



Humanities
and Arts

Natural Sciences
and Mathematics

Social Sciences

**WHITMAN
COLLEGE
UNDERGRADUATE
CONFERENCE
WUC 2016**

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 18th Annual Whitman Undergraduate Conference brings together students from every academic area of the college to share their research and creative projects with the campus community. The conference is noteworthy for its variety of presentations, which take the form of talks, poster presentations, musical performances and special exhibitions.

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



WHITMAN COLLEGE



**UNDERGRADUATE
CONFERENCE
APRIL 12, 2016**

MUSICAL PERFORMANCES

MORNING INTERMISSION

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

WUC chamber ensembles

Ensemble I

Mozart: String Quintet No 2 in C minor, K406/K516b (Allegro)

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

Ensemble II

Arnold Bax: Quintet for Oboe and Strings (Allegro giocoso-Piu lento-Vivace)

Rose Baunach, oboe, Anna Burgess,
violin, Lila Stange, violin, Jacqueline Rees-
Mikula, viola, Soobin Dokko, cello

NOON INTERMISSION

noon–1 p.m.
Reid Coffeehouse

Jazz Ensemble I

DOUG SCARBOROUGH, DIRECTOR,
SAXES Anya Tudisco, alto, Hillary Smith,
alto, James Leroux, tenor, Taka Olds, tenor,
Lucas Barry, baritone, TRUMPETS Jeffrey
Gustaveson, Daniel Lovato, James Bogley,
Gary Gemberling,* TROMBONES Joey
Schaffer, Cello Lockwood, Alex Ihle, Aiyana
Mehta, bass, PIANO Kyle Donald, GUITAR
Jake Barokas, BASS Caitlin Foster, Isaac
Berez, DRUMS Skye Vander Laan, Steven
Aslin, VOCALS Brenna Feeney

AFTERNOON INTERMISSION

3:15–3:45 p.m.
Reid Coffeehouse

Jazz Ensemble II

GARY GERMBERLING, DIRECTOR,
Nate Miller, trumpet, Griffin Cronk,
alto sax, Ted Liu, alto sax, Samuel Curtis,
baritone sax, rhythm section TBA

* Whitman faculty



SCHEDULE

Tuesday, April 12, 2016

8:15 a.m.

BREAKFAST

Reid Campus Center

9–10:15 a.m.

SESSION 1

10:15–10:45 a.m.

MORNING INTERMISSION

Hall of Science Atrium

10:45 a.m.–Noon

SESSION 2

Noon–1 p.m.

LUNCH, ALL-CAMPUS

Reid Campus Center

1–2 p.m.

POSTER SESSION

Cordiner Hall Foyer

2–3:15 p.m.

SESSION 3

3:15–3:45 p.m.

AFTERNOON INTERMISSION

Reid Campus Center

3:45–5 p.m.

SESSION 4

PANEL SCHEDULE

	OLIN 130	OLIN 157	SCIENCE 159	SCIENCE 100 BRATTAIN AUDITORIUM	KIMBALL THEATRE	REID G02
SESSION 1	Race and Trauma	Developmental Psychology	Physical Science	Cells and Sickness	Japan: Tradition and Modernity	Environmental Impacts
9:00 AM	Renee Van Bergijk, Marlene Anderson, John Reed, Sarah Robinson, Chris Calamita*	Kate Robinson, Eva Davis, Sara Teplow	John Brooksbank	Sarah Krawczak	Hannah Horner	Madeline Duppenthaler
9:15 AM		Amy Ishida, Catherine Bayer	Nick Wechter	Julia Hart	Matthew Hirano	Margo Heffron
9:30 AM		Lachlan Johnson, Flora Sheppard, Rose Gottlieb	Matt Gabel	Anna Cichocki	Joel Ponce	Cameron Hancock
9:45 AM		Marlena Sloss, Luke Hampton, Nicole Hodgkinson*	Greg Holdman*	Samuel Curtis	Marcus Helm	Emily Williams*
10:00 AM				Mackinzie Stanley*	Yasuha Miura*	
Coaches	Chris Cahoon	Authur Shemitz	Emma Thompson	Emma Newmark	Danica Wilbanks	Katie Steen
SESSION 2	Women's Voices	Body and Mind	Geology and Climate	Animal Kingdom	Our Town, Our Times	Rhetoric Studies: Interventions
10:45 AM	Katy Wills	Audrey Inglis	Jon Miranda	Troy Warwick	Josie Furbershaw, Isaac Berez, Riley Worthington	Andrew Durand
11:00 AM	Meghan Ash	Alex Ayal, Joey Schaffer	Henry Lanman	Joe Abbott	Casey Schafer	Samantha Grainger Shuba
11:15 AM	Emma Newmark	Benjamin Woletz, Taylor Cook, Gabriella Luther	Bea Sheffer	Mateo Seger	Chris Hankin	Rachel Brock
11:30 AM	Katie Steen*	Sarah Blacher, Zach Calo	Nevin Schaeffer*	Eric Hsu	Carolyn Erving	Allie Donahue
11:45 AM		Emily Reynolds, Maeve Sloan*		Megan O'Brien*	Jenna Dobrin*	Meredith Ruff*
Coaches	Marlene Anderson	Austin Biehl	Kyla Rapp	Andrew Durand	Molly Evered	Joshua Ward
SESSION 3	Race and Prejudice		Plant Life	Secrets of the Deep	Art and Interpretation	Rhetoric Studies: Public Culture
2:00 PM	Chloe Serkissian		Bryan Semonsen	Will Erickson, Ruth Thirkill	Sarah Cornett	Ben Caldwell
2:15 PM	Andrea Berg		Arty Kraistudomsook	Nina Finley	Kyra Arnett	Jessica Kostelnik
2:30 PM	Austin Biehl, Brian Glickman		Ben Sheppard	John DeBuysser	Abby Seethoff	Evan Romasco-Kelly
2:45 PM	Arthur Shemitz*		Sam DeFreese	Maegan Nelson*	Jenna Stanley	Liz Chenok
3:00 PM			Heather Gaya*		Jeremy Nolan*	Leda Zakarison*
Coaches	Felipe Rivera		Gordon Kochman	Cassandra Otero	Ye He	Shane Randle
SESSION 4	Politics of Power		Health, Education and Ecology	Politics of Church and State	Composer's Studio	Gender Inequities
3:45 PM	Emma Altman		Lily Monsey	Gordon Kochman	Thomas Meinzen	Emma Neslund
4:00 PM	Annie Boyenneh		Paal Nilssen	Chris Meabe	Calvin Brigham	Linnea Valdivia
4:15 PM	Jack Percival*		Cat Mulanax	Emma Thompson	Cody Burchfield	Emily Grossman*
4:30 PM			Alexander Hulse	Thomas Breeze, Caroline Burnett, Grace Fritzke*	Logan Schmidt*	
4:45 PM			Erin Walters*			
Coaches	Elise Frank		Sunny Ysa	Marlene Anderson	Gordon Kochman	Authur Shemitz

POSTER SESSION

1-2p.m., Cordiner Hall

EMMA ALTMAN, PETER FRENCH, *Growth, Expression, and Characterization of Two Putative Hydroquinone Dioxygenases, MhqO and MnpC*

PcpA is an enzyme involved in the degradation of the pollutant pentachlorophenol. It is a hydroquinone ring-cleaving dioxygenase (HQDO), and it oxidatively cleaves 2,6-dichlorohydroquinone. In order to better characterize and understand the specificity of PcpA, homologs of PcpA were studied. The homologs, selected based on sequence similarity, were procured and cloned into appropriate vectors, if necessary. Of the homologs grown and expressed, MnpC and MhqO currently have the most promise in demonstrating activity with hydroquinones. Recent experiments show 2-hydroxyhydroquinone as a possible substrate for MnpC, and 2-methylhydroquinone as a possible substrate for MhqO. Kinetic studies of these enzymes will help to elucidate more information about their binding affinities for their respective substrates. This information, coupled with ongoing and completed research, may help to further clarify the specificity of HQDOs; in the future, this information may be relevant to environmental remediation of chlorinated aromatic hydrocarbons. Faculty Sponsor: Tim Machonkin

JASON ANTHONY, *Trace Metal Substitution in and Release from Jarosite*

Historical mines are often unregulated and release acidic, metal-rich water known as acid mine drainage (AMD). A common AMD remediation method is neutralization of pH. This causes precipitation of iron oxide minerals and dissolved metals from solution. The stability of trace metal substituted (TMS) iron oxides is not well known. This study investigates the mobility of trace metals, specifically cobalt, as they are substituted into the mineral structure of jarosite, an iron oxide mineral. We describe leach experiments with synthesized pure and Co-substituted jarosite, as well as the character of water and precipitate samples from Blackbird Creek, a mining affected, remediated stream in the Idaho Cobalt Belt. The goal is to understand how Co-substitution affects the stability of jarosite and the feasibility of using synthesized Co-substituted jarosite to model natural Fe-rich precipitates in mining-affected stream sediments. Faculty Sponsor: Bryn Kimball

JESSIE AUSTIN, *Specificity in Pollen Consumption of Oligolectic Solitary Bees in Öland, Sweden*

Adult solitary bees consume pollen and nectar for their sustenance and females also collect both to feed their young. Oligolectic solitary bees are specialists in terms of what flowers they visit to collect pollen; however, their degree of specialization in the pollen they consume has

not been clearly documented. My goal was to determine the species composition of pollen in the digestive tract of four oligolectic bee species in Öland, Sweden. Bees were dissected to obtain a sample of pollen from their gut, and the pollen was identified under the microscope. Dissection of over 20 bees for each species revealed that the composition of gut pollen was over 97% from the bee's host plants. These findings indicate that the bees display uniform specificity towards pollen (consumption, collection) and that the term "oligolecty" should be expanded to include not only pollen collection for nest provisioning but also pollen consumption by adults. Faculty Sponsor: Heidi Dobson

KATHRYN BEEBE, *Sexual Dimorphism in Dopaminergic VTA Neurons and Their Presynaptic Partners*

A brain region called the ventral tegmental area (VTA) is a group of predominantly dopamine-producing (DA) neurons involved in reward circuitry and addiction and is implicated in diseases such as Parkinson's and schizophrenia. Current studies suggest differences in inputs (from the dorsal raphe nucleus) onto DA neurons in the VTA between male and female adult mice. It is not yet clear whether these differences are due to differences between sexes in the number of DA neurons in the VTA or in the effectiveness of viral injection techniques. To answer this question, we replicated methods of viral-labeling of inputs to the VTA (using modified AAV virus and mCherry rabies virus) and methods of immunohistochemistry (mCherry, GFP, and TH staining). Preliminary results suggest that male and female mice show equal numbers of DA neurons across the VTA and that the viral injection worked as expected and equally in both sexes of mice. Faculty Sponsor: Thomas Knight

BROOKE BESSEN, *Combined-Eye-and-Head Gaze (CEHG) Shift Testing for Detection of Mild Traumatic Brain Injury (mTBI)*

Mild traumatic brain injury (mTBI, or concussion), can result in cognitive, physical, and behavioral symptoms that substantially affect one's quality of life. mTBI is highly prevalent in the US, with many cases occurring through high-impact sport. However, an estimated 70 to 90% of concussions go undiagnosed. Considering the possible long-term effects caused by repetitive concussion, it is crucial that we find a dependable and accessible diagnostic tool for mTBI. Our primary objective was to determine if combined-eye-and-head gaze (CEHG) shift testing could detect mTBI in student athletes subjected to mild head injury. We used an eye tracker to measure CEHG shifts in varsity soccer players during three different visual tracking paradigms. Qualitative intrasubject comparisons in student



athletes have indicated deficits in CEHG shifts following concussion. Quantitative analyses of gaze shift metrics (e.g., velocity) may demonstrate differences related to mTBI, supporting the use of CEHG examination to detect concussion. Faculty Sponsor: Thomas Knight

DAVID BURTT, *The Habitat of Pleistocene Mammoths as Examined Through Strontium Isotopes*
Mammoths migrated from Asia to North America in the Pleistocene, ca. 1.7 Ma. These mammoths spread from the Arctic to Florida; however, there remains a mystery related to the migration patterns and habitats of these mammoths. Within Washington State, two species of mammoth, *Mammuthus columbi* and *Mammuthus imperator*, competed with mountainous terrain and expansive ice sheets extending as far south as Seattle. This study investigates the migration patterns by analyzing isotope ratios of C, O and Sr preserved within the enamel of eight molars taken from three separate mammoths. A comparison between the Sr ratio of one molar and the literature values for the local bedrock suggests that one of the mammoths originated outside Washington, potentially in Wyoming or Canada. These Sr ratios successfully differentiate the Pacific Northwest mammoths from other mammoths found in Florida and Georgia and more significantly, from the unglaciated bedrock of Washington State. Faculty Sponsor: Kirsten Nicolaysen

JESSY CHERRY, *Effect of Floral Organs in Wild Roses on Flower Visitation by Insects*
Flowers consist of different organs that vary in their attractiveness to insects, which are necessary for pollination. As part of a long-term study, my goals were to determine the effect of petals and anthers on insect attraction and subsequent landings on flowers of two wild rose species, *Rosa canina* and *R. rugosa*. Manipulative behavioral experiments were conducted in the field: insects were offered a choice between intact flowers (control) and experimental flowers, in which either all petals or anthers were removed. The results show that petals are crucial to the attraction of all insects (bumble bees, honey bees, solitary bees and syrphid flies), whereas anthers are important only in modulating landings by bees. To translate these findings to evolutionary selective pressures shaping flower structure in the populations studied, further research is needed to identify which insects are the most effective pollinators and hence contribute to the plant's sexual reproduction. Faculty Sponsor: Heidi Dobson

GABRIEL CRANE, *Inverse Gas Chromatography Characterization of Calcium Carbonate*
Using Inverse Gas Chromatography characterization, we can use retention times of known gases to determine both surface

and bulk properties of the gas chromatography column filler material calcium carbonate (CaCO₃). The main property studied by this method is surface energy, but it can also give information about other properties such as heats of sorption and adsorption isotherms. Carbonates are commonly used in a number of polymer systems as a functional additive; final properties of the polymer compound depend intrinsically on the interfacial tension between the polymer and the calcium carbonate. The IGC technique provides a measure of the mineral's surface energy allowing a direct calculation of the work of adhesion between the mineral and the polymer. Faculty Sponsor: Allison Calhoun

CHRIS DAILEY, *Competition Limits the Annual Growth of Pseudoroegneria spicata (Bluebunch Wheatgrass) in a Semi-arid Environment*
Competition for water plays a significant role in dictating the yearly growth of individual plants in semi-arid grasslands. Using data collected from Spring Gulch in Walla Walla County, WA, we examined the annual growth of bluebunch wheatgrass in areas with high soil water content compared to areas with low soil water content. We hypothesized that competition for water was the limiting factor in determining the annual growth of individual plants. We suppressed the growth of all plants surrounding a target individual and compared it to a control plant with no manipulation, as well as the growth of a plant with limited suppression of competitors. We predicted that, without competitors, plants would exhibit greatest annual growth in areas with higher moisture content. However, our data indicated that, contrary to our prediction, plants in low-moisture areas exhibited more annual growth than plants with no competition in areas with higher soil moisture content. Faculty Sponsor: Tim Parker

EMILY DEACON, *Geochemical Analysis of Stratigraphic Profiles to Reconstruct Unangax Past in the Islands of Four Mountains, Alaska*
Thousands of years ago, ancient Unangax people first inhabited and built villages in the Aleutian Islands, where living conditions were very inhospitable. In the Islands of Four Mountains (IFM) region, the history of Unangax inhabitation was distorted after Russian colonization, which later led to abandonment of the IFM. However, these sites of Unangax habitation are still present within the IFM, and some of that lost history can be reconstructed and rediscovered through archaeology and geology. Geochemical analysis of stratigraphic profiles near these abandoned village sites targeted natural strata, such as volcanic ashes, as well as human-influenced layers. Being able to clearly identify the human-influenced by geochemistry and disturbed stratigraphy allows for extraction of human prehistory in the IFM without excavation of artifacts. Faculty Sponsor: Kirsten Nicolaysen

LENA GOSS, *Microorganisms Found in a Metal-impacted Stream, Blackbird Creek, Idaho*
This study investigates the key role that microorganisms play in the iron cycle. In metal-rich environments, microorganisms interact with iron by catalyzing oxidation, reduction, and precipitation reactions, and forming biogenic minerals. Iron-oxidizing bacteria (FeOB) that live in neutral environments are unique since these bacteria have to compete with the rapid chemical oxidation of reduced iron that occurs at neutral pH. The primary research objective was to see what FeOB can be detected in the neutral, iron-rich environment of Blackbird Creek, which flows from the retired Blackbird Mine in Cobalt, Idaho. The significance of FeOB interactions pertains to environmental cleanup and mine remediation, as the bacteria help to remove the iron from the stream water through biomineralization. The preliminary findings indicate that FeOB were in fact present in Blackbird Creek, along with a large variety of aquatic bacteria. Faculty Sponsor: Bryn Kimball

