

**PROCEEDINGS  
OF THE  
OREGON ACADEMY OF SCIENCE**



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**OF THE**  
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# PROCEEDINGS OF THE OREGON ACADEMY OF SCIENCE

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# THE OREGON ACADEMY OF SCIENCE

## Keynote Address

*Dr. Phil Mote*

*Oregon Climate Change Institute*

*Oregon State University*

*Five Things I Wish Were True about Global  
Climate Change*

**Dr. Phil Mote** is Director of the Oregon Climate Change Research Institute in the College of Oceanic and Atmospheric Sciences at Oregon State University. Dr. Mote is a leading scientist in the field of climate change. His areas of expertise include sea level rise, water resources, precipitation, and temperatures, as well as variations in Pacific Northwest and national snowpacks. Dr. Mote was a lead author for the fourth assessment report by the Intergovernmental Panel on Climate Change, which for its efforts received a Nobel Peace Prize in 2007. Dr. Mote received his A.B. in physics from Harvard, and received his PhD in Atmospheric Sciences from the University of Washington. His presentation at the 70<sup>th</sup> Annual Meeting of the Oregon Academy of Science is titled “Five Things I Wish Were True about Global Climate Change.”

## THE OREGON ACADEMY OF SCIENCE

### History of the Outstanding Scientist Award

The Oregon Academy of Science's Outstanding Scientist Award is awarded in recognition of significant research contributions to the natural, physical, or social sciences, notable reputation in science education, and meaningful contributions in the application 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. Past recipients of the Outstanding Scientist Award are listed below

1949	F. L. Griffin	1963	E. A. Gilillan
	A. R. Moore	1969	Ira S. Allison
	E. L. Packard		Frank M. Beer
1950	A. A. Knowlton		A. A. Groening
	Thornton Munger		James A. Macnab
	Warren D. Smith	1970	James J. Brady
1951	Stanley W. Jewett		Bert Christensen
	Morton E. Peck		E. Ebbighausen
	J. Hugh Pruett		Ralph W. Macy
1952	Helen M. Gilkey		Cecil R. Monk
	L. E. Griffin		Leo F. Simon
	Ethel I. Sanborn	1971	Andrew Moursund
1953	W. P. Boynton		Loren McKinley
	Olaf Larsell		Homer G. Barnett
	Rosalind Wulzen		Stephen Shelton
1954	Leo Friedman	1972	Samuel N. Dicken
	Alonzo W. Hancock		Helen M. Gilkey
	Willibald Weniger		R. Sinnhuber
1955	W. J. Kroll	1973	George Birrel
	F. W. Libbey		Harold J. Evans
	W. E. Milne		Anton Postl
1956	E. T. Hodge		Lloyd W. Staples
	R. R. Huestis	1974	Larae Dennis
	E. J. Krause		Joel Hedgspeth
	J. P. Mehlig		Thomas P. Thayer
	Harry B. Yocum		Norman S. Wagner
1957	L. S. Cressman		Aaron C. Waters
	Leo Isaac	1975	John Allen
	Adolph Kunz		Ralph Badgley
	E. E. Osgood		Ewart Baldwin
1958	Phil F. Brogan		Winthrop Dolan
	Vernon Cheldelin		William Rockie
	Samual L. Diack		Howel Williams
1959	Walter Dyke	1976	Harold Enlows
	Henry P. Hansen		Paul Elliker
	Alex Walker		Paul Weswig
1962	Joe Chamberlin	1977	Robert Coleman
	F. Gilchrist	1978	W. Taubeneck
	Earl Gilbert	1979	G. Bodvarsson
	Arthur F. Scott	1980	Kensal Van Holde
	Edward S. West	1981	Ernst Dornfeld

**THE OREGON ACADEMY OF SCIENCE**  
**Outstanding Scientists**

*(Continued)*

1982	Howard Vollum
1983	Carl E. Bond
1984	Arthur J. Boucot
1986	Paul Lutus
1987	Linus Pauling
1988	Lewis Schaad
1990	C. Melvin Aikens
1991	Jack Ward Thomas
1992	Beatrice Epperson
1993	Lynwood W. Swanson
1994	Jane Lubchenco
1995	Michael Posner
	Paul Slovik
1996	A. Morrie Craig
1997	William G. Loy
1998	Gertrude Rempfer
1999	LeRoy Klemm
2000	Kent L. Thornburg
2001	Geraldine L. Richmond
2002	Carl Wamser
2003	Joseph D. Matarazzo
2004	M. Aslam Khalil
2005	Ewart M. Baldwin
2006	David C. Johnson
	James D. White
2007	Richard Ellis
2008	Andrew Fountain
2009	Reinhold Rassmussen
2010	---
2011	---



## THE OREGON ACADEMY OF SCIENCE

### Outstanding Educator Award

The Oregon Academy of Science's Outstanding Teacher Award is awarded to Oregon teachers with a demonstrated record of excellence in teaching in any of the subject areas represented in the Academy. Recipients of this 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.

1992	Bea Epperson
1993	Stephen Boyarsky
1994	Roy Chambers Andrea Hyslop Elizabeth Nirschel Jan Heaton
1995	Ford Miyashita
1996	Edith Anderson Pamela Lopez
1997	Mary Omberg Terry Favero
1998	Rosa Hemphill Joel Kuyper Diane Nelson
1999	Dwight Kimberly Bill Lamb
2000	Becky A. Houck Richard Duncan
2001	Patty Toccalino Kathleen Wickman
2002	David Damcke
2003	Kenneth M. Doxsee James E. Hutchison Ralph Schubothe
2004	Gwen Schusterman John Gibbs Chris Murray
2005	Richard P. Taylor Gail Gederman
2006	Peter Langley
2007	Tamina Toray Dan Jamsa
2008	April Ann Fong Terry Tucker
2009	Charles Kunert Michael Geisen
2010	Charles (Kip) Ault Jean Ames
2011	Lauren Roscoe Jim Hartman

## THE OREGON ACADEMY OF SCIENCE

### **Outstanding Educator Award: Higher Education**

*Dr. Lauren Roscoe*

#### **Western Oregon University, Monmouth**

**Dr. Lauren Roscoe** is an Associate Professor of Psychology at Western Oregon University. She received her undergraduate degree from the University of Notre Dame, and her PhD from Southern Illinois University. Dr. Roscoe is well known for both her deep personal commitment to student development, and her novel instructional programming. Recently, Dr. Roscoe received grant funds and offered a Vocational Discernment Retreat for students. Students analyzed their values, interests, strengths, weaknesses, and goals in a weekend-long event. Such out of the classroom programming is typical of Dr. Roscoe's accomplishments. Last spring, during *PsychNIGHT*, hundreds of participants (high school and college students, professors, and professionals) came together under Dr. Roscoe's direction to learn about psychology, career paths, mentoring, and volunteerism. As one participant noted, "Lives were changed at that event." The Oregon Academy of Science congratulates Dr. Roscoe as the 2010 Educator of the Year for Higher Education.

## THE OREGON ACADEMY OF SCIENCE

### Outstanding Educator Award:

*K- 12*

*Mr. Jim Hartman*

*West Linn High School, West Linn*

**Mr. Jim Hartman** is an inspirational leader who teaches AP environmental science and geology classes at West Linn High School. He holds a BS in Biology from Portland State University and an MAT from Lewis & Clark College. Throughout his 22 years at West Linn High School and his earlier teaching experience at Gordon Russell Middle School, he has gone above and beyond to ensure that his students have exposure to the natural world and opportunities for real research. Studying salmon habitat at Eagle Creek, monitoring migrating birds at Sauvie Island, monitoring amphibian populations in the Salmon/Huckleberry Wilderness are just a few examples. His geology students explore the effects of the Missoula Floods in the Gorge and the lava tubes of Mt. St. Helens, and they review evidence of megathrust earthquakes on the Oregon Coast. In Portland, his students study examples of green building/sustainable design. Ongoing restoration projects with his students include working with SOLV to heal damaged stream ecosystems and working with West Linn City Parks to restore wetlands. Mr. Hartman served for several years on the board of the Oregon Science Teachers Association and as President of the Environmental Education Association of Oregon. Additionally, he served on the Sustainability Stewardship Committee of the West Linn-Wilsonville School District. The Oregon Academy of Science congratulates Mr. Hartman as the 2010 Educator of the Year for K-12 Teaching.



**ABSTRACTS**  
**FOR THE POSTERS AND ORAL PAPERS**  
**PRESENTED DURING**  
**THE SECTION MEETINGS AT**  
**THE SEVENTIETH ANNUAL**  
**CONFERENCE OF**  
**THE OREGON ACADEMY OF SCIENCE**

**February 26, 2011**

**PORTLAND COMMUNITY COLLEGE,**

**SYLVANIA**

**Portland, Oregon**



# BIOLOGY

## Section Chairs:

Dwight Kimberly  
*George Fox University*

Jeff Duerr  
*George Fox University*

### **BIOLOGY - ORAL PRESENTATIONS:**

#### **EFFECT OF ESTRADIOL APPLICATION ON RESPIRATORY COMPLEX PROTEIN ACTIVITY IN THE MCF-7 BREAST CANCER CELL LINE.**

Melissa Kelley and Jeffrey M. Duerr. Department of Biology, George Fox University, Newberg, OR 97132

Cancer is a disease characterized by uncontrolled cell growth and division. Breast cancer, the second-highest cause of death for women in America, remains a poorly-understood disease. Many studies have consistently found that exposure to estrogen is a risk factor in breast cancer. Estrogen receptors (ER) act as transcription factors that regulate the expression of estrogen-responsive genes. Investigation into the impact of estrogen on mitochondrial function is a new and novel area of investigation. The MRC is normally responsible for the aerobic production of ATP. The mitochondrial respiratory chain (MRC) plays a key role in the regulation of apoptosis (programmed cell death) and may be involved in tumor progression by virtue of disabling the apoptosis pathway, a necessary cell defense against carcinogenesis. Little information regarding the specific action of estrogens on oxygen consumption and MRC activity is available. One recent study demonstrates estradiol increases oxygen consumption rates in MCF-7 cells after 4-6 days, consistent with the upregulation of complex I and complex IV proteins. We hypothesized that exogenous application of estrogens to MCF-7 cells will increase MRC activity. Results indicated a 3-fold increase in activity of complex II and a 1.5-fold increase in citrate synthase activity following 48 hours of estrogen exposure. Overall, these results are consistent with an initiation or augmentation of a "Warburg effect."

THE EFFECT OF ANGIOTENSIN II ON MITOCHONDRIAL RESPIRATORY CHAIN ACTIVITY IN LNCAP HUMAN PROSTATE CANCER CELLS. Jennifer Kordosky and Jeffrey M. Duerr. Department of Biology, George Fox University, Newberg, OR 97132.

