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Spokane Intercollegiate Research Conference 2013

Whitworth University

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SIRCC

Spokane Intercollegiate Research Conference

Saturday, April 27th, 2013

11th Annual

Whitworth University
E-mail: sirc@whitworth.edu

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SIRC 2013 Schedule

8:15-9 a.m.	Check-in, Coffee and Pastries	Weyerhaeuser Avista Square
9-9:10 a.m.	Welcome and Introductions	Weyerhaeuser Robinson Teaching Theater
9:10-10 a.m.	Keynote Address	Weyerhaeuser Robinson Teaching Theater
10:15-11:45 a.m.	Morning Oral Sessions 1-12	Weyerhaeuser Hall (WEYR) and Robinson Science Hall (ROB)
10:15-11:45 a.m.	Morning Poster Session, Session 13	Hixon Union Building (HUB) Multipurpose Room
11:45-12:45 p.m.	Break for lunch	Hixon Union Building (HUB) Cafeteria
1-2:30 p.m.	Early Afternoon Oral Sessions 14-25	Weyerhaeuser Hall (WEYR) and Robinson Science Hall (ROB)
1-2:30 p.m.	Early Afternoon Poster Session, Session 26	Hixon Union Building (HUB) Multipurpose Room
2:45-4:30 p.m.	Late Afternoon Oral Sessions 27-34	Weyerhaeuser Hall (WEYR) and Robinson Science Hall (ROB)
3-4:30 p.m.	Late Afternoon Poster Session, Session 35	Hixon Union Building (HUB) Multipurpose Room

Conference Speaker

Beck A. Taylor, Ph.D.: “The Opportunities and Challenges of Interdisciplinary Scholarship”

Many of the best ideas and most promising solutions to society’s biggest problems lie not exclusively within selected and more narrowly defined academic fields and sub-disciplines, but rather at the intersections of two or more areas of study. Although academic curricula often continue to maintain restrictive silos that prevent appropriate cross-fertilization across disciplines, researchers are regularly unharnessing the power of interdisciplinary investigation. Beck Taylor, president of Whitworth University and interdisciplinary scholar, will discuss the inherent challenges and opportunities as students and professors examine difficult problems from a variety of disciplinary perspectives.



Beck A. Taylor
President, Whitworth University

Beck A. Taylor, Ph.D., became the 18th president of Whitworth University (Spokane, Wash.) in July 2010. He came to Whitworth after serving as dean and professor of economics for the Brock School of Business at Samford University, Birmingham, Ala., and as associate dean for research and faculty development for the Hankamer

School of Business at Baylor University, Waco, Texas, where he was also the W.H. Smith Professor of Economics.

Since arriving at Whitworth, Taylor has led the university in developing a 10-year vision and strategic plan, *Whitworth 2021: Courage at the Crossroads*, which calls for expanding student opportunities for experiential learning, intercultural engagement and post-graduate preparation while continuing to elevate Whitworth’s standing as one of the finest Christian liberal arts universities in the country. He also has opened new channels of communication with students, alumni and friends of the university and has strengthened connections with business, community and legislative leaders in the region.

After earning his undergraduate degree from Baylor, with majors in economics and finance, Taylor was employed as an analyst for Andersen Consulting (now Accenture) in Houston. He went on to earn the M.S. and Ph.D. in economics from Purdue University, in West Lafayette, Ind. After returning to the Baylor faculty, Taylor received the Young Researcher Award from the Hankamer School of Business in 2000 and subsequently was named the first holder of the W.H. Smith Professorship in Economics. In 2002, he was appointed a visiting scholar by Harvard University, where he spent one year in residence at the Harvard Graduate School of Education pursuing research interests. In 2005, Taylor was named a Baylor University Outstanding Professor for his research accomplishments.

As dean of Samford’s Brock School of Business, Taylor helped to lead the rapid transformation of the business school, spearheaded by a commitment from Harry B. Brock, Jr., founder of Compass Bank, to build a \$100 million endowment for the

school. Taylor also led the Brock School to establish an honors program and eight new academic programs, including an entrepreneurship program that was recognized in 2010 as the nation’s top emerging program by the U.S. Association for Small Business & Entrepreneurship.

As a scholar, Taylor has published more than two dozen studies in economics journals such as *Review of Economics and Statistics*; *Journal of Labor Economics*; *Journal of Human Resources*; and *Journal of Money, Credit, and Banking*. Illustrating his diverse research interests and his connections to the social sciences, Taylor has also published research in public health and child developmental psychology. His research has been cited in testimony given before the U.S. Congress and the California State Assembly and also has been referenced in publications such as *The New York Times*, *The Boston Globe*, *The Christian Science Monitor*, and *Chief Executive Magazine*. His research has also been mentioned by organizations as diverse as the National Center for Children and Poverty at Columbia University, the Center for Law and Social Policy, the Center for the Advancement of Health, the National Institute for Child Health and Human Development, and the Heritage Foundation.

Taylor is a member of numerous professional and academic organizations, including the American Economic Association, Beta Gamma Sigma (international honor society for business programs), Omicron Delta Epsilon (international economics honor society), Beta Alpha Psi (honor society for financial information students and professionals), and the Association of Christian Economists. Additionally, he served for six years on the editorial board of the *Atlantic Economic Journal*. Taylor has served as a business consultant for dozens of organizations, and he was director for the NASDAQ-listed Goldleaf Financial Solutions, Inc. (Norcross, Ga.). He currently serves on the boards of Whitworth University, The Whitworth Foundation, Greater Spokane Incorporated, Association of Presbyterian Colleges and Universities, Independent Colleges of Washington, University District Public Development Authority, Spokane, and Thrive by Five Washington.

Taylor and his wife of 20 years, Julie, have three children: Zach (17), Lauren (14), and Chloe (6).

Welcome and Keynote Address **9-10 a.m.**

Faculty Moderator: Noelle Wiersma
Weyerhaeuser, Robinson Teaching Theater

Keynote Beck A. Taylor, Ph.D.: "The Opportunities and Challenges of Interdisciplinary Scholarship"

Morning Oral Sessions **10:15-11:45 a.m.**

Session 1 **Room ROB 141**

Faculty Moderator: John Beck

1A Laura Fabiola Watts Cesena and Andrew Warlaumont: "Past Economic Theories and their Modern Applications"
Faculty Sponsor: John Beck

1B Courtney Hoffmann: "Athletic Success and Donations"
Faculty Sponsor: S. Roger Park, Karen Rickel

1C Patrick Noonan: "The Big Dance and Big Divide: Demographic Differences between Men and Women's College Basketball Appreciation"
Faculty Sponsor: Vikas Gumbhir

Session 2 **Room WEYR 203**

Faculty Moderator: William Hayes

2A Tim Yates: "No Homo: Representations of Gay Men in a Modern Family"
Faculty Sponsor: Vikas Gumbhir

2B Chelsea Hunt: "The YOLO Tattoo: University Students Stigmatization and the Labor Market"
Faculty Sponsor: William Hayes

2C David Fong: "Gender and Motivation within Gaming Culture"
Faculty Sponsor: Vikas Gumbhir

2D Morgan Saad: "The Pope the Pill and the Public: Different Usages and Perceptions of Birth Control at a Catholic Campus"
Faculty Sponsor: William Hayes

Session 3 **Room WEYR 204**

Faculty Moderator: Gary Chang

3A Edward Lee: "A Theoretical Matrix Model Representing the Abundance of Mecinus Janthiniformis within Urbanized areas of Dalmation Toadflax"
Faculty Sponsor: Gary Chang

3B Nicole Green and Casey Collins: "The Effect of Site Test Size on Urban Environment and Stem-boring Weevil (*Mecinus janthiniformis*) Densities"
Faculty Sponsor: Gary Chang

3C Patrick Ronay, Meredith Crenshaw and Kathryn Kirdahy: "Coal Trains and Urban Development in Spokane"
Faculty Sponsor: Gregory Gordon

Session 4 **Room WEYR 205**

Faculty Moderator: Karin Heller

4A Lily Sears: "The Only Instance We are Free"
Faculty Sponsor: Fr. Timothy Clancy

4B Kayla Sisk: "The Holy Spirit: A Comparison of Catholic and Pentecostal Theologies"
Faculty Sponsor: Karin Heller

4C Kayla Schierman: "Exploring the Limits of Complementarian and Egalitarian Gender Relationships"
Faculty Sponsor: Karin Heller

Session 5 **Room WEYR 303**

Faculty Moderator: Jennifer Brown

5A Morgan Chambers: "(Man)Dating Masculinity: How Bromance Resists and Reinforces Gendered Expectations"
Faculty Sponsor: Vikas Gumbhir

5B Angela Lutwitz: "Unity as the Solution to War in 'La Grande Illusion'"
Faculty Sponsor: Jennifer Brown

5C Jonathan Whitmore: "A Different Path: Gay Culture Through the Lens of French Cinema"
Faculty Sponsor: Jennifer Brown

Session 6 **Room WEYR 304**

Faculty Moderator: Vikas Gumbhir

6A Caitlin Taylor: "Contaminating the Hopi Way: An Exploration of the Effects of Hopi Contact with the White Man"
Faculty Sponsor: Jennifer Holsinger

6B Christina Hendrickson: "Rape Culture on College Campuses"
Faculty Sponsor: Marguerite Marin

6C Amy McLoughlin: "Youth Who Age Out of the Foster Care System: What They Say Can Improve Their Life Outcomes"
Faculty Sponsor: Marguerite Marin

Session 7 **Room WEYR 305**

Faculty Moderator: Anna Marie Medina

- 7A Tsega Gaim: "Language Fluency and One's Communal Worth"
Faculty Sponsor: James Hunter
- 7B Ayaka Dohi: "'Being Brown': The Coping Mechanisms of Racial/Ethnic Minority and First-Generation Students in a Predominantly White School"
Faculty Sponsor: Vikas Gumbhir
- 7C Alen Tersakyan and Andrew Maldonado: "Social Networking and Self-Esteem"
Faculty Sponsor: Anna Marie Medina

Session 8 **Room WEYR 111**

Faculty Moderator: Raja Tanas

- 8A Kaitlin Asson and Allison Scott: "Bourdieu Goes to College: Notions of Capital and Student Choices"
Faculty Sponsor: Vikas Gumbhir
- 8B Chelsea Caslavka: "I'd Tap That: Homosocial Groups, Alcohol Consumption, and Gender Harassment"
Faculty Sponsor: Vikas Gumbhir
- 8C Ylisse Bess: "Racial Preference No Offense: Explaining Attitudes Toward Interracial Dating at a Private University"
Faculty Sponsor: Vikas Gumbhir
- 8D Sinead Christensen: "A Prescription for College: Use and Abuse of Prescription Drugs at a Private University"
Faculty Sponsor: Vikas Gumbhir

Session 9 **Room ROB 229**

Special Session: Imagining England in Modern British Fiction

Faculty Moderator: Charles Andrews

- 9A Maggie Montague: "Death in Brackets: War's Intrusion on To the Lighthouse"
Faculty Sponsor: Charles Andrews
- 9B Ana Quiring: "The Cinematic Catholic Spy Novel: Genre Fusion in Graham Greene's End of the Affair"
Faculty Sponsor: Charles Andrews
- 9C Shannon Ritchie: "Challenging Victorian Stereotypes: Comparison of Mrs. Ramsay and Lily Briscoe"
Faculty Sponsor: Charles Andrews

Session 10 **Room ROB 210**

Special Session: Gonzaga Chemistry Department

Faculty Moderator: Katherine Hoffmann

- 10A Gregory Prussia: "Structural Elucidation of the DesD Enzyme in the Desferrioxamine Synthesis Pathway"
Faculty Sponsor: Katherine Hoffmann
- 10B Alex Hofstetter: "Structural Characterization of 3-Hydroxy-3-methylglutaryl Coenzyme A Reductase from *Burkholderia cenocepacia*"
Faculty Sponsor: Jeffrey Watson
- 10C Christopher Chapman: "Exploration of Oxidative HMG-CoA Reductase by Various Kinetic Techniques"
Faculty Sponsor: Jeffrey Watson
- 10D Hannah Maul-Newby: "Towards Design of New Anti-Tuberculosis Drugs: Targeting Eubacterial β -Carbonic Anhydrase"
Faculty Sponsor: Jeff D. Cronk

Session 11 **Room ROB 310**

Special Session: Gonzaga Chemistry Department

Faculty Moderator: Eric Ross

- 11A Gregory Busch: "Factors Affecting the Adsorption of Fluoride to Charred Bone in Drinking Water"
Faculty Sponsor: Joanne Smieja
- 11B Marin Hatcher: "Development and Optimization of a Radiosynthesis of ^{18}F Labeled Derivatives of Lactic Acid for the Potential Diagnosis of Alzheimer's Disease"
Faculty Sponsor: Stephen Warren
- 11C Samantha Blake: "Characterization of Designer Drugs of Abuse via 1D and 2D NMR"
Faculty Sponsor: Jennifer Shepherd
- 11D Taylor Johnston: "Evaluation of Gramicidin Interactions with Metal Ions by Chromatography"
Faculty Sponsor: Eric Ross

Session 12 **Room ROB 126**

Faculty Moderator: Gary L. Thorne

- 12A Lauren Joplin and Maria Mai: "Book Embedding Optimizations for Families of Graphs"
Faculty Sponsor: Shannon Overbay and Paul De Palma

12B Patrick Mosca: "Online Teacher Evaluations May Not Be What You Think: Insights into Education Quality via RateMyProfessor.com"
Faculty Sponsor: Shawn Bowers

12C John Berkes and Stevie Hamilton: "Reaction Times in Athletes and Non-Athletes"
Faculty Sponsor: Gary L. Thorne

Morning Poster Session 10:15-11:45 a.m.

Session 13 HUB, Multipurpose Room

13A Angela Lutwitez, Alicia Peebles and Megan Smith: "Urtica Dioica is Ineffective as an Inflammation Reducer at Doses of 870 mg as Compared to a Commercial Antihistamine"
Faculty Sponsor: Mike Sardinia

13B Jack Dunbar and Dominique Armstrong: "Microbial Arsenic Respiration in the Spokane River"
Faculty Sponsor: Frank Caccavo

13C Michael Landkammer and Amy Thompson: "Structural Orientation Analysis from the Beacon Hill Area of the Spokane Dome"
Faculty Sponsor: Chad Pritchard

13D Lindsey LaShaw: "Can Tree Cover Account for Variations in Length and Start of Season?"
Faculty Sponsor: Grant Casady

13E Kari Jenson: "Validating Raman Spectroscopy and Micro-Indentation Tests for In-Vivo Assessment of Bone Quality"
Faculty Sponsor: Tailen Chen

13F Bradley Hopp, Ashlin Phelps and Audie Hyatt: "B-Alert System Sensor Headset Encephalography Used to Measure Brain Activity in Response to Playing Halo 2 (Videogame) and Solving Sudoku"
Faculty Sponsor: Michael Sardinia

13G Mackenzie Grow: "Evaluating the Phenological Plasticity between Varying Land Cover Types"
Faculty Sponsor: Grant Casady

13H Taylor Powell: "Evaluating ISO 23 & 68 Grade Eco-Friendly Hydraulic Fluids used Hydropower Energy"
Faculty Sponsor: Kerry Breno

13I Shauna Maple: "Alkaline Dissolution Kinetics of Iron-Phosphate Glass"
Faculty Sponsor: Kerry Breno

13J Anita Wang: "Analysis of Volatiles Involved in Ageing of Beer between Gluten-Free and Regular Beer through Gas Chromatography and Mass Spectroscopy"
Faculty Sponsor: Drew Budner

13K Luke Welle: "A Microwave-Assisted Palladium Cross-Coupling 2-Phenylindole Synthesis for the Undergraduate Organic Chemistry Laboratory"
Faculty Sponsor: Kerry Breno

13L Raeann Hutson: "pH-Dependent Fluorescence of Rhenium Tricarbonyl Dihydroxyphenanthroline Chloride"
Faculty Sponsor: Kerry Breno

13M Katherine Shaw and Lauren Worcester: "Functional Analysis and Treatment of Aberrant Behavior Maintained by Multiple Functions"
Faculty Sponsor: Anjali Barretto

13N Lauren Worcester: "Evaluating the Effects of Escape Extinction on the Number of Bites Accepted Both Pre- and Post- Fundoplication"
Faculty Sponsor: Anjali Barretto

13O Eric Wonn: "Optimization of Parameters for Hydrogen Peroxide Detection Using Polymer-Prussian Blue Layered Electrodes"
Faculty Sponsor: Drew Budner

13P Emily Foreyt: "Susceptibility of Amphibian Species to the Fungal Pathogen *Batrachochytrium dendrobatidis*"
Faculty Sponsor: Christy Watson

13Q Whitney Shirley, Hannah Tubbs and Colby Davis: "Glyphosate Toxicity in *Gambusia Affinis*"
Faculty Sponsor: Mike Sardinia

13R Zachary Arms, Sim Gosal and Austin Ulakovich: "Groundwater Interaction between Columbia River Basalt Group and Paleodrainage Aquifers West Plains Washington"
Faculty Sponsor: Chad Pritchard

13S Megan Hulsey: "Antibacterial and Antifungal Properties of *Inula helenium* Extract"
Faculty Sponsor: Erin R. Griffin

13T Vicki Rozell and Christopher Doll: "The Assessment of Communication Modalities in a Young Child with Autism"
Faculty Sponsor: Anjali Barretto

- 13U Amanda Stansell and Samantha Cagle: "Decreasing Aberrant Behavior during Cooperative Play in a Child with Severe Problem Behaviors using a Behavior Management Treatment Package"
Faculty Sponsor: Anjali Barretto
- 13V Kelsey Harris: "The Effects of Using a Model Lead-Test Error Correction for Teaching a Student with ADHD Multiplication Facts: A Case Report"
Faculty Sponsor: T. F. McLaughlin
- 13W Hanna Gutting-McKee: "The Differential Effects of Using Tracing Sheets to Improve Developmentally Delayed Student's Handwriting Ability"
Faculty Sponsor: T. F. McLaughlin
- 13X Alecia Tumpap: "Differences in Hippocampal Volume Associated with Post-Traumatic Stress Disorder (PTSD): A Meta-Analytic Review of Quantitative MRI Findings"
Faculty Sponsor: Michael Nelson
- 13Y Iliana Sanchez: "Sea Anemones' Substrate Preferences for Attachment"
Faculty Sponsor: Craig Tsuchida
- 13Z Mary Konis and Allison Blake: "Characterizing bacterial membrane components: Efforts toward understanding antimicrobial peptide mechanisms"
Faculty Sponsor: Matthew Cremeens

Early Afternoon Sessions

1-2:30 p.m.

Session 14

Room ROB 229

Faculty Moderator: Randy Michaelis

- 14A Laura Fabiola Watts Cesena: "A Comparison of Education Systems: USA vs. UK"
Faculty Sponsor: Michael Treleven
- 14B Jenna Hansen: "Math Education in Singapore and the United States: A Comparative Analysis"
Faculty Sponsor: Randy Michaelis
- 14C Matthew Gilles: "Corrective Feedback and Action Research"
Faculty Sponsor: James Hunter

Session 15

Room WEYR 111

Faculty Moderator: Gary L. Thorne

- 15A Katherine Jones and Christopher Galeucia: "More Frequent Electrodermal Responses to Familiar Than Unfamiliar Chimpanzee Faces"
Faculty Sponsor: Gary L. Thorne

- 15B Jakeem Lewis and Terran Poindexter: "The Effects of Stress on Problem-Solving"
Faculty Sponsor: Gary L. Thorne
- 15C David Fong and Sarah Tilghman: "Tension and Judgment of Time Duration"
Faculty Sponsor: Gary L. Thorne
- 15D Fallon Baraga and Virginia Whalen: "Meditation and Social Connectedness"
Faculty Sponsor: Gary L. Thorne

Session 16

Room ROB 126

Faculty Moderator: Corliss Slack

- 16A Sarah O'Bernier: "Fascist Art and Aesthetics: Questioning the Homogeneity in Artistic Perspectives in Mussolini's 'New Italy'"
Faculty Sponsor: Corliss Slack
- 16B Sarah Jaymes Kenney: "Reformation: A Tool for the Fulfillment of Dynastic and Personal Goals"
Faculty Sponsor: Corliss Slack
- 16C Brandon Campbell: "Babi Yar: The Conscience behind Dmitri Shostakovich's Thirteenth Symphony"
Faculty Sponsor: Corliss Slack

Session 17

Room WEYR 305

Faculty Moderator: Gary Chang

- 17A Jennifer Ampadu: "Quenching Briggs-Rauscher Reactions: Effects of Organic and Inorganic Salts"
Faculty Sponsor: Karen Stevens
- 17B Nathan Peck: "Manmade Closed Ecological Systems"
Faculty Sponsor: Gary Chang
- 17C Erin Lapsansky: "Genetic Pest Resistance in *Rosa hybrida*"
Faculty Sponsor: Marianne Poxleitner

Session 18

Room WEYR 304

Faculty Moderator: Michael Rempe

- 18A Aaron Marsh: "A Percolation Model for Cluster Formation in Systems of Gapped Metal Rings"
Faculty Sponsor: Christopher Lasota
- 18B Evan Edstrom: "Improving Multi-Agent Exploration Efficiency Through Perimeter Analysis"
Faculty Sponsor: Kent Jones

18C Nathan Hunter: "A Mathematical Model for Celiac Disease"
Faculty Sponsor: Michael Rempe

Session 19 **Room WEYR 303**
Faculty Moderator: Heather Easterling

19A Christina Iatridis: "The Moon in A Midsummer Night's Dream: Alternative to Patriarchy or Catalyst of Tragedy?"
Faculty Sponsor: Heather Easterling

19B Megan Dempsey: "Minds Transfigured?: An Interrogation of Pyramus and Thisbe in A Midsummer Night's Dream"
Faculty Sponsor: Heather Easterling

19C Amanda Klasila: "Managing Anxieties through Comedy: A Guidebook of the City of London through the Shoemaker's Holiday & A Chaste Maid in Cheapside"
Faculty Sponsor: Heather Easterling

19D Diana Cater: "So Irrefutable It Can't Be True: The Erosion of the Traditional Scientific Narrative in Randy Shilts' *And the Band Played On*"
Faculty Sponsor: Nicole Sheets

Session 20 **Room WEYR 205**
Faculty Moderator: Andrew Goldman

20A Hanna Hanks: "The Role and Reality of the Hetaira in Classical Greek Culture and Iconography"
Faculty Sponsor: Andrew Goldman

20B Katherine Joyce: "Evidence for the Jewish-Roman Treaty of 161 BCE"
Faculty Sponsor: Andrew Goldman

20C Victoria Fallgren: "The Julio-Claudians: They Put the Fun in Dysfunction"
Faculty Sponsor: David Oosterhuis

20D Jasmine Linane-Booey: "Schoenberg Center: An Ideological Analysis"
Faculty Sponsor: Lisa Davis

Session 21 **Room WEYR 203**
Faculty Moderator: Anna Marie Medina

21A Amber Buehlmaier: "The Last Piece: Adoptees Identity Construction and the Reunification Process"
Faculty Sponsor: Vikas Gumbhir

21B Kaitlyn Dowd: "While Mom is Away the Kids Will Play: Parental Attachment Familial Disruptions and Delinquency"
Faculty Sponsor: Vikas Gumbhir

21C Centered Israel: "Don't Be a Drag Just be a Queen; An Ethnographic Study of Drag Queens"
Faculty Sponsor: Vikas Gumbhir

21D Madeline O'Neil: "What Happens in College Stays in College: Exploring the Relationship Between Hedonism Careerism Achievement Orientation and Deviance at a Private University."
Faculty Sponsor: Vikas Gumbhir

Session 22 **Room WEYR 204**
Special Session: What the Writings of Henry George Teach Us about Taxation to Promote Fairness and Prosperity
Faculty Moderator: John Beck

22A Katherine Catlin: "Progress Poverty and Planetary Preservation"
Faculty Sponsor: John Beck

22B Alec Stannard: "Fair Taxation"
Faculty Sponsor: John Beck

22C Ian Houts: "A Critical Juncture"
Faculty Sponsor: John Beck

Session 23 **Room ROB 210**
Special Session: Gonzaga Chemistry Department
Faculty Moderator: David Cleary

23A Krystal Orth: "Host-guest Interactions of a Membrane Bound Cavitand Investigated by Biomembrane Analytical Affinity Chromatography"
Faculty Sponsor: Eric Ross

