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THE OREGON ACADEMY OF SCIENCE

Keynote Address

*Hydrology and Groundwater-Dependent Ecosystems of Central Oregon*

**Marshall Gannett**
*United States Geological Survey*

We are pleased to announce our plenary speaker is Marshall Gannett, the 2017 OAS Outstanding Scientist recipient from Oregon State University. His talk is titled “Hydrology and Groundwater-Dependent Ecosystems of Central Oregon.”

Marshall Gannett is a Research Hydrologist with the U.S. Geological Survey Oregon Water Science Center in Portland, Oregon. During his 27 years with the USGS, he has led several large-scale investigations to understand the water resources of Oregon and the Pacific Northwest. He has worked at the interface of hydrology and ecology to merge quantitative assessment of groundwater resources and persistence of freshwater ecosystems. His scientific work has transformed understanding of groundwater systems and furnished tools to improve management of scarce water resources. Gannett’s contributions have had impact on the lives of millions of people across vast tracks of land in the region.
OUTSTANDING SCIENTIST AWARD

The Oregon Academy of Science’s Outstanding Scientist Award is bestowed in recognition of significant research contributions to the natural, physical, or social sciences, notable reputation in science education, and meaningful applications of science research. Recipients of this award must have been Oregon residents during the time they made the distinguished contributions for which they are recognized.

2018 Outstanding Scientist Award

Niles E. Lehman

Niles Lehman is a Professor of Chemistry at Portland State University, and has worked there since 2001. Niles has established a highly impactful research program primarily in the area of molecular evolutionary biochemistry. His work is intrinsically interdisciplinary, and provides sound scientific explorations into the often controversial field of origins of life. In recognition of his contributions in this area, Niles has been elected President of the International Society for the Study of the Origins of Life. In particular, his research provides a strong foundation for the theory of RNA recombination as a driving force in the early evolution of life. Niles also engages in spirited community science outreach, mentoring students and teachers at local high schools and giving regular public seminars at OMSI Science Pubs and other community events.

Awardees

2018  Niles E. Lehman
2017  Marshall Gannett
2016  Mas Subramanian
2015  Vincent T. Remcho
2014  Scott F. Burns
2013  Eric U. Selker
2009  Reinhold Rasmussen
2008  Andrew Fountain
2007  Richard Ellis
2006  David C. Johnson, James D. White
2005  Ewart M. Baldwin
2004  D. Aslam Khalil
2003  Joseph D. Matarazzo
2002  Carl Wamser
2001  Geraldine L. Richmond
2000  Kent L. Thornburg
1999  LeRoy Klemm
1998  Gertrude Rempfer
1997  William G. Loy
1996    A. Morrie Craig
1995    Michael Posner, Paul Slovik
1994    Jane Lubchenco
1993    Lynwood W. Swanson
1992    Beatrice Epperson
1991    Jack Ward Thomas
1990    C. Melvin Aikens
1988    Lewis Schaad
1987    Linus Pauling
1986    Paul Lutus
1984    Arthur J. Boucot
1983    Carl E. Bond
1982    Howard Vollum
1981    Ernst Dornfield
1980    Ken Van Holde
1979    G. Bodvarsson
1978    W. Taubeneck
1977    Robert Coleman
1976    Harold Enlows, Paul Elliker, Paul Weswig
1975    John Allen, Ralph Bagdley, Ewart Baldwin, Winthrop Dolan, William Rockie, Howel Williams
1974    Larae Dennis, Joel Hedgpeth, Thomas P. Thayer, Norman S. Wagner, Aaron C. Waters
1973    George Birrel, Harold J. Evans, Anton Postl, Lloyd W. Staples
1972    Samuel N. Dicken, Helen M. Gilkey, R. Sinnhuber
1971    Andrew Moursund, Loren McKinley, Homer G. Barnett, Stephen Shelton
1970    James J. Brady, Bert Christensen, E. Ebbinghausen, Ralph W. Macy, Cecil R. Monk, Leo F. Simon
1969    Ira S Allison, Frank M. Beer, A.A. Groening, James A. McNab
1963    E. A. Gililan
1962    Joe Chamberlain, F. Gilchrist, Earl Gilbert, Arthur F. Scott, Edward S. West
1959    Walter Dyke, Henry P. Hansen, Alex Walker
1958    Phil F. Brogan, Vernon Cheldelin, Samuel L. Diack
1957    Luther S. Cressman, Leo Isaac, Adolph Kunz, E.E. Osgood
1955    W.J. Kroll, F.W. Libbey, W.E. Milne
1954    Leo Friedman, Alonso W. Hancock, Willibald Weniger
1953    W.P. Boynton, Olaf Larsell, Rosalind Wulzen
1952    Helen M. Gilkey, L.E. Griffin, Ethel I. Sanborn
1951    Stanley W. Jewett, Morton E. Peck, J. Hugh Pruett
1950    A.A. Knowlton, Thornton Munger, Warren D. Smith
1949    F.L. Griffin, A.R. Moore, Earl L. Packard
OUTSTANDING EDUCATOR AWARDS

The Oregon Academy of Science’s Outstanding Teacher Awards are for Oregon teachers with demonstrated records of excellence in teaching in any of the subject areas represented by the Academy. Recipients of the award must have been Oregon residents during the time they made the distinguished contributions for which they are recognized. Past recipients of the Outstanding Teacher Award are listed below.

2018 Outstanding Educator Award – Higher Education

Jacquie Van Hoomissen

Jacquie Van Hoomissen is a Professor of Biology at University of Portland, and has worked there since 2002. Jacquie is being recognized for her excellence in teaching, her commitment to leading diverse efforts at University of Portland to improve student learning, and her outreach to the Portland K-12 community. In the Biology department at University of Portland, she is a leader who challenges colleagues to look for ways to improve their own teaching. Jacquie has consistently secured internal and extra funding from a number of sources to support student research and institutional initiatives such as the Noyce Scholars and Interns Program. Outside of UP, Jacquie has passionately engaged with K-12 students and their families. A prime example is her leadership to start the successful STEM night program at UP, a program that has positively impacted hundreds of community members and continues to be a major enterprise at UP.

Awardees

2018  Jacquie Van Hoomissen  
2017  Richard L. Nafshun  
2016  Corinne Manogue & Tevian Dray  
2015  David Foster  
2014  Angela Hoffman  
2013  Robert T Butler  
2011  Lauren Roscoe, Jim Hartman  
2010  Charles (Kip) Ault, Jean Ames  
2009  Charles Kunert  
2008  April Ann Fong  
2007  Tamina Toray  
2003  Kenneth M. Doxsee
2018 Outstanding Educator Awards – K-12

Cara Benfield

Cara Benfield teaches Science classes at Amity High School in Amity, Oregon. Cara is being recognized for her excellence in teaching, primarily an Anatomy & Physiology course she developed as a new teacher, and an Independent Research Science Program, which allows high school students to earn college credit. High school students in Cara’s research class travel with her to present their findings at conferences and events all over the state, including OAS conferences, the Oregon Science and Humanities Symposium, and the Central Western Oregon Science Expo. Cara has also been instrumental in developing and running Amity High School’s “Amity Education Abroad” program, and is currently working with students who will travel to Nicaragua and Costa Rica in the summer of 2019.

Adam Kirsch

Adam Kirsch teaches Science and Engineering classes at Crescent Valley High School in Corvallis, Oregon. Adam is being recognized for his excellence in teaching, primarily in courses incorporating science, engineering, and math along with elements of design, art, architecture, manufacturing, and marketing. Adam redesigned the school’s engineering pathway to include three dual-credit courses that focus on preparing students with real-world skills and challenging them to collaborate and creatively solve design problems. Students gain expertise with 3D printers, CNC equipment, laser engravers, vinyl cutters, and software associated with many different instruments. Adam invites OSU students, professional engineers, and skilled artists to his classes in order to promote engagement between his students and working professionals.

Shari Read

Shari Read teaches Science classes at Silverton High School in Silverton, Oregon. Shari is being recognized for her excellence in teaching, primarily Biology and Accelerated Biology. Shari brings technology to the forefront in her biology classes, allowing students to gain experience in important techniques such as DNA extraction, gel electrophoresis, and DNA transformation and restriction analysis. She serves as the advisor of the Environmental Club, facilitating student engagement with environmental education and clean-up in the community. Shari has formed partnerships with Silverton community members, resulting in students engaging in field studies at the Oregon Garden and Silver Creek. She also contributes to the education of students at Silverton High School by training colleagues in techniques to integrate technology in their classrooms through participation in the Intel Teach to the Future program.
Awardees

2018  Cara Benfield, Adam Kirsch, Shari Read
2017  W. Jason Niedermeyer
2016  Bradford Hill
2015  Stuart Perlmeter
2014  Kerry Morton
2013  Kathryn McDermott
2010  Jean Eames
2009  Michael Geisen
2008  Terry Tucker
2007  Daniel Jamsa
2006  Peter Langley
2003  Ralph Schubotha
2002  David Damcke
2001  Patty Toccalino, Kathleen Wick, & Samuel L. Diack
2000  Becky A. Houck & Richard Dunca
1999  Dwight Kimberly & Bill Lamb
1998  Rose Hemphill, Joel Kuyper & Diane Neslon
1997  Mary Omberg & Terry Favero
1996  Edith Anderson & Pamela Lopez
1995  Ford Morishita
1994  Roy Chambers, Andrea Hylsop, Elizabeth Nirschel, & Jan Heaton
1993  Stephen Boyarsky
1992  Bea Epperson
Effects of plasminogen and ABCA1 interactions on cellular sterol efflux
Paige Bergstrom¹, Alex M. Fenton², Deanna L. Plubell², Nathalie Pamir² / ¹Department of Biology, George Fox University, Newberg, OR 97132; ²Knight Cardiovascular Institute, Oregon Health and Science University, Portland, OR 97239

Cholesterol efflux capacity (CEC) is the ability of high-density lipoprotein (HDL) particles to promote sterol efflux from lipid-laden macrophages by accepting its cholesterol, which involves in priority the ATP-binding cassette (ABC) transporter ABCA1. While the zymogen plasminogen (PLG) has also been identified as able to perform CEC, the mechanism is still unknown. The aim of this study was to investigate the mechanism which PLG CEC occurs, specifically looking at lysine binding sites on ABCA1. hABCA1-expressing BHK kidney cells were cultured in 96-well plates followed by ABCA1 upregulation and exposure to varying concentrations of sulfo-NHS-acetate (abolishes lysine binding sites) and/or external PLG. Primary peritoneal macrophages were collected from wildtype (C57B1/6) mice at day 4 post-thioglycolate injection then cultured in 96-well plates with ABCA1 upregulation and exposure to varying concentrations of external PLG. In-Cell-Western (ICW) assays were performed on both BHK cells and primary macrophages to quantify the relative levels of PLG and ABCA1 on the cell surface. We observed that PLG binding increased by 89% with ABCA1 upregulation in BHK cells and is trending to increase in primary macrophages as well, supporting the importance of ABCA1 for PLG binding. The results also indicate that PLG most likely does not bind to ABCA1 via lysine binding sites like APOA1 (the major protein on HDL) does and suggest that there may be other mechanisms at work that also contribute to upregulation of sterol efflux. This investigation has provided beginning insight into understanding how PLG CEC occurs and its possible involvement with ABCA1.

Proximity dependent labelling strategies using covalent biotin ligation to identify components of cellular organelles
Krista Cave¹, Tayfun Mithu², Anthony Paul Barnes² / ¹Department of Biology, Pacific University, Forest Grove, OR, 97116; ²Oregon Health and Sciences University, Portland, OR, 97239

Proximity dependent biotinylation is a powerful tool for mapping the protein repertoire with the right tools. Cells normally biotinylate six endogenous enzymes, making this reaction the perfect target in recent years for new methods of screening for protein-protein interactions. Our aim was to develop tools to better determine protein localization around organelles,
specifically lysosomes and peroxisomes, with less manipulation than require less by current techniques. We did this by +building constructs of mutated biotin ligase (BirA*) fused to an organelle membrane protein of interest. Our intention is to evaluate and compare the complement of proteins tagged by a mutated biotin ligase fused directly to the organelle membrane protein and BirA* fused to a linking protein (GBF) that is then attracted bound to GFP which is attached to the organelle membrane. Early results have proven our method's ability to fuse mutated biotin ligase directly to a protein targeted to the membrane of a given organelle and SDS -PAGE results show that BirA* can be targeted to the membrane of interest and can label proteins with biotin.

Characterization of CLCA1 in the Primate Cervix
Jessenia Chavez¹, Ov Slayden / Division of Reproductive Sciences. Oregon Health and Sciences University, Portland, Oregon; National Primate Research Center, Beaverton, OR, 97006

Use of hormone-based contraceptives can result in serious risks such as stroke, heart attack and contraceptive failure; thus, safer and more reliable contraceptives are needed. The Chloride Channel Accessory 1 (CLCA1) protein, a contributor to mucus production, is present in the cervix and is a potential candidate target for non-steroidal contraception. However, development of CLCA1 is inhibited due to the lack of information regarding its expression. In this study, the regulation and localization of CLCA1 was characterized in the rhesus macaque throughout the menstrual cycle. Rhesus macaques are menstruating nonhuman primates with menstrual cycles identical to women and serve as excellent animal models for contraceptive development. Cervical tissue from rhesus macaques was isolated and analyzed via RT-qPCR. Localization of CLCA1 was performed on paraffin sections immunohistochemistry. We report that CLCA1 within the cervix is regulated by the presence of estrogen and progesterone. CLCA1 was most abundant at the time of ovulation, a period in which women are most fertile. Furthermore, CLCA1 levels increased during the follicular phase of the cycle, as estrogen levels increase, and decrease during the luteal phase of the cycle as progesterone levels increase. CLCA1 was localized to the cervix epithelium and lamina propria within cervical tissue (Figure 1). We conclude that blockade of CLCA1 could reduce mucus fluidity and prevent sperm passage and therefore become a contraceptive. Further development of CLCA1 could produce non-steroid based contraceptives that are more effective and less harmful than current methods.

The role of Rab7A in cortical development
Brittany Curtiss¹, Sarah Santiago², James Smart¹, Anthony Paul Barnes² / ¹Department of Biology, George Fox University, Newberg, OR 97132; ²Knight Cardiovascular Institute, Oregon Health and Sciences University, Portland, OR 97239

The development of mammalian cortical layers requires that cells navigate a complex and dynamic environment. Cells respond to regulatory extracellular cues by exchanging activated surface membrane proteins and targeting damaged or unnecessary surface membrane proteins for lysosomal degradation. The small GTPase Rab7A operates within both autophagic and endocytic pathways as a master regulator of lysosomal degradation and membrane trafficking. We have used a conditional Rab7A knockout in neural progenitor cells and their post mitotic progeny to look at the consequences of improper trafficking events in the endocytic and autophagic pathways. Immunofluorescence of cortical layer markers CTIP2 and TBR1 in the conditional knockout reveal perturbations in layer V development and the subplate, respectively. Furthermore, loss of Rab7A resulted in aberrantly projecting axon bundles in the lateral and medio-dorsal cortex, highlighting a potential role for Rab7A in subplate-mediated axon guidance. Ultrastructurally, knockout cortices exhibited intracellular accumulations of vesicular machinery and evidence of failed fusions with LAMP1-positive lysosomal structures. Disrupted trafficking translates to proliferative deficits in ventricular zones of the cortex. This work suggests novel functions for Rab7A during key processes of cortical development.
**Differential effects of high sugar diets on hepatic metabolic pathways in obese mice**

Katereanna Coen, Joel Johnson, Dallyce Vetter, Sarah Comstock / Department of Health Science, Corban University, 5000 Deer Park Drive SE, Salem, OR 97317

Obesity is a significant health concern associated with the development of nonalcoholic fatty liver disease (NAFLD). The increased incidence of this disease is often linked to sugar consumption associated with sugar sweetened beverages (SSB). This study investigates the link between high-sugar consumption in the form of sucrose, glucose, and fructose and the development of NAFLD in C57Bl/6 mice by analyzing gene regulation in the pathways involved in glycolysis, fructolysis, and fatty acid synthesis. To investigate these mechanisms, an obese mouse model was developed by providing mice with *ad libitum* access to a 30% sucrose (SUC), glucose (GLC) or fructose (FRT) solution in place of water for 27 weeks. Despite similar caloric intake, SUC and GLC mice exhibited greater than 75% weight gain, while FRT weight gain was more subtle (20%) and did not become significant until week 20. After sacrifice, liver triglycerides were measured and found to be significantly higher in all three experimental groups. Furthermore, GLC liver triglycerides levels were significantly higher than both FRT and CTR levels. Expression of hepatic genes involved in various metabolic pathways were analyzed using 2-step RT-qPCR. Genes involved in all three pathways under investigation were upregulated in the SUC group, while only genes involved in glycolysis and fructolysis exhibited upregulation in the GLC group, and virtually no changes in gene expression were detected in the FRT group. These results indicate a potential synergistic effect of glucose and fructose when consumed together in the form of sucrose.

**Exploring the functional effect of synonymous mosaic mutations in autism spectrum disorder**

David Degnan¹, Ryan Mulqueen², Rebecca Barnard², Brian O’Roak² / ¹Department of Biology, George Fox University, Newberg, OR; ²Department of Molecular & Medical Genetics, Oregon Health & Science University, Portland, OR 97239

The complement of genetic risk factors for autism spectrum disorder (ASD) has yet to be fully elucidated. Genomic studies of simplex cases have revealed that an estimated 3-4% of individuals with ASD have a postzygotic mosaic mutations related to their diagnosis. A postzygotic mutation can occur after zygote formation when there is a mitotic error. This can result in a mosaic individual with two distinct cell populations, those with or without the mutation. Interestingly, approximately half of the mosaic genetic risk comes from synonymous mosaic mutations (SMMs). Synonymous changes result in a non-wildtype amino acid codon, but the same amino acid product is made. Since SMMs are not predicted to alter translation, we hypothesize that alternative splicing may be disrupted by these mutations and explain their associations with ASD. Computational splicing predictors identified specific exons in high risk ASD genes ACTL6B, COL5A3, STMN1, and FBN1 that may be selectively spliced when a SMM is introduced. To determine the role of splicing in SMMs, we took advantage of a minigene assay were the splice efficiencies of exons with or without mutations could be evaluated. We constructed pSPL3m minigenes with wildtype and mutant exons and underwent a minigene prep assay. Results indicated that SMMs in ACTL6B (exon 4) and COL5A3 (exon 32) favor exon exclusion while SMMs in FBN1 (exon 60) and STMN1 (exon 4) favor exon inclusion. These data support further investigation into the role of alternative splicing in simplex ASD.

**Independent association of the Tpeak-Tend interval on vectorcardiogram and sudden cardiac death**

Ryan Gonzales / Department of Biology, Concordia University, Portland OR; Knight Cardiovascular Institute, Oregon Health and Science University, 3181 SW Sam Jackson Park Rd, Portland, OR 97239

The T wave has not been well studied and documented in scientific literature. There are certain controversies as to the mechanisms behind what is read as the T wave on an Electrocardiogram (ECG), global or transmural dispersion of repolarization. Cardiac disease has not been well treated either, as it is the leading cause of death in industrialized nations. Correlation of the T wave length to Sudden Cardiac Death (SCD) has been demonstrated in recent studies, most notably the meta-analysis, *The T peak – T end interval as an electrocardiographic risk marker of arrhythmic and mortality outcomes: A systematic review and meta-analysis* (Tse et al., 2017). However, this project is attempting to show independent association of the T wave and SCD. This means that some mechanism in the heart which is elongating the T wave is also causing SCD. Use of the Vectorcardiogram (VCG) is novel because of its consistency and accuracy over an ECG. The VCG offers three independent orthogonal views of the electrical activity of the heart, thus limiting subjectivity, overlapping information, and noise. Each of the three views offer an X, Y, and Z axis; when plotted, the electrical activity is represented as loops in three dimensional space. The Tpeak-Tend interval is measured on these VCG loops via algorithms developed by
the Tereshchenko laboratory. The lab has received data from two prospective cohort studies known as the Arteriosclerosis Risk In Communities (ARIC) and Cardiovascular Health Study (CHS), (Chen et al., 2013). These databases provide digital ECGs, large study sample (>102,000 ECG readings), and repeat visits. These ten second ECG readings are mathematically transformed with the Kors Transformation Matrix, in order to provide the VCG which is then analyzed. Review of the algorithms is currently taking place and results will be discussed in the presentation.

**Novel method of constructing short synthetic gene regulatory elements**

Adit Gupta 1,2, Elizabeth Ferrick-Kiddie1, Hiroyuki Nakai1,3,4 1Department of Molecular & Medical Genetics; 2Westview High School; 3Department of Molecular Microbiology & Immunology, Oregon Health & Science University, Portland, OR

While recent advances in gene therapy have reinforced the appeal for using Adeno-Associated Virus (AAV) for targeted gene delivery, the small genome delivery size limits the capabilities of AAV as a comprehensive delivery vector. One approach to increasing the AAV gene delivery capacity is to develop shorter promoters that maintain the high transcriptional strength of conventional promoters. However, it is challenging to shorten promoters without compromising transcriptional activity. This research presents a method of generating libraries of promoters derived from the CMV-IE gene regulatory sequence consisting of shuffled transcription factor binding sites (TFBS). These libraries have been constructed with a randomized design that express RNA barcodes, where each barcode is linked to a unique set of TFBS, and thus serves as surrogates. The randomized libraries are transfected into 293 and CHO-KI cell lines for characterization of delivery and expression. This research serves as a proof-of-principle for the rational design of new, shorter promoters to increase the delivery capacity of AAV. There are two main applications of this research: First, when applied to reducing the length of cell-type specific promoters, this technique maintains the high transcriptional activity from the standard CMV-IE promoter, and allows for an additional level of transcriptional specificity; Second, the methodology can be used to customize promoters to cell-specific constraints using other gene regulatory sequences, such as the Glial Fibrillary Acidic Protein (GFAP) gene-regulatory sequence.