RACHELLE HANCOCK, *Role of Cdk-2 in LET-23 Mediated Suppression of Cell Death*
Characterizing cell signaling pathways involved in suppressing cell death has important significance in understanding cancer and neurodegenerative diseases. Cell death suppression can be investigated through the use of animal model organisms, such as *Caenorhabditis elegans*. LET-23 is the receptor in the epidermal growth factor (EGF) signaling pathway that is critical for multiple developmental processes. In addition, a novel role for LET-23 in suppression of cell death was recently discovered. How does LET-23 suppress cell death? We found that cdk-2, a cyclin dependant kinase that plays a critical role in the cell cycle, is necessary for the LET-23 mediated suppression of cell death. What is the mechanism of cdk-2 in LET-23 cell death suppression? What proteins does cdk-2 interact with in this process? To answer these questions we will knock down cyclin E, a cdk-2 binding partner, as well as cdk-2 inhibitors and targets using RNAi. Faculty Sponsor: Matthew Crook

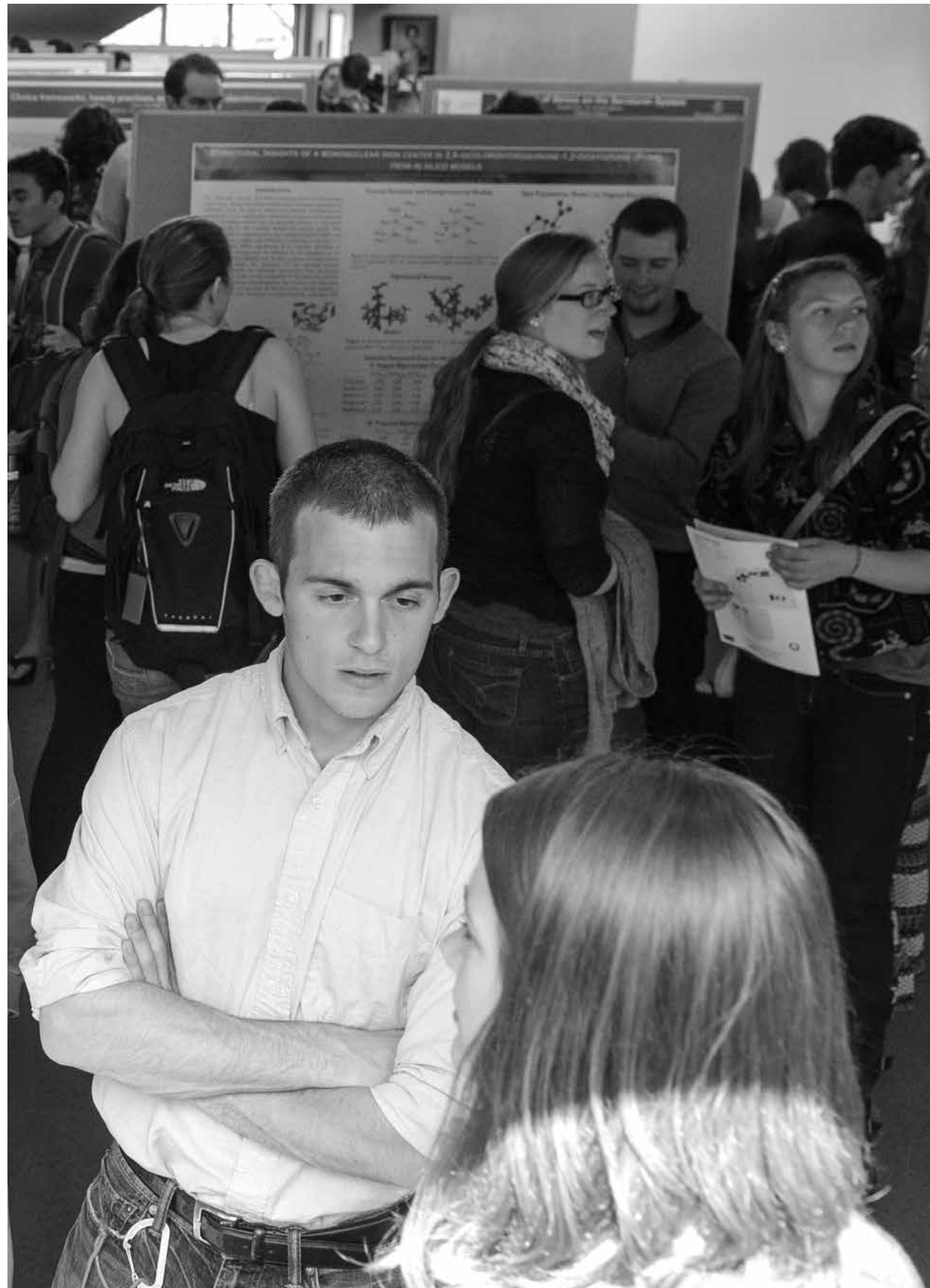
EVAN HEBERLEIN, *Iron Mobilization and Water Quality in the Restricted Herring River Estuary*
For over a century, the Herring River Estuary has been restricted through a dike which severely limits tidal exchange. Water quality has declined since the dike's construction, and work is underway to restore the degraded tidal wetlands by increasing exchange with the Atlantic Ocean. This study analyzed pH and oxidation-reduction (redox) potential measurements from throughout the river system, and investigated the impacts these chemical attributes could have on the mobilization of bioactive heavy metals like Fe²⁺. Several nutrient sources were considered,

including Cape Cod's glacial geology and seasonal fluctuations in nutrient deposition. These findings can be used as a baseline for water quality monitoring once tidal exchange is increased in the estuary. The Herring River study also provides an opportunity to investigate aquatic nutrient dynamics, particularly related to eutrophication and the role of tides in estuarine function. Faculty Sponsors: Paul Yancey and Allison Calhoun

DANI HUPPER, *Project Turbine: Using the Campus as a Learning Laboratory*
Whitman educates future generations of leaders who grow up to educate, debate, research, and join the global exploration for clean energy. But why should we wait until then? After receiving a grant from our energy utility, Pacific Power, Physics and Environmental Studies majors designed Whitman's first ever student-built vertical axis wind turbine. We're investigating the most efficient battery, voltage regulator, and blades to maximize energy from Whitman's slow wind speeds. The turbine was designed with detachable parts, a plexiglass base, and a portable foundation so as to be moved to other locations. Moreover, the project will be integrated into course curricula, ranging from activities that test various blade models with the 3D printer, to writing the turbine's Environmental Impact Statement. Above all, the wind turbine is designed with the intention of being a constantly evolving experiment, for both Whitman's future and current leaders in sustainability. Faculty Sponsor: Kurt Hoffman

KUBA JEFFERS, OLIVIA KINNEY, JAS BASI, *An Imagination Effect in Learning From Self-Referential Scientific Text*
We extended research on the imagination effect, which states that imagining difficult content while learning it improves later recall of the information. All participants learned about the respiratory system, but only some received instructions to imagine the content as they learned it. We hypothesized that (1) those who received instructions to the imagination effect would perform better on a subsequent knowledge test than those who did not; (2) self-referential instructions—those that prompt the participant to imagine something in relation to himself or herself—would magnify the imagination effect; and (3) those with highly vivid imaginations would benefit from imagery instruction more than those with less vivid imaginations. Our research has the potential to optimize student learning from scientific text. Faculty Sponsor: Matthew Prull

KELLY KOPCZYNSKI, *Woody Plant and Grass Species Associations in the Ngorongoro Crater, Tanzania*
The Ngorongoro Crater in Tanzania has recently experienced severe overgrazing by wild and domesticated herbivores, and colonization by non-native plants. The main aim of my study was to identify the introduced



woody plants and determine which native grass species they are associated with. A secondary aim was to find links between these plant associations and changes in populations of grazing mammals. Using transects within the crater, I measured the size of each woody plant patch and the distance from its center to the nearest grass species. I found that the most dominant grass species, *Cynodon dactylon*, often grew within patches of woody plants, while other grass species, such as *Pennisetum sphacelatum*, grew almost exclusively on the edge of patches. This suggests that certain grass species grow better when they are in close proximity to introduced woody species, which might also be disrupting the grazing habits of some native mammals. Faculty Sponsor: Heidi Dobson

JACK HENRY KOTNIK, *Documenting the Neuropathology of a Genetic Disorder: Fragile X-Associated Tremor/Ataxia Syndrome*
Fragile X-associated Tremor/Ataxia Syndrome (fxtas) is a late-onset neurodegenerative disorder associated with loss of motor coordination, cognitive decline, susceptibility to depression, and earlier age of death (as well as a myriad of other symptoms more loosely associated with the disorder). It is linked to a trinucleotide CGG repeat expansion on the long arm of the X chromosome, on the fragile X gene (Fmr1). Although we know that a repeat expansion between 55 and 200 trinucleotide causes fxtas, we do not know how the resulting pathology causes the symptoms. This study worked to document the neuropathology of a new transgenic mouse model of the disorder. Faculty Sponsor: Leena Knight

ZIGGY LANMAN, *Role of Floral Scent Compounds in Host-Flower Recognition by the Solitary Bee *Chelostoma florissomne**
Buttercup flowers are the only source of food for the solitary bee *Chelostoma florissomne*. Different scent chemicals in the flowers have been found to elicit attraction (landings) and recognition (feeding responses) by foraging-experienced females. The dominant petal volatile, trans- β -ocimene, attracts the bees, whereas the combination of trans- β -ocimene with two dominant pollen volatiles, protoanemonin and α -farnesene, elicits recognition. To identify which chemicals are used by the bees to recognize their host flower, over 80 bees were tested in a two-way choice behavioral experiment. Bees were offered an experimental scent solution (trans- β -ocimene + protoanemonin) and a control solution (solvent only), and their behavioral responses (landings, feedings) were recorded. Surprisingly, bees showed no discrimination between samples. This suggests that these scent compounds presented together elicit different responses than when they are combined with α -farnesene. Additional experiments are needed to identify how bees use these floral scent chemicals in locating and recognizing host flowers. Faculty Sponsor: Heidi Dobson

JENNA LEA, *Effects of Competition on Bumblebee Foraging Strategy*
Depending on the length of the bee's tongue and the location of the flower's nectary, nectar may be unobtainable through the flower's opening. Certain bumblebee species have adapted a different method to collect nectar, and bypass the flower's opening. These bee species rob nectar through a pierced hole along the flower's nectar spur. In the *Corydalis caseana* plant-pollinator system in the Rocky Mountains, both types of bumblebees exist, aiding and inhibiting the plant's pollination efforts. In my study, various bee densities of *Bombus flavifrons* and *Bombus appositus*, were put on a single *C. caseana* plant to determine if competition affected the foraging strategies of the bees. Faculty Sponsor: Susanne Altermann

PHILLIP LOCKLEAR, *Uncovering Unknown Gonad Development Mechanisms*
Proper gonad development is essential for successful reproduction. Gonad development has been studied but the mechanisms involved are not fully understood. I used *C. elegans* as a model to study how the gonad is formed, by disrupting genes that may be involved. One of those genes is cdk-1, a cyclin-dependent kinase that is essential for cell division, because cdk-1 is required for the initiation of gonad development. How does cdk-1 control the initiation of gonad development? What other proteins does CDK-1 interact with? Cyclin-dependent kinases require cyclins to function and CDK-1 is known to interact with several cyclins. I sought to determine which of these cyclins CDK-1 interacts with to control initiation of gonad development by knocking down each cyclin by RNAi and looking for cdk-1 absence of gonads phenotype. I will also look at cdk-1 inhibitors and targets and shed some light on the control of reproductive development. Faculty Sponsor: Matthew Crook

ASA MEASE, *Maintenance of Mutualism in a Neotropical Fig: *Ficus pertusa* and Its Wasp Symbionts*
The maintenance of mutualism is poorly understood. As each member seeks to maximize its individual fitness, a coevolutionary arms race can alter the dynamics of the symbiotic relationship. Four hypotheses posit the maintenance of fig-fig wasp mutualism in the face of a generational discrepancy between the two organisms: 1. Ovipositor length, 2. Parasitic wasp competition, 3. Optimal foraging, and 4. Unbeatable seeds. I evaluated these hypotheses for the Neotropical fig species, *Ficus pertusa*. Even with the ability to access all ovules, both the pollinator and non-pollinator wasp species inhabit the same long-pedicelled ovule stratum—thus avoiding oviposition in ovules close to the syconium wall that become seeds. In light of this data I reject the parasite-mediated and ovipositor-limited hypotheses of mutualism maintenance. I also found high variation

between individual trees of *F. pertusa* in foundress numbers, distribution, and resource partitioning by the host. Faculty Sponsor: Susanne Altermann

SPENCER MUELLER, *Games and Social Identity in Danish Cafés*
In a study-abroad course titled “Independent Study: Qualitative Research Psychology” at the Danish Institute for Study Abroad, I observed how a variety of games facilitated interaction in Danish cafés and bars. My research is based on the theory of legitimate peripheral participation (Lave and Wenger, 1991) and social identity theory (Tajfel and Turner, 1986). In five separate locations I used grounded theory (Strauss and Corbin, 1998) to elucidate underlying systematic relationships. Through my research, I conclude that the cultures in the cafés, bars, restaurants and game cafés have unique pathways to integrate individuals who do not have intimate knowledge of the community’s explicit and implicit social rules. I also note that games strengthen relationships between self-identified “players” and do not have an effect on “non-players.” My findings provide observational evidence about the role that games play in building a community. Faculty Sponsor: Matthew Prull

KRISTIN NESBIT, *Role of Major Pollen Scent Compound α -farnesene in Host-Flower Recognition by Pollen-Specialist Bee *Chelostoma florissomne**
The pollen-specialist solitary bee *Chelostoma florissomne* collects pollen exclusively from buttercups, and previous research shows that the color yellow and specific floral scent chemicals are necessary for host-flower recognition. My goal was to determine the relative attractiveness of a major pollen volatile α -farnesene. Female bees were offered a choice of two scents under yellow cheesecloth, one with and one without a farnesene solution; both samples had 2-6 non-host flowers for floral background scent (previous experiments used 6 flowers). Host-flower recognition was recorded, based on landings (attraction) and feeding attempts (full recognition). Results suggest that farnesene elicits attraction and feeding attempts in bees, but it is dose-dependent; when 2 flowers were used as background floral scent, farnesene acted as a repellent, but when 6 flowers were used, farnesene became an attractant. This shows the complexity of floral scent in insect-flower interactions, and the challenge of conducting chemical ecological studies. Faculty Sponsor: Heidi Dobson