23B MacGregor Hodgson: "Can an Exclusion Mechanism of Retention be Designed into Biomembrane Analytical Affinity Chromatography?"
Faculty Sponsor: Eric Ross

23C Chasina Olis: "Low Temperature Synthesis of Nickel(II) Hypodiphosphate"
Faculty Sponsor: David Cleary

23D Jonathan Barnett: "Photocatalytic Water Splitting with Rare Earth Metal Oxides"
Faculty Sponsor: David Cleary

Session 24**Room ROB 310**

Special Session: Gonzaga Chemistry Department
Faculty Moderator: Jennifer Shepherd

- 24A Ingmar Bolinger: "Virtual Screening for Inhibitors of Mycobacterium Tuberculosis β -Carbonic Anhydrase"
Faculty Sponsor: Stephen Warren
- 24B Thuy-mi Nguyen: "The Characterization of Parahaemolyticus Vibrioferriin Synthesis B (PvsB)"
Faculty Sponsor: Katherine Hoffmann
- 24C Connor Cahill: "The Purification and Characterization of RquA in *Rhodospirillum rubrum* and *Escherichia coli*"
Faculty Sponsor: Jennifer Shepherd
- 24D Taylor Brown: "A Lipidomic Study of Antimicrobial-Peptide-Sensitive Bacteria"
Faculty Sponsor: Matthew Cremeens

Session 25**Room ROB 141**

Special Session: Jane Austen Adaptations
Faculty Moderator: Laura Bloxham

- 25A Kirsten Bleeker: "Prose or Film: The Battle of Aesthetics Concerning Jane Austen's Emma"
Faculty Sponsor: Laura Bloxham
- 25B Joanna Szabo: "The Lizzie Bennet Diaries Web Series: Why Jane Austen is best told in 'vlog' form"
Faculty Sponsor: Laura Bloxham
- 25C Hannah Crawford: "Film Misnomers: How Culture Rewrote Mansfield Park"
Faculty Sponsor: Laura Bloxham

Early Afternoon Poster Session**1-2:30 p.m.****Session 26****HUB, Multipurpose Room**

- 26A Megan Smith: "The Effect of Relative Light and Darkness on the Burrowing Behavior of *Venerupis philippinarum* the Manila Clam"
Faculty Sponsor: Craig Tsuchida
- 26B Allie Anderson: "Tensile Testing of Hydrogen-Exposed 304 Stainless Steel"
Faculty Sponsor: Patrick Ferro
- 26C Michael Landkammer: "Monthly Variation in Dissolved Metal Concentrations in the Spokane River"
Faculty Sponsor: Carmen Nezat

- 26D Whitney Shirley: "Synthesis of Meso-Unsubstituted Metal Corrole and Strategies for its Recombination and Purification in the Apohemoprotein Myoglobin"
Faculty Sponsor: Kerry Breno
- 26E Shane Kostka and Garth Ahern: "A Model of Orogenic Settings"
Faculty Sponsor: Chad Prichard
- 26F Austin Winkelman: "Determining Surface Concentration Tunability of Core-shell Dendrimer Encapsulated Nanoparticle Palladium Rhodium Alloys using X-Ray Photoelectron Spectroscopy."
Faculty Sponsor: Markus Ong
- 26G Joseph Regalado: "Development of a Prussian Blue Modified Electrode with Improved Hydrogen Peroxide Detection via Current-free and Simultaneous Deposition of Aniline and Insertion of Ni²⁺ Ions."
Faculty Sponsor: Drew Budner
- 26H Asia Stephens-Argraves: "Quenching of Manganese-catalyzed Bromate-Ethylacetoacetate Oscillation Reaction"
Faculty Sponsor: Karen Stevens
- 26I Lindsay Fague: "Site-directed cysteine mutagenesis of HMG-CoA Reductase from *Burkholderia Cenocepacia*"
Faculty Sponsor: Jeffrey Watson
- 26J Hilary Weisbeck: "Volume Differences in the Orbitofrontal and Anterior Cingulate Cortices Associated with Borderline Personality Disorder (BPD): A Meta-Analysis of Magnetic Resonance Imaging Studies"
Faculty Sponsor: Michael D. Nelson
- 26K Sheridan Cooper: "Operational Stability and Sensitivity of Prussian Blue Layered Peroxide-Detecting Electrodes with Sacrificial Membranes of Aniline and Nickel Hexacyanoferrate"
Faculty Sponsor: Drew Budner
- 26L Nicholas Gamboa, Laura Hoeg and Tessa Anton: "Do COX-2 Inhibitors Restore Cell Adhesion and Migration in Cultured Epithelial Cells Expressing Truncated APC?"
Faculty Sponsor: Maria Bertagnolli
- 26M Jordan Saribay: "Imparting Water-Solubility to Molybdenum Complexes through Ligand Substitution"
Faculty Sponsor: Kerry Breno

- 26N Courtney Wanke and Jacob Mallery: "An Annotated Mitochondrial Genome of Arctic Grayling"
Faculty Sponsor: Steve Fisk and Randall James
- 26O Joseph Bell: "Metabolic Disorders in Gray Wolves and Grizzly Bears"
Faculty Sponsor: Steve Fisk and Randall James
- 26P Lindsey Wickman: "Wind Analysis of KDOT Sites at Grainfield KS and Osborne KS and Site Analysis for Hastings NE."
Faculty Sponsor: Ruth Miller
- 26Q Ceaira Nichols: "Metabolic Disorders in *Thymallus Arcticus*"
Faculty Sponsor: Steve Fisk and Randall James
- 26R Kellyann Cameron: "Study of Public Attitudes toward Wolves in North Central Community"
Faculty Sponsor: Steve Fisk and Randall James
- 26S Cherish Flores and Duncan Mize: "Complete Mitochondrial Genome of Ancient Bighorn Sheep"
Faculty Sponsor: Steve Fisk and Randall James
- 26T Austin Ulakovich, Zack Arms and Sim Gosal: "Stratigraphy of the Columbia River Basalt Group in the West Plains Eastern Washington"
Faculty Sponsor: Chad Pritchard
- 26U Ellen Jokerst: "For the Love of Spinach: The Vegetarian Man "
Faculty Sponsor: Vikas Gumbhir
- 26V Kristin Wucherer: "Partial Purification and Characterization of a Putative Prolyl Dipeptidyl Aminopeptidase from *Lactobacillus sanfranciscensis* "
Faculty Sponsor: Deanna D. Ojennus
- 26W Helya Peyman and Sein Pyo: "Mutation Studies Towards the Design of a Pepsin Resistant x-prolyl Dipeptidyl Aminopeptidase"
Faculty Sponsor: Deanna D. Ojennus
- 26X Molly Dundon: "The Effects of a Model Lead and Test Procedure to Teach Correct Requesting Using Two Apps on an Ipad with a 5-Year-Old Student with Autism Spectrum Disorder"
Faculty Sponsor: T. F. McLaughlin
- 26Y Genevieve Klusmeyer: "Sheltering preferences of *Hemigrapsus nudus* and *Hemigrapsus oregonesis* as studied on San Juan Island"
Faculty Sponsor: Craig Tsuchida

- 26Z Jared Keibler: "Ability of Decapoda to Navigate a Maze"
Faculty Sponsor: Craig Tsuchida

Late Afternoon Sessions

2:45-4:30 p.m.

Session 27

Room WEYR 304

Faculty Moderator: Sean Swan

- 27A Laura Fabiola Watts Cesena : "How Significant is the National Health Services in Contemporary British Politics?"
Faculty Sponsor: Sean Swan
- 27B Nicholas Halliburton: "The Eroding of the United Kingdom's Two Party System"
Faculty Sponsor: Sean Swan
- 27C Marlyss Maxham: "The Fruit of Their Labor: An Analysis of the Effectiveness of the Delano Grape Strike and Boycott "
Faculty Sponsor: Cynthia Stavrianos
- 27D Jacqueline Pittaway: "Britishness: The Not So United Kingdom"
Faculty Sponsor: Sean Swan
- Session 28** **Room WEYR 205**
Faculty Moderator: Shannon Overbay
- 28A Scott Campanario, Melissa Villeneuve and Danielle Simien: "Working Memory Load in the Performance of Math Tasks"
Faculty Sponsor: Gary L. Thorne
- 28B Samuel Gordon: "Mental Inflexibility: The Confirmation Bias' Threat to Science and How to Fix It"
Faculty Sponsor: Michael Nelson
- 28C Christopher Galeucia: "The Utility of Pointing In Cross-Fostered Chimpanzees"
Faculty Sponsor: Mark Bodamer
- Session 29** **Room ROB 141**
Special Session: Jane Austen: gender and money
Faculty Moderator: Laura Bloxham
- 29A Sarah Jaymes Kenney: "'Having Formed her Mind and Gained her Affections': The Male-Female Relationship as Destructive in Mansfield Park"
Faculty Sponsor: Laura Bloxham
- 29B Willa Schober-Hockman: "Proposals and Power Plays in Jane Austen's Pride and Prejudice "
Faculty Sponsor: Laura Bloxham

29C Mikayla Ludiker: "Entailment Entanglement: Inheritance Schemes in Sense and Sensibility"
Faculty Sponsor: Laura Bloxham

Session 30 **Room WEYR 204**
Faculty Moderator: William Hayes

30A Jaime Fischer and Shaun Flemming: "Damn I Hope I Look Good: A Measure of Appearance Sensitivity Among College Students"
Faculty Sponsor: Vikas Gumbhir

30B Philip Tostado: "You're Not Really A Girl: A Study on Gender Communication in Online Games"
Faculty Sponsor: Vikas Gumbhir

30C Emmanuel Weke: "You Don't See Race--Really?: Color-Blind Racism and Identity Development Among African Americans"
Faculty Sponsor: Vikas Gumbhir

30D Jennifer Gerlomes: "Won't You Be My Neighbor?: Community-Oriented Policing From the Officer Perspective"
Faculty Sponsor: Vikas Gumbhir

Session 31 **Room WEYR 203**
Special Session: Explorations In Creative Nonfiction
Faculty Moderator: Nicole Sheets

31A Krystal Valle: "How To Beat Jimmy Corrigan In Badminton"
Faculty Sponsor: Nicole Sheets

31B Cameron Parker: "On Heathen Hands"
Faculty Sponsor: Nicole Sheets

31C Lydia Buchanan: "Like Constellations"
Faculty Sponsor: Nicole Sheets

31D Emily Grant: "Five Walks for Enlightenment"
Faculty Sponsor: Nicole Sheets

Session 32 **Room ROB 210**
Special Session: Gonzaga Chemistry Department
Faculty Moderator: Jeff Watson

32A Erik Pihl: "Biophysical Characterization of *Burkholderia cenocepacia* HMG-CoA Reductase."
Faculty Sponsor: Jeffrey Watson

32B James Palmer: "Comparison of Class II Oxidative and Reductive HMG-CoA Reductases by Phylogenetic Analysis"
Faculty Sponsor: Jeffrey Watson

32C Dana Walters: "Characterization of Allosteric Inhibitors for Beta Carbonic Anhydrase"
Faculty Sponsor: Jeff Cronk

32D Monica Schroll: "Identification of an Amidotransferase Gene Required for Rhodoquinone Biosynthesis in *Rhodospirillum rubrum*"
Faculty Sponsor: Jennifer Shepherd

Session 33 **Room ROB 310**
Special Session: Gonzaga Chemistry Department
Faculty Moderator: Gergely Gidofalvi

33A Jake Zaragoza: "The Application of Fractional Brownian Motion to an Ensemble Average Model"
Faculty Sponsor: Gergely Gidofalvi

33B Matthew Smith: "C-D probes of Biologically Relevant Interactions"
Faculty Sponsor: Matthew Cremeens

33C Christopher Hastings: "Natural Orbitals for Multiple Electronic States"
Faculty Sponsor: Gergely Gidofalvi

33D Kyle Stumetz: "Assessing the Possibility and Probability of Surface Crossings in High Energy Ring Expansions"
Faculty Sponsor: Matthew Cremeens

Session 34 **Room WEYR 303**
Special Session: Victorian Literature and Social Critique
Faculty Moderator: Pamela Corpron Parker

34A Rosie McFarland: "Dracula to Twilight: The Transformation of the Vampire"
Faculty Sponsor: Pamela Parker

34B Jenna Hoole: "Deviant Women: The Threat of the Femme Fatale to Victorian Society"
Faculty Sponsor: Pamela Parker

34C Brittany Kirkpatrick (Fulton): "Performing the Angel in the House"
Faculty Sponsor: Pamela Parker

34D Taylor Countryman: "Deviant Masculinities in Victorian Fiction"
Faculty Sponsor: Pamela Parker

34E Caroline Swinford: "No Man's Land: The Tension of Domesticity in the Wilderness in Isabella Bird's A Lady's Life in the Rocky Mountains"
Faculty Sponsor: Pamela Parker

Late Afternoon Poster Session 3-4:30 p.m.

Session 35 Poster Session HUB, Multipurpose Room

- 35A Sabrina Judson: "Genetic Variation in Arctic Grayling (*Thymallus arcticus*) from Southwestern Montana"
Faculty Sponsor: Steve Fisk and Randall James
- 35B Alexis Holder: "Characterization of Sixteen Polymorphic Microsatellite Markers for the Acorn Woodpecker *Melanerpes formicivorus*"
Faculty Sponsor: Joseph Haydock
- 35C Elijah Hiler: "An Analysis of Genetic Diversity of Ancient and Modern *Bison bison*"
Faculty Sponsor: Steve Fisk and Randall James
- 35D Kylenea Kerr: "Analysis of gene flow in Arctic Grayling (*Thymallus Arcticus*) in Big Hole Valley Montana"
Faculty Sponsor: Steve Fisk and Randall James
- 35E Rose Richardson and Larissa Baxter: "Analysis of Cytochrome b and ATP6 SNPs in Aleutian Islands Sea Otter (*Enhydra lutris*) Populations"
Faculty Sponsor: Steve Fisk and Randall James
- 35F Corey Horn, Deaunte Floyd and Dylan Smith: "Genetic Analysis of D-loop Diversity in *Canis lupus* and *Ursus arctos horribilis*"
Faculty Sponsor: Steve Fisk and Randall James
- 35G Ryan Lyski: "Co-Deposition of Prussian Blue with Aniline for the Improvement of Operational Stability and Sensitivity of Hydrogen Peroxide Sensors"
Faculty Sponsor: Drew Budner
- 35H Rachel Retherford: "Finding Protection Against the Infection"
Faculty Sponsor: Suzanne Bassett
- 35I Candace Ireland and Nicole Ecklund: "Analysis of *Bison bison* Mutations within the Mitochondrial Genome"
Faculty Sponsor: Steve Fisk and Randall James
- 35J Brandon Walling and Ryan Keefe: "R-Bodies: Cloning Expression and Purification of Reb C and Incorporation of a His-Tag into Reb B"
Faculty Sponsor: Deanna Ojennus
- 35K Alyson Donahoo: "Hypertrophic Stimuli Alter O-GlcNAc but not the Cardiac Fetal Gene Program in HL-1 Cells"
Faculty Sponsor: Kerry Breno
- 35L Nichole Boyd, Christine Moen and Samantha Santos: "Investigating Small Molecules as Potential Treatments for Mucopolysaccharidosis VI"
Faculty Sponsor: Trisha Duffey
- 35M Hanh Nguyen: "A Computational Approach to Engineering Proteins for Increased Pepsin Resistance"
Faculty Sponsor: Kent Jones
- 35N Timothy McQuaid: "Concurrent Operant and Treatment of Inappropriate Social Skills in a Boy with PDD/NOS"
Faculty Sponsor: Anjali Barretto
- 35O Lauren Gibb: "Cheaters Drinkers and Drug-users: College Students Perceptions of Common Deviances on Campus"
Faculty Sponsor: Vikas Gumbhir
- 35P Megan Wingfield and Matthew Rockstrom: "Effects of Caffeine on Athletic Performance"
Faculty Sponsor: Mike Sardinia
- 35Q Brian McPartland: "Wireless Power Transmission by Incorporating Evanescent Waves Magnetic Metamaterial and Resonance"
Faculty Sponsor: Kent Jones
- 35R Kyle Prescott: "Balance Performance Differences Between Older Men and Women Using Four Outcome Measures"
Faculty Sponsor: Kimberly Cleary
- 35S Keith Davidson and Michael Beckett: "Effects of Hydrogen Exposure on Fatigue Failure in Austenitic Steels"
Faculty Sponsor: Patrick Ferro
- 35T Jessica Griffith: "The Differential Effects of the Use of Handwriting Without Tears[®] Gray Block Worksheets and LetterSchool App to Teach Two Preschool Students with Developmental Delays Letter Writing Skills"
Faculty Sponsor: T. F. McLaughlin
- 35U Chelsea Barberio-Kitts and Lauren Worcester: "The Effects of Cover Copy Compare on Spelling Third Grade Core Words for a Student with Autism in a Designed Instruction Elementary School Classroom"
Faculty Sponsor: T. F. McLaughlin
- 35V Allison Maus: "Preference for Edge versus Open Area in *Pisaster ochraceus*"
Faculty Sponsor: Craig Tsuchida

- 35W Michael Swart: "Average Pulling Force and Endurance of Cancer Magister"
Faculty Sponsor: Craig Tsuchida
- 35X Brian Tully: "Comparison of Shearing and Pulling Forces on the Marine Snail *Nucella lamellosa* as Studied on San Juan Island"
Faculty Sponsor: Craig Tsuchida
- 35Y Mustafa Al dahri: "The Differential Effects of Direct Instruction Model-Lead-Test Procedure with and without a Reward on Rote Counting Number Recognition and Rational Counting with a Young Child"
Faculty Sponsor: Kimberly P. Weber
- 35Z Rosemary Houglum: "The Differential Effectiveness of Direct Instruction Flashcards with Guided Practice Activities to Instruct Two Elementary Students Diagnosed with Autism Spectrum Disorder and Delays in Pre-Academics"
Faculty Sponsor: T. F. McLaughlin

List of Abstracts

1A Laura Fabiola Watts Cesena and Andrew Warlaumont: "Past Economic Theories and their Modern Applications"

Presentation will cover a brief history of Economic figures and schools of thought with an analysis of how their theories are applied and have affected modern day economic theory. Some of the figures discussed will be economists such as Adam Smith Karl Marx Alfred Marshall John Maynard Keynes Friedrich von Hayek Joseph Schumpeter Milton Friedman; who belong to the following schools of thought such as the Austrian School the Scottish School the German Historical School the Chicago School among others. The audience will learn the basic history of economic theory which are still prevalent in today's modern economic world.

Faculty Sponsor: John Beck

1B Courtney Hoffmann : "Athletic Success and Donations"

University Athletic programs function on budgets based on thousands of dollars to those that maintain multi-million dollar budgets generated from ticket sales licensed merchandise television rights and donations from alumni and boosters. Much of the research on university fund raising has focused on the influence of winning programs and donations to the general university fund with little attention devoted to understanding the impact of donations on other sports (and the respective departments) as a whole. Additionally very little research has focused on the percentages by which donations have increased decreased or affected non-high profile sports once an athletic program has become noted for its athletic success and prowess. Thus for the purpose of helping colleges and universities refine their development strategies this study seeks to examine donor contributions to a Division 1 athletic program that has successful revenue generating sport teams.

Faculty Sponsor: S. Roger Park, Karen Rickel

1C Patrick Noonan: "The Big Dance and Big Divide: Demographic Differences between Men and Women's College Basketball Appreciation"

Women's sports are plagued with low attendance marginal media visibility and persistent degradation. Studies have yet to sufficiently explore the negative and indifferent attitudes of college student fans towards women's basketball. Who embodies positive negative and indifferent attitudes towards women's college basketball? What characterizes those who only follow men's college basketball and how are they separated from those who support their women's basketball program? How are negative and indifferent attitudes of men's basketball fans toward the women's program explained? The data for my project will come from an online omnibus social indicators survey that is administered to a probability sample of undergraduates. The survey features questions on women's and men's basketball fan demographics levels of fandom and student attitudes towards women's basketball.

Faculty Sponsor: Vikas Gumbhir

2A Tim Yates: “No Homo: Representations of Gay Men in a Modern Family”

The representation of homosexuality in the mass media has increased substantially in recent years. This increase in the visibility of media representation has been recognized and highlighted as a progressive step toward equality. However previous research indicates this may not be the case. This study examines the popular prime time situational sitcom “Modern Family.” Through Foucault’s theories of normalization and sexuality and working off of previous research I will examine how the visibility and representations of gay men are presented in a heteronormative fashion. To examine how these discourses are processed by the audience I will guide several focus groups leading a discussion regarding the viewers’ perceptions of the characters and the shows normalcy. The focus groups will provide insight into how the average viewer internalizes these media representations of homosexuality and gay men.

Faculty Sponsor: Vikas Gumbhir

2B Chelsea Hunt: “The YOLO Tattoo: University Students Stigmatization and the Labor Market”

This project investigates the decision-making process of private university students who choose to “get tattoos.” The study focuses on whether or not students select tattoos (visible versus invisible) due to perceived employment stigmatization. In other words do students contemplate the consequences of tattoos on future employment? I will conduct eight interviews with students who are seeking professional degrees and eight interviews with students who are seeking non-professional degrees. The study examines two hypotheses: (1) professional students engage in “future-oriented” thinking due to awareness of employment stigmatization and select non-visible tattoos and (2) non-professional students engage in “present-oriented” thinking due to unawareness of employment stigmatization and select visible tattoos. The study seeks to counter popular perceptions that students represent the so-called “YOLO” (you only live once) generation.

Faculty Sponsor: William Hayes

2C David Fong: “Gender and Motivation within Gaming Culture”

Video game research is currently in its infancy. Much of the knowledge on video games is based not on empirically observed phenomena but on common sense and conjecture. In an attempt to rectify this this research will examine in depth the motivations and notions of gender of online gamers. Specifically players of the game “Star Battle” will be interviewed and observed both in and out of the game. Initial results would suggest that there are definite disparities in treatment of women and that men and women enjoy separate aspects of the game.

Faculty Sponsor: Vikas Gumbhir

2D Morgan Saad: “The Pope the Pill and the Public: Different Usages and Perceptions of Birth Control at a Catholic Campus”

Many Catholic colleges across the United States do not supply contraception for any of their students because the Catholic colleges have to abide by the Catholic Church. In 2011 the Obama administration made a political decision that the new health care law requires insurance plans at Catholic colleges to cover birth control for employees and eventually that may be extended to students. The goals of my research are to collect data at a Catholic university to determine who is using the birth control pill why they are using it what other birth control is being used and the role that religiosity plays in birth control choices. My research design contains a survey distributed to Gonzaga University students a Catholic college via the General Gonzaga Survey.

Faculty Sponsor: William Hayes

3A Edward Lee: “A Theoretical Matrix Model Representing the Abundance of *Mecinus Janthiniformis* within Urbanized areas of Dalmation Toadflax”

The stem-boring weevil (*Mecinus janthiniformis*) is a successful biological control of Dalmation Toadflax (*Linaria dalmatica*) by feeding on its leaves as an adult and ovipositing the eggs into the stem during the winter where the larvae burrow and mature. However urbanization of toadflax patches affects the abundance of *M. janthiniformis* due to extrinsic influences such as mowing of the patch affecting survivorship. I developed a theoretical matrix model to examine four differential survivorships of weevils in urban versus non-urban areas that might influence observed gradients in weevil densities. Therefore the goal of this project is to provide a theoretical model to represent the population of *M. janthiniformis* in different patches in which the chance of the patch being mowed affects the weevil’s survivorship and abundance in urbanized areas of Spokane County WA.