**Flow induced alterations of endothelial cell function on plasma treated PVA biomaterials**

Rachel Hills1, Patrick Jurney2, Monica Hinds2, 1College of Engineering, George Fox University, Newberg, OR 97132; 2Department of Biomedical Engineering, Oregon Health & Science University, Portland, OR 97239

Cardiovascular disease is a severe medical concern and often results in vascular bypass surgery to combat specific diseases such as atherosclerosis and thrombosis. Current graft treatments are not ideal and may be improved by the development of a new biomaterial, poly(vinyl) alcohol (PVA). PVA is compliant, enabling the design of vascular grafts which match the compliance of arterial walls. We specifically focused on encouraging the endothelialization of PVA, while preventing smooth muscle cell growth. In order to see endothelial cell attachment and proliferation, the surface was modified with “mussel-inspired” Polydopamine, which has been shown to be successful in functionalizing various material surfaces. This would allow the modified PVA to be tested under two different flow conditions, steady and pulsatile. Steady flow has a uniform velocity and causes endothelial cells to elongate and protect against inflammation and intimal hyperplasia in the body. Pulsatile flow flows positively as a sinusoidal wave and has the same positive effects as steady flow on stiff surfaces. Since flow encourages endothelial cells to increase integrin binding to substrates and induces a protective phenotype, we hypothesize that steady flow will ultimately induce firmer adhesion of the endothelial cells to the PVA walls, while eddies and wall motion of the compliant PVA will be observed under pulsatile flow, causing negative effects for endothelial cells. Future studies will characterize the endothelial cells in terms of thrombosis and inflammation, specifically quantifying their gene expression, protein expression, and protein activity under both steady and pulsatile flow conditions.

**Biomolecular target identification of a nerve specific fluorophore using novel proteomics methods for nerve sparing radical prostatectomy**

Broderick House1,2, Connor Barth3, Summer L. Gibbs1,2,3 1Department of Biomedical Engineering; 2Center for Spatial Systems Biomedicine; 3Knight Cancer Institute, OHSU, Portland, OR 97201; 4University of Portland, Portland, OR 97203

Prostate cancer is currently one of the most diagnosed cancers in men. The most common treatment type is the radical prostatectomy, involving removal of the entire prostate as prostate cancer cure, with 90,000 performed annually. Despite development of nerve sparing methods and minimally invasive surgical systems, approximately 60% of patients still experience incontinence and/or impotence due to nerve damage. Fluorescence image guided surgery is a potentially useful tool for aiding nerve visualization and sparing. However, no FDA approved nerve specific fluorophores currently exist. Oxazine 4, a small molecule fluorophore, has proven to be nerve specific in vivo, and thus provides a viable structure for the development of a near infrared (NIR) probe. The near infrared range, 700 nm-900 nm, is an important range for medical
fluorescence imaging as it maximizes tissue penetration and is void of all auto-fluorescence. The objective of this research is to identify the biomolecular target for Oxazine 4 in order to determine the active regions responsible for nerve specificity. In turn, this knowledge can be used to produce clinically viable NIR compounds for fluorescence-image-guided nerve-sparing radical prostatectomies. The use of novel proteomics methods will allow for Oxazine 4 target discovery and validation and the furthering of comparable compounds.

**Characterization of the fetal inflammatory response to chronic *Ureaplasma parvum* intrauterine infection in the rhesus monkey**

Renee LaFountain¹, Peta Grigsby², Meredith Kelleher², Rosie Steinbach² / Department of Biology, Linfield College, McMinnville, OR 97128; ²Department of Reproductive Science, Oregon National Primate Research Center at Oregon Health and Sciences University, Beaverton, OR 97006

*Ureaplasma parvum* is an opportunistic pathogen often found in the normal flora of the human reproductive tract. It is a common cause of intrauterine infections (IUI) and subsequent preterm labor. When *U. parvum* intrauterine infections reach the fetus, they can induce fetal inflammatory response syndrome (FIRS), an immune response that is thought to contribute to fetal morbidity and mortality associated with preterm labor. Currently, there is no standard prenatal treatment available to prevent IUI related preterm birth and the comorbidities. In our study we attempted to characterize the impact of FIRS on fetal immune tissue (thymus, spleen, and lymph nodes), and to ameliorate its effects in the rhesus macaque model. We divided a cohort of pregnant macaques into four groups: (1) uninfected controls, (2) untreated *U. parvum* infection, (3) *U. parvum* infection treated with azithromycin, and (4) *U. parvum* infection treated with azithromycin and anti-inflammatories dexamethasone and indomethacin. Fetuses were delivered by cesarean section at the first sign of labor and euthanized; fetal immune tissue from each group was analyzed for markers of tissue damage and inflammation (FOXP3, CD3, Cleaved Caspase-3, and H&E stains) via immunohistochemistry. Treatment with azithromycin or azithromycin + anti-inflammatories cleared intrauterine infection with *U. parvum* and delayed labor; however there was no significant difference in the number of inflammatory markers or morphology of fetal immune tissues between treatment groups at delivery. This result may be due to the length of time between *U. parvum* inoculation and tissue analysis; in the future we would like to examine the fetal immune tissue within hours and days of infection rather than weeks.

**Vitamin D and CaM kinase phosphatase mediate breast cancer proliferation**

Quinlan Morrow and John M. Schmitt / Department of Biology, George Fox University, 414 N. Meridian St., Newberg, OR 97132

The family of enzymes called CaM Kinases have been shown to participate in cell signaling pathways in different cell types including cancer cells. Ionomycin, carbachol and estrogen (E2) may increase intracellular calcium resulting in the activation of either CaM Kinase II (CaM KII) or CaM Kinase Kinase (CaM KK) and their substrates. Several agonists including E2 trigger calcium-responsive pathways that regulate a number of transcription factors, causing proliferation. CaM KK has been shown to activate numerous enzymes including CaM KI and ERK. In contrast, hormones Vitamin D (VitD) and thyroid hormone (T3) have been suggested to antagonize ERK activation and growth of certain cells, although the mechanism remains unknown. CaM Kinase Phosphatase (CaM KP) inactivates CaM KK and CaM KI, so we hypothesized that it may mediate the inhibitory effects of VitD and T3. To the best of our knowledge, the specific role for CaM KP in E2 signaling in breast cancer cells has not been examined. Our results suggest that calcium-mediated activation of CaM KK, CaM KI, and ERK leads to the growth of MDA-MB-231 (MDA) and MCF-7 cells. VitD and T3 appear to inhibit E2 stimulation of CaM KI and ERK activity in MCF-7 cells. Carbachol- and E2-mediated cell growth was decreased by pretreatment with VitD or T3. Interestingly, inhibition of CaM KP via siRNA knockdown reversed the inhibitory effect of VitD. These results suggest that VitD and T3 may utilize CaM KP to antagonize calcium signaling through CaM KK and ERK in MDA and MCF-7 cells.
Climate or disturbance? The relative effects of climate and disturbance on temporal patterns of tree establishment in a Rocky Mountain mixed-species forest
Christopher P. Murar, Paige E. Copenhaver-Parry / Department of Biology, George Fox University, Newberg, OR 97132

Regeneration plays a critical role in long-term forest dynamics, particularly in forests that are structured by recurring disturbances like fire. Although seedling establishment following fire has been well-studied in Rocky Mountain forests, non-disturbance influences on establishment patterns, such as those of climate, have not been investigated as widely, despite growing evidence that shows a significant effect of climatic conditions on establishment. Here, we evaluate establishment trends of two dominant Rocky Mountain tree species in relation to climate and fire to clarify the relative influences of climate and disturbance on establishment. We evaluated tree ring series for subalpine fir and lodgepole pine trees from a mixed-species stand to identify establishment years and then used a Bayesian hierarchical Poisson regression modelling approach to relate establishment to climate factors and fire occurrence within five-year intervals. We then performed a Bayesian sensitivity analysis to estimate the relative importance of each climate factor and disturbance. Subalpine fir establishment was influenced more strongly by climate than fire, and the many individuals established during fire absence, while lodgepole pine establishment was influenced more strongly by fire than climate, with many individuals having established during and immediately following fire periods. For both species, temperature affected establishment more strongly than precipitation, and the probability of establishment increased as temperature range increased. Under projected climate change and associated increases in disturbance frequency and severity, mixed-species, mixed-severity stands in the Rocky Mountains may experience a compositional shift toward species that establish effectively soon after disturbances and that tolerate altered climatic conditions.

Using TTR$_{50-127}$ fragments as probes to detect amyloidogenic seeding
L. Nelson$^1$, J.D. Schonhoft$^2$, J. Duerr$^1$, J. Kelly$^2$ / George Fox University, Newberg, OR; $^2$The Scripps Research Institute, La Jolla, CA 92037

The aggregation and amyloid deposition of soluble Transthyretin (TTR) has been linked to the development sporadic and familial forms of cardiac amyloidosis. TTR associated cardiomyopathy is often diagnosed when the disease state has reached advanced stages (if at all), precluding effective clinical intervention. This diagnostic problem can largely be attributed to a lack of fundamental understanding of the mechanism for disease pathogenesis and the clinical similarities of TTR cardiomyopathies to other heart failure related conditions. In the human prion diseases and tau protein related neurodegenerative diseases, the amyloidogenic protein conformations have the ability to “seed” and transform non-amyloidogenic states into pathogenic amyloid-like states. Therefore, we hypothesized that TTR related cardiomyopathies may undergo similar seed base aggregation mechanisms. To test this hypothesis, we synthesized C-terminal fragments of Transthyretin that are fluorescently labeled and upon assembly, the fluorescent signal is quenched and provides a convenient method to measure aggregation. We specifically chose the C-terminal peptide fragment (TTR$_{50-127}$) because at autopsy it has been shown that the C-terminal region is preferentially deposited in heart tissue compared to the full-length sequence. First, we used these fluorescent probes to analyze the kinetics involved in the transition from monomeric TTR to the stable polymeric form of TTR and thus demonstrated proof-of-principle. As C-terminally cleaved TTR is primarily found in biopsies of cardiomyopathy patients, introduction of Rhodamine labeled TTR$_{50-127}$ to cardiomyopathy and polyneuropathy patient plasma revealed distinct aggregation profiles in Native PAGE gels. While preliminary in nature, these results suggest that plasma of symptomatic patients may accelerate the aggregation of transthyretin.

Regulation of hERG C-terminal Isoform Expression by PABPN1
Rachel Nguyen$^1$, Matthew Stump$^1$, Zhengfeng Zhou$^1$ / Department of Biology and Chemistry, George Fox University, Newberg, OR 97132; $^1$Knight Cardiovascular Institute, Oregon Health & Science University, Portland, OR 97239

The human ether-à-go-go related gene (hERG) encodes the hERG potassium channel that contributes to cardiac action potential repolarization and maintenance of normal heart rhythm. Loss of hERG function due to inherited mutation or through non-specific drug blockade give rise to long QT syndrome type 2, a disorder that causes ventricular arrhythmias. Two C-terminal hERG isoforms are expressed in the human heart. Splicing of hERG intron 9 results in the expression of the full-length, functional hERGa channel. Alternative polyadenylation at a noncanonical poly(A) site within intron 9 generates a truncated, non-functional hERGa-USO isoform. The intron 9 poly(A) site is followed by a unique 25 nt adenosine stretch. The aim of this study was to determine whether the RNA binding protein PABPN1 is able to bind to hERG intron 9 and modulate hERG isoform expression. Initial immunoblot and luciferase reporter studies suggest that over-expression of
PABPN1 with full-length, splicing competent hERG gene constructs results in increased expression of the hERGα isoform. These results suggest that binding of PABPN1 may prevent alternative polyadenylation of hERG intron 9. The results of this research will continue to provide insight into the molecular mechanisms of hERG channel expression in the context of LQT2 and will contribute towards a greater understanding of trans-acting factors that are involved in post-transcriptional gene modification.

Prevalence and diversity of Wolbachia in Aedes albopictus and Aedes aegypti populations on the Big Island of Hawai‘i
Eriq Plechot and Megan Joaquin / 2043 College way, Forest Grove, OR

Avian malaria is one of the most important threats to endemic birds of Hawaii. One of the methods to counter this is through the use of Wolbachia. Wolbachia are a group of obligate intracellular bacteria found in 20-75% of all Arthropods. Most notably, non-matching strains of Wolbachia can lead to cytoplasmic incompatibility, in which no viable offspring are produced. The first step in for implementing Wolbachia as a form of biocontrol is to screen existing populations of mosquitos for infection. The goal of this project is to screen Aedes aegypti and Aedes albopictus populations on the Big Island of Hawaii for Wolbachia using restriction enzyme digests and genetic sequencing. Using these methods, we found that there was a 100% infection rate within the population of A. albopictus. Genetic sequencing revealed that there was a wAlbA and wAlbB co-infection present in this population. A. aegypti populations absent of Wolbachia infection. The findings of this project will inform future scientists and researchers how to proceed with using Wolbachia as a biocontrol method to stop the spread of avian malaria to native Hawaiian birds.

Evolutionary insights from a course-based undergraduate research experience (CURE) in genomics: research collaboration through the Genomics Education Partnership facilitates student training and faculty development in bioinformatics research
Catherine Reinke¹ and Sarah C.R. Elgin² / Department of Biology, Linfield College, McMinnville, OR; ²Department of Biology, Washington University, St. Louis, MO 63130

Undergraduate biology students frequently learn abstract concepts of gene structure, chromatin organization, and the evolution of genes and genomes in foundational genetics or evolution courses. The utility of active learning strategies to facilitate learning in undergraduate biology courses has been well documented. Specifically, engagement in a hands-on scientific research experience helps students to develop improved abilities and self-confidence in scientific reasoning and communication, which increase the likelihood of student perseverance in STEM. Increasingly, undergraduates engaging in post-baccalaureate training in biology will use computational approaches to analyze large data sets. Since 2006, the Genomics Education Partnership (GEP) has engaged in training faculty from primarily undergraduate institutions in contemporary methods of genome analysis using freely available genomic data sets and bioinformatics tools such as a custom UCSC Genome Browser mirror and BLAST. A wealth of genomic sequence data exists, and genome annotation by undergraduate researchers led by collaborating faculty improves the utility of these data sets. Training and mentorship through the GEP enables collaborating faculty to productively contribute to genomics research. To date, GEP collaborations have yielded insights on how chromosomes and genes have changed over time. Utilizing the model organism Drosophila melanogaster and related Drosophila species, GEP research has illuminated the relationships between genome sequence, higher-order chromatin packaging, and the maintenance of gene function, and provided insights into genomic properties in Drosophila that have been maintained over 40 million years of evolution. Current and future GEP projects will include the genome annotation and analysis of diverse research organisms.

Exploring the inverse relationship between Alzheimer’s disease and cancer
Kristen Shirley¹, Thomas Wolijer², and Randy Wolijer³ / Department of Natural Sciences and Health, Warner Pacific College, Portland, OR 97215; ²Department of Computer Science, Calvin College, Grand Rapid, MI 49546; ³Department of Pathology, Oregon Health & Science University, Portland, OR 97239

Alzheimer’s disease (AD) is a debilitating neurodegenerative disease that affects about 44 million people worldwide. Several epidemiologic studies have shown an inverse relationship between AD and cancer and have shown that the relationship is stronger in patients with more than one case of cancer. The objective of this ongoing study is to investigate whether the AD/Cancer inverse relationship is reflected in the OHSU autopsy records and archived tissues. Samples of the frontal lobe were selected from deceased patients over the age of 50 without previous diagnosis of AD. Eighty-three matching medical
records were examined for history of cancer (all types); thirty-three were found to have had cancer. Frontal lobe samples were tested for the presence of beta amyloid plaques and tau containing neurofibrillary tangles using immunohistochemistry (IHC). Images were analyzed using ImageJ for intensity of IHC signal. Statistical analysis with unpaired t-tests was done using GraphPad analytical software. The data collected to date suggests that patients with history of cancer have a lower burden of AD-related beta-amyloid plaques than patients without history of cancer (P<0.05). Images for tau tangles have been collected but not yet analyzed. Further studies are planned to determine if the relationship can be accounted for by a specific cancer treatment.

**Disentangling the effects of light availability, edaphic factors, and biotic interactions on seedling establishment patterns in Rocky Mountain forests**

Elizah Stephens and Paige E. Copenhaver-Parry / Department of Biology, George Fox University, Newberg, OR 97132

As climate change and other human-induced environmental changes progress, accurately predicting the responses of forests becomes increasingly urgent. There is a growing understanding that broad-scale forest responses to environmental change rely on underlying demographic variation across fine-scale resource gradients. Seedling establishment in particular will determine the environments in which species persist in and/or move to, and the ability of species to respond to stressful environments. The factors influencing seedling establishment may differ from those determining the success of adult trees, but are not well understood for many species and systems. Here we quantify the relative influences of light availability, soil fertility, and neighborhood biotic interactions on seedling establishment patterns of four species (subalpine fir, lodgepole pine, quaking aspen, and limber pine) in a mixed-species forest in the Rocky Mountains using a hierarchical Bayesian Poisson regression model. Establishment patterns were consistent with expectations based on typical successional trajectories and life histories of Rocky Mountain trees. Establishment of sub-dominant species (aspen, limber pine) responded most strongly to declining neighborhood interactions and high light availability. Subalpine fir, a late-successional species, demonstrated high establishment probability and density with low light availability and strong neighborhood interactions. Lodgepole pine establishment responded strongly to neighborhood interactions and low soil fertility. These findings indicate that persistence of mixed-species stands requires fine-scale heterogeneity in stand structure and resource availability and that species responses to environmental change may depend strongly on local resource gradients.

**Functional evaluation of mutant kinases in medulloblastoma**

Theodore Truong, Nicolle Hofmann, and Monika Davare / Division of Hematology and Oncology. Oregon Health & Science University, Portland, OR 97239

The leading cause of cancer-related mortality in children is brain tumors, of which medulloblastoma is the most common form. NGS of over 300 tumors reveals that unlike WNT and SHH subgroups of medulloblastoma, Group 3 and 4 tumors carry a variety of somatic mutations, many of them belong to the kinase family. This is of special interest as kinases are typically “druggable” enzymes. Despite the abundance of already generated genomic data, development of targeted therapies remains stalled due to a lack of functional characterization for kinase mutations. The objective of this study is to understand the role of these mutations, whether activating, inhibiting, or neutral, within the context of medulloblastoma in order to search for a target-specific treatment that has low toxicity. We hypothesize that these kinase mutations cooperate with oncogene MYC to drive high-risk medulloblastoma tumors. The evaluation of the functional consequence, oncogenic potential, and pathogenic cooperativity (specifically with MYC) is accomplished using two cell models: Ba/F3 (IL-3 dependent) and NIH3T3 (anchorage dependent). Mutations are prioritized by already available and relevant FDA-approved treatments. Gateway™ compatible cloning is used to produce expression vectors. Retroviral particles are produced by Plat-E cells to transduce the Ba/F3 and NIH3T3 cell model systems for neoplastic transformation evaluation. Current results indicate that FLT3 A627T has no oncogenic role. Both mutations of FGFR1, N546K and K656E, are modestly phenotypic without MYC and demonstrate aggressive cancer phenotype with MYC.
Sex differences in obesity-induced increases in sympathetic nerve activity: Role of brain cytokines
Van Grouw Alexandria, Brooks Virginia, Zhigang Shi, and Pelletier Nicole / Department of Physiology, Oregon Health and Science University, Portland, OR, 97239

The physiological effects of obesity are not consistent between the sexes. Specifically, obesity causes increased sympathetic nerve activity (SNA) in men but not in women (Figure 1). This study examines the role of cytokines and microglial activation in this sex difference. Obesity induced inflammation causes the release of cytokines which activate microglia in the hypothalamus. It is hypothesized that this process causes increases in SNA and that it is mitigated by estrogen. Rats given a control diet or a high-fat diet for four weeks were then given hypothalamus injection of IL1-β and SNA responses were measured. This was done for the following groups of rats: males, females following an ovariectomy, females following an ovariectomy after which estrogen was introduced exogenously, and female rats whose reproductive cycle was monitored. Immunohistochemical analysis was then performed on brain sections of the hypothalamus and activated microglia were quantified via tagging of iba1 marker. Results showed that microglia in the control (lean) and obese males were more sensitive and gave greater response in general to microglia in the female groups (Figure 2). However, greater microglia activation occurred in obese males than in lean males. Additionally, estrogen did not impact the level of microglia activation, showing that estrogen cannot be the sole contributor to the sex difference.

Completing DNA replication in Escherichia coli
Brian M. Wendel, Nicklas Hamilton, Jessica Cole, Charmain T. Courcelle, and Justin Courcelle / Department of Biology, Portland State University, Portland, OR, 97201

In order to successfully duplicate, a cell must complete replication of its DNA, resolving it into discrete molecules. Accurate completion is essential to allow even segregation of the newly replicated pieces of DNA whether on a chromosome or a plasmid. Furthermore, while the mechanisms involved in initiation and elongation have been well characterized, the process by which genomic replication is completed has, until recently, remained largely unknown. Using a blend of applied high-throughput sequencing techniques and traditional genetics, we show that converging replication forks whether on the chromosome, or on bidirectionally-replicating plasmids require RecBCD, SbcCD, and ExoI to efficiently complete replication and do so in a manner similar to chromosomal completion. In the absence of those gene products, an aberrant recombinational pathway facilitates completion in a manner that frequently results in genomic instabilities and multimeric plasmid species that cannot segregate. Based on this data and the previously reported biochemical activities of these enzymes, we propose a model in which converging replication forks produce a palindrome-like intermediate that is a substrate for SbcCD and ExoI. RecBCD acts after SbcCD and ExoI to resolve the remaining completion intermediates. In the absence of the normal completion process, an aberrant recombinational pathway facilitate completion with a decreased efficiency.

