: Heather Hayes

BRIANNA BROWN, JENNY GRUENBERG, ALEX KEMPLER, *The Financial Impact of Heritage Park on Local Businesses*, 3 p.m.

In the summer of 2014, an issue that has long followed

Walla Walla surfaced yet again: The sun came out, and so did the homeless, transients, and street people who gather in Heritage Park on the main street of downtown. The increased activity in Heritage Park this summer led a group of merchants, concerned about how illegal activity in the park might be affecting their businesses, to approach the Downtown Walla Walla Foundation and the Walla Walla Valley Wine Alliance about conducting research to find out if their claims were true. We joined the research team to examine resident, tourist and merchant perceptions of Heritage Park and the downtown area in general. Our presentation represents the first data on this longstanding social issue. Faculty Sponsor: Keith Farrington

GEOLOGY STUDIES

SCIENCE 159

Collin Smith, moderator

Jessica Van Horne, coach

ALEXANDRA BAILEY, *Interpreting Past Climate from Geochemical Characterization of Paleosol Sequences in the Palouse Hills*, 2 p.m.

Earth's climate oscillated dramatically between glacial and interglacial conditions during the Quaternary Period, the last 2.6 million years of Earth history. Detailed marine climate records exist, but the record from terrestrial sites is more limited. Because soil formation is partly a function of climate, paleosols, or fossil soils, present an opportunity to gain insight into past climate patterns in inland regions such as southeastern Washington. The Rulo site, in the Palouse Hills region of the Walla Walla Valley, contains numerous paleosols that directly overlie basaltic basement rock. In this study, we sampled the paleosols of the Rulo site for geochemical analysis using X-ray fluorescence. Our data can be used to assess the relative degree of soil development that each paleosol experienced when it was at the ground surface. Faculty Sponsor: Nicholas Bader

EMILY TINKLER, *Microscopic Structure of Ancient Soils in the Palouse Hills of Southeastern Washington*, 2:15 p.m.

The record of past climates on land is incomplete, partially because terrestrial climate is so spatially variable. One way to fill this knowledge gap is to examine ancient soils, or paleosols. Since soils form at Earth's surface, and the rate of soil development is partly a function of local climate, paleosols can preserve indicators of terrestrial climate for a region. We studied a sequence of paleosols from the Rulo outcrop on Sudbury Road, in the Palouse hills. In the field, we recorded paleosol characteristics including burrows, roots, calcification and soil structure. Intact, oriented soil samples were carefully collected and made into thin sections for study with a petrographic microscope. The micromorphology (microscopic structure) of these samples reveals the lithology and texture of the parent sediment, as

well as the soil processes that affected each paleosol. This study adds to our understanding of past climate in the Palouse hills region. Faculty Sponsor: Nicholas Bader

LYDIA LOOPESKO, *Archeological Site Stratigraphy as a Record of Human Resilience in the Islands of Four Mountains, Alaska*, 2:30 p.m. Volcanoes played a pivotal role in the life of the Unangan people who inhabited the Islands of Four Mountains (IFM) in the Central Aleutians. The IFM lie in the center of the volcanically active Aleutian Island chain and contain one of the most active volcanoes of the region, Mount Cleveland. Examining the geologic make-up of archaeological sites helps scientists and archeologists study the effects of the nearby active volcanoes on the island inhabitants. In spite of being subject to continuous volcanic activity, the Unangan people evidently would continually reoccupy this subarctic environment, relying only on littoral and marine resources. This study examines grain size distribution, thickness, mineral composition, and carbon content of the various stratigraphic layers of archaeological sites on the IFM to better understand the resilience of Unangan people in the face of the various environmental hazards of the region. Faculty Sponsor: Kirsten Nicolaysen

GRAYSON CARLILE, *Advance and Retreat of the Grinnell Glacier Recorded in Lake Sediments*, 2:45 p.m.

Glacier National Park in Montana is known for its spectacular landscape, carved by valley glaciers. Understanding the complex pattern of glacial advance and retreat may provide important insights into the relationship between climate and glacial cycles in alpine environments, and may help us to better predict the future of such landscapes. In the Grinnell Glacier valley, the remaining glacier sits atop a carbonate formation of the Belt Supergroup. Previous studies of lake sediment cores within the drainage system have found higher concentrations of carbonate at times of expected glacial advance, suggesting that the concentration of carbonate may be used as a proxy for periods when the Grinnell Glacier advanced. In this study, we test this hypothesis by measuring carbonate concentrations from sediment cores in a glacially fed lake more proximal to the Grinnell Glacier. Faculty Sponsors: Nicholas Bader and Robert Carson

COLLIN SMITH, *Utah's Hummocks: More Than Just 'Bumps in the Ground'*, 3 p.m.

Very little research has been conducted on the role of



ungulates in the development of hummocks. This survey evaluates hummocked and non-hummocked wet meadows and riparian areas on the Dixie, Fishlake and Manti-La Sal National Forests in southern Utah. The survey explores the variability in location, morphology and vegetation communities of hummocked areas in order to better understand the mechanisms of formation at play. A better understanding of hummock formation, exacerbation and decay will better direct how federal land managers approach wetland protection and mitigation. The study outlines types of hummocks observed on the forests. It then identifies indicators that a hummocked area is formed or exacerbated by ungulates, including truncation of soil horizons, elongated and serpentine-shaped hummocks and shearing. The lack of suitable ungrazed reference areas compounds the difficulty of determining ungulate impact, however the study uses locations where exclosures or lighter grazing regimes present different hummock morphology. Faculty Sponsor: Robert Carson

DISEASE, DISORDER AND CURE
SCIENCE 100, BRATTAIN AUDITORIUM
Sarah Debs, moderator
Ian Becker, coach

HEATHER LOVELACE, *The Physiological Effects of Acute Intraocular Pressure Elevation in Eight Rhesus Monkeys with Experimental Glaucoma*, 2 p.m.

Glaucoma is a complex group of eye diseases that results in damage to the optic nerve head and decreased visual function. Glaucoma is the second leading cause of blindness worldwide and affects approximately 60 million people. Elevated intraocular pressure is a principal risk factor associated with this disease. In this experiment, eight rhesus monkeys served as experimental models of glaucoma, and intraocular pressure was elevated in one eye of each monkey over the course of the longitudinal study while the fellow eye served as the control. Clinical images of the optic nerve head were acquired in all animals. Optic nerve head anatomy was delineated and the physiological changes within each eye were measured. These results gave us a better understanding of the small structural changes that occur during glaucoma. The overall goal of this work was to use these findings to better understand glaucoma and discover earlier methods of detection. Faculty Sponsor: Christopher Wallace

CHLOE ALLEY-SARNACK, *Gut Proteins as Modifiers of Brain Activity: How a Diet Can Treat Epilepsy*, 2:15 p.m.