Faculty Sponsor: Gary Chang

3B Nicole Green and Casey Collins: “The Effect of Site Test Size on Urban Environment and Stem-boring Weevil (*Mecinus janthiniformis*) Densities”

Dalmatian Toadflax (*Linaria dalmatica*) is an invasive weed that resides in 33 U.S. states including Spokane County Washington. The stem-boring weevil (*Mecinus janthiniformis*) has a negative effect on the toadflax which makes it a viable biological control for toadflax populations. Previous works looked at the effect the urban environment around Spokane had on the toadflax and weevil population density. That study used 17 sites that varied in distance from downtown Spokane and determined the percent area of non-weevil habitat within a 200-meter radius for each site. Our current objective is to determine if a 100-meter 200-meter or 400-meter radius site is an adequate site size for showing the relation between toadflax and weevil populations versus urban site cover. The concern is that increasing or

decreasing the site radius could change the percent of non-weevil habitats thus altering the results from previous studies.
Faculty Sponsor: Gary Chang

3C Patrick Ronay, Meredith Crenshaw and Kathryn Kirdahy: “Coal Trains and Urban Development in Spokane”

A current issue for Spokane is that of the proposed coal train export project. The project stands to mine coal in the Powder River Basin of Montana and Wyoming and then ship, by train that coal to the Pacific Coast where it will be exported to Asia. Because of the limited rail infrastructure in the Inland Pacific northwest all of this coal will travel through Spokane en route to proposed ports along the coast. As all of the coal mined will come through Spokane, so too will the consequences associated with this project. These ramifications will include, but are not limited to, the lessening of Spokane’s air quality, adverse public health benefits, the compromising of our area’s ecological integrity, the potential decrease of land value proximate to the railway corridor, to name but a few. All the while, Spokane is trying to rebound from the recent economic recession while simultaneously readying itself for the globalized, 21st century economy. One project to aid in this modernization is the University District in downtown Spokane. This district has drawn the investment of Eastern Washington University, Gonzaga University, Washington State University, and Whitworth University; four economic engines of the greater Spokane area.

Faculty Sponsor: Gregory Gordon

4A Lily Sears: “The Only Instance We are Free”

Considering both the materialist and fatalist themes present throughout Stoic writings it is intriguing that Stoics such as Epictetus still defend the existence and well-functioning of volition. This thesis examines the concept of “prohairesis” a particular mental phenomenon that Epictetus provides as a free action in a determinist system. By doing this it will be concluded that “prohairesis” is weakened considering modern psychology but still find it a worthy addition to a compatibilist model of free will.

Faculty Sponsor: Fr. Timothy Clancy

4B Kayla Sisk: “The Holy Spirit: A Comparison of Catholic and Pentecostal Theologies”

What is the Holy Spirit exactly? Well it depends on who is asked and the answers vary depending on the particular faith tradition of the respondent. The question of interest in this research is twofold: What do Pentecostal and Catholic theologies say about 1) the nature of the Holy Spirit and 2) the implications of this nature in real life specifically private and corporal worship? This research focuses on the differences between these two groups and specific problems found inherent to the application of Pentecostal theology. In good ecumenical style the research also addresses potential concerns and stereotypes for the theologies and applications of both groups Catholic and Pentecostal alike.

Faculty Sponsor: Karin Heller

4C Kayla Schierman: “Exploring the Limits of Complementarian and Egalitarian Gender Relationships”

“Your desire will be for your husband and he will rule over you” (Genesis 3:16). Since the fall in the Garden of Eden men and women have been at odds with each other - but this was not God’s original intent. Complementarian Christians believe that God created and designed men and women for specific gender roles where man appears as the powerful superior and woman the weaker inferior. Egalitarians on the other hand dismantle these viewpoints. My paper will compare and contrast the positions of Sarah Sumner a moderated complementarian and Rebecca Groothuis a staunch egalitarian. The focus will be on the way in which these female theologians deal with specific biblical texts that defy traditional gender roles and how both of them address the implications of an egalitarian way of understanding God’s design of male and female relationship.

Faculty Sponsor: Karin Heller

5A Morgan Chambers: “(Man)Dating Masculinity: How Bromance Resists and Reinforces Gendered Expectations”

From *Butch Cassidy and the Sundance Kid* to Judd Apatow’s slew of 21st century frat comedies the “buddy film” has reinvented and rebranded itself as “bromance” media. Snugly situated within “no-homo” American rhetoric the “bromance” phenomenon represents both a departure from and an adherence to pervading norms of masculinity and sexuality. Though the origins and consequences of homosocial intimacy and “ideal” masculinity have been well researched little attention has been paid to the effect these factors have on male interpretation of “bromance” media. This project investigates the connection between homosociality sexuality and mainstream masculinity. Conducted in a university setting this research utilizes in-depth interviews and focus groups to examine the intricacies of male-male relationships as influenced by media cultural norms and personal experience.

Faculty Sponsor: Vikas Gumbhir

5B Angela Lutwitz: “Unity as the Solution to War in ‘La Grande Illusion’”

In response to the inevitable war that would soon plague France Jean Renoir proposed his solution for a peaceful world in the film *La Grande Illusion*. Through the use of his unique characters from various countries and social classes set in a prison camp during World War I Renoir suggests true peace may only be obtained if all men are willing to put aside their differences. In this film the concept of escape correlates to the idea of peace. As the viewer will soon learn escape from the prison camp is only possible if all soldiers are willing to ignore their differing nationalities and social classes and work towards a common goal. Through the characters of Boeldieu and Von Rauffenstein Renoir illustrates that those unwilling to conform have no place in this new world in which humanity and equality reign.

Faculty Sponsor: Jennifer Brown

5C Jonathan Whitmore: "A Different Path: Gay Culture Through the Lens of French Cinema"

Throughout the twentieth century French society has dealt with the emergence of gay culture much differently than the United States. This could not be more evident than in the creative and powerful cinematographic productions of these years. However to truly understand the importance of these expressions we must first understand how gay culture in France developed separately and distinctly different than that of the U.S. and how these important cultural differences are seen in film. Through a careful study of four films: *Ma Vie En Rose* (1997), *Gazon Maudit* (1995), *La Cage Aux Folles III* (1985), and *Le Derrière* (1999) we can begin to see how much of this cinema is a reaction meant to showcase the unique oppression trials and stereotypes of members of the gay community in French society and to give us a sense of the tension around these issues present in this distinct cultural context.

Faculty Sponsor: Jennifer Brown

6A Caitlin Taylor: "Contaminating the Hopi Way: An Exploration of the Effects of Hopi Contact with the White Man"

Ever since initial contact with Europeans the lifestyle of the Hopi tribe of Northeastern Arizona has been impacted and influenced by Western values. The presence of outsiders including the Christian Church has played a significant role in the degradation of traditional cultural ceremonies. The influence of the United States government and methods of Western education have also challenged the traditional Hopi way of life. This presentation will focus on current issues that the Hopi face which include widespread alcoholism domestic abuse and environmental damage how these issues have been perpetuated by the contact of Hopi with outside influences and how they are being addressed today.

Faculty Sponsor: Jennifer Holsinger

6B Christina Hendrickson: "Rape Culture on College Campuses"

In the United States twenty percent of female college students are raped during their undergraduate years making their chances for being a victim higher than any other demographic. This research seeks to explain these startling statistics by examining the construction of rape culture and the prevalence of rape myths on college campuses. Rape is not commonly talked about leaving the issue shrouded in ambiguity. This leads to definitional problems miscommunication and victim-blaming. Other studies have found that requiring rape education for incoming students can help debunk rape myths increase awareness and understanding about the topic and encourage reporting the incident. Drawing on past research this study proposes that increasing students' understanding about rape can eradicate the problem. It advocates a national requirement for the implementation of rape education programs beginning in students' first year and continuing throughout their time in college.

Faculty Sponsor: Marguerite Marin

6C Amy McLoughlin: "Youth Who Age Out of the Foster Care System: What They Say Can Improve Their Life Outcomes"

This study will attempt to locate and interview a selection of former foster care youth who aged out of the foster care system without a permanent family. These former foster youth tend to face many negative life outcomes. Many of these youth do not receive a high school diploma or GED have trouble getting and keeping a job have trouble finding a stable place to live and/or become involved with the criminal justice system. There has been a lot of research surrounding these youth and the problems that they face and create. Very little of the research has actually interviewed the youth about their perspectives on what could have improved their life outcomes. I hope to use this study to identify small changes that can be made without completely overhauling the foster care system.

Faculty Sponsor: Marguerite Marin

7A Tsega Gaim: "Language Fluency and One's Communal Worth"

The purpose of this presentation to explore the concepts of language fluency identity and how this may affect our place in our community; through a series of semi-structured interviews with immigrants and first-generation Eritreans in America a study was conducted to understand cultural expectations of language fluency in the Eritrean community and how meeting or not meeting those expectations can affect ones' identity within the culture.

Faculty Sponsor: James Hunter

7B Ayaka Dohi: "'Being Brown': The Coping Mechanisms of Racial/Ethnic Minority and First-Generation Students in a Predominantly White School"

The first year of college can be an extremely stressful experience and the transition can negatively impact on students' academic and social success. Research shows that minority and first generation students in particular experience higher levels of academic social and psychological distress especially at predominantly white schools. My research will look at how minority and first generation students cope with the university transition. Specifically I will be focusing on three key areas: social support for the lack of such support may be a cause of distress; acculturation which suggests that a process of change occurs when entering into a new culture; and colorblind racism to illuminate how minority students interpret their relations among their peers and university officials. My study consists of in-depth interviews with undergraduates at a predominantly white university in the northwest.

Faculty Sponsor: Vikas Gumbhir

7C Alen Tersakyan and Andrew Maldonado: "Social Networking and Self-Esteem"

The purpose of this study is to examine the relationship between social networking websites and self-esteem. We wish to examine whether high involvement in social networking

affects self esteem through positive or negative feedback. Undergraduate university students often use social networking websites to keep in contact with friends from home as well as establishing new friendships. Since use of such websites is so high we wish to further explore the correlates of such usage. We will be administering a 27 item questionnaire regarding social networking use. In addition we will administer the 10 question Rosenberg Self Esteem Scale.

Faculty Sponsor: Anna Marie Medina

8A Kaitlin Asson and Allison Scott: "Bourdieu Goes to College: Notions of Capital and Student Choices"

This study focuses on Pierre Bourdieu's theory of social cultural and symbolic capital and how perceptions of these influence university students' choices. Decisions when applying to colleges are influenced by both the students' perceptions of their own capital as well as those of the university. These perceptions may change as students progress through their academic careers. Their personal perceptions of capital blend with those of the university during their time there resulting in a shift in the expectations of benefits they will receive after graduating. We will be conducting a survey using a random sample of students at Gonzaga University and focusing on two major research questions: 1. What perceived elements of social cultural and symbolic capital influence students' choices when deciding to attend Gonzaga University? 2. What social cultural and symbolic benefits do students believe will come from attending Gonzaga University?

Faculty Sponsor: Vikas Gumbhir

8B Chelsea Caslavka: "I'd Tap That: Homosocial Groups, Alcohol Consumption, and Gender Harassment"

The "party culture" found on college campuses is one that only increases once students turn twenty-one. This golden age of youth, friendship, and, most importantly, beer is almost sacred to college parties across the nation. However, it is also a time of great immaturity, lack of knowledge, and actions affected by alcohol. Women often see the brunt of these actions. Although we say our nation has worked through great inequalities we often forget that the views of society still greatly diminish women through jokes and crude comments. Homosocial groups, or groups of all one gender, were the focus of my study. I observed how all-male homosocial groups participated in gender harassment, which degrades women through jokes, comments, and actions in a bar setting to perceive the importance in the lack of female presence and how alcohol, if at all, influenced the degradation of women.

Faculty Sponsor: Vikas Gumbhir

8C Ylisse Bess: "Racial Preference No Offense: Explaining Attitudes Toward Interracial Dating at a Private University"

While interracial relationships are no longer subject to the same scrutiny as before and while intermarriage has reached its highest rate in American history there is evidence that these

relationships remain taboo in the eyes of some. Research has shown that attitudes and behavior are strongly enforced by familial stressors and intergroup pressures which greatly impact one's relationships. Gordon Allport's Contact Theory states that all forms of interaction from sports teams to one's work environment influence and reinforce an individual's attitudes and behavior. My research will test whether Allport's Contact Theory is applicable to attitudes toward interracial dating at a Private University located in Spokane WA. The data for my research will come from the General Survey - an annual survey distributed to a random sample of students. My research will survey to what degree intergroup bias affects an individual's relationships.

Faculty Sponsor: Vikas Gumbhir

8D Sinead Christensen: "A Prescription for College: Use and Abuse of Prescription Drugs at a Private University"

Current public health research demonstrates that the abuse of pharmaceutical drugs by the college age population deemed "Generation Rx" is a growing concern across the United States. This research seeks to further describe usage of prescription drugs among university students and the extent to which these drugs are used in an illicit manner without a prescription. In addition this study looks at the various reasons students give for using the most commonly abused categories of drugs including academic health related and recreational use. The manner in which students obtain these drugs will be assessed as well as influences of variables such as gender racial/ethnic identity and perception of severity. The data for this research will come from the General Gonzaga Survey an annual online undergraduate survey that features standard questions that capture vital characteristics of college life and student culture.

Faculty Sponsor: Vikas Gumbhir

Session 9

Special Session: Imagining England in Modern British Fiction

Writers such as Graham Greene and Virginia Woolf employed experimental literary forms in the early twentieth century as a way to cope with a dramatically changing world. This panel explores the various ways that Woolf Greene and their contemporaries constructed a new sense of national religious political and personal identity through their fictions.

Faculty Moderator: Charles Andrews

9A Maggie Montague: "Death in Brackets: War's Intrusion on To the Lighthouse"

As part of the larger special faculty organized panel "Imagining England in Modern British Fiction" moderated by Professor Charles Andrews I will discuss the presence of World War I and the resulting fragmentation of the characters' relationships and cognizance in Virginia Woolf's *To the Lighthouse*. Unlike the adrenaline pulsing image of war with which Hollywood saturates our society in *To the Lighthouse* war is a distant enemy and casualties are reduced to a phrase within brackets.

In this time of humanity's insignificance and war-induced trauma the characters seek meaning and recovery. The structure of the book in conjunction to the looming presence of war repeatedly lead back to the image of the lighthouse. The narrative's central fixation upon the lighthouse is at the heart of the characters' search for purpose throughout prewar wartime and postwar settings.

Faculty Sponsor: Charles Andrews

9B Ana Quiring: "The Cinematic Catholic Spy Novel: Genre Fusion in Graham Greene's *End of the Affair*"

As part of the panel "Imagining England in Modern British Fiction" organized by Professor Charles Andrews my paper will address the changing aesthetic and topical qualities in the fiction of Graham Greene. *The End of the Affair* stands at a pivotal point in both Greene's oeuvre and the changing British literary scene: after the World Wars after High Modernism but before the heyday of Postmodernism. Greene incorporates several of his genre commitments from spy fiction and cinema-influenced writing to Catholicism into *The End of the Affair* and integrates them in a new and innovative way transcending earlier forms and moving toward the pastiche of postmodernism. With my peers who will present on Virginia Woolf I will assess the boundaries of genre and literary period as the ground-breaking first wave of Modernism passes and gives way to new and even more fragmented styles of writing.

Faculty Sponsor: Charles Andrews

9C Shannon Ritchie: "Challenging Victorian Stereotypes: Comparison of Mrs. Ramsay and Lily Briscoe"

This paper is part of a special session moderated by Professor Charles Andrews called "Imagining England in Modern British Fiction." This piece is centered on Virginia Woolf's novel *To the Lighthouse* as she reveals her opinions on the true power of women possess if they break free of the roles they have been pushed into. In this paper I demonstrate how *To the Lighthouse* represents the struggle of woman trapped in what is known as the Victorian stereotype as demonstrated through the character of Mrs. Ramsay and contrasted by the character of young artist Lily Briscoe. I culminate by presenting Lily Briscoe as the ideal woman one who has finally found peace at the completion of her painting representing her huge feat breaking the bounds of societal pressure.

Faculty Sponsor: Charles Andrews

Session 10

Special Session: Gonzaga Chemistry Department

Senior thesis presentations from the Department of Chemistry and Biochemistry at Gonzaga University.

Faculty Moderator: Katherine Hoffmann

10A Gregory Prussia: "Structural Elucidation of the DesD Enzyme in the Desferrioxamine Synthesis Pathway"

Siderophore production is critical for the survival of many microorganisms the NIS pathway of siderophore production is

increasingly correlated to the pathogenicity of bacteria. Bacteria such as multidrug-resistant *Staphylococcus aureus* (MRSA Staph) and *Bacillus anthracis* the etiological agent of anthrax utilize this unique pathway. The NIS (Non-Ribosomal Peptide Synthesis Independent Synthesis) enzymatic pathway synthesizes siderophores; small molecules secreted by microorganisms to scavenge ferric iron from the environment or host body. The NIS pathway has been severely understudied and produces siderophores that effectively evade the enzyme siderocalin from the mammalian immune system. Biochemical characteristics of the NIS synthetase desferrioxamine D (DesD) including circular dichroism x-ray crystallography trials and exclusion chromatography will add to the understanding of the NIS family of synthetases.

Faculty Sponsor: Katherine Hoffmann

10B Alex Hofstetter: "Structural Characterization of 3-Hydroxy-3-methylglutaryl Coenzyme A Reductase from *Burkholderia cenocepacia*"

The synthesis of isoprenoids is required for both prokaryotic and eukaryotic life. The enzyme 3-hydroxy-3-methylglutaryl coenzyme A (HMG-CoA) reductase (HMGR) catalyzes the rate-determining step in the mevalonate pathway to isoprenoid biosynthesis. In most species HMGR reduces HMG-CoA forming mevalonate. Interesting amongst such enzymes the opportunistic lung pathogen *Burkholderia cenocepacia* possesses an HMG-CoA reductase (BcHMGR) that exhibits higher activity in the oxidative direction. This seems to indicate that this enzyme functions as a source of acetyl-CoA in *B. cenocepacia*. Additionally BcHMGR appears to form exist in an octameric state differing from the hexamers commonly formed by such enzymes. A range of conditions were screened in the crystallization of BcHMGR. The stability of BcHMGR was monitored over time to confirm the maintenance of protein solubility and activity. Results are presented herein.

Faculty Sponsor: Jeffrey Watson

10C Christopher Chapman: "Exploration of Oxidative HMG-CoA Reductase by Various Kinetic Techniques"

3-hydroxy-3-methylglutaryl coenzyme A reductase (HMGR) catalyzes the rate-limiting step in the reductive mevalonate pathway for isoprenoid biosynthesis in mammals eukaryotes archaea and some eubacteria. There is strong evidence however that in *Burkholderia cenocepacia* an opportunistic lung pathogen HMGR catalyzes the oxidative catabolic reaction instead. Kinetics data shows the enzyme is highly regulated and it exhibits mixed cooperativity with respect to substrate in the oxidative direction. A detailed understanding of the mechanism by which this behavior arises is key to understanding how the enzyme works and how it is regulated. Results from a series of experiments including pH-rate profile site directed mutagenesis and size-exclusion chromatography will be presented and their relation to the enzyme function will be explored.

Faculty Sponsor: Jeffrey Watson

10D Hannah Maul-Newby: "Towards Design of New Anti-Tuberculosis Drugs: Targeting Eubacterial β -Carbonic Anhydrase"

Tuberculosis (TB) is an infectious disease caused by the bacterium *Mycobacterium tuberculosis*. New therapeutics are needed to combat this disease and has lead us to investigate bacterial carbonic anhydrase as a potential drug target against TB and other infectious bacterial diseases. A plasmid vector for expression of MTCA was constructed and a protein purification protocol developed in order to investigate the allosteric site of the enzyme as a specific locus for the binding of a potential inhibitory molecule. Based on research done on the carbonic anhydrases of *Escherichia coli* and *Haemophilus influenzae* (ECCA and HICA) orthologues of MTCA structural modeling can be used to identify candidates for such an inhibitor (drug). Current research working with crystallization trials in concert with allosteric site modeling is the focus of this presentation.
Faculty Sponsor: Jeff D. Cronk

Session 11

Special Session: Gonzaga Chemistry Department

Senior thesis presentations from the Department of Chemistry and Biochemistry at Gonzaga University.

Faculty Moderator: Eric Ross

11A Gregory Busch: "Factors Affecting the Adsorption of Fluoride to Charred Bone in Drinking Water"

Some areas in the world have high fluoride concentrations in their groundwater. Removal of fluoride from contaminated drinking water is essential to prevent skeletal fluorosis a debilitating condition affecting millions of people in developing nations whose water supplies lack effective methods of purification. Our previous research has shown that charred bovine bone is a cost-efficient defluoridation adsorbant. This project investigated whether other anions compete with fluoride for binding sites on the charred bone as well as clarifying data found from previous work. In addition the adsorption process was studied through analyzing the physical and chemical changes in the bone when charred at 800 °C.
Faculty Sponsor: Joanne Smieja

11B Marin Hatcher: "Development and Optimization of a Radiosynthesis of ^{18}F Labeled Derivatives of Lactic Acid for the Potential Diagnosis of Alzheimer's Disease"

Alzheimer's Disease (AD) is a neurodegenerative disease that currently affects 5.4 million Americans. The symptoms of confusion along with loss of cognitive ability are related to the formation of β -amyloid fibers in the patient's brain. These protein aggregates bind nonspecifically to additional proteins in the interstitial fluid of the brain that ultimately result in neuronal cell death. There is no current antemortem asymptomatic diagnosis for AD. Cell death will be preceded by dramatic changes in cell metabolism rates allowing for a monitor of aerobic metabolism- using positron emission tomography

(PET) to be a potential AD diagnostic agent. Lactic acid has been found to be the preferred energy source for neurons suggesting the use of a ^{18}F labeled lactic acid derivative as the PET tracer. This project works to develop a practical reaction scheme and optimize the conditions to progress towards a useable ^{18}F labeled lactic acid analog.

Faculty Sponsor: Stephen Warren

11C Samantha Blake: "Characterization of Designer Drugs of Abuse via 1D and 2D NMR"

The topic of this presentation is the use of Nuclear Magnetic Resonance (NMR) in the characterization of emerging designer drugs of abuse. With a grant from the Midwest Forensic Research Center research was performed in collaboration with the Gonzaga University Chemistry Department to determine the validity in using 2D NMR techniques to characterize the structure of popular cathinone drug analogs. Cathinone or benzoylethanamine is a Schedule I substance that composes the illicit material "bath salts" and its analogs were chosen for this study because of their increasing prominence in drug culture. The 1D proton and carbon NMR spectra were collected and data analyzed for the ability to determine structural differences from this common characterization method. Additionally the 2D HMQC and COSY spectra were collected for extremely similar cathinone analogs to determine if 2D NMR is necessary in the characterization process used to identify and schedule drug analogs.

Faculty Sponsor: Jennifer Shepherd

11D Taylor Johnston: "Evaluation of Gramicidin Interactions with Metal Ions by Chromatography"

Binding and partitioning events at cell membranes are difficult to study because of their dynamic behavior and complex structure. This research focuses on chromatographic evaluation of the interactions of the ion channel peptide gramicidin with alkali ions using supported lipid bilayers. Building on previous work this study sought to refine the chromatographic methodology used with the novel stationary phases developed previously. Results using frontal analysis methods are presented which have allowed the analysis of interactions that were problematic to study by standard zonal elution methodology.

Faculty Sponsor: Eric Ross

12A Lauren Joplin and Maria Mai: "Book Embedding Optimizations for Families of Graphs"

A standard n -book is a line in 3-space (called the spine) together with n half-planes (the pages) joined together at the spine. A graph is embedded in a book by ordering the vertices along the spine and placing the edges within the pages of the book so that no two edges cross each other or the spine. The book-thickness of a graph G is the smallest number of pages needed to embed G in a book. This presentation will explore the optimum book embeddings for certain families of graphs.

Faculty Sponsor: Shannon Overbay and Paul De Palma

12B Patrick Mosca: "Online Teacher Evaluations May Not Be What You Think: Insights into Education Quality via RateMyProfessor.com"

Online review sites for rating teacher effectiveness have gained significant popularity in recent years. Sites such as RateMyProfessors.com (RMP) have created significant controversy in terms of the utility and validity of such ratings due to the increasing use of these ratings by students (e.g. to choose which classes to take) employers (e.g. in hiring and promotion) and higher-education rankings (e.g. "America's Best Colleges"). Commonly held critiques have been published concerning the validity of RMP teacher ratings. We describe our work on analyzing the entire corpus of RMP data. In particular we developed software to extract and store all professor ratings on RMP and a framework for performing various analyses (using MySQL and the R system). Our results confirm those of previous studies on small samples of RMP data and we show additional findings concerning commonly held beliefs of perceived quality within and across universities.

Faculty Sponsor: Shawn Bowers

12C John Berkes and Stevie Hamilton: "Reaction Times in Athletes and Non-Athletes"

The purpose of this research was to look at the difference in reaction times between skilled varsity athletes and non-athletes. We hypothesized that athletes would have faster reaction times than non-athletes. The results did not support the hypothesis. Reaction times for athletes and non-athletes were not statistically different. We conclude that reaction time alone does not account for skilled athletic performance.