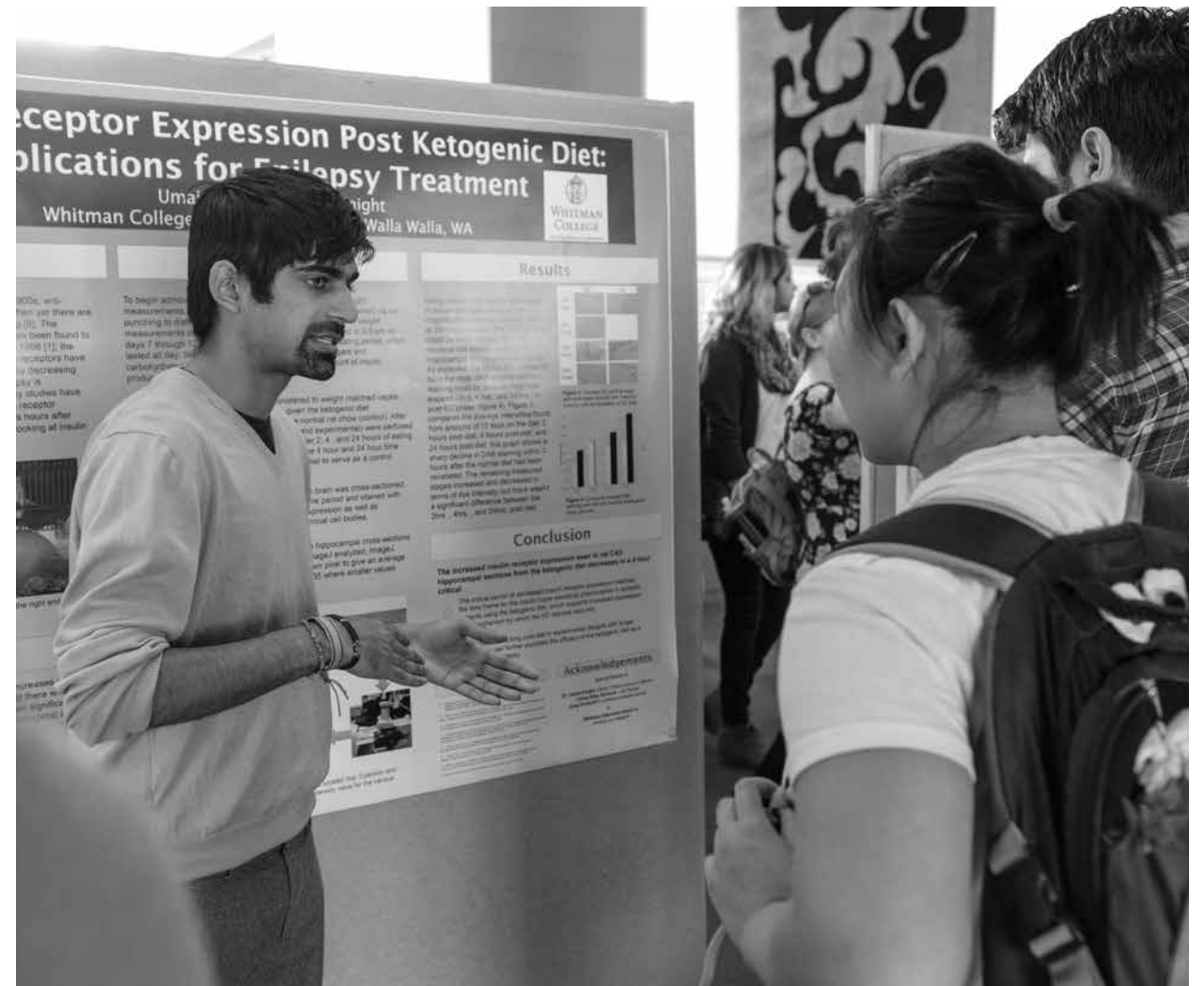
JEREMY NOLAN, *Physiological Response of *Mimulus luteus* and *Mimulus cupreus* to Elevated Levels of CO₂*
Plants confront a variety of environmental stressors on a daily basis, and must develop effective physiological and ecological responses in order to successfully survive and propagate. In order to test the ability of plants to respond to elevated levels of atmospheric carbon dioxide, we

germinated and propagated *Mimulus luteus* and *Mimulus cupreus* (two emerging model plant species) in normal (410ppm) and high (840ppm) CO₂ conditions. We then examined seven distinct physiological and phenotypic traits and performed a principal components analysis (PCA) in order to determine how these two species respond to an enriched CO₂ environment. We found that CO₂ treatment (and in some cases species) had a significant, negative effect on physiological and phenotypic traits. We believe these findings are the result of restricted cellular respiration. Faculty Sponsor: Arielle Cooley

JESSICA PALACIOS, *Diversity Within and Between Chilean *Mimulus* (Monkeyflower) Species*
The *Mimulus* genus is becoming an increasingly important study species in the biological community, but most studies to date have focused on the North American rather than the South American species complexes. This study focused on three taxa from Chile—*M. cupreus*, *M. luteus* var. *luteus*, and *M. luteus* var. *variegatus*—and compared physiological characteristics such as germination success, number of flowers produced, rate of flowers produced, and number of seeds produced under different pollination strategies. My study looks at traits that could help determine if the current naming system for the three varieties is an accurate representation of their evolutionary relationship. More clarification in taxonomical names can help in unraveling the evolutionary history of a species and add to our understanding of biological diversity. Faculty Sponsor: Arielle Cooley

BRANDON PARIS, *Adjuvant Stability and Performance in Human Whole Blood*
Modern vaccines have come to rely on the use of adjuvants for their efficacy in eliciting a robust immune response. Adjuvant formulations typically contain molecules that encapsulate the vaccine and allow it to pass through membranes more effectively, and/or immunostimulatory molecules that strengthen the immune system’s response to the vaccine, thus allowing for lower dosages to extend the vaccine supply. Adjuvant formulations routinely go through stability tests and *in vivo* tests in mice. The purpose of this study is to understand the behavior of the adjuvant formulations *ex vivo* in human whole blood, by measuring cytokine levels and comparing these responses to the stability results. Faculty Sponsors: James Russo and Jeff Brown

ELLIE PATTERSON, *Abundance and Current Fishing of Parrotfish (*Scaridae*) on South Caicos, Turks and Caicos Islands*
This study compares the abundance of parrotfish (*Scaridae*) inside and outside of National Cockburn Land and Sea Park (NCLSP) in South Caicos, as well as addresses the



compliance of the finfishing industry with the recent prohibition of parrotfish capture. Parrotfish are ecologically important species to coral reef habitats because of services that they provide, such as grazing on macroalgae. Their ecological services support the health and survival of coral reefs. This study is important because it assesses the ability of marine protected areas (MPA) to protect parrotfish abundance. This study found that there was a highly significant difference in overall parrotfish abundance inside and outside of NCLSP, and abundance index values were consistently higher inside of the MPA. These results suggest that the MPA enhances parrotfish abundance and coral reef health correspondingly. The study also found incidences of parrotfish capture, suggesting a lack of compliance with regulation banning parrotfish capture. Faculty Sponsor: Leena Knight

COLE PHALEN, *Spectroscopic Assay Development in Drug Development*
This past summer (2015) I worked in the Tuberculosis Drug Discovery group at the Infectious Disease Research

Institute (IDRI) in Seattle, Washington. IDRI had already identified a potential drugable target enzyme that produces pyrophosphate (PPi) as a side product. Our project was designed to figure out a novel way to monitor the release of PPi and be able to do so in a 384-well plate format. Once complete, our chosen technique (using either UV or fluorescent techniques) would enable IDRI to test a suite of potential drugs they received from a corporate partnership. Faculty Sponsor: James Russo

ANNEKA SONSTROEM, MIRA ENGEL, TREVOR PRESS, *Disgust Conditioning and Eye Tracking*
Traditionally, techniques for disgust conditioning involve presenting two stimuli (one disgusting, one neutral) at the same time in order to create an association between them. We developed a new technique in which we presented participants with two stimuli in the same place, with a neutral image that morphed into a disgusting image. We then showed participants the neutral images alone to extinguish the conditioned association. To measure conditioning and

extinction, we tracked participants' eye movements. We predicted that conditioning would cause them to look away from the neutral images, and extinction would reduce this effect slightly. We also had the participants self-report whether they considered the neutral images disgusting before and after conditioning. Preliminary data follow the predicted pattern, in line with research on conditioned taste aversion. These findings validate our technique and may promote research on disgust conditioning in anxiety disorders. Faculty Sponsor: Tom Armstrong

MORROW TOOMEY, *Cardiovascular Health Status of Childhood Cancer Survivors Treated With Anthracyclines*

Anthracycline-based anticancer drugs pose a unique challenge to researchers seeking to improve long-term health outcomes in pediatric cancer patients as these drugs are associated with superior treatment outcomes, as well as late-cardiotoxic events. In adult cancer patients, the cardioprotectant dexrazoxane (DRZ) has been shown to mitigate associated cardiotoxicity when given in conjunction with anthracycline-based agents. In children, studies of the efficacy of dexrazoxane have been more limited. In order to better understand the effects of DRZ, individuals who were treated from 1996-2001 on Children's Oncology Group DRZ randomized clinical trials were approached for prospective health assessment at sites across North America. Eligible survivors were assessed on anthropometry, six-minute walk distance, and self-reported physical activity and smoking history. Our analysis compared these data across DRZ treatment arms and compared survivors to an age-matched general population sample to give a preliminary cardiovascular

health update on childhood cancer survivors treated with anthracyclines. Faculty Sponsor: James Russo

JENNIFER TORNAY, *Predictability of ER Radiology Results, and Reasons for Ordering Negative Studies*

Current usage of radiological studies, such as X-rays and CT scans, has recently come under scrutiny. Because of the consequences associated with the overuse of such tests, including an increased risk of cancer due to repetitive exposure to radiation and elevated healthcare costs, it's essential to establish if these tests are being used effectively. A research study was conducted to assess if the use of these scans in the emergency room is appropriate. A survey evaluated physicians' ability to predict the outcomes of scans they ordered. Their reasoning for ordering tests that they predicted to be negative for pathology was also assessed, to identify the driving factors behind ordering tests with a low possibility of yielding significant findings. We found that physicians were often able to predict when a scan wouldn't show any significant pathology, but frequently anticipated the presence of pathological findings when, in fact, there were none. Faculty Sponsor: Matthew Crook

GODWIN WANG, *Spectroscopic Characteristics of Erbium-doped Fullerenes (Er@C60)*

Erbium doped fullerenes (Er@C60) consist of an erbium ion or ions encased in a carbon cage, and have very interesting optical properties. Here we present the results of our recent study on the production, isolation and optical characterization of Er@C60. In order to optimize Er@C60 production, we used sublimation methods to separate the numerous metallofullerene molecules created in the reaction process. We performed spectroscopic

characterization of Er@C60 through its absorption and emission spectra. We carried out fluorescence lifetime measurement of Er@C60, and built a tunable laser for optical measurement by using laser dye, a nitrogen pulsed laser source, a stepper motor, and a LabView Program. Faculty Sponsor: Kurt Hoffman

RAVNEET WARAICH, *Immunofluorescent Profiling of Synaptic Density Changes in the Visual Cortex of Rats During Development and Eye Opening*

A dominant hypothesis in neuroscience is that the developing brain produces an excess of neural connections, called synapses, from which a subset are selected by processes like learning, while under-used synapses are pruned away. There is evidence for this mechanism in primates, but surprisingly, there is no experimental evidence from the cortex of rodents. Here, we used fluorescent markers of synapses to estimate relative synapse density across postnatal (P) development in the visual cortex of rats, including analysis of the days immediately preceding and following eye opening. We found a progressive increase in the number of synapses during the first three weeks, from P12-21, but no pruning after P21. We also did not detect significant changes in synapse density associated specifically with eye opening. Based on these data, we propose that synapse formation during development is progressive and pre-programmed, and that synapse formation associated with learning is a distinct process. Faculty Sponsor: Ginger Withers

ANDREW WILDMAN, *Oxalate Influences Rates of Reaction 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, oxalate, on the exchange between two chelating agents, nickel-NTA and CDTA, was investigated. Several factors that speed up and slow down the reaction are discussed. We propose a reaction pathway and discuss future research objectives. Faculty Sponsor: Nate Boland

CHRIS WILLIAMS, *Synthesis of a Model Complex for Toxic Carbon Monoxide Conversion*

Soil bacteria can convert approximately millions of tons of toxic carbon monoxide (CO) into non-toxic carbon dioxide (CO₂) annually using the enzyme CO dehydrogenase (CODH). During CO conversion, CODH also splits water molecules into protons and electrons which are the primary source for hydrogen fuel production. We are focusing on a particular CODH enzyme found in aerobic bacteria *Oligotropha carboxidovorans* due to its unique molybdenum-copper reaction center not seen in other

forms of CODH. Our goal is to synthesize a chemical compound that mimics the function of the CODH enzyme, which has implications in the fields of alternative fuels and environmental remediation. Currently we have designed multiple compounds that fit the physical specifications of the enzyme and we are in the process of synthesizing these complexes. If successful, the CO conversion activity of these complexes will be investigated. We plan to further modify these complexes to improve catalytic efficiency. Faculty Sponsor: Dalia Rokhsana

SUZY XU, *The Influence of Calcium on Rates of Ligand Exchange Between Strong Chelating Agents by Capillary Electrophoresis*

Chelating agents are widely used in plants and human industries to capture and control metal ions. Constituent ions in soils (e.g. Ca²⁺, Mg²⁺) influence the exchange of a metal ion between two chelating agents. Predicting changes in reaction pathways and the magnitude of kinetic effects is fundamental to understanding dynamic metal speciation where strong chelating ligands control metal ion speciation. This research focuses on the influence of calcium ions on the exchange rate of Ni between nitrilotriacetic acid (NTA) and 1,2-cyclohexylenedinitrilotetraacetic acid (CDTA). Capillary electrophoresis was used to monitor the changes in free chelating agent and nickel-chelating agent complex concentration with time at different pHs and reactant concentrations. The presence of calcium ions reduces overall exchange rates and alters reaction order under the conditions studied. Kinetic modeling is used to support a proposed mechanism for the influence of calcium on this exchange reaction. Faculty Sponsor: Nate Boland

BRENDA ZARAZUA-OSORIO, *Using the Model Organism *Caenorhabditis elegans* to Study the Role of Epidermal Growth Factor Signaling in Lipid Synthesis*

Obesity affects more than one-third of adults in the United States. In order to better treat this disease we need to understand how fat synthesis is controlled. I used the model organism *Caenorhabditis elegans* to study the control of lipid synthesis and in particular LET-23, an epidermal growth factor (EGF) receptor involved in multiple developmental processes. We study the role of LET-23 in lipid synthesis because LET-23 gain of function mutants appear paler than wildtype animals suggesting they have less fat. My research questions were: does LET-23 over activation reduce fat levels and, if so, is it via increasing phosphatidylcholine levels? I found that overactivation of LET-23 decreases fat levels but that underactivation of LET-23 had no effect. I also found that decreasing phosphatidylcholine levels in a LET-23 gain of function background restored fat levels to normal. This suggests that LET-23 overactivation maintains elevated phosphatidylcholine levels to suppress fat synthesis. Faculty Sponsor: Matthew Crook



SESSION 1

9-10:15a.m.

RACE AND TRAUMA

OLIN 130

Chris Calamita, moderator
Chris Cahoon, coach

RENEE VAN BERGIJK, MARLENE ANDERSON, JOHN REED, SARAH ROBINSON, CHRIS CALAMITA,

Race, Trauma, Narrative, 9:00 a.m.

Contemporary discourse surrounding race-based violence has established two critical and oft-repeated points. First, that we should be talking about race-based violence. Second, that it is difficult to talk about race-based violence. We approach the issue through the study of its relation to narrative and trauma: to the building of frameworks of meaning and discussion and to the breakage of those frameworks and the limits of discussion. We examine the subject position of the individual as it forms in relation to others. We carefully unfold the ethics of listening to the silenced: the limits of empathy and the dangers of transmission. We grapple with the tensions aroused in witnessing and testifying to racial trauma, hoping to engage in a healing discourse with those who have been formerly excluded, no matter the difficult questions and reflections such a discourse will inspire. Faculty Sponsor: Nicole Simek

DEVELOPMENTAL PSYCHOLOGY

OLIN 157

Nicole Hodgkinson, moderator
Authur Shemitz, coach

KATE RUBINSTEIN, EVA DAVIS, SARA TEFLOW, *The Intersection Between Infant Sex and Socioeconomic Status as it Relates to Maternal Infant-Directed Speech*, 9:00 a.m.

Maternal speech—how mothers talk to their infants—significantly influences language development, readiness for school, and later academic success. Maternal speech affects language growth by providing a stream of information for word-learning mechanisms. Many demographic and social factors shape how a mother speaks to her child. Past literature has focused on two such factors: infant sex and socioeconomic status (SES). While the research has investigated both factors separately, a gap remains regarding the intersectionality between sex and SES. We explore the interaction between infant sex and SES as it pertains to maternal speech in order to better understand how these variables contribute to the academic achievement gap in later childhood. Faculty Sponsor: Melissa Clearfield

AMY ISHIDA, CATHERINE BAYER, *Effect of Age on Second-Language Proficiency*, 9:15 a.m.

Our presentation focuses on the effectiveness of second-

language learning at a young age compared with formal language instruction in higher education. Participants in our research include children ages 7-9 who have been enrolled in a bilingual or dual language program at their school for three or more years and students (ages 18-25) who have completed at least two semesters of a second language exclusively at a liberal arts college. Participants are timed as they name a series of simple pictures in English and in their second language as quickly as they can. We compare response speed between the two ages for each language as well as between English and the second language within each age group. Based on previous research, we predict the younger sample is faster than the college students at rapid naming in the second language, at least relative to their rapid naming in English. Faculty Sponsor: Emily Bushnell

LACHLAN JOHNSON, FLORA SHEPPARD, ROSE GOTTLIEB, *Beyond Tipis and Arrowheads: Children's Responses to Lessons on Historical Injustices against Native Americans*, 9:30 a.m.

In July 2015, Washington state implemented a law requiring all school districts to cover in their curriculum the history, culture and governance of the state's Native American tribes. Washington's superintendent of instruction and 29 federally recognized tribes recommend the Since Time Immemorial curriculum, which emphasizes tribal perspectives and a more accurate representation of history. Our presentation examines the effects of such history lessons on children's racial attitudes. In our research, participants ages 7 to 11 are asked to complete measures of racial attitudes before and after three 20-minute interactive history lessons based on the Since Time Immemorial curriculum. Following each lesson, participants' empathy, racial guilt and moral disengagement are also measured. We hypothesize that participants' racial attitudes are more positive after the lessons, and that greater improvement is related to higher levels of self-esteem, empathy and collective guilt, and to lower levels of moral disengagement. Faculty Sponsor: Emily Bushnell

MARLENA SLOSS, LUKE HAMPTON, NICOLE HODGKINSON, *The Effect of Play on Learning for Infants Living in Poverty*, 9:45 a.m.