POSTER PRESENTATIONS

Human papillomavirus (HPV) prevalence and vaccination rates before and after the Affordable Care Act (ACA)
Donald Bourne / OHSU-PSU School of Public Health, Portland, OR, 97239

This cross-sectional analysis examines the prevalence of and vaccination rates for human papillomavirus (HPV) before and after the passage of the Affordable Care Act (ACA). About 80% of sexually active people in the U.S. will be infected with HPV at some point in their lives, but most people are never aware they carry the virus. Vaccines are available that can prevent infection from the strains of HPV that most commonly cause cancers, most notably cervical cancer. To explore the role that health policy plays in vaccination rates and subsequent HPV prevalence, this paper analyzes nationally representative data from the National Health and Nutritional Survey (NHANES): 2007-2014 among females aged 18-59 years, covering the years immediately preceding and following the passage of the ACA in 2010. We found significant increases in the proportion of people who received an HPV vaccine (19% vs 10%, P<0.001), mean number of HPV doses (2.33 vs 2.16, P<0.001), and decrease in HPV prevalence (44% vs 46%, P= 0.039) between the years after the ACA (2010-2014) compared to the years before its passage (2007-2009). Altogether, we found strong epidemiological evidence that in the years following the passage of the ACA, HPV vaccinations significantly increased while the prevalence of HPV significantly decreased. This research can help shed light on the relatively short-term impact the ACA has had on a vaccine of vital importance to the sexual and reproductive wellbeing of adult women in America.
Differential effects of high sugar diets on hepatic metabolic pathways in obese mice
Katareneanna Coen, Joel Johnson, Dallyce Vetter, and Sarah Comstock / Department of Health Science, Corban University, 5000 Deer Park Drive SE, Salem, OR 97317

Obesity is a significant health concern associated with the development of nonalcoholic fatty liver disease (NAFLD). The increased incidence of this disease is often linked to sugar consumption associated with sugar sweetened beverages (SSB). This study investigates the link between high-sugar consumption in the form of sucrose, glucose, and fructose and the development of NAFLD in C57Bl/6 mice by analyzing gene regulation in the pathways involved in glycolysis, fructolysis, and fatty acid synthesis. To investigate these mechanisms, an obese mouse model was developed by providing mice with ad libitum access to a 30% sucrose (SUC), glucose (GLC) or fructose (FRT) solution in place of water for 27 weeks. Despite similar caloric intake, SUC and GLC mice exhibited greater than 75% weight gain, while FRT weight gain was more subtle (20%) and did not become significant until week 20. After sacrifice, liver triglycerides were measured and found to be significantly higher in all three experimental groups. Furthermore, GLC liver triglycerides levels were significantly higher than both FRT and CTR levels. Expression of hepatic genes involved in various metabolic pathways were analyzed using 2-step RT-qPCR. Genes involved in all three pathways under investigation were upregulated in the SUC group, while only genes involved in glycolysis and fructolysis exhibited upregulation in the GLC group, and virtually no changes in gene expression were detected in the FRT group. These results indicate a potential synergistic effect of glucose and fructose when consumed together in the form of sucrose.

The ontogeny of kisspeptin neurons in the rhesus monkey
Heidi Funderburgh1, Uyen-Vy Navarro2, Heidi Rivera2 Oline K. Rønnekleiv2/ Department of Biology, George Fox University, Newberg, OR 97132; 2Department of Physiology & Pharmacology, Oregon Health and Sciences University, Portland, OR 97239

Kisspeptin (Kiss1) neurons are a potent regulator of GnRH neurons and, consequently, the HPG axis. While the relationship between Kiss1 and GnRH is known, the origins of this interaction require further investigation in order to elucidate the mechanism. Developmental studies in the mouse model show that Kiss1 neurons originate from POMC progenitor cells around gestational day 13. The objective of this study was to investigate the ontogeny of Kiss1 neurons in two different gestational periods of Macaca mulatta, embryonic day 40 and day 130, in order to observe development in a model that more closely represents the human condition. Four fetal heads (day 40) and three fetal brains (day 130) were sectioned on a cryostat. Immunocytochemistry was performed on the sections using antibodies against Kiss1 (Caraty #564), POMC (β-endorphin), and GnRH (EL-14). Photomicroscopy was performed using a Nikon E800 fluorescent microscope for images 1-4 and a confocal microscope for image 5. The results reveal that at day 40 the rhesus monkey Kiss1 neurons have no interaction with GnRH (Image 1), but are expressed in the caudal region of the hypothalamus (Image 3) that also expresses POMC (Image 2). On day 130 the populations inhabiting the hypothalamus appear mature (Image 4), with possible interaction occurring between the Kiss1 and GnRH fibers in the arcuate nucleus of the hypothalamus. Altogether, these results indicate the possible point in gestation at which POMC progenitor cells convert to Kiss1, and that GnRH secretion may be possible prior to birth in the rhesus monkey.
Novel method of constructing short synthetic gene regulatory elements
Adit Gupta 1,2, Elizabeth Ferrick-Kiddie 3, Hiroyuki Nakai 1,3-1 1 Department of Molecular & Medical Genetics; 2 Department of Biology, Western Oregon University, Monmouth, OR 97351

While recent advances in gene therapy have reinforced the appeal for using Adeno-Associated Virus (AAV) for targeted gene delivery, the small genome delivery size limits the capabilities of AAV as a comprehensive delivery vector. One approach to increasing the AAV gene delivery capacity is to develop shorter promoters that maintain the high transcriptional strength of conventional promoters. However, it is challenging to shorten promoters without compromising transcriptional activity. This research presents a method of generating libraries of promoters derived from the CMV-IE gene regulatory sequence consisting of shuffled transcription factor binding sites (TFBS). These libraries have been constructed with a randomized design that express RNA barcodes, where each barcode is linked to a unique set of TFBS, and thus serves as surrogates. The randomized libraries are transfected into 293 and CHO-KI cell lines for characterization of delivery and expression. This research serves as a proof-of-principle for the rational design of new, shorter promoters to increase the delivery gene capacity of AAV. There are two main applications of this research: First, when applied to reducing the length of cell-type specific promoters, this technique maintains the high transcriptional activity from the standard CMV-IE promoter, and allows for an additional level of transcriptional specificity; Second, the methodology can be used to customize promoters to cell-specific constraints using other gene regulatory sequences, such as the Glial Fibrillary Acidic Protein (GFAP) gene-regulatory sequence.

Bacterial abundance and resistance in ground beef varieties
Savannah Kumar 1, Sarah Boomer 2 / Department of Biology, Western Oregon University, Monmouth, OR 97351

Raw ground beef purchased at supermarkets across America all have one thing in common: they harbor bacteria, some of which can harbor antibiotic resistance and be potentially detrimental to public health. To understand the impact of farming and processing practices on the quantity of bacteria and antibiotic resistance, organic beef (antibiotic- and hormone-free) and regular beef were assessed using MacConkey media. MacConkey targets many fecal and soil bacteria, differentiating them into two categories: purple/lactose using (e.g. fecal E. coli), and white/lactose non-using (e.g. soil Pseudomonas or fecal Salmonella). To characterize these bacterial contaminants, dilutions of beef solutions were spread on MacConkey agar, and colonies were counted and sorted according to lactose utilization. Bacteria that don’t utilize lactose were differentiated further using the oxidase test, sorting into soil/oxidase positive (e.g. Pseudomonas) and fecal/oxidase negative (e.g. Salmonella). Microbiology class testing in 2017 showed that regular beef contained approximately 18 times more E. coli-like bacteria, 4 times more total fecal bacteria, and 3 times more total bacteria (soil and fecal) than organic beef; in all cases, the observed difference was significant (p<0.0001). Recently, I have begun testing ground beef using MacConkey media supplemented with agriculturally-important antibiotics, tetracycline and penicillin. While preliminary results show no tetracycline-resistance in either ground beef source, extensive penicillin-resistance was retrieved from regular beef. Observed penicillin resistance included both E. coli-like and Pseudomonas-like colonies. These data suggest that tetracycline can still effectively kill the bacteria present in both beef samples analyzed, but that some bacteria present have developed resistance to penicillin.

Effects of ecological restoration on small mammal health
Dru Martinez, Elijah Waxman, Rachel Aber, and Laurie Dizney / University of Portland 5000 N Willamette Blvd, Portland, Oregon, 97203

Ecological restoration seeks to return degraded habitat to its historical state, attempting to bring back native flora and fauna, as well as important ecosystem functions such as disease regulation. Tualatin River National Wildlife Refuge (TRNWR) began restoration efforts in 2008 on historic riparian forests converted to agricultural lands. Habitat quality has been shown to effect stress levels in small mammals, which in turn could lead to reduced immune function and/or increased infection prevalence. We examined stress and infection prevalence on 3 habitat types: agricultural (disturbed), restored, and intact (riparian forest). We hypothesized that stress would be highest in the lowest quality habitat (disturbed), highest in the highest quality habitat (intact), and intermediate in restored areas. We predicted that infection prevalence would exhibit the same trend as stress, hence would be highest in disturbed areas. Deer mice (Peromyscus maniculatus) were the focal species because they were the only small mammal we captured on all 3 habitat types. Stress was quantified by corticosterone levels in fur. Infection prevalence was evaluated with Sin Nombre virus, a zoonotic pathogen that has a 30% mortality rate in humans. Stress levels in all 3 habitat types supported our hypothesis. Infection prevalence was also supported in the restored and intact sites, but with so few deer mouse captures in the disturbed sites, we found no infected mice. These results suggest restoring habitat quality improves wildlife health and has important implications for human health.
**Calcium control of MDM2 in breast cancer cells**
Gia Han Nguyen and John M. Schmitt / Department of Biology, George Fox University, Newberg, OR 97132

The hormone estrogen (E2) can activate a series of intracellular signaling pathways, one of which being the calcium/calmodulin-dependent kinases (CaM Kinases) that have been implicated in cancer cell signaling including breast cancer cells. CaM Kinase Kinase (CaM KK) can directly phosphorylate and activate CaM KI, CaM KIV or Protein Kinase B (AKT), which promote cell growth, differentiation and survival. AKT can directly phosphorylate the pro-survival enzyme murine/human double minute 2 (M/HDM2) that regulates the amount of p53 present in breast cancer cells. The purpose of this study was to examine the ability of calcium-elevating agents carbachol and E2 to stimulate MDM2 phosphorylation and survival of breast cancer cells. In addition, we focused on examining whether CaM KK and AKT may be mediating MDM2 phosphorylation downstream of calcium signaling. Treatment of MDA-MB-231 (MDA) cells or MCF-7 cells to increase intracellular calcium levels resulted in phosphorylation and activation of ERK and MDM2. Treatment of MDA and MCF-7 cells with CaM KK and ERK inhibitors, STO-609 and U0126 respectively, decreased MDM2 phosphorylation and cell survival, suggesting the involvement of CaM KK and ERK in this pathway. Interestingly, pre-treatment of cells with the AKT inhibitor, AKT-X, followed by E2 stimulation did not decrease phosphorylation of MDM2. Transfection of cells with shRNA directed against CaM KK decreased MDM2 and ERK phosphorylation. In summary, the data obtained suggests that carbachol and E2 activate a novel CaM KK, ERK and MDM2 pathway in breast cancer cells.

![Diagram](image)

**Identification of two previously unknown genes within the TonB2 system of V. vulnificus**
Hailey J. Pfeifer, Michael M. Berry, Brianne R. Zbylicki, and Ryan Kenton / Department of Biology, University of Portland, Portland, OR, 97203

*Vibrio vulnificus* is a gram-negative bacterium capable of causing fatal infections in humans as well as other animals. Iron is one of the essential elements needed for a successful infection. *V. vulnificus* obtains iron from its external environment by secreting small iron binding molecules called siderophores, which bind back to the cell after they have attached to an iron molecule. This siderophore-iron complex is then brought into the cell using a TonB energy-transduction system. The focus of this project was to identify the functions of two previously uncharacterized proteins, Orf1 and Orf6, within the TonB2 system of *V. vulnificus*. Growth assays, Bioassays, CAS assays, and Ferrozine assays were used to evaluate the roles that these proteins play in the TonB2 system’s ability to bring iron into the cell. We determined that both Orf1 and Orf6 are essential components of the TonB2 system. These proteins are necessary for the system’s ability to power the uptake of iron and for *V. vulnificus* to grow sufficiently in iron-deficient media. We have also shown that the function of the TonB2 system deleted for Orf6 can be restored when complemented with any Vibrio species’ Orf6. In contrast, when the TonB2 system was deleted for Orf1, complementation can only occur when Orf1 from *V. vulnificus* is used.
Validation of miR-15a targets via bioinformatics analysis and luciferase assay
Latroy Robinson1, 2, Shushan Rana3, Cristina Espinosa-Diez2, Sudarshan Anand2 / Department of Biochemistry and Molecular Biology, Lewis & Clark College, Portland, OR 97219; 2Department of Cell Developmental and Cancer Biology Department, Oregon Health and Sciences University, Portland, OR 97239

MicroRNAs (miR) are short ~22 nucleotide-long RNA that bind to messenger RNA and regulate gene expression. Previous results showed that miR-15 is induced at 2Gy but suppressed at 10Gy, miR-15 inhibition mimics the effects of 10Gy, while overexpression of miR-15 mimics 2Gy. Using two different bioinformatic softwares, RNA Hybrid and Target Scan, I identified Capase 10, SMPD1, and CCND1 3’UTRs as predicted targets for miR-15a. These targets had more than two strong binding sites in RNA Hybrid and were cross-validated in Target Scan. SMPD1, CCND1, and Caspase 10 3’UTRs were cloned into a pMIR report vector. I designed PCR oligos to amplify the SMPD1 and Caspase 10 3’UTRs. CCND1 3’UTR oligos were found in primary literature. SacI and MluI restriction sites were used to ligate the three amplicons into the pMIR report vector prior to transformation of E.coli cells. Cloning success was verified with the same restriction sites. Only CCND1 3’UTR vector transformation was successful. This vector and miR-15 mimic were transfected in HEK-293T cells. pMIR report control vectors was also transfected. The luciferase activity of the CCND1 3’UTR cells was quantified 48 hours post-transfection using Steady-glow assay. The results for this assay were negative, as there was no difference between CCND1 3’UTR and the control vectors. Upon further investigation, sequencing of the three pMIR vectors revealed the 3’UTR inserts to be incorrect. I designed new oligos and cloned these vectors again, but I did not achieve the desired result. Future efforts would be focused toward investigating more effective oligo design and cloning methods.

Regulation of HERG C-terminal isoform expression by KCNH2 intrinsic elements
Sequoyah Tate1, Matthew Stump1, Zhengfeng Zhou2 / 1Department of Biology, George Fox University, Newberg, OR 97132; 2Knight Cardiovascular Institute, Oregon Health & Science University, Portland, OR 97239

The KCNH2 gene encodes the hERG potassium channel that conducts the rapidly activating delayed rectifier current in the heart. Two C-terminal hERG isoforms are expressed in the heart. Splicing of KCNH2 intron 9 leads to the formation of a full-length, functional hERGa isoform and polyadenylation of intron 9 results in the production of a non-functional, C-terminally truncated hERGa-USO isoform. In the heart, only one-third of KCNH2 pre-mRNA is processed to hERGa due to inefficient intron 9 splicing. A unique feature of KCNH2 intron 9 is the presence of a 25 nt adenosine stretch immediately downstream of the weak, noncanonical, polyadenylation site, AGTAAA. Interestingly, non-human primate species contain the AGTAAA poly(A) site, but differ in the length of the downstream poly(A) stretch. It is not known how the length of the adenosine stretch affects the alternative processing of KCNH2 and the generation of C-terminal hERG isoforms. To test the effect of adenosine stretch length on alternative processing, the KCNH2 intron 9 poly(A) stretch was changed from 25 nt to 13 nt and 33 nt, corresponding to the sequences of the marmoset and baboon. In the presence of a 13 nt or 33 nt adenosine stretch, intron 9 splicing was outcompeted polyadenylation and resulted in two-thirds of KCNH2 pre-mRNA being processed to hERGa. Although the expression of hERGa-USO has not been previously reported in other species, our present findings suggest that length of the poly(A) stretch within KCNH2 contributes to the species-specific regulation of hERG C-terminal isoform expression.

Nematode diversity and soil composition in varying habitat types
Elijah Waxman, and Laurie Dizney / Department of Biology, University of Portland, Portland Oregon 97203

Wetlands are prevalent on every continent in the world with the exception of Antarctica, and if they were bundled together into a single area, they would cover an area equal to roughly a third of the United States. They are clearly diminishing due to global warming and human influences. The importance of their preservation and restoration is ever increasing as they contribute to filling the demand for water and land (Scheer). In order to continue the restoration process, a better understanding regarding restorative processes is needed. This study gives further insight into a foundational trophic level of terrestrial environments, soil. Three habitat types (disturbed, intact, and restored) were compared at nine habitat sites for nematode differences and soil characteristics. There was a significant difference in the percentage of herbivorous and fungivorous nematodes between the three habitat types. Additionally, the water content and organic material measured in the soil was highest in the intact sites.

Crystallins, which are proteins that make up 90% of the dry mass of the eye’s lens are responsible for its refractive properties. Crystallins tend to be susceptible to modifications that can cause protein insolubility and result in cataracts. Research has demonstrated that obesity is a significant risk factor for cataract development, but few studies have investigated its mechanism. The purpose of this project was to discover connections between obesity and protein modifications in the lens that may ultimately lead to cataract development. A mouse model of diet induced obesity (DIO) via sucrose consumption was used for this study. We hypothesized that excess sucrose consumption, which is known to lead to obesity, will stimulate a higher rate of lens protein modifications that may increase their susceptibility to cataract development. Tandem mass tag mass spectrometry (TMT-MS/MS) revealed that the primary type of protein modification was deamidation of Asparagine (Asn) and Glutamine (Gln). Asn and Gln deamidation rates were significantly increased in sucrose mice. We also demonstrated a four-fold upregulation of HSP71 in the sucrose lens in addition to an increase in alpha crystallin A. HSP71 is a molecular chaperone, which assists in folding of unfolded proteins. Alpha crystallins have chaperone-like properties and collect denatured proteins as soluble aggregates, preventing insolubility. While these changes did not result in cataracts, the increase in chaperone proteins in the lens suggests that proteostatic mechanisms may be upregulated to repair the damage caused by sucrose consumption.
ORAL PRESENTATIONS

Co-culture of two forms of a marine-derived *Aspergillus alliaceus* results in the production of allianthrones A-C
Paige E. Mandelare¹, Donovon A. Adpressa¹, Elizabeth N. Kaweesa¹, Lev N. Zakharov², Sandra Loesgen¹ / ¹Department of Chemistry, Oregon State University, Corvallis, OR 97331; ²Department of Chemistry, University of Oregon, Eugene, OR 97403

Filamentous fungi represent a large group of underexplored chemical diversity. However, not all metabolites found in *Aspergillus* sp. are produced under normal lab conditions. In recent years, co-culturing has gained traction as a method to elicit natural product production. Two developmental forms of the marine alga-derived *Aspergillus alliaceus* strains were explored as sources of new metabolites. The asexual (conidial) and the sclerotial morph of the endophytic fungus can be separated and produce their own, distinct secondary metabolite profile. Ochratoxin A, a known mycotoxin, was found produced by the sclerotial morph of *Aspergillus alliaceus*, while the anthraquinone pigment nalgiovensin was produced by the asexual morph. After combining both fungal phenotypes in a co-culture experiment, the metabolite profile changed drastically. A chlorinated anthraquinone pigment nalgiolaxin was abundant and bianthrones were produced that were not exhibited in monoculture conditions. The new bianthrones, allianthrones A-C, varied only in their stereoconfiguration at the bridging carbon positions, C-10/10’. The new structures were determined by extensive NMR spectroscopic analysis, supported by optical properties and X-ray crystallography. Allianthrone A exhibited moderate cytotoxic activity against the HCT-116 colon cancer and SK-Mel-5 melanoma cell line.
The natural product mensacarcin induces mitochondrial toxicity in melanoma cells
Elizabeth Kaweesa, Birte Plitzko, and Sandra Loesgen / Department of Chemistry, Oregon State University, Corvallis, OR 97331

Mensacarcin is a stereogenic complex polyketide with potent anti-tumor activity produced by a soil-dwelling *Streptomyces bottropensis*. The US National Cancer Institute (NCI) 60 human tumor cell line anticancer drug screen (NCI60) reveals mensacarcin’s cytostatic properties in almost all tested cell lines and distinct cytotoxic properties specifically in eight melanoma cell lines with an average IC50 value of 0.5-1 μM. We show that mensacarcin activates caspase-3/7-dependent apoptotic pathways and induces apoptosis in melanoma cells and not colon cancer carcinoma cells. Mensacarcin co-localizes in mitochondria and impairs mitochondrial function by either inhibiting mitochondria respiration directly or by causing general mitochondrial dysfunction.