Faculty Sponsor: Gary L. Thorne

13A Angela Lutwitez, Alicia Peebles and Megan Smith: "Urtica Dioica is Ineffective as an Inflammation Reducer at Doses of 870 mg as Compared to a Commercial Antihistamine"

Nearly half of Americans suffer from allergies and many turn to antihistamine drugs to alleviate their symptoms. Previous research has found that stinging nettle (*urtica dioica*) contains bioactives that demonstrate antihistamine activity and patients receiving *urtica dioica* reported greater reduction in allergic rhinitis. This study aims to quantify the anti-inflammatory activity and side effects of this remedy. In a double-blind experiment 23 volunteers were given a placebo 25 mg diphenhydramine and 870 mg freeze-dried nettle leaves with following skin prick tests over the course of three test sessions. Surveys regarding the side effects of each treatment were given with each skin test. Results indicate that *urtica dioica* has a low incidence of side effects commonly associated with antihistamine use. Although nettle showed a reduction in maximum wheal diameter the difference was not statistically significant.

Faculty Sponsor: Mike Sardinia

13B Jack Dunbar and Dominique Armstrong: "Microbial Arsenic Respiration in the Spokane River"

Dissimilatory arsenate-reducing bacteria (DARB) mobilize arsenic into the water column by reducing As^{6+} . Enumerating sedimentary DARB may determine the extent to which this metabolism poses a hazard in recreational waters. This study compares a most probable number (MPN) assay with acridine orange direct counts (AODC) of *Shewanella* strain ANA-3. Cultures were grown in an anaerobic medium with arsenate as the electron acceptor. Replicate MPN assays were sacrificed weekly to determine the MPN as a function of time. As^{6+} reduction was determined using a sulfide precipitation assay. The MPN counts showed a linear increase with a final concentration of 2.3×10^4 cells ml^{-1} after four weeks. The AODC concentration was 9.26×10^6 cell ml^{-1} . These results suggest that further incubation may result in a more accurate determination of DARB numbers in a sample.

Faculty Sponsor: Frank Caccavo

13C Michael Landkammer and Amy Thompson: "Structural Orientation Analysis from the Beacon Hill Area of the Spokane Dome"

During the Sevier Orogeny the Prichard Formation underwent high grade metamorphism which formed the Spokane Dome on the southern portion of the Priest River Complex. It has since been exhumed and now exists as an antiformal dome of mylonitized paragneiss and schist (Till et al. 2007) with pegmatitic dike intrusions. This doming is confirmed by the foliation dip recorded at about 20-40° southwest on the west side and then at about 60-80° south on the southern side of Beacon Hill. Compressional deformation of this area likely occurred during the formation of the Cordilleran Thrust Belt in the Jurassic into the Miocene; there are also multiple normal faults which originated during Eocene extension (Rhodes 1986). One such fault recorded was a shear zone antithetic fault at the southern edge of Camp Sekani Park which strikes at about 300° with a 65° dip to the northeast.

Faculty Sponsor: Chad Pritchard

13D Lindsey LaShaw: "Can Tree Cover Account for Variations in Length and Start of Season?"

Land surface phenology measures the timing of vegetation growth. Start and length of the growing season vary from year to year affecting ecosystem dynamics including productivity and organism interactions. This study examined the influence of percent tree cover on length and start of season. True color aerial photography (0.3 m resolution) was classified using ERDAS Imagine®. Percent tree cover was found for each 250m pixel. Length of season and start of season were evaluated as a function of the percentage of trees in each pixel. Simple linear regression indicated a significant relationship between percent tree cover and mean length of season ($p = 0.020$) however we did not establish significance for variation in length of season or for start of season metrics. Low R^2 values indicate that much of the variation in these phenology metrics remains unexplained.

Faculty Sponsor: Grant Casady

13E Kari Jenson: “Validating Raman Spectroscopy and Micro-Indentation Tests for In-Vivo Assessment of Bone Quality”

Fractures of the third metacarpal bones are a common and often fatal injury for racehorses. Most fractures are the result of fatigue damage accumulation which triggers modeling and remodeling processes that change the strength and physiochemical properties of the bone. The ability to measure these changes in live animals could allow for assessments of fracture risk before a catastrophic fracture occurs. In this preliminary investigation we assessed the efficacy of Raman spectroscopy and bone micro-indentation for in vivo measurements of bone physiochemical properties and strength respectively by looking for age-related trends. It was observed that mineral/matrix ratio decreased with age indentation distance increase from first to last cycles decreased with age and loading slope increased with age. The ability to show significant age-related trends in bone quality properties validates further investigation into the use of these techniques for fracture risk assessment.

Faculty Sponsor: Tailen Chen

13F Bradley Hopp, Ashlin Phelps and Audie Hyatt: “B-Alert System Sensor Headset Encephalography Used to Measure Brain Activity in Response to Playing Halo 2 (Videogame) and Solving Sudoku”

Both Sudoku and videogames have shown to be cognitively beneficial. This study examined the effect of first person shooter (FPS) videogames on engagement and looked at the mental engagement of test subjects while playing Halo 2 compared it to the cognitive engagement while solving Sudoku. The B-Alert System Sensor is proven to evaluate engagement in mental workload a term used to refer to the measure of the level of cognitive processing in the range of executive functions. The EEG is used to measure brain waves in response to high engagement and low engagement. The current study will use the B-Alert Sensor to observe the overall brain engagement while solving Sudoku compared to playing videogames. This study has found higher engagement in videogames especially among participants who play videogames more often and participants ≤ 20 years old have significantly more high engagement in Halo 2 than Sudoku when compared to participants >20 .

Faculty Sponsor: Michael Sardinia

13G Mackenzie Grow: “Evaluating the Phenological Plasticity between Varying Land Cover Types”

Knowledge of the response and adaptability of vegetation to seasonal climate changes is important in understanding the interaction between the environment and living organisms as it pertains to habitat loss land management and policy planning. Enhanced Moderate Resolution Imaging Spectroradiometer (eMODIS) is useful for analyzing the environment on a large scale as well as understanding global dynamics and land processes. eMODIS data were used to determine how phenological plasticity varies with differing land cover types. We evaluated Eastern Washington and the Idaho panhandle using the USGS

Gap Analysis Program to differentiate between land cover types relating it to land surface phenology data using a TIMESAT algorithm to analyze Normalized Difference Vegetation Index (NDVI). The results of this study demonstrate that plasticity varies between land cover types. Forests have high variability for start of season whereas grasslands have low variability.

Faculty Sponsor: Grant Casady

13H Taylor Powell: “Evaluating ISO 23 & 68 Grade Eco-Friendly Hydraulic Fluids used Hydropower Energy”

Hydropower energy is increasingly popular around the world as a more “eco-friendly” substitute to gas and other electrical energies. However within the hydropower industry concerns regarding the environmental profile as well as performance of hydraulic fluids and greases are growing. Developing and assessing green hydraulic fluids and greases is a particular need. Current research being conducted is to provide essential performance and ecological information about hydraulic fluids to guide the industry. Testing on a variety of ISO 32 and 68 grade fluids has been completed. Testing included viscosity pour point (freezing point) copper corrosion and emulsion testing; this will lay the foundation for future biological or environmental testing. Data for samples that met the desired ASTM or other testing standards have been assembled for reference in selecting hydraulic fluids.

Faculty Sponsor: Kerry Breno

13I Shauna Maple: “Alkaline Dissolution Kinetics of Iron-Phosphate Glass”

High loading capacities, low melting temperatures, and equivalent or possibly higher stability make iron-phosphate glass formulations potential cost-effective alternatives to borosilicate glass for the immobilization of low-activity waste. Single-pass flow-through (SPFT) tests were conducted on an iron-phosphate glass to complete a data set quantifying the dissolution kinetics over the pH range of 7 to 10 and temperatures of 23°C to 60°C. Effluent samples were analyzed by inductively coupled plasma-mass spectrometry (ICP-MS) and inductively coupled plasma-optical emission spectrometry (ICP-OES) for the major glass components Fe, P, Cr, Al, Na, Si, and Zr. The results will provide a baseline for the performance of iron-phosphate-based glass wastefoms for comparison against borosilicate glasses and a measure of performance from which further iron-phosphate glass formulations can advance. *Faculty Sponsor: Kerry Breno*

13J Anita Wang: “Analysis of Volatiles Involved in Ageing of Beer between Gluten-Free and Regular Beer through Gas Chromatography and Mass Spectroscopy”

Flavor profiles of beers are highly dependent on various chemicals that dictate its aroma. Thus the elimination or alternation of gluten in beer is expected to amend the profiles of the aroma and therefore its flavor. Headspace Solid-phase microextraction combined with Gas Chromatography and Mass Spectroscopy was employed to detect the chemical reactions

that would occur during beer ageing. Detection method was represented by the application of HS-SPME extraction by utilizing two different fibers: the Stableflex and PDMS/DVB. For this experiment procedures were modified for optimizing results. The changes in procedure were optimized for SPME coating and thus improved the loading temperature and time extraction temperature and time as well as the effects of salt addition. The method was verified and validated to be employed for enhanced results in the studies of the stability of flavor for most beer types.

Faculty Sponsor: Drew Budner

13K Luke Welle: "A Microwave-Assisted Palladium Cross-Coupling 2-Phenylindole Synthesis for the Undergraduate Organic Chemistry Laboratory"

A modern synthetic methodology for the synthesis of 2-phenylindole via microwave-assisted palladium cross-coupling reaction for the undergraduate organic chemistry laboratory was developed. This procedure increases yields and efficiency within three-hour lab blocks as compared to traditional reflux methods. Several literature procedures were evaluated tested and amended in order to develop a method that produced quantifiable yields while remaining economical and accessible to the standard undergraduate laboratory. The best procedure for this synthesis was identified and 2-phenylindole was successfully isolated and characterized. In contrast to previous methodologies this synthesis produces respectable yields in a timely manner with only standard undergraduate laboratory equipment materials and techniques.

Faculty Sponsor: Kerry Breno

13L Raeann Hutson: "pH-Dependent Fluorescence of Rhenium Tricarbonyl Dihydroxyphenanthroline Chloride"

Rhenium tricarbonyl 4,7-dihydroxy-1,10-phenanthroline chloride, $\text{Re}(\text{CO})_3\text{DHphenCl}$, has the potential to be a fluorescent pH probe. Fluorescence stemming from the Metal-Ligand Charge Transfer (MLCT) has been reported with related rhenium complexes. The novel complex $\text{Re}(\text{CO})_3\text{DHphenCl}$ demonstrates pH-dependent fluorescence based on the acidity of the dihydroxyphenanthroline ligand indicating a similar MLCT-based fluorescence. Fluorescence studies of $\text{Re}(\text{CO})_3\text{DHphenCl}$ have established that the complex fluoresces reliably in micromolar concentrations and demonstrates the expected linear relationship between concentration and emission. For a set of solutions with concentrations of 424 μM and varying pH the emission maxima derived from excitation at 380 nm was observed at 520 nm at pH 4.11, 465 nm at pH 6.89, and 480 nm at pH 9.57.

Faculty Sponsor: Kerry Breno

13M Katherine Shaw and Lauren Worcester: "Functional Analysis and Treatment of Aberrant Behavior Maintained by Multiple Functions"

We conducted a functional analysis to assess the aberrant behaviors of a preschool boy diagnosed with Autism Spectrum

Disorder. The participant's behaviors included aggression tantrums property destruction and self-injurious behavior. The functional analysis results showed that there was tangible and attention functional relationship for the participant's physical aggression and tantrum behaviors. It also demonstrated the possibility of an automatic function relative to the property destruction. Functional communication training was implemented to provide the participant with an effective mode of communication and proved effective in decreasing his physical aggression and tantrum behavior. A consequence procedure was added to the intervention to address the automatic property destruction displayed by the participant. Results will be discussed in terms of treatment of topographies of behavior for which a clear function was identified as well as for stereotypic behavior.

Faculty Sponsor: Anjali Barretto

13N Lauren Worcester: "Evaluating the Effects of Escape Extinction on the Number of Bites Accepted Both Pre- and Post-Fundoplication"

The purpose of this study was to evaluate the effects of escape extinction on the number of bites accepted by a two-year old boy with acid reflux. The effects of escape extinction on oral intake and refusal behavior was compared both pre- and post-fundoplication. The results indicated no significant difference in the effects of escape extinction pre-fundoplication compared to post-fundoplication. Escape extinction was effective at increasing the number of bites consumed by the participant while simultaneously decreasing the participant's refusals and negative behavior. Escape extinction was conducted along with texture fading. We began with pureed food and moved to fork-mashed foods. Results will be discussed in terms of conducting this type of feeding intervention in different environments with the parent as the therapist. Interobserver agreement was collected for 54% of the sessions with an average of 99.2% agreement.

Faculty Sponsor: Anjali Barretto

13O Eric Wonn: "Optimization of Parameters for Hydrogen Peroxide Detection Using Polymer-Prussian Blue Layered Electrodes"

Detecting atmospheric hydrogen peroxide (H_2O_2) is essential to understanding the oxidation capacity of the troposphere and related atmospheric conditions. While some methods for detecting H_2O_2 exist further development of stable sensitive detection techniques are needed to accurately monitor H_2O_2 levels. Prussian Blue has been used extensively for the electrochemical detection of dissolved hydrogen peroxide in water but often suffers from low stability. In the most stable systems the reproducibility of electrochemical measurements regarding stability and efficiency of Prussian Blue sensors has been elusive. It was determined that deposition of aniline and nickel-based polymers with the Prussian Blue and layer of the electrodes can both increase stability of the electrode while retaining sensitivity.

Faculty Sponsor: Drew Budner

13P Emily Foreyt: “Susceptibility of Amphibian Species to the Fungal Pathogen *Batrachochytrium dendrobatidis*”

This study was conducted to determine the level of susceptibility of species of frogs in the Peruvian Andes to *Batrachochytrium dendrobatidis* (*Bd*) and how their survival was affected by the presence of this fungal pathogen. Through a series of susceptibility trials in which uninfected frogs were exposed to the pathogen it was found that mortality rate did vary by species. Conclusive evidence of the exact factors that determine the level of susceptibility have yet to be determined but the results show a correlation between level of susceptibility and habitat type with the more terrestrial species seeming to be unsusceptible to *Bd*.

Faculty Sponsor: Christy Watson

13Q Whitney Shirley, Hannah Tubbs and Colby Davis: “Glyphosate Toxicity in *Gambusia Affinis*”

Washington State contains extensive agricultural land that affects local ecosystems. Undesirable plant life is often found in these areas and removed with various herbicides containing the active ingredient glyphosate. Increased herbicide use can create glyphosate-resistant plants which cause many land owners to disregard recommended concentrations during application. Excess herbicide can run off into nearby water sources adversely affecting other animal and plant life particularly fish. This study seeks to determine the toxic effects of glyphosate on fish in stagnant fresh water conditions where herbicide has a higher tendency to collect due to runoff from rainfall. *Gambusia affinis* were chosen for this study because of their use as mosquito fish in stagnant ponds near areas where herbicides like Roundup are used. Even when concentrations of Glystar were abused or washed off before the suggested wait time it did not affect fish mortality.

Faculty Sponsor: Mike Sardinia

13R Zachary Arms, Sim Gosal and Austin Ulakovich: “Groundwater Interaction between Columbia River Basalt Group and Paleodrainage Aquifers West Plains Washington”

The Columbia River Basalt Group host multiple aquifers and may impede storm water runoff which are both major concerns in the West Plains of eastern Washington. The aquifers are dominated by Columbia River Basalts namely a shallow and less extensive aquifer in the Priest Rapids member of the Wanapum basalts and deeper zones near the contact of the Sentinel Bluffs and Wapshilla Ridge members of the Grande Ronde basalts. However the presence of a few gravel filled channels (paleodrainages) influence recharge or drawdown of the aquifers and may facilitate rapid storm water removal from densely populated areas. We have analyzed samples from drill cuttings and classified the basalts from three wells in Airway heights. In conjunction with other well data we have produced a cross section that shows that the paleodrainages may act as

conduits for groundwater recharge aquifer mixing and storm water drainage pathways.

Faculty Sponsor: Chad Pritchard

13S Megan Hulsey: “Antibacterial and Antifungal Properties of *Inula helenium* Extract”

Due to the rapidly increasing identification of drug resistant pathogens novel approaches to treating and preventing infection are critical. In prior studies tinctures created from the root of the wildflower *Inula helenium* have exhibited antibacterial properties specifically against *Methicillin Resistant Staphylococcus aureus* (MRSA). This study was designed to verify the finding of its efficacy against *S. aureus* by testing three commercially available tinctures against *S. aureus* as well as to test the efficacy of the tinctures against a variety of other bacteria and yeasts that have a tendency to cause infections in immune compromised individuals. This project seeks to identify the minimal inhibitory concentration (MIC) of the *I. helenium* extracts as well as cidal versus static activity.

Faculty Sponsor: Erin R. Griffin

13T Vicki Rozell and Christopher Doll: “The Assessment of Communication Modalities in a Young Child with Autism”

We evaluated the effects of functional communication training (FCT) using assistive devices as an intervention for problem behavior of a 6-year-old child with autism. A concurrent operant assessment and functional analysis was conducted to identify function of behavior. Treatment consisted of an analysis of the picture exchange communication system (PECS) Proloquo2Go and a micro-switch. We compared the use of verbalizations and use of the assistive communication device as well as occurrences of problem behavior. Results demonstrated the lowest use of verbalizations and most consistent use of a device occurred with Proloquo2Go. In addition problem behaviors were the lowest with the micro-switch and Proloquo2Go. Results of PECS showed the highest problem behaviors in addition to highest levels of verbalizations.

Faculty Sponsor: Anjali Barretto

13U Amanda Stansell and Samantha Cagle: “Decreasing Aberrant Behavior during Cooperative Play in a Child with Severe Problem Behaviors using a Behavior Management Treatment Package”

The purpose of this intervention was to decrease aberrant behavior in an eight-year-old boy with ADHD and a history of neglect. The therapists implemented a treatment package consisting of discussing game play rules and appropriate behaviors combined with a break request procedure with a visual self-management tool during cooperative play with his older sibling. The treatment evaluation was conducted via a generalized case study across the behavioral lab and home settings. This treatment was effective in reducing his aberrant behavior to near zero levels. Results will be discussed in terms

of effectiveness in decreasing problem behavior generalization across settings and maintaining low aberrant behavior while fading the treatment package.

Faculty Sponsor: Anjali Barretto

13V Kelsey Harris: “The Effects of Using a Model Lead-Test Error Correction for Teaching a Student with ADHD Multiplication Facts: A Case Report”

This study was conducted to determine if using a model lead test error correction would be effective in teaching a child with ADHD basic multiplication facts. Another purpose of this study was to improve the child’s fluency and accuracy when solving basic multiplication facts at a third grade level. An ABC model was used across the of multiplication fact sets. The study was conducted in an intermediate resource room in a public school in the Pacific Northwest. High levels of improvement were made across the times two through five facts but levels of improvement varied with the times four facts. Learning was consistent across facts two through five; however was inconsistent for the four facts but improvements were made from his baseline performance. This study suggests that the model lead test error correction was effective when teaching the times two through five math facts. However it but was ineffective in teaching the times four facts.

Faculty Sponsor: T. F. McLaughlin

13W Hanna Gutting-McKee: “The Differential Effects of Using Tracing Sheets to Improve Developmentally Delayed Student’s Handwriting Ability”

The purpose of this study was to see the effects of using tracing sheets to improve developmentally delayed student’s handwriting ability. The participants in this student were three developmentally delayed 4-year-old preschool students. The study was conducted in a special education preschool program. The student’s in the classroom ranged from ages 3-5. The letters in the student’s name were presented to the participants. During baseline the performance was low. All three participants showed improvement during training. Reasons for mastery not being met by some of the participants were discussed.

Faculty Sponsor: T. F. McLaughlin

13X Alecia Tumpap: “Differences in Hippocampal Volume Associated with Post-Traumatic Stress Disorder (PTSD): A Meta-Analytic Review of Quantitative MRI Findings”

Post-Traumatic Stress Disorder (PTSD) is an anxiety disorder that may develop following a traumatic event. PTSD is characterized by symptoms of increased arousal intrusive re-experiencing and avoidant behaviors. It has also been linked to memory deficiencies. Research on both humans and animals suggests that the hippocampus is associated with stress and PTSD. While many magnetic resonance imaging (MRI) studies have found significant decreases in the hippocampal volume of PTSD patients others have not. In order to investigate the potential

impact of PTSD on hippocampal volume the current study uses meta-analytic techniques to generate a larger sample size.

Faculty Sponsor: Michael Nelson

13Y Iliana Sanchez: “Sea Anemones’ Substrate Preferences for Attachment”

Anthopleura elegantissima are mostly sessile filter-feeders. I wondered if they moved great distances when on an unsuitable substrate. The question I addressed was to figure out which selected substrates would *Anthopleura* prefer to remain sessile on the longest and which would it move the most on over a period of time. I used the method of recording the initial and final positions of the anemones by an over-the-tank grid made up of twine. I used the tank floor as one of the substrates along with a cement block, a red brick, a mossy rock, a clean rock and plywood. I had two anemones one large and one small on each substrate and recorded their position for three three-hour intervals. The substrate with the most movement was the plywood and the one with the least amount of movement was the red brick.

Faculty Sponsor: Craig Tsuchida

13Z Mary Konis and Allison Blake: “Characterizing bacterial membrane components: Efforts toward understanding antimicrobial peptide mechanisms”

The rise in antimicrobial resistant strains of bacteria presents a challenge to modern medicine that demands a solution, and antimicrobial peptides (AMPs) have served as a potential alternative to current drugs. Rational drug design would build on the knowledge of current antimicrobial mechanisms to find new solutions, but current antimicrobial peptide modes of action have only been derived from circumstantial evidence and still lack compelling experiments that implicate one proposed mode of action over another. To determine whether antimicrobial peptides act by a membrane disruption or a non-membrane disruption mechanism their activities were tested against three bacterial strains of gram positive, *Bacillus subtilis*, and three gram negative, *Escherichia coli*. In the case of a membrane disruption mechanism, one might expect little or no strain dependence of the antimicrobial peptides. However, this expectation assumes little or no variation of membrane composition for varying strains of a given bacteria. We are directly testing this assumption by characterizing lipid membrane composition using thin layer chromatography (TLC) and mass spectrometry (MS). Significant differences in lipid composition were seen between species, but not between strains, thereby affording a tool to further probe antimicrobial peptide modes of action. For example, changes in antimicrobial peptide activity against multiple strains would imply a non-membrane disruption mechanism. Because lipids are not the only major constituent of cell membranes, future studies involve the characterization of membrane peptidoglycan content.

Faculty Sponsor: Matthew Cremeens

14A Laura Fabiola Watts Cesena: "A Comparison of Education Systems: USA vs. UK"

Presentation will analyze two different educational systems: the public American Education system and the state British Education system. British education system has a higher world ranking than the American education system. Presentation will compare both educational systems and will shed light on improvements to the US education system. Aim of this analysis is to answer the following questions: 1) How can the American public education system mainly k-12 be improved? 2) What is the American system doing right and what it's doing wrong? Through five different areas of focus we will discover differences and similarities between the two systems. The five areas of focus are: 1) Education System & Curriculum 2) Costs 3) Interviews 4) Political Influences and 5) Potential Improvements. Each of these areas will allow us to understand in-depth and reflect upon the current education system.

Faculty Sponsor: Michael Treleven

14B Jenna Hansen: "Math Education in Singapore and the United States: A Comparative Analysis"

Singaporean K-12 students have consistently outperformed their U.S. counterparts on the TIMSS, an international mathematics and science test, since 1995, and U.S. students have fallen behind other industrialized countries. This paper is a comparative analysis of mathematics education in Singapore and the United States. After providing background information on the history of math education in Singapore, this paper compares the framework, curriculum, textbooks, teachers, instructional methods, and testing practices in the two countries and identifies strengths in Singapore's closely aligned framework teacher preparation programs and focus on teaching to mastery. This analysis indicates that these components lead to greater student success. This paper concludes with a set of recommendations for reform to the current U.S. math education system so that students in the United States can be more competitive internationally.

Faculty Sponsor: Randy Michaelis

14C Matthew Gilles: "Corrective Feedback and Action Research"

Which of the following forms of written corrective feedback do students prefer?

- Highlighting error without identifying the type.
- Highlighting errors and using coded symbols to indicate the type of error.
- Re-writing errors using target structures.
- Record the target (corrected) structures and have students listen notice and edit their writing.

This was the research question used in my Action Research project. I will discuss its findings and its significance.