Approximately 22 percent of children in the United States live in poverty. Developmental differences in visual attention and motor development between children of low and high socioeconomic status are observed as early as six months of age and may lead to the well-known achievement gap when children enter grade school. In our study, we implemented an intervention to improve motor development in low-SES infants ages 6 months to 12 months. The intervention



consisted of two weeks of daily play sessions between mothers and infants in which the mother demonstrated different exploratory techniques with a rattle, and the infant replicated the behaviors. At the end of the intervention, improvements in both visual attention and object exploration are expected. Our study will be used to inform future interventions to improve cognition in low-SES infants. Faculty Sponsor: Melissa Clearfield

PHYSICAL SCIENCE SCIENCE 159

Greg Holdman, moderator
Emma Thompson, coach

JOHN BROOKSBANK, *The Behavior of Iodine in Multi-Phase Solutions*, 9:00 a.m.

Elemental iodine has several potential uses due to its characteristic absorbance and several other factors, including antimicrobial properties, that could make it a good low-cost antiseptic. However, the behavior of iodine at surface boundaries has not been widely explored. Emulsions are systems of two or more solvents that are insoluble in each other, but have been mechanically dispersed and held in suspension by surfactants and other surface-active compounds. This results in several chemical environments present in emulsions due to the different phases and boundary conditions, each with their own unique chemical makeup. In our research we have investigated the behavior of iodine found in these systems by NMR, GC, and other techniques, with the goal of discovering where and in what ratios the iodine is present. Faculty Sponsor: Allison Calhoun

NICK WECHTER, *Hypotonic Soaking Induced Fracture in Hexagonal Thermolysin*, 9:15 a.m.

Protein crystals are classified as nanoporous materials containing large pores that introduce low weight solutes throughout the crystal. Soaking, a term that describes the introduction of protein crystals to new solutions, takes advantage of this property to apply protein crystals to various processes such as chiral separation of enantiomers, catalysis, and high resolution determination of protein structure through x-ray diffraction. My research aimed to investigate and model fracturing induced by hypotonic soaking in hexagonal thermolysin. To ensure reproducibility of results, many variables including the ambient humidity and the orientation of the crystal during soaking proved relevant. Furthermore, a time dependent aspect of hypotonic soaking fracture was identified through the use of NVH oil and a high speed camera. Ultimately a correlation between the concentration gradient of the soak and the degree of fracture was established and modeled. Faculty Sponsor: Douglas Juers

MATT GABEL, *Measuring and Characterizing Thermo-Optic Response of Mirror Coatings*, 9:30 a.m.

Thermo-optic noise is caused by small temperature changes at the surface of a mirror. It is comprised of both a physical expansion in the mirror coating and changes in the mirror's reflective properties (which can result in apparent length changes). These length changes were measured with an interferometer where one end mirror was hit by a pumped heating beam. Once data from the interferometer is collected with low enough noise for the thermo-optic response to be visible, the data can be used to calculate coefficients for both the physical expansion and changes in reflective properties of any given mirror. By better understanding thermo-optic noise, the thermo-optic noise threshold can be lowered in high-precision optical measurements such as those being undertaken at the Laser Interferometer Gravitational-Wave Observatory (LIGO). Faculty Sponsor: Gregory Ogin

GREG HOLDMAN, *Detecting Opposite-Sign Vector Boson Scattering in the ATLAS Detector*, 9:45 a.m.

The 2012 discovery of the Higgs boson by the ATLAS and CMS experiments at the Large Hadron Collider (LHC) marked a new era for particle physics by completing the Standard Model of Particle Physics. Now, after a two-year shutdown, the LHC has begun Run 2 at a higher energy ready to delve deeper into the Standard Model. Further measurements of the properties of the Higgs will solidify physicists' understanding of this theory. Vector Boson Scattering (VBS) is one fundamental process that will provide that information. The current understanding of this interaction relies heavily on the Higgs boson. With the ATLAS group at Indiana University, I began a study that will help determine the cross-section, or likelihood, of VBS at the higher LHC energy. Comparing the results of this study with data from Run 2 will provide evidence for or against the Higgs' role in VBS. Faculty Sponsor: Moira Gresham

CELLS AND SICKNESS SCIENCE 100

Mackinzie Stanley, moderator
Emma Thompson, coach

SARAH KRAWCZAK, *The Role of Regulatory T Cells in Immune Responses to Influenza*, 9:00 a.m.

Regulatory T cells (Tregs) make up a population of T cells in the immune system that are crucial for preventing autoimmunity and promoting immune homeostasis. It is well established that during infection Tregs function to prevent autoimmunity and dampen over exuberant immune responses. Although less well known, it is hypothesized that Tregs also play an important role in the facilitation of pathogen clearance. Here we explore

this hypothesis by analyzing how Tregs function in immune responses to influenza, a virus that affects 5 million people across the world annually. Specifically, we examine how immune responses to influenza virus are impaired in the absence of regulatory T cells, and evaluate mechanisms that could lead to the observed impairment. Faculty Sponsor: Kendra Golden

JULIA HART, *Developing a Sense of Taste: An Investigation of Cell Renewal Rates in Lingual Taste Epithelium*, 9:15 a.m.

Head and neck cancer patients often lose their sense of taste after receiving radiation therapy. Understanding the physiological mechanisms of taste and smell has the potential to improve these patients' sense of taste. Previously it was accepted that taste buds only lived for 10-14 days, however, here I present research that suggests otherwise. Transgenic mice were first generated to express fluorescent markers in taste buds. Mice were then sacrificed, their tongues were sectioned and these sections were immunostained for confocal microscopy. Confocal analysis revealed taste bud cells that survived for up to 14 weeks. These startling results help to provide insight into taste bud cell turnover rates in humans, and may also help to improve the quality of life of cancer patients. Faculty Sponsor: Hilary Lease

ANNA CICHOCKI, *Characterization of Differential Protein Regulation of Meningioma Aggressiveness*, 9:30 a.m.

Meningioma tumors are the most common primary brain tumor, yet there is no effective chemotherapy treatment; surgery is the only option. These tumors are classified into three WHO grades according to histopathology. Ninety percent of meningioma cases are benign, but can evolve to become cancerous unexpectedly. This research was conducted to find a biomarker for meningioma malignancy by investigating five potential biomarker proteins (AKAP12, Rb-1, p53, SMAD2/3, and Merlin) based on protein expression in benign compared to malignant tumors. Using western blot methods, these proteins were tested in specimen tissue samples and cell lines to determine differences in regulation across the grades. We found that AKAP12 and Rb-1 were down-regulated. These findings and prior research of other cancers led to the theory that AKAP12 and Rb-1 may be in the same phosphorylation cascade that is involved with the cell aggressiveness in meningiomas via CDKs and cyclin kinases, particularly cyclin D. Faculty Sponsor: Leena Knight

SAMUEL CURTIS, *Easy as ADC: Antibody Drug Conjugates as a Novel Cancer Therapy*, 9:45 a.m.

In recent years, antibody-drug conjugates (ADCs) have become an effective tool for treating various types of cancer. ADCs are complex molecules composed of a monoclonal antibody specific for a tumor-associated antigen, a highly potent, synthetic, cytotoxic agent, and

a stable protein linker that connects the cytotoxic agent to the antibody. Upon antibody-antigen recognition on surface of cancer cells, ADCs are internalized by a process known as receptor-mediated endocytosis. Endosomes transport the ADC/antigen complex to lysosomes, in which lysosomal proteolytic enzymes cleave the antibody-drug linker, thereby activating the cytotoxic agent and inducing cell death. By combining the unique targeting of monoclonal antibodies with the potent, cancer-killing ability of cytotoxic drugs, ADCs allow for sensitive discrimination between healthy and cancerous tissue. My research explores ADC design optimization, and the efficacy of ADC treatment across various cancer types. Faculty Sponsor: Jeff Brown

MACKINZIE STANLEY, *The Protein IRGQ's Role in Cancer Metastasis*, 10:00 a.m.

Autophagy is traditionally thought of as a cellular recycling pathway used to regularly turn-over organelles and proteins found within the cell, as well as to eliminate dysfunctional organelles like mitochondria. The autophagy pathway has recently been shown to also function as a secretion pathway, raising the possibility for a role in signaling between cells. Recent studies suggest that the autophagy-dependent secretion pathway may play an important role in cancer metastasis. This raises exciting new possibilities for anti-cancer drugs targeting these secreted proteins or the process that secretes them. However, the autophagy secretion pathway is still poorly understood. My summer research project at the Debnath Lab at UCSF was to investigate a specific protein, IRGQ, that was screened as a possible player in the autophagy secretion pathway. IRGQ was found to be secreted in an autophagy-dependent manner and was found to interact with previously-known players in the autophagy pathway. Faculty Sponsor: Britney Moss

JAPAN: TRADITION AND MODERNITY

KIMBALL THEATRE
Yasuha Miura, moderator
Emma Thompson, coach

HANNAH HORNER, *Japanese Temple Geometry*, 9:00 a.m. *Sangaku*, or "mathematical tablet" in Japanese, are geometry problems transcribed by hand in colorful, pleasing designs onto wooden tablets. The tablets are found in temples throughout Japan, with the older *Sangaku* dating back to the late 17th century. The problems found on the tablets range from simple exercises to extremely difficult problems even with the benefit of modern mathematics. To better understand the role of these tablets, I focus on the people who made them and the intention in their work. My presentation also examines the history of two styles

of mathematics: *wasan* (native Japanese mathematics) and *yosan* (Western mathematics). I discuss how *Sangaku* fit into this history as well as how they reflect traditional aesthetics of Japan. Finally, I present a few simple *Sangaku* that can be solved using high-school geometry. Faculty Sponsor: Ron Takemoto

MATTHEW HIRANO, *Longevity in Japan: Facets of a Healthy Culture*, 9:15 a.m.

A recent study published in *The Japan Times* indicates that Japan's population enjoys the longest average life expectancy of all developed countries. I naturally wonder what kinds of factors contribute to this statistic. Is it dependent on Japanese diet and lifestyle—Does the genetic history and diversity of the island country have an impact? Medical technology and availability are also surely important. As a science student who recently spent a semester living in Japan, I investigate how daily life and culture in Japan affect the body and general health, not as an argument for how to live in order to extend one's life, but rather to evaluate the facets of daily living from a scientific perspective. An examination of these factors is valuable for an understanding of various impacts on longevity in Japan. Faculty Sponsor: Ron Takemoto

JOEL PONCE, *Flamenco in Japan: Fusion and Transnational Identity*, 9:30 a.m.

Japan has the largest flamenco following outside of Spain. An estimated 80,000 Japanese students study flamenco at 600 studios and schools. The flamenco tradition has grown in popularity through the performances of Yoko Komatsubara and the dance company Arte y Solera. Both Komatsubara and Arte y Solera are well-regarded performers in Japan and Spain. To better understand the reception of flamenco in Japan and Japanese flamenco performers in Spain, I analyze three programs presented by the Spanish television station *Canal Sur*. Given flamenco's complex and ill-defined history and identity, I explore the ways in which it has gained a transnational identity in the fusion of traditional Japanese theatre arts and flamenco performance. Faculty Sponsor: Ron Takemoto

MARCUS HELM, *Modern Japan, Mobile Phones and Friendships*, 9:45 a.m.

Mobile phones are the fastest-growing form of communication in modern Japan. Japanese students use mobile phones to maintain relationships with friends through e-mail exchanges, social network systems such as Facebook and phone applications called LINE. It is not unusual to watch Japanese students sitting next to each other and communicating via cyberspace. In fact, students are hard-pressed to function in a social setting without their mobile phones. Psychologists recently have begun to investigate the link between mobile phone use and emotional

dependency. Yet, little research exists about the psychology and sociology of mobile phone use. My presentation focuses on the psychological and sociological effects of mobile phones on Japanese students. I explore the social history of mobile phones and tap psychological studies conducted by Japanese psychologists to show how pre-university level students form and maintain friendships in contemporary Japan. Faculty Sponsor: Ron Takemoto

YASUHA MIURA, *Job Seekers in Black Outfits*, 10:00 a.m.

Japanese college students often say: "We study hard to get into a university so that we can begin looking for jobs at prestigious companies." It would not be an exaggeration to say that many Japanese students consider "job hunting" more important than writing a graduation thesis. The word in Japanese for "job hunting" is *sh'katsu*, a system controlled by the Japanese Business Federation (*Keidanren*) that determines all aspects of the annual job hunting and hiring season. Each year, when the *Keidanren* sets the date that opens the job hiring season, undergraduates rush in a panic to prepare for interviews. In cities throughout Japan, undergraduates wear obligatory black outfits without a hint of color and parade to job interviews and fairs. I examine the story behind these black suits as well as the culture that drives job hunting and hiring in Japan today. Faculty Sponsor: Ron Takemoto

ENVIROMENTAL IMPACTS

REID GOZ

Emily Williams, moderator

Emma Thompson, coach

MADLINE DUPPENTHALER, *Boon and Bane: The Paradox of Neolithic Caprine Domestication in the Southern Levant*, 9:00 a.m.

My presentation examines how domestication of sheep and goats was both beneficial and disastrous for many Pre-Pottery Neolithic B humans in the southern Levant. While domestication caused an increase in population and complexity of some settlements in the southern Levant, overgrazing, environmental degradation and population increasingly strained the economy of such settlements. In the 7th millennium this development culminated in the dissolution of major settlements. While several factors led to this dissolution, I argue that goats and sheep were a major factor. In the end, while agriculture and animal domestication led to initial improvement in living conditions, ultimately and ironically they were responsible for the disastrous downfall of these settlements. Faculty Sponsor: Gary Rollefson

MARGO HEFFRON, *Food Waste Hierarchy of Scandinavia*, 9:15 a.m.

In a perfect world, waste would not exist; waste is just a symptom of mismanaged resources. On a global scale,



almost a third of the world's food supply is wasted. We know food waste should go toward extinguishing hunger, but how do we prevent and manage our food waste effectively? Through the Danish Institute of Study Abroad course, "Sustainability in Northern Europe," I explore this question by analyzing Food Waste Systems in Malmö, Sweden and Copenhagen, Denmark. Through comparative analysis, I study how both cities manage food waste and in which ways they promote prevention. I share that even though many cost-effective methods exist to prevent food waste, these two Scandinavian cities rely on waste

to produce energy and electricity, a systematic flaw that prevents them from moving up the waste hierarchy. I will analyze food waste issues of the Pacific Northwest as well. Faculty Sponsor: Amy Molitor

CAMERON HANCOCK, *Exotic Ungulates and Cushion Plants: A Story of the Mountain Goat in Southeastern Utah*, 9:30 a.m.

The La Sal mountains of southeastern Utah are sky islands harboring alpine plants that exist nowhere else in the state and one endemic species, the La Sal daisy (*Erigeron mancus*). In September of 2013, 20 exotic mountain goats



were introduced to the mountains for hunting and viewing purposes by the Utah Division of Wildlife, a state agency. The following year, 15 more goats were released despite a strong backlash from the community and environmentalists. These goats expanded their distribution to include the Manti-La Sal National Forest, a parcel of federal land that encompasses the mountain range. The story of the mountain goat introduction is rife with controversy as hunting enthusiasts and plant protectors butt heads. I will examine this story at many levels, from the wind-blown wildflowers atop the 11,000 foot peaks to the tumultuous town hall meetings where the mountain goat becomes a symbol for so much more. Faculty Sponsor: Susanne Altermann

EMILY WILLIAMS, *Dam Removal: the Politics Behind the Symbol*, 9:45 a.m.