In cancer cells, mitochondria are a crossroads for catabolic and anabolic pathways as they are in normal cells. In many tumor cells there is an increase in glycolysis and a decrease in oxidative phosphorylation, even in the presence of normal oxygen concentration (Warburg effect). As of now it is undetermined if this is because of decreased mitochondrial function or because of environmental alterations. The application of androgen analogs to LNCaP cells at concentrations normally found in adult men (1 nM) induces an increase in mitochondrial number (mass) and ROS production, and lower mitochondria respiratory chain (MRC) activity. It is well established that cell signaling pathways are dysregulated in cancers. Many cell signaling pathways terminate with the phosphorylation (by a kinase) of a target protein and subsequent alteration in its activity. We investigated the effect of angiotensin II, a hormone whose concentration is correlated with incidence of prostate cancer, on MRC activity in LNCaP cells. Following 24 hour exposure to angiotensin II, we measured a significant increase in citrate synthase activity and a 3.5-fold increase in complex II expression levels. Curiously, expression levels of complexes III, IV, and V decreased. Taken together, these data may be interpreted as evidence for increased tricarboxylic acid cycle activity and reduced respiratory chain activity, which is consistent with the Warburg Effect (reduced mitochondrial activity). It appears that the respiratory chain activity is actively downregulated and that this represents a fundamental and likely strategic metabolic shift in LNCaP cancer cells.

EFFECT OF MATERNAL LOW PROTIEN DIET DURING PREGNANCY AND LACTATION IN RATS ON THE EXPRESSION OF RENAL OAT1. Jacob Pearson<sup>1,3</sup>, Michael Godsey<sup>3</sup>, Anil P D'mello<sup>2</sup>, Ganesh Cherala<sup>1</sup>.<sup>1</sup>College of Pharmacy, Oregon State University / Oregon Health & Science University, Portland, OR 97239. <sup>2</sup>Philadelphia College of Pharmacy, University of the Sciences in Philadelphia, Philadelphia, PA 19104.<sup>3</sup>Concordia University, Portland, Or 97211.

It has been demonstrated that subjects with low birth weight (LBW) are at a greater risk for the onset of adult pathologies such as diabetes mellitus, hypertension, hyperlipidemia, high blood pressure, and obesity. From a pharmacological perspective, these pathologies necessitate intense drug therapies. Organs involved in the absorption, distribution, metabolism and/or elimination of drugs are shown to be structurally and morphologically altered in LBW animals. A decrease in kidney size makes the study of renal drug transporters important for predicting LBW induced adverse drug reactions and/or altered drug therapy. The purpose of this study is to evaluate the effect of LBW on the expression of Organic Anion Transporter-1



(OAT1) at the mRNA and protein level(s) in juvenile (day28 old), adolescent (day65 old), and adult (day150 old) rats. Protein restriction (maternal low protein diet) is one common animal model used to induce and study LBW, and it is the model employed in this study. Through RT-PCR, it was shown that mRNA levels were significantly decreased in the LBW adult offspring, in a sex dependent manner. Western blotting of various membrane fractions indicated further dysregulation at the protein level. In conclusion, there are interesting differences in the transcriptional and translational regulation of OAT1 in the LBW animals. Further studies could lead to more clinically relevant implications of this data, as well as a more mechanistic understanding of the changes in OAT1 in this model.

#### PREPARATION TECHNIQUES USED TO IMAGE EXTREMOPHILES UNDER A FIELD EMISSION SCANNING ELECTRON MICROSCOPE.

Kimia Ighani<sup>1</sup>, Kenneth Stedman, Ph.D.<sup>2</sup> Department of Biology, George Fox University, Newberg, OR, 97132, <sup>2</sup>Department of Biology, Portland State University, Portland, OR, 97201.

Cells in extreme environments tend to be difficult to image under a scanning electron microscope, SEM. The most commonly viewed and studied cells of this habitat, *sulfolobus solfataricus* P2, are the cells being viewed in this research. The protocols that have been established still produce raisin-like outer structures and are not best for viewing outer structure. The structures are key to viewing infection of the lysogenic virus STIV and therefore a new protocol should be researched. The cells were centrifuged at 1300g and 700g. The supernatant was extracted and the pellet was washed with 1mL of 1.5% and 3.0% glutaraldehyde in diH<sub>2</sub>O, and left overnight and for one hour in a 4°C refrigerator. The solution was centrifuged again and the pellet was washed with 1 mL of 2% NaCl in ddH<sub>2</sub>O twice. The pellet was resuspended in 1mL of 2% OsO<sub>4</sub> for one hour and then washed with 2% NaCl in diH<sub>2</sub>O three times. After fixation the pellet is resuspended in 1mL diH<sub>2</sub>O. About 20μL of the solution was placed onto a 0.2μm membrane filter and the membrane was not be allowed to dry. The whole membrane was submerged into about 1mL of a series of ethanol concentrations. Each submersion was for three minutes. The membrane was submerged in HMDS for five minutes. The membrane then was left out to dry completely. Results show that overnight fixation and 1300g centrifuge speed were two alterations from the original protocols that produced more rotund cells when imaged.

THE ENERGETIC COST OF STABILIZATION IN CROSS WIND DURING HOVERING IN HUMMINGBIRDS. K. R. Corder<sup>1</sup>, D. R. Powers<sup>1</sup>, and B. W. Tobalske<sup>2</sup>; <sup>1</sup>Biology Department, George Fox University, Newberg, OR 97132, USA; Research Station at Fort Missoula, Division of Biological Sciences, University of Montana, Missoula, MT 59812, USA.

Recent studies have characterized the flight power curve for hummingbirds and elucidated the energetic costs of flying across a range of wind speed including 0 m/s (hovering). However no studies have addressed the energetic costs associated with body stabilization when ambient airflow includes crosswind components common in natural environments. To measure the contribution of stabilization to hovering metabolic rate (HMR) we placed a feeder in a wind tunnel that required calliope hummingbirds (*Stellula calliope*; n = 4) to hover feed with their longitudinal axis perpendicular to the direction of air flow (cross flow) and measured HMR using open-circuit mask-respirometry at 2, 4, and 6 m/s. HMR did not differ between cross wind speeds (mean =  $0.48 \pm 0.12$  mL O<sub>2</sub> g<sup>-1</sup>min<sup>-1</sup>), but was significantly lower (1.5X) than HMR at 0 m/s and significantly higher (1.5X) than forward flight at 2, 4, and 6 m/s. During cross wind measurements hummingbirds rotated their posterior body away from the direction of airflow with the degree of rotation increasing with wind speed (21° at 2 m/s, 37° at 4 m/s, and 54° at 6 m/s). By rotating in this manner, hummingbirds oriented their wings such that it appeared incurrent airflow could reduce the induced power required for flight and, thereby, reduce HMR compared to hovering at 0 m/s. Because body rotation is incomplete, aerodynamic efficiency (lift : drag ratio) is likely less than that of forward flight making cross wind HMR more energetically expensive than forward flight at comparable wind speeds. Supported in part by NSF IOS-0923606 and IOS-0919799.

LOCALIZATION AND QUANTIFICATION OF AQUAPORIN 1, 2, AND 4 EXPRESSION IN VENTRAL SKIN OF THE ROUGH-SKINNED NEWT (*TARICHA GRANULOSA*). Ryan S. Lane, Donald R. Powers, and John M. Schmitt. Biology Department, George Fox University, Newberg, OR 97132.

Skin permeability to water in Urodele amphibians is a two-edged sword in that it allows absorption of moisture from the environment yet also promotes dehydration by evaporative water loss. Like other tissues bulk water flow across the skin occurs through aquaporin water channels (AQP), some of which are likely regulated to control either inward or outward water flow depending environmental conditions. However, the specific AQPs involved in water flow across Urodele skin and their associated regulatory pathways have not been well described. In this study we used immunofluorescence (IF) and Western blotting to localize and quantify the expression of AQP 1, 2, and 4 homologs in the ventral skin of rough-skinned newts (*Taricha granulosa*) acclimated to both terrestrial and aquatic environments. We hypothesized that terrestrial acclimated newts

would up-regulate AQP1, 2 and 4 expression in their ventral skin, compared to aquatic acclimated newts, to facilitate water uptake. AQP1 was expressed equally in aquatic and terrestrial newts and localized in dermal capillary endothelium. AQP2 and AQP4 increased 36 and 100%, respectively in aquatic newts contrary to our hypothesis. AQP2 was localized in the outer layers of the stratum corneum and AQP4 in the sub-dermal tela subcutanea. The reduction of AQP2 and 4 in terrestrial newts suggests protection from desiccation is more critical to the newts than enhancing water influx through the ventral skin. AQP1 appears to traffic water into and out of circulation in the skin and might not require regulation.

**THE ROLE OF INNATE METABOLIC CAPACITY IN THE COURTSHIP BEHAVIOR OF MALE RED-SIDED GARTER SNAKES (*THAMNOPHIS SIRTALIS PARIETALIS*).** Jessi-Ann B. Michaelson<sup>1</sup>, Donald R. Powers<sup>1</sup>, Chris R. Friesen<sup>2</sup>, and Robert T. Mason<sup>2</sup>. <sup>1</sup>Biology Department, George Fox University, Newberg, OR 97132; <sup>2</sup>Department of Zoology, Oregon State University, Corvallis, OR 97331.

Red-sided garter snakes are an exceptional model for study of energetic costs of courtship and mating as they fast during the spring mating season segregating the cost of energy acquisition from the cost of courtship and mating. Male red-sided garter snakes (*Thamnophis sirtalis parietalis*) can upregulate their group metabolic rate (MR) 18X SMR during courtship of females. However, males within a mating group exhibit variable behavior with regard to how actively females are courted making it likely that the males courting most intensely upregulate MR higher than the group mean. To test if a male's courtship ability is related to metabolic performance we measured resting metabolic rate (RMR), courting metabolic rate (CMR), and metabolic scope (MS; CMR-RMR) in single males collected from natural mating groups. During CMR measurements a courtship score (CS) was calculated to correlate CMR with courtship activity. We tested males from mating groups that 1) copulated (A), 2) courted but did not copulate (B), and 3) were near but did not court (C). RMR, CMR, and CS did not differ between groups. CS did not differ between A and B males, but was significantly lower in C males suggesting that although C males are different from A and B males this difference is not driven by metabolic performance. Similarity of A and B males was supported by supplemental video analysis of natural mating groups suggesting that the probability of mating by these males is influenced by position in the mating group and that male position changes with female movement.

**CHANGES IN BLOOD FLOW LEAD TO ABNORMAL FUNCTION OF EMBRYONIC ENDOCARDIAL CELLS, A POTENTIAL CAUSE OF CARDIAC DEFECTS.** Alexandra Paradis<sup>1</sup>, Monica Hinds<sup>2</sup>, <sup>1</sup>Department of

Biology, George Fox University, Newberg, OR, <sup>2</sup>Department of Biomedical Engineering, Oregon Health and Sciences University, Portland, OR 97239.