Faculty Sponsor: James Hunter

15A Katherine Jones and Christopher Galeucia: "More Frequent Electrodermal Responses to Familiar Than Unfamiliar Chimpanzee Faces"

This project used electrodermal activity (EDA) to examine the biological response of humans to the recognition of chimpanzee faces. We familiarized each participant with a set of chimpanzee faces and then measured their EDA while they viewed both the familiar and brand new faces. After viewing each face participants also said whether that face was familiar or new. Results showed participants had more frequent EDA responses to familiar than unfamiliar faces $z = -2.575$ $p = .010$. Participants also performed well above chance at successfully identifying which faces were familiar and which faces were new $M = .823$ $SD = .110$. These findings are consistent with those that used human faces as stimuli suggesting that there may be some overlap in the way we process both human and chimpanzee faces. A few brief viewings are enough for both overt recognition and for some level of covert biological recognition.

Faculty Sponsor: Gary Thorne

15B Jakeem Lewis and Terran Poindexter: "The Effects of Stress on Problem-Solving"

This experiment investigated the effects of stress on problem-solving under massed and spaced conditions. Participants did an anagrams task twice with a pause between the first and second attempts. There were three conditions. In the massed condition the pause was brief. In the spaced/low-stress and spaced/high-stress conditions the pause was 13 minutes and they did a delayed-matching-to-sample (DMS) task at one of two levels of difficulty. In the spaced/low-stress condition the DMS task was very easy and in the spaced/high-stress condition the DMS task was very difficult. We hypothesized that the number of new words created during the second attempt would be greater in the spaced than the massed conditions. Furthermore we hypothesized that the number of new words created during the second attempt would be greater in the spaced/low-stress than the spaced/high-stress condition.

Faculty Sponsor: Gary L. Thorne

15C David Fong and Sarah Tilghman: "Tension and Judgment of Time Duration"

Time is a fickle thing. One moment can seem to take years another only seconds. This study investigated the effect of emotional state on the judgment of time passage. Participants watched six sequences of pleasant pictures and six sequences of unpleasant pictures and judged the duration of each sequence. We hypothesized that the duration of the unpleasant series would be judged as shorter than the pleasant series.

Faculty Sponsor: Gary L. Thorne

15D Fallon Baraga and Virginia Whalen: "Meditation and Social Connectedness"

We are hardwired for relationships; connection with others is a basic and vital need. Loving-kindness meditation (LKM) has been demonstrated to increase social connectedness. This

study tested the effectiveness of loving-kindness meditation on increasing social connectedness and investigated whether the effects of relaxation mediate the result. To do so we compared LKM with progressive muscle relaxation. Participants were randomly assigned to one of two conditions. In one condition participants listened to an audio clip guiding them through a progressive muscle relaxation exercise. In the second condition participants listened to an audio clip of a loving-kindness meditation. We hypothesized that loving-kindness meditation would increase social connectedness more than progressive muscle relaxation.

Faculty Sponsor: Gary L. Thorne

16A Sarah O’Bernier: “Fascist Art and Aesthetics: Questioning the Homogeneity in Artistic Perspectives in Mussolini’s ‘New Italy’”

The nature of the relationships between art movements and the Italian Fascist State during Mussolini’s reign (1883-1945) is often oversimplified by historians. It has been assumed that if an art movement supported Fascism the relationship was one without conflict; however this does not take into account the real experiences of artists. Novecento and Pittura Murale were movements that demonstrate multiple perspectives towards creating Fascist art and Fascist aesthetic. Artists of Novecento spoke out in *Critica Fascista* against the forced visual aesthetic. Pittura Murale’s manifesto demonstrated the importance of the creation and adherence to a specific aesthetic to make a more powerful impact on society. Previous descriptions of art and culture in Fascist Italy assume a homogenous feeling of acceptance of Fascism within artistic movements; however an examination of manifestos issued by prominent artists demonstrates that this is a simplistic approach.

Faculty Sponsor: Corliss Slack

16B Sarah Jaymes Kenney: “Reformation: A Tool for the Fulfillment of Dynastic and Personal Goals”

Since the middle of the 15th century the crusading order of the Teutonic Knights had been declining as a military and political entity in Prussia. After selecting Albrecht von Hohenzollern to be their next grand master the order believed that they would be able to rise to power once again in the region. However Albrecht had his own dynastic and personal goals to fulfill. I assert that while Albrecht initially believed the Order could serve to expand his family’s dynastic authority and establish his own political reputation he eventually saw that the order was too degenerate to fulfill these goals. Therefore he used Lutheranism as a tool to supersede traditional structures and create a secularized state through which he could secure a political future for himself and his family.

Faculty Sponsor: Corliss Slack

16C Brandon Campbell: “Babi Yar: The Conscience behind Dmitri Shostakovich’s Thirteenth Symphony”

Ranked among the most prominent composers of the twentieth century Dmitri Shostakovich’s (1906-1975) legacy

stands at the center of one of the most active and polarized debates among western musicologists. Fueled by a significant lack of verifiably authentic personal records the debate focuses on varying interpretations of Shostakovich’s compositional motivations his stance regarding Soviet communism and its effect on Soviet artists and composers and the degree to which his political views influenced his music. By examining first-hand accounts recorded by poet Yevgeny Yevtushenko Shostakovich’s collaborator on the Thirteenth Symphony as well as letters exchanged between Shostakovich and close friend Isaak Glikman this paper attempts to provide an insight into Shostakovich’s motivations while composing the Thirteenth Symphony and ultimately the degree to which this single work reflects Shostakovich’s compositional legacy.

Faculty Sponsor: Corliss Slack

17A Jennifer Ampadu: “Quenching Briggs-Rauscher Reactions: Effects of Organic and Inorganic Salts”

The Briggs-Rauscher reaction is a kind of oscillating reaction which begins as a colorless solution which oscillates from amber blue-black and then to back to colorless. During this period the electrical potential of the solution oscillates at a range of x-60mV. Quenching is a procedure which employs perturbation of the oscillating system and in this experiment the reaction was quenched with a variety of salts including LiF LiI LiBr Li₂SO₄ LiCO₃ LiC₂H₃O₂ LiC₇H₅O₃ Li C₅H₃N₂O Li C₇H₅O₃ NaF NaBr NaC₂H₃O₂ NaC₇H₅O₃ and NaC₇H₅O₃. Quenching was not observed for LiNO₃ and DI water. It was observed that the inorganic salts were more efficient at quenching than the organic salts.

Faculty Sponsor: Karen Stevens

17B Nathan Peck: “Manmade Closed Ecological Systems”

A closed ecological system is a dynamic self-sustaining network of living and non-living elements with an essentially closed material cycle kept in motion by solar energy. The primary and most grand example of a closed ecological system is Earth. The first major research on creating manmade closed ecological systems came as a result of the space race and has continued since. There are three main reasons why research on manmade closed ecological systems is worthwhile: human space exploration relies on its development it has the potential to greatly enhance sustainability on Earth and research in this area can be used as a teaching and learning platform for upcoming scientists. My personal research in this area includes work done at NASA to develop more efficient methods for purifying water when off the Earth and work done at Gonzaga University to develop small closed ecological systems based around shrimp and algae.

Faculty Sponsor: Gary Chang

17C Erin Lapsansky: “Genetic Pest Resistance in Rosa Hybrida”

Many types of roses are grown worldwide for their use in gardens and bouquets as well as for their use in everyday products such as cosmetics. Aphids are a major predator of

these ornamental plants and require multiple applications of pesticides throughout the growing season. This research is attempting to transformation of *Rosa hybrida* with the aphid alarm pheromone and predator attractant E- β -Farnesyl Synthase to confer pest resistance to the plant. This process involves the regeneration of plants from embryogenic tissue following genetic modification through co-cultivation with *Agrobacterium tumefaciens* containing a plasmid with the E- β -Farnesyl Synthase gene.

Faculty Sponsor: Marianne Poxleitner

18A Aaron Marsh: "A Percolation Model for Cluster Formation in Systems of Gapped Metal Rings"

Percolation models have been used to analyze many types of physical systems. Our goal is to discover if a percolation model of a tangled network of metal rings would or would not exhibit the same properties of other percolating systems. We constructed a computer model based on a new algorithm that scales linearly as a function of system size and demonstrates behaviors coincident with percolation theory.

Faculty Sponsor: Christopher Lasota

18B Evan Edstrom: "Improving Multi-Agent Exploration Efficiency Through Perimeter Analysis"

In the presented research collaboration between multiple robotic devices is used to efficiently explore and construct a map of an unknown structure. In order to most efficiently split up the task of exploration various search algorithms are considered which use prior search experience to avoid redundancy and maintain stability. Different algorithms apply to different locations such as hallways rooms or the outdoors. If a robot can understand its current environment the efficiency of operating in that environment can increase. Simulations apply varying reward and cost estimates to different location types in an effort to find the most efficient search allocation method.

Faculty Sponsor: Kent Jones

18C Nathan Hunter: "A Mathematical Model for Celiac Disease"

Celiac disease is a genetic autoimmune disorder that causes gluten intolerance. To increase understanding of the disease we built a mathematical model for the processes involved in its progression. From the model insight can be gained into the mechanism of the disorder. One hypothesis that arises from the model is that quicker returns of symptoms from eating gluten again could be due to longer-term survival of certain immune cells. To determine how the disease will behave over a long period of time we solved for fixed points and analyzed stability. We found that the system has one stable fixed point meaning that given enough time all variables will reach constant values. We believe that further analysis of the model could unlock a better understanding of the disease.

Faculty Sponsor: Michael Rempe

19A Christina Iatridis: "The Moon in A Midsummer Night's Dream: Alternative to Patriarchy or Catalyst of Tragedy?"

The presence of the moon in Shakespeare's *A Midsummer Night's Dream* may be used as a thematic vehicle that exposes potential problems and tragedies through contesting patriarchal authority as the play cyclically transitions from Athens to the forest and back to the city. The cyclical and transformative nature of the moon and the play-within-a-play suggest the moon as a feminine energy that perhaps contests masculine dynamism and directs the play's happenings.

Faculty Sponsor: Heather Easterling

19B Megan Dempsey: "Minds Transfigured?: An Interrogation of Pyramus and Thisbe in A Midsummer Night's Dream"

"Minds Transfigured?: An Interrogation of *Pyramus and Thisbe* in *A Midsummer Night's Dream*" investigates the relationship between tragic and comic elements in Shakespeare's work. The essay first explores critical commentary about the interrelationship between the Mechanicals' performance of this tragedy and the comedy of *A Midsummer Night's Dream*. Drawing ultimately from Virgil Hutton I argue that the play-within-a-play is included for discursive purposes rather than simply "humor and burlesque." Turning to the play itself I align with Hutton's position that *Pyramus and Thisbe* represents "the mingling of comic delight with tragic instruction" by suggesting that the young lovers' inadequate responses to the tragedy indicate their inability to apprehend the fullness of the lessons about love offered in the forest.

Faculty Sponsor: Heather Easterling

19C Amanda Klasila: "Managing Anxieties through Comedy: A Guidebook of the City of London through The Shoemaker's Holiday & A Chaste Maid in Cheapside"

The late sixteenth and early seventeenth centuries was a time of great transformation for England and specifically the city of London. Popular drama proliferated and city-comedies spoke directly to the anxieties emerging in this growing pre-industrial city. In this presentation I will examine how two such comedies interrogated London's vast growth. *The Shoemaker's Holiday* by Thomas Dekker and *A Chaste Maid in Cheapside* by Thomas Middleton both explore transforming ideas of class hierarchy and economic consumption as these pertained to their contemporary London audiences. While the plays evoke two very different tones one of geniality and the other of cynicism both capture the fears that emerge from a society turned on its head. Viewed from within a historical framework of the period I will examine how Dekker and Middleton make use of romantic plots and comedy to manage the anxieties of a pre-modern London.

Faculty Sponsor: Heather Easterling

19D Diana Cater: "So Irrefutable It Can't Be True: The Erosion of the Traditional Scientific Narrative in Randy Shilts' *And the Band Played On*"

The pursuits of scientific inquiry lend themselves well to story-telling and narrative. Here the lone scientific investigator becomes a hero in the quest for objective truth. But what is lost when science is spun into story? An examination of common themes in nonfiction science narratives reveals the genre's astonishing ability to transform the complex and ambiguous realities of science into a clear and confident narrative arc. In Randy Shilts' nonfiction narrative *And the Band Played On* however this narrative clarity disintegrates. Here Shilts warps the expected structure of the science story creating an unsettling portrait of the faults and ambiguities within science eroding the easy confidence of inductive reasoning.

Faculty Sponsor: Nicole Sheets

20A Hanna Hanks: "The Role and Reality of the Hetaira in Classical Greek Culture and Iconography"

Evidence from the early sixth century B.C. has suggested the emergence of an ideological and social distinction between two classes of sympotic 'prostitute' the *hetaera* and *pornê*. Defining and describing each woman's sexual labor has been an issue of considerable contention given that ancient evidence is both limited and extremely varied. This presentation will thus explore the rights and roles of the infamous *hetairai* or courtesans with an eye to their broader social and political impact in Classical Athens. Using literary and iconographic sources primarily Attic figural pottery the dialogue on women in sexual labor can expand to encompass not only prostitution as an occupation but also its social and political ramifications. This analysis reveals that previous work has disregarded or downplayed the importance of education to the relative freedom of the *hetaira* in Greek patriarchal culture.

Faculty Sponsor: Andrew Goldman

20B Katherine Joyce: "Evidence for the Jewish-Roman Treaty of 161 BCE"

In 161 BCE Judas Maccabeus initiated the formation of an alliance between the Jews and the Roman Republic. This alliance committed both parties to fighting for the other in times of conflict and stipulated a prohibition on either aiding the other's enemies. Although the Jews were under oppression by the Seleucids at that time Rome never stepped in to help a fact which raises questions about the authenticity of the treaty record. The likelihood of the existence of the Jewish-Roman Treaty can be demonstrated by holding it up against the accepted form and rhetoric used in similar treaties made between the Romans and Hellenistic peoples such as the Treaty of Apamea. In light of this comparison Rome's failure to protect the Jews from their enemies was not a true breach of the treaty stipulations and the treaty was - although a useful political tool - nominal rather than practical.

Faculty Sponsor: Andrew Goldman

20C Victoria Fallgren: "The Julio-Claudians: They Put the Fun in Dysfunction"

When Augustus established the *Lex Iulia de adulteriis et pudicitia* in 18 B.C.E., he stepped into the Roman household as someone who set the bar as what was expected from them. Not only did Augustus set the bar for the Romans though he also used his own family as an example of how he wanted the Roman citizens to comport themselves. In an effort to follow his new legislation Augustus found himself intermarrying his kin essentially creating an inner circle among the Roman elite that no one could break into and making endogamous relationships the norm in the Imperial family for generations to come.

Faculty Sponsor: David Oosterhuis

20D Jasmine Linane-Booey: "Schoenberg Center: An Ideological Analysis"

Colleges and universities possess legacies that are conceived from stories urban legends and tall tales about what used to be and how it became what now is. Typically those stories are rooted in truth and historical evidence but as roots grow and change so do stories. This presentation will explore the historical events that influenced Gonzaga as an educational institution. An analysis of the history of Gonzaga will be compared with today's Schoenberg Center for Global Engagement and the significance of its architectural design as well as its geographical location within the Gonzaga campus. Schoenberg Center for Global Engagement is a symbol of greater societal issues regarding injustices between those who hold the dominant power and those who do not and we will explore those discrepancies throughout the presentation.

Faculty Sponsor: Lisa Davis

21A Amber Buehlmaier: "The Last Piece: Adoptees Identity Construction and the Reunification Process"

As adoptees grow older many express a desire to learn about and possibly reunify with their biological parents. The process an adoptee goes through in order to achieve this is an often critical and emotional personal journey. This experience is far from simple - there are often conflicts between a sense of accepting their adoptive past or rejecting it entirely. The resulting identity is a compilation of their past in order to make meaning of their present. I will be using in-depth interviews to explore adoptees experiences their feelings about being adopted about possible reunification and how their status as an adopted child has affected their sense of self. I suspect that adoptees sense of self will be incomplete. They will see their identity as fractured because of a lack of familiarity with their biological roots and then either accept this identity or reflect it.

Faculty Sponsor: Vikas Gumbhir

21B Kaitlyn Dowd: “While Mom is Away the Kids Will Play: Parental Attachment Familial Disruptions and Delinquency”

This study examines the attachment between a child and their parental figure and how it affects the likelihood of delinquency. The research will be done through secondary analysis based in The National Longitudinal Study of Adolescent Health which was compiled of the “residents’ social economic psychological and physical well-being with contextual data on family neighborhood community school friendships peer groups and romantic relationships” (Add Health). The respondents of the Add Health data were asked questions regarding their perceptions of how much their parents care about them along with how much of their time is spent with their parents. Questions regarding any violent or deviant actions that they have been a part of were cross examined with the attachment scale which was ultimately used to analyze the depth of attachment. The process was repeated for each of the waves of the data in order to assess how the relationship changed as the respondent grew older.

Faculty Sponsor: Vikas Gumbhir

21C Centered Israel: “Don’t Be a Drag Just be a Queen; An Ethnographic Study of Drag Queens”

Drag queens are defined as male individuals who impersonate females for the sake of performance and expression. Through the imitation of the characterization of femininity drag queens have created a subculture that appears to deviate from typical hegemonic gender norms. When individuals embody characters of the opposite sex we are quick to assume this is a viable and effective way to deviate from binary gender norms. However current literature suggests that the act of drag may actually propagate hegemonic gender norms. Drag queens can conclusively be labeled as both a representation of gender anomaly and a subculture heavily associated with gender activism and diversity. This study qualitatively explores the drag community and the individuals involved via observation in order to compare the interactions of drag queens with different audience member types and the extent of the interconnectedness within the drag community.

Faculty Sponsor: Vikas Gumbhir

21D Madeline O’Neil: “What Happens in College Stays in College: Exploring the Relationship Between Hedonism Careerism Achievement Orientation and Deviance at a Private University.”

One aspect of student life that most colleges share is the excessive use of alcohol among their students also known as binge drinking. Scholars define binge drinking as five drinks for males and four drinks for females in one sitting. Experts agree that binge drinking is heightened by students’ belief that heavy drinking is common and normal behavior among their peers and in turn they view it as an accepted practice. I have developed three theories that may further explain binge drinking:

- Hedonism or the devotion to pleasure as a way of life will increase the frequency of binge drinking.

- Careerism or a focus on one’s professional life after college will decrease the frequency of binge drinking.
- Achievement orientation or viewing academic success as personal validation will decrease the frequency of binge drinking.

Faculty Sponsor: Vikas Gumbhir

Session 22

Special Session: What the Writings of Henry George Teach Us about Taxation to Promote Fairness and Prosperity

Henry George’s *Progress and Poverty* was first published in 1880 advocating a “single tax” on land values as both equitable in capturing “unearned” income of landowners for the benefit of the community and efficient in avoiding the disincentives to productive activity associated with other forms of taxation. The papers presented in this session are based on *Progress and Poverty* and may also draw on other works by George or other writers on economics relevant to the topic.

Faculty Moderator: John Beck

22A Katherine Catlin: “Progress Poverty and Planetary Preservation”

An argument that in order to achieve long-term economic sustainability and equality we must learn from Henry George’s arguments for a “single tax” on land values and tax a hypothetical fourth factor of production: “planet stock.” *Planet stock* is defined as the remaining expendable natural resources of the earth. Included in this definition are quantifiable items such as trees volume of potable water biodiversity and soil nutrients; and immeasurable items such as clean air the ozone layer and functioning biogeochemical cycles. Such resources our currently being liquified at an unsustainable rate to the detriment of our sustainable economy.

Faculty Sponsor: John Beck

22B Alec Stannard: “Fair Taxation”

“Poverty is the relentless hell waiting beneath civilized society. Poverty is not just deprivation; it is shame and degradation.” These words encapsulate the feeling Henry George held for poverty. In his book *Progress and Poverty* he outlines his theories behind the origins of poverty and its relationship to progress. He proposes a single tax on land values as a solution to inequality in modern society.

Faculty Sponsor: John Beck

22C Ian Houts: “A Critical Juncture”

A general trend throughout the evolution of the society has been to progress past restrictive and extractive institutions through critical junctures. These periods have dissolved the institutions such as chattel slavery and extractive colonialism and at each point the political and economic inclusivity fostered has allowed for immeasurable opportunities for development and innovation. We are at a point in our society where we enjoy many social and economic freedoms. Yet there are still restrictions that disallow full returns to labor and capital and the

institutions that keep them in place have ossified in the public mind and culture. A chance to dissolve these institutions and create a new wave of economic opportunity is available and will encourage fairness and prosperity. It is the single land value tax as advocated by the American economist Henry George and may have as much positive impact as the previous critical junctures.

Faculty Sponsor: John Beck

Session 23

Special Session: Gonzaga Chemistry Department

Senior thesis presentations from the Department of Chemistry and Biochemistry at Gonzaga University.

Faculty Moderator: David Cleary

23A Krystal Orth: "Host-guest Interactions of a Membrane Bound Cavitand Investigated by Biomembrane Analytical Affinity Chromatography"

A water and lipid soluble tetracarboxylate cavitand selectively binds tetraalkylammonium guests acetylcholine and choline into its binding cavity. Interaction between the host-guest complex in a lipid bilayer has been difficult to characterize by spectroscopic techniques. This research paper details efforts to study the binding interactions chromatographically using novel stationary phases composed of a cavitand-membrane bilayer composite assembled on stöber agglomerated particles in a microcapillary. Previous work with these materials has focused on metal ion retention to more robust receptors. Challenges associated with self-assembly of the cavitand into the lipid bilayer such that the cavitand retains its host-guest properties and probing organic acid retention using conductivity detection will be discussed.

Faculty Sponsor: Eric Ross

23B MacGregor Hodgson: "Can an Exclusion Mechanism of Retention be Designed into Biomembrane Analytical Affinity Chromatography?"

The incorporation of a size exclusion mechanism of retention into biomembrane analytical affinity chromatography poses interesting implications for the study of analyte interactions with lipid bilayer stationary phases. Building on our lab's previous chromatographic study of alkali ion binding to gramicidin the question of whether alkali ion retention can arise from transportation to a restricted stationary phase access volume is the focus of this investigation. It was initially hypothesized that a water filled access volume could be generated using polyethylene glycol-tethered lipids to create a nanometer gap between silica colloidal surface and the lipid bilayer or that these lipids could potentially exhibit reduced interaction with the silica so as to favor vesicle entrapment over adsorbed films. Progress towards describing the effect of these lipids and understanding the biomembrane affinity phases under study will be presented.

Faculty Sponsor: Eric Ross

23C Chasina Olis: "Low Temperature Synthesis of Nickel(II) Hypodiphosphate"

In traditional solid state synthesis high temperatures are generally used to create compounds from solid materials. However with varying temperature the crystal structure of a compound may change. The purpose of this experiment was to test a low temperature synthesis pathway for the compound $\text{Sn}_2\text{P}_2\text{O}_6$ and see if the crystal structure changes. To accomplish the analog $\text{Ni}_2\text{P}_2\text{O}_6$ was first tested since the crystal structure at low temperature was already known. Solutions of hypodiphosphate and nickel acetate were set up on opposite sides of a gel and allowed to diffuse. This resulted in the growth of two different crystals one of which was the known $\text{Ni}_2\text{P}_2\text{O}_6$ structure. Therefore it is plausible that this pathway with gel as the medium will work for the synthesis of tin(II) hypodiphosphate.

Faculty Sponsor: David Cleary

23D Jonathan Barnett: "Photocatalytic Water Splitting with Rare Earth Metal Oxides"

A series of photocatalysts with the structure $\text{A}_w\text{R}_x\text{Ta}_y\text{O}_{3y}$ (La) (A=Na K Rb; R=Ce Nd Ta Pr Sm; La=2%; W=124; X=125; Y=125) were prepared by direct combination of the appropriate oxides to yield a perovskite based ($\text{X}^{\text{II}}\text{A}^{2+\text{VI}}\text{B}^{4+}\text{X}^{2-}_3$) crystal structure. These solids were then doped with lanthanum for optimization of their ability to catalyze water decomposition in the presence of light. Materials were first screened for catalytic activity as thin films in a photoelectrochemical cell. Materials with sufficient catalytic activity were further characterized with a high-pressure 300 W Xe lamp. The gas evolution was monitored with GC-MS and GC. Ancillary characterization of the materials was performed by X-ray diffraction and scanning electron microscopy.

Faculty Sponsor: David Cleary

Session 24

Special Session: Gonzaga Chemistry Department

Senior thesis presentations from the Department of Chemistry and Biochemistry at Gonzaga University.