Throughout U.S. history dams have been considered symbols of progress and development. Since the rise of the environmental movement in the 1960s, dams are also considered symbols of environmental degradation. Attitudes towards environmentally driven dam removal vary based on differing interpretations of, and attachments to, the symbolism of dams. Dams removal functions as a powerful political symbol for both the environmental movement and those opposed to environmental frameworks; the debate stems from tensions between varying conceptions and understandings of nature. My presentation examines these disparate conceptions of nature through an analysis of activist rhetoric on both sides of dam removal debates in the Pacific Northwest. Faculty Sponsor: Shampa Biswas

SESSION 2

10:45a.m.-Noon

WOMEN'S VOICES OLIN 130 Katie Steen, moderator Marlene Anderson, coach

KATY WILLS, *Revolutionary Women: The Arab Spring*, 10:45 a.m. In 2011, women flooded the streets of Yemen's capital, Sana'a, in a massive yet strategic movement to protest a corrupt government with systemically unequal policies in the treatment of women in Yemeni society. To simplify the role of women within this multifaceted series of demonstrations is dangerous and restrictive at best. Who were the subgroups of women that protested? What problems did they face? What successes did they achieve? What implications did their successes have on Yemeni people? Through research and conversations with bloggers and activists, I explore the both powerful and frustrating experience of women dissenters in the third of the revolutionary uprisings in the region. Faculty Sponsor: Susanne Beechey

MEGHAN ASH, *Dar a Luz: Pregnancy in a Mayan-Kaqchikel Community*, 11:00 a.m. My presentation focuses on pregnancy in a Mayan-Kaqchikel community in Santa Cruz La Laguna, Guatemala. I explore the experience of pregnancy from the perspective of Mayan women, specifically their understanding of pain and how that relates to health and emotional well-being, an underlying relationship intrinsic to a woman's understanding of health. I outline how pain is understood as a symbol of the baby's discomfort or illness, or the presence of a potential threat to the unborn child, which creates an intense sense of fear for the mother. This fear is linked to the mother's own sense of responsibility for the child and its health during pregnancy. I argue that health during pregnancy is understood via emotions, and that pain holds a specific symbolic meaning for these Mayan women. Faculty Sponsor: Rachel George

EMMA NEWMARK, *Sexy Baby Voice: the Infantilization of Women's Speech*, 11:15 a.m. Over the past decade, the "sexy baby voice" has emerged as a prevalent dialect that serves to infantilize and hypersexualize adult women. My presentation identifies the cause of this phenomenon and investigates the systemic rhetorical infantilization of women as a symptom of larger gendered prejudices. I will analyze examples of the "sexy baby voice" through the pop culture artifact, 30

Rock's episode, "TGS Hates Women," in conversation with feminine rhetorical theories to expose inherent inconsistencies in the perception of women's voices. Faculty Sponsor: Andrew Culp

KATIE STEEN, *Performativity and Pornography: Possibilities for Feminist Porn Futures*, 11:30 a.m. In a world of ever-increasing access to and diversity of pornography, I analyze the specific moment of female orgasm in porn through comparative visual analysis of film clips representing both feminist and mainstream heterosexual pornography. My analysis is positioned within a framework of the privileging of heterosexuality, the imperative of orgasm, and the pressure that post-feminist discourse places on women to experience a certain form of sexual subjectivity. I am interested in theorizing possible ways in which individual viewers are impacted, especially in understanding their own gender identities, by the pornography that they consume, and how these impacts may be mediated by the creation of feminist pornography and other alternative pornographic narratives. Faculty Sponsor: Melissa Wilcox

BODY AND MIND OLIN 157 Maeve Sloan, moderator Austin Biehl, coach

AUDREY INGLIS, *Methamphetamine in the Aggravation of Pulmonary Hypertension*, 10:45 a.m. Little is currently known about the pathology of pulmonary hypertension, and treatment options are limited, with lung transplant being the only treatment option in severe cases. Amphetamines have been shown to increase the risk of developing pulmonary hypertension, and the hypoxia inducible factor (HIF) pathway has been identified as a potential target to further understand how the DNA damage seen in pulmonary hypertension is exaggerated by amphetamines. We used western blot analysis, immunofluorescent imaging, and qPCR to examine the effects of amphetamine and hypoxia treatments on pulmonary arterial endothelial cells. This approach allowed us to determine how two HIF proteins are affected by hypoxia and amphetamines, and to explore how dysregulation of the HIF pathway may lead to pulmonary hypertension. We found that amphetamine is likely associated with HIF dysregulation, which leads to

an imbalance of HIF-regulated genes. This imbalance may underlie the DNA damage seen in pulmonary hypertension. Faculty Sponsor: Hilary Lease

ALEX AYAL, JOEY SCHAFFER, *Affect and the Interaction Between Openness and Reappraisal*, 11:00 a.m.
Chronic negative affect correlates negatively with quality of life, whereas individual differences in regulating negative affect predict physical and psychological health. The cognitive-affective reappraisal of negative emotion, which involves positive reflections of negative stressors, has received much attention in research as a strategy that promotes psychological adjustment. Relatively little research addresses the question of whether personality traits moderate the effectiveness of emotion regulation strategies. Because openness to experience entails a preference for experiencing strong emotions, we theorize that this trait moderates the short-term effects of reappraisal on positive and negative affect. In our study, we asked participants to recall a sad memory and asked them, randomly, to write about it with or without reappraisal. We sought to bring closer together past research on personality and emotion regulation in the hope that our research will further illuminate the conditions in which certain emotion regulation strategies are most effective. Faculty Sponsor: Pavel Blagov

BENJAMIN WOLETZ, TAYLOR COOK, GABRIELLA LUTHER, *Putting the Past Behind: the Effect of Written Disclosure on Cognitive Performance*, 11:15 a.m.
Trauma can have lasting detrimental impacts on emotional, physical and cognitive well-being. Studies show that expressive writing helps to alleviate negative psychological and physical effects of trauma. However, the effect of expressive writing on cognition has not been adequately researched. Our study examines the extent to which writing about a traumatic experience yields short-term cognitive benefits. We hypothesize that emotion regulation (i.e., the extent to which an individual modulates her emotional reactions) may influence the effect of expressive writing on facets of cognition such as processing speed and selective attention. The results of our study have implications for the efficacy of expressive writing as a therapeutic technique. Such results are particularly pertinent to college students, whose learning depends on optimal cognitive functioning. Faculty Sponsor: Pavel Blagov

SARAH BLACHER, ZACH CALO, *Self-Focused Attention in Depression: An Analogue Study of Ad Libitum Viewing Behavior*, 11:30 a.m.
The theory of approach-avoidance motivation, which contends that humans and animals alike approach pleasurable stimuli and avoid unpleasant stimuli, explains the attentional patterns of healthy individuals. However, depression appears to disrupt these patterns. We present

evidence for a broken approach-avoidance motivational system in depressed individuals, citing the differences in self-focused attention between healthy and depressed participants. In our study, we examined how depression influences self-focused attention. It has been shown that increases in attention toward the self can be interpreted as a consequence of reduced motivation to pursue positive mood states and escape negative ones. By measuring the time spent attending to various stimuli, including images of the self, and by monitoring mood over time, we are able to examine self-focused attention of participants in the context of the approach-avoidance motivation. Faculty Sponsor: Tom Armstrong

MAEVE SLOAN, EMILY REYNOLDS, *Investigating the Relationship Between Mindfulness Meditation and Emotional Regulation*, 11:45 a.m.
Mindfulness practice has been an important component of Eastern religious tradition for centuries. Only recently has it been recognized by Western clinical psychologists as an effective treatment for mood and anxiety disorders. Among its theorized benefits are stress reduction, decreased symptoms of psychopathology, increased emotion regulation skills and subjective well-being. Because mindfulness is a relatively new and unexplored intervention, the cognitive mechanisms responsible for its beneficial effects remain unclear. Evidence indicates that mindfulness increases one's willingness to tolerate uncomfortable emotions and engage in emotional reappraisal. With research connecting mindfulness meditation to enhanced reappraisal skills, we hypothesize that brief mindfulness interventions enhance reframing skills and lead to lower levels of negative emotion following a distressing film clip. This research aims to improve and streamline clinical intervention of mindfulness meditation. Faculty Sponsor: Tom Armstrong

GEOLOGY AND CLIMATE SCIENCE 159

Nevin Schaeffer, moderator
Kyla Rapp, coach

JON MIRANDA, *Ash and Trash: Geochronology of Human Occupation in the Aleutians*, 10:45 a.m.
The native Unangan people of Alaska left no written record of their migration across the volcanic islands of the Aleutian archipelago. Using ash deposits from local volcanoes, my research focused on dating the occupation of village sites in the Islands of Four Mountains volcanic cluster. Across the islands successive village soil layers are separated by ash layers. I used geochemical analysis combined with carbon dates of organic matter from trash pits in village layers to match these strata across several

sites, establishing a new timeline of human and volcanic activity in the area. This history of human occupation in the Aleutians gives insight into how people moved across the region and how their interactions with volcanoes shaped the journey. Faculty Sponsor: Kirsten Nicolaysen

HENRY LANMAN, *Glacial Sculpting of the Tana Island Volcano*, 11:00 a.m.
The Tana Volcano is home to one of the last receding glaciers in the Aleutian Islands, despite having one of the lower summit elevations. Tana has the ability to host a glacier at such low elevations due to a large basin area to accumulate snow. The Tana Glacier eroded the soft hydrothermally altered lavas, creating a large basin area to allow for further snow accumulation. This multi-hued rock has significantly different erosional properties relative to unaltered lavas on Tana. I mapped a suite of moraines and compared the composition and morphology of moraines containing altered and unaltered lavas. This study furthers our understanding of the climate on the Islands of Four Mountains, and also how host rock affects the erosional and depositional processes of a glacier. Faculty Sponsors: Lyman Persico and Kirsten Nicolaysen

BEA SHEFFER, *Sourcing Obsidian in the Islands of the Four Mountains*, 11:15 a.m.

The isolated, windswept Islands of the Four Mountains (IFM) are central within the Aleutian arc. Although not currently inhabited, prehistoric Aleut sites up to calibrated 3760±60 years old are nestled on the flanks of almost every volcano within the IFM. Using what was available, these prehistoric communities worked obsidian, jasper, and dacite into tools. These siliceous tools are especially resistant to physical and chemical weathering (dissolution) in soils. Comparing elemental abundances collected by electron microprobe and by pXRF of the possible source material and artifacts provides clues into how the prehistoric Aleut people lived. In 2015, a fifteen-person research team collected possible source material from four volcanoes within the IFM. By connecting geographical locations of these source materials and the artifacts, the IFM team can investigate distances traveled to collect source material and the rarity of that material. These links provide insight into the relationship between people and their environment. Faculty Sponsor: Kirsten Nicolaysen

NEVIN SCHAEFFER, *It Isn't Always Cloudy in the Northwestern United States: Characterizing the Solar Energy Resource and Short-term Irradiance Variability in Relation to Weather and Climate*, 11:30 a.m.
Two barriers limiting the widespread implementation of commercial solar energy generation plants throughout





the nation are the solar energy resource of a location and the short-term variability of solar energy caused by inhomogeneous cloud cover. Short-term variability of solar energy can lead to increased costs associated with integration into the electrical grid if the minute-to-minute fluctuations of power output are not predicted accurately. Often disregarded in discussions of solar power generation due to its high latitude and frequent cloud cover, the Northwestern United States in fact sustains a yearly averaged solar resource akin to that of Tampa, Florida. In addition to assessing the solar resource of the region, the short-term variability of five sites located from Western Oregon to Southwestern Montana was analyzed in conjunction with weather and climate data to explore the relationship between cloudiness and short-term variability of solar power. Faculty Sponsors: Kurt Hoffman and Barry Balof

ANIMAL KINGDOM
SCIENCE 100
Megan O'Brien, moderator
Andrew Durand, coach

TROY WARWICK, *Abundance Estimations of Ixodid Ticks on Boran Cattle and Somali Sheep in Northern Tanzania*, 10:45 a.m.

Reduction of numbers of ticks and tick-borne diseases has been identified as the most pressing veterinary health concern in continental Africa. The loss of livestock to tick-borne illness is especially devastating in resource-poor pastoral communities. In areas where wild animals and livestock coexist, tick abundances are often very high, and therefore the development of effective treatment plans is necessary. Assessments of tick abundance on live animals are required for management or research purposes, however tick counts on the entire body are time consuming, costly, and stressful to the animal. Here we analyzed Boran cattle and Somali sheep in Northern Tanzania and developed linear regression models wherein only the ticks on one body part need to be counted in order to estimate total-body abundance. These models aid in drastically reducing data collection time and are essential in developing tick management strategies in East Africa. Faculty Sponsor: Susanne Altermann

JOE ABBOTT, *Distribution, Frequency and Mimicry: A Study of Heliconius in Central Ecuador*, 11:00 a.m.
Heliconius butterflies (*Nymphalidae: Heliconiinae*) warn predators of their toxicity through a variety of intricate and colorful warning patterns (aposematism). The original study of these butterflies and their aposematic interactions led Henry Walter Bates to develop his theory of mimicry

in 1862. As a part of the study abroad program *SIT Ecuador: Comparative Ecology and Conservation*, I conducted a study of this genus in the Río Zuñag valley in central Ecuador. The primary goals of my study were to obtain an inventory of *Heliconius* species present in this region, to analyze the distribution and frequencies of these species, and to observe mimicry complexes. In total, 53 individuals across five species of *Heliconius* were recorded. Furthermore, I identified two mimicry complexes in the Río Zuñag valley. This study provides a comprehensive basis for further investigations involving this genus in Ecuador, primarily in regards to mimicry. Faculty Sponsor: Susanne Altermann

MATEO SEGER, *The Thermal Dependence of Sprint Speed for Two African Lizards Mochlus sundevallii and Scincus scincus*, 11:15 a.m.
Current work suggests that many lizard populations are experiencing negative impacts from ongoing climate change, possibly mediated through the reduction of time available to accomplish life activities such as foraging and breeding, as a result of warming environmental temperatures. Part of better understanding the mechanisms behind how lizards are impacted by climate change involves estimating how ecologically relevant metrics of performance are affected by temperature. We examined the thermal dependence of sprint speed for two species of African skink about which little is known: Sundevall's writhing skink (*Mochlus sundevallii*) and sandfish (*Scincus scincus*). We acclimatized the lizards to different temperatures, and then used a high speed video system to record lizard sprinting down a linearly demarcated track. Here we present thermal optimal performance curves for these two ecologically distinct African lizard species, which can help inform models of lizard extinction risk in the face of global climate change. Faculty Sponsor: Hilary Lease

ERIC HSU, *Assembling a Multi-Access Key for Identification of Genera of Central and West African Snakes*, 11:30 a.m.
The dichotomous key has been used by biologists to identify organisms for centuries. However, the linear nature of a dichotomous key means that if a data point is missing at any point in the series of questions, accurate identification becomes very unlikely. This limitation can be overcome by the use of multi-access keys: using all available characteristics to narrow down possibilities. While multi-access keys have significant advantages over dichotomous keys, they come with a set of new limitations—from software becoming outdated to restricted accessibility in the field—which hinders their use. I explore both the advantages and disadvantages multi-access keys have with relation to my work in constructing one for the snakes of Central and West Africa, while addressing other fundamental issues in the identification of organisms. Faculty Sponsor: Kate Jackson

MEGAN O'BRIEN, *Beaks for Swords: Costa Rican Hummingbird Dominance Hierarchies*, 11:45 a.m.
Hummingbirds, some of the smallest and most beautiful birds on the planet, are also surprisingly aggressive. Their high energy requirements necessitate feeding strategies that provide them with the most nectar while expending the least energy. Each hummingbird species exhibits a different foraging strategy that varies with habitat conditions, and some will fight for their food. I observed two communities in the Costa Rican cloud forest in Monteverde, both consisting of the same seven hummingbird species. I hypothesized that, at constantly refilled nectar feeders, each hummingbird species and sex would assume the maximally aggressive foraging strategy that its physiology allowed. Through my observation of the outcome of agonistic interactions, such as fighting and display threats, I constructed dominance hierarchies for the two communities. I qualitatively and quantitatively analyzed the patterns that emerged in order to construct a picture of how tropical hummingbird communities function. Faculty Sponsor: Tim Parker

OUR TOWN, OUR TIMES
KIMBALL THEATRE
Jenna Dobrin, moderator
Molly Evered, coach

JOSIE FURBERSHAW, ISAAC BEREZ, RILEY WORTHINGTON, *Brainstorm to Prototype: Creating the Outdoor Activity Finder*, 10:45 a.m.
Walla Walla is abundant with outdoor recreational opportunities. Yet, they are rarely taken advantage of; most Walla Walla residents seem unaware of the vast opportunities to play outside. In part this stems from the fact that there are no systems that adequately combine all information in one place in a user-friendly way. Over the course of a semester, our Human-Computer Interaction team tackled this problem in order to promote outdoor opportunities in Walla Walla. Our challenge was to consolidate the information into a mobile application that was aesthetically pleasing, fun and easy to use. We discuss our process for the design cycle, from observation and brainstorming to creating prototypes and testing them before arriving at a demo of our final prototype. Faculty Sponsor: Janet Davis

CASEY SCHAFER, *Time Series Analysis of DMV Survey Response Rates*, 11:00 a.m.
Last summer I worked at the Survey Research Center at Oregon State University, where I used the statistical techniques of linear modeling and time series to analyze the response rates of DMV surveys from 1994 to 2015. Findings indicate that response rates have dropped significantly and thus the results of the surveys may be affected by non-

response bias. I present the methods for determining the linear model, graphical examinations of the data, conclusions of the study and their implications affecting the DMV and all surveyors. Faculty Sponsor: Stacy Edmondson