Investigation of silica sol-gel materials doped with graphene oxide and TiO$_2$ as substrates for plasmon-free surface enhanced Raman spectroscopy
Perez Morales, Luis, and Atkinson, Elizabeth / Department of Chemistry, Linfield College, McMinnville, OR 97128

Silica sol-gel materials doped with graphene oxide (GO) and TiO$_2$ were investigated as possible reusable substrates for plasmon-free surface enhanced Raman spectroscopy. Sol-gels were prepared by the base-catalyzed hydrolysis of tetramethyl orthosilicate in the presence of GO, and titanium dioxide nanoparticles. The characteristic Raman spectrum of GO was enhanced in the sol-gel materials with low titanium dioxide concentrations. Sol-gels were air dried or heated under a nitrogen atmosphere to obtain xerogels. Analysis of the Raman spectra of xerogels obtained using the latter method indicated that there was a decrease in the oxygen content and a decrease in the defect density for GO within the silica matrix. This suggests that the carbon sp$^2$ network was partially reformed within the xerogels, forming reduced GO/graphene. GO can be detected and reduced within silica sol-gel materials in the presence of TiO$_2$, potentially providing a stable surface for reduced GO/graphene to promote charge transfer and enhance Raman scattering alongside TiO$_2$. GO/TiO$_2$-doped sol-gel materials are potential candidates to be used as highly stable, reusable, biologically-compatible, plasmon-free SERS substrates.

Lipidomics profiling of brain tissue to investigate the treatment effects of *Centella asiatica* using liquid chromatography-quadrupole-time-of-flight-mass spectrometry (LC-QTOF-MS)
Mona Khorani$^1$, Parturni Lak$^1$, Armando Alcazar Magana$^{1,2}$, Nora E. Gray$^3$, Maya Caruso$^3$, Kirsten M. Wright$^3$, Jeffrey Morre$^1$, Don Matthews$^3$, Joseph Quinn$^3$, Amala Soumyana$^3$, Jan F. Stevens$^{1,2}$, Claudia S. Maier$^{1,2}$ / $^1$Department of Chemistry, Oregon State University, Corvallis, OR 97331; $^2$Linus Pauling Institute, Oregon State University, Corvallis, OR 97331; $^3$Department of Neurology, Oregon Health and Science University, Portland, OR 97239

Lipids have crucial roles in cell signaling and tissue physiology. Changes in lipid profiles have been observed in many neurological disorders, including Alzheimer's disease in which dysregulation of lipid metabolism has been reported [1]. In this study, we are interested in determining lipid changes in distinct regions of mouse brain to investigate the neuroprotective effects of *Centella asiatica* (CA) extracts, a medicinal herbal supplement that has been used in Ayurvedic medicine to enhance memory. We used an optimized extraction protocol for the extraction of lipids of cortex tissue. We analyzed the lipid extracts from treated and untreated C57BL6 mice (21 months old) using ultra-performance liquid chromatography (UPLC) coupled to a Q-TOF mass analyzer. Data processing includes aligning of ion chromatograms, peak picking and normalization of the datasets. Statistical tests were performed with RStudio software for principal component analysis (PCA) and multivariate analysis. Our initial analysis revealed that lipid profiles were altered in cortex upon CA treatment. Preliminary results revealed changes in the levels of phosphatidylethanolamines, lysophosphatidylcholines, ethanolamines and ceramides after CA treatment. These initial findings suggest that CA administration may impact lipid metabolism in aging mouse cortex.

Tracking molecular aggregation during film formation by modeling in situ absorbance spectra
Morgan Sosa / Department of Chemistry, University of Oregon, Eugene, OR, 97401

Intermolecular electronic coupling in aggregates can cause spectral shifts in the absorbance and fluorescence spectra when compared to monomers. In this work, we develop a method to systematically fit absorption spectra collected in situ during molecular aggregation to simulated absorption spectra. The resulting fit yields insight into the evolving composition of molecular aggregates during thin film formation. To calculate absorbance spectra, we use a site-based Hamiltonian that includes vibronic and nearest-neighbor electronic coupling for linear molecular aggregates of various sizes. The absorbance spectrum of a dilute solution of monomers is fit and electronic transition energy, vibrational energy, and Huang-Rhys factor are determined. These parameters are used to fit in situ absorbance spectra, during aggregation from a solution to a thin film, to a linear combination of n-mers, giving insight to the evolving composition during molecular aggregation. We have measured in situ absorbance spectra of psuedoisocyanine, which exhibits spectral signatures of a J-aggregate as solvent begins to evaporate in solution deposited thin films. Once all the solvent has evaporated and the final film forms, the absorbance spectrum red shifts and broadens. Our analysis suggests that this occurs when the ensemble of well-solvated J-aggregates with relatively homogeneous electronic couplings are disrupted and strained upon solvent vaporization as it dries into a thin film. This work shows that we can systematically fit in situ spectral measurements to determine the composition of oligomers in an evolving system of molecular aggregates, yielding deeper understanding into the process of thin film formation by solution deposition.

Copper, ROS, and mitochondrial stress: Understanding the pathways that govern metabolic homeostasis
Matthew Walser, Megan Bestwick / Department of Chemistry, Linfield College, McMinnville, OR 97128

The role of copper in the production of mitochondrial reactive oxygen species (ROS) as a part of normal aerobic respiration is not well characterized. We are specifically interested in quantifying the effect of exogenous copper treatment on the relative protein expression of copper-dependent cytochrome c oxidase (COX) subunits and overall COX complex assembly in yeast. Our previous work has indicated the protective behavior of copper treatment on yeast lifespan, and we propose this is due to copper inducing more robust electron movement through more functional electron transport chain (ETC) complexes. Improved efficacy of the ETC is thought to minimize premature electron leakage to oxygen, and lessen mitochondrial ROS levels. Many ageing-related disorders, such as Alzheimer’s and Parkinson’s, implicate ROS-mediated cellular damage as a major contributing factor for the onset and exacerbation of symptoms. As such, understanding the cellular pathways that are responsible for the production of these damaging ROS is beneficial for facilitating future breakthroughs in medical treatment of these diseases. This work hopes to contribute to our understanding of the copper-utilizing components of this mitochondrial pathway, and this metal’s impact on local ROS production.

POSTER PRESENTATIONS

Biodiversity and bioactivity of high desert derived Oregonian soil bacteria
Chenxi Zhu, Cassandra Lew, and Sandra Loesgen / Department of Chemistry, Oregon State University, Corvallis, OR, 97331

Soil-dwelling bacteria have given us a remarkable chemical diversity and an unprecedented amount of bioactive small molecules, such as the clinical used approved anticancer drugs doxorubicin, mitomycin, and many antibiotics, such as erythromycin and kanamycin. Here we present the chemical and bioactivity screening of twenty bacterial strains isolated from soils collected near Bend Oregon from an arid, high desert area. Species diversity was assessed using 16S rRNA gene sequencing. Organic extracts were prepared from each bacterium cultivated in malt-based liquid media and tested for their respective anti-bacterial and cytotoxic activities. Antibacterial screening was carried out against four human pathogens, Enterococcus faecium, Staphylococcus aureus, Pseudomonas aeruginosa, and Escherichia coli, by broth dilution method. Cell viability of mammalian cell lines treated with bacterial extracts were evaluated using a MTT-based cell proliferation assay to assess their potential to contain drug leads for the treatment of cancer. Cell lines include colon cancer adenocarcinoma (HCT-116), breast adenocarcinoma (MCF-7), lung carcinoma (A549), malignant melanoma (SK-Mel-5), and prostate adenocarcinoma (PC-3). Noteworthy, seven extracts (35%) showed strong inhibition with less than 50% cell proliferation at 10 μg/mL extract in at least one cell line; and twelve extracts (60%) exhibited antibacterial properties with less than 20% cell survival at 125 μg/mL in broth dilution assay. Eight active compounds were purified and characterized by HPLC and NMR techniques. A new tetrapeptide was identified and characterized by NMR, ECD and Marfey’s analysis.
An artful look into a 15th Century altarpiece: Pigment analysis using microscopy and Raman and XRF spectroscopy
Cesar Cornejo¹, Triona Matheson¹, Valerie Walters¹, Ronda Bard¹, Kara Breuer¹, Miguel Ángel Cau Ontiveros², Esther Cháves Álvarez, ³ / Department of Chemistry, University of Portland, Portland, OR 97203; ²University of Barcelona, Barcelona, Spain; ³University of La Laguna, Tenerife, Islas Canarias, Spain.

In summer 2017, faculty and student research teams from the University of Portland joined a University of Barcelona archaeological expedition to explore the Roman city of Pollentia. These teams were also invited to perform spectroscopic analysis of pigments in a medieval painting at the Sant Jaume Church Museum in Alcúdia, Mallorca, Spain. Our analysis used Raman and XRF spectroscopy as well as UV/IR microscopy to identify pigments used in the painting. Experimental spectra were compared to reference spectra from a database to make these identifications. Several pigments were identified, including ultramarine, phthalo green, and several regions of vermillion. Other regions have been partially identified as lead white mixed with other unidentified pigments. Ultramarine, vermillion, and lead white were readily available in the 15th century, while phthalo green was not available until the 20th century. The presence of phthalo green indicates that the painting has been restored in recent times. Future work will involve identification of unknown pigments via Raman comparison and expansion of the microscopic analysis of pigment transparency. This type of non-destructive pigment analysis aids in dating of paintings, identification of restored areas, and identification of unexpected or regional pigments.

Stability of epinephrine when exposed to varying environmental conditions
Nikole Gomez and Gregory Miller / Department of Chemistry, Southern Oregon University, 1250 Siskiyou Blvd., Ashland, OR 97520

Epinephrine, (Figure 1) also known as adrenaline, is a neurotransmitter and hormone (“fight or flight” response). Epinephrine is a universally accepted treatment for anaphylaxis, a severe life-threatening allergic reaction. In the United States, the most commonly prescribed epinephrine autoinjector is the EpiPen. A patient who is at-risk for anaphylaxis, must carry an EpiPen with them at all times. Therefore, the device is exposed to various environmental conditions that could accelerate the degradation process for epinephrine. Epinephrine has three known degradation products: D-epinephrine (the least potent enantiomer), adrenochrome, and epinephrine sulfonate (Figure 2). Adrenochrome is the only colored product, so other degradation products can be present without the knowledge of the patient. Sodium metabisulfite is preservative found in EpiPens, and is the source of sulfur for epinephrine sulfonate. The purpose of this study was to determine the stability of epinephrine in different environmental conditions. The recommended storage conditions for the EpiPen are 20 – 25°C in the dark and buffered from pH 2.2 – 5. For this study, epinephrine was subjected to storage temperatures of -18 °C, 4 °C, 22 °C, and 40 °C, light exposure, pH conditions buffered at 2, 3.5, 5, and 6.5, and absence/presence of sodium metabisulfite. The results for the temperature study show increased degradation in the sample at high heat and in the sample placed at room temperature. Epinephrine concentrations were unaffected by light exposure. The results for the pH and sulfite study are still in development.

Figure 1. The structure of epinephrine.

Figure 2. The degradation pathways of epinephrine.
Alloy Au/Ag nanoparticles introduced to \textit{S. Cerevisiae} cells \textit{in vitro}.
Brian Gilbert, Fatima Falcon Ontiveros, and Ana Alfaro / Department of Chemistry, Linfield College, McMinnville, OR 97128

The interest in nanomaterials and their properties has been increasing over the years thanks to the ease with which they can be produced in bulk, their stability over long periods of time, and the different uses they can have across disciplines. One of the possible applications of nanomaterials is as drug-delivery systems. The purpose of this study was to synthesize monodisperse silver and gold alloy nanoparticles to introduce them to live wild type \textit{S. cerevisiae} cells \textit{in vitro}. The composition and size of the alloy Au/Ag nanoparticles was controlled through a seeded growth co-reduction of gold and silver salts, using the Turkevich approach. The size of the nanoparticles was characterized using a NanoSight LM10 HS and their composition with a UV-Vis spectrophotometer. These alloys and earlier gold nanoparticles of varying sizes were introduced to live wild-type \textit{S. cerevisiae} cells in their exponential growth phase, and the absorbance of the cells after incubation with nanoparticles was measured with a UV-Vis spectrophotometer. Absorbance data suggests that the number of nanoparticles taken up by the yeast cells is negligible as no peak was observed in the yeast cells after they had been washed and centrifuged to discard excess alloy nanoparticles. Further research is necessary to see if the degradation of the cell wall allows an increased number of nanoparticles absorbed into the cells. In addition, attaching antibodies to the nanoparticles may allow them to target and adhere to the cell wall of the yeast cells.

Investigation of antibiotic and anticancer materials extracted from bacterium collected at a Roman archeological dig site
Astrid Schick, and Angela Hoffman, / University of Portland, 5000 N. Willamette Blvd. Portland, OR 97203-5798

As antibiotic resistance becomes a driving issue in today’s medical reality, the discovery of completely new compounds is quintessential to the vitality of tomorrow’s world. Finding potential antibiotic sources can be as simple as culturing the teeming ecosystems of microbes in dirt beneath one’s feet, or as complex as extracting the bacteria that live in the depths of the ocean trenches. In this study, the antibiotic source was a series of soil samples taken from an archeological dig site of the ancient city of Pollentia on the island of Alcudia, Spain. These samples were cultured under sterile conditions on various agar mediums. Over a hundred different bacteria were isolated by their morphology and initial antibiotic properties for further study. Seven of these were tested against \textit{Streptococcus epidermidis} ATCC 12228, \textit{Staphylococcus aureus} ATCC 25923, \textit{Escherichia coli} DH10B Life Technologies and \textit{Pythium ultimum} provided by Gary Strobel from Montana State University using the Agar disk diffusion and broth dilution methods. Three out of those five were able to kill one, or more of the test cultures. Initial isolation attempts of two of the three have yielded promising results. Further purification of the samples is needed to determine the molecules responsible for these results as well as identification of the exact bacteria species present which will be pursed in future research.

Purifying potential cancer-inhibiting compounds in basket plant (\textit{Callisia fragrans})
Siva Ho, Alexys Bermudez, Kevin Truong, Mackenzie Brandon, and Angela Hoffman / Department of Chemistry, University of Portland, 5000 N. Willamette Blvd. Portland, OR 97203

\textit{Callisia fragrans} (basket plant), is found in many tropical regions, and is used by people in Vietnam as a medicinal herb. Leaves from the plant were extracted with methanol, followed by many chromatography steps to separate the soluble compounds from the plant and isolate active compounds. The crude mass was measured to calculate the concentration. The samples were tested with \textit{Pythium ultimum} to determine its activity. The active fractions from \textit{C. fragrans} extracts were separated multiple times by flash chromatography on silica gel. Fractions that gave positive inhibition of \textit{P. ultimum} growth were eluted with a mixture of ethyl acetate and methanol. So far active fractions have been found in similar areas on the chromatogram after multiple separations using flash chromatography. Compounds that inhibit the growth of \textit{P. ultimum} have a 90% chance of killing cancer cells.
Further exploration of the cryptic genome of *Fusarium graminearum*: Early bioassay testing of extracts from a kmt6 mutant and a kmt6-fusC double mutant

James Taylor¹, Jessica Thomas¹, Karissa Morrison¹, Kristina Smith¹,², Jeff Gautschi¹,³ / ¹Chemistry-Biochemistry Undergraduate Research Group, Oregon State University-Cascades, Bend, OR 97702; ²Department of Biochemistry and Biophysics, Oregon State University, Corvallis, OR 97331; ³Department of Chemistry, Oregon State University, Corvallis, OR 97331

Investigations of fungal extracts and natural products with antimicrobial activity continues to be a part of ongoing research within the Chemistry-Biochemistry Undergraduate Research Group (CBURG) at OSU-Cascades. One potential source of novel antibiotics may be from the cryptic genome of the wheat blight fungus *Fusarium graminearum*. The *kmt6* mutant of this fungus (strain FMF248), developed previously via a lysine methyltransferase (KMT) gene knockout, has been shown to express many additional genes (i.e., the cryptic genome) that are not expressed in wild type.¹ The *kmt6* mutant and the wild type *F. graminearum* both produce the compound fusarin C and its analogs, which are known to be biologically active. This activity can potentially mask activity of non-fusarin C compounds during early antimicrobial screening using disk diffusion methodologies. To better understand the impact of the fusarin compounds in early assays, crude extracts from two different mutant strains of *F. graminearum* are being investigated. One strain is the original *kmt6* mutant (strain FMF248) and the other is a *kmt6* mutant that also has a *fusC* gene deletion (strain FMF827). Crude extracts from both strains were generated using solvent-solvent partitioning methods and tested for antimicrobial activity.


Mass Spectrometry for establishing plasma lipid signatures of aging in mouse models

Ashish Vaswani¹,²; Dr Armando Alcazar Magana¹,²; Dr Sanjiv Kaul³; Dr Nabil J. Alkayed³; Claudia S Maier¹,² / ¹Oregon State University, Corvallis, OR; ²Department of Chemistry, Oregon State University, Corvallis, Oregon; ³Oregon Health & Science University, Portland, OR

Aging is the single most significant risk factor for developing disease. We use mass spectrometry-based strategies to determine biomolecules, chemical and biochemical mechanisms associated with aging with the goal to develop intervention for promoting health and longevity. Here we report on a LC-MS- based workflow using plasma as a source of biomarker signatures. We chose plasma because it is readily accessible and it is therefore suitable bio-specimen for conducting longitudinal aging studies. We use C57BL/6 mice as model. We conducted a comparative study in which we determine lipidomic profiles of plasma from young (3 months, n=6) and old mice (18 months, n=7). Analysis was carried out using ultra-performance liquid chromatography (UPLC) coupled to an accurate mass high resolution mass spectrometry (HRMS). We initially optimized liquid liquid extraction by testing dichloromethane:isopropanol:methanol (20:10:65, v/v/v), chloroform: methanol (1:2, v/v) and butanol:methanol (BuOH/MeOH) mixture (1:1, v/v). The coefficient of variation % (CV %) was the lowest for BuOH/MeOH mixture (1:1, v/v) and lipid extraction using this mixture was highly reproducible hence the mixture of butanol/methanol (1:1, v/v) with 5 mM ammonium formate was chosen for lipid extraction. Our study involved 13 biological samples (6 young and old) along with 2 technical replicates, 8 blanks and 8 QC samples (used for QC normalization). Statistical analysis was performed using both univariate and multivariate statistical methods. We obtained 184 discriminant ion features which display statistically significantly different levels in plasma samples from young and old mice (p-value < 0.05 and q value < 0.05). Lipid classes such as Lysophosphatidylecholines (Lyso PC), Lysophosphatidylethanolamines (Lyso PE), Lysophosphatidylglycerols (Lyso PG), Phosphatidylcholines (PC), Phosphatidylethanolamines (PE), Sphingomyelins (SM), Triglycerides (TG), Cholesteryl Esters (ChoE) exhibited fold change differences > 1.3 between young and old samples. Future work will evaluate the impact of dietary and medicinal supplements on lipid profiles.
Analyzing honeybee propolis with mass spectrometry
William Walls¹, Tanner Simpson², Jeff Morré¹, and Claudia Maier¹ / Department of Chemistry, Oregon State University, Corvallis, OR 97331; ²Department of Physics, Oregon State University, Corvallis, OR 97331

Propolis, a byproduct of the honey industry, is a resinous mixture of saliva, beeswax, and native plant resins, used to seal cracks and reinforce the structural integrity of a honeybee (Apis Mellifara) hive. Propolis has recently been marketed as a nutritional supplement with potential health benefits, attributed to its anti-inflammatory and antibacterial properties. The composition of propolis is known to vary by region based on the surrounding botanical species. Previous research has identified classes of compounds, such as terpenes, fatty acid esters, and phenylpropanoids, which can potential serve as indicators of propolis. The objective of this study is to identify marker compounds associated with propolis that may ultimately assist in the authentication of propolis, and adulteration and mislabeling of propolis supplements. Four propolis sources were analyzed in duplicate: two commercial health supplements, one commercial unknown, and a raw propolis sample sourced directly from a local honeybee hive. Samples were analyzed in positive ion mode using LC-MS (Liquid Chromatography Mass Spectrometry), APGC-MS (Atmospheric Pressure Gas Chromatography-Mass Spectrometry), and GC-EIMS (Gas Chromatography - Electron Ionization Mass Spectrometry). Data analysis using the NIST library and Metlin spectral library was used for tentative compound identification. Principal Component Analysis was used to identify common and unique compounds throughout each sample.

Fluorescent detection of reactive oxygen species in Saccharomyces cerevisiae applied to chronological lifespan
Kelly Schultz, Megan Bestwick / Department of Chemistry, Linfield College, McMinnville, OR 97128

During aerobic metabolism, cells are exposed to a wide range of reactive oxygen species (ROS) such as the superoxide anion, hydrogen peroxide, and the hydroxyl radical. Normally, molecular oxygen is relatively unreactive and harmless in its' ground state, however, it can undergo partial reduction via electrons leaked from the electron transport chain to form the superoxide anion and hydrogen peroxide, both of which can react further to form the dangerously reactive hydroxyl radical. To combat the toxic and potentially deadly effects of ROS, cells are equipped with various antioxidant defense mechanisms, which include enzymes like superoxide dismutase 1 (Sod1p). Our objective is to observe these various reactive oxygen species using yeast and exploring different biochemical staining assays such as Amplex Red (AR) and Dihydroethidium (DHE), which can be used to track live cells and quantify ROS levels. This will ultimately allow us to study how ROS changes during chronological yeast lifespan. Although there are many types of reactive oxygen species that exist in various parts of the cell, our work thus far has aimed to track extracellular hydrogen peroxide via AR, and superoxide generation via DHE. Our initial results indicate that we are able to track superoxide production using DHE in wild type cells and sod1Δ yeast strains spectroscopically. Ultimately we will use both spectroscopy and live cell imaging via microscopy to assess superoxide levels in multiple yeast strains. Our results will provide insight into the role of ROS in aging.