Faculty Moderator: Jennifer Shepherd

24A Ingmar Bolinger: "Virtual Screening for Inhibitors of Mycobacterium Tuberculosis β -Carbonic Anhydrase"

Mycobacterium tuberculosis (Mtb) causes Tuberculosis. Tuberculosis has been troubling humans for centuries and cases are currently at epidemic levels with one third of the world's population infected. A recent discovery has revealed an allosteric bicarbonate binding site in *E. coli* β -carbonic anhydrase (ECCA) that is also present in *Mtb* β -carbonic anhydrase (MTCA). The activity of carbonic anhydrase (CA) is crucial to the life of all organisms most notably in carbon assimilation and pH homeostasis. The allosteric site in MTCA is not found in vertebrate α -CA which poses the potential for a selective drug target to bind and halt the growth of mycobacteria. Using OpenEye software a collection of compounds was virtually screened using molecular docking. The top scoring molecules

for the MTCA model could serve as novel candidates for enzyme inhibition targeting *Mtb* β -carbonic anhydrase.

Faculty Sponsor: Stephen Warren

24B Thuy-mi Nguyen: “The Characterization of Parahaemolyticus Vibrioferriin Synthesis B (PvsB)”

Vibrio parahaemolyticus are bacteria that can manifest themselves as acute gastroenteritis if ingested by humans in raw seafood. Many of these virulent bacteria produce siderophores which are high-affinity ferric iron chelators needed in order to acquire iron from the host. One path to synthesize siderophores involves nonribosomal peptide synthetase (NRPS) multienzymes and the other involved NRPS-independent siderophore (NIS) enzymes. Since the NIS pathway is crucial to bacteria and not to most eukaryotic organisms the pathways in the biosynthesis of siderophores are a unique target for chemotherapeutic inhibition. The goal of this project was to optimize an overexpression and purification protocol for Parahaemolyticus vibrioferriin synthesis B (PvsB) using *E. coli*. The purified protein will then be used for structural analysis utilizing techniques including x-ray crystallography and kinetics assays.

Faculty Sponsor: Katherine Hoffmann

24C Connor Cahill: “ The Purification and Characterization of RquA in *Rhodospirillum rubrum* and *Escherichia coli*”

The gene *rquA* is necessary for the synthesis of rhodoquinone (RQ) a key cofactor in energy metabolism of *Rhodospirillum rubrum* under anaerobic conditions. RQ is made directly from ubiquinone (Q) a structurally similar quinone. The gene *rquA* has been previously shown to be necessary for the synthesis of RQ from Q. The gene *rquA* has a predicted protein product that resembles a S-Adenosylmethionine (SAM) binding site. RQ is also involved in the anaerobic metabolism of parasitic helminthes. Therefore the structural elucidation of the protein RquA may provide a novel drug target. In this study the protein RquA was attempted to be over expressed and purified using both native *R. rubrum* and *Escherichia coli* using various growth and purification techniques. Based on the results presented RquA has not yet been successfully purified enough for any assays to be run.

Faculty Sponsor: Jennifer Shepherd

24D Taylor Brown: “A Lipidomic Study of Antimicrobial-Peptide-Sensitive Bacteria”

Antimicrobial peptides (AMPs) are endogenous molecules that can supplement an organism’s immune response. Although many AMPs have been identified the mechanisms by which they act are largely unknown. Previously our efforts have been to test the efficacy of a select group of peptides on several strains of *Escherichia coli* and *Bacillus subtilis* establishing a standard method for categorizing AMP mechanisms. To establish confidence in such standard method the lipid profile of each strain must be known. This study used LC/ESI MS as well as MS to determine the lipid profiles of the *E. coli* strains ATCC25922

ATCC35218 and ATCC9637; and *B. subtilis* strains ATCC49343 ATCC11774 and ATCC6633. The results suggest that the lipid profiles vary between the two species but are similar among strains of the same species. This data offers insights necessary for a more robust method of AMP mechanism elucidation.

Faculty Sponsor: Matthew Cremeens

Session 25

Special Session: Jane Austen Adaptations

Faculty Moderator: Laura Bloxham

25A Kirsten Bleeker: “Prose or Film: The Battle of Aesthetics Concerning Jane Austen’s Emma”

This paper compares Jane Austen’s novel *Emma* to the film adaptation directed by Jim O’Hanlon. The use of 21st Century film in portraying a classic novel provides an interesting analysis of what the director may or may not have deemed significant to emphasize in a visual portrayal. In this particular adaptation O’Hanlon uses the advantage of film to highlight aspects of Austen’s novel such as Emma’s inner voice and meddling personality yet at the same time allowing the maturity of Austen’s title character to be sacrificed in its portrayal by Romola Garai.

Faculty Sponsor: Laura Bloxham

25B Joanna Szabo: “The Lizzie Bennet Diaries Web Series: Why Jane Austen is best told in ‘vlog’ form”

Hank Green and Bernie Su - two popular YouTube personas - began a web series in April of 2012 with the intention of retelling Jane Austen’s *Pride and Prejudice*. Using video logs (“vlogs”) as a channel for literature is an entirely new concept and it may seem like it would take away from the novel form. In this presentation I will show how *The Lizzie Bennet Diaries*- presented as a compilation of real-life real-time vlogs - succeeds in delivering important elements of the novel that are not afforded in a film narrative. We will look at how vlogs afford similar narrative style and characterization as the novel as well as how they can adapt mass communication formats that more effectively relate period communication than works presented through other contemporary mediums.

Faculty Sponsor: Laura Bloxham

25C Hannah Crawford: “Film Misnomers: How Culture Rewrote Mansfield Park”

Patricia Rozema’s film interpretation of Jane Austen’s *Mansfield Park* blends the original story with aspects of Austen’s own life as well as contemporary cultural concepts. By doing so Rozema’s film loses many of the key themes of Austen’s novel such as the high regard for moral propriety which is replaced by themes of sexual catharsis and unwritten romances. This paper analyzes the effect of the film’s changes to the story and how Fanny Price ultimately becomes less demure and more feminist than Austen’s original heroine.

Faculty Sponsor: Laura Bloxham

26A Megan Smith: “The Effect of Relative Light and Darkness on the Burrowing Behavior of *Venerupis philippinarum* the Manila Clam”

Clams are renowned for their ability to dig into soft substrates to avoid a variety of predators. This burrowing behavior is variable and changes with environmental conditions. This experiment measures digging behavior over time of *Venerupis philippinarum* the Manila clam in high and low light conditions. 22 manila clams were observed under both light and dark conditions. First a 50 cm cotton string was tied to a small plastic bead which was then attached to each clam. These clams were placed in a bucket filled with sand and seawater. Above the bucket a 75W incandescent bulb was mounted. This light was turned on for the light trials and the bucket was covered for dark trials. The depth of each clam was measured at half-hour intervals for four hours. It was found that clams in lighter conditions burrowed more frequently began digging sooner and dug deeper than those in dark conditions.

Faculty Sponsor: Craig Tsuchida

26B Allie Anderson: “Tensile Testing of Hydrogen-Exposed 304 Stainless Steel”

This research project is concerned with hydrogen embrittlement which is a process that causes certain metals to become brittle and fracture following exposure to hydrogen. The objective of this study is to determine how hydrogen exposure will affect the ductility and ultimate tensile strength of 304 austenitic stainless steel. Tensile testing was used to gather the necessary data for comparison. Three different populations subjected to various levels of hydrogen were tested; no hydrogen exposure low-pressure hydrogen exposure and high-pressure hydrogen exposure. In addition these populations were also tested at both low and high strain rates. It is expected that the low strain rate populations exposed to hydrogen will be less ductile than the untreated specimens. Little change in ductility is anticipated to be observed in the high strain rate populations due to the strain rate sensitive nature of the hydrogen embrittlement process.

Faculty Sponsor: Patrick Ferro

26C Michael Landkammer: “Monthly Variation in Dissolved Metal Concentrations in the Spokane River”

The Spokane River has some of the highest concentrations of heavy metals (e.g. lead cadmium zinc) in Washington State which have originated from the Coeur D’Alene Mining District. The purpose of this ongoing study is to measure these elements as well as pH alkalinity and some more common elements (e.g. calcium sodium) at approximately three week intervals at eight locations along the Spokane River through the Spokane industrial district as well as from Arthur Lake an artificial lake on Gonzaga’s campus which is fed by the river. Our goal is to understand how the stream water chemistry changes throughout the year as a result of seasonal variations episodes of rain and snowmelt surface runoff and storm water input. The river chemistry does not change significantly over the two mile

stretch; however the concentrations of some elements can differ by 200% in as short as a three week period.

Faculty Sponsor: Carmen Nezat

26D Whitney Shirley: “Synthesis of Meso-Unsubstituted Metal Corrole and Strategies for its Recombination and Purification in the Apohemoprotein Myoglobin”

The meso-unsubstituted metal corrole is a porphyrin analogue of the naturally occurring prosthetic heme group found in many proteins. Its integration into such proteins has shown significant increases in protein function and affinity properties. The study of corrole chemistry has been challenging due to the difficulty of its synthesis. Modification of the existing synthetic steps has led to an increased product yield and purity as evidenced in ¹HNMR samples. For its use as a recombinant factor in myoglobin protein the heme was extracted to create apomyoglobin and then reconstituted with the synthesized corrole. Analysis of the reconstituted protein was performed using UV-Vis spectroscopy which showed the successful integration of metallated corrole in the apomyoglobin protein. This product was successfully recrystallized by hanging drop vapor diffusion for future determination of its 3D structure and its comparable functionality to heme in physiological systems.

Faculty Sponsor: Kerry Breno

26E Shane Kostka and Garth Ahern: “A Model of Orogenic Settings”

We modeled an orogenic belt to examine compression on units of different grain-sizes and thicknesses and to study changes in fault angles through incremental shortening. The forces modeled resemble a tectonic setting such as the Cordilleran thrust belt. In our sandbox model we added alternating layers of kaolinite and sand. The beds were compressed in seven separate increments of three centimeters. We placed two irregular bodies of fine grain orange sand to model igneous intrusions and act as strain ellipsoids in the hanging and footwall. Bedding displayed faults whose angles decreased as compression increased and became inactive when energy transferred to a new fault. Deformation initiated as folding during the first increments and progressed to more complex structures. Fault angles decreased from 30° to 20° over 21cm of compression. Similar observed features in the model can be found in the natural orogenic settings.

Faculty Sponsor: Chad Prichard

26F Austin Winkelman: “Determining Surface Concentration Tunability of Core-shell Dendrimer Encapsulated Nanoparticle Palladium Rhodium Alloys using X-Ray Photoelectron Spectroscopy.”

Because of their high ratios of surface area to metal volume nanoporous palladium alloys are predicted to have improved mass transport and catalytic rates when compared to bulk materials. Dendrimer-encapsulated nanoparticle samples with core-shell palladium-rhodium alloys are seen as promising hydrogen storage materials as the surface rhodium increases

its longevity. This experiment used X-Ray Photoelectron Spectroscopy to show that the relative surface concentrations of palladium and rhodium can be manipulated by controlling the surrounding gas environment and the temperature. Heating the alloy in vacuum yielded no change in surface concentration; heating the alloy in an oxidative environment however brings more rhodium to the surface of the sample and our experiment's results have provided information to further the research of these alloys and their hydrogen storage properties.

Faculty Sponsor: Markus Ong

26G Joseph Regalado: "Development of a Prussian Blue Modified Electrode with Improved Hydrogen Peroxide Detection via Current-free and Simultaneous Deposition of Aniline and Insertion of Ni²⁺ Ions."

Prussian blue modified electrodes have proven to be the most effective electrodes for the detection of hydrogen peroxide. Hydrogen peroxide is the predominant storage species for the OH radical and a highly important analyte for quantifying atmospheric oxidation levels. Currently Prussian blue electrodes are the most sensitive electrodes for hydrogen peroxide detection but have demonstrated a short lifespan. Research has indicated that stabilizing the electrode without significant loss of sensitivity can be accomplished by layering aniline-nickel-Prussian blue electrodes. A current free deposition technique involving Prussian blue 20mM aniline and nickel chloride solution was utilized to assemble a reliable sensitive and longer lasting electrode when compared to standard Prussian blue films.

Faculty Sponsor: Drew Budner

26H Asia Stephens-Argaves: "Quenching of Manganese-catalyzed Bromate-Ethylacetoacetate Oscillation Reaction"

Chemical oscillation is an unusual phenomenon in which some property repeats cyclically, such as voltage, color, etc. Quenching is a halt of oscillations that occur either suddenly or gradually under non-equilibrium conditions. The oscillating manganese-catalyzed bromate-ethylacetoacetate oscillation reaction is similar to the well-known Briggs-Rauscher oscillation reaction, except that cerium is replaced with manganese and malonic acid is replaced with ethylacetoacetate. This reaction is a one-electron transfer reaction observed within the bromate-ethyl acetoacetate oscillating reaction. In this research project, several sodium and lithium salts were evaluated as potential quenching agents.

Faculty Sponsor: Karen Stevens

26I Lindsay Fague: "Site-directed cysteine mutagenesis of HMG-CoA Reductase from *Burkholderia Cenocepacia*"

The HMGR enzyme which normally catalyzes the rate-limiting step of the mevalonate pathway can be grouped into two classes by structural and biochemical properties. *Burkholderia cenocepacia* expresses a Class II HMGR that has a unique C-terminus "flap domain" characteristic of many Class II HMGRs. The flap domain can only be visualized when the enzyme is

active; in its inactive state the flap domain is disordered and thus invisible. To visualize the flap and its movement from inactive to active state sixteen amino acid residues were targeted for site-directed cysteine mutagenesis. Later studies will attach a fluorescent dye to these cysteines to track the flap's movement via spectroscopic methods. Preliminary kinetic work however suggests that some of the residues targeted cannot be changed without loss of enzymatic function. Further studies are needed to explore the possible functional significance of these residues.

Faculty Sponsor: Jeffrey Watson

26J Hilary Weisbeck: "Volume Differences in the Orbitofrontal and Anterior Cingulate Cortices Associated with Borderline Personality Disorder (BPD): A Meta-Analysis of Magnetic Resonance Imaging Studies"

Borderline Personality Disorder (BPD) characterized by unstable emotional regulation impulsivity and interpersonal problems has been the focus of much recent research. However the causal factors of the disorder are unclear especially with regard to neurobiological factors. In fact controversy exists regarding whether or not volumetric differences exist in the Orbitofrontal Cortex (OFC) and the Anterior Cingulate Cortex (ACC). Since both areas are involved with emotional regulation and impulse control any changes in the structure of these areas would provide important information regarding the neural correlates of BPD. The present study attempts to bring clarity to this literature through meta-analysis. Two meta-analyses will be conducted one for the ACC and for the OFC to determine if volumetric differences are associated with BPD. Moderator variables such as illness duration and comorbidity with depression and PTSD will also be investigated.

Faculty Sponsor: Michael D. Nelson

26K Sheridan Cooper: "Operational Stability and Sensitivity of Prussian Blue Layered Peroxide-Detecting Electrodes with Sacrificial Membranes of Aniline and Nickel Hexacyanoferrate"

Use of Prussian blue films on electrodes has been found to effectively detect dilute concentrations of hydrogen peroxide an important analyte in biological and industrial systems. Subsequent layers of sacrificial films are used to increase the electrode's longevity but increase time of production. Films of nickel hexacyanoferrate and aniline were analyzed for increased operational stability and peroxide-detecting efficiency through voltage changes from electroreduction and electrooxidation. Order of these membranes was found to have a significant change on the usable time of the electrodes as Prussian blue-nickel hexacyanoferrate-aniline was more efficient than its counterpart. Compared to past research however these sacrificial layers were found to accelerate Prussian blue loss. As peroxide-monitoring capabilities were reduced significantly by the combination of nickel and aniline sacrificial layers there is no added benefit from the united use of these two films.

Faculty Sponsor: Drew Budner

26L Nicholas Gamboa, Laura Hoeg and Tessa Anton: “Do COX-2 Inhibitors Restore Cell Adhesion and Migration in Cultured Epithelial Cells Expressing Truncated APC?”

The majority of patients with colorectal cancer possess mutations in the adenomatous polyposis coli (*APC*) tumor suppressor gene resulting in a truncated protein. Epithelial cell migration and adhesion are altered by (*APC*) loss thus promoting colorectal adenoma development. Our previous studies confirmed that cultured epithelial cells expressing truncated (*APC*) protein exhibited slower migration rates and vitiated adhesiveness between cells in both wound and dissociation assays. By treating epithelial cells expressing truncated (*APC*) with a cyclooxygenase-2 (*COX-2*) inhibitor to increase E-cadherin production we hope to restore wild-type adhesion since migration rates were restored to wild-type levels under similar conditions. Through a better understanding of the (*APC*) -associated changes in migration and adhesion we hope to advance the background necessary for the development of novel chemopreventive agents for human colorectal cancer.

Faculty Sponsor: Maria Bertagnolli

26M Jordan Saribay: “Imparting Water-Solubility to Molybdenum Complexes through Ligand Substitution”

Organometallic catalysts are increasingly important in complex organic syntheses. Typically the reactions use organic solvents but pressure to utilize greener solvents have led to a need for water-soluble organometallic catalysts. One methodology employed to impart water solubility is to use water-soluble ligands typically sulfonated phosphines. This research utilizes 47-dihydroxy-110-phenanthroline (DHPPhen) as a ligand in molybdenum complexes. The resulting complex $\text{Mo}(\text{DHPPhen})(\text{n}^3\text{-C}_2\text{H}_4)(\text{CO})_2(\text{OTFA})$ is soluble in basic aqueous solution. Here the synthesis and characterization of $\text{Mo}(\text{DHPPhen})(\text{CO})_4$ and $(\text{DHPPhen})\text{Mo}(\text{n}^3\text{-C}_2\text{H}_4)(\text{CO})_2(\text{OTFA})$ under inert conditions are reported.

Faculty Sponsor: Kerry Breno

26N Courtney Wanke and Jacob Mallery: “An Annotated Mitochondrial Genome of Arctic Grayling”

The Arctic Grayling (*Thymallus Arcticus*) located in the Big Hole River Montana are the last native fluvial Grayling in the lower 48 states. Their range has experienced a dramatic decrease due to a variety of factors including human interaction environmental issues and the introduction of invasive species. The Big Hole River Grayling’s genetic uniqueness and diversity are potentially threatened by attempts to augment the local population with non-native Grayling and hatchery populations. Our goal is to establish complete sequence coverage of the Montana Arctic Grayling Mitochondrial Genome and for use as a template to assess introgression and diversity. Our initial sequencing efforts have been focused on metabolic regions like Cytochrome B and ATP6. To this point we have successfully sequenced 39.2% of Cytochrome B and are actively working to increase our coverage.

Faculty Sponsor: Steve Fisk and Randall James

26O Joseph Bell: “Metabolic Disorders in Gray Wolves and Grizzly Bears”

Within the last two hundred years both the Gray Wolf (*Canis Lupus*) and Grizzly Bear (*Ursus Arctos Horribilis*) have gone through major population declines. These declines have resulted in bottlenecks which potentially cause decreased diversity and the accumulation of maladaptive SNPs. We are currently researching the accumulation of maladaptive SNPs at two specific mitochondrial loci (ATP 6 and Cytochrome B) in the Gray Wolf and Grizzly Bear genomes using DNA sequencing. The results from this study will be compared to previously published sequences for each species and then compared to other bottleneck populations. This will allow us to place the Gray Wolf and Grizzly Bear within the continuum of other bottleneck populations.

Faculty Sponsor: Steve Fisk and Randall James

26P Lindsey Wickman: “Wind Analysis of KDOT Sites at Grainfield KS and Osborne KS and Site Analysis for Hastings NE.”

In 2009 Kansas Department of Transportation (KDOT) installed two Skystream 3.7 wind turbines on 33-ft poles in Osborne and Grainfield. KDOT then asked Kansas State University to evaluate the turbines’ energy production and determine pay back for their installations. Using data provided by the National Oceanic and Atmospheric Administration and Kansas Tall Tower Wind Resource Data estimations were made for time to payback. While doing this work the possibility of installing a wind turbine on Hastings College campus for educational purposes was also explored. Comparisons of sites were made using multiple tools including Windographer. Conclusions were made based on calculations showing that the average pay-back for the installed turbines was 30 years. In addition the annual electricity production of the KDOT turbines showed comparable values obtained for Hastings NE. Deeming Hastings College a potential location for a wind turbine for educational purpose.

Faculty Sponsor: Ruth Miller

26Q Ceaira Nichols: “Metabolic Disorders in Thymallus Arcticus”

The Arctic Grayling has gone through a genetic bottleneck in recent years due to habitat loss. Many other species have gone through bottlenecks and are reported to have developed metabolic disorders as a result. The ATP6 gene plays a vital role in metabolism and any changes could potentially cause a metabolic disorder. We will be extracting DNA from 30 different samples taken from Bobcat and O’Dell Lakes to study Single Nucleotide Polymorphisms (SNPs) in the ATP6 gene. By studying SNPs we can determine if there are metabolic disorders in the Grayling. If a SNP is found we can see if it changes the gene and if that change causes any disorder in that particular fish. This species is nearly gone in the lower 48 states. From this research we hope to provide evidence that the Arctic Grayling should be on the endangered list due to lack of genetic diversity.

Faculty Sponsor: Steve Fisk and Randall James

26R Kellyann Cameron: “Study of Public Attitudes toward Wolves in North Central Community”

Ever since wolf reintroduction efforts began in the Northwestern United States in the 1980s studies have been conducted on public attitudes toward wolves. These surveys have impacted the methods and results of wolf reintroduction. In our study we have drawn upon two surveys (conducted by the Washington Department of Fish and Wildlife and the Montana Department of Fish Wildlife and Parks) to construct our survey and apply it to the North Central High School community. We will analyze the correlation between attitudes toward wolves and two generations (parent and student) genders and zip code taking into consideration the number of years lived in Washington. The student population will be analyzed for the relationship between attitudes toward wolves and GPA while in the parent/adult population we will observe the correlation between attitudes and income. Our results will be compared to that of other surveys and shared with the public.

Faculty Sponsor: Steve Fisk and Randall James

26S Cherish Flores and Duncan Mize: “Complete Mitochondrial Genome of Ancient Bighorn Sheep”

We are attempting to obtain the complete mitochondrial genome of ancient bighorn sheep for comparison to modern bighorn sheep (*ovis canadensis*). Our sample of study is a 10000 year metacarpal bone provided by Eastern Washington University. Ancient bighorn sheep have never before been sequenced and our sample is one of only five in the world of this age. Currently we are optimizing procedures to increase the yield of the extracted DNA prior to amplification. Due to DNA degradation over time the DNA is fragmented into small pieces of around 100 base pairs. After these fragments are compiled comparison analysis can be made to genetically age populations of bighorn sheep aid threatened sheep species and identify possible genetic diseases.

Faculty Sponsor: Steve Fisk and Randall James

26T Austin Ulakovich, Zack Arms and Sim Gosal: “Stratigraphy of the Columbia River Basalt Group in the West Plains Eastern Washington”

Determining the presence of formations members and sub-members of the Columbia River Basalt Group (CRBG) in eastern Washington is extremely important in understanding potential groundwater pathways in CRBG aquifers and geology of the area. For this study we analyzed samples from selected water wells and outcrops in the West Plains WA. Chemical discrimination of CRBG from water wells has identified that the area has the following general stratigraphy: Wanapum Formation (Priest Rapids Member) Grande Ronde basalt (Sentinel Bluffs and Wapshilla Ridge Members). We did not observe the presence of the Four Mound sub member of the Sentinel Bluffs Member as mapped by the Washington Department of Natural Resources. Instead we proposed that this sub-member is part of the Wapshilla Ridge Member and that

possible mass wasting confused the stratigraphy along the left bank of the Spokane River.

Faculty Sponsor: Chad Pritchard

26U Ellen Jokerst: “For the Love of Spinach: The Vegetarian Man “

Vegetarians makeup a small portion of U.S. citizens. They are often perceived as being people who are overly-emotional and sensitive; both of these descriptors run contrary to the ideals of hegemonic masculinity. I used in depth interviews of eleven current or former male vegetarians to capture data on their reflections. I aimed to study their thoughts experiences and means of adaptation to a diet which is neither mainstream nor associated with males.