Insulin receptors are gut proteins, meaning that they are associated with digestion and metabolism, but they have been co-opted for an even more important function in the brain. Insulin receptors are crucial for signaling in

our brains—they help us transmit information and form memories—and they are key players in medical disorders like epilepsy, Alzheimer's and schizophrenia. Dietary modifications are thought to alter the expression of insulin receptors in our guts and our brains, and thus modify brain function. High-fat, low-carbohydrate diets have been used for over a century to treat epilepsy, even when medications fail. The mechanism of the diet's efficacy is presumed to be rooted in insulin receptor expression patterns in the learning and memory formation center of our brains: the hippocampus. Understanding protein modification here may illustrate the connection between our guts and our brains and help us treat a variety of metabolically-linked disorders. Faculty Sponsor: Leena Knight

GREGORY DWULET, *Killing Cancer with Intracellular Nuclear Fission: How Synthetic Chemistry Leads to New Treatments for Inoperable Tumors*, 2:30 p.m.

Radiation therapy and chemotherapy are the most common noninvasive treatments for malignant tumors. Unfortunately, these treatments damage healthy tissue and lead to harmful side effects. Boron Neutron Capture Therapy (BNCT) is a promising noninvasive treatment for inoperable tumors. BNCT uses neutrons to initiate a nuclear reaction in boron nuclei to destroy surrounding tissue. In order for BNCT to be effective, boron must be administered in high concentrations (approximately a billion atoms per cell), and boron delivery must be selective to cancer cells to avoid damaging healthy tissue. Boron clusters are promising for use as BNCT drugs because of their high boron content and low toxicity. However, the viability of these compounds for BNCT is limited in part by the lack of available synthetic derivatives. Developing new synthetic methods for these compounds contributes to a greater understanding of boron chemistry and may lead to effective BNCT drugs. Faculty Sponsor: Marcus Juhasz

SARAH DEBS, *A Reverse Genetic Screen in Zebrafish Identifies SEC24B and LPP as Genes Required for Convergent Extension*, 2:45 p.m. Annually, over 300,000 babies worldwide are born with neural tube defects (NTDs) that can lead to death. The main causes of NTDs are genetic mutations of the planar cell polarity pathway (PCP), the process by which cells are oriented and localized in a 2D plane during development. We can visualize disruptions of the PCP by observing phenotypic processes including the blocked migration of facial branchiomotor neurons, shortened body length, and disruption of floor plate polarization. We conducted a reverse genetic screen on zebrafish utilizing the CRISPR/Cas system, which is an effective genetic engineering tool. We hypothesized that there are core genes involved in some, but not all of the PCP phenotypic processes. We identified two genes, LPP and SEC24B, that demonstrate

different phenotypic processes recruit specific genes. This research may help elucidate the intricacies of the PCP pathway and identify genes central to NTDs, allowing for development of gene-specific therapeutics. Faculty Sponsors: Leena Knight and James Russo

SECRETS OF THE DEEP

SCIENCE 151

Meaghan Clark, moderator

Halley McCormick, coach

ANNA DOWNING, CHLOE WEINSTOCK, *In the Deep: The 2014 Research Cruise to the Mariana Trench*, 2 p.m.

The deepest part of the ocean, 5,000 meters to 11,000 meters down below the surface, is called the hadal zone and is one of the least-studied environments and ecosystems on the planet. This winter we participated in a month-long comprehensive research cruise conducted by the Schmidt Ocean Institute on the R/V Falkor to the Sirena Deep of the Mariana Trench, one of the deepest spots in the world. Several topics of study were explored on this trip, including research on population genetics of amphipods, the geology and origins of earthquakes, pressure adaptations of deep-sea fish and many more. Findings yielded a wealth of data and discoveries, including several new species and the deepest-dwelling fish found thus far. Faculty Sponsor: Paul Yancey

ALLISON WORK, *Elucidating the Relationship between *Sargassum natans* Seaweed and *Clytia noliformis* Hydroids in the Sargasso Sea*, 2:15 p.m.

Marine hydroids are small invertebrate animals related to jellyfish that live in coastal and open ocean regions throughout the world. In the North Atlantic Ocean's Sargasso Sea, hydroids such as *Clytia noliformis* spend much of their lives bound to free-floating *Sargassum* seaweed and provide an important source of food for dozens of other animals associated with the seaweed ecosystem. Hydroid individuals present on any one piece of *Sargassum* remain constant during the hydroid's lifetime, so the two species can be tracked together as oceanic weather and currents dictate their movement throughout the region. This study analyzed the relationship between *Sargassum natans* and *C. noliformis* in an effort to better understand the origin and reproduction of these floating ecosystems. As anthropogenic pressures on the region increase, answering questions regarding the area's basic ecology is critical in understanding how the region will respond to change. Faculty Sponsor: Delbert Hutchison

LAUREN VORONA, *Analysis of Organic Matrices in Scleractinian Corals*, 2:30 p.m.

Scleractinian coral, also known as hard coral or rocky

coral, precipitates an aragonite exoskeleton. This precipitation is governed by the organics produced by the coral and incorporated into the matrix. In order to better understand the mechanism of precipitation, we examined the organic matrices in Scleractinian coral. Samples from Mo'orea Island, French Polynesia, were analyzed using Thermogravimetric Analysis (TGA), Scanning Electron Microscopy (SEM), and Diffuse Reflectance Infrared Fourier Transform spectroscopy (DRIFTS-IR). SEM allows characterization of the elemental composition of the bulk crystal. IR is used to characterize the bound water and carbonyl groups on the proteins. By analyzing the weight change using TGA and comparing that to analysis of IR spectroscopy we were able to form a more complete picture of Scleractinian coral composition. This research will further the understanding of coral growth by describing the role of the organic matrix in formation. Faculty Sponsor: Allison Calhoun

NEVÉ BAKER, *Salmon Snacks: Humpback Whale Depredation on Hatcheries in Southeastern Alaska*, 2:45 p.m.

Humpback whales are an intelligent and socially sophisticated species, capable of innovating and learning new behaviors. Though they usually feed on krill or small schooling fish such as herring, some humpbacks in southeastern Alaska have been observed feeding on salmon smolt that have been recently released from hatcheries. Salmon hatcheries are key to sustaining Alaska's salmon industry, and it is not yet known what impact humpback depredation is having on hatchery production. Using genetics and behavioral observation, I investigated whether there are any life-history characteristics that differentiate humpback individuals who forage at hatcheries from those who do not. Factors that were considered included if the salmon predators were closely related or possibly immigrants from a different feeding ground. In the future, this information may help us predict which humpbacks depredate hatcheries and why, and develop techniques to discourage this behavior, protecting both the whales and Alaska's sustainable salmon fishery. Faculty Sponsor: Delbert Hutchison

MEAGHAN CLARK, *Genetic Differentiation of Circadian Clock Genes in Resident and Migratory Arctic Charr (*Salvelinus alpinus*)*, 3 p.m.