Identification of protein interactions for the mitochondrial transcription factor TFAM and mutants
Shae Reece, and Megan Bestwick / Department of Chemistry, Linfield College, McMinnville, OR 97128

Mitochondria are key organelles in eukaryotic cells for their role in metabolism and other biosynthetic pathways. They play a key role in the production of ATP via oxidative phosphorylation (OXPHOS). Over eighty proteins make up the various OXPHOS complexes, several of which are encoded by the mitochondrial genome (mtDNA). Within mitochondria the processes of transcription and translation take place to generate these important OXPHOS subunit proteins. During the process of mitochondrial transcription, the transcription factor TFAM (transcription factor A, mitochondria) is important in promoter regulation. TFAM itself is a multifunctional mitochondrial protein in that it binds both specific and nonspecific mtDNA sequences. At promoter sequences the protein causes U-turn in the DNA, while less dramatic bending takes places when bound nonspecifically. Our aim is to identify novel interacting proteins with TFAM using a yeast-two-hybrid model. Additionally, we are interested in determining if there are changes in these proteins interacting partners in mutant forms of TFAM. Specially, two-point mutations in the TFAM gene have been linked to late onset Alzheimer’s disease, S12T and P178L. Biochemical and genetic techniques are being used to identify and characterize changes in protein interaction partners as a result of these mutations.
Expanding the investigations of the \textit{kmt6} mutant of \textit{Fusarium graminearum}: Bioassay testing of a pre-fractionated library of extracts to further explore the antimicrobial potential of fungal cryptic genomes

Katharine Foster \textsuperscript{1}, Devin Wicker \textsuperscript{1}, Kristina Smith \textsuperscript{1,2}, Jeff Gautschi \textsuperscript{1,3} / \textsuperscript{1}Chemistry-Biochemistry Undergraduate Research Group, Oregon State University-Cascades, Bend, OR 97702; \textsuperscript{2}Department of Biochemistry and Biophysics, Oregon State University, Corvallis, OR 97331; \textsuperscript{3}Department of Chemistry, Oregon State University, Corvallis, OR 97331

In the ongoing search for novel antimicrobial secondary metabolites within the Chemistry-Biochemistry Undergraduate Research Group (CBURG) at OSU-Cascades, investigations of the \textit{kmt6} mutant of \textit{Fusarium graminearum} (strain FMF248) continue. Previous studies have shown that this mutant expresses an additional 14\% of the wild type genome and that this “cryptic genome” might express novel secondary metabolites\textsuperscript{2}. Previous data from our lab indicated antimicrobial activity in crude extracts obtained from the liquid broth of the \textit{kmt6} mutant. Expanding upon this, a pre-fractionated library of extracts was tested in a disk-diffusion antimicrobial bioassay against \textit{Escherichia coli}, \textit{Staphylococcus aureus} and \textit{Bacillus cereus}. Crude extracts were produced using a solvent-solvent partitioning scheme, and the pre-fractionated library was produced using size-exclusion chromatography (i.e., hand-packed Sephadex\textsuperscript{®} LH-20 column). It is thought that this bioassay approach can provide activity data that differentiates between the known biologically active compounds such as fusarin C and its analogs, and non-fusarin C compounds that may be produced by the cryptic genome of \textit{F. graminearum}.
GEOGRAPHY

Section Chair:

Ted Eckmann
University of Portland

ORAL PRESENTATIONS

Don’t wine about climate change: New climate model downscaling to prepare Oregon vineyards for the future
Barsanti, Danielle C. and Eckmann, Ted C. / Department of Environmental Studies, University of Portland, Portland, OR 97203

In 2016, California’s wine industry produced $1,158 million in exports according to the US Census Bureau, but climate change will soon threaten California’s ability to produce many of the highest quality wines by increasing temperatures above ideal growing-season ranges. Oregon’s wine industry is much smaller than California’s, but climate change will soon move many Oregon vineyards into these optimal growing season temperatures that currently occur in California. This study therefore developed new techniques for downscaling the output of climate change models to sub-kilometer spatial scales appropriate for examining the impacts of climate change on individual vineyards in Oregon. Results show that in the mid-21st century, many of Oregon’s Willamette Valley vineyards will experience growing-season air temperatures 3-4°C warmer than today’s, which will move Willamette Valley vineyards that currently produce Pinot Noir, Pinot Gris, and Chardonnay, above the ideal temperature ranges for those important components of Oregon’s wine industry. Results also show how parts of the Willamette Valley currently below the ideal growing-season temperatures for Zinfandel, Sangiovese, and Cabernet Sauvignon will soon be able to produce these wines at a high level of quality, but only if wine growers plant these soon, because the age of vine stock necessary for many of the highest quality wines can exceed 30 years. This delay between planting time, and the highest quality harvests, necessitates advanced planning by wine growers in the face of changing climates, demonstrating the value in our new methods for modeling future climate changes on the scales of individual vineyards.

New methods for improving orthomosaic mapping using drones
Castillo, Dani, Morach, Annemarie E., and Eckmann, Ted C. / Department of Environmental Studies, University of Portland, Portland, OR 97203

This study developed and applied new approaches for using a DJI Phantom 3 Professional quadcopter drone, also called an “Unmanned Aerial Vehicle” (UAV), to acquire centimeter-resolution visible-wavelength photographs for orthomosaic generation utilizing images acquired both in sunny and overcast conditions, along with methods for using this imagery to measure the albedo of plants. We tested and validated these methods through over 100 flights at the University of Portland (UP) campus in Portland, Oregon (USA) from 2015 to 2017. Results show the approaches we developed are effective in reducing the detrimental effects of shadows, and more efficient in georeferencing and orthorectification than are existing methods which require substantially more labor, plus expensive software and hardware. In addition, the plant albedo values we calculated through new methods developed by this study match closely with values from the literature for the 23 plant species we used for validation, but offer tremendous advantages in speed and spatial coverage as compared to measuring plant albedo through traditional in situ methods. Plant albedo is a necessary input for some microclimate models, and can provide useful information about vegetation health and phenology, but values reported in the literature for individual plants are scarce. The approaches developed and validated by this study can be applied in many areas worldwide, and serve to democratize the availability of high-resolution imagery for a variety of users who until recently could not afford such advanced data products.
Spatiotemporal patterns in agricultural greenhouse gas emissions in the United States
Corris, Taylor S., Cronin, Kate J., Valdez, Theresa C., and Eckmann, Ted C. / Department of Environmental Studies, University of Portland, Portland, OR 97203

This study investigated spatial and temporal patterns in greenhouse gas emissions from agriculture in the United States, using Geographic Information Systems (GIS) and temporal statistics to analyze data from the United States Department of Agriculture (USDA) National Agricultural Statistics Service, the USDA Economic Research Service (ERS), and the United States Environmental Protection Agency (EPA) Greenhouse Gas Inventory. Results show how cattle population has decreased over the last 20 years while greenhouse gas emissions from cattle have increased during the same time period, with the increase in methane emissions from manure management accounting for much of this trend. Causes for these trends include widespread transition from small-scale farms to large commercial operations, which generally don’t use locally-grown feed, and don’t apply locally-produced manure, along with an increase in the average live weight per cow. Our GIS analysis shows these operations are also becoming more spatially concentrated at a variety of scales. In addition, we found the percentages of corn, soybeans, sorghum, barley, and wheat grown in the US for animal feed is increasing over time, with projections through the next decade anticipating this trend will continue. Our spatial and temporal analyses could be applied to 1) understand and account for spatiotemporal variations in greenhouse gas emissions from agriculture, and 2) reduce those emissions through identifying the best policies for meeting food supply needs while minimizing greenhouse gas emissions.

New spatiotemporal statistical methods to identify sources of industrial odors
Cruz-Cuevas, Ximena P., Wright, Samantha G., Simpson, Logan K., Walker, Joseph L., and Eckmann, Ted C. / Department of Environmental Studies, University of Portland, Portland, OR 97203

We developed new methods to use odor monitoring data, wind direction data, and spatiotemporal statistical tools, to identify the source of an industrial odor in a neighborhood of Portland, Oregon called University Park. We selected this as a case study in order to demonstrate these new methods because residents there frequently complain about industrial odor. We hypothesized that the source of the odors was a Daimler Trucks North America LLC manufacturing plant, which manufactures and paints heavy trucks. Thus, we examined qualitative data on odor type in order to assess how common paint odors were in the area compared to industrial odors that may have been coming from other potential sources. We measured winds and odors across the study area for over a full year at multiple times per day. Results show that locations immediately northwest of the Daimler plant experience far more industrial odors than other locations within the study area, especially when winds are predominately from the southeast. Results also show odors occur more during winter as compared to other seasons, which demonstrates the importance of measuring odor over the course of an entire year to avoid the seasonal biases that exist in many other studies of industrial odors. Nuisance odors can cause symptoms beyond simple annoyance, as studies have shown they are related to a variety of health problems. This demonstrates the value in our study’s new methods, which can be applied to identify sources of industrial odors in many areas worldwide.

Economic valuation of large coniferous trees in Oregon
Egan, Matthew V., Lower, Sasha N., and Eckmann, Ted C. / Department of Environmental Studies, University of Portland, Portland, OR 97203

This study was conducted in response to plans by administrators at the University of Portland (UP) in Portland, Oregon (USA) to cut down eight giant sequoias (Sequoiadendron giganteum), to make room for the construction of a new academic building on the UP campus. In an attempt to save these sequoias, we used the i-Tree suite to model the effects of these eight trees on building energy savings, in addition to removing air pollutants such as O₃, SO₂, NO₂, CO₂, and PM₂.⁵. We then calculated the associated reduction in healthcare costs and missed work due to the amounts of air pollutants removed by these trees. We also calculated the economic value of these trees in carbon storage and carbon sequestration. However, our results show the largest economic benefits of these trees are in the form of improving hydrologic stability. In response to the efforts of co-authors of this study, and others in the UP community, UP administrators agreed to only cut down four giant sequoias instead of the eight originally planned. Our economic modeling suggests these efforts to protect the trees therefore saved UP over $700,000 in direct costs from increased energy bills, air pollutant exposure, and hydrologic problems, which would have occurred if UP administrators had followed their original plan to cut down all eight trees. The modeling framework developed by this study could be applied elsewhere to quantify economic values of other large trees and help decision-makers to better see the value that such trees provide.
Modeling ecoroof performance in current and future climates
Hamilton, Maranda J., and Eckmann, Ted C. / Department of Environmental Studies, University of Portland, Portland, OR 97203

Many studies have documented how native plants that thrive at ground level often do not succeed on nearby green roofs (also called ecoroofs and vegetated roofs). Studies have also found that the species originally planted on a green roof are often outcompeted by non-natives in some portions of the green roof. Evidence suggests that microclimate conditions on most green roofs vary substantially by location across the roof, and this could explain why some plants die in some portions of a green roof but succeed in others. Unfortunately, few studies have investigated this important within-roof microclimate variability. Our research fills this gap by developing new methods for using a computational fluid dynamics (CFD) model called ENVI-met to calculate air and surface temperature, winds, humidity, direct and diffuse radiation, soil moisture, and other microclimate variables at sub-meter resolution. We validated this model using automated stations that measured these parameters on a green roof in Portland, Oregon (USA). These variables exert strong influences on success of common green roof plant species, so the new modeling approach developed by this study can improve green roof planting strategies in the US Pacific Northwest and many other regions worldwide. In addition to improving green roof design in current climates, this study also demonstrates how our modeling framework can inform planting strategies so they account for anticipated future climate changes. Through this, we also show CFD model output for the effects of climate change within a green roof at sub-meter spatial scales, potentially for the first time.

A new micrometeorological network for applications to sustainable landscaping
Hurst, Maya A., Wood-Gaines, Anna K., and Eckmann, Ted C. / Department of Environmental Studies, University of Portland, Portland, OR 97203

This study developed a new micrometeorological monitoring network comprising dozens of lightweight portable sensor packages that can be deployed rapidly at heights ranging from ground level to 3m above ground, or flown aboard unmanned aerial vehicles (UAVs). By deploying a large number of these sensor packages with spacing of a few meters between stations, we gathered datasets with temporal resolutions down to seconds, for hours at a time. We used these datasets to study the effects of trees and ground cover on microclimates near the Clark Library at the University of Portland in Portland, Oregon. Results show the influence of vegetation on air temperature, dew point, wind speed/direction, and other atmospheric variables. These findings also demonstrate how vegetation placement can impact the energy efficiency of nearby buildings, with applications to sustainable architecture and landscape design. This new micrometeorological monitoring network offers spatial and temporal resolutions superior to those of almost all existing atmospheric datasets, offering the possibility for unprecedented levels of detail in studies on individual building sites. Applications include more informed decisions about what kinds of vegetation to plant where, with benefits ranging from improved energy efficiency of buildings to improved human comfort.

Forecasting populations of older persons
Lycan, Richard / Institute on Aging, Portland State University, Portland, OR 97207

Many organizations need population forecasts to support their planning. In the case of older persons, public agencies and non-profits that supply services to older persons depend on this information for budgeting and capital investment programs. One thing that is sure is that the number of older persons will increase substantially over the next few decades as the baby boomer population bulge ages and flows into retirement. In Oregon local and county governments are required to cooperatively develop population forecasts to support their land use and planning efforts. In Portland Metro has this responsibility and uses its Metroscope urban simulation model to forecast future housing development and population. Metroscope mainly focuses on employment and worker housing and does not include logic that correctly matches the needs of older persons to housing. Demographers usually are inclined to use a cohort-component forecasting model that projects trends of age cohorts into the future based on assumptions about births, deaths, and migration. On comparing forecasts of older persons from Metroscope and from a demographer’s Hamilton-Perry cohort model the author found a zero correlation of growth rates for census tract level data. Which is more right? Likely neither. This paper discusses why models such as Metroscope and Hamilton-Perry are unlikely to accurately forecast the spatial growth of older populations. It suggests elements that would be required in a model to forecast the numbers and census tract level location of older persons in a metropolitan area such as Portland, Oregon.
Optimizing Photovoltaic and Green Roof Efficiency
McManus, Madison B., Hawken, Cody T., Adams, Amanda M., Statler, Nicole E., and Eckmann, Ted C. / Department of Environmental Studies, University of Portland, Portland, OR 97203

This study examined economic returns for installing photovoltaic panels and green roofs on various buildings used as residences and offices. We accounted for installation costs, loan costs, proposed carbon taxes, stormwater management discounts, and other relevant factors. In addition, we modeled the optimal ratio of photovoltaics to vegetated roof area for newer and older buildings, quantified by several economic metrics. We also developed new methods to account for cloud cover in optimizing photovoltaic positioning. We found that photovoltaic positioning solutions can be very sensitive to clouds in frequently-overcast regions of the US even though clouds do not affect angle optimization much in sunnier climates. Our results quantify how, even in the areas of the US with the lowest electricity costs and lowest annual sunlight hours, photovoltaics produce positive returns on investment if installed properly. We also found that photovoltaics produce a higher return on investment than do vegetated roofs for new office buildings, while vegetated roofs produce a better return on investment than do photovoltaics for older buildings, whether used as offices or residences. This is important because in many areas, buildings have photovoltaics when a vegetated roof would have been more cost and energy efficient, while other buildings have vegetated roofs when photovoltaics would have been more cost and energy efficient. Potential applications include modifying incentive programs and other policies to properly account for building age, use, and other relevant factors to ensure building owners make the most energy-efficient decisions.

Measuring and modeling microclimate effects of vegetation
Morach, Annemarie E. and Eckmann, Ted C. / Department of Environmental Studies, University of Portland, Portland, OR 97203

This study developed new methods for using the ENVI-met computational fluid dynamics model to isolate the effects of large trees on nearby microclimates. In particular, we solved a problem plaguing many other ENVI-met studies in that plant foliage albedo is time-consuming and expensive to measure using traditional methods. Our solution involved using drone images and pyranometers to calculate albedo, with validation showing our methods produced an $r^2$ of 0.99. We investigated sensible heat, latent heat, and ground heat fluxes, along with radiant temperatures, surface temperatures, air temperatures, winds, carbon dioxide concentrations, and specific humidity. Our study is likely the most thorough to ever measure and model microclimate effects of large trees. Results show model simulations of plant metabolic processes and their influence on air temperature, surface temperature, winds, and carbon dioxide were close to measured values, with an $r^2$ for many parameters at or near 0.99, and other statistics ranking model performance comparable to or superior to previous ENVI-met studies. Applications include new methods for running and validating microclimate models, which could lead to better decisions about what kinds of trees to plant where, and greater protection for trees, which can reduce the urban heat island effect and its detrimental influences on energy demand and human comfort.

Using dispersion modeling to reduce impacts of oceangoing vessels on pollution in Portland, Oregon
Welsford, Acacia A., and Eckmann, Ted C. / Department of Environmental Studies, University of Portland, Portland, OR 97203

This project investigated the air pollution impacts that result from oceangoing vessels producing electricity from their diesel gensets while in port in Portland, Oregon, instead of using shore-based electricity from cleaner sources. This is particularly problematic because oceangoing vessels typically use dirty diesel engines that produce far more air pollutants than do the engines on shore, which are subject to local regulations. We developed methods for using the AERMOD atmospheric dispersion modeling system to see exactly where this pollution goes in Portland, in response to various wind conditions, vertical temperature profiles, and emission sources. These new methods could be applied to study the impacts of various policies for reducing air pollution from oceangoing vessels both in Portland, and elsewhere. Additionally, we used the EPA’s Shore Power Emissions Calculator to estimate the volume of pollutants that come from the types of vessels that most commonly dock in the Port of Portland. Finally, we investigated the infrastructure requirements of a shore power source for the Port of Portland. Applications of this research include detailed quantitative information on the environmental and public health benefits possible by requiring oceangoing vessels to use shore power while in the Port of Portland, similar to policies that are already in place in other areas such as in California.
GEOLOGY

Section Chairs:

Scott Burns
Portland State University

Jeff Myers
Western Oregon University

Melinda Shimizu
Western Oregon University

ORAL PRESENTATIONS

Pseudotsuga (Douglas Fir): Truly Oregon’s Tree
Jeffrey A. Myers¹, Diane M. Erwin², Howard E. Schorn².¹ Western Oregon University Department of Earth Science; ²University of California, Berkeley, Museum of Paleontology, CA

Douglas Fir (Pseudotsuga) is one of the most important timber trees in North America. Fossil occurrences of the genus have been reported from as early as the Cretaceous and from dozens of localities in western North America and Eurasia. Here we reevaluate and revise the fossil record of Pseudotsuga in order to establish the chronology and pattern of its diversification and changing distribution. A revision of the megafossil record found that the majority of specimens identified as Pseudotsuga were either incorrectly identified or too poorly preserved to be identified. All unequivocal records in western NA and eastern Asia occur within the present range of the genus, and virtually all reports from throughout the Great Basin and high elevations of the west (including the Sierra Nevada) are incorrect. The oldest known occurrence is from the ~ 32 Ma Rujada Flora of the Western Cascades east of Cottage Grove, Oregon. Pseudotsuga is sparsely represented throughout the Neogene of Oregon and Idaho, and, slightly later, California. These fossils closely resemble the two extant North American species: P. macrocarpa (32 Ma to present) and P. menzeisii (14 Ma to present). The genus first appears in the Eurasian fossil record in the early Miocene. While all North American fossil and extant occurrences of Pseudotsuga possess leaves with acute apices, all Asian fossil and living forms have emarginate apices, suggesting that Pseudotsuga originated in the wet, warm temperate Pacific Northwest and migrated to Eurasia during the early Miocene. In North America the genus expanded its range into drier regions of California and the interior NA west in the middle or late Miocene. This contrasts with earlier interpretations in which the genus was interpreted to have been widespread throughout the west through the middle Miocene, then becoming increasingly restricted in its range as western NA climate cooled and dried.

Landscape ecology of the Pleistocene (47 ka) fauna of Fossil Lake, Oregon
Adrian Broz and Gregory Retallack, Department of Earth Sciences, University of Oregon, 1585 E 13th Ave. Eugene, OR 97403

Fossil Lake is a famous locality for Pleistocene fossils in Lake County, Oregon, first collected in 1876 by John Whiteaker and Thomas Condon, and then in 1879 by E.D. Cope. James Martin has established a tephrostratigraphy showing that the fossils are mixed by deflation from several different stratigraphic levels ranging in age from 23-646 ka, but the most productive and extensive horizon is the 47 ka Marble Bluff tuff. Our study of paleosols above and below the Marble Bluff tuff provides a context for the fossil fauna. Four pedotypes were recognized. The most striking of these is a paleosol below the Marble Bluff tuff with very clayey, columnar-structured, Bn horizon, which we identify as a Natrargid paleosol. Directly below is a different clayey paleosol with crumb textured surface horizon 22 cm thick, which we identify as a Xeroll. A third pedotype is brown burrowed sandstone with persistent relict bedding, which we identify as Psamments. A fourth pedotype
is sandstone and volcanic ash with a tabular calcareous rhizoconcretions, as evidence of very shallow water table and allowing identification as Aquents. The Aquents and Psamments represent streamside and lakeside early successional communities. The Natriargids on the other hand has scattered silica rhizoconcretions and represents an open alkali shrubland. The Xerolls has fine root traces of a sod grassland, which is significant in light of common grazers, Columbian mammoth (Mammuthus columbi) and horse (Equus scotti), in the mammal fauna. There are also fossil fish and waterbirds in the fossil fauna as evidence for lakes in the past, but there has been concern about how the diverse mammal fauna made so far out into the lake depositional basin. It now is clear that fossiliferous lacustrine sediments and well drained paleosols alternated in the sequence.