Congenital Heart Disease (CHD), found in approximately 1% of newborns, can be caused by genetic factors and/or environmental factors. Key environmental factors are the hemodynamic forces, pressure and shear stress, due to the flow of blood. The Outflow Tract (OFT), a structure that connects the heart to the arterial system, is often malformed in patients with CHD. Endocardial cells (ECs) line the interior of the OFT and provide an interface between blood flow and the heart wall. ECs are greatly impacted by wall shear stress, the tangential force that blood flow exerts on the heart wall, which in turn influences the regulation of various proteins. The objective of this study was to investigate how shear stress affects the function of ECs during heart development and may cause changes in EC gene expression of E-cadherin, Integrin  $\alpha 4$ , and Endothelin-1, proteins involved in cell adhesion and vasoconstriction. ECs were isolated from the OFTs of chick embryos at stages HH18 and HH24. After 24 hours of incubation, the ECs were placed in a chamber and exposed to flow (15 dynes/cm<sup>2</sup>) for 24 hours. Following flow, RNA Isolation and Reverse Transcription were performed on the cells and the cDNA was analyzed via qPCR. In ECs from HH24 OFTs, all three genes, Endothelin-1, Integrin  $\alpha 4$ , and E-Cadherin were upregulated cells under flow versus static conditions. Additionally, Endothelin-1 was upregulated in static HH18s compared to static HH24s. Overall these results suggest a role for Endothelin-1 in development, which is likely regulated by shear stress.

14-3-3 $\gamma$  BINDS TO CAM KK $\alpha$  AND BLOCKS ESTROGEN SIGNALING IN MCF-7 CELLS. Amanda P. Ankeny and John M. Schmitt, Department of Biology, George Fox University, 414 N. Meridian St., Newberg, OR 97132

Extracellular Signal-Regulated Kinase (ERK) is activated by estrogen (E2) downstream of CaM KK leading to cell growth in MCF-7 breast cancer cells. Previous studies have shown that ERK activation may be inhibited by cAMP and PKA. PKA has numerous cellular targets including CREB, Src, Raf-1, arrestins, and CaM KK. CaM KK is inhibited by direct PKA phosphorylation and the subsequent interaction with 14-3-3 $\gamma$ . Agonists that activate cAMP and PKA may block CaM KK activation of ERK and cell proliferation. Our goal was to evaluate the ability of cAMP and PKA to antagonize the effects of E2 on MCF-7 breast cancer cell signaling specifically, we examined CaM KK phosphorylation and inhibition. Our results suggest that activation of cAMP and PKA with Forskolin, inhibits E2 stimulation of ERK activation. E2 treatment of MCF-7 cells did not trigger PKA phosphorylation of CaM KK. Forskolin treatment of cells increased CaM KK phosphorylation and its association with endogenous 14-3-3. Interestingly, Vitamin D also enhanced 14-3-3 $\gamma$  binding to CaM KK. Our results suggest that PKA activation, and subsequent phosphorylation of CaM KK, inhibits its activity, and

associates with 14-3-3 $\gamma$ , which in turn may remove CaM KK from the ERK signaling cascade in MCF-7 cells.

**TRANSCRIPTION FACTOR REGULATION BY ERK AND ESTROGEN IN MCF-7 CELLS.** Jessica Magill and John M. Schmitt, Department of Biology, George Fox University, 414 N. Meridian St., Newberg, OR 97132

ERK is activated by increased intracellular calcium downstream of the hormone estrogen (E2). E2 activates ERK via the CaM Kinases, specifically CaM KK and CaM KI in MCF-7 cells. ERK may control cell growth and proliferation through Elk-1, Rsk, SRF, CREB, and numerous other molecules and nuclear targets. Vitamin D, a hormone, has proven to be an effective antagonist of ERK and MCF-7 breast cancer cell growth. Our goal was to evaluate if the E2 pathway working through CaM KK and ERK regulated the transcription factors Elk-1, CREB, and SRF. We also examined the ability of vitamin D to antagonize ERK activation of its downstream targets. Interestingly, E2 stimulation of MCF-7 cells activated both ERK and Elk-1 an effect that was blocked by inhibiting both CaM KK and ERK. E2 treatment of MCF-7 cells also triggered a significant increase in SRF and CREB phosphorylation in a CaM KK- and ERK-dependent manner. Dimerization of transcription factors may enhance DNA binding and gene expression. E2 stimulation of MCF-7 cells promoted the formation of a molecular complex between endogenous Elk-1 and SRF. Finally, E2 triggered a prolonged increase in ERK and Elk-1 phosphorylation, both of which were blocked by vitamin D treatment. Taken together our data demonstrates several transcriptional targets for E2 working through CaM KK and their inhibition by vitamin D signaling.

**DEVELOPMENT OF AN *IN VITRO* MODEL TO CHARACTERIZE THE ROLE OF THE ENDOCARDIAL ENDOTHELIUM IN HEART FAILURE.** Nicole Iranon, Rachael Andrie, Jill Gelow, and Antony Kim, Division of Cardiovascular Medicine, Oregon Health and Sciences University, Portland, OR 97239.

Heart failure is associated with a procoagulant state and increases the risk of thromboembolic events. *Ex vivo* work in our laboratory suggests that the endocardium, the endothelial cell layer lining the cavities of the heart, becomes dysfunctional in heart failure, resulting in altered thromboresistance. To study the mechanisms underlying altered endocardial thromboresistance in heart failure, we developed and validated an *in vitro* endocardial endothelial cell culture model. Baboon hearts were obtained from the Oregon National Primate Research Center (Beaverton, Oregon). To isolate endocardial endothelial cells, left and right ventricular cavities were incubated with 2% collagenase, type 1, at 37 degrees Celsius for 15 minutes and washed with media. Isolated cells were collected by centrifugation and cultured in endothelial-specific media. After initial expansion,

left and right ventricular endocardial cell cultures were immunopurified with magnetic beads conjugated to platelet endothelial cell adhesion molecule-1 antibody. The identity and purity of the endocardial endothelial cell cultures was determined with fluorescence microscopy of key endothelial-specific markers. Independent left and right ventricular endocardial endothelial cell cultures were isolated and validated from three independent baboons. Primary aortic endothelial cell cultures were established from each animal to serve as matched vascular endothelial controls. Successful development of a baboon endocardial cell culture model will allow systematic *in vitro* study of the mechanisms underlying altered endocardial thromboresistance in heart failure.

**PROTEOMIC PROFILE OF SPORADIC INCLUSION BODY MYOSITIS.**  
Randy Woltjer, Sarah Click, Sarah Stanfield. Pathology Department. Oregon Health and Sciences University. Portland, OR 97239

Sporadic inclusion body myositis (sIBM) is the most common inflammatory myopathy occurring in patients over the age of 50. The two most distinguishing pathological features of sIBM are intracellular deposits of detergent-insoluble proteins, called inclusions, and rimmed vacuoles. However, these lesions can be difficult to detect in muscle biopsies, especially at early stages of disease. The objectives of this study were to: (1) use proteomics to identify abnormal proteins present in fractionated muscle tissue from sIBM patients compared to controls, (2) determine which abnormalities are associated with immunohistochemical abnormalities that might be helpful in early identification of sIBM in muscle biopsies, and (3) gain novel insight into the mechanism of muscle degeneration in sIBM affected tissue. Mass spectrometry was used to identify protein differences in the detergent-insoluble fraction of muscle tissue affected by sIBM and controls. These results were confirmed using ELISA immunochemical assays. Key proteins that were present at significantly higher concentration in affected tissue included  $\alpha/\beta$  crystalline, ubiquitin (previously reported in inclusions of sIBM), and carbonic anhydrase 3 (CA3), a novel finding. Immunohistochemical studies confirmed CA3 as a protein present in inclusions of sIBM as well as additional novel lesions that may be helpful in earlier establishment of the diagnosis.

**PHENOTYPIC VARIATION IN THE SPOTTED TUSSOCK MOTH, *LOPHOCAMPA MACULATA* HARRIS 1841 ALONG THE PACIFIC COAST OF NORTH AMERICA.** Kenneth G. Strothkamp, Melinda Green & Ruth Gravanis, Department of Chemistry, Lewis & Clark College, Portland, OR 97219.

The spotted tussock moth, *Lophocampa maculata* Harris 1841 is found across North America. Along the Pacific coast it ranges from Juneau, AK to Los Angeles, CA. Coastal populations show a number

of phenotypic variations not seen in this species over most of its range. At least three distinct varieties of larvae are observed, referred to as all yellow, black & yellow and orange. In addition there are intermediate forms between these three extremes. Adults show considerable variation in wing color, from the classic yellow and brown patchwork to a form with only a faint brown spot midway on the forewing, and a form intermediate between these two. Early observers described several species based on these differences but present taxonomy assigns all these variants to the species *L. maculata*. Because there are no reported investigations by captive rearing, the correlation between the various larval and adult forms is unknown. In addition, the coastal populations, at least south of San Francisco, are bivoltine in contrast to all other *L. maculata*. Captive rearing of eleven separate broods from Aptos, CA are beginning to reveal the relationships between these multiple forms. Preliminary data indicate differences in larval food preferences between the CA coastal populations and those of the Pacific Northwest and elsewhere. Coastal populations preferred Pacific willow (*Salix lasiandra*) over Vine maple (*Acer circinatum*), whereas most *L. maculata* feed and develop normally on vine maple. Although coastal larvae ate vine maple, they did not grow as well, were unable to pupate, and died as final instars.

**MICRO-AEROBIC COMPOSTING OF WOODY BIOMASS: THE QUEST FOR A GREENHOUSE GAS NEUTRAL CARBON RECYCLING BIOTECHNOLOGY.** Manar A. Alattar, Radu Popa, Terrence R. Green, Jordan Henry, Mikias Tizaz, Robby Bergstrom and Vitalie Gulca, Department of Biology, Portland State University, Portland, OR, 97201.

Aerated composting is often presented as a green technology for recycling organic waste. Although aerated composting lowers amounts of organic waste deposited into landfills, its C-recycling potential is poor, turnover rate low and green house gas (GHG) footprint large. Micro-Aerobic Composting (MC), a closed system, micro-aerobic composting technology, presents a promising alternative. We tested the effects of different amounts of vegetal amendments and varying tea treatments on the efficiency of MC of lignocellulosic waste. During MC of lignocellulosic biomass we monitored the evolution of temperature (°C), atmospheric gases above compost residue (O<sub>2</sub>, N<sub>2</sub>, CH<sub>4</sub>, CO<sub>2</sub>), volatile organic acids (VOAs), alcohols, ketones, pH, water content of solid residue, polysaccharide degradation and glucose equivalents in compost tea and compost residue, Biological Oxygen Demand (BOD) of both compost tea and residue and compost tea production. After MC was completed compost was amended into the soil and polysaccharide hydrolysis rates were measured for each treatment. During MC treatments with increased abundance of vegetal amendments and elimination of compost tea had increased fermentation rates, water production and pH balance, and decreased BOD and free

polysaccharide content. MC also increased the degradation rate of cellulose in soil in comparison to non-fermented controls, but there were no significant differences in polysaccharide degradation rates between compost materials from varying tea treatments and vegetal waste amendments upon reintroduction into soil.