Many fish use fluctuation in day length to time their migrations to the ocean. The molecular mechanism behind day length measurement is the circadian clock, controlled by circadian clock genes. The influence of clock genes on migration has been documented in several salmonid species, but not in Arctic charr (*Salvelinus alpinus*), an ecologically important salmonid. At the northern reaches of its range within the Arctic Circle, anadromy, the migration to the ocean for feeding, occurs in some populations of Arctic charr, while other populations remain resident

in lakes year-round. This study investigated whether patterns of variation in two copies of the circadian clock gene, Clock1a and Clock1b, are associated with these migrational differences in Arctic charr. No variation was found at Clock1a, but resident populations were found to be similar at Clock1b, which suggests that the gene may influence migratory behavior in Arctic charr. Faculty Sponsor: Delbert Hutchison

THOUGHT, DEED AND CREED

MAXEY 104

Madeline Levy, moderator

Molly Emmett, coach

HENRY ALLEN, *Living the Good Life Outside of Plato's Ideal City*, 2 p.m.

Plato's "The Republic" presents a fictional discussion between residents of classical Athens about how one ought to live. In the discussion, Socrates presents the case that we should live so as to attain psychic health, which he terms "justice." He then stipulates that we can best attain justice by undergoing an upbringing and education in an ideal city, Kallipolis. But Kallipolis, as acknowledged in the text, doesn't exist anywhere on earth and isn't likely to in the future. How then do we, readers of "The Republic," have any chance at the good life? Fortunately, Plato was well aware of this problem and did, in fact, resolve it. In my presentation I will explain how he did so and hence why we needn't live in his utopia to lead good lives. Faculty Sponsor: Michelle Jenkins

JOHN COPPINGER, *For God and Country: A Study of 'Muscular Christianity,' Patriotism, Secularization and the Enduring Legacy of R.V. Borleske*, 2:15 p.m.

Focused on the Whitman College campus during the first half of the 20th century, my presentation outlines the ways in which the rise of "Muscular Christianity" contributed to a widespread trend of secularization in American higher education. I examine how this potent religious ideology, which emphasized a "sound mind and sound body" as a means of salvation, eventually resulted in the development of an increasingly powerful sense of American national identity that emphasized an inherent moral and physical superiority. I also provide historical background on the early days of Whitman College athletics, specifically on R.V. Borleske, Whitman College's most famous athlete and coach. Faculty Sponsor: Rogers Miles

EMMA THOMPSON, *Refusing Vihāra Mahā Devi's Footsteps: Sinhala Buddhist Nationalist Constructions of Motherhood in Sri Lanka*, 2:30 p.m.

In the 1980s in Sri Lanka, many students joined the Janathā Vimukthi Peramua, a communist party that

participated in anti-government uprisings. As their sons started "disappearing," a group of Sinhala Buddhist women started the Mother's Front to protest the abduction of their sons by the government. Both the Mother's Front and the government used the story of Vihāra Mahā Devi, the ancient queen of Sri Lanka and mother to the hero of the Mahāvasa, a grand narrative chronicling the history of Buddhism in Sri Lanka. This imagery carries with it strong nationalist tones. In my presentation, I explore how such images shape the political and religious roles of women in nationalist movements in Sri Lanka. Faculty Sponsor: Jonathan Walters

ALISSA BECERRIL, *Dealing with Dinosaurs: Seventh-day Adventist Approaches to the Evolution-Creation Debate*, 2:45 p.m.

Since the beginning of the Seventh-day Adventist tradition, Adventists have believed that God created the universe in six 24-hour days. Whereas other Christian traditions have accepted the theory of evolution and reconciled its conflict with the biblical account of creation, Adventists continue to strictly adhere to their doctrine. Such adherence seems at odds with the Adventist's strong commitment to the health sciences. Adventist universities offer health professional programs that teach students basic principles of biology, including a theory of origin that has been historically contested by Adventists: Darwin's theory of evolution. My presentation focuses on how Adventists have historically negotiated the conflict between evolution and their belief in a literal six-day creation. I will also explore how this conflict is dealt with at nearby Walla Walla University. By exploring these questions, we can come to a more enriched understanding and appreciation for the age-old religion and science debate. Faculty Sponsor: Rogers Miles

MADELINE LEVY, *Dietrich Bonhoeffer: Theology and Resistance During the Third Reich*, 3 p.m.

Dietrich Bonhoeffer, a 20th-century German pastor and theologian, was an active preacher throughout Europe, a leader in the ecumenical movement and, famously, a conspirator in several plots to assassinate Hitler. Many have asked whether Bonhoeffer's move to tyrannicide signaled a repudiation of his earlier perceived pacifism. In this vein, I focus on the question: What theological seeds does Bonhoeffer's early work sow that justify his later political actions? Through an examination of his theological writings, I argue that Bonhoeffer's early thought supported and even obligated him to his involvement in the plots to assassinate Hitler. As to the perceived tension between Bonhoeffer's early thought and later action, I argue that it is rooted not in a shift from pacifism to violence but rather in his changing notion of correct Christian political involvement as he confronted the realities of the Third Reich. Faculty Sponsor: Walter Wyman

PUBLIC SPACE AND POLITICS

KIMBALL THEATRE

Hilary Painter, moderator
Eli Zavatsky, coach

LAUREN HAUCK, *Occupied Architecture: Identity in the Palestinian-Israeli Conflict*, 2 p.m.

Architecture not only offers a structure for people to live and interact but also provides a material identity for those who live within its walls. The Palestinian-Israeli conflict is marked by a seemingly unsolvable dispute over one's right to land. Tracing their claims to the area to biblical times, Israeli and Palestinian populations have utilized the land itself to establish a historical connection that defines identity through built space. My presentation focuses on the production of an Israeli national identity throughout the occupied West Bank, examining the ways in which architecture has not only played a role in occupation but also in the creation of identities framed through difference. Faculty Sponsor: Matthew Reynolds

ANNABELLE MARCOVICI, *Intentional Communities in Neoliberal Cities*, 2:15 p.m.