**Ecological niches from Oligocene fossils in paleosols of central Oregon**

Gregory J. Retallack / Department of Earth Sciences, University of Oregon, Eugene, OR, 97403

Paleosols are evidence of past environments independent of fossils, but few collections have been made with attention to exact location of fossil within paleosols. This study recorded exact locations of 489 in situ fossils and measured the depth to nodules in paleosols of the Oligocene (Whitneyan-Arikareean), Turtle Cove Member, John Day Formation, near Dayville, Oregon. Depth to calcic horizon has been shown to be related to mean annual precipitation (MAP), so that niches of precipitation range can be determined for each species. Mammal, snail, and trace fossils of the John Day Formation are segregated into semiarid shrubland and subhumid, bunch-grassland to woodland species. Semiarid snails include “Polygyra” expansa (MAP 457±46 mm, n 17) and Monadenia dubiosa (MAP 460±57 mm, n 10), while subhumid snails include Vespericola dalli (MAP 810±81 mm, n 26) and Monadenia marginicola (MAP 849±196 mm, n 14). Semiarid trace fossils include cicada burrows (Nakotodemas bowii MAP 451±66 mm, n 50); subhumid trace fossils include dung beetle balls (Pallichnus dakotensis MAP 804±105 mm, n 38) and earthworm castings (Edaphichnium lumbricatum MAP 829±97, n 10). Hypertragulid species include the semiarid Hypertragulus hesperius (MAP 490±90 mm, n 29) and the subhumid Nanotragulus planiceps (MAP 935±97 mm, n 7). Other semiarid mammals include the apleodontid Haplomys liolophus (MAP 479±91 mm, n 6), the geomyid Pleurolicus sulcifrons (MAP 509±112 mm, n 6), the castorid Palaeocastor perinisulatus (MAP 520±49 mm, n 4), and the leporid Archaeolagus ennisianus (MAP 542±133 mm, n 17). Other subhumid mammals include the oreodonts Epoprodon occidentalis (MAP 786±166 mm, n 32) and Promerycochoerus superbus (MAP 854±101 mm, n 7), the agrochoere Agrochoerus antiquus (MAP 924±17 mm, n 5), the equid Miohippus annectens (MAP 695±198 mm, n 14), and rhinos Diceratherium annectens (MAP 854±132 mm, n 16) and Diceratherium armatum (MAP 1067±183, n 8). Fossil mammals with adaptations for life in open, arid habitats, such as high crowned teeth, and semifossorial or cursorial limb structure, are strongly biased towards semiarid paleosols, while arboreal adaptations were found exclusively from subhumid paleosols.

**Sequence stratigraphy of Early Cretaceous paleosols in Zhangye Danxia Geopark, Gansu, China**

Xuegang Mao1,2 Gregory Retallack1 / 1Department of Earth Science, University of Oregon, Eugene, Oregon, USA 97403-1272; 2Institute of Geography, Fujian Normal University, Fuzhou 350007, China

Sequence stratigraphy was invented for hydrocarbon search in seismic data, but has found wide application for correlation of sedimentary sequences from changes in global sea level. Sequence stratigraphy has been applied to successions of paleosols, and can be enhanced by paleoenvironmental information from the paleosols. In this study, 156 Early Cretaceous paleosols of 14 different pedotypes in Zhangye Danxia, Gansu province, northwestern China, showed numerous aging upwards, drying upwards, and draining upwards cycles of regressive systems tracts, intercalated with reverse trends of transgressive systems tracts. Five maximum flooding surfaces within the sequence can be correlated with Aptian-Albian Oceanic Anoxic Events: 125 Ma Selli, 115 Ma Jacob, 113 Ma Urbino, 107 Ma Amadeus, and 101 Ma Breitstroffer events. These anoxic events were also negative δ13C excursions, CO2 greenhouse spikes, and eustatic sea level highs. Spectral analysis of parasequences of paleosols within these sequences has shown that they correspond with 100 kyr cycles of Milankovitch eccentricity, and thus 75 % of geological time has been lost to erosion at sequence boundaries in Zhangye Danxia. Nevertheless, our new dates refine considerable the geological age of the important discoveries of fossil plants, birds and dinosaurs in the Xiagou and Zhonggou Formations.

**Volcanic rocks of the Lower Miocene Western Cascade Volcanic Series near Hyatt and Howard Prairie Lakes, Southwest Oregon**

Alec Sweetland1, and Jad D’Allura2 / 1Department of Geological Sciences, University of Oregon, Eugene, OR; 2Chemistry Department, Southern Oregon University, Ashland, OR, 97520

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Lower Miocene rocks of the Western Cascade Volcanic Series crop out in the northeastern portion of the Cascade-Siskiyou National Monument in Southwestern Oregon. Silicic flows and tuff of the Wasson Formation (~23Ma) are unconformably overlain by a red paleosol that separates it from the dominantly basaltic andesite and andesite flow units of the Heppsie Formation (21.73-19.6 Ma). Early Heppsie rocks show a variety of compositions, have larger plagioclase phenocrysts, contain two pyroxenes (hypersthene which always forms first then augite) and can contain altered olivine phenocrysts. Succeeding lava units, and intervals of minor volcanic breccia, can be separated as different calc-alkaline flow units based on composition and phenocrysts. They likely represent overlapping volcanic centers of limited areal extent. Olivine, most altered to iddingsite, and magnetite occur in all units. Large augite phenocrysts along with olivine and small plagioclase laths define one unit. The groundmass color of all lava is dark containing intergranular crystals of plagioclase, augite and magnetite. Evidence of high grade diagenesis is present as zeolites and incipient recrystallization. As contrasted to older (Oligocene) lavas, Heppsie lavas are more evolved likely as a result of crustal thickening, slow magmatic rise, and assimilation. The easternmost rock exposures are silicic pyroclastic rocks and lava heralding a marked change in composition and eruptive history. All rocks are tilted gently (10° or slightly more) toward the northeast. Fractures form a prominent northwest-trending fabric and likely control concomitant or later northwest-trending faults and dikes.

**Expected erosion and landslides in the aftermath of the 2017 forest fire in the Columbia River Gorge National Scenic Area, Oregon**

Scott Burns¹, and John Rogers², ¹Department of Geology; ²Department of Geography, Portland State University, Portland, OR

The Columbia River Gorge National Scenic Area is the number one tourist attraction in Oregon according to Trip Advisor. In 1986 about 292,500 acres were set aside to preserve this area of natural beauty. On September 2, 2017 as forest fire in the eastern end of the Gorge was set by a 15 year old boy. It burned 48,831 acres in one of the most landslide prone areas in the state, all on the Oregon side. 7,300 acres were classified as severely burned and scorched, 14,600 acres were moderately burned (80% of the ground cover gone), and 26,850 acres were classified as low and very low severity of burn. That is 17% of the scenic area was burned. We can turn to the 1991 fire in the Gorge that was almost as big and resulted in three major problems: surface soil erosion, increased rockfall, and large debris flows in the drainages 5-10 years later. We predict the same from the 2017 fire. The surface erosion of the burned soils has already happened with dark sediments moving through the system with the first rains of the fall. Abundant rockfall is predicted because the slopes are very steep, and where trees have been burned on the slopes, their exposed roots are burned freeing up rocks to fall below. Trails have been evaluated for this danger, and slopes along the highways and railroads have been proactively scaled of rock to prevent rockfall. The debris flows are expected in the originate from scorched areas higher in elevation in the next 5-10 years as the roots of the trees burned have their roots disintegrate freeing up sediment to the streams during large rainfall events. Classic debris flows occurred in 1996 and 2001 at Dodson and Rock of Ages after the 1991 fire. We predict that Oneota, Horsetail, Tanner and Eagle Creeks will have significant debris flows in 5-10 years when “Pineapple Express” storms hit the area.

**Terroir of wines from the Applegate and Illinois Valleys of southern Oregon**

Scott F. Burns, Department of Geology, Portland State University, Portland, OR 97207

These two valleys lie to the west of the Rogue Valley. The Applegate Valley became its own AVA in 2001, and the Illinois Valley (to the west) is officially part of the Rogue Valley AVA, even though it really should be its own AVA. The Applegate Valley has 27 vineyards with a total of 455 acres in grapes. The geology is uniform – mostly alluvial fans with a few stream terraces close to the river. The grapes are mostly warm climate varieties except a couple of pockets like Longines from the Applegate and Illinois Valleys of southern Oregon. These areas have a severe problem with early and late season frosts. It also has a severe problem with high magnesium in the soil from the abundant serpentine bedrock (like Napa and Sonoma Valleys) so soils have to be amended with potassium to overcome the problem. Rows have to go north-south and not east-west because the north side never dries out, and one has mold problems. Soils are well drained and Mollisols, Inceptisols, Alfisols and some Ultisols.
POSTER PRESENTATIONS

Deformation across the Hurricane Ridge fault in the southeastern Olympic Peninsula WA, USA.
Veronica C. Biesiada, Nancy A. Price, Department of Geology, Portland State University, 1721 SW Broadway, Portland, OR, 97201

The Olympic Mountains of NW Washington, USA, have undergone a complex deformational history that is heavily influenced by E-W accretion from the Cascadian Subduction Zone (Tabor & Cady, 1978) and N-S shortening from regional rotation (McCaffrey et al., 2007). The interpretation of deformation structures provides insight into the role of these tectonic models in the uplift of the Olympic Mountains. This study investigates structures along a transect where the Hamma Hamma River crosses the Hurricane Ridge Fault, which juxtaposes the meta-sedimentary core (west) and the basaltic Crescent Formation (east). In the study area, the meta-sedimentary unit is characterized by outcrop-scale folding with calculated fold axis of 69→342. Two distinct fabrics are present: a foliation (130, 65) which is best developed in the slate layers and fractures (180, 75) that cross-cut bedding and other structures. Veins are also present, have a similar orientation to the foliation, and are cross-cut by fractures. The Crescent Fm. has near vertical, N-S striking beds which are cut by five fracture populations and four vein populations. Two of the fracture populations dominate at (303, 40) and (211, 39), and one vein orientation dominates at (315, 40). The foliation, bedding, and veins in the meta-sediments are overprinted by the N-S oriented fracture fabric, which may be related to the exhumation and fracturing of the Crescent Fm. Considering the regional setting, these structures can be related to the both models of deformation.

Overview of historic water quality in the Willamette Valley using GIS and the Oregon Water Quality Index
Aaron Orr / Department of Earth and Physical Science, Western Oregon University, Monmouth, OR 97361

The current system for rating river quality by the Department of Environmental Quality is the Oregon Water Quality Index (OWQI), which condenses key issues down to a number for simple review and analysis. However, this index score falls short in the task of capturing hydrologic systems as dynamic systems in terms of river health. With GIS, all of the components that go into the OWQI can be displayed, both validating the index scores each river is given and providing a map that allows users to actively track the state of each river on an annual temporal scale. The model presented here is an attempt to make the OWQI understandable and accessible to the public while allowing the user opportunities to isolate the variables that influence index ratings, thereby reflecting the current state of the Willamette Valley’s water quality and identifying problems that have dominated particular watersheds over the past 50 years.
HISTORY, PHILOSOPHY, ENVIRONMENTAL & SOCIAL STUDY OF SCIENCE

Section Chair:

Randall Smith
Portland State University

POSTER PRESENTATIONS

Readability of publicly available physical activity information: An opportunity for kinesiology to improve knowledge translation
Jafrā D. Thomas1, Brian R. Flay2, Bradley J. Cardinal1 / 1Kinesiology Program, School of Biological and Population Health Sciences, College of Public Health and Human Sciences, Oregon State University, Corvallis, OR 97331; 2School of Social and Behavioral Health Sciences, College of Public Health and Human Sciences, Oregon State University, Corvallis, OR 97331

Central to the mission of affiliate members of the American Association for the Advancement of Science is enhancing communication between scientists and the general public (AAAS, 2017). Enhanced communication is critical to achieving other AAAS objectives, too (e.g., “provide a voice for science on societal issues,” “foster education in science and technology for everyone”). Knowledge translation (KT) is essential to effective scientific communication and the promotion of science literacy (National Academy of Sciences, 2016). KT topics address how well scientific knowledge is integrated into professional practices, used to develop policies, and used in peoples’ everyday life activities (Bennett & Jessani, 2011). Readability is a practical measure of KT. It assesses how easily information can be read and understood (Albright et al., 1996). In various academic disciplines, readability is routinely identified as a persistent barrier to effective scientific communication (Cardinal & Seidler, 1995; Gazni, 2011; Rudd, 2010; Severance & Cohen, 2015). We performed a meta-analytical review of 14 readability studies of physical activity lay health educational resources conducted over the past 25 years. These studies assessed 819 resources produced by government and nongovernment organizations. Our meta-analysis showed this collection of resources were written beyond the eighth-grade reading level (M=10.25, 95% CI=[9.62, 10.91], p<.001), which is the maximum level recommended for lay educational resources. While this study focused on physical activity resources, the results may have implications for other disciplines as well. Recommendations aimed at promoting clear and effective scientific communication aimed at maximizing successful knowledge translation regardless of discipline are advanced.

Environmental NanoBiology: The Structure of Metallic Mixed-Valent Surface Films Reveals Habitat and Habitability in the Dynamics of Aquatic Surface Film Environments. A Tribute to Gertrude F. Rempfer
Randall W. Smith, Department of Physics, Portland State University, Portland, OR 97207

The formation of mixed-valent metallic surface films has been an enigmatic feature of estuarine and wetland environments. Unlike extreme environments, these are features of temperate aquatic habitats that still offer a useful perspective on our definition of habitat and habitability, important features of future studies in AstroBiology and ExoBiology. High resolution microscopy plays a significant research role in documenting structure and function as habitats. One of the microscopic methods is the photoemission electron microscope (PEM or PEEM), which uses ultraviolet light to stimulate electron emission. Portland State University is one of the few laboratories in the world to have two photoemission electron microscopes, the development of the late Dr. Gertrude F. Rempfer. Under wetland conditions, samples of metallic surface films confirms mixed valent structures and nanocrystalline structures useful for evaluating both present and past aquatic and geologic conditions. Applications are discussed. A tribute to Gertrude F. Rempfer is reviewed.
Differentiating physical and numerical oscillations in solving advection-type equations with DGFEM
Ellen Pearson, Corban Harwood / Department of Mathematics, George Fox University, Newberg, OR 97132

In numerically solving partial differential equations, it is essential to predict and identify irregular behavior including error amplification and numerical oscillations. Numerical oscillations can be difficult to detect when physical oscillations are also present, such as in the advection equation with periodic boundary conditions and Maxwell’s equations. The discontinuous Galerkin finite element method numerically solves a partial differential equation locally over each element and then stitches the global solution together without requiring continuity at the element interfaces, creating jump discontinuities which converge to zero as the global error diminishes. Through our analysis of these jump discontinuities, we identified numerical oscillations, predicted instability conditions (Figure 1), and determined sharp behavioral bounds related to the step sizes and element test functions. We also compare these results to earlier analysis of finite difference methods.

Figure 1: Comparison of regions of stability for the semi-discretized form of the advection equation to eigenvalues of DGFEM and a standard method.
Building an Accessible Web-Based Frontend for High-Performance Clusters
Ben Glick, Jens Mache / Department of Computer Science, Lewis & Clark College, Portland, OR 97219

High-performance computing has become a necessity. One way colleges and universities provide this access to faculty, staff, and students is through operation of campus cluster systems. Many campuses have dedicated scientific computational resources, and ensuring that those resources are secure and accessible is important. One challenge with high performance clusters is ensuring that researchers without a systems administration background are able to easily and effectively use the high-performance clusters. Often, tasks submitted to these systems are controlled by resource managers. While resource managers offer a high degree of control over job submission, they are often hard to use. This project introduces a secure, easy to use, web-based access manager designed to make interacting with a computational system easy. Currently, the web-based component uses python’s Flask and the high-performance interactions are handled by libsubmit. In the future, we plan to continue to expand the capabilities of the access manager to include automated external data staging and workflow optimization, as well as enhanced monitoring and interactivity of jobs.

Topological Invariants of Food Web
Kennedy Courtney, Christopher Lee, Jen Richey / Department of Mathematics, University of Portland, Portland, OR 97203

A food web is an interconnected network of food chains in an ecosystem. Food webs are easily modeled by directed graphs and have been well-studied from the graph theoretic perspective. However, viewing food webs as graphs does not seem to easily reveal the robustness of a food web, how to quantify/qualify total resources to a top predator in a food web, nor does it illuminate the frequency in which directed cycles occur in nature. We seek to address these problems by analyzing graphs of food webs through a more sophisticated topological approach. The directed forest complex is our primary means for evaluation. The directed forest complex gives us immediate information on directed, acyclic, rooted graphs, in that the directed forest complexes of these food webs are contractible. This complex has also given us insight on how we might be able to detect so-called "redundant edges" and directed cycles in food web graphs, which would allow us to sharpen the concepts of robustness and complexity of food webs.

Ordinary differential equation modeling exercise: Beam equation
Tiernan R. Fogarty / Department of Mathematics, Oregon Institute of Technology, Klamath Falls, OR 97601

This scenario is designed to lead students to discover a differential equation that models the vertical deflection of a horizontal beam under different boundary conditions. Vertical deflection occurs as a result of the weight of the beam alone, with no compressive force at the ends or distributed loads other than the mass of the beam. Data is collected to measure the vertical deflection from horizontal against the distance from one end for several boundary condition situations, and a mathematical model is arrived at for the vertical deflection. From this model the general form of the governing ODE can be inferred.

Stability Analysis of DGFEM for advection-type equations
Corban Harwood, Ellen Pearson / Department of Mathematics, George Fox University, Newberg, OR 97132

Trust in a numerical solution relies upon its accuracy and stability. The discontinuous Galerkin finite element method (DGFEM) was analyzed for advection-type equations, including Maxwell’s equations in two dimensions. Due to physical oscillations present in advection-type equations with periodic boundary conditions, we investigated numerical oscillations in frequency space through a Fourier transform. Solving locally over each element, the DGFEM global solution (Figure 1) is then stitched together without requiring continuity at the element interfaces. The resultant jump discontinuities, which converge to zero when the global error diminishes, instead manifest numerical oscillations when the solution is not oscillation-free stable. Due to usage of Gauss-Lobatto nodes, we were able to prove several interesting symmetry patterns in the matrix form of DGFEM and the effects on eigenvalues.
POSTER PRESENTATIONS

A Deep Neural Network-Based Predictive Model of Undergraduate Student Retention
Taylor Dawson¹, Brian Snider² / Department of Biology, George Fox University, Newberg, OR 97132; ²Department of Computer Science, George Fox University, Newberg, OR 97132.

The issue of student retention is one that has become of increasing interest in higher education. Having a better understanding of why students leave college before completing a degree is crucial as those who lack a college degree will most likely have diminished lifetime earnings. Thus, we believe that at the institutional level the task of identifying the early symptoms of student failure and dropout and designing targeted strategies to support student retention and degree completion is an ongoing concern for all stakeholders. Our goal was to be able to better predict the probability of student retention with the use of advanced and cutting-edge technology that is Deep Neural Networks and to discover the features that can better inform the predictive model of student retention.

Regular convex and non-convex polytopes through Dimension 4 and beyond
Brittany Johnson / Department of Mathematics, Western Oregon University, Monmouth, OR 97361

It is well-known that there exists five regular convex polyhedra, more commonly known as the Platonic solids. We seek to prove this fact and to extend our findings to other classifications of solids (namely regular convex polychora, regular nonconvex polyhedra, and regular nonconvex polychora) to prove how many solids exist in each of these sets. We will explore characteristics of 3- and 4-dimensional regular solids (both convex and nonconvex) to make generalizations about polytopes in n dimensions. These includes the Euler characteristic of a solid, vertex figures, and combinatorial patterns between a k-polytope and a (k+1)-polytope.

The group of rational points on elliptic curves
José Sosa Vasquez / Department of Mathematics, Western Oregon University, Monmouth, OR 97361

Combining abstract algebra, projective geometry and number theory, the study of elliptic curves can yield interesting results. Adhering to the work of Silverman and considering the work of Rienzo, we explore the general geometric structure of elliptic curves, Weierstrass normal form, and the group structure of rational points on elliptic curves, along with some findings. We present necessary theorems that will further our study of rational points on elliptic curves. To acquire intuition of the Abelian group of rational points on elliptic curves, we show computations conducted over the real numbers before delving into finite fields.
Fantastic topological surfaces and how to classify them
Khorben Boyer / Department of Mathematics, Western Oregon University, Monmouth, OR 97361

The Classification theorem of Surfaces shows us that all compact connected 2-dimensional manifolds are homeomorphic to one of three categories of manifolds. These cases consist of a sphere or g-holed torus, the connected sum of a g-holed torus and a projective space, or a connected sum of a g-holed torus and a Klein bottle. We aim to rigorously prove the theorem via verification of the requisite auxiliary theorems and lemmas. This will require an analysis of a relationship that can be established between these topological surfaces and equivalent representational polygons.

Stability and oscillatory analysis with DGFEM
Ellen Pearson, Corban Harwood / Department of Mathematics, George Fox University, Newberg, OR 97132

The discontinuous Galerkin finite element method (DGFEM) gained popularity for its ability to efficiently deal with complex dynamics and surface geometries in three dimensions, which are ineffectively handled by standard finite difference methods. Yet, little is known about the oscillatory behavior of DGFEM. Used for quickly predicting the behavior of various phenomena described by partial differential equations, DGFEM needs to be accurate and operate in a stable manner to be trusted. Numerical oscillations, however, may occur and destroy the accuracy and/or stability of the solution. This study found that while more accurate than standard methods, DGFEM is less stable, prior stability bounds for it were imprecise, and conditional numerical oscillations embedded in physical oscillations were identified for it through Fourier transform. Also, novel patterns in DGFEM matrices were discovered, which conditionally produced purely imaginary spatial eigenvalues.