CHRIS HANKIN, *Arsenal F.C. Versus McWorld*, 11:15 a.m. Since the end of the Cold War and the subsequent integration of global markets and cultures, soccer has changed dramatically to catch up with a more interconnected world. In many ways global soccer is taking cues from global politics: The structure of soccer mirrors that of international relations, and the movement of players between teams mirrors the movement of commodities between nations. The similarities between soccer and politics make recent indictments of FIFA officials especially interesting; they show that these arrests are about much more than soccer. The reactions from fans and FBI agents alike demonstrate that the future of soccer may well be the future of the world. Faculty Sponsor: Shampa Biswas

CAROLYN ERVING, *High Terror: Cannabis Culture and Altered States of Consciousness*, 11:30 a.m. While socially sanctioned methods of “getting high” exist, namely through the consumption of alcohol, marijuana continues to carry a stigma which bars its social acceptability and legalization across most of the United States. I explore this conflict by analyzing marijuana in relation to certain aspects of U.S. political and racial debates that have placed restraints on altered states of consciousness. I pursue a deeper exploration of the lived experience of the cannabis-altered state of consciousness. Under the guise of medicine, cannabis becomes more accepted, but recreational uses cause U.S. populations to respond with fear and rage. I ask two questions: Why is “getting high,” specifically through the consumption of cannabis, so problematic and terrifying for much of the U.S. population? And, what is it about the specific nature of the marijuana high that is so forbidden to certain U.S. societal factions? Faculty Sponsor: Donald Snow

JENNA DOBRIN, *Who’s Framing Whom? Critical Analysis of Jay Z and Beyonce Meeting the Mona Lisa*, 11:45 a.m. I critique the widely circulated photo of music icons, Jay Z and Beyonce, standing directly in front of the iconic *Mona Lisa* at the Louvre. I allow that, at first, it is a natural response to analyze the photo through a superficial, popular cultural lens. I then argue that analyzing the photo through this frame distracts viewers from the racial component and the tension of high/low culture that are equally important in the photo. Interestingly, after the photo was transformed into memes on the Internet, the frame was altered drastically, bringing new meaning to the photo. I argue that it is the memes and not the original pop culture frame that draw attention to the issues of race and

the convoluted nature of high/low culture in the photo. Faculty Sponsor: Tarik Elseewi

RHETORIC STUDIES: INTERVENTIONS

REID GOZ

Meredith Ruff, moderator
Joshua Ward, coach

ANDREW DURAND, *Drone Melancholia*, 10:45 a.m. My presentation attempts to extend the work of Barbara Biesecker, distilled in her scholarly article, “No Time for Mourning: The Rhetorical Production of the Melancholic Citizen-Subject in the War on Terror,” by applying her theory of melancholic rhetoric to President Obama’s speech at the National Defense University. I trace the history of the drone program through the War on Terror and argue that the melancholic rhetoric employed by President Obama has facilitated the continued use of drones as a counter-terrorism tactic. I suggest that there are three distinct tropes present in this rhetoric: creation of an omen of loss; invocation of a state of emergency; and creation of a state of exception. I conclude that like President Bush, President Obama invokes melancholic rhetoric in order to facilitate the continuation of American war efforts. Faculty Sponsor: Heather Hayes

SAMANTHA GRAINGER SHUBA, *“This is Not a Legal Proceeding”: Deconstructing the New Title IX*, 11:00 a.m. The legalistic framework of Whitman College’s Title IX grievance policy from 2011 to 2016 influences the public’s understanding of Title IX. I argue that the Office for Civil Rights’ push for collegiate adjudication of sexual assault as a result of the 2011 Dear Colleague Letter led to campus policies that speak in legalese but hold none of the authority of the law. The exigency of Title IX grievance policies stems from a failure of the legal system to provide justice for victims of sexual assault. I argue that the legalistic framework in collegiate adjudications (which are not legal proceedings) portrays these proceedings as a fair system that putatively delivers justice. I also argue that meeting the standards of the judicial system will evolve into justice. I utilize feminist deconstruction to demonstrate how required collegiate adjudication of sexual assault functionally decriminalizes rape instead of offering a just means of redress. Faculty Sponsor: Heather Hayes

RACHEL BROCK, *Conditions of Possibility: Racialized Reporting in The New York Times*, 11:15 a.m. I use a lens of rhetoric, race and media scholarship to analyze the first *New York Times* articles published after the deaths of Emmett Till, Fred Hampton, and Michael Brown, black men killed by white men in positions of



power. My analysis suggests that personal details, race identification, governmental discourse and dissenting voices in the articles contribute to the possibility of governmental action. Media matters, and institutional racism is still a prominent issue in the United States. It is in part through themes and focus within the news media that white power is protected and black bodies are marginalized. Faculty Sponsor: Heather Hayes

ALLIE DONAHUE, *A Single Narrative: Obscuring Difference in “The Guardian” Campaign Against Female Genital Cutting*, 11:30 a.m. Female genital cutting (FGC) has become an indisputable atrocity in Western public discourse. Many argue that popular Western advocacy against the practice tends to denigrate FGC cultures and to reduce genitally cut women to voiceless victims. In 2014, the British newspaper *The Guardian* joined the fight against FGC with the launch of its End Female Genital Mutilation Global Media Campaign. Drawing on postcolonial criticism and political scientist Sanjay Seth’s theory of liberalism’s intolerance of difference, I argue that *The Guardian* campaign authorizes only one condemning narrative of FGC that obscures all

others. Through this narrative model, the campaign usurps the agency of the same women it seeks to liberate. Faculty Sponsor: Heather Hayes

MEREDITH RUFF, *Rude Noises: Queer Zines, Unsettling the Symbolic and Enjoying Abjection*, 11:45 a.m. Abjection, the process of being marginalized, is more than a harmful way of being pushed outside of culture. While scholars approach Julia Kristeva’s psychoanalytic concept of abjection in many different ways, I argue that abjection offers up the margins of culture as a potentially productive space. Reading the queer/punk fanzine *Homocore* through a method of tropological economy, I illustrate what anti-assimilation subcultures can do in their place on the edge of normative cultures. Ultimately, *Homocore* demonstrates that abjection, accompanied by feelings of *jouissance* (French for enjoyment or delight), can unsettle existing power relations. Instances of abjection can thus transform “the center” of normative cultures by destabilizing the Symbolic Order, Lacan’s notion of the means of understanding communication, upon which the center relies. Faculty Sponsor: Heather Hayes

SESSION 3

2-3:15p.m.

RACE AND PREJUDICE

OLIN 130

Arthur Shemitz, moderator
Felipe Rivera, coach

CHLOE SERKISSIAN, *How the Cannabis Market (Pre- and Post-Legalization) Informs Racism*, 2:00 p.m.

American society has gone through an evolutionary and revolutionary process in the legalization and cultural conceptions of marijuana. Cannabis has long been illegal and illicit with no grey area. Now, it is a legal substance in some states and will likely become legal in many others. Legalized marijuana has the potential to produce millions in taxes. Yet, a social stigma is still attached to marijuana use. Although African American and white populations are reported to use cannabis at comparable rates, African Americans are penalized 2.5 times more than whites for marijuana possession and use. Research indicates that, with the legalization of cannabis, these false, racially-based notions of crime are being perpetuated by the very market that is trying to legitimize itself. Faculty Sponsor: Eunice Blavascunas

ANDREA BERG, *Care and Control in Immigration Detention*, 2:15 p.m.

Immigration detention centers are infamous for terrible conditions, mistreatment and human rights violations. In 2009, President Obama called for “civil detention” reforms to improve conditions and government oversight. I explore how these reforms, specifically those focused on improving medical care, have transformed immigration detention as an institution, and how detainees have experienced these transformations. I use an ethnographic approach to understand how the rhetoric of health and care, as well as the overwhelming use of psychotropic medication, affect detainees’ understanding of themselves and the meaning of their detention experience. My findings will add to scholarly understanding of immigration detention through its examination of civil detention. It will also challenge the acceptance of these reforms as improvements. If, as I contend, these reforms have refined the mechanisms of control and marginalization at work in immigration detention, my findings support an abolitionist critique of detention. Faculty Sponsor: Aaron Bobro-Strain

AUSTIN BIEHL, BRIAN GLICKMAN, *Allied Against Discrimination: Testing the Effect of Stigma Type on Perceptions of Allies and Targets Who Confront Prejudice*, 2:30 p.m.

What are the costs to those who stand up for targets of prejudice? In our study, we examined how the

consequences of confronting prejudice differ for allies of either African Americans or overweight people. Since research on confrontation and allyship demonstrates that social identities of targets and allies interact to predict these consequences, we also evaluated how perceptions of the ally are influenced by the weight (Study 1) or race (Study 2) of both allies and participants. We presented participants with a scenario depicting an incident of weight bias or racial prejudice, after which participants provided their impression of the ally who confronted discrimination in the scenario. Ultimately, this research furthers our understanding of the consequences that allies may face as a function of their social status and the type of prejudice they confront, while also improving understanding of the ally characteristics most preferred by different targets of prejudice. Faculty Sponsor: Brooke Vick

ARTHUR SHEMITZ, *“But Can They Suffer?”: Black Lives and Cecil the Lion*, 2:45 p.m.

In July 2015, the Zimbabwean lion Cecil was killed by an American dentist, leading to widespread outrage across social media. I analyze the counter-discourse that criticized those who were incensed over Cecil’s death for their silence over unarmed African Americans killed by police. I argue that this counter-discourse served to discursively devalue the lives of non-human animals, delegitimize animal advocacy as legitimate social justice work and elide the genuine intersections between animal rights and anti-racism. I do this through use of Rogers Brubaker’s analysis of discourses that place social justice movements in a zero-sum game with each other for societal recognition and Lori Gruen’s call for activists to recognize their common goals rather than tearing each other down. Ultimately, I affirm the validity of animal liberation as complementary to anti-racism, arguing not that “All Lives Matter” but rather that *all systematic injustice is significant and worth combating*. Faculty Sponsor: Lydia McDermott

PLANT LIFE

SCIENCE 159

Heather Gaya, moderator
Gordon Kochman, coach

BRYAN SEMONSEN, *Macrofungi of Sumak Allpa: A Biodiversity Survey of an Island’s Fungal Community in the Ecuadorian Amazon*, 2:00 p.m.

Sumak Allpa, a small island in the Ecuadorian Amazon rainforest, was the site of study for a baseline biodiversity



survey of macrofungi. Sampling from three main forest types (secondary forest, primary forest, and varzea), a total of 140 morphological species were identified from 468 collected specimens, and statistical analysis was used to predict true species richness. Comparisons of the forest types revealed distinct micro-communities with intriguing trends, such as a lower biodiversity of the varzea, and a significantly higher percentage of soil-inhabiting species in primary forest. The significance of these findings is discussed, but more specific research is necessary to better understand this unique tropical ecosystem. The results of the study support and expound upon previous research that emphasizes the dire need for more biodiversity studies of fungal communities and longer-term research, especially in the understudied tropical rainforests of South America. Faculty Sponsor: Heidi Dobson

ARTY KRAISITUDOMSOOK, *Fungal Endophyte Diversity in Herbaceous Desert Plants*, 2:15 p.m.

Plants and fungi are known to form many types of symbiotic interactions. Emerging evidence suggests that the most common plant-fungal interactions likely involve fungal

endophytes. These fungi live within plant tissues without causing any apparent symptoms. Data have shown that fungal endophytes are extremely common and diverse in the tropical forests. However, little is known regarding their prevalence and diversity in deserts. I investigated the diversity and community structures of fungal endophytes in leaf, stem, and root tissues of three herbaceous plant species found in Tucson, Arizona: *Solanum elaeagnifolium* (Solanaceae), *Nicotiana obtusifolia* (Solanaceae), and *Verbesina encelioides* (Asteraceae). Faculty Sponsors: Tim Parker and Kate Jackson

BEN SHEPPARD, *Effects of the PIRL9 Gene in Arabidopsis*, 2:30 p.m.

Arabidopsis thaliana is a small flowering plant native to Eurasia that is used by geneticists to study plants. Geneticists often study groups of genes or “gene families.” The PIRL family is made up of nine related genes which all share certain characteristics that are unusual in plants. Functional genomics attempts to determine the function of genes, and one approach is to create an over-expression construct. An over-expression construct is a piece of DNA inserted into the plant’s genome to create many extra copies of a gene



product, in this case, protein. This approach has proved successful in the study of the the PIRL9 gene. In *Arabidopsis* extra PIRL9 protein creates a stunting or dwarf-like effect in the plants which contain the construct. This effect has been quantitatively measured in both the roots and leaves of experimental plants, indicating an important role for PIRL9 in plant development. Faculty Sponsor: Dan Vernon

SAM DEFRESE, *Effects of Invasive Plant Species on Native Grasses in Ngorongoro Crater, Tanzania*, 2:45 p.m.

Invasive alien plants are often thought to cause detrimental effects to ecosystems, destroying native plant life and altering ecosystem function. Not all interactions between native and invasive plant species are detrimental, however. The native arid grasslands of Ngorongoro Crater, in Tanzania, were surveyed to determine the effects of recent plant invasion. I recorded the color and dryness of the grasses both with and without the presence of invasive shrubs. After analyzing the relationship between presence of invasive shrubs and grass color and dryness, I found something quite unexpected. The presence of the invasive shrubs is not detrimental to the grasses but actually results in greener, less dry grass. This change in greenness may be attributed to a type of symbiotic relationship between the shrub and grasses that is seen in other arid systems. Shrubs may shade grasses, reducing evaporation, or concentrate nutrients in the soil for the grasses to utilize. Faculty Sponsor: Tim Parker

HEATHER GAYA, *An Integral Projection Model for Bluebunch Wheatgrass*, 3:00 p.m.

Bluebunch wheatgrass (*Pseudoroegneria spicata*), a local native bunchgrass species, has experienced significant decline over the past century. Historic overgrazing, competition with invasive species such as cheatgrass, and increasingly dry soil conditions may be responsible for this major decline. I created integral projection models of a bluebunch population in the Wallula Gap to analyze the long term behavior of this population and identify demographic patterns in bluebunch wheatgrass that can lead to the population's survival or decline. Through the analysis of these models, conservation can efficiently target precise size stages of the bluebunch wheatgrass life cycle to maximize survival and reduce the cost of bluebunch wheatgrass restoration efforts. Faculty Sponsor: Tim Parker

SECRETS OF THE DEEP
SCIENCE 100
Maegan Nelson, moderator
Cassandra Otero, coach

WILL ERICKSON, RUTH THURKILL, *Origin of Atmospheric Mercury Deposition to Pacific Northwest Alpine Lakes*, 2:00 p.m.
Pacific Northwest lakes mainly receive their atmospheric

weather patterns from Asia and as a result also receive many pollutants in the form of wet and dry deposition. Alpine lake water samples from the Big Horn Crags in the Frank Church Wilderness Area (Idaho), Olympic National Park (Washington), City of Seattle Watershed Reservoirs, and the Eagle Cap Wilderness area (Oregon) were analyzed for isotopic mercury. Water samples from these lakes are currently being isotopically analyzed using an inductively coupled plasma-mass spectrometry-quadrupole (ICP-MS-Q). Frank Church, Eagle Cap, Seattle watershed, and Olympia National Park samples show mercury concentrations in the low parts-per-trillion (ppt) and parts-per-quadrillion range (ppq). Initial analysis shows that mercury concentrations decrease as air fronts go inland. Samples will later be analyzed for ^{198}Hg , ^{199}Hg , ^{201}Hg , ^{202}Hg that will fingerprint the origin of mercury. Sources of mercury include United States and China coal pollution, and volcanic emission. Faculty Sponsor: Frank Dunnivant

NINA FINLEY, *Is Ocean Acidification Melting Sea Stars? The Effect of Lowered pH and Wasting Disease on Nearshore Asteroid Health*, 2:15 p.m.

Sea Star Wasting Disease (SSWD), the largest wildlife epizootic ever recorded, has killed millions of sea stars since June 2013. Evidence points to a viral infectious agent, Sea Star-Associated Densovirus, and multiple environmental factors are probably involved. This study evaluated the effect of ocean acidification (OA) on the progression of SSWD in four native Puget Sound species. Thirty-five individuals were maintained in ambient pH of Elliot Bay (pH = 7.80 to 8.00) or lowered pH predicted for 2100 (pH = 7.40 to 7.60). Daily visual grading and computed tomography (CT) were used to quantify the effects of OA on sea star health and ossicle density. Our results show that OA conditions accelerate SSWD in mottled sea stars during the first 25 days of exposure. Preliminary analysis indicates that OA decreases ossicle density, suggesting a trade-off between skeletal maintenance and immune function serves to amplify SSWD in OA conditions. Faculty Sponsors: Paul Yancey

JOHN DEBUYSSER, *Recruitment as a Tool for Coral Reef Conservation*, 2:30 p.m.