From the commercialization of public spaces to the defunding of social services, neoliberalism has dramatically transformed today's political landscape. Massive reorganization and privatization of American cities has figured centrally in this change, calling into question the relationship between physical space and the public sphere. My presentation uses intentional communities—groups of people who come together to live in accordance with shared values—to explore the changing relationship between cities and political possibilities. It asks: “In what ways do these groups challenge, reentrench or reconfigure the neoliberalization of politics, especially as it pertains to the restructuring and reimagining of urban space?” I hope to shed light on how intentional communities call us to rethink the spatial and imagined borders of political engagement and resistance. Faculty Sponsor: Jack Jackson

RILEY FOREMAN, *Olympic Sculpture Park: From Brownfield to High Culture*, 2:30 p.m.

The transformation of an abandoned urban property to a public sculpture park affords locals the opportunity to build a sense of community through art. In the wake of urban renovation, even a chemically contaminated site may possess the potential to become the focal point of a city. However, repurposing such a site induces the potential for neighborhood gentrification, a process by which surrounding real estate values skyrocket beyond the affordability of the area's residents. In my presentation I explore this phenomenon as a result of the Seattle Art Museum's construction of the Olympic Sculpture Park. I argue that, though the park attempts to retain some of the

site's unkempt history through certain design elements, the space and the sculptures it features caters to an elite group of city dwellers. Faculty Sponsor: Matthew Reynolds

HILARY PAINTER, *New York City's High Line: Inaccessibility in Public Park Space*, 2:45 p.m.

Industrial revitalization is frequently fueled by a civic, green image, which often produces an egalitarian façade and affects one's ability to critically examine these spaces. I examine how the High Line's ruined and wild past misinforms its revitalized structure, promoting a groomed and aesthetically fueled landscape based upon notions of branding and commercial support. I question the accessibility of the High Line's public space, referring back to Frederick Olmsted's establishment of the public park and the ideologies that fueled his landscape design. I argue that while the High Line is successful on many fronts, its success is primarily influenced by middle and upper-class ideologies that are tied to private forms of funding. Through this analysis I hope to provoke a reconsideration of revitalized and re-imagined industrial spaces in our contemporary urban landscape. Faculty Sponsor: Matthew Reynolds

WOMEN AND DISCRIMINATION

REID G02

Samantha Grainger-Shuba, moderator
Andrew Schoenborn, coach

SERENA RUNYAN, *The 'Woman' and the Female Domestic Worker*, 2 p.m.

In late Victorian England and Cold War America, the cult of domesticity became an integral aspect of both private domestic life and national ideology and identity. Strict expectations defined the ideal “woman” as one who cared for the home and for her family, and provided a nurturing environment that fostered morality and an appropriate national character. Meanwhile, the working woman was denied access to total womanhood and femininity by virtue of her occupation. For the female domestic worker especially, intersections of race, class and gender provide insight into these societies and the way the female domestic worker existed. Through my research on domestic workers within their respective feminist movements, the relationships they had with their family employers and the way their work influenced their socioeconomic mobility, I address the question: How did the female domestic worker in late Victorian England and Cold War America operate within the cult of domesticity? Faculty Sponsor: David Schmitz

ARIKA WIENEKE, *Mammography Among Low-Income and Uninsured Women in Walla Walla*, 2:15 p.m.



Mammography, a tool for early detection of breast cancer, is the current standard in preventative services. Its use has spiked since the breast cancer awareness movement. But is this trend true for low-income and uninsured women as well as for middle- and high-income women? In my presentation, I explore the state of mammography among low-income and uninsured women in Walla Walla. For a variety of reasons—rural setting, demographics, rate of uninsured women—Walla Walla is a unique location through which to study knowledge, perception and utilization of mammography. My research draws on sociological theory to better understand mammography among this population. My findings led me to formulate a recommendation to improve awareness of mammography (and general breast health) in Walla Walla. Faculty Sponsor: Alissa Corder

EMMA NEWMARK, MARLENE ANDERSON, LAUREN HAUCK, *The Tokenization and Erasure of Women in Debate*, 2:30 p.m. Our presentation examines how women are systemically disadvantaged in competitive collegiate and high school debate. More specifically, we address how women on the Whitman College debate team have been excluded, erased and tokenized. Competitive debate has long been a “boy’s club” which has resulted in oppressive sexual politics

and resistive survival strategies. As women debaters and feminist scholars, we utilize psychoanalytic, rhetorical and affective theories to elucidate these experiences and offer possible alternatives. Faculty Sponsor: Kevin Kuswa

SAMANTHA GRAINGER-SHUBA, *The Evolution of Title IX*, 2:45 p.m.

The passage of Title IX, part of the United States Education Amendments of 1972, marked great change for women in education, as it guaranteed their participation in sports with protection from harassment on and off the field. In 2011, Assistant Secretary for Civil Rights Russlyn Ali wrote a “Dear Colleague” letter that marked a shift in focus in Title IX rhetoric from equal representation in sports to protection of students from sexual assault. Ali’s purpose was to make education America’s “great equalizer” by ensuring the safety of those in federally funded programs. My presentation examines the reception to and contention for the 1972 law. I conclude that Title IX has always had gender implications and that these implications are laden with power. I argue that the shift in focus does not disrupt pre-existing gender power dynamics but rather changes the conversation entirely, making it about the battle between the sexes. Faculty Sponsor: Heather Hayes

SESSION 4

3:45–5p.m.

SEXUAL VIOLENCE

OLIN 130

Sayda Morales, moderator

Caroline Rensel, coach

KATRINA ALLICK, *Reclaiming Intimacy*, 3:45 p.m.

Emma Sulkowicz, an art student at Columbia University, was allegedly raped in her own living space: her dorm room. In the wake of that attack, she has committed to carrying around campus the mattress she was allegedly raped on until the accused student is expelled from school or both he and she graduate. Her goal in carrying her mattress on her back is to make visible the violent breach of private and intimate space. Adapting insights from philosophers Gaston Bachelard, Maurice Merleau-Ponty and Martin Heidegger, my presentation examines how Sulkowicz's protest and performance art piece re-appropriates as a "thing" the intimate meaning of the mattress, transforming it into a symbol that challenges rape culture by forcing into public view the site in which a private (and unacknowledged) violation took place. Faculty Sponsor: Julia Ireland

EMMALYNN DULANEY, *Regaining Agency Through Performance Art*, 4 p.m.

I have researched "Carry That Weight," a performance art piece by Columbia University senior Emma Sulkowicz that grew out of her experience as a victim of an alleged sexual assault. My presentation focuses on her uniquely drastic resurgence of agency and how she was able to achieve it. I argue that Sulkowicz's employment of body and constitutive rhetoric to be the causation of her dramatic regaining in agency. She achieves this through her ability to engage in argumentative tactics such as ethos and pathos which allows her to break down the barriers of social and political constraints that rape victims must overcome within a society's hegemonic rape culture. Sulkowicz's symbolic action has also created a medium for other survivors of rape to regain agency. Sulkowicz's example has been pivotal in the current anti-rape movement. Faculty Sponsor: Heather Hayes

CORINNE VANDAGRIFF, *Crippling Survivorhood: The Nation-State's Treatment of Sexual Violence as a Disability*, 4:15 p.m.