Nonsmooth Spectral Projected Gradient Methods on Convex Sets
Alexa McQuiston¹, Vinayak Sharma², Rebecca Wood³, Milagros Loreto² / Department of Mathematics, University of Portland, Portland, OR 97203; ²Department of Engineering and Mathematics, University of Washington Bothell, Bothell, WA 98011; ³Department of Mathematics, Vanderbilt University, Nashville, TN 37235

To solve nonsmooth minimization problems on a convex set, we combine the spectral step length with two sub differential schemes. Using the classical subgradient method and the simplex gradient method results in the Spectral Projected Subgradient (SPS) and the Projected Spectral Simplex Gradient (PSS). These methods use a nonmonotone globalization condition, and do not require estimates of the optimal solution to compute the step length. For the Spectral Projected Subgradient method, a subgradient has to be supplied. On the other hand, the Projected Spectral Simplex Gradient method is a direct search method that only requires function evaluations to build an approximation to the gradient direction. For both algorithms, we present numerical results on a set of nonsmooth test functions. The results indicate the spectral step length can improve the practical performance of both methods.
Sexual identity and health care seeking in sexual minority individuals
Danielle M. Anderson, Jane M. Tram / School of Graduate Psychology, Pacific University, 190 SE 8th Ave, Hillsboro, OR, 97123

Individuals who identify as sexual minorities (e.g. lesbian, gay, bisexual, queer, etc.) have historically encountered greater health disparities when compared to heterosexual individuals. Although some research indicates that these disparities are decreasing, sexual minority individuals still report disparities as well as negative experiences with health care. In particular, sexual minority individuals report fewer encounters with the health care system on average when compared to heterosexual individuals. Because sexual minority individuals’ experiences with health care may differ based on a variety of factors, it is important to understand how their development as a sexual minority individual impacts their health care seeking behavior. Researchers have demonstrated that sexual minority individuals experience their sexual identity development through several facets. Because disclosure of sexual orientation and sexual activity is often necessary in encounters with health care providers, certain aspects of individuals’ sexual identity may influence the likelihood of seeking health care services. In this proposed study we aim to investigate whether aspects of sexual identity relate to health care seeking in sexual minority individuals. Participants who identify as sexual minority individuals will report through an online questionnaire about their sexual identity and their health care seeking behaviors. In this presentation we will discuss the proposed study examining the relation between sexual identity and health care seeking in sexual minority individuals.

Minimizing Sex Offenders in the U.S. Military
Amanda Marie Zayas, Tanya M. Gonzalez, Lisa R. Christiansen / Department School of Graduate Psychology, Pacific University, Hillsboro, OR 97123.

According to the Department of Defense, sexual assault in the U.S. Military is a significant problem and reports of assault continue to trend upward (DoD, 2016). Studies conducted on populations similar to military recruits reported sex offenders attempt and commit sexual offenses repeatedly (Lisak & Miller, 2002). At this time, the military does not attempt to identify sexual offenders in new recruits nor does it obtain their criminal history outside the scope of a background check. Studies in which the MMPI or MMPI-2 were administered display promise in identifying sexual offenders without self-incrimination (Herkov, Gynther, Thomas & Meyers, 1996; Curnoe & Langevin, 2002; Davis & Archer, 2010). Based on a review of the literature, suggestions for reducing the number of sexual assaults in the military and evidence supporting the MMPI-2 as a tool for identifying sexual offenders will be presented.

Predictive Validity of Oregon State Juvenile Recidivism Risk Assessments for African American Youth
Chanel Dismuke, Jane M. Tram / School of Graduate Psychology, Pacific University, 190 SE 8th Avenue Hillsboro, OR 97123

In the State of Oregon, youth recidivism rates vary between 20 and 34 percent. African American youth experience one of the highest rates of recidivism (OJJDP, 2013). The primary goal of the juvenile justice system is to reduce the rate of recidivism through rehabilitative services for youth in contact with the juvenile justice system. The Oregon Juvenile Crime Prevention Assessment (JCP, 2006) and the Oregon Youth Authority Recidivism Risk Assessment (ORRA, 2011) are currently utilized in every county in Oregon, regardless of ethnic minority status, and influence the type of sentencing and
services youth receive within the juvenile correctional system (Baird, Healy, Johnson, Bogie, Dankert, & Scharenbroch, 2013). The current study examined whether the JCP and ORRA scores are more accurate for Caucasian than African American youth offenders. It was hypothesized that the JCP and ORRA would both have a stronger relation to recidivism for Caucasian youth than African American youth. The results of the study did not support a difference in accuracy of the JCP and ORRA scores for Caucasian and African American youth offenders. However, this results must be interpreted with caution. A post hoc power analysis indicated that the sample size of 197 for this study had insufficient power to detect significant results if they exist. Thus, if there is a difference in accuracy, we would not have had the statistical power to detect a difference. Research in this realm has important implications, however, we must also ensure that we interpret study results with the appropriate caution.

The Effects of Sociosexual Orientation and Advertisement Content on Self-Perceived Physical Attractiveness

Jacob Dougherty¹, Jaime M. Cloud¹, Carin Perilloux² / ¹ Department of Psychology, Western Oregon University, 345 Monmouth Ave N; Monmouth, OR 97361. ² Department of Psychology, Southwestern University, 1001 E University Ave, Georgetown, TX 78626

Previous research has demonstrated that exposure to cultural ideals of attractiveness through the media (e.g., advertisements) can decrease body satisfaction in both men and women. The purpose of the present study was to determine whether men (N = 174) and women (N = 197) would experience a decrease in self-perceived physical attractiveness after exposure to advertisements featuring same-sex models who were dressed provocatively or who displayed cues of high status, and whether this effect depended on their sociosexual orientation (SOI). We predicted that individuals with high SOI scores – indicating a greater desire to pursue short-term sexual relationships – would experience a decrease in self-rated physical attractiveness after viewing sexy advertisements, whereas individuals with low SOI scores would experience a decrease in self-rated physical attractiveness after viewing high status advertisements. A trend was found supporting this hypothesis, F(1, 89) = 3.27, p = .07. This finding suggests that individuals compare themselves to same-sex rivals along different dimensions based on whether they are pursuing short-term or long-term relationships. Given that individuals with high SOI scores are more inclined toward promiscuity, sexy models might be perceived as more threatening than high status models, thereby causing a decrease in participants’ self-perceived attractiveness. In contrast, individuals who are pursuing committed relationships may be more concerned with status than appearing sexy; consequently, high status models might elicit a greater decrease in their self-perceived attractiveness. Further testing of this hypothesis is essential, particularly given that the results of the present study failed to reach traditional significance levels.

Cannabis as a factor in the moderating relationship between alcohol, sleep, and adverse drinking consequences among health professions students

Jessica Egusquiza, Megan Dorenkamp, Carisha Kelsey, Peter Vik / Pacific University, School of Graduate Psychology, 222 SE 8th Avenue, Hillsboro, OR 97123

Previous studies have shown that sleep quality moderates the relationship between alcohol use and drinking consequences (Kenny et al., 2012; Miller et al., 2016). Other drugs, such as cannabis, have not been explored in the same context as thoroughly. Recently, we found evidence among first year college students that cannabis moderated the relationship between alcohol use, sleep, and drinking consequences. For those who both drank alcohol and used cannabis, poor sleep mediated greater consequences from drinking. In contrast, sleep quality did not predict consequences for students who drank but did not use cannabis. The current study attempts to replicate these findings among post baccalaureate health professions students. Consistent with previous research sleep is expected to moderate the relationship between alcohol use and consequences, as these effects are expected to be stronger for cannabis users than on-users.

Method: Health professions students completed the Pittsburg Sleep Quality Index (PSQI) and the Rutgers Alcohol Problems Index (RAPI). For analysis, students will be grouped according to Substance Use (SU): None, Alcohol, and Alcohol plus Cannabis.

Results/Discussion: Data collection and entry is completed. Analyses are underway. Relationships between cannabis, alcohol, sleep, and adverse drinking consequences will be investigated.
Not in MY forest: The interaction of nature connectedness and environmental alteration
Christopher J. Frost, Cody Welty, Clarissa Toplar, Ethan A. McMahan / Department of Psychology, Western Oregon University, Monmouth, Oregon

To address the lack of research examining person-specific factors that impact responses to nature, we investigated whether those high in dispositional nature connectedness differed in emotional responses to human-altered versus nature-altered natural environment. The hypothesis of the current research was that dispositional nature connectedness would interact with the alteration history of the natural environment, such that those high in nature connectedness, relative to those lower in nature connectedness, would respond more negatively to human-altered versus nature-altered environment.

Participants (n = 90) watched a photographic slideshow depicting a natural area. A vignette that varied between participants stated that the environment was human-altered or nature-altered. Participants then completed the following instruments: The Connectedness to Nature Scale, the Positive and Negative Affective Schedule, the Implicit Positive and Negative Affect Test.

Multiple regression analyses examined associations between alteration status and nature connectedness and their interaction on positive affect, negative affect, and implicit affect. The interaction of alteration status and nature connectedness was not significant for positive affect (Beta = .21, p = .53). However, results indicated a significant interaction of nature connectedness and alteration status on negative affect (Beta = -.70, p = .04) and implicit affect (Beta = .87, p = .01).

Examination of interactions suggested individuals high in nature connectedness responded more negatively to human-altered environments than nature-altered environments, while individuals with low nature connectedness responded less negatively to human-altered environments. These findings indicate that emotional responses to natural environment depend on the characteristics of the environment and an individual’s dispositions.

Science and Law: Positive Psychology Interventions for DUII Clients
Kevin Gates, Ashley Biles, Josephina Losco / Department of Psychology. Western Oregon University, 345 Monmouth Ave N, Monmouth, OR 97361

According to the Centers for Disease Control (CDC, 2013), approximately 31% of driving accidents in which there was a fatality, alcohol was involved. In other words, 10,076 people were killed in a preventable driving-related accident (CDC, 2013). Understanding the impact of a driving under the influence of intoxicants (DUII) and its subsequent impact on the well-being is key to working with these people to help them overcome this obstacle. In the current study, all participants were arrested for DUIIs and were clients for a local attorney. Participants agreed to be part of the Blue Binder Project (BBP), which is a voluntary intervention program where positive psychology strategies are used to assist the clients following a DUII charge. We investigated the impact of the BBP on their well-being (i.e., satisfaction with life and distress levels) 30 and 60 days after completion of the program. Participants included 74 males and 32 females amongst which 98% were Caucasian. Upon agreeing to the program, participants took a baseline survey and then two subsequent surveys at 30 and 60 days after completion of the BBP. Repeated-measures ANOVA revealed that distress decreased significantly in the following 30 to 60 days after the intervention (p = .002); additionally, satisfaction with life increased significantly during this period (p = .004). These encouraging findings suggest that intentional intervention following DUIIs can make a positive impact on people's lives.

Personality as an identity domain: The identity centrality of narrow and big five traits
Ashton B. Hoffman, Susan L. O'Donnell / Department of Psychology, George Fox University, Newberg, OR, 97132

Research indicates that personality and identity are related; however, there is considerable confusion as to how (Clancy & Dollinger, 1993). Personality could influence identity development (Lounsbury, Levy, Leong, & Gibson, 2007), personality and identity could be two separate entities (McLean, & Pasupathi, 2012), or personality could be yet another way of answering the question “Who am I?” Research has investigated the first two approaches but has yet to address the third. The current study attempts to fill this gap in the existing literature by testing whether it is possible for specific traits to function as central aspects of identity. Participants (N=106) were largely female (62%) undergraduate students in a psychology class, ranging in age from 18 to 46, who completed an online survey for class credit. Participants chose three traits as descriptive of themselves and another three traits as not descriptive from a list of 26 traits. They completed an identity centrality measure for each trait selected as well as a Big Five measure (NEO-PI-R Domains; Costa & McCrae,
Internet gaming disorder: Addiction or pathologizing of a common behavior?
Austin N. Kelly, Connor Rose, Lisa R. Christiansen / School of Graduate Psychology, Pacific University, Hillsboro, OR, 97123

Since the advent of the first home video game consoles in the 1970’s, “gaming” has become an increasingly popular pastime across the world. Today 91% of U.S. children ages 2-17 play digital games regularly including 94% of teenage girls and 99% of teenage boys. Even 48% of adult women and 50% of adult men play digital games regularly. There are documented instances of individuals neglecting essential needs to continue playing games in excess of 24 hours with the most extreme incidents resulting in death. The most recent revision of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) included Internet Gaming Disorder (IGD) as a proposed condition for further study. IGD is based on the same model as other addictive disorders, including gambling. The similarities between gambling and internet gaming are apparent when discussing the proliferation of “microtransactions” found in most video games produced in recent years. Microtransactions use a variable reward system very similar to a slot machine to allow players to spend real money on virtual items within games. The proposed criteria for IGD has sparked controversy and debate about the nature and relevance of such a diagnosis. In this presentation we will discuss the proposed criteria for IGD, the benefits of non-

Exploring the importance of the desire to learn an ethnic language
Amia Huang, Jane M. Tram / School of Graduate Psychology, Pacific University, Hillsboro, OR

Many researchers have investigated individual factors that contribute to ethnic identity formation. The purpose of this study was to explore language as it relates to strength of ethnic identity by examining three contributing factors: (a) familial ethnic socialization, (b) actual proficiency in ethnic language, and (c) desire to learn the ethnic language. Researchers have demonstrated that familial ethnic socialization and actual proficiency in an ethnic language positively correlate with strength of ethnic identity; however, very few researchers have studied whether the desire to learn an ethnic language contributes to strength of ethnic identity. In addition, researchers have not explored how these factors contribute to ethnic identity formation relative to each other. The results of this study suggest that familial ethnic socialization, actual language proficiency, and desire to learn ethnic language significantly influence ethnic identity. In addition, desire to learn ethnic language contributed to ethnic identity above and beyond the contribution of other factors.

A Pilot of The Student, Faculty, and Staff LGBTQ+ Attitude, Literacy and Awareness Questionnaire and a college Center for Gender and Sexual Equity
Kaira Bird, Marissa Williams, Heide D. Island / Department of Psychology, Pacific University, Forest Grove, OR 97116

Gender and sexuality based discrimination are commonly reported among persons of non-heterosexual or non-cisgender identities. To retain the spectrum of diversity within university communities, resources must be established to welcome, support, and advocate for all underrepresented students, faculty and staff. Centers on campus that provide programming, education, and advocacy for LGBTQ+ students are essential for a healthy campus climate that nurtures diverse student populations. Pacific University’s Center for Gender (and Sexual) Equity (CGE), is a 16-year program, initially established as part of a feminist studies program. The mission and the goals of CGE provide student-run programming about gender differences, advocacy, and resources for LGBTQ+ students. Yet, no program evaluation has ever been conducted to establish efficacy, or recommendations for improvements. The purpose of this research was to: 1.) Conduct a formative evaluation of CGE; 2.) Construct a viable, self-report measure of gender and sexuality attitudes, literacy, and awareness that could be used as part of the program evaluation; and may also be generalizable to similar centers in the United States; and finally, 3.) To provide recommendations of ways CGE can further develop or revise their mission to meet the needs of their local community. The program evaluation includes programming, advocacy, research, educational data, and service experiences collected from CGE over the last 16 years, and data from a piloted psychometric measure, The LGBTQ+ Attitude, Literacy and Awareness Questionnaire. This presentation will focus on the student, faculty, and staff responses on this piloted measure.
problematic gaming, provide a review of the literature exploring behavioral, cognitive, and neurological evidence of “video game addiction,” the consequences related to the inclusion of microtransactions in modern video games, and review criticisms of IGD as a proposed diagnosis.

**Impact of community mental health in Portland, Oregon**
Abigail Millard, Jane M. Tram, Susan Bettis / School of Graduate Psychology, Pacific University, Hillsboro, OR, 97123

Impact of Community Mental Health in Oregon Historically, the mental health safety net in Portland is rated as one of the least effective in all 50 states. The need for mental health resources in Oregon, specifically, Portland, is at an all-time high. Small community mental health agencies have served individuals and families throughout the greater Portland metro area. The agency in this study serves clients that hover or fall below the federal poverty limit. Thus a sliding scale is used to meet their clients’ financial concerns. The effectiveness of the treatment provided is assessed in this study. Clients will be assessed at 7 week intervals using the Outcome Questionnaire (OQ 45.2). A client satisfaction survey will also be administered at termination. If a client does not return, their completed OQ 4.2 will be assessed. In total the OQ 45.2 will be administered a minimum of three and at most five times. Data will be collected beginning in February of 2018 and ending in October 2018. This study will highlight the benefit of mental health services in Oregon that do not hold to insurance limitations.

**Does dopamine signaling change in a brain with Huntington’s disease? Measures of tyrosine hydroxylase intensities in the mesolimbic-cortical circuitry over time in a transgenic mouse model of Huntington’s disease**
Ruby Perez, Zachary Daniels, Mark Pitzer / Department of Psychological Sciences, University of Portland, Portland, OR 97203

Huntington’s disease (HD) is a neurodegenerative disease that produces motor, cognitive, and psychological dysfunction. Atrophy occurs throughout the brain; however, the most dramatic loss occurs in the basal ganglia, cerebral cortex, and limbic structures. While the most studied symptom is chorea, characterized by involuntary movements, more recent findings indicate that, prior to chorea, there are dramatic changes in personality, including impulsivity and the perseveration of tasks that are no longer beneficial to the person. This study investigated the changes in brain structures that might mediate impulsivity and perseveration, including the cingulate cortex, striatum, and nucleus accumbens. Employing a transgenic mouse model of HD (N171-82Q), we investigated the changes in dopamine synthesis in the mesolimbic and mesocortical pathways. Thirty-one mice (17 transgenic and 16 wildtype) were sacrificed at either 5 weeks or 15 weeks and the staining density of tyrosine hydroxylase, the rate limiting enzyme for dopamine synthesis, was measured using standard immunofluorescent techniques. Our results indicate reduced dopaminergic activity in the shell of the nucleus accumbens of Huntington’s mice when compared to wildtypes. These findings are consistent with previous work in non-Huntington’s mice that reductions in dopamine levels in the shell increase responding to stimuli absent of reward and reduces the inhibition behaviors that are associated with punishments. Taken together, these findings in transgenic mice may provide some guidance to future neuro-pathological studies of Huntington’s patients and may also suggest possible targets when considering treatments for HD to increase the quality of life of these individuals.

**Biopsychosocial effects of adversity among adolescents**
Megan Poole, Theresa LaFavor, & Sara Wong / School of Graduate Psychology, Pacific University, Hillsboro, OR 97123

Adverse childhood experiences (ACEs) such as trauma and abuse are highly predictive of poor physical health due to its relation to the psychophysiological stress response system. ACEs are also associated with poor mental health and dysregulated emotional regulation. ACEs thus disrupt the biopsychosocial development of affected individuals. This study investigates ACEs among youth who have been unsuccessful in traditional educational settings. Baseline biopsychosocial profiles of youth with ACEs are established. Variables include ACEs, perceived stress, perceived physical health, and mindfulness as measured by Life Time Events- Child, PROMIS Psychological Stress Experiences, PROMIS Pediatric Global Health and Child and Adolescent Mindfulness Measure (CAMM), respectively. We hypothesize that the number of ACEs will be negatively associated with poorer biopsychosocial outcomes. Our preliminary data included 6 adolescents in their first year of high school. Participants’ ages ranged from 14 to 15-years old (mean=14.80.4). Half of the participants identified as
female (33% identified as male, 17% identified as transgender male) and two-thirds identified as white. The majority of participants (83%) experienced at least 5 ACEs. Nonparametric correlation analyses suggest increased ACEs are negatively associated with mindfulness (rs=0.79, p<0.1). No significant associations were found between ACEs and perceived stress and physical health. Our findings suggest ACEs affects emotional regulation and highlight the need to study youth through a biopsychosocial framework. The current study investigates domains that may be responsive to intervention and may improve the lives of vulnerable youth. Data collection in ongoing, including measurements of neuropsychological functioning.

Effects of rhesus macaque rearing on infant-maternal relationship
Paige A Reohr1, Kristine Coleman2, Zachary Simmons1 / 1University of Portland, PortlandOR; 2Oregon Health and Sciences University

Rhesus macaques (Macaca mulatta) are social, old world monkeys commonly involved in primate research. Like most primates, there are rare cases in which mothers may abandon their infants, including illness or delivery via cesarean section (for captive animals). In such cases, the orphaned monkey can be ‘fostered’ with a lactating female who has recently lost her own infant. These foster mothers are typically eager to take the new infant, and raise them as their own. It is established that nursery rearing is detrimental to healthy infant development, and foster rearing is a viable replacement by giving the infant a mother. Though it is widely assumed that the maternal care these fostered infants receive is identical to that of biological infants, there is very little evidence to support this contention. This study seeks to address this deficit in the literature. It was hypothesized that biological infants would display more exploratory behaviors and spend more time near their mothers compared to foster infants based on behavior expected from healthy, natural maternal care. Less independence is associated with maternal rejection. The subjects in this study were 8 rhesus macaques mother-infant pairs from the Oregon National Primate Center (4 pairs foster, 4 pairs biological) born within one year of each other. Behavioral data in these animals was collected in 12 focal observations over the span of 4 weeks. Measures included observations of typical mother-infant interactions, including grooming, exploration, and proximity. The data show fostered infants received more grooming, and were retrieved by their mothers more often than biological infants. These differences – though minor – may be the product of unique suite of maternal behaviors that is activated only in fostering situations.

The interactive role of alcohol, exercise, and mood on sleep quality
Sarah Riffel, Ashley McWaters, Amelia Robinson, and Peter Vik / Pacific University, School of Graduate Psychology, 222 SE 8th Avenue, Hillsboro, Oregon 97123

Previous studies have found that mood symptoms and alcohol consumption predict sleep quality in adolescents and college students (Marmorstein, 2017; Miller et al., 2017). Our lab further examined the negative impact of this relationship among college students by demonstrating that exercise ameliorated or compensated for adverse effects of mood and alcohol on sleep quality. Post baccalaureate education in health professions can be a stressful time for students, possibly resulting in poor mood, alcohol consumption, and poor sleep. The current study sought to replicate our prior findings of exercise benefits among this vulnerable population. We hypothesize that we will find that, among health professions students, exercise moderates the impact of alcohol and mood on sleep quality.