Coral reefs are refugia of biodiversity of the ocean, but these critical habitats are in decline worldwide due to changing environment parameters and human impact. Coral recruitment, the settlement of coral larvae on substrate, is an excellent indicator of coral reproductive success and a key process for recovery and resiliency of reef-building corals. However, recruitment is a sensitive process that is influenced by a number of factors including coral stock health, ocean currents, algal competition, pollution and site connectivity. These factors produce large variations in recruitment across time and location. Pinpointing the factors critical to recruitment success in the Caribbean

by establishing patterns of recruit density and examining correlations with environmental parameters are essential to protecting the health and productivity of valuable coral reef ecosystems. This work furthers the understanding of this phenomenon by describing coral recruitment patterns in coral reefs of the Turks and Caicos Islands. Faculty Sponsor: Amy Molitor

MAEGAN NELSON, *Potential Species Differentiation in Corals Via Protein Analysis*, 2:45 p.m.

Coral calcification is distinctive because it is similar to abiotic mineralization, occurs fast, involves rapid aragonite super saturation at the calcification site, the deposition of aragonite fibers and their organization into bundles. Our research examined the proteins and water involved in these calcification sites and compared them among species of coral collected from the Moorea Islands using Thermo Gravimetric Analysis (TGA), Differential Scanning Calorimetry (DSC), and Infrared Spectroscopy (IR). Faculty Sponsor: Allison Calhoun

ART AND INTERPRETATION

KIMBALL THEATRE
Jeremy Nolan, moderator
Ye He, coach

SARAH CORNETT, *Empty Landscapes: Orientalist Photography and the Beginnings of 'Ruin Porn'*, 2:00 p.m.

With the invention of the daguerreotype in 1839, photography became the newest visual medium to depict the Middle East as consumable to European and American audiences. British and French photography depicted the Holy Land and Egypt as a region in deterioration, with ruins that referenced ancient pasts. Photographers rendered these sites as empty and depopulated, without regard for contemporary life. Intentionally or not, they framed the region as available for the taking and in need of intervention from the West. These images, preoccupied with emptiness and crumbling sites, were the first photographs to glorify decay, embodying the “ruin porn” tropes now popular with images of deteriorating urban landscapes in cities such as Detroit. In their glorification of emptiness, early Middle East landscape photographs stand as the first to enframe, capture and fetishize degeneration, a photographic tradition that continues today. Faculty Sponsor: Elyse Semerdjian

KYRA ARNETT, *Locating Chinese Contemporary Art: Ai Weiwei in Walla Walla*, 2:15 p.m.

In the summer of 2015, a series of artworks by Chinese artist Ai Weiwei arrived in Walla Walla. Almost simultaneously, Ai was given several of his first solo exhibitions in China. While Ai Weiwei has received

critical and popular acclaim in the United States and Europe, his work remains at the fringe of China’s art scene. This disjuncture signals larger problems surrounding international and domestic perceptions of contemporary Chinese art. My presentation considers the relationships and institutions that allow Ai’s art to stand for contemporary art in China, particularly though not exclusively in the United States. Ai’s dominance in Western discussions of Chinese contemporary art suggests an attraction to Chinese artists and artwork that confirm the cultural and political superiority of Western liberal democracies. Faculty Sponsor: Lisa Uddin

ABBY SEETHOFF, *Intertwined: Life and Death in Latino/Spanish Graphic Narrative*, 2:30 p.m.

I examine the portrayal of death in three graphic novels from Spanish-speaking countries: *Daytripper* by Fábio Moon and Gabriel Bá, *Julio’s Day* by Gilbert Hernandez and *el Duelo* by Esteban Hernández. Each work resists the trope of death as a tragedy, ultimately offering a more hopeful understanding of it. Specifically, I analyze how the visual technique of braiding links various series of repeated images throughout each text that favors a non-linear reading, resists the finality of death and involves the reader in the act of narrative creation. Faculty Sponsor: Janis Breckenridge

JENNA STANLEY, *Werewolves and Aliens: Borders, Trauma and Transformation in Feeding Ground and El mundo gira*, 2:45 p.m.

Physical and metaphorical borders between the United States and Mexico are the subject of both *Feeding Ground*, a graphic novel, and *El mundo gira*, an *X-Files* episode. Drawing on Giorgio Agamben’s theory of the werewolf and Anne Whitehead’s theory of trauma fiction, I argue that the visual repetitions that characterize these distinct visual media emphasize the trauma of being an immigrant and of living on the border, or the in-between, amidst differing cultures, languages and identities. Ultimately, *Feeding Ground* and *El mundo gira* present themselves as works of the horror genre but with a commitment to social justice, fusing so-called high and low culture and setting an important precedent for other works of popular culture. Faculty Sponsor: Janis Breckenridge

JEREMY NOLAN, *Aesthetic Representation of Autism in Two Spanish Graphic Novels*, 3:00 p.m.

I examine the aesthetic representation of autism in two contemporary Spanish graphic novels that successfully counteract the typical medical presentation of disability: *María y Yo* (2007) and *María Cumple 20 Años* (2015), both written and drawn by Miguel Gallardo with his daughter Maria. Each text incorporates purposeful visual techniques in order to present the peculiar characteristics of Maria’s autism as well as her father’s preoccupations with her future. I share how their presentation facilitates educational discourse,

empowers the disabled and their families, and reflects the capability of the graphic novel to give authority to groups who are often overlooked. Faculty Sponsor: Janis Breckenridge

RHETORIC STUDIES: PUBLIC CULTURE

REID GOZ

Leda Zakarison, moderator
Shane Randle, coach

BEN CALDWELL, *Rhetoric and Public Culture: BP’s Commitment to Advertising and Ideographs*, 2:00 p.m.

After its public reputation was tarnished by the Deepwater Horizon oil spill, British Petroleum attempted to repair its public image by resignifying many of its previous campaign commitments through several rhetorical strategies, including personae, enthymemes and especially ideographs. In August 2012, BP released a video advertisement, “BP’s Commitment to America,” which constituted a dramatic shift from the video advertising campaigns that BP employed prior to the spill. In previous campaigns, BP portrayed itself as an ecologically conscientious company through the use of “green” ideographs. In “BP’s Commitment to America,” the energy giant abandoned this strategy, portraying itself as a company aligned with American values through the ideograph of “America” in order to foster identification with American consumers. I analyze and employ McGee’s conception of the ideograph to examine the effect of this strategy on BP’s public image. Faculty Sponsor: Heather Hayes

JESSICA KOSTELNIK, *Rhetoric and Public Culture: Bernie Sanders and Resignification*, 2:15 p.m.

After years of stigma, socialism has new currency in the presidential campaign of Bernie Sanders, a self-proclaimed Democratic Socialist. In interviews and public appearances, Sanders has attempted to resignify what it means to be a Democratic Socialist. Sanders’ candidacy brings to the forefront clashing interpretations of socialism. While his ability to maneuver around the modern political landscape is telling, a more fascinating consideration is what the current election cycle will mean for socialism. I argue that Bernie Sanders is resignifying socialism. He does so by rejecting the existing construct of the term socialism and reframing socialism in a modern context. The origins of socialism’s construction is not explicitly stated by Sanders. This strategic omission is a rhetorically powerful technique. Why is socialism stigmatized, and who perpetuates and benefits from these stigmas? Sanders enthymematically explores these questions in his interviews and speeches. Faculty Sponsor: Heather Hayes

EVAN ROMASCO-KELLY, *Rhetoric and Public Culture: Partisan Politics Feels the Bern*, 2:30 p.m.

In September 2015, Democratic presidential candidate

and Vermont senator Bernie Sanders gave a speech at Liberty University, the evangelical school founded in 1971 by conservative televangelist Jerry Falwell. Unlike the crowds of avid supporters that attended Sanders’ rallies in Portland or Seattle, the audience at Liberty University was much more skeptical. I show how Sanders employed two key rhetorical strategies to find common ground with the Liberty University community. First, he focused the attention of his primarily Christian audience on religious identity rather than on partisan political views. Second, he framed his liberal political platform in terms that would appeal to Christians, namely, the language of the Bible, morality, and justice. Finally, I discuss the implications of this analysis on broader partisan political discourse in the United States. Faculty Sponsor: Heather Hayes

LIZ CHENOK, *Rhetoric of Public Culture: Humans of New York and Pathos*, 2:45 p.m.

I explore the rhetorical significance of an image from the popular photoblog, Humans of New York. The image is of a young boy, clearly distressed and crying. The caption reads: “I’m homosexual and I’m afraid about what my future will be and that people won’t like me.” I focus on how this image generates pathos in individuals. My argument is threefold: how the image works rhetorically, how the caption works rhetorically, and how, together, image and caption have the potential to create change and pathos in individuals. My discussion ranges from the persona the photographer has created for the boy to what the boy is wearing to potential reasons why individuals might identify with the boy to issues of LBGTQ representation in the media. I unpack why, especially in this circumstance, visual and verbal rhetoric as a duet have significant impact on pathos in people. Faculty Sponsor: Heather Hayes

LEDA ZAKARISON, *Mipsters, IIMuslims, and MAZA: Muslim Americans and Social Media*, 3:00 p.m.

Current discourse within Islamic communities frequently emphasizes the importance of the global Muslim community, or *umma*, and the importance of maintaining this network. Historically, connections within the *umma* have been established and reinforced through kinship ties and trade partnerships. With the advent of the Internet age, Muslims have used online tools to connect further with members of the global Muslim community. At the same time, American discourse increasingly discusses Muslims in the United States within the monolithic identity category of “Muslim Americans.” At the intersection of these two trends, young Muslims in the United States are going online to discuss, navigate and perform their identities. Through interviews with young U.S. Muslims, I explore how Muslim millennials navigate the multiple dimensions of their identities, and how their interactions over social media influence, aid or hinder this navigation. Faculty Sponsor: Lauren Osborne

SESSION 4

3:45-5p.m.

POLITICS OF POWER

OLIN 130

Jack Percival, moderator
Elise Frank, coach

EMMA ALTMAN, *You Can't Sit With Us: Evocatio, Roman Imperialism and the Case of Juno Regina*, 3:45 p.m.

Evocatio, literally a “summoning,” was a religious rite in which Roman commanders invited the tutelary deity of a warring city to move to Rome. There are only five existing accounts of this ritual, and the precise place of *evocatio* in Roman *religio* and imperialist thought have yet to be fully investigated. All five instances transpired during the Republic in the context of Rome’s evolving international “empire” (*imperium*), while the surviving accounts all date to the Empire. Several similar, although distinct, events of physical relocation of deities are also primarily discussed in the Empire. I investigate the roles of foreign gods, whether introduced by *evocatio* or another practice, and explore Roman conceptions of empire building. Examples include the *evocatio* of Juno Regina, the journey of the ancient household gods the Penates of Lavinium as detailed in Virgil’s *Aeneid*, and the introduction of the cult of Magna Mater. Faculty Sponsor: Sarah Davies

ANNIE BOYENNEH, *Survival in Nigeria: Understanding Corruption outside the Framework of Western Representation*, 4:00 p.m.

Like many African nations, Nigeria has fallen victim to a Western narrative that characterizes the country as one of the most corrupt in the world. Nigeria has consistently been cited among countries with the worst governance, the least government transparency and the highest level of mistrust and corruption in the public sector. A U.S. House of Representatives hearing on Africa in 2006 concluded that Nigeria has a reputation for corruption. This Western view often dismisses the way in which corrupt practices in Nigeria have become a necessary social norm, a method of survival in the society. My presentation examines these “corrupt” social norms by drawing out colonial influences tied to contemporary corruption. I also show how corruption functions as a survival mechanism in Nigerian society. Faculty Sponsor: Shampa Biswas

JACK PERCIVAL, *The Same World Order: 'Operation Just Cause' and American Foreign Policy at the End of the Cold War*, 4:15 p.m.

On December 20, 1989, the United States invaded Panama to overthrow and arrest Panamanian dictator Gen. Manuel Noriega. The invasion, code-named

“Operation Just Cause,” was the biggest deployment of U.S. troops since the Vietnam War and represented a turning point in the use of military force. Since Vietnam, American policymakers had been constrained by the so-called “Vietnam Syndrome,” a reluctance to use force in situations in which U.S. national interests are at stake. Moreover, since the end of World War II, U.S. foreign policy had been guided by the prerogatives of the Cold War, with every international conflict framed by a bipolar worldview. I examine the policies of the administration of President George H.W. Bush that led to the invasion of Panama; the impact of the end of the Cold War on the decision to invade; and global implications of that decision for U.S. foreign policy. Faculty Sponsor: David Schmitz

HEALTH, EDUCATION AND ECOLOGY

SCIENCE 159

Erin Walters, moderator
Sunny Ysa, coach

LILY MONSEY, *Medicine as Balance: A Fusion of Traditional and Biomedical Children's Healthcare in Bali*, 3:45 p.m.

Why are mothers choosing to integrate traditional herbal medicines with increasingly prevalent biomedicines in rural regions of Bali? Why do traditional medicines endure given the increased availability of biomedicine? I explore how Balinese mothers consider and choose traditional and biomedical forms of healthcare for their young children. I use examples from traditional Balinese philosophy, current forms of government-sponsored biomedical healthcare and medical anthropological theory as lenses through which to examine why parents choose different types of medicines for their sick children. I examine how traditional and biomedicines are being merged to create an inclusive, integrative form of pediatric healthcare. Faculty Sponsor: Suzanne Morrissey

PAAL NILSSEN, *Bridging Gaps in Burma's Education: The Role of Migrant Schools Along the Thai-Burma Border*, 4:00 p.m.

Burma’s military government has kept many of its colleges closed for the past 20 years for fear of another student-led uprising for democracy. Some 25 percent of Burma’s budget is allocated to the military compared with only 1.3 percent for education. Lack of funding makes Burma’s education system one of the weakest in Southeast Asia. Thus, many students leave the country to find education in Mae Sot, a

Thai-Burma border town, where grassroots organizations provide funding for migrant ethnic minorities. I examine the effects of grassroots organizations on migrant communities and how education, as a perceived form of success, can also be a form of political resistance. Organizational efforts make it possible for migrant children to receive an education and return to their native villages in Burma to teach future generations. Faculty Sponsor: Kimberly Mueller

CAT MULANAX, *Effects of the Healthcare Service Gap on Residents (Age 65 and Older) of Marin County, California*, 4:15 p.m.

The health outcomes and demographics of residents of Marin County, California who are at least 65 years old were analyzed for three population groups: residents that fall below the 100% federal poverty line (FPL), residents that fall between the 100%-300% FPL, and residents that are over the 300% FPL. Survey data from the California Health Interview Survey (CHIS) were used to examine diabetes, immunizations, access to health care, and health behaviors. The 100%-300% FPL cohort is particularly interesting since these individuals do not qualify for welfare services like free healthcare but are also not wealthy enough to be in the self-sufficiency population to easily and

independently afford healthcare. Being stuck in this service gap creates hardships that affect health and well being. This study explored hardships faced by these individuals and policy changes to better serve this population. Faculty Sponsor: James Russo

ALEXANDER HULSE, *Fungus in Your Beer: Using GMOs to Fight Global Famine*, 4:30 p.m.

In a modern U.S. culture of anti-science rhetoric, it is important that the fear surrounding GMOs does not prevent subsistence and commercial farmers from protecting their barley from almost certain destruction due to the spread of highly virulent pathogens. Wheat stem rust is a common barley fungal pathogen found across the world in a variety of species. Current resistance genes have provided durable resistance to different stem rust species for many years and are of interest in developing further resistance mechanisms against the newest stem rust threat, Ug99, which has the potential to wipe out the majority of the world’s barley due to its strong virulence. Naturally occurring resistance genes can be used to genetically modify barley to protect world food supplies of barley, and thus GMOs need to stop being blacklisted by society. Faculty Sponsor: Britney Moss



ERIN WALTERS, *Sowing Change: Agro-ecology and Alternative Development in Ecuador*, 4:45 p.m.

Organic, small-scale farming in the Andes, also known as agro-ecology, has a rich history and immense possibility for socio-economic empowerment. Despite this potential, agro-ecology barely figures into global plans for “sustainable development,” which revolve around carbon markets. It also has little credibility with those who believe that biotechnology, pesticides and synthetic fertilizers represent the future of farming. As a small, non-industrialized country, Ecuador has many networks of small farmers but fewer institutionalized examples of small, sustainable agriculture. I studied various cases of agro-ecology in Cuenca (a midsize city in the south of Ecuador), their involvement with concepts of development and sustainability, and their position relative to local and national governments. In my presentation I explore what is gained and lost when regional governments, as opposed to community networks, direct agro-ecology initiatives. Faculty Sponsor: Aaron Bobrow-Strain

POLITICS OF CHURCH AND STATE SCIENCE 100

Grace Fritzke, moderator
Marlene Anderson, coach

GORDON KOCHMAN, *From Constantine to Ambrose: The Church-State Relationship of the Fourth Century*, 3:45 p.m.