My presentation employs crip theory, which draws on the insights of queer theory to radically rethink the social construction of the non-normative body, to examine how the current college sexual assault epidemic has been framed. I use this example to argue that the labels of "victims" or "survivors" serve to treat sexual violence in the

United States as a disability. My analysis will allow a better understanding of the hierarchical disparities in a survivor's access to recognition of violence and services for healing and justice. Faculty Sponsor: Melissa Wilcox

SAYDA MORALES, *Group Membership and Rape Culture at Whitman College*, 4:30 p.m.

Whitman College has a vested interest in investigating the ways in which students understand, think about and navigate sexual assault on campus. The first goal in my research is to identify whether or not Whitman students perpetuate rape culture on campus. Behaviors associated with rape culture include victim-blaming, protecting perpetrators, trivializing rape, refusing to acknowledge non-heteronormative instances of sexual violence and sexually objectifying victims in accordance with patriarchal gender norms. I also investigate whether or not Whitman students who identify as active members in single-sex groups on campus like varsity athletic teams and/or Greek organizations are more, less, or just as likely to perpetuate rape culture as Whitman students who are not active members in single-sex groups on campus. Faculty Sponsors: Michelle Janning and David Hutson

RACE AND DISCRIMINATION

OLIN 157

Andrea Horwege, moderator

Gordon Kochman, coach

KANUPRIA SANU, *Tiger Woods in the Media: Emblem of Post-Racialism or Object of White Power*, 3:45 p.m.

Tiger Woods is an anomaly in the sports world: a mixed-race man with a dark skin tone who has become a superstar in the historically upper-class, white-dominant sport of golf. A comparison of two prominent media moments—Woods' first appearance on "The Oprah Winfrey Show" in 1997 at the beginning of his fame and his portrayal in Vanity Fair in 2010 following his sex scandal—illustrates how sports media perpetuates the illusion of society's past racial discrimination while reproducing the white racial frame, hegemonic notions of whiteness and blackness. When media portrayals of Woods, post-scandal, are juxtaposed with those of other prominent men, it is evident that Woods avoids the white racial frame to a larger extent than other black men. The selective presence and erasure of whiteness and blackness around Woods point out the role of sports media in maintaining white dominance. Faculty Sponsor: Susanne Beechey

DOMINIC LIPPI, *The Race Narrative in Basketball: Exposed by the 2014 NBA Draft*, 4 p.m.

My presentation uses the 2014 NBA draft and combine along with player interviews to expose a racialized narrative within basketball. This presumptive dialogue occurs before the players have even competed in an NBA game. Thus, the event serves as the operative factor in the discourse that determines whether or not these athletes move forward. I examine how white players are assumed to be hard-working players of high character, while black players are assumed to be raw talents and elite athletes. This racialized narrative reaffirms implicative cultural conclusions drawn by scholars within rhetoric's arena of race and sports with regard to identity construction, racial stereotyping and societal constructs. Evidence of the lasting effects of this racialized narrative is shown by revealing statistics of each race's chances of receiving a job within the NBA organization after their playing careers are over. Faculty Sponsor: Heather Hayes

NATHAN FISHER, *Female and Minority Superheroes: The Untapped Market*, 4:15 p.m.

Big-budget superhero movies are among the highest grossing films in the industry. Hollywood studios are creatures of habit, and if projects with similar themes and casts keep making hundreds of millions of dollars, why stray from the formula? Ironman, Superman, Thor and Captain America are all members of a seemingly endless superhero white boys' club that have found success at the box office. Yet, in the past few years Hollywood has seen a surge of financially successful films with strong female and minority leads. Despite resistance in the industry, the time seems ideal to tap deeper into this new revenue stream. Faculty Sponsor: Tarik Elseewi

ANDREA HORWEGE, JYOTICA BARRIO, *Racial Discrimination Advocacy: Targets' Views of Their Advocates*, 4:30 p.m.

Due to the costs of claiming discrimination for oneself, other individuals may intervene and make these claims on behalf of a target of discrimination. In so doing, these advocates can either provide enough tools for the target or attempt to solve the problem on their own. However, the target's perception of these different forms of help may depend on whether the advocate and the target share the same group status. Racial minority students participated in an experiment in which the type of help provided and the racial group status of the advocate were manipulated. We hypothesize that these factors will affect the target's ratings of the likability, trustworthiness, effectiveness of their advocate and attitude about the type of help received. Our research may contribute to a better understanding of advocacy and allow individuals to become more effective advocates. Faculty Sponsor: Brooke Vick

GENES: EXPRESSION AND THERAPY

SCIENCE 159

Philip Cheng, moderator
Zac Parker, coach

HEATHER JOHNS, *Examining Cooperation Between Two Cellular Pathways That Control Errors in Gene Expression*, 3:45 p.m.

In human cells, the genetic information carried in DNA is expressed in an RNA intermediate and is eventually made into a protein. Such proteins drive many biological processes and are essential to the cell. However, the transition from DNA to RNA to proteins is highly complex and error-prone and may yield non-functional RNA and protein products that may cause damage to a cell. RNAs and proteins such as these are present in a number of neurodegenerative diseases such as Alzheimer's disease. To combat these errors, the cell has two quality control pathways that work independently of each other to find the errors in either RNA or protein and degrade the product before they can cause damage. I explored the possibility that these two pathways act together and cooperate with each other. Faculty Sponsor: Daniel Vernon

NINA KOSTUR, *Effects of Protein Kinase A on the Actin Cytoskeleton in an Inner Ear Model System*, 4 p.m.

Hair cells in the auditory and vestibular systems possess specialized, actin-rich microvilli, called stereocilia, that are required for hearing and balance. Protein kinase A (PKA) is a ubiquitous signaling enzyme that is activated in response to increased intracellular cyclic-AMP (cAMP) and has been shown to regulate actin dynamics during cell migration as PKA controls the polymerization of actin. Since stereocilia are polarized in hair cells, we used a polarized epithelial cell line that is well studied as a model for stereocilia development which relies on actin bundling as to test the effects of PKA activation on microvilli elongation. We activated or inhibited PKA activity and measured microvilli length using confocal microscopy. Our results suggest that stimulation of PKA signaling increases microvilli length, which may have important implications for stereocilia development in the inner ear. Faculty Sponsor: Ginger Withers

SARAH KRAWCZAK, *Gene Therapy as a Cure for Color Blindness*, 4:15 p.m.