THE IDENTIFICATION AND CHARACTERIZATION OF SMALL MOLECULE INHIBITORS OF DNA POLYMERASE KAPPA. Kinrin Yamanaka<sup>1,2</sup>, Irina G. Minko<sup>2</sup>, Robert L. Eoff<sup>4</sup>, Martin Egli<sup>4</sup>, Dorjbal Dorjsuren<sup>5</sup>, Ajit Jadhav<sup>5</sup>, Anton Simeonov<sup>5</sup>, and R. Stephen Lloyd<sup>2,3</sup>, <sup>1</sup>Department of Physiology and Pharmacology, <sup>2</sup>Center for Research on Occupational and Environmental Toxicology, and <sup>3</sup>Department of Molecular and Medical Genetics, Oregon Health & Science University, Portland, OR 97239. <sup>4</sup>Department of Biochemistry, Center in Molecular Toxicology and Vanderbilt Institute of Chemical Biology, Vanderbilt University School of Medicine, Nashville, TN 37232. <sup>5</sup>NIH Chemical Genomics Center, National Human Genome Research Institute, National Institutes of Health, Bethesda, MD 20892.

Translesion DNA synthesis (TLS) is a significant DNA damage tolerance mechanism that utilizes specialized DNA polymerases (TLS polymerases) to overcome replication blocks caused by DNA lesions or to seal gaps present opposite the lesion. Human DNA polymerase kappa ( $\kappa$ ) is one of the TLS polymerases belonging to Y-family and has been demonstrated to catalyze TLS past a variety of bulky, minor groove linked lesions including DNA–DNA interstrand cross-link lesions (ICLs) that are induced by many chemotherapeutic agents. Since the TLS activity of pol  $\kappa$  could result in cellular resistance to chemotherapy and since gliomas have been shown to overexpress pol  $\kappa$ , small molecule library screens were carried out using pol  $\kappa$  with the objective being to develop a new cancer therapeutic that can lead to the improvement of efficacy of chemotherapeutic agents. A high throughput, fluorescence-based DNA strand displacement assay using non-damaged DNA has been utilized to screen the Library of Pharmacologically Active Compounds and additional compound libraries. The hit compounds have been identified and confirmed by radioactive gel-based TLS assays with non-damaged DNA. Lead inhibitors have been identified and are being characterized for their specificity toward pol  $\kappa$  in radioactive gel-based TLS assays with DNAs containing site-specific acrolein-mediated adduct (reduced form of g-HOPdG adduct). Additionally, the selectivity of these compounds has been examined for several other DNA polymerases.

THE ROLE OF TRANSCRIPTION FACTOR GATA5 IN ATRIOVENTRICULAR SEPTAL DEFECT. Stephanie Ho, Darcie Babcock, Cheryl Maslen. Division of Cardiovascular Medicine, Oregon Health & Science University, Portland, OR 97239.



Congenital heart disease affects nearly 1 in 100 newborns; however, the mechanisms by which heart malformations occur remain unclear. Compared to euploid children, children who have Down syndrome (trisomy 21) possess a 2,000-fold increased risk of developing atrioventricular septal defect (AVSD), a congenital heart defect characterized by abnormal endocardial cushions development resulting in incomplete septation between the atria and ventricles. A case-control candidate gene study was performed to identify genetic risk factors for AVSD. Missense mutations in *GATA5*, a transcription factor implicated in endocardial differentiation, were found in children with Down syndrome and AVSD but not in children with Down syndrome and a normal heart. Four mutations, P55T, F159L, Q3R, and Y142H, were predicted to affect the function of *GATA5*. To investigate the role of *GATA5* in the development of AVSD, a dual luciferase reporter assay was performed to analyze the effects of specific *GATA5* mutations. *GATA5* constructs containing mutation Q3R increased luciferase activity compared to wildtype *GATA5* constructs, whereas constructs possessing mutations P55T and F159L did not, indicating that mutation Q3R enhances *GATA5* transcription activity and therefore may be involved in the cause of AVSD. Results also suggest that the Q3R mutation has the potential to increase vascular endothelial growth factor A (VEGF-A) expression, which is known to disrupt endocardial cushions development. Continuing research is being performed to assess the effects of the *GATA5* Y142H mutation on heart development.

**KNOCKDOWN OF *FANCL* MAY IMPAIR MULTI-LINEAGE PROGENITOR EXPANSION FROM CORD BLOOD STEM CELLS.** Whitney Nelson<sup>1</sup>, Kim-Hien Dao<sup>2</sup>, Department of Biology, Pacific University, Forest Grove, OR, 97116, <sup>2</sup>Oregon Health and Sciences University Knight Cancer Institute, Oregon Health and Sciences University, Portland, OR, 97239.

Fanconi anemia (FA) is a rare, inherited chromosomal instability disorder characterized by bone marrow failure and susceptibility to cancer. Cells from patients with FA accumulate excessive chromosome breaks when exposed to DNA damaging agents, therefore, providing evidence that the FA pathway functionally exists as an integral part of DNA repair. Recent evidence suggests that alternative functions of the FA pathway exist, yet precisely for what cell type and context is unknown. Our laboratory has evidence that the FA pathway may regulate the signaling output of Wnt/ $\beta$ -catenin, a known signal transduction pathway that regulates a stem cell's ability to expand and self-replicate. Specifically, *FANCL* may enhance the signaling output of  $\beta$ -catenin. Given the relationship between *FANCL* and this pathway, as well as the observation that hematopoietic stem cells from FA patients are remarkably susceptible to apoptosis and display defective stem cell properties, we investigated whether introducing the FA phenotype in cord blood stem cells impacts its self-renewal properties in colony forming cell

assays and replating assays. We first used Western blot and qPCR to verify knockdown of FANCL expression using a set of small hairpin RNA constructs. We will also verify that knockdown of the FANCL gene reproduces the classic FA phenotype, which includes increased chromosome breaks and diminished ubiquitinated FANCD2 protein upon treatment with mitomycin C compared with control cells. Our preliminary data shows that *FANCL*-deficient hematopoietic stem cells have reduced capacity to form multi-lineage progenitors. Based on this preliminary work, we will further investigate if perturbation of the Wnt/ $\beta$ -catenin pathway is the mechanistic explanation for why these cells have impaired multi-lineage potential. Identifying these mechanisms may provide insights into how Wnt/ $\beta$ -catenin signaling may be modulated by other pathways to maintain the stem pool. Thus, inherited or acquired perturbations of this regulation may lead to bone marrow failure.

THE ARCUATE NUCLEUS AS A POSSIBLE SITE FOR INSULIN ACTION WITHIN THE BAROREFLEX PATHWAY. Bryce Rasmussen<sup>1</sup>, Priscila A. Cassaglia<sup>2</sup> & Virginia L. Brooks<sup>2</sup> <sup>1</sup>Department of Math and Science, Warner Pacific College, Portland, OR and <sup>2</sup>Department of Physiology & Pharmacology, Oregon Health & Science University, Portland, OR.

Baroreflex function is impaired in many conditions, such as pregnancy and obesity. Evidence has accumulated to suggest that this impairment is due, at least in part, to a fall in brain insulin levels. First, pregnancy and obesity are associated with insulin resistance and decreases in brain insulin levels. Second, intracerebroventricular (ICV) infusion of insulin normalizes baroreflex function in pregnant and obese rats. However, the brain sites and mechanisms by which insulin in brain supports or improves baroreflex function are not clear. Recently, the Brooks lab has discovered that the blockade of the paraventricular nucleus (PVN) of the hypothalamus reverses the effect of insulin to increase baroreflex function, suggesting that this brain region is involved. However, while the PVN is a clear part of the neurocircuitry, it does not appear to be the place at which insulin initiates its action, since microinjection of insulin into the PVN does not affect the baroreflex. The arcuate nucleus (ArcN), however, is a likely site for insulin action as it is abundant with Neuropeptide Y (NPY) neurons containing insulin receptors and is a key region in circulation. To test this hypothesis microinjections of the retrograde tracer cholera toxin B substrate (CTb) were injected into the PVN of anesthetized female rats. Double-labeling immunocytochemistry was performed a week later to determine projection of insulin receptor carrying NPY neurons from the ArcN to the PVN. Results suggest that NPY neurons containing insulin receptors in the ArcN project to the PVN. This data suggests that the ArcN is part of the insulin pathway in the brain, and further research will show if it is a required site for insulin's action to improve baroreflex gain.

## **BIOLOGY - POSTER PRESENTATIONS:**

**TRANSCRIPTION FACTOR REGULATION BY ERK AND ESTROGEN IN MCF-7 CELLS.** Jessica Magill and John M. Schmitt, Department of Biology, George Fox University, 414 N. Meridian St., Newberg, OR 97132

ERK is activated by increased intracellular calcium downstream of the hormone estrogen (E2). E2 activates ERK via the CaM Kinases, specifically CaM KK and CaM KI in MCF-7 cells. ERK may control cell growth and proliferation through Elk-1, Rsk, SRF, CREB, and numerous other molecules and nuclear targets. Vitamin D, a hormone, has proven to be an effective antagonist of ERK and MCF-7 breast cancer cell growth. Our goal was to evaluate if the E2 pathway working through CaM KK and ERK regulated the transcription factors Elk-1, CREB, and SRF. We also examined the ability of vitamin D to antagonize ERK activation of its downstream targets. Interestingly, E2 stimulation of MCF-7 cells activated both ERK and Elk-1 an effect that was blocked by inhibiting both CaM KK and ERK. E2 treatment of MCF-7 cells also triggered a significant increase in SRF and CREB phosphorylation in a CaM KK- and ERK-dependent manner. Dimerization of transcription factors may enhance DNA binding and gene expression. E2 stimulation of MCF-7 cells promoted the formation of a molecular complex between endogenous Elk-1 and SRF. Finally, E2 triggered a prolonged increase in ERK and Elk-1 phosphorylation, both of which were blocked by vitamin D treatment. Taken together our data demonstrates several transcriptional targets for E2 working through CaM KK and their inhibition by vitamin D signaling.