Faculty Sponsor: Vikas Gumbhir

26V Kristin Wucherer: “Partial Purification and Characterization of a Putative Prolyl Dipeptidyl Aminopeptidase from *Lactobacillus sanfranciscensis*”

Proline- and glutamine- rich proteins trigger an autoimmune response in persons with celiac disease. Prolyl dipeptidyl aminopeptidases (PEPXs), enzymes which cleave proteins at internal proline residues, are potential therapeutic aides for celiac disease. In this study, putative PEPX genes from *Lactobacillus sanfranciscensis*, bacteria present in sourdough bread, were amplified and isolated via polymerase chain reaction. The products were cloned into a pET expression vector and sequenced. Recombinant constructs were transformed into a BL21(DE3)pLysS cell line and induced with isopropyl β-D-thiogalactoside for protein expression. Recombinant PEPX proteins were partially purified and kinetically assayed. Only slight enzymatic activity was observed, however activity of partially purified native PEPX from *L. sanfranciscensis* cells was confirmed and partially characterized.

Faculty Sponsor: Deanna D. Ofjennus

26W Helya Peyman and Sein Pyo: “Mutation Studies Towards the Design of a Pepsin Resistant x-prolyl Dipeptidyl Aminopeptidase”

Lactobacillus helveticus is a bacterium of significance in the food industry particularly in the manufacture of Swiss cheese. An enzyme called x-prolyl dipeptidyl aminopeptidase (PEPX) can potentially break down gluten peptides by breaking proline peptide bonds which are difficult to digest. X-prolyl dipeptidyl aminopeptidase (PEPX) from *Lactobacillus helveticus* was cloned transformed into *E. coli* expressed and purified. It was shown to be soluble active and electrophoretically pure through SDS-PAGE. A pH optimum of 7.2 and a K_M value of 250 μM were determined by kinetic assay. To make PEPX more pepsin resistant and therefore a better potential dietary aid site-directed mutations were selected using a straightforward bioinformatics technique that predicts the probability of pepsin cleavage between amino acid pairs. These mutants will be purified and characterized for comparison with w.t. upon construction.

Faculty Sponsor: Deanna D. Ofjennus

26X Molly Dundon: "The Effects of a Model Lead and Test Procedure to Teach Correct Requesting Using Two Apps on an Ipad with a 5-Year-Old Student with Autism Spectrum Disorder"

The present case study evaluated the effectiveness of employing the model lead and test error correction procedure across two iPad applications in a special preschool classroom. These augmentative and alternative systems interventions were used to teach a preschool student with autism to correctly communicate. The two applications employed were My Choice Board and Go Talk Now for Free. The behavior measured was our participant's correct requests with each application. In addition data were gathered without the use of model lead and test error correction to assess the maintenance of treatment effects over time. The outcomes indicated increased correct requesting when model lead and test were employed. In addition after model lead and test error correction was no longer in effect our participant continued to accurately use both applications on his Ipad touch.

Faculty Sponsor: T. F. McLaughlin

26Y Genevieve Klusmeyer: "Sheltering preferences of *Hemigrapsus nudus* and *Hemigrapsus oregonesis* as studied on San Juan Island"

The intertidal zone is home to a variety of creatures. Two of these are different species of small crabs *Hemigrapsus nudus* and *Hemigrapsus oregonesis*. The purpose of this experiment was to compare and contrast the sheltering habits of the two organisms (i.e. do they prefer habitats that provided more shelter or less shelter?). To do this multiple shelters were constructed and sixty crabs (thirty *H. nudus* and thirty *H. oregonesis*) were observed over the course of an hour. Their sheltering locations were recorded every fifteen minutes and their final position recorded at the end of that hour. After all trials were run *H. oregonesis* was found to strongly prefer a hiding place that offered significant protection. The greatest number of *H. nudus* also preferred that shelter; however that preference was not as strong.

Faculty Sponsor: Craig Tsuchida

26Z Jared Keibler: "Ability of Decapoda to Navigate a Maze"

I chose to do my experiment on *Metacarcinus magister* because they I knew they were abundant in the area. *M. magister* is a large commercially harvested species of crab in the northwest and I wanted to find out just how clever they really were. I wanted to know if *M. magister* possessed the mental capacity to problem solve. In order to determine cognitive ability of *M. magister* test subjects were placed in a maze and it was attempted to teach the specimen how to run the maze correctly by placing food at one end of the maze in the hopes that the crab would be attracted to the food. The results of the experiment were very sporadic with successful trials amidst failures and no discernible trend towards faster completion

times. Only one out of three crabs tested showed any sign of progression over the time that the experiment was run.

Faculty Sponsor: Craig Tsuchida

27A Laura Fabiola Watts Cesena : "How Significant is the National Health Services in Contemporary British Politics?"

This presentation will give an overview of the Beveridge Model also known as the National Health Services (NHS) created by Lord William Beveridge which through taxes provides health care for all citizens of the United Kingdom. This analysis will cover the significance of health care as a public good and its effect on contemporary British politics. The analysis will follow a process in learning about the history of the NHS the costs and impact on the public and what can be improved upon.

Faculty Sponsor: Sean Swan

27B Nicholas Halliburton: "The Eroding of the United Kingdom's Two Party System"

Electoral support for the United Kingdom's two largest political parties - the Conservatives and Labour - has been steadily declining throughout the last half century. In the 1951 and 1955 United Kingdom general elections the two parties won a combined 96% of the popular vote. When Margaret Thatcher was elected in 1979 the two parties won a combined 81%. In the 2010 general election the two parties won only 65%. This presentation will analyze the underlying causes for this erosion of the two party system. It will also explore how this dramatic shift will affect the United Kingdom's traditional constitutional structure.

Faculty Sponsor: Sean Swan

27C Marlyss Maxham: "The Fruit of Their Labor: An Analysis of the Effectiveness of the Delano Grape Strike and Boycott "

In 1965 The Delano Grape Strike gave birth to the Migrant Farm Workers Movement headed by Cesar Chavez. The United Farm Workers Organizing Committee (UFW) Chavez's organization lead a successful strike against grape farms in Delano CA as well as an effective nation wide boycott of table grapes. The Delano Grape Strike and Boycott lead to a union contract between growers and laborers providing the workers with a more livable wage. This paper explores how the UFW was able of unifying people across racial gender and socioeconomic lines creating a movement that was truly universal. The movement allowed Filipino and Mexican migrant farm workers to unify across racial lines gave women and college students prominent positions in the movement and persuaded middle class housewives to join in on the boycott. All of these groups united under the strong leadership of Cesar Chavez who led the strike to victory.

Faculty Sponsor: Cynthia Stavrianos

27D Jacqueline Pittaway: “Britishness: The Not So United Kingdom”

This presentation will examine the implications of Scotland's quest for independence, the emergence and success of English nationalist parties and the United Kingdom's referendum on leaving the E.U. This presentation also seeks to reconcile traditional “Britishness” with the apparent emergence of nationalist feelings among Wales, England, Scotland and Northern Ireland.

Faculty Sponsor: Sean Swan

28A Scott Campanario, Melissa Villeneuve and Danielle Simien: “Working Memory Load in the Performance of Math Tasks”

This experiment investigated the effects of easy and difficult arithmetic tasks on eating behavior and ratings of stress. Participants did math tasks with a bowl of M&M candies nearby. There were two conditions. In the easy condition participants saw two-digit addition equations that did not require carry. In the difficult condition participants saw three-digit subtraction equations that required borrow. They were asked to judge whether each equation was correct or incorrect. Participants were told to complete the problems as quickly and accurately as possible and to help themselves to the nearby M&Ms. Before the math task they completed a math anxiety scale. After the math task they completed a packet of questionnaires including a measure of stress, a measure of neuroticism and a demographic survey. We hypothesized that participants in the difficult condition would consume more M&Ms; and would report higher levels of stress.

Faculty Sponsor: Gary L. Thorne

28B Samuel Gordon: “Mental Inflexibility: The Confirmation Bias’ Threat to Science and How to Fix It”

The confirmation bias is a prevalent and pernicious cognitive error that occurs when an individual favors information that fits preexisting beliefs; contrary pieces of information are dismissed or regarded as unimportant. The bias can be observed in a wide variety of everyday circumstances but is most dangerous for fields of scientific inquiry where it threatens the essential principle of objectivity. A growing collection of research has indicated the strong presence of the confirmation bias within the scientific community, proving to be detrimental to the integrity of scientific and medical research. Erroneous or misleading scientific results can have harmful effects in the real world when the inaccurate research is implemented. However, strategies are currently being developed that provide hope for the possibility of reducing the magnitude of the bias.

Faculty Sponsor: Michael Nelson

28C Christopher Galeucia: “The Utility of Pointing In Cross-Fostered Chimpanzees”

Pointing can be used to create a “referential triangle” between communicator, communicatee and the subject of conversation. There is some debate about whether our sibling species, the chimpanzee, is capable of using pointing to create “referential triangles”. In order to determine the utility of pointing in four chimpanzees, forty hours of video were reviewed to see how these chimpanzees use pointing. These chimpanzees were cross-fostered and use sign language to communicate with human companions. Since these chimpanzees were cross-fostered, they may have learned to point from interactions with social companions. Social interactions were transcribed to identify possible “referential triangles”. Other instances of pointing that did not contribute to the creation of “referential triangles” were recorded as well. These were studied to see how cross-fostered chimpanzee points differ from ours.

Faculty Sponsor: Mark Bodamer

Session 29

Special Session: Jane Austen: gender and money

Faculty Moderator: Laura Bloxham

29A Sarah Jaymes Kenney: “‘Having Formed her Mind and Gained her Affections’: The Male-Female Relationship as Destructive in Mansfield Park”

Is Fanny Price's relationship with Edmund Bertram in Jane Austen's *Mansfield Park* positive or destructive? While Edmund undertakes a role as Fanny's protector, his pursuit of Mary Crawford causes him to neglect his cousin's health. Furthermore, Edmund's dismissal of Fanny's moral instincts leads her to misjudge her superior intellect; in fact, she is able to emerge as the strongest moral character in the novel after Edmund falls from his own beliefs. These restraints ultimately demean Fanny as a woman: through their relationship, she is reduced to the position of a physically and intellectually dependent slave. Through analysis of *Mansfield Park* and works on physicality, feminism and morality in Jane Austen's novels, I assert that Fanny's relationship with Edmund is restrictive to her identity as a woman and that her marriage to Edmund signifies her complete subjugation to an unfit partner.

Faculty Sponsor: Laura Bloxham

29B Willa Schober-Hockman: “Proposals and Power Plays in Jane Austen's Pride and Prejudice”

This research essay focuses on the patriarchal nature of marriage proposals in *Pride and Prejudice* and how Austen uses Elizabeth Bennet's responses to her two suitors, Mr. Collins and Mr. Darcy, to dismantle and devalue the inherently sexist nature of such arrangements. The responses of the two suitors also reflect what makes them either undeserving or worthy of Elizabeth: as Mr. Collins responds to her refusal with denial and blatant refusal to respect her wishes, while Mr. Darcy responds with sober and meaningful self-reflection. His decision to overcome his wounded ego and attempt to understand Elizabeth

as a person is what allows for their union as she cannot settle for anything less than mutual respect and love.

Faculty Sponsor: Laura Bloxham

29C Mikayla Ludiker: “Entailment Entanglement: Inheritance Schemes in *Sense and Sensibility*”

This paper explores the laws and implications of entailment as they relate to the plot of Jane Austen’s *Sense and Sensibility*. Although it may seem initially that the novel turns on the axis of courtship and marriage the plot truly depends upon the various legal settlements concerning the main characters. This research draws on the complex system of primogeniture entailment and strict settlement in 18th and 19th century England and on Austen’s primary works. “Entailment Entanglement” seeks to explore the connections among inheritance property courtship and marriage in fictional plot.

Faculty Sponsor: Laura Bloxham

30A Jaime Fischer and Shaun Flemming: “Damn I Hope I Look Good: A Measure of Appearance Sensitivity Among College Students”

Throughout our lives we are influenced by our peers and family members to present ourselves in certain ways. Whether it be through positive or negative opinions the perspectives of others seem to play a role in how we carry ourselves as individuals. The media is able to send unified messages to its audience of unrealistic beauty ideals. These ideals are then internalized and reinforced by peers. Taking into account Fredrickson and Robert’s objectification theory as well as the appearance-based rejection sensitivity (ABRS) concept we plan to develop an understanding of what drives a person’s physical appearance. In addition we plan to look at how different environments and settings may alter appearance. Through our study we predict women will have higher levels of ABRS than men. We also predict that the levels of ABRS will be greater in more social settings.

Faculty Sponsor: Vikas Gumbhir

30B Philip Tostado: “You’re Not Really A Girl: A Study on Gender Communication in Online Games”

Studies on gender in gaming are concerned with explaining why women are less likely to play video games. Sexualization of women violence and lack of social aspects are all listed as primary reasons. However these studies ignore the fact that about 40% of gamers are women. This study observes the social setting of three online games each of which attracts a different audience. Observations should provide insight on how men are responding to increased female participation and how women choose to respond to sexism. Gamers are also interviewed to provide their own experiences. Interviewees are found through snowball and convenience sampling. I compare the two methods in order to see if gamers exaggerate or ignore the gendered nature of their gaming experience. The results show that gamers value the authenticity of a gamer highly and believe that sexism in games is hard to dispose of.

Faculty Sponsor: Vikas Gumbhir

30C Emmanuel Weke: “You Don’t See Race -- Really?: Color-Blind Racism and Identity Development Among African Americans”

Eduardo Bonilla-Silva suggests that racism today is different from racism of the past. Today’s racism which he labels “color-blind racism” is hidden in contrast to overt “old school” racism. I will be using the theory of color-blind racism to discover the effects of this form of racism upon African Americans in majority white populations. I will collect data via in-depth interviews with African Americans in a predominantly white community in the northwest and on a predominantly white university in this community. Overall I anticipate finding that African Americans develop their identities of blackness from being influenced by dominant white perceptions.

Faculty Sponsor: Vikas Gumbhir

30D Jennifer Gerlomes: “Won’t You Be My Neighbor?: Community-Oriented Policing From the Officer Perspective”

Community-oriented policing (COP) is “a philosophy of full service policing where the same officer patrols and works in the same area on a permanent basis from a decentralized place working in a proactive partnership with citizens to identify and solve problems.” The police are in constant contact with the community and it is vital that their relationship be positive with mutual respect and cooperation. A strong police-community relationship creates safety for the community and aids police work in that citizens are more helpful and trusting of officers’ efforts to reduce crime. I will conduct in-depth interviews with officers in a department that has a COP focus to uncover how officers enact COP and how COP tactics help bridge the gap between the police and the community. Scholars have primarily focused on COP from the community’s point of view but my research based on officers’ experiences will offer a new perspective.

Faculty Sponsor: Vikas Gumbhir

Session 31

Special Session: Explorations In Creative Nonfiction

Panelists will read and discuss original creative nonfiction pieces. The range of subjects and styles represented should spark an engaging conversation about the boundaries and freedoms of this popular genre.

Faculty Moderator: Nicole Sheet

31A Krystal Valle: “How To Beat Jimmy Corrigan In Badminton”

This personal how-to essay experiments with the power of the second-person point of view and comic delivery. An inning in badminton transforms into a framework for a larger tale of good vs. evil because badminton is not your grandfather’s sport. Not if you’re playing against Jimmy Corrigan which you probably are. If you’re having daydreams of dollops of sunshine and a nice quiet game in the middle of the park you’re playing wrong. Jimmy Corrigan doesn’t care for a friendly match. He’s there to

win. And he must be stopped at all costs. This is your moment. Badminton may seem trivial compared to your day-to-day life but only you can stop him. Dust off that cape you've stowed away in the back of your closet and rise to fulfill your destiny.
Faculty Sponsor: Nicole Sheets

31B Cameron Parker: "On Heathen Hands"

"On Heathen Hands": Exploring the boundaries between natural and social limitations in the context of predetermination through highlighted sections of palmistry and friendship. Intertwining sentences of atonal texts feature the competition between a textbook reading and a dramatic plot line.

Faculty Sponsor: Nicole Sheets

31C Lydia Buchanan: "Like Constellations"

In this piece I explore the dissonance that occurs between a father and daughter as the daughter comes of age. The narrative takes place on a flight from Spokane Washington to Philadelphia Pennsylvania. The daughter experiences the feeling of being suspended between two homes and two realities and uses that time to reflect on what returning to her childhood home means to her.

Faculty Sponsor: Nicole Sheets

31D Emily Grant: "Five Walks for Enlightenment"

This is a non-fiction essay written for a Pilgrimage class. In my essay I reflect on five walks during which I have had moments of realization about myself or the world around me.

Faculty Sponsor: Nicole Sheets

Session 32

Special Session: Gonzaga Chemistry Department

Senior thesis presentations from the Department of Chemistry and Biochemistry at Gonzaga University.

Faculty Moderator: Jeff Watson

32A Erik Pihl: "Biophysical Characterization of *Burkholderia cenocepacia* HMG-CoA Reductase."

The mevalonate pathway facilitates the synthesis of isoprenoids in archaea eukaryotes and some bacteria. The first committed step of the mevalonate pathway is catalyzed by 3-hydroxy-3-methylglutaryl-CoA reductase or HMGR. *Burkholderia cenocepacia* contains solely the HMGR gene from the mevalonate pathway. Previous research has shown that *B. cenocepacia* HMGR is a Class II enzyme that exhibits positive cooperativity in the reductive reaction and mixed cooperativity in the oxidative direction. Enzyme kinetic data displays double saturation kinetics and the existence of multiple classes of active site. In this study circular dichroism and isothermal titration calorimetry are used to investigate the ligand binding and structural changes of *B. cenocepacia* HMGR in order to further characterize and explain the complex regulation and characteristics unique to *B. cenocepacia* HMGR.

Faculty Sponsor: Jeffrey Watson

32B James Palmer: "Comparison of Class II Oxidative and Reductive HMG-CoA Reductases by Phylogenetic Analysis"

Isoprenoid biosynthesis occurs via two distinct pathways in bacteria: the mevalonate pathway and the deoxyxylulose-5-phosphate (DXP) pathway. The mevalonate pathway proceeds through a mevalonate intermediate generated by the enzyme HMG-CoA reductase (HMGR) whereas the DXP pathway is independent of both. Previous bioinformatic analysis has identified genes for HMGR in the genomes of organisms that express only DXP pathway enzymes suggesting that these HMGRs do not participate in the biosynthesis of isoprenoids via the mevalonate pathway. Together with enzyme kinetic data from one of these HMGRs data suggests that these HMGRs act oxidatively generating HMG-CoA from mevalonate as opposed to the known reductive biosynthetic role of most HMGRs. Bioinformatic and phylogenetic analysis to predict the sequence of the last common ancestor of oxidative and reductive bacterial HMGRs has been performed and progress toward the resurrection of this ancestral gene will be presented.

Faculty Sponsor: Jeffrey Watson

32C Dana Walters: "Characterization of Allosteric Inhibitors for Beta Carbonic Anhydrase"

Several subclasses of β -carbonic anhydrase (CA) have been observed based on the coordination around the catalytic Zn^{2+} ion. Among these *Escherichia coli* CA (ECCA) has shown a unique non-catalytic bicarbonate binding pocket which has been characterized both structurally and kinetically. Kinetic analysis supports a model for allosteric regulation through a conformational switch. Molecular modeling identified compounds that fit in this pocket. Inhibition assays revealed 246-triaminopyrimidine (TAP) and 45-Dibromoimidazole (DBI) were more potent than bicarbonate. DBI was successfully cocrystallized with ECCA and electron density showed evidence of interaction with the non-catalytic pocket. Current work shows that native ECCA crystals tolerate soaking of TAP. *Mycobacterium tuberculosis* CA is a structural orthologue of ECCA providing the opportunity of using ECCA as a model organism for drug design exploiting this non-catalytic binding site.

Faculty Sponsor: Jeff Cronk

32D Monica Schroll: "Identification of an Amidotransferase Gene Required for Rhodoquinone Biosynthesis in *Rhodospirillum rubrum*"

Parasitic helminthes cause millions parasitic infections worldwide. Resistance to antibiotics used to treat the infection has made the search for a new class of anti-helminthic drugs important. The parasites can survive both anaerobically and aerobically. Anaerobic metabolism requires rhodoquinone (RQ) instead of ubiquinone (Q). Hosts do not use RQ making it an attractive drug target. Using *Rhodospirillum rubrum* as a model organism we have found that Q is a biosynthetic precursor for RQ. The conversion from Q to RQ likely involves an amine transfer by a predicated amidotransferase. From RNA

sequencing data two genes targets were identified that have an up-regulated level of mRNA under anaerobic conditions (Rru_A3121 a predicated amidotransferase and Rru_A2106 unknown function). The project involved the independent knockout of these genes from *R. rubrum* to determine if the genes are required for RQ biosynthesis.

Faculty Sponsor: Jennifer Shepherd

Session 33

Special Session: Gonzaga Chemistry Department

Senior thesis presentations from the Department of Chemistry and Biochemistry at Gonzaga University.

Faculty Moderator: Gergely Gidofalvi

33A Jake Zaragoza: "The Application of Fractional Brownian Motion to an Ensemble Average Model"

Active remote sensors have various applications including defense uses. However investing in sensors can be expensive especially when instrument success is not guaranteed. A relatively inexpensive alternative to field testing is numerical simulation. Despite the difficulties in simulating turbulence and the atmospheric boundary layer many numerical models have been developed to tackle such problems: ensemble average models though computationally efficient lack accuracy; while 'single realization' models which are computationally expensive maintain high resolution. This study attempts to improve the accuracy of an ensemble average model while maintaining computational efficiency. We will be attempting to mimic the effects of turbulence with the application of fractional Brownian motion to "contaminant" plumes. In order to test the viability of the process comparisons will be made to 'single realization' results with an active remote sensor as a test case.

Faculty Sponsor: Gergely Gidofalvi

33B Matthew Smith: "C-D probes of Biologically Relevant Interactions"

The sensitivity and timescale of IR spectroscopy enables the detection of a variety of interactions relevant to biological systems. Herein carbon-deuterium (C-D) probes were used to detect alpha- C-D conformations in proline and to detect rapidly interconverting tautomeric forms. The low relative intensity of C-D peaks combined with the sheer number of similarly shifted peaks inherent to the systems tested makes data analysis difficult. Thus a more robust data-fitting method was developed to identify peak number location width and amplitude with greater confidence than previous methods and was applied to three systems involving C-D bonds and one system involving amide bonds.

Faculty Sponsor: Matthew Cremeens

33C Christopher Hastings: "Natural Orbitals for Multiple Electronic States"

High accuracy electronic structure calculations involve computational costs in terms of time and storage which grow rapidly as the size of the orbital basis set is increased. It can

therefore be desirable to minimize costs through truncation of the molecular orbital basis set. Natural orbitals are often used in order to minimize the loss of accuracy associated with the truncation process. When multiple electronic states are considered natural orbitals may be obtained through two different methods both of which offer benefits and drawbacks. State-specific natural orbitals may be obtained for each state separately or a single set of state-averaged orbitals may be obtained for all of the states of interest. Calculations using both state-averaged and state-specific natural orbitals were performed for comparison of the accuracy of the two methods.

Faculty Sponsor: Gergely Gidofalvi

33D Kyle Stumetz: "Assessing the Possibility and Probability of Surface Crossings in High Energy Ring Expansions"

In exploring excited state surface crossings of high-energy ring expansions derivatives of fused cyclopropane were mapped using density functional theory (DFT) and complete active space self-consistent field (CASSCF) methods. Since the ring openings involve relatively high-energy species that lead to low energy aromatic species a common scenario for non-adiabatic reaction paths we posited that such reaction paths might come close to or cross excited state surfaces. In exploring nine fused cyclopropane derivatives all quantum chemical calculations suggested potential crossings. Given the possibility of crossings efforts to synthesize one of the nine cases 6-methylidenebicyclo[3.1.0]hex-3-en-2-one outlined by Rule et al. is reported herein. The future work of the project is focused toward assessing both the (1) possibility of crossing and (2) the probability of crossing along the bifurcated path.

Faculty Sponsor: Matthew Cremeens

Special Session: Victorian Literature and Social Critique

Students will present essays on novels as divergent as Charles Dickens's *David Copperfield*, Mary Elizabeth Braddon's *Lady Audley's Secret*, Elizabeth Gaskell's *North and South*, and Bram Stoker's *Dracula* to investigate Victorian fiction's penchant toward biting social commentary. Their presentation will comment on the novel as an inventive and interventional genre.