Method: Health professions students completed the Pittsburg Sleep Quality Index (PSQI), the Center for Epidemiological Studies-Depression (CES-D), and questions related to alcohol use and exercise.

Results/Discussion: Data are collected entered, and analyses are beginning. The relationship between alcohol, exercise, and mood on sleep quality continues to be investigated. This research will contribute to a better understanding of the health behaviors of entering college students and draws attention to concerns regarding risks associated with mood and alcohol use.

Developing self-report measures of creative behavior
David Foster, Caitlin Hochderffer, David Kampff, and Avery Smith / Psychological Sciences Department, Western Oregon University, Monmouth, OR 97361

Psychometric measures of the creative process focus primarily on divergent thinking; assessing an individual’s ability to generate a variety of responses to a given prompt. In contrast to this measurement approach, other theoretical models of the creative process (e.g., Amabile, 1996; Mumford, Mobley, Reiter-Palmon, Uhlman, & Doares, 1991) posit that creative
behavior is more than just the ability to engage in divergent thinking. Amabile (1996) proposed that the creative process consisted of four distinct behaviors: problem or task identification; preparation; response generation; and response validation and communication. Tests of divergent thinking are limited in two ways. First, tests of divergent thinking only assess one type of creative behavior; response generation. Second, tests of divergent thinking only measure the outcomes of divergent thinking (e.g., number and originality of responses) instead of the processes utilized to generate the responses. To effectively study creativity, researchers need reliable and valid measures of the actual behaviors underlying the creative process. We proposed a four-process model of creative behavior: problem formulation (anticipating; identifying; and structuring ill-defined problems); preparation (gathering relevant information); ideation (utilizing insight, analogical thinking; and conceptual combination); and evaluation (choosing evaluation criteria; forecasting consequences of idea implementation; and appraising those consequences relative to criteria). Items were generated for each of the proposed creative behaviors. Students at a mid-sized university in the Pacific Northwest completed a survey of the items; indicating how much they engaged in each of the behaviors. The psychometric properties of each scale were evaluated. The results and implications will be discussed.

Pursuit of the American tradition: Familial ethnic socialization in the United States
Arthur Truong, Kayla Wojda, Jane M. Tram M / School of Graduate Psychology, Pacific University, Hillsboro, OR 97123

The understanding of ethnic and cultural traditions have been long studied by sociologists, cultural anthropologists, and psychologists alike, but the information regarding whether or not the passing on of those traditions is a larger priority for certain individuals has not been fully explored. This study aims to identify if ethnic identity, as well as an existing parental status are related to the likelihood of passing down traditions within the United States. Participants completed an online survey comprised of three different measures: the Revised Multi-group Ethnic Identity Measure (MEIM-R), the Familial Ethnic Socialization (FES) and a modified FES for both existing and hypothetical parents called the Parental Ethnic Socialization (PES). The result would be to compare whether belonging and identification to specific ethnic identities would be significantly related to an individual’s openness to passing down traditions through comparing FES scores. In the United States, understanding ethnic identity has now become a more salient topic for nearly all individuals, with terminology such as “white heritage” and “white culture” being more identifiable and studying traditions in an ever growing society provides insight into the cultural habits will continue into the future.

Impact of interracial contact on the own-race bias
Victoria Weber, Zachary Simmons / Department of Psychology, University of Portland, Portland, OR, 97203

The Own-Race Bias (ORB) has been implicated in cross-racial misidentifications for many years and is characterized by other-race facial blurring during memory recall. Previous research suggests that higher levels of interracial contact may attenuate this effect, but this research has relied almost entirely on a single research paradigm. The present study was designed to expand upon previous literature by testing the ORB and the effect of interracial contact using an experimental design (the “Who Said What?” paradigm; Taylor, et. al., 1978). Participants (N = 228) were drawn from the University of Portland and Amazon’s Mechanical Turk. Each participant viewed a succession of 27 photos of Asian, Black, and White men associated with a criminal or non-criminal statement. Following a distractor, participants were asked to recall the face associated with the criminal statement, and then answered a series of questions designed to measure interracial contact. Consistent with the ORB, participants were more accurate when the target was of their own race and were more likely to confuse faces with others of the same race (other-race facial blurring) when the target was of a different race than their own. Though only marginally significant, interracial contact did seem to reduce the magnitude of the ORB when a participant was identifying a target of a different race than their own.

The impact of familial ethnic socialization on parenting
Kayla Wojda, Jane M. Tram, and Arthur Truong / School of Graduate Psychology, Pacific University of Oregon, Hillsboro, OR, 97123

Researchers have identified the important influence immediate family members and engagement in cultural activities has on ethnic identity. However, little is known about how one’s ethnic identity influences engagement in cultural activities with one’s own children. In this study, we examine ethnic identity and engagement in cultural activities of participants who currently have children. For participants that do not yet have children, we assess their anticipated engagement with future children. Participants complete three measures online. The Revised Multigroup Ethnic Identity Measure (MEIM-R) is used
to assess ethnic identity, the Familial Ethnic Socialization (FES) measure is used to determine the individual’s ethnic socialization growing up, and the Parental Ethnic Socialization (PES) measure, a modified version of the FES, assesses participant desire to incorporate cultural activities into their (prospective) childrens’ lives. The goal of this study is to determine whether there is a difference on the PES for parents and prospective parents. We will also examine whether FES scores impact PES scores. These findings will provide more information on ethnic socialization and how it is passed down to future generations.

**Posttraumatic growth: Controversy and future directions**
Natalia Kazakova, Amanda Barr, and Björn Bergström / School of Graduate Psychology, Pacific University, Hillsboro, OR; Pacific University Health Professions Campus, Hillsboro, OR 97123

Posttraumatic growth (PTG) refers to the positive personal changes some individuals report after experiencing trauma (Tedeschi & Calhoun, 1995). Researchers continue to debate how best to assess PTG (Boals & Schuler, 2017). According to the Janus-faced model, PTG has two opposing aspects, a constructive and an illusory one (Maercker & Zoellner, 2004). Early studies on PTG have relied primarily on self-report to determine improvement (Tedeschi & Calhoun, 1996); however, because people usually prefer to think of themselves positively (Makridakis & Moleskis, 2015), their self-reported improvement may simply be an illusory coping strategy to avoid dealing with the aftermath of a traumatic experience. The illusory aspect of PTG has been supported by recent studies, with some finding a positive relationship between self-reported PTG and markers of distress (Blix et al., 2016), and some finding no relationship (Lahav et al., 2017). Changes in memory may serve as a reliable determinant of objective PTG (Huang & Gan, 2017). In this review, we will present promising findings that demonstrate a promising link between narrative exposure therapy and PTG (Jirek, 2017). Finally, we will propose a study to further delineate the construct of PTG and offer recommendations for fostering PTG in clinical practice.

**Where’d you get that? Compliment response variations by sex and status level**
Cody Welty¹, Jaime M. Cloud², & Carin Perilloux² / ¹Department of Psychology, Western Oregon University, Monmouth, OR 97361; ²Department of Psychology, Southwestern University, Georgetown, TX 78626

While previous research has explored how compliments are received by men and women, little has been conducted regarding the influence of social status on compliment responses. To address this research gap, two studies explored the contexts in which men and women show modesty. In Study 1, participants read three vignettes in which they received a compliment and chose the type of reaction they would most likely give. Researchers hypothesized that women would respond more modestly than men, and results revealed that women chose the modest response option significantly more frequently than men across all vignettes. In Study 2, participants were randomly assigned to one of three hypothetical scenarios in which they received a compliment from someone of either (1) higher status than them, (2) lower status than them, or (3) equal status to them, and indicated their most likely response in an open-ended format. Research assistants subsequently coded participant responses as either humble or not humble. A chi-square cross-tabulation analysis showed that women demonstrated significantly greater modesty after receiving a compliment from a relatively low-status versus high-status member of the same sex, 𝜒² (2, n = 130) = 13.51, p < .01. Men did not show this effect, 𝜒² (2, n = 39) = 0.97, p = .61. This was consistent with our prediction that women use modesty to manage intrasexual hierarchies. A third study is currently underway to examine how an individual’s likability is affected by their response to compliments.

**Deconstructing the reifications of culture in clinical psychology**
Hanna Bosse and Björn Bergström, Pacific University, Hillsboro, OR

The American Psychological Association (APA), has called for culturally appropriate and informed research and interventions that emphasize the importance of intersectionality as it relates to culture (American Psychological Association, 2017). As a field, we have also seen a growing emphasis on studies evaluating culturally adapted interventions and subsequent reports of superior effectiveness (Griner & Smith, 2006; Benish, Quintana, & Wampold, 2011). To date, culturally adapted practice however, has taken a nomothetic approach and emphasized understanding and treating individuals based on larger cultural or ethnic groupings to which they appear to belong. This current framework is incongruent with research that has shown the heterogeneous nature of cultural groups and emphasized the consideration of unique variation, and the fluid nature of cultural identity (Trueba, 1999; Gonzalez Burchard, Borrell, Choudhry, Naqvi, Tsai, Rodriguez-Santana, & Arena, 2005). This presentation will review and deconstruct current approaches of conceptualizing culture in clinical psychology as evidenced by research and clinical practice of anxiety with Latino-Americans. Implications for future research and a call for an ideographic approach to providing culturally adapted interventions will be discussed.
Exposure therapy adaptations: Irritable bowel syndrome (IBS)
Caitlin Hines and Björn Bergström / School of Graduate Psychology, Pacific University, Hillsboro, OR

Physical and mental health are frequently discussed as discrete facets of wellbeing. Despite this, it is widely accepted that anxiety disorders are often associated with somatic symptoms, with gastrointestinal distress being one of the most salient examples. Extrapolating from this concept, the connection between anxiety disorders and Irritable Bowel Syndrome (IBS) will be examined as a micro-example of the point of intersection between psychology and physiology in theory as well as practice. Psychological interventions, namely cognitive and exposure-based therapies, have been shown as efficacious for multiple populations of patients with IBS. Research on the mechanisms of change in psychologically-based IBS treatment link changes in cognition and mood with reduced gastrointestinal symptoms. This work reflects an interdisciplinary effort to acquire a holistic understanding of health and an innovative approach to treatment. Implications on future research, training, and application in clinical practice will be discussed.

Evidence-based diversity training: Applied principles of exposure and response prevention
Björn Bergström, Sarah Afromowitz, Stephanie Garcia, and Judy Jagiello / School of Graduate Psychology, Pacific University, Hillsboro, OR 97123

Diversity training has become a cornerstone of organizational culture and policy as the demand for a culturally competent workforce continues to increase. The combination of globalizing markets and increased social focus on cultural awareness and equity-based-values has created a systemic and rapid demand for cross-culturally sophisticated practitioners. As the United States becomes increasingly diverse, many medical practitioners will be providing services to groups of individuals with whom they are unfamiliar with, or may have had limited contact or experience with. Like any young endeavor, the call for action has led to multiple concurrent efforts to affect change, often without scientific support or scrutiny. Clinical science, social psychology and anthropology all provide complimentary explanations for the mechanisms of prejudice and othering, as well as strategic methods for changing human responses to fear and bias. This presentation will firstly, provide a brief panorama of the changing and increasingly diverse sociological landscape. Secondly, we will provide a brief overview of diversity-training models to-date and their theoretical foundations. Thirdly, functional-analysis and exposure and response prevention (ERP) models will be used to conceptualize othering, as well as interventions for reducing othering. Social psychology, cognitive science and anthropological explanations for attitude-maintenance and -change will be explored, as it relates to ERP methods for reducing conditioned beliefs of othering. Lastly, recommendations will be made for adapting current diversity training models and methods, and methods to evidence outcomes of said programs.

Voluntary structured activities and their instigation of the flow-state: An exploration into the anxiety related benefits of flow-state activation
Jacob Perry and Björn Bergström / School of Graduate Psychology, Pacific University, Hillsboro, Oregon

The goal of this presentation is to argue the strong likelihood of voluntary structured activities, and the flow-states these activities produce, to both decrease symptoms of trait anxiety, and increase one's ability to utilize therapeutic techniques. The experience of flow-states has been largely linked to athletic success, and outcomes of increased well-being within several studies. While the athletic benefits of flow-states have received much attention, its alternate benefit of increasing mental well-being has not, especially with the purpose of direct integration into a therapeutic context. Voluntary structured activities have been selected as a vessel to access the mental health oriented benefits of flow-states as they are not only intertwined with harmonious passion and thus more likely to produce them, but are also positively correlated with increases in agency, self-efficacy, and self-control. As increases in flow-states, agency, and self-efficacy have each been shown to decrease symptoms of trait anxiety in their own right, we propose them to serve as mediators, causing engagement in voluntary structured activities to also directly lower such symptoms. We also hypothesize the increases in agency, coupled with increases in self-efficacy, and self-control to increase a given individual's ability to utilize therapeutic techniques. Through further defining the positive benefits of the flow-state experience, we hope to instigate more research focused on the associated benefits they can provide to all people (instead of only athletes), and in turn, provide patients a more vast collection of tools with which to develop and maintain their mental health.
Examining methodological considerations for the implicit association test
Elizabeth Meaders, and Chris Koch / Department of Psychology, George Fox University, Newberg, OR, 97132

The Implicit Association Test (IAT) examines implicit associations people make between other individuals and their traits. In some ways, the task sparked an “implicit revolution” (Greenwald and Banaji, 2017) in which cognitive processes are examined indirectly. Although the task has been widely used, it is not without some criticism as a pure measure of association. For instance, Seigel, Dougherty, and Huber (2012) showed that cognitive control influences IAT performance (also Storbeck, 2012). Furthermore, Wright and Meade (2012) found that cognitive ability can impact performance. They also found that dissimilar IATs were correlated with each other which they referred to as “method-specific variance”. The IAT requires participants to categorize traits that appear on either the left or right side of a monitor. Categorization is done by making a key press. Simon interference occurs when the location of a stimulus does not match the location of a response option. Therefore, it is possible that Simon interference may contribute to at least part of the categorization differences found in the IAT. This study was conducted to examine that possibility. Participants completed the race version of the IAT along with typical Simon and Stroop tasks. The Stroop task was included as a measure of cognitive control and the Simon task was included to examine presentation and response effects. The relationship between these three tasks is discussed

Client experiences of exposure therapy: Measurements of treatment credibility and expectancy, hope, optimism/pessimism, distress tolerance, and therapeutic alliance
Meghan Walls, and Bjorn Bergstrom / School of Graduate Psychology, Pacific University, Hillsboro, Oregon

Exposure therapy is underutilized despite empirical support for its efficacy (Harned, Dimeff, Woodcock, & Contreras, 2013). Extant literature largely focuses on the negative perceptions of professionals towards exposure therapy with little or no regard for the experience of clients receiving exposure therapy. No current longitudinal studies exist that explore client perceptions of exposure therapy. For example, research suggesting client perceptions of treatment credibility and treatment expectancy are predictive of posttreatment outcomes (Safren, Heimberg, & Juster, 1997) measure these constructs prior to treatment and thereby fails to take into account how perceptions change over time while participating in treatment. Other constructs (i.e. hope, optimism/pessimism, distress tolerance, and therapeutic alliance) have been found influential to treatment outcomes but there is no data regarding how these constructs change over the course of treatment and significant time points in which change is likely to occur. Client perceptions may represent an important mechanism of change that contributes to the success of exposure therapy (Smith, Norton, & McLean, 2012) and exploring client experience would further inform clinicians when to intervene with additional support in order to improve posttreatment outcomes. The intent of this presentation is to present a thorough literature review of constructs hypothesized to influence the outcomes of exposure therapy and introduce the methods for a longitudinal, single subject design study to investigate the typical trajectory of clients’ experience of exposure therapy.

An exploration of sexual pleasure as a potential anxiolytic for men
Rachel Wolf, and Bjorn Bergström / School of Graduate Psychology, Pacific University, Hillsboro, Oregon

Research exploring the therapeutic benefits of sex and the impact of sex on well-being has mostly focused on sexual dysfunction. Although studies have investigated the effects of anxiety on sexual activity, the examination of the anxiolytic effect of sex is lacking. There are reasons to believe however that sex may aid in the reduction of anxiety. Research indicates that sex improves health and well-being and lowers stress levels in men and women. Findings also indicate that socially phobic women and men who engage in pleasurable sexual activity experience a decrease in next day’s anxiety symptoms. The mechanisms underlying these findings are not yet clear, signaling a need for more research. The current body of literature relating to sex as a potential treatment for anxiety will be summarized, focusing on the effects of sex on stress and anxiety symptoms in men. Some known and hypothetical mechanisms which support a positive relationship between sex and anxiety will be discussed such as: physical activity, testosterone levels and social connection. This presentation will end with an outline of a proposed study comparing the effects of sex on varying levels of anxiety symptoms with the effects of masturbation and aerobic exercise. It is hypothesized that next day’s anxiety symptoms in men will be reduced by engagement in pleasurable sexual activity to a greater degree than exercise or masturbation. Male gender identity, and other cultural factors effecting male sexuality and anxiety in males will be discussed as well as implications for clinical practice.
The effect of environmental control on individual and group outcomes
Sarah Golder, and Zachary Simmons / University of Portland, Portland, OR

Organizations are increasingly emphasizing the value of efficient and collaborative working groups. The present study explored how task performance and group cohesiveness were influenced by the ability to control the working environment. Ten groups of participants (2-5 per group, n = 35) were randomly assigned to an individual control condition (present vs. absent) and a group control condition (present vs. absent). Control was operationalized as the ability to position tables, chairs, and décor items in the laboratory space; an absence of control meant all of these items were in fixed positions. Individual control meant full autonomy over the placement of some items, while group control required a consensus. Following arrangement of the laboratory space, participants performed a winter survival task alone and then again with their group. A series of two-way ANOVAs tested the impact of both individual and group control. Though no effects were observed on performance, participants were significantly more likely to change their minds (measured by comparing personal and group scores on the survival task) during group discussions when they had both individual and group control of their environment. These results suggest that high levels of both individual and group control may be necessary to generate cohesiveness and, even if they do not directly impact performance, facilitate the creation of consensus within the group. These findings have implications for improving group performance in organizations through flexible workplaces and participatory design.
POSTER PRESENTATIONS

Access to competitive sport and physical activity opportunities for collegiate students with physical disabilities
Kathleen McCarty¹, Antoinette Domingo², Michael Cottingham³, Megan MacDonald¹ / ¹Department of Kinesiology, Oregon State University, Corvallis, OR 97331; ²School of Exercise and Nutritional Sciences, San Diego State University, San Diego, CA 92182; ³Department of Health and Human Performance, University of Houston, Houston, TX, 77204

College students with disabilities are at higher risk for dropout, unemployment, and development of secondary health conditions (e.g., diabetes, cardiovascular disease, obesity) than their peers without disabilities. Recent studies performed on both students with and without disabilities have found that those who participate in college sport programming and physical activity opportunities have a higher rate of graduation, employment, and improved overall health. However, few collegiate adaptive sports opportunities exist and, of those available, little is known about their structure or impact. The aim of this proposal will be to evaluate current access to sport programming at a collegiate level for students with physical disabilities. Furthermore, this study will more deeply evaluate the impact of current programming on college campuses and attempt to define models of success. Impact will be measured by participation, scholarships available, and perceptions of disability. It should be known that this project is currently in the inception phase, thus the purpose of this proposal is to obtain feedback for the proposed study approach and design. This study will use a mixed methods approach. Initial data collection will include an audit of current collegiate, adaptive program characteristics to identify potential clusters of features that could be associated with program barriers and successes. Further, a case study analysis of one- two highly successful programs will be used to identify a richer understanding of program operations as well as their impact on the university and the perceptions surrounding them.

Athletic and exercise attire marketing: Message framing, orientation, and worldview
Bradley J. Cardinal, Shannon C. Austin, Melodee A. Cluster, Allison M. Rasquinha, Samantha A. Rodenberg, and Jafrr D. Thomas / Kinesiology Program (Sport and Exercise Psychology concentration), School of Biological and Population Health Sciences, College of Public Health and Human Sciences, Oregon State University, Corvallis, OR 97331

A content analysis of commercially sponsored athletic/exercise posters was undertaken in an effort to elucidate their latent ideologies. Exercise/sport posters were obtained from four corporate brands (N = 110). Only posters showing a person or people along with one or more written words were included. The model’s/models’ sex (assumed) was recorded, and the text was coded on the basis of three variables: (1) message framing, (2) message orientation, and (3) worldview. Chi-square tests with alpha set at p < .016 was used. While more posters featured women (55.5%) than men (45.5%), the difference was not significant, p = .25. Most posters had ambiguous message framing (72.73%), followed by gain (24.55%), and loss (2.73%) messages, p < .001, with no relationship observed between sex and message framing, p = .033. Most posters had an ambiguous message orientation (53.64%), followed by task, self-referent, or process (36.36%), and then ego, social comparison, or outcome (10%), p < .001. There was a significant relationship between sex and message orientation, p <
.01, with women’s posters more likely to feature task, self-referent, or process oriented messages and men’s posters more likely to feature ego, social comparison, or outcome oriented messages. The worldview of most posters was individualism (94.5%) rather than collectivism (5.5%), $p < .001$, with no relationship observed between sex and worldview, $p = .27$. Some athletic/exercise posters may be perpetuating and reinforcing the ideology that health and physical activity are squarely individual responsibilities, which diminishes the known role of environmental determinism in physical activity promotion.
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