**CAM KINASE REGULATION OF AKT AND BAD IN PROSTATE CANCER CELLS.** Samantha Smith and John M. Schmitt, Department of Biology, George Fox University, 414 N. Meridian St., Newberg, OR 97132

AKT and its substrate BAD promote prostate cancer cell survival. Agonists, such as carbachol, and hormones that increase intracellular calcium concentration can activate AKT leading to cancer cell survival. LNCaP prostate cancer cells express the carbachol-sensitive M<sub>3</sub>-subtype of GPCR's that increase intracellular calcium and activate the family of Ca<sup>2+</sup>/Calmodulin-dependent Protein Kinases (CaM Ks). One type of CaM Kinase, CaM Kinase Kinase (CaM KK), directly phosphorylates AKT on threonine 308. AKT phosphorylation and activation can enhance cell survival through phosphorylation BAD protein and the subsequent blockade of caspase activation. Our goals were to examine the mechanism of carbachol activation of AKT and BAD in LNCaP prostate cancer cells and evaluate whether CaM KK may be mediating carbachol's activation of AKT and cell survival. The results suggest that carbachol triggered phosphorylation of both AKT and BAD in LNCaP cells. AKT and BAD phosphorylation were blocked by the selective CaM KK inhibitor, STO-609, as well as siRNA directed

against CaM KK. Taken together this data suggests a role for CaM KK in the pathway. In addition, the bacterial toxin anisomycin triggered caspase activation in LNCaP cells that was blocked by carbachol treatment. Finally, our results suggest that carbachol treatment of LNCaP cells promoted cell survival through CaM KK and its phosphorylation of AKT.

CHARACTERIZATION OF TISSUE-SPECIFIC GENES ASSOCIATED WITH TOMATO SEED GERMINATION. Goloviznina, N.A.<sup>1</sup>, Martínez-Andújar, C.<sup>1</sup>, Pluskota, W.E.<sup>2</sup>, Bassel, G.W.<sup>1</sup>, Asahina, M.<sup>1</sup>, Pupel, P.<sup>2</sup>, Nguyen, T.T.<sup>1</sup>, Gorecki R.<sup>2</sup>, Takeda, N.<sup>3</sup>, Yamaguchi, S.<sup>3</sup>, Kamiya, Y.<sup>3</sup>, Nonogaki, H.<sup>1</sup> (<sup>1</sup> Department of Horticulture, Oregon State University, Corvallis, OR 97331, <sup>2</sup>Department of Plant Physiology and Biotechnology, University of Warmia and Mazury, Oczapowskiego 1A, 10-718, Olsztyn, Poland, <sup>3</sup>RIKEN Plant Science Center, Yokohama, Kanagawa 230-0045, Japan)

Germination is defined by the emergence of the radicle from the micropylar region of the seed. It is known that this region is genetically active during imbibition, just prior to radicle emergence. Tomato seeds were imbibed for 18 h for gene expression analysis. Imbibed seeds were dissected and the embryos were removed. The endosperm was divided into two parts: endosperm cap (EC) and lateral endosperm (LE). The embryo was also divided into radicle-half embryo (R) and cotyledon-half embryo (C). RNA was extracted from each of the four tissues and used for gene expression analysis using GeneChip. Analysis of the microarray data showed high expression of cell wall-, pathogenesis (*PR*)-, and hormone-associated genes specific to EC. Tomato *ETHYLENE RESPONSE FACTOR1* (*TERF1*) is a hormone-associated gene found in the EC with >9 fold enrichment. Analysis of *TERF1* expression showed an increase in *TERF1* mRNA during imbibition toward radicle emergence. *NP24*, a *PR* gene, was found in EC with >9 fold enrichment. The *TERF1* binding sites were found in the 5' upstream of *PR* genes, including *NP24*. Effector-reporter analysis is currently underway to verify the induction of *NP24* by *TERF1*.

PRIME INTERNSHIP PROJECT: DETERMINING THE ENERGETIC CONTENT OF PREY SPECIES OF JUVENILE CHINOOK SALMON (*ONCORHYNCHUS TSHAWYTSCHA*) AND THE EFFECTS OF AN ISOPOD PARASITE ON THE SMOOTH BAY SHRIMP (*LISSOCRANGON STYLIROSTRIS*). Laurelyn Perry<sup>1</sup>, Jose Marin Jarrin<sup>2</sup>, Jessica Miller<sup>2</sup>, Itchung Cheung<sup>2</sup>, Coral Gehrke<sup>3</sup>, <sup>2</sup>Hatfield Marine Science Center, Oregon State University, Newport, OR, 97365, <sup>1</sup>Biology, Portland Community College, Portland, OR, 97280, <sup>3</sup>COSEE Pacific Partnerships, Charleston, OR, 97420.

There are not many studies on surf-zones as a habitat, in particular the inner surf-zone of sandy beaches. Recent studies have found that Chinook salmon (*Oncorhynchus tshawytscha*) inhabit sandy-beach surf zones as they migrate out of estuaries. This could partially be

due to the quality of prey found there. During summer 2010, I was an intern in the COSEE Pacific Partnerships Promoting Research Investigations in the Marine Environment (PRIME) Program for community college students and worked on a project to determine the energetic content of prey species of *O. tshawytscha*. This study was part of a larger, ongoing research project examining the spatial and temporal patterns of Oregon sandy beach surf-zone use by juvenile Chinook. The most common prey species, mainly amphipods, insects, fish, mysids, and other crustaceans, were caught by seining and dredging at sites in Alsea Bay and Coos Bay. Caloric content of the surf-zone caught prey was determined using a bomb calorimeter. The results were compared to the caloric content of estuarine caught prey of the same species and were found to be within the same range. During the study, a large portion of the smooth bay shrimp (*Lissocrangon stylirostris*) were found to be harboring the parasitic isopod *Argeia pugettensis*. A separate study was conducted to determine whether the parasites affected the caloric content of the shrimp. The average caloric content for shrimp with and without parasites was similar, suggesting that the parasites had no effect.

ROOT ACID INVERTASE ACTIVITY IN A TRANSGENIC MAIZE ISOLINE. Luke Reyes<sup>1</sup>, Tanya Cheeke<sup>2</sup>, Corey Guidry<sup>2</sup>, Todd Rosenstiel<sup>2</sup>, Mitchell Cruzan<sup>2</sup>, <sup>1</sup>Department of Biology, Concordia University, Portland, OR 97211, <sup>2</sup>Department of Biology, Portland State University, Portland, OR 97239.

Nontarget effects of genetically modified (GM) plants, such as those engineered to express Cry proteins from *Bacillus thuringiensis* (*Bt*), have yet to be fully characterized. Arbuscular mycorrhizal fungi (AMF) are especially susceptible to these effects due to their reliance on plant hosts and their root exudates for carbon. This AMF carbon allocation is regulated by root apoplast acid invertase, which cleaves sucrose, the major transport sugar, into hexoses that colonizing AMF are able to digest. This study explored AMF colonization and root apoplast acid invertase activity in a genetically modified *Bt*-maize line (event *Bt* 11) and its parental isoline (P), with and without AMF inoculation, to test the hypothesis that a reduction in invertase activity in *Bt*-maize is a potential mechanism regulating colonization by AMF, as pilot studies under nutrient stress suggested. *Bt* 11 and P maize seeds were planted in a field soil based potting mix with AMF (AMF+) or without AMF (AMF-); whole plants were harvested after 30 days growth in a greenhouse. Root samples were incubated with sucrose, then tested with the DNS reaction and photometric analysis for reducing sugar concentration. There was no detectable difference in invertase activity between *Bt* 11 and P cultivars, but activity was significantly lower in AMF+ than the AMF- treatments. The reduction in AMF+ plants suggests down-regulation of invertase; future studies will determine whether this reduction in invertase activity may be attributed to pathogen stress or a reduced ability to either up- or down-regulate invertase levels in the *Bt* 11 isoline.

# CHEMISTRY

## Section Chairs:

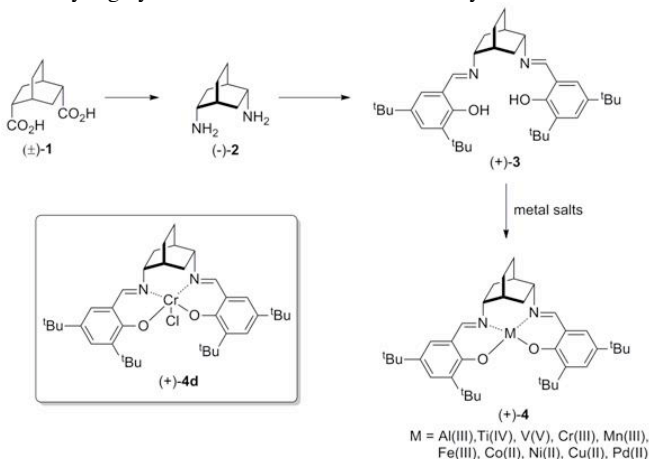
Angela Hoffman  
*University of Portland*

Ted Picciotto  
*Portland Community College*

### CHEMISTRY – ORAL PRESENTATIONS:

CIS-2,5-DIAMINOBICYCLO[2.2.2]OCTANE, A NEW SCAFFOLD FOR ASYMMETRIC CATALYSIS VIA SALEN-METAL COMPLEXES. Subrata Shaw, James D. White, Department of Chemistry, Oregon State University, 153 Gilbert Hall, Corvallis, OR-97331.

A new  $C_2$  symmetric salen ligand is designed having bicycle[2.2.2]octane moiety. Racemic dicarboxylic acid **1** was synthesized in five steps from benzoic acid, resolved via its brucine salt and was converted to diamine **2** by double Curtius rearrangement of the corresponding bis acyl azide. The salen derivative **3** obtained from **2** formed complexes **4** with a variety of metals which catalyze asymmetric induction in reactions such as Hetero Diels-Alder reaction, Nozaki-Hiyama-Kishi coupling and Conia-ene cyclization with very high yield and excellent stereoselectivity.



CHARACTERIZATION OF ORGANICALLY MODIFIED DAWSON-WELLS POLYOXOTUNGSTATES BY LANGMUIR-BLODGETT AND ELECTROCHEMICAL TECHNIQUES. Andrew Carpenter<sup>1</sup>, Department of Chemistry, Linfield College, McMinnville, OR, 97197.

Silyl-organo groups with carbon tails of eight, twelve, and eighteen carbons long were used to organically modify the dawson-wells polyoxotungstate  $P_2W_{17}O_{61}$ <sup>6-</sup>. The organic-inorganic hybrids are,

- 1  $\{[C_4H_9]_4N\}_6\{[C_8H_{17}Si]_2OP_2W_{17}O_{61}\}$ ,
- 2  $\{[C_4H_9]_4N\}_6\{[C_{12}H_{25}Si]_2OP_2W_{17}O_{61}\}$ ,
- 3  $\{[C_4H_9]_4N\}_6\{[C_{18}H_{37}Si]_2OP_2W_{17}O_{61}\}$ , and
- 4  $\{[C_4H_9]_4N\}_6\{[C_{18}H_{37}Si]_2OP_2W_{17}O_{61}\}$ .

Cyclic voltammetry and Langmuir-Blodgett techniques were used to characterize these compounds. Six electron processes were seen in the voltammograms for each compound, with the formal potential positions remaining constant between each compound and scan rates of 50-400 mV/s. Average molecular areas were found to be between 290-416 Å<sup>2</sup>. A hysteresis study found that compound **4** showed atypical stability with a change in the surface area of 1.04%. surface area changes at similar surface pressures were 9.09-12.3%. These findings lay a basis for further electrochemical work, catalysis studies, and spectroelectrochemical studies in the future.