Color blindness is a genetic disease which currently has no cure in humans. Color vision is determined by three types of cone photoreceptor cells in the eye, each of which contains a specific visual pigment that detects corresponding wavelengths of light. When one or more types of cones are absent or have limited spectral sensitivity, color blindness occurs. However, Jay Neitz at the University of Washington has pioneered a gene therapy technique to replace missing photopigments in

the eyes of colorblind squirrel monkeys. Viral vectors were used to insert genes encoding for the missing photopigments, and two squirrel monkeys were successfully cured of red-green color blindness. In order to move this technique closer to human trials, the viral vector is being tested in rhesus macaque monkeys, a species of monkey with an eye structure similar to that of humans. My presentation explores this second project and its current results. Faculty Sponsor: Ginger Withers

PHILIP CHENG, *Uncovering the Evolution of Duplicate Genes*, 4:30 p.m.

Gene duplication provides raw material for evolution, freeing duplicate genes to change functions. One example involves three separate evolutionary gains of petal anthocyanin pigmentation among the Chilean monkeyflower species *Mimulus luteus* var. *variegatus*, *M. cupreus* and *M. naiandinus*. Duplicated Myb regulatory genes are the suspected cause of at least two of the three gains in pigmentation. My study focuses on the anthocyanin gains in *M. l. variegatus* and compares Myb gene expression between *M. l. variegatus* and *M. l. luteus*. Between these two floral varieties, anthocyanin pigmentation is correlated with Myb 5 gene expression levels, while duplicated gene Myb 4 may

have become nonfunctional. Within the larger context of evolution, these findings support a growing body of evidence that changes in gene expression can be a major driver in evolution. This provides an alternative to the classical evolutionary paradigm, which holds that changes to amino acid sequences largely drive evolution. Faculty Sponsor: Arielle Cooley

COLLABORATIVE RESEARCH: A SCIENCE STUDY

SCIENCE 100, BRATTAIN AUDITORIUM

Arika Wieneke, moderator

Kyle Hendrix, coach

MEAGHAN CLARK, AUDREY DENMAN, SOOBIN DOKKO, MARA HEILIG, JESSICA PALACIOS, LINDSEY SCOTT, GROOVER SNELL, BRENDA ZARAZUA, ARIKA WIENEKE, *How Do Animals Control Development of Their Sex Organs?*

A Collaborative, Undergraduate-led Class Research Project, 3:45 p.m.

There is still much to be discovered about even the most well-studied organisms. Gonad development, a process seen in organisms as simple as *Caenorhabditis elegans* and as complex as humans, is essential for reproduction. The development of specialized sex organs is an intricate



series of events controlled by an interplay of different signaling pathways and genes. We discovered a number of genes—*wee-13*, *plk-1*, *bub-1*, *cdk-1*, and *cdtl-1*—that were not previously known to be involved in gonad development. What do they do, and what is their role in gonad development? What pathways are these genes involved in? Understanding the role these genes play in *C. elegans* development will further our understanding of human development and shed light on the causes of a range of congenital developmental defects. This multi-student presentation will cover the research methods, findings and future steps. Faculty Sponsor: Matthew Crook

CHILDREN AND LEARNING
SCIENCE 151
Gabrielle Brosas, moderator
Noah Stern, coach

KELLY CHADWICK, ELLEN CHAMBRON, *The Influence of a Partner on Infants' Movements to Music*, 3:45 p.m.

It is well known that humans can synchronize their movements to a musical beat, but it is unclear if this ability evolved as part of their complex vocal abilities or for more social reasons. Some studies have shown that preschool-aged children synchronize their movements to an auditory rhythm more accurately if they are with another person moving to the same music. There is no evidence that younger children can synchronize their movements to music; however, no studies have yet examined this ability in a social context. We observed children 12-30 months old moving to music by themselves and with an adult moving either to the same or different music. We predict that the children synchronize their movements to the beat better when they are with another person moving to the same music than when they are dancing alone or with another person moving to different music. Faculty Sponsor: Emily Bushnell

SERENA SANDERS, AISLYN BOOTH, *Plan Formation and Spatial Understanding in Young Walkers*, 4 p.m.

One reason young children switch from crawling to walking is to move with their hands free in order to carry things. As young walkers gain experience and skill, they are likely to want to carry more (and bigger) items, sometimes through doorways or into tight spaces. This often demands planning a locomotion strategy involving an item that extends past the child's body height or width. Our presentation examines how young walkers make decisions, maneuver and strategically carry items through inconveniently shaped passageways. Participants (18- to 42-month-old toddlers) carried long tubes through doorways shorter or narrower than the tubes, and their errors and adjustments were used to create a model

reflecting the development of children's planning for locomoting while carrying objects. Our results contribute to growing literature focusing on "embodied cognition": the way in which mental decisions, planning and problem-solving are involved in seemingly simple motor activities. Faculty Sponsor: Emily Bushnell

HANNAH FRANKEL, FABIOLA OCHOA, *Young Children's Memory for Spoken Versus Gestural Words*, 4:15 p.m.

Between the ages of 3 and 5, children's vocabularies expand rapidly. Although research suggests a shift in preference from gestural to spoken language at about 18 months of age, data about children fluent in both spoken English and American Sign Language show that this may be merely an effect of practice. We examined children's performance when speech and gesture were equally encouraged. Children ages 3 to 5 were taught a selection of novel words; for each word, an experimenter showed the child a novel object and provided both a verbal name and a gesture. Children were tested on recognition and recall for spoken as well as signed names to determine if one form was learned and remembered better than the other. Results will illuminate children's patterns of learning and may provide insight into how to help children learn new words and alternate ways of communicating. Faculty Sponsor: Emily Bushnell

CLAIRE BOYER, TARA MAH, *Breaking the Cycle of Abuse: Themes of Post-traumatic Growth in Survivors of Childhood Abuse*, 4:30 p.m.

Research indicates that abuse within family systems is cyclical. In the field of psychology, much of the literature has focused on what perpetuates this cycle (maladaptive parenting practices, insecure attachment and dissociation) rather than on what can break it. Our presentation explores the experience of positive change that can occur as a result of the struggle with adversity, otherwise known as post-traumatic growth. Through extensive, semi-structured interviews with Walla Walla community members, we investigate the relationship between post-traumatic growth and abuse potential in survivors of childhood abuse. We assess themes of post-traumatic growth as well as attitudes towards parenting, attachment styles and dissociative symptoms. Our findings have implications for how to best support, treat and foster healthy interpersonal relationships in individuals with a history of childhood abuse. Faculty Sponsor: Thomas Armstrong

GABRIELLE BROSAS, *Kindergarten Readiness and the 'Achievement Gap' in the Walla Walla Valley*, 4:45 p.m.