Faculty Moderator: Pamela Corpron Parker

34A Rosie McFarland: "Dracula to Twilight: The Transformation of the Vampire"

In the 1931 and the 1992 movies of *Dracula* and the book *Twilight* the figure of the vampire is adapted from Stoker's original *Dracula* to fit a modern audience whose perception of female sexuality shapes the portrayal of the title character. *Dracula* was written in a male dominated society emphasizing the male hero and the objectified female that the men need to protect. *Twilight* on the other hand was written for a young female audience to fulfill their romantic and sexual desires with a vampire as the main love interest not the antagonistic predator. Since the fictional vampire figure is - and will always be - a vehicle for unnatural desire the shift in audience also affected

the portrayal of the human characters as they express their desire. The transformation of the vampire figure from *Dracula* to *Twilight* corresponds to a shift in audience from the sole male gaze to a more contemporary female gaze.

Faculty Sponsor: Pamela Parker

34B Jenna Hoole: "Deviant Women: The Threat of the Femme Fatale to Victorian Society"

Victorian middle class society was preoccupied with 'the women question'- what should be done with women? Changing perceptions of women's morality created anxiety when women fell outside of socially accepted roles. This anxiety manifested in the Victorian version of the *femme fatale*. The *femme fatale* or fatal woman is a literary archetype that shows up again and again throughout history as a representation of cultural- especially male- anxiety over unrestrained women. Through the *femmes fatales* of Lady Audley from *Lady Audley's Secret* and Lucy Westenra from *Dracula* we can see how destructive female deviance and agency were considered to the structure of Victorian society.

Faculty Sponsor: Pamela Parker

34C Brittany Kirkpatrick (Fulton): "Performing the Angel in the House"

The societal expectations of the Victorian woman force her to carry out the role of the angel in the house. The term "angel in the house" refers to a myth concerning the Victorian woman in which she was expected to assume a kind of moral strength and stability that established her as the self-sacrificing caretaker of the home. Popular novelists such as Mary Elizabeth Braddon and Charles Dickens reveal distinguishing characters in their works that embody and distort the angel icon. In addition a correlation exists between the staged actress who performs within the confines of the theatre and the angel in the house who performs her role within the confines of the Victorian home. My presentation will explore the performative aspects of the angel in the house in the novel and on the stage. In doing so societal pressures and expectations facing the Victorian woman will be revealed through the theatrical facade of the angel in the house.

Faculty Sponsor: Pamela Parker

34D Taylor Countryman: "Deviant Masculinities in Victorian Fiction"

Conversation surrounding gender roles in Victorian literature often explores either femininity or femininity in relationship to masculinity. Masculinity as an isolated discourse has only just recently joined Victorian criticism. Often found in subtext behind the more ubiquitous topics of the Woman Question or class structures the question of what it means to be a man in the Victorian age is answered in prominent texts of the time. Characteristics of the ideal Victorian man include assertiveness courage independence straight-forwardness and -- most importantly -- self-discipline. This presentation will explore how Charles Dickens' *David Copperfield* and Mary Elizabeth Braddon's

Lady Audley's Secret deal with male characters that deviate from the standards of Victorian masculinity.

Faculty Sponsor: Pamela Parker

34E Caroline Swinford: "No Man's Land: The Tension of Domesticity in the Wilderness in Isabella Bird's A Lady's Life in the Rocky Mountains"

Isabella Bird's 1870 *A Lady's Life in the Rocky Mountains* intersects discourses on femininity nationality British colonial attitudes and scientific observation of the natural world. However these discussions tend to neglect the specific relationship of an author especially a female author to place. Place provides a source of identity that travel must disrupt resulting in a new self-conception. This presentation re-visits Bird's travel log through the American West to investigate her re-creation of self apart from the British homeland. Specifically I will juxtapose her preoccupations with an ideal of domesticity against the backdrop of a rugged and uncouth landscape. What emerges is a negotiation of her identity as a British woman abroad both for herself and her reading public.

Faculty Sponsor: Pamela Parker

35A Sabrina Judson: "Genetic Variation in Arctic Grayling (*Thymallus arcticus*) from Southwestern Montana"

In this research Arctic Grayling *Thymallus arcticus* found in O'Dell Lake and Bobcat Lakes Montana were studied to see if the two populations have shared genes (due to gene flow via illegal stocking) and adequate genetic diversity worth preserving. Restriction fragment length polymorphisms (RFLPs) were used to analyze 100 samples looking at four loci (D-loop Cyt b Cyt C and ND5). Currently the study is focused on the ND5 region due to the promising variability in the banding patterns between fish samples seen in gels which tested for functional enzymes and primers. The results from this study will be used to inform the Montana Department of Fish and Wildlife about the current genetic condition of the Grayling and ultimately help them determine whether or not to protect the two populations.

Faculty Sponsor: Steve Fisk and Randall James

35B Alexis Holder: "Characterization of Sixteen Polymorphic Microsatellite Markers for the Acorn Woodpecker *Melanerpes formicivorus*"

The mating system of the acorn woodpecker (*Melanerpes formicivorus*) is among the most complicated of any social species due to the varied composition among breeding groups. Some nests contain a single breeding pair while other groups exhibit the complex mating system of polygyny wherein as many as four females mate with up to seven breeder males. Observational data of the acorn woodpecker population of Hastings Natural History Reserve has been documented since 1972. Since the 1980's blood samples have been collected to obtain DNA for the purpose of using molecular techniques to compare genetic and behavioral data. Within this population sixteen polymorphic microsatellite markers from genomic

libraries enriched for various repeat motifs are being used to assign parentage, infer the quantitative genetics of helping behavior and determine population genetic structure. The expected and observed effectiveness of these microsatellite markers is discussed.

Faculty Sponsor: Joseph Haydock

35C Elijah Hiler: “An Analysis of Genetic Diversity of Ancient and Modern *Bison bison*”

In the late nineteenth century the *Bison bison* population was decimated by both environmental and human factors and in 1888 the population size in Yellowstone National Park dropped below 28 individuals. This bottleneck should have caused a decrease in the diversity of the species but currently there is no evidence to support this. Presently the species has recovered due to government and private intervention. Ancient samples which were collected from various regions throughout North America were ground into a fine powder from which DNA was extracted. In order to determine the difference in genetic diversity between ancient and modern *Bison bison* the highly variable mitochondrial D-loop was sequenced from samples ranging from 700 to over 9000 years in age and was compared with NCBI’s nucleotide database on modern Bison.

Faculty Sponsor: Steve Fisk and Randall James

35D Kylenea Kerr: “Analysis of gene flow in Arctic Grayling (*Thymallus Arcticus*) in Big Hole Valley Montana”

Arctic Grayling have gone through a series of population declines for a multitude of reasons since the last Ice Age. They currently reside only in Montana since the populations in Michigan became extinct over 70 years ago. It is hypothesized that there is no correlation between the two populations because there is no geographic linkage. Additionally there is a lack of diversity due to breeding habits and outside contributing factors. The purpose of this study is to determine genetic diversity between populations of Arctic Grayling as well as gene flow between two Montana populations. To accomplish this samples have been collected from both Bobcat Lake and Odell Lake and will be analyzed for Restriction Length Fragment Polymorphisms (RFLPs). This information will be used by the Montana Wildlife Department as well as the Endangered Species List.

Faculty Sponsor: Steve Fisk and Randall James

35E Rose Richardson and Larissa Baxter: “Analysis of Cytochrome b and ATP6 SNPs in Aleutian Islands Sea Otter (*Enhydra lutris*) Populations”

Historically sea otters (*Enhydra lutris*) have been hunted to near extinction throughout the Pacific Northwest. Sea otters have gone through two genetic bottlenecks in the last 300 years and have consequently lost genetic diversity. We are analyzing samples from the Aleutian Islands in Alaska because the Sea Otters there have not been translocated. To process our DNA we will use a Qiagen bone extraction kit and compare our results to that of other projects on NCBI. By focusing on the ATP6 Cytochrome b and D-loop regions we hope to discover

maladaptive SNPs within the mitochondrial genome of the sea otters. With our research we hope to advocate for existing policies regarding the protection and maintenance of Sea Otter populations.

Faculty Sponsor: Steve Fisk and Randall James

35F Corey Horn, Deaunte Floyd and Dylan Smith: “Genetic Analysis of D-loop Diversity in *Canis lupus* and *Ursus arctos horribilis*”

Through noninvasive sampling our research looks at single nucleotide polymorphisms (SNPs) to determine the severity of bottlenecks on Gray Wolf (*Canis lupus*) and Grizzly Bear (*Ursus arctos horribilis*) populations. Bottlenecks create low diversity levels within a population and therefore threaten the viability of the species. By analyzing DNA extracted from hair samples we have successfully amplified a portion of the D-Loop region of the mitochondrial genome in both Gray Wolf and Grizzly Bear. Comparing our results to published D-Loop sequences allows us to determine how much gene flow is occurring within each species. Collection and analysis of additional samples will enable us to determine which population has experienced the most severe repercussions from their respective bottlenecks. From this research we hope to gain a better understanding of the genetic endangerment these populations are experiencing and influence policies regarding these species.

Faculty Sponsor: Steve Fisk and Randall James

35G Ryan Lyski: “Co-Deposition of Prussian Blue with Aniline for the Improvement of Operational Stability and Sensitivity of Hydrogen Peroxide Sensors”

Prussian blue (PB) based electrodes are useful for the detection of hydrogen peroxide. H_2O_2 is an important analyte of interest in environmental industrial and medical chemistry fields. Research has demonstrated PB can be deposited using a current free method based on the affinity of iron salts for the hydrophilic carbon surfaces of sensors. Research has suggested the sensitivity and operational stability of PB based sensors can be improved by current free co-deposition with organic molecules that form polymers when oxidized. This research optimized a procedure of current free deposition of PB with aniline and characterized the stability and sensitivity of the electrode for H_2O_2 detection. PB based electrodes deposited using this method demonstrated sensitivity to low molarities of H_2O_2 and stability under low flow conditions.

Faculty Sponsor: Drew Budner

35H Rachel Retherford: “Finding Protection Against the Infection”

Pertussis is one of the leading causes of vaccine-preventable deaths worldwide and is the leading cause of infant mortality. This respiratory illness reached epidemic levels in Washington State in 2012. Pertussis is a highly contagious respiratory illness caused by toxins released by the bacteria *Bordetella pertussis*. These toxins are thought to be responsible for many of the harmful outcomes in whooping cough. Researchers are actively

trying to target the pertussis toxin using a variety of approaches in hopes of alleviating some of the symptoms typically associated with pertussis and fatalities in infants. We are trying to develop an aptamer that targets these same areas with hopes that it will also offer protection against pertussis infections.

Faculty Sponsor: Suzanne Bassett

35I Candace Ireland and Nicole Ecklund: "Analysis of *Bison bison* Mutations within the Mitochondrial Genome"

This research project is focused on locating and comparing mutations within the Alberta Bison population to known mutations in other herds using ND2; as well as locating base pair mutations (V98A in Cytochrome b and I60N in ATP6) in various bison populations to identify if those mutations were present before the bottleneck. By sequencing the mitochondrial genome we can analyze the DNA for significant mutations. When we compare these mutations to mutations in other sequences we will be able to determine whether they existed prior to the bottleneck because certain mutations in the bison could have made it difficult for survival. Studying the *Bison bison* population and its loss in genetic diversity provides a template for studying other species that have also experienced a loss in genetic diversity.

Faculty Sponsor: Steve Fisk and Randall James

35J Brandon Walling and Ryan Keefe: "R-Bodies: Cloning Expression and Purification of Reb C and Incorporation of a His-Tag into Reb B"

Refractile inclusion bodies (R-bodies) are endosymbiotic bacterium which are resistant to denaturation. Very little is known as to how the R-body is structurally composed and determination of which essential genes (*rebA rebB rebC*) are required for formation. To this extent site-directed mutagenesis to insert a 6x-His tag on the N-terminus of RebB *in vivo* has been attempted for an immunofluorescence microscopy assay confirmation. Work has also been done to characterize the self-assembly process of the R-body. Recombinant constructs can be expressed in BL21(DE3) *E. coli*. Work to successfully clone and purify RebC using the pGEX-6p-1 plasmid provides a crucial step in determining if the R-body is truly a self-assembling system. Better understanding of R-body structure may provide insight into bacteriophage capsid assembly and insight into protein nanostructure design.

Faculty Sponsor: Deanna Ojennus

35K Alyson Donahoo: "Hypertrophic Stimuli Alter O-GlcNAc but not the Cardiac Fetal Gene Program in HL-1 Cells"

Cardiac hypertrophy is blunted by hyperglycemia. Hyperglycemia increases levels of O-linked β -N-acetylglucosamine (O-GlcNAc) which is added by O-GlcNAc transferase (OGT) to key transcription factors involved in cardiac hypertrophy. Increased cardiac O-GlcNAc blunts hypertrophy *in vitro* in primary ventricular cardiomyocytes. HL-1s are immortalized murine atrial cardiomyocyte line that maintain differentiated characteristics. We aimed to determine whether HL-1s respond to pathological

hypertrophic stimuli and high glucose. HL-1s were treated with the hypertrophic stimulants phenylephrine (PE) or angiotensin II (ANG II) with or without high glucose in 1% or 10% serum. Independent of glucose treatment PE and ANG II increased total O-GlcNAc in the 10% serum group; high glucose increased OGT levels in the 1% serum group. These data confirm that O-GlcNAc can be manipulated by hypertrophic stimuli in HL-1s but that serum conditions moderate this response.

Faculty Sponsor: Kerry Breno

35L Nichole Boyd, Christine Moen and Samantha Santos: "Investigating Small Molecules as Potential Treatments for Mucopolysaccharidosis VI"

Mucopolysaccharidosis VI (MPS VI) is a lysosomal storage disease which results from a deficiency in the enzyme arylsulfatase B (ASB). ASB is required to desulfate carbohydrates within the cell. In this presentation we will discuss the use of praziquantel as a potential inhibitor for ASB. The effectiveness of inhibition will be tested using dried blood spot samples and fluorimetric detection at different concentrations of praziquantel and different pH levels. Effective inhibition may lead to a treatment for MPS VI using praziquantel in chaperone therapy.

Faculty Sponsor: Trisha Duffey

35M Hanh Nguyen: "A Computational Approach to Engineering Proteins for Increased Pepsin Resistance"

Celiac Disease is an autoimmune disorder that is caused by incompletely digested gluten proteins. Recently researchers have been studying the use of therapeutic enzyme *L. helveticus* to break down gluten peptides. Computational approach focuses on modeling the 3-D structure of the candidate PEPX (prolyl dipeptidyl aminopeptidase). NAMD (Scalable Molecular Dynamics) Pymol Rosetta Docking and Autodock programs were utilized to select the best amino acid to insert at the cut sites to increase the resistance of this enzyme to pepsin. An algorithm was developed to choose the mutations to compare with the other approaches and to make final decision. Future work focuses on developing and improving the computation prediction of pepsin resistant enzymes.

Faculty Sponsor: Kent Jones

35N Timothy McQuaid: "Concurrent Operant and Treatment of Inappropriate Social Skills in a Boy with PDD/NOS"

The purpose of this study was to evaluate the effects of the Power Cards strategy as treatment for a nine-year old boy diagnosed with PDD/NOS. The participant's inappropriate social behaviors included inappropriate participation in group activities inappropriate eye contact and inappropriate noises. The concurrent operant results showed that the participant preferred to seek adult attention over tangible and escape functions. The Power Cards strategy was implemented to teach the participant the appropriate behaviors involved in playing with a group seeking out adult attention how to act during work or class time and what to do when meeting someone new.

The treatment proved effective in increasing the participant's percentage of eye contact and decreasing the amount of inappropriate noises when adult attention was withheld. Results will be discussed in terms of treatment of topographies of behavior.

Faculty Sponsor: Anjali Barretto

35O Lauren Gibb: "Cheaters Drinkers and Drug-users: College Students Perceptions of Common Deviances on Campus"

This project will look into the perceptions both students and faculty will have of drinking marijuana use and cheating on their specific campuses. This will be done through means of a randomly distributed survey. The survey will ask a number of questions concerning how severe the respondent thinks each issue is on his or her campus.

Faculty Sponsor: Vikas Gumbhir

35P Megan Wingfield and Matthew Rockstrom: "Effects of Caffeine on Athletic Performance"

Caffeine is an ergogenic aid which can provide physiological advantages to users; acting as a vasodilator competitively inhibiting neurotransmitters that cause drowsiness and indirectly increasing lipid catabolism to provide energy. This study aims to examine the effects of caffeine on athletic performance measuring the improvement of participant's endurance by testing mile times with and without the use of caffeine pills. The experiment was conducted by randomly selecting 15 participants from a pool of 25 non-caffeine users not participating in college athletics. Participants ran two timed miles one with a placebo and one with a caffeine pill. Results showed increased performance in trials where caffeine was administered. This suggests that caffeine offers physiological advantages in endurance performance.

Faculty Sponsor: Mike Sardinia

35Q Brian McPartland: "Wireless Power Transmission by Incorporating Evanescent Waves Magnetic Metamaterial and Resonance"

Wireless power transfer technology with coupled magnetic resonance evanescent wave coupling and magnetic metamaterials enables a new concept for a way to transfer power. The intended purpose of evanescent wave coupling is to couple a system so the electromagnetic waves are sent from one device to another. Magnetic metamaterials can amplify the evanescent waves which decay exponentially outside the magnetic field. Using self-resonant coils with a coupled system along with evanescent wave coupling and a metamaterial surrounding the coils we can theoretically transfer power with a high efficiency along with better range. Utilizing the principles from the MIT experiment which indicated a near field resonance a new potential system is proposed in this paper demonstrating a long range system and a potentially more efficient system.

Faculty Sponsor: Kent Jones

35R Kyle Prescott: "Balance Performance Differences Between Older Men and Women Using Four Outcome Measures"

Falls are the leading cause of injury related death and hospitalization in older adults. Current research points to gender differences in fall incidence. This presentation investigates differences in balance between men and women using four well-established balance performance measures: BBS TUG Tinetti and FSST.46 subjects from a senior living community aged 65 and older participated. Balance performance means for men were better than fall risk thresholds while women's means were poorer than threshold scores on both the TUG and FSST. The association between fall risk and gender was statistically significant using the TUG with more women at high risk of falling ($p=.049$).

Faculty Sponsor: Kimberly Cleary

35S Keith Davidson and Michael Beckett: "Effects of Hydrogen Exposure on Fatigue Failure in Austenitic Steels"

As interest in alternative energy sources increases there is a growing need for engineering data to guide structural material selection. While it has been shown that exposure to hydrogen can accelerate failure in a number of ways the understanding of the mechanisms by which failure occurs is often based on empirical data. The present study specifically investigates the effects of pre-exposure to a high-pressure hydrogen environment on the fatigue life of single-phase austenitic steel. Pre-charging samples with hydrogen significantly reduces the fatigue life relative to control groups. The data obtained in this study are consistent with existing expectations and can contribute to the growing body of knowledge surrounding hydrogen-related failure phenomena in structural metals. Future studies may expand to cover different modes of failure effects on welded specimens varying exposure conditions and different alloys.

Faculty Sponsor: Patrick Ferro

35T Jessica Griffith: "The Differential Effects of the Use of Handwriting Without Tears® Gray Block Worksheets and LetterSchool App to Teach Two Preschool Students with Developmental Delays Letter Writing Skills"

The purpose of this study was to evaluate and measure the effectiveness of Handwriting Without Tears (HWT) gray block worksheets with letter writing with two preschool students diagnosed with developmental delays in pre-academics. Two students were selected from a self-contained special education preschool classroom in the Pacific Northwest. The gray block worksheet intervention was used to teach both students how to write the letters in their first names. In baseline both students were instructed to "Write the letters of your name." During baseline both students were able to write some of the letters in their names. The final outcomes showed improvement in both

students in their ability to write the letters of their name. The gray block worksheets proved to be an inexpensive and easy to implement solution for students with developmental delays to learn and refine writing the letters of their names.

Faculty Sponsor: T. F. McLaughlin

35U Chelsea Barberio-Kitts and Lauren Worchester: “The Effects of Cover Copy Compare on Spelling Third Grade Core Words for a Student with Autism in a Designed Instruction Elementary School Classroom”

The purpose of this study was to evaluate the effectiveness of modified cover copy compare (CCC) on spelling third grade core words for an elementary school student with autism. This intervention required the student to trace the spelling word copy it cover it write it from memory then compare the copied word to the original correct model. The effectiveness of CCC was measured using a multiple-baseline across word sets. The results indicated that the intervention was successful for teaching spelling words to a single student with autism in a self-contained special education classroom setting. The use of a slightly modified CCC with students with autism was discussed.

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35V Allison Maus: “Preference for Edge versus Open Area in *Pisaster ochraceus*”

This study hypothesized that in a testing situation sea stars would measurably favor edge areas over open areas through observational comparison of time spent in edge areas and time spent in open areas. Preference was determined by the location of the sea stars in a sea water table categorized as either edge or open area. Two types of tests were run one with a sea water table with nothing but still water pumped in from the harbor next to the lab facility and the other in the same sea water table but with a brick in the center that offered additional edge area for the sea stars to utilize. The data collected did not reveal a statistically supported preference for either edge or open area that was expected from original observation and hypothesis. There are several factors that may have played a role in this conclusion such as quick attachment due to disturbance or lack of disturbance from tide changes waves or predators.

Faculty Sponsor: Craig Tsuchida

35W Michael Swart: “Average Pulling Force and Endurance of *Cancer magister*”

In my experience at Friday Harbor Washington I tested the average pulling force and endurance of *Cancer magister* or the Dungeness crab across different substrates. I tested the force the crabs pulled with over different time periods and was able to assess the results on my laptop. The equipment I used was supplied by the physics department of Whitworth. I tested the crab across three different substrates gravel sand and the bottom of the sea water table. In my results I found that the crabs pulled with the most average force on the gravel substrate. This is due to the crabs ability to place their legs between gaps

in the rocks and pull themselves along. The second part of my experiment was to find the endurance. I found that the substrate that gave the crabs the most endurance was sand.

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35X Brian Tully: “Comparison of Shearing and Pulling Forces on the Marine Snail *Nucella lamellosa* as Studied on San Juan Island”

The marine intertidal snail is of interest due to its ability to attach to a substrate and resist removal via wave action and predation. These snails possess tremendous foot strength in terms of attachment to a substrate in comparison to their body size. Of particular interest in this study was the determination of how foot size affects their ability to resist removal caused by external horizontal (shearing) and vertical (pulling) forces. A test measuring the forces required to remove the intertidal snail *Nucella lamellosa* from an artificial surface in the laboratory setting was utilized. These measurements were then scaled to foot area. Research took place during a two week period in January 2013 at Friday Harbor Laboratories on San Juan Island. With the findings of this study it is possible to understand the relationship between foot size and foot strength when both vertical and horizontal stresses are applied.

Faculty Sponsor: Craig Tsuchida

35Y Mustafa Al dahri: “The Differential Effects of Direct Instruction Model-Lead-Test Procedure with and without a Reward on Rote Counting Number Recognition and Rational Counting with a Young Child”

We evaluated the effects of direct instruction Model-Lead-Test (MLT) for a kindergartner’s rote counting number recognition and rational counting. The results indicated that MLT produced a gradual increase in the child’s performance. However when a highly desired reward was added the participant’s skills to count and rational count and recognize numbers increased even further. Maintenance for rote counting produced a decrease in performance that was not found for number identification or rational counting. When a reward was added and MLT was reintroduced for three sessions performance improved. When maintenance was again employed the child’s performance for each of our three measures did not decrease. Suggestions for future research as well as limitations to our outcomes were made.

Faculty Sponsor: Kimberly P. Weber

35Z Rosemary Houglum: “The Differential Effectiveness of Direct Instruction Flashcards with Guided Practice Activities to Instruct Two Elementary Students Diagnosed with Autism Spectrum Disorder and Delays in Pre-Academics”

The purpose of the study was to evaluate the effectiveness of Direct Instruction (DI) flashcards in combination with guided practice activities to instruct two elementary male students diagnosed with Autism Spectrum Disorder. Our goal for the 7 and 9 year-olds was to master the names and sounds of the 18 most common lowercase letters of the alphabet and to generalize the newly acquired knowledge across settings and instructors. Throughout the study a token economy system using pennies, stickers, or stamps was utilized in combination with specific praise to reinforce positive behaviors and focus. Participant 1’s performance for identifying lowercase letters improved by 19% and mastered Set 1. For sounds Participant 1’s performance slightly increased by 12%. The DI flashcards in combination with the guided practice activities intervention proved to be ineffective for Participant 2 for sounds and lowercase letters.

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