RELIABLE SYNTHESIS OF THE FIRST PSEUDO-OXIME. Anna M. Daniels<sup>1</sup> and Edward J. Valente<sup>1</sup>. <sup>1</sup>Department of Chemistry, University of Portland, Portland, OR 97203.

We have reported the low-yield synthesis of the first pseudo-oxime by a solventless method from the pseudoacyl chloride of 4,4-dimethyl-3-hydroxyisobenzopyran-1-one (**1**). Now, we able to report a clean, high-yield synthesis. The dehydration resistant pseudoacid **1** forms a solid, moisture insensitive pseudoacyl chloride 4,4-dimethyl-3-chloroisobenzopyran-1-one (**2**). It was known that **2** reacts with morpholine to form a mixture of a solid pseudomorpholinamide (**3**) and an oily open aldehydo-tertiary morpholinamide (**4**). An attempt to form the oxime of (**4**) led instead to a product formed with two equivalents of hydroxylamine, identified by crystallography as 4,4-dimethyl-3-hydroxyimino-2(N)-hydroxyisobenzopyridin-1-one (**5**), a pseudo-oxime. Repeated attempts to prepare **5** from **2** using bases pyridine, morpholine or triethylamine were at best low in yield and inconsistent. A new method for purifying **2** has been worked out. Taking advantage of the difficulty with which **1** and **2** form its pseudoesters, we have found that quantitative conversion of **2** to pseudo-oxime **5** occurs with sodium carbonate as the base in warm 95% aqueous ethanol. Product **5** is isolated as colorless crystals in >70% yield after filtration of the insoluble inorganics, and recrystallization. Solid **5** melts at 160°C with dehydration. The structure, determined at 101 K, is monoclinic, space group P2(1)/c,  $a = 13.1638(3)\text{Å}$ ,  $b = 6.3069(2)\text{Å}$ ,  $c = 13.4581(3)\text{Å}$ ,  $\beta = 108.256(3)^\circ$ ,  $V = 1061.09(5)\text{Å}^3$  for  $Z = 4$ ,  $d = 1.391\text{ Mg/m}^3$ .

We acknowledge support by the National Science Foundation for crystallographic equipment (MRI 0616148).

ROUTES TO DEHYDRATED PSEUDO-OXIMES IN DEHYDRATION SENSITIVE PSEUDOACYL SYSTEMS. Megan Supinski<sup>1</sup> and Edward J. Valente<sup>1</sup>. <sup>1</sup>Department of Chemistry, University of Portland, Portland, OR 97203.

We have shown that dehydration sensitive pseudocids form a class of N-hydroxyiminoamides by reaction of their pseudoacyl chlorides with hydroxyamine and a suitable base. Pseudocids and their derivative pseudoacyl chlorides are variously sensitive to elimination reactions. Following the discovery that 4,4-dimethyl-3-chloroixobenzopyran-1-one formed a pseudo-oxime 4,4-dimethyl-3-hydroxyimino-2(N)-hydroxyisobenzopyridin-1-one by reaction with a nitrogenous base and excess hydroxylamine, we sought similar products in furanoid pseudoacyl systems. Thus, *o*-formylbenzoic acid was converted to its pseudoacyl chloride, 3-chloroisobenzofuran-1-one (**1**) in 20% yield with thionyl chloride (the balance is a mixture of diastereomeric dipseudoanhydrides). Treatment of **1** with triethylamine and excess hydroxylamine, and after removal of the non-polar colored byproducts, gave solid 3-hydroxyiminoisobenzopyrrolid-1-one (**2**), mp 255°C. Similarly, mucochloric acid (*Z*-2,3-dichloro-4-oxobutanoic acid, **3**) forms its pseudoacyl chloride **4** in poor yield by reaction with thionyl chloride. With triethylamine and hydroxylamine, **4** gives tarry unidentified products, but with sodium carbonate in 95% ethanol, moderate yields of 3-hydroxyimino-2,3-dichloropyrrolid-1-one (**5**), mp 145°C (dec.), are recovered. Both **2** and **4** appear to have formed by dehydration of related hydroxyamino/N-hydroxyamide intermediates. A similar study with opianic acid, 5,6-dimethoxy-2-formylbenzoic acid is under development. Crystals of **2** are monoclinic, space group: P2<sub>1</sub>2<sub>1</sub>2<sub>1</sub> (#19), at 101 K  $a = 3.8606(18)\text{\AA}$ ,  $b = 20.635(10)\text{\AA}$ ,  $c = 9.102(4)\text{\AA}$ ,  $V = 725.1(6)\text{\AA}^3$ ,  $Z = 4$ , and  $d = 1.485\text{ Mg/m}^3$ . Crystals of **5** are triclinic, space group: P-1 (#2), at 298 K  $a = 7.2634(7)\text{\AA}$ ,  $b = 7.6485(7)\text{\AA}$ ,  $c = 12.2085(11)\text{\AA}$ ,  $\alpha = 93.523(10)^\circ$ ,  $\beta = 98.001(8)^\circ$ ,  $\gamma = 101.844(11)^\circ$ ,  $V = 654.5(2)\text{\AA}^3$ ,  $Z = 4$ ,  $d = 1.42\text{ Mg/m}^3$ .

We acknowledge support by the National Science Foundation for crystallographic equipment (MRI 0616148).

POOR PACKING CONTRIBUTES TO CONSIDERABLE LIBRATION IN SOLID STATE ENANTIOMERIC PHENPROCOUMON. Truc-Vi Duong<sup>1</sup> and Edward J. Valente<sup>1</sup>. <sup>1</sup>Department of Chemistry, University of Portland, Portland, OR 97203.

It has been known since the 1970's that racemic and enantiomeric phenprocoumon (C<sub>18</sub>H<sub>16</sub>O<sub>3</sub>) are pseudoisomeric in their solid states. Crystals of the racemate, mp 179-180°C, are monoclinic,



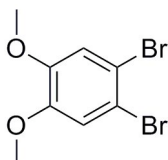
space group  $P2_1/a$  with  $Z=4$  and density  $1.268 \text{ g/cm}^3$  at 295 K; crystals of the (S)-isomer, mp  $170\text{-}171^\circ\text{C}$ , are monoclinic, space group  $P2_1$  with  $Z=4$  (two molecules per asymmetric unit) and density  $1.245 \text{ g/cm}^3$  at 298 K. As this relationship is unusual, the (S)-isomer was subjected to a low-temperature crystallographic investigation to see if a phase transition might occur. At 101 K, the structure of the (S)-isomer is the same as at room temperature. Both (S)-phenprocoumon molecules show considerable librational motion, as implied by the displacement amplitudes of the phenyl and benzo carbons at the “ends” of the molecules. Molecules have two different conformations such that one (A) occupies a similar lattice location to that of a similar conformer in the racemate; and the other (B) occupies the lattice location equivalent to the enantiomer in the racemate. The resulting packing in the enantiomeric structure is poorer, leading to a smaller density and lower melting point. In both racemate and enantiomeric structures, strong linear H-bonding links molecules along an axis roughly perpendicular to the phenyl and benzo rings, leaving these groups relatively poorly packed in their lattices. This is displayed in the magnitude of the anisotropic displacement parameters, which represents minute disorder rather than molecular vibrations. These persist even at low temperature in the less tightly packed enantiomeric structure.

We acknowledge support by the National Science Foundation for crystallographic equipment (MRI 0616148).

## CHEMISTRY – POSTER PRESENTATIONS:

**4,5-DIBROMOVERATROLE: A VERSATILE PLATFORM FOR THE SYNTHESSES OF POLYFUNCTIONAL PHOSPHINES AND COORDINATION COMPLEXES.** Rose Chuong, Lillian P. Nguyen, Diane Phan, Eugenijus Urnezisius Department of Chemistry, University of Portland, 5000 N. Willamette Blvd., Portland, OR 97203.

Organic compounds possessing the ability to coordinate various metal centers and to undergo electron transfer have been actively investigated for decades. Such functional units are often present in a number of naturally occurring enzymes, and are also actively sought for various “smart materials” to be used for the technological



4,5-Dibromoveratrole

advances of the future. Structural features present in 4,5-dibromoveratrole make it a rather unique starting material allowing for new investigations in this field. For example, bromine groups can be easily exchanged for donor functions capable of binding to metals, and the methoxy groups can be transformed into *o*-hydroquinone moiety, which is in turn capable of electron transfer. Surprisingly, very few studies

utilizing 4,5-dibromoveratrole for such purposes are known. We have started a project where 4,5-dibromoveratrole serves as a platform for a buildup of new organic compounds and coordination complexes derived from them. Herein we present our initial synthetic, structural and spectroscopic investigations.

COMPARISON OF PRODUCTS BEFORE AND AFTER EPIGENETIC MODIFICATION OF A FUNGUS. Valerie Chiong, Angela Hoffman. Department of Chemistry, University of Portland, 5000 N Willamette Blvd, Portland Oregon 97203.

Organisms have genes that are not always used. Some of these genes may be turned on or off under certain conditions. By adding methyl jasmonate or azacytidine to a fungal culture that was isolated from *Taxus chinensis*, gene methylation was altered and different products were made as observed by TLC chromatograms reacted with a vanillin-H<sub>2</sub>SO<sub>4</sub> solution. These products are being isolated and identified.

ISOLATION OF A COMPOUND FROM PIGWEED (*CHENOPODIUM AMBROSIOIDES*) THAT PREVENTS SEED GERMINATION. Wyatt Olson, Angela Hoffman. Department of Chemistry, University of Portland, 5000 N Willamette Blvd, Portland Oregon 97203.

After observation of plant germination inhibition in areas where *Chenopodium ambrosioides* is prevalent attempts to separate non-volatile allelopathic compounds from the species roots and soil were attempted. Extracts from *C. ambrosioides* roots were separated using chromatography gradient of hexane to ethyl acetate and fractions bioassayed in germination inhibition tests of *Raphanus sativus*. Fractions of soil extract with 78% hexane showed complete inhibition of germination at a concentration of 0.002 µg/µL. The root extracts shows many more fractions with significant inhibition. Fractions from 15-28% ethyl acetate show a inhibition of 13.33% at a concentration of 0.044 µg/µL. Fractions 22-26% were combined and further purified by HPLC and each peak bioassayed. Fraction from peak 10.7-13.4 min showed complete inhibition of radish seed germination at a concentration of 0.028 µg/µL. All active fractions show a dark green spot on TLC analysis when stained with vanillin. R<sub>f</sub> value for this spot ranges from 0.568-0.609. Further purification of root extract using flash chromatography and HPLC is currently underway with hopes of isolating and identifying the active compound(s).