Research on the "achievement gap" tells us that Latino children are academically out-performed by their white peers. When does this gap begin? Through research of kindergarten readiness in the Walla Walla Valley, my

presentation presents a picture of the early learning experiences of children—as they enter a formal school system—that impact an eventual “achievement gap.” Kindergarten readiness includes measures of social, emotional, physical and academic readiness. My presentation seeks to unpack how measures of, and research on, readiness gaps and academic achievement are constructed. Through a critical race theory approach, my presentation offers personal accounts that challenge dominant narratives about children’s experiences in schools. Faculty Sponsor: Michelle Janning

MUSIC STUDIO
KIMBALL THEATRE
Clayton Collins, moderator
Duy Tran, coach

MAYA ABRAMSON, *The Cross-Cultural Music of Alan Hovhaness,* 3:45 p.m.

Alan Hovhaness is widely overlooked as an important figure in 20th century music. A detailed theoretical analysis of Hovhaness’s Armenian-influenced compositions shows how he created musical connections between Eastern and Western styles. Through an examination of his pitch collections, harmonic approach and unique compositional techniques such as drone and senza misura (unmetered rhythm), we can better understand the ways in which Hovhaness imitated Middle-Eastern folk instruments and styles while composing with Western forms such as the symphony, rhapsody and concerto. My theoretical analysis of transcultural compositional techniques will help elucidate the ways in which Middle-Eastern sounds have been incorporated into 20th-century American music. Faculty Sponsor: Rachel Chacko

KAMNA SHASTRI, *Expressions of Devotion: Exploring the Essence of Karnatik Music,* 4 p.m.

Karnatik music, the classical music style of southern India, is admired for its depth and complexity, yet it is also criticized as an elite practice. An increasingly competitive performance culture has given rise to the preference of technicality and musical prowess over emotional and devotional appeal, which have been present throughout the history of the music. As a Karnatik vocalist, I am compelled to ask: What is the essence of Karnatik music? In my exploration, I challenge the idea of Karnatik music as an elite art form with an emphasis on technical prowess. I posit that Karnatik music is constantly expanding to a larger audience with each era through composition, content and language. At its core, it is a music intertwined with devotion, whether that be to a higher power, a child, one’s nation or music itself.

My presentation is complemented with demonstrations. Faculty Sponsor: Rachel Chacko

RYAN JACOBSEN, *Fantasy on a Waltz by Brahms,* 4:15 p.m.

Fantasy on a Waltz by Brahms was written in the fall of 2014 and is scored for string trio (two violins and cello). The compositional material comes from Brahms’ Waltz, Op. 39, No. 3 in G-sharp minor for solo piano. Split into brief episodes of contrasting material, this fantasy explores and develops motives and ideas presented in Brahms’ work through techniques such as augmentation, antiphony, rhythmic variation and sequence. The piece features the wide textural range of violin and cello while expanding the intricate harmonies found in the original waltz. When writing imitative music, it is important to establish a stylistic balance. One composer might easily present an overly repetitive reiteration of the original work; another might create a seemingly unrelated composition by taking too many liberties. In my presentation, I discuss this balance along with some of the techniques I used to reveal and vary the material. Faculty Sponsor: John Earnest

WILLIAM HUNT, *'Twisted Toccata,'* 4:30 p.m.

I composed “Twisted Toccata” during the spring and fall semesters of 2014. The piece is scored for alto sax, cello and piano. Based on some of the formal and technical ideas of Renaissance and Baroque keyboard works, the work is divided into three main sections, evoking, respectively, a toccata, a fugue and a fantasia. I have tried to maintain the spirit of the 17th-18th century toccata and fantasia, forms built on episodes of virtuosic instrumental display. The fugue, at the center of the work, is contrapuntally complex. Each of the three sections is separated by a short, quick refrain. The instrumentation of the piece maximizes the possibilities for unusual colors and textures. Faculty Sponsor: John Earnest

CLAYTON COLLINS, *"Reproductive Services,"* 4:45 p.m.

“Reproductive Services,” composed over the fall semester of 2014, is a solo piano theme and variations. A theme using a whole tone scale is introduced and followed by variations that draw upon the theme for their source material. The theme itself is built around melodic shapes and patterns of odd numbers, both rhythmic and melodic. Largely minimalist, this work makes economic use of material, slowly modifying motives and themes in the construction of variations. Rather than using the “repetition with variation” idiom heard in most Western music, minimalist music preserves the basic structure of an idea, and introduces changes slowly in order to make them more perceptible to the listener. The title is an ode to the former name of the printing and copying office, located in the basement of the Music Building, where most of the piece was written. Faculty Sponsor: John Earnest

GENDER AND IDENTITY

REID GOZ

Haley Friel, moderator

Jessica Van Horne, coach

ARTHUR SHEMITZ, *Of Neckbeards and Men: A Gendered Slur in the Men's Rights Movement*, 3:45 p.m.

The Internet slang “neckbeard,” recently recognized by the Oxford English Dictionary, is a term typically used to disparage men for being physically unattractive and overly fixated on video games and the Internet. Noting its frequent use by feminists to dismiss the voices of antagonistic men’s rights advocates, I analyze a December 2013 comment thread on the men’s rights sub-community of the social networking forum Reddit in which men’s rights activists discuss the term. I argue that “neckbeard” is a problematic slur used to disparage a form of perceptually neutered masculinity that serves to perpetuate the hegemony of a monolithic masculinity. From this perspective, I suggest that “neckbeard” serves as a microcosm for the communication gap between feminists and the men’s rights movement, with men’s rights advocates rightly observing many of the problematic aspects of the term yet failing to understand the interactions of power and privilege that dictate its use. Faculty Sponsor: Melissa Wilcox

JESSE MONEYHUN, *Queering Conversion: The Impossibility of 'Ex-Gay,'* 4 p.m.

In a video circulated widely on social media, a garishly dressed young black man is shown in a Pentecostal service. He declares before a large audience a now-infamous testament: “I’m not gay no more; I am delivered!” The video was met by intense skepticism and humorous interpretation, which led to its viral circulation. Why wasn’t this event seen as genuine? In my presentation, I argue that the inefficacy of this act arises from a clash of narratives and institutional practices, which creates a double-consciousness in the young man’s performance—the trait advanced by the ex-gay community as a characteristic of homosexuality. This undermines the very purpose of his declaration. My analysis draws from a combination of queer theory and rhetorical analysis, drawing on the work of Eve Sedgwick, Judith Butler and Michel Foucault. My analysis further demonstrates the significance of queer theory across disciplines. Faculty Sponsor: Andrew Culp

EVAN GRIFFIS, *Artificial Sexuality in the 21st Century: Beyond Corporeality in Sexual Subjectivity*, 4:15 p.m.