The fourth century saw the development of Christianity from persecution to the endorsed religion of the Roman Empire. Beginning with Constantine’s conversion after his victory at the Battle of Milvian Bridge in 312, Christianity began to play an ever larger part in Roman religious and political life. Constantine summoned the Council of Nicaea in 325 to address the question of the Trinity; in 390 Saint Ambrose, the Bishop of Milan, forced Emperor Theodosius I to humiliate himself in public for the purpose of penitence. What changed during the fourth century that gave Christianity the influence over the Roman state that traditional Roman paganism lacked? I analyze the reasons behind Christianity’s usurpation of religious and political authority from the emperor during this time in an effort to understand the relationship between church and state. Faculty Sponsor: John Cotts

CHRIS MEABE, *Linking Monks to Massacres: Tales of a 16th-century Reformer*, 4:00 p.m.

The early 16th century saw Spain’s rise as a colonial power, expanding its empire through evangelism and violence. One of the first proponents of that strategy was Francisco Jiménez de Cisneros, leader of the Spanish Inquisition and the most powerful religious authority in Spain. However, Cisneros also reformed many religious institutions,

combated corruption within the Catholic Church and promoted a near-heretical re-evaluation of the Bible. In the past, historians have puzzled over the two sides of Cisneros: the humanist reformer and the violent inquisitor. My presentation seeks to resolve this tension by proposing that his repressive and violent actions were a logical fulfillment of his ideals and desire for religious reform. Cisneros’ beliefs and repressive tendencies carried into later centuries, thus my examination of his motives and actions also aims at a greater understanding of Spanish colonial expansion. Faculty Sponsor: John Cotts

EMMA THOMPSON, *Narrative Inversion: Identity Construction in the Nation of Islam*, 4:15 p.m.

The Nation of Islam, a black Muslim group, proclaimed a cosmology that inverted the racist narrative of white supremacy by positing that the original humans were black and that white people are devils created by a mad scientist. I trace how the Nation of Islam’s narrative changed during the 1960s and 1970s in response to the Civil Rights Movement, Pan-Africanism and rejection from other Muslims. Faculty Sponsor: Lauren Osborne

THOMAS BREEZE, CAROLINE BURNETT, GRACE FRITZKE, *Marcus Whitman as Missionary and Mascot*, 4:30 p.m.

The [Whitman] *Alumnus* reported in October 1951: “Yes, Marc gets around these days—keeping cheerful vigil over the fighting spirit of the College.” Marc, the Fighting Missionary, may have gotten around Whitman College in the 1950s, but these days many Whitman students are denouncing the Fighting Missionary’s links to cultural imperialism and Manifest Destiny. Our panel of presenters wants this conversation to continue. By examining the Whitmans’ intentions, the social environment of the 19th century United States, the myth of Marcus Whitman saving Oregon, and the way Whitman College exploited each of these components, we hope to provide a broader context for Whitman’s namesake and mascot. Understanding context is essential for informed, intentional discussion of and choices about the college’s mascot. Inasmuch as Whitman wishes to create citizens of a global community, informed discussion and choices are crucial parts of the education of its students. Faculty Sponsor: Rogers Miles

COMPOSER’S STUDIO KIMBALL THEATRE

Logan Schmidt, moderator
Gordon Kochman, coach

THOMAS MEINZEN, *"A Suite on the Wing,"* 3:45 p.m.

Composed this past fall, “A Suite On the Wing” is a set of character pieces for solo piano. Each piece aims to convey the essence of a specific bird and its habitat. “Eagle of

the Frozen Crags” begins with variations on three minor themes, superimposed upon the rhythm of a heartbeat to evoke the mystery of a mist-enshrouded eyrie. The second composition, “Thrush of the Autumn Leaves,” brings a contrast of tone and pace in a sweet, wandering melody, all captured by broken major sevenths, quintuplets and feathered triplet passages. The suite concludes with “Swallow of the Summer Skies,” a lilting, joyful song that glides through highly syncopated passages and descending chromatic progressions in tribute to the grace and speed of the swallow. I will speak briefly about the conception of the piece and my working process in creating it before it is played. Faculty Sponsor: John Earnest

CALVIN BRIGHAM, *"A Suite of Insects,"* 4:00 p.m.

“A Suite of Insects” consists of three pieces written for solo piano. The suite is based largely on a changing metrical structure, with each piece incorporating compound and shifting time signatures aimed at a cohesive musical texture. Each of the three pieces is dedicated to a specific insect or group of insects. The first piece seeks to represent the seemingly erratic movements of a bee swarm. The second captures a lone moth in its melancholy drifting. The third piece is modeled on the agile, collective movement of a centipede’s limbs. Before this debut suite is performed, I will speak briefly about its conception and my working process in creating it. Faculty Sponsor: John Earnest

CODY BURCHFIELD, *"Learning (Theme and Variations for Saxophone Trio),"* 4:15 p.m.

My composition, written for alto, tenor and baritone saxophones, opens with a quiet melodic theme voice by alto sax supported by chords in the tenor and baritone saxes. The theme has a moderate tempo and simple rhythmic structure. The melodic content is repeated and reworked eight times. The variations introduce new tempos and varying rhythmic structures. The harmonic relationships within the theme begin simply and then turn in surprising directions. This transition from simple chord progressions to unexpected, off-balance chords characterizes the theme and is noticeable in throughout the variations. I titled the composition *Learning* because the piece tries to learn from itself while exploring many different moods. As humans, we are constantly learning, and we are constantly forgetting. Before my composition is performed, I will speak briefly about my working process in creating it. Faculty Sponsor: John Earnest

LOGAN SCHMIDT, *"Simple Shift" for Quintet*, 4:30 p.m.

This past semester I worked on a theme and variations for a unique quintet featuring English horn, tenor saxophone, cello, piano and djembe (African hand drum). These five instruments, not frequently combined in a small ensemble setting, nonetheless match the tonal colors of each other.

My composition, titled *Simple Shift*, is actually anything but simple due to difficult rhythms, untraditional tonality, and other complexities. Before the piece is performed, I will speak briefly about the conception of the piece and my working process in creating it. Faculty Sponsor: John Earnest

GENDER INEQUITIES REID GOZ

Emily Grossman, moderator
Authur Shemitz, coach

EMMA NESLUND, *Game On: Language, Gender and Exclusivity in Sports Rhetoric*, 3:45 p.m.

Recent discourse about sports politics focuses on inequalities among men and women: pay discrepancies, media coverage and inconsistencies in access to resources. I examine the way in which language in sports commentary reveals a society grappling with the growing participation of women in sports traditionally defined by masculine values. This results in an otherness, a position on the periphery, for women athletes. I examine language used by commentators to describe men and women competing in tennis and basketball. Previous studies prescribe purposeful labeling of gender markers in sports to correct the dialect of men’s sports as the “original” and women’s sport as the “other.” I find this labeling practice equally problematic, forcing a categorization and identification that automatically excludes. Is all-inclusivity possible? Let’s play ball. Faculty Sponsor: Zahi Zalloua

LINNEA VALDIVIA, *Trans* Narratives in Pop Culture*, 4:00 p.m.

In recent years, trans* representation in pop culture has grown tremendously. From popular shows such as *Orange Is the New Black* and *Transparent* to icons such as Laverne Cox, Scott Schofield and Caitlyn Jenner, transgender narratives are enjoying record levels of representation and interest. At the same time, the images of transgender individuals are often highly distorted and driven by a highly transphobic ideology. Rarely presented as fully realized or happy characters, trans* individuals are often portrayed as the butt of jokes, long-suffering victims or moral deviants (murderers, rapists, drug addicts, etc.). I explore the ways in which trans* individuals are exploited in popular narratives for the “stories” surrounding their gender identity, and how, ultimately, trans* representation in its current form often does more harm than good. Faculty Sponsor: Melissa Wilcox

EMILY GROSSMAN, *Masculinity, Femininity and Perceived Personality Pathology*, 4:15 p.m.

Historic and current controversies related to gender surround the operationalization and use of certain

psychiatric diagnoses from the Diagnostic and Statistical Manual of Mental Disorders. Researchers have argued that gender bias may be present in either the diagnostic criteria or practices pertaining to the personality disorders, specifically histrionic and antisocial personality disorders. According to gender schema theory, gender categories and stereotypes play a central role in social cognition and lead people to make certain assumptions about the personalities of men and women. If certain

disorders, such as histrionic and antisocial, are in fact constructed on the basis of hyper-femininity and hyper-masculinity, then schematic effects of gender on our perceptions of men and women could explain gender differences in diagnoses for these disorders. Through correlational analysis of survey responses, I evaluate interactions between observers—perceptions of targets—gender and gender roles in predicting levels of perceived personality pathology. Faculty Sponsor: Pavel Blagov



PRESENTER INDEX

Abbott, Joe	28	Glickman, Brian	32	Paris, Brandon	14
Altman, Emma	8, 38	Goss, Lena	11	Patterson, Ellie	14
Anderson, Marlene	18	Gottlieb, Rose	18	Percival, Jack	38
Anthony, Jason	8	Grainger Shuba, Samantha	30	Phalen, Cole	15
Arnett, Kyra	36	Grossman, Emily	41	Ponce, Joel	22
Ash, Meghan	25	Hampton, Luke	18	Press, Trevor	14
Austin, Jessie	8	Hancock, Cameron	23	Reed, John	18
Ayal, Alex	26	Hancock, Rachelle	11	Reynolds, Emily	26
Basi, Jas	11	Hankin, Chris	30	Robinson, Sarah	18
Bayer, Catherine	18	Hart, Julia	21	Romasco-Kelly, Evan	37
Beebe, Kathryn	8	Heberlein, Evan	11	Rubinstein, Kate	18
Berez, Isaac	29	Heffron, Margo	22	Ruff, Meredith	31
Berg, Andrea	32	Helm, Marcus	22	Schaeffer, Nevin	27
Bessen, Brooke	8	Hirano, Matthew	22	Schafer, Casey	29
Biehl, Austin	32	Hodgkinson, Nicole	18	Schaffer, Joey	26
Blacher, Sarah	26	Holdman, Greg	20	Schmidt, Logan	41
Boyenneh, Annie	38	Horner, Hanna	21	Seethoff, Abby	36
Breeze, Thomas	40	Hsu, Eric	29	Seeger, Mateo	29
Brigham, Calvin	41	Hulse, Alexander	39	Semonsen, Bryan	32
Brock, Rachel	30	Hupper, Dani	11	Serkissian, Chloe	32
Brooksbank, John	20	Inglis, Audrey	25	Sheffer, Bea	27
Burchfield, Cody	41	Ishida, Amy	18	Shemitz, Arthur	32
Burnett, Caroline	40	Jeffers, Kuba	11	Sheppard, Ben	33
Burt, David	10	Johnson, Lachlan	18	Sheppard, Flora	18
Calamita, Chris	18	Kinney, Olivia	11	Sloan, Maeve	26
Caldwell, Ben	37	Kochman, Gordon	40	Sloss, Marlena	18
Calo, Zach	26	Kopczynski, Kelly	11	Sonstroem, Anneka	14
Chenok, Liz	37	Kostelnik, Jessica	37	Stanley, Jenna	36
Cherry, Jessy	10	Kotnik, Jack Henry	13	Stanley, Mackenzie	21
Cichocki, Anna	21	Kraisitudomsook, Arty	33	Steen, Katie	25
Cook, Taylor	26	Krawczak, Sarah	20	Teplow, Sara	18
Cornett, Sarah	36	Lanman, Henry	27	Thompson, Emma	40
Crane, Gabriel	10	Lanman, Ziggy	13	Thurkill, Ruth	35
Curtis, Samuel	21	Lea, Jenna	13	Toomey, Morrow	16
Dailey, Chris	10	Locklear, Phillip	13	Tornay, Jennifer	16
Davis, Eva	18	Luther, Gabriella	26	Valdivia, Linnea	41
Deacon, Emily	10	Meabe, Chris	40	Van Bergijk, Renee	18
DeBuysser, John	35	Mease, Asa	13	Walters, Erin	38, 40
DeFreese, Sam	35	Meinzen, Thomas	40	Wang, Godwin	16
Dobrin, Jenna	30	Miranda, Jon	26	Waraich, Ravneet	17
Donahue, Allie	31	Miura, Yasuha	22	Warwick, Troy	28
Duppenthaler, Madeline	22	Monsey, Lily	38	Wechter, Nick	20
Durand, Andrew	30	Mueller, Spencer	14	Wildman, Andrew	17
Engel, Mira	14	Mulanax, Cat	39	Williams, Chris	17
Erickson, Will	35	Nelson, Maegan	36	Williams, Emily	24
Erving, Caroline	30	Nesbit, Kristin	14	Wills, Katy	25
Finley, Nina	35	Neslund, Emma	41	Woletz, Benjamin	26
French, Peter	8	Newmark, Emma	25	Worthington, Riley	29
Fritzke, Grace	40	Nilssen, Paal	38	Xu, Suzy	17
Furbershaw, Jose	29	Nolan, Jeremy	14, 36	Zakarison, Leda	37
Gabel, Matt	20	O'Brien, Megan	29	Zarazua-Osorio, Brenda	17
Gaya, Heather	35	Palacios, Jessica	14		

RESEARCH FUNDING SOURCES/OFF-CAMPUS STUDY PROGRAMS

NOTES

Joe Abbott SIT: Ecuador	Heather Gaya Perry Summer Research Award	Jessica Palacios Perry Summer Research Award, Abshire Scholar Research Award
Emma Altman Perry Summer Research Award	Brian Glickman Perry Summer Research Award	Cole Phalen Infectious Disease Research Institute
Jason Anthony Keck Geology Consortium	Lena Goss Arthur Belden Watts Student Field Research Fund	Nevin Schaeffer National Science Foundation
Kathryn Beebe Whitman Internship Grant	Nicole Hodgkinson Perry Summer Research Award	Mateo Seger Abshire Scholar Research Award
Andrea Berg Perry Summer Research Award	Greg Holdman National Science Foundation	Bea Sheffer National Science Foundation
Brooke Bessen Perry Summer Research Award	Eric Hsu National Science Foundation	Ben Sheppard Perry Summer Research Award, Abshire Scholar Research Award
Austin Biehl Perry Summer Research Award	Audrey Inglis Whitman Internship Grant	Morrow Toomey Whitman Internship Grant
Jessy Cherry Perry Summer Research Award	Sarah Krawczak Howard Hughes Medical Institute	Erin Walters SIT: Ecuador
Chris Dailey Perry Summer Research Award	Ziggy Lanman Perry Summer Research Award	Raveneet Waraich Perry Summer Research Award
John DeBuysser The School for Field Studies, Marine Resource Studies, Turks and Caicos Islands	Jenna Lea Whitman Internship Grant	Troy Warwick The School for Field Studies, Wildlife Management Studies, Tanzania
Sam DeFreese The School for Field Studies, Wildlife Management Studies, Tanzania	Jon Miranda National Science Foundation	Nick Wechter Perry Summer Research Award
Will Erickson Perry Summer Research Award	Lily Monsey SIT: Indonesia	Katy Wills IES: Spain
Nina Finley Hollings Scholarship (National Oceanic and Atmospheric Administration)	Kristin Nesbit Perry Summer Research Award	Brenda Zarazua-Osorio Perry Summer Research Award
Matt Gabel Perry Summer Research Award	Megan O'Brien CIEE: Costa Rica	

NOTES

CONFERENCE ORGANIZING COMMITTEE

Keith Raether
DIRECTOR, OFFICE OF FELLOWSHIPS AND GRANTS

Katie DePonty
DIRECTOR, OFFICE OF CONFERENCES,
EVENTS AND SCHEDULING

Jon Loney
MANAGER OF INSTRUCTIONAL MULTIMEDIA SERVICES,
OFFICE OF TECHNOLOGY SERVICES

Deberah Simon
SENIOR LECTURER OF CHEMISTRY

Debi Evans
SCHEDULING COORDINATOR, OFFICE OF CONFERENCES,
EVENTS AND SCHEDULING

Devon Wootten
LANGUAGE LEARNING CENTER MANAGER

David Schulz
SENIOR DESIGNER, OFFICE OF COMMUNICATIONS

Austin Ables
INSTRUCTIONAL AND LEARNING TECHNOLOGIST FOR
SCIENCES, OFFICE OF TECHNOLOGY SERVICES

With special thanks to McKenzie Lynn, Natasha Blake, Amy Dodds, Doug Scarborough, Gary Gemberling, Whitman College Technology Services, Teresa Maddess and the staff of Bon Appétit, and the student musicians who provide entertainment throughout the day.

CONFERENCE VENUES

- | | |
|---|---|
| 1 Cordiner Hall | 4 Olin Hall
130 |
| 2 Reid Campus Center
G02 | 5 Maxey Hall
104 |
| 3 Hall of Science
100 (Brattain Auditorium)
151
159 | 6 Hunter Conservatory
Kimball Theatre |



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