THE KINETIC ANALYSIS OF PRODRUG ACTIVATION AND ATP/UTP SUBSTRATE PREFERENCE OF NINE HUMAN DEOXYCYTIDINE KINASE MUTANTS. Breanna Wentz\*, Jaclyn Einspahr\*, Michael Godsey Ph.D, Math and Science Department, Concordia University, Portland, OR 97211. \*Authors contributed equally to this work.

Deoxynucleoside analogues are prodrugs that can function as inhibitors of both viral and cellular DNA replication processes. They are important in anti-cancer therapy because they hinder DNA synthesis and cellular mitosis. Within the cell, deoxyribonucleotides are synthesized using the salvage pathways by converting the unphosphorylated nucleosides to their mono-, di- and tri-phosphate forms using a phosphoryl donor: ATP or UTP. Human deoxycytidine kinase (dCK) uses nucleoside triphosphates to phosphorylate several clinically important nucleoside analogue prodrugs in addition to its natural substrates. The dCK protein is the first and rate-limiting enzyme to this process. The preferred physiological phosphoryl donor for dCK is UTP although it is less prevalent in the human body than ATP. Our objective was to improve the understanding of the phosphate-donor binding loops of dCK by kinetic analysis of a series of mutants of Asp241 and Phe242. These mutants were designed in order to improve the activity between dCK and the phosphate donors. We grew, purified and performed colorimetric kinetic analysis on nine mutants of dCK. Results were analyzed to determine the rate of activity of each mutant with both ATP and UTP. Our results showed that mutating the dCK residues will open up the active donor site to make it more accessible to bind ATP and UTP resulting in more phosphate donor flexibility. The implications of this research has the potential to progress in anti-cancer therapy as a more efficient form of dCK can act as an inhibitor of both viral and cellular DNA replication.

REMOVAL OF THE PURIFICATION TAG IN PUTATIVE TOXIN PROTEIN BC\_2332, RELATED TO *BACILLUS ANTHRACIS*, VIA SITE-SPECIFIC MUTAGENESIS AND PROTEOLYTIC CLEAVAGE. Joanna Fridlund, Bethany Taylor, Michael Godsey, Department of Math & Sciences, Concordia University, 2811 NE Holman St, Portland, OR 97211.

Putative toxin protein BC\_2332, isolated from *Bacillus cereus* which is a relative of *Bacillus anthracis*, shows similarity in the active site to ADP-ribosylating proteins present in cholera and diphtheria. Preliminary attempts to measure the activity of the putative toxin BC\_2332 were unsuccessful leading to the hypothesis that the purification tag is hindering the activity. This hypothesis is supported by crystal structure analysis showing the putative active site occupied by the purification tag. Our objective was to remove the purification tag, via two different methods, in order to relieve potential inhibition. One method entailed using site-specific mutagenesis and restriction enzyme cutting in order to genetically modify the expression system to remove the purification tag. The second method involved purifying the protein using immobilized metal affinity chromatography (IMAC) to allow proteolytic cleavage of the purification tag using the Tobacco Etch Virus (TEV) protease. The first method yielded a modified plasmid and further analysis is underway. The second method has shown that the protein is

somewhat resistant to TEV cleavage perhaps due to the sequestration of the TEV cutting site in the putative active site. These two methods together are making progress towards removal of the purification tag to allow for measurement of the activity of the putative toxin protein.

#### CHARACTERIZATION OF THE INVERTASE-SUCROSE COMPLEX USING SURFACE-ENHANCED RAMAN SCATTERING. Amanda Wolf, Dr. Brian Gilbert, Department of Chemistry, Linfield College, McMinnville, Oregon 97128

Understanding the relationship between protein structure and function is a hot topic of research. In this study we used the invertase-sucrose complex to analyze if SERS could be used to characterize changes in protein structure. Ideal conditions for SERS of the invertase were determined through multiple experiments varying pH and concentration. The optimal conditions were found to be pH 7 and 25  $\mu\text{g/mL}$  invertase. Reference spectra were taken of invertase, sucrose, glucose, and fructose. The enzyme was mixed with sucrose and spectra were taken and compared to the reference spectra. Based on these preliminary results, the invertase-sucrose complex is detectable through SERS. One of the peaks seen in the complex that is not present in SERS of just invertase corresponds to B-sheet which indicates a conformational change. It could also indicate that invertase and the complex bind differently to the colloids.

#### DETERMINATION OF THE OPTIMAL CONDITIONS FOR BOVINE SERUM ALBUMIN SURFACE ENHANCED RAMAN SCATTERING ON SILVER COLLOIDS. Joell D. Reyes and Dr. Brian D. Gilbert. Chemistry Department, Linfield College McMinnville, OR 97128.

Bovine serum albumin (BSA) was analyzed using surface enhanced Raman scattering (SERS) to find the optimal conditions to observe BSA with SERS. Colloidal silver,  $\text{Na}_2\text{SO}_4$ , and BSA were mixed together at varying pHs and concentrations to obtain multiple spectra. The most favorable conditions using SERS for BSA were 500 $\mu\text{g/mL}$  and pH 4. The spectrum under those conditions showed the most intense and discernable peaks and the alpha helical secondary structure was very distinct at 1297  $\text{cm}^{-1}$ . SERS can be used for label free detection of proteins, thus finding the best conditions to obtain spectra using this technique may be very beneficial to proteomic research.

# GEOGRAPHY

## Section Chairs:

Joe Poracsky  
*Portland State University*

Hunter Shobe  
*Portland State University*

### **GEOGRAPHY – ORAL PRESENTATIONS:**

**A GEOGRAPHIC ASSESSMENT OF THE RISK POSED BY HAZARDOUS MATERIALS IN OREGON.** David Banis, Katie Urey & Heather Ann Van Dyke, Geography Department, Portland State University, Portland, OR 97207-0751.

The Center for Spatial Analysis and Research at Portland State University, in partnership with the Oregon Department of Environmental Quality and funded by the Oregon State Fire Marshal's Office, has performed initial analysis of risks posed to Oregon communities of potential unplanned releases of hazardous materials. These risks from hazardous material exposure depend on many factors including the relative danger of the substance, the size of the release, the people that are affected, and the environment that is impacted, and may be compounded by fire, flood, and tsunami events. This presentation focuses on the exposure to hazardous material that may be associated with both storage at a fixed facility or transport by highway, rail, and water. In addition, ten years of incident data for the unplanned releases of hazardous substances were included in the analysis.

**LEGACY EFFECTS RELATED TO MARMOT DAM AND THEIR INFLUENCE ON PEDOGENESIS OF UPLAND SOILS, SANDY RIVER, OREGON.** Robert Bean & Daniel Uthman, Geography Department, Portland State University, Portland, OR 97207-0751.

The former site of Marmot Dam on the Sandy River in Clackamas County, Oregon is a suitable study area for the examination of legacy effects of dam presence and removal on nearby soils. The Soil Survey of the Clackamas County Area (Gerig, 1985) classifies the terrace soils upstream and downstream of the former dam site as Aquentic Haplorthods (Crutch Series). Soils of the river terraces upstream of the dam were inundated by reservoir waters from 1913-2007, while the same geomorphic surfaces downstream were not. Five soil pit sites, three experimental pits upstream and two control

pits downstream, were excavated, and samples were extracted for field and lab identification and lab analysis. Results from the both the experimental soil pits in the river terrace upstream of the dam and the two downstream control pits, where the Crutch series is mapped, do not have the characteristics of Spodosols as described in the Crutch Series. The downstream control pits should be classified as Oxyaquic Eutrudepts. Due to effects caused by a nearly 100-year inundation of water, the downstream soils instead display traits of subaqueous soils and should be classified as Fluventic Psammowassents or Thapto-Histic Fluviwassents. Characteristics of inundation found in upstream experimental pits included lacustrine varves, gleyed coloration, and increased organic carbon content at depth, indicative of soils buried in a freshwater lacustrine environment with seasonal flushing.

**BASIN ANALYSIS GIS - A SPATIAL DECISION SUPPORT SYSTEM FOR SELECTING SNOWPACK MONITORING SITES.** Jiunn-Der Duh, Geography Department, Portland State University, Portland, OR 97207-0751.

The Center for Spatial Analysis and Research (CSAR) in the Department of Geography at Portland State University is currently engaged in a multi-year agreement with the USDA-NRCS, National Water and Climate Center (NWCC) to develop a spatial decision support system (SDSS) for improving water forecast accuracy. The SDSS has the functions to organize watershed GIS layers, delineate hydrological response units (HRU), and generate HRU physical parameters that are used in water-forecasting models. This presentation describes the analytic functions of the SDSS, called Basin Analysis GIS (BAGIS), developed during Phase I (2009-2010). The main purposes of BAGIS are to delineate the watershed boundaries (i.e., AOIs) and generate reports and maps for locating potential snowpack monitoring sites such as SNOTEL within the AOIs. BAGIS provides functions for (1) managing and organizing basin analysis data, (2) preparing terrain datasets for AOI delineation, (3) delineating AOIs, (4) performing spatial computation, and (5) generating analysis maps and Excel reports. It integrates DEM-based watershed delineation algorithms, raster classification, and zonal statistics routines in ArcGIS to streamline the complex site selection process. BAGIS is being used at NWCC and PSU on both ESRI's ArcGIS 9.X and 10 platforms. On-site testing of BAGIS indicates that BAGIS has improved the efficiency of SNOTEL site selection by a factor of ten - a task that took a week to complete now only takes a couple hours. The completion of the SDSS would provide a tool for better integration of scientific research in water resources management.

**USING TREE-RINGS TO RECONSTRUCT WESTERN SPRUCE BUDWORM OUTBREAK HISTORIES IN THE INTERIOR PACIFIC**

NORTHWEST. Aquila Flower & Dan Gavin, Geography Department, University of Oregon, Eugene, OR 97403.

Douglas-fir forests in the interior Pacific Northwest are subject to sporadic outbreaks of the western spruce budworm, a species widely recognized as the most destructive defoliator in western North America. Outbreaks of the western spruce budworm often occur synchronously over broad regions and lead to widespread decreases in photosynthesis and growth rates in affected forest stands. These outbreaks may also predispose host trees to subsequent infestations by other insects and pathogens, and have the potential to increase future wildfire severity by increasing fuel loads through defoliation-induced mortality and litter accumulation. Increases in the severity, duration, frequency, and/or synchronicity of western spruce budworm outbreaks during the late 20th century have been reported in many regions, with these increases commonly attributed to changing land-use patterns and climatic conditions. In spite of the ecological and economic significance of this species, the controlling mechanisms behind its outbreak patterns are still not fully understood, due in part to the limited historic observational record. Preliminary results will be presented from a study in which dendroentomological methods are being used to reconstruct multi-century western spruce budworm outbreak paleo-histories at sites located along a transect running from northeastern Oregon to western Montana. Statistical analyses were used to quantify the influence of local climatic variability on the reconstructed western spruce budworm outbreak records at specific sites. The inter-regional synchronicity of outbreaks from different sites was also assessed, and potential climate drivers behind observed patterns of synchronicity were explored.