Modern technological advancements are changing the ways that people form erotic and intimate relations with others. These changes have the potential to reframe notions of the body, sexuality, pleasure, desire and subjectivity. The 2013 film “Her,” directed by Spike Jonze, provides myriad examples of the ways in which relationships between

humans and their operating systems comprise new forms of artificially intelligent sexual subjectivity. Through an analysis of the film, I argue that contemporary sexuality is no longer bound to strict corporeality. Instead, subjects express and experience sexuality through ties of emotional intimacy by means of certain technological advancements. These projected forms of non-corporeal sexual subjectivity may alter the ways that we organize subjects through sexuality and gender identities and instead offer technology-infused social relations that aim to multiply and maximize pleasure and desire through disembodied emotional networks. Faculty Sponsors: Suzanne Morrissey and David Hutson

CAITLIN ROONEY, *Advocating for Gay Rights Abroad: Lessons Learned from U.S. Advocacy Against Russia's Anti-Gay Propaganda Law*, 4:30 p.m.

Prior to the 2014 Olympics in Russia, U.S. media, corporations and politicians condemned a 2013 Russian law banning “gay propaganda” to children. Today the law remains in Russia. While much research has been done on effective techniques for advocating for gay marriage domestically, less has been devoted to effective transnational gay rights advocacy. Since Russians are the ones able to affect domestic policy change, I examined Russia’s reception to U.S. advocacy through media, interviews and public opinion polls. I argue that, partly because Russians believe homosexuality is a choice, they both disagreed with American ideas of gay equality and gay rights and they interpreted U.S. discourse as anti-Russian propaganda and Western imperialism rather than as principled international rights advocacy. This case teaches (Western) international advocates to recognize cultural differences and the differing interpretations by disparate audiences so that they can craft their discourse to effectively advance rights worldwide. Faculty Sponsor: Matthew deTar

HALEY FRIEL, *Characters of Colorful Communities : An Exploration of the Modern GLBTQ Community*, 4:45 p.m.

The experience of individuals with same-sex attraction in American society has changed drastically in the past decade. The current social climate of increased acceptance and normalization of GLBTQ identities calls into question the role of GLBTQ communities within greater society and their role in individuals’ experiences of sexual identity. My presentation examines the relationship that GLBTQ-identifying individuals have to the GLBTQ community as their sexuality continues to be normalized and possibly even de-emphasized. As a community that accepts and champions diversity, Whitman College provides an ideal space to explore GLBTQ students’ experiences of community and relationship to GLBTQ organizations on campus. Faculty Sponsor: Keith Farrington

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Jessie Austin SIT/Nepal	Janni Conrad Perry Summer Research Award	Andrew Wildman Perry Summer Research Award
Brooke Bessen SIT/Chile	Nina Kostur NIH/NIDCD	Thomas Kubail Kalousdian Perry Summer Research Award
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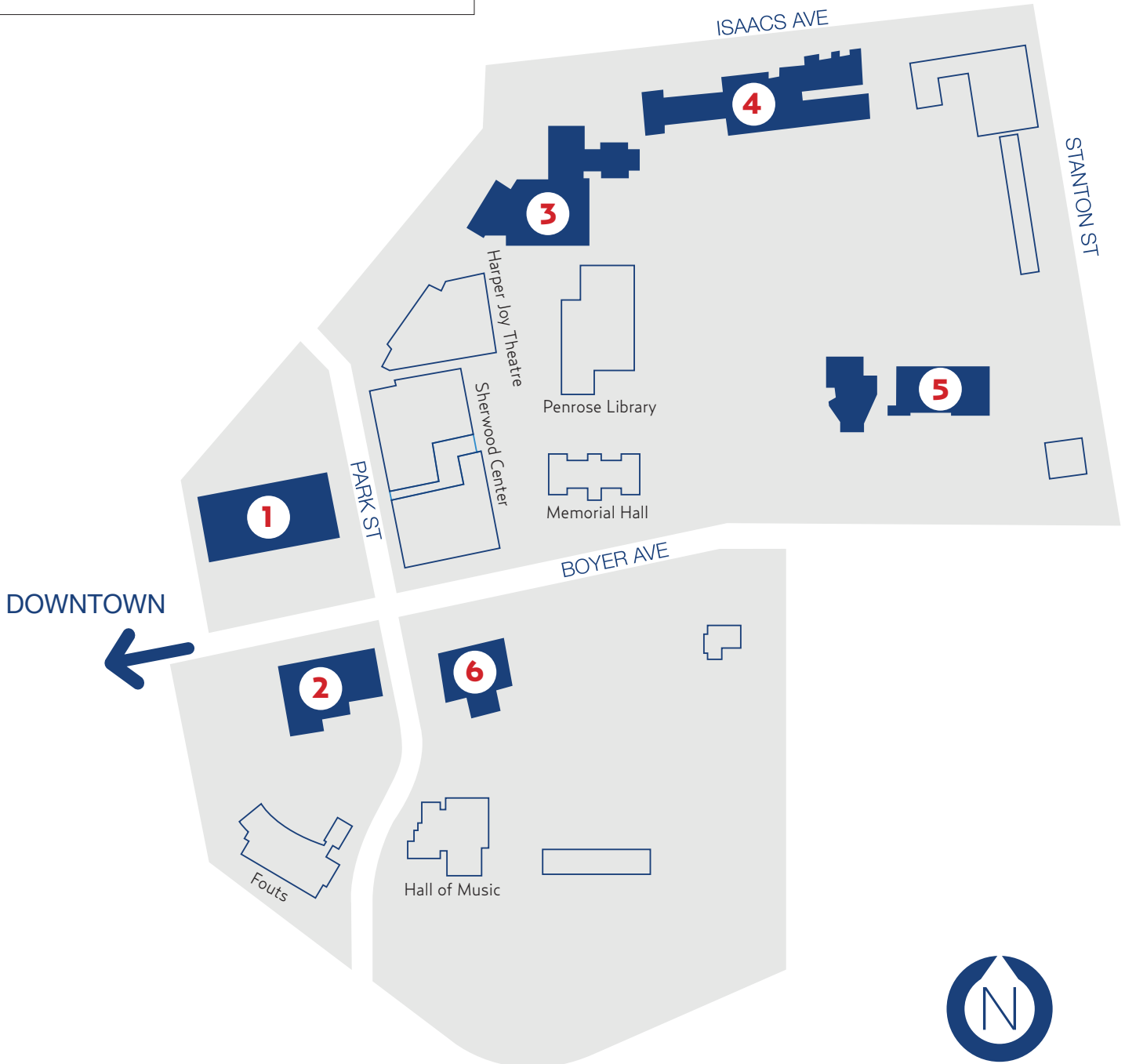
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