THE EFFECT OF MULTIPLE THEMATIC LAYERS ON WEB MAP USAGE BY MIDDLE SCHOOL STUDENTS. Andy Freed, Geography Department, Portland State University, Portland, OR 97207-0751.

Access to the Internet and to a variety of interactive mapping tools has increased interest among middle school teachers to use interactive maps in conjunction with learning activities. There is very little research in the area of interactive mapping in educational situations, specifically with regards to layer maps that combine multiple thematic layers on a single map. This study evaluates the relationship between the number of layers present on a web-based map and middle-school students' accuracy and timeliness using the map to answer geographic questions. Additionally, this study examines the specific effect of a hill shade on student response time and accuracy when answering questions do not require any terrain information. Tests were conducted in five Portland, Oregon area middle school classrooms using Blackboard CE8 to present maps and collect responses. Early findings indicate that response times improved with age, but that accuracy of responses did not. There also appears to be a relationship between the number of layers and

response time. There does not appear to be any relationship between the presence of a hill shade and the response time or accuracy in student responses.

SOIL DEVELOPMENT ON THREE LATERAL MORAINES OF ELIOT GLACIER, MOUNT HOOD, OREGON. Nadia Jones, Geography Department, Portland State University, Portland, OR 97207-0751.

My research investigates the Holocene glacial history of Mount Hood by analyzing a set of three lateral moraines of Eliot Glacier. These moraines may aid in providing a more complete history of Holocene glaciations on Mount Hood, which is well documented for the past 100 years but is less clear for earlier possible Holocene glacial advances. This study seeks to: (1) establish the relative ages of these lateral moraines, and (2) determine if these features represent distinct glacial advances. My hypothesis is that the lateral moraines for Eliot Glacier represent three distinct periods of glaciation based on their position relative to the current glacier and other diagnostic indicators. Relative dating techniques applied to these glacial features are used to distinguish the recent glacial history of Mount Hood. These techniques include an analysis of the soil development by considering color, texture, depth, particle size, and pH. This presentation will show the preliminary findings of the soil samples taken from the eastern set of lateral moraines. Soil profiles were described in the field and samples were taken from each horizon for laboratory analysis of pH and particle size. The initial findings of this research show that the soils developing on the moraine furthest from the current glacier are more developed and deeper than the soils on the closest moraine, indicating a considerable age difference.

THE 2010 CENSUS AND THE AMERICAN COMMUNITY SURVEY. Richard Lycan, Population Research Center, Portland State University, Portland, Oregon 97207-0751.

In December the American Community Survey (ACS) became available for all geographies down to the block group level. The initial release of data from the 2010 census will occur in about a month, to the census block level to support legislative redistricting. The fine geographic granularity of these data makes them of particular interest to geographers and cartographers. What is different compared to the 2000 census? A key difference is that the "long form" census data, which provided socioeconomic detail on variables such as employment, poverty, and education, will be found in the ACS, not the 2010 Census. If you want to make a detailed map of poverty in your city you now can do this using the 2005-2009 ACS five year data for census tracts or block groups. The data tables will be similar to those for the 2000 census, but are based on the continuous surveys of the ACS. Sampling errors will be larger than those from the 2000 census for comparable geographies, but the ACS



does a better job of informing the user of the range of likely values. The ACS surveys also are better at call-backs to get completed census questionnaires on complicated questions like those on sources of income. The ACS results in less use of imputation to fill for missing data. You don't know what "imputation" is? You should come to this presentation.

**MODELING THE SENSITIVITY OF TUCANNON RIVER HYDROLOGY TO CHANGES IN TEMPERATURE AND PRECIPITATION.** Sarah Praskievicz, Geography Department, University of Oregon, Eugene, OR 97403.

Anthropogenic climate change is expected to affect water resources at the basin scale, notably through increased precipitation intensity and reduction of snowpack from warmer temperatures. Previous hydrologic modeling studies have simulated the consequent changes in streamflow, including increased winter flow and shift of peak flow to earlier in the season in snowmelt-dominated basins. This increased hydrologic variability may affect the physical form of river systems. Alluvial channels adjust their channel and planform to the flow and sediment load they must accommodate. The effects of climate-driven changes in hydrologic variability on the geomorphic characteristics of river channels in snowmelt-dominated basins – including sediment transport, channel cross-section, and planform – is unknown. As a preliminary step in simulating hydrologic and geomorphic impacts of climate change in the Tucannon River Basin in southeastern Washington, I am calibrating and validating the Soil and Water Assessment Tool (SWAT), a basin-scale semi-distributed hydrologic model developed by the United States Department of Agriculture, using historic gaging station records. I am using a range of synthetic climate change scenarios to simulate changes in the magnitude, frequency, and seasonality of peak flows, relative to simulated historical flows, in the validated model. The goal of this project is to examine the relative sensitivity of simulated flows in the Tucannon River to changes in temperature and precipitation, in preparation for using downscaled Regional Climate Change (RCM) scenarios from the North American Regional Climate Change Assessment Program (NARCCAP) in continued modeling of hydrologic and geomorphic impacts of climate change.

**DEVELOPMENT OF A 3-D BUILDING MODEL IN ASTORIA, OREGON.** Mark Scott, P.O. Box 17, Ocean Park, WA 98640.

For two years the City of Astoria, Oregon has been in the process of creating a 3-D building model of the 83 acre downtown Historic District. Using Google Sketchup (version 7-8), the final product is intended to provide a way to represent information about downtown businesses and building inventory. Along with the 3-D building exteriors, the building models have interior partitions to represent the

diversity of existing spaces where 471 businesses operate in 213 separate buildings. Many interesting problems were identified when these data were assembled. A spatial database is used to maintain the information for unique businesses spaces that occupy some portion of a buildings inventory that spans several hundred parcels. A classification scheme was created to further identify the types of business spaces, and the 3-D building model incorporated other spatial data with the addition of hook fields. The spatial data created for this project is intended to be periodically updated and maintained by community resources. There are a number of both public and private participants involved with the project, including city staff, Clatsop Community College, the Astoria Downtown Historic District Association (ADHDA), Columbia River Estuary Taskforce (CREST) and CARTOMATION INC.

POTENTIAL CLIMATE-INDUCED RUNOFF CHANGES IN TWO OREGON COASTAL WATERSHEDS. Madeline Steele, Heejun Chang & Il-Won Jung, Geography Department, Portland State University, Portland, OR 97207-0751.

In the coming decades, climate change may have various adverse impacts on critical, delicate estuarine habitat in the Pacific Northwest, including major shifts in the salt water/freshwater balance. To help managers prepare for such shifts, we estimated changes in freshwater discharge into two key Oregon estuaries using the US Geological Survey's Precipitation Runoff Modeling System (PRMS). The two study basins are the Yaquina and the Coquille river watersheds. We calibrated the models using gaged sub-basin flow data and area-averaged climate data from the CIG (Climate Impacts Group), and then forced the models with downscaled climate scenario data from the NARCCAP (North American Regional Climate Change Assessment Program). The scenarios are Regional Climate Models (RCMs) forced with Atmosphere-Ocean General Circulation Models (AOGCMs). With each scenario, we simulated runoff for a reference period (1971-1995) and future period (2041-2065). We then analyzed the results at several temporal scales, using a range of hydrological indices to assess magnitude, frequency, and variation of low and high flows, and more. Monthly, seasonal and yearly changes varied strongly between scenarios, with most variability coming from the AOGCMs. Coastal basin runoff is highly sensitive to precipitation. Given the uncertainty associated with future precipitation projections, potential climate impacts are more uncertain for such basins than for snow-melt dominated basins, which are more temperature sensitive. Nonetheless, the models do suggest that the freshwater inputs into these coastal estuaries are projected to decrease in July and August, and strongly increase in September and October, which could have important effects on estuarine salinity and thus habitats.

# GEOLOGY

## Section Chairs:

Scott Burns  
*Portland State University*

Jeff Myers  
*Western Oregon University*

### GEOLOGY – ORAL PRESENTATIONS:

MASSIVE EROSION OF FLORAS CREEK AND NEW RIVER IN CURRY COUNTY, OREGON RESULTING FROM BREACHING OF NEABY SAND DUNES. Scott F. Burns, Derrick Wagner, Shira DeGroot, Ayda Forouzan, Dept. of Geology, Portland State University, P.O. Box 751, Portland, Oregon 97207

Floras Creek originally flowed from the mountains near Langlois, Oregon into the New River which then traveled approximately 10 km along a coastal dune system before flowing into the Pacific Ocean. The dunes have been purposely breached since 1970 near the confluence of Floras Creek and New River to drain the wetland next to the New River to convert it into a ranch. Since the initial breach, the Floras Creek has responded to the changes in base level and massive erosion has been noted. The initial breach caused a significant increase in slope for the creek. It nearly tripled from 0.64m/km prior to breaching to 1.72 m/km after. The increase in slope disturbed the natural equilibrium of sediment aggradation, erosion and incision of this meandering stream that was very close to base level. Analysis of aerial photos from 1954 to 1997 have indicated that parts of Floras Creek have widened up to 1130% of the 1954 creek width and downcut 1-2 meters. The creek has become less sinuous. Extensive fish habitat and wetland destruction has occurred.

ROLE LANDSLIDES PLAY IN REDUCING DRINKING WATER QUALITY IN THE WESTERN CASCADES – CASE STUDY IN THE LITTLE NORTH SANTIAM RIVER BASIN, OREGON. Steven Sobieszcyk<sup>1,2</sup>, Scott F. Burns<sup>1</sup>, <sup>1</sup>Department of Geology, Portland State University, Portland, OR, <sup>2</sup>U.S. Geological Survey, Portland, OR 97201.

The Little North Santiam River Basin is a 111-square-mile watershed located in the Western Cascades of Oregon. The Little North Santiam River is a major tributary to the North Santiam River, which is the primary source of drinking water for Salem, Oregon, and the surrounding communities. Consequently, adverse water quality

conditions in the Little North Santiam River, such as high turbidity, affect treatment and delivery of the drinking water. Between 2001 and 2008, suspended sediment from the Little North Santiam River accounted for 69% of the total load that passed the treatment plant. Recent studies suggest that much of this sediment originates from landslide activity in the basin. Using airborne Light Detection and Ranging (LiDAR)-derived imagery, 401 landslides were mapped. Landslide types vary by location, with deep-seated earth flows and earth slumps common in the lower basin and channelized debris flows prominent in the upper basin. Over 37% of the lower basin shows evidence of landslide activity compared to just 4% of the upper basin. Instream turbidity monitoring and suspended-sediment load estimates during the winter of 2009–2010 demonstrate a similar distribution of sediment transport in the basin. During a 3-month study period, from December 2009 through February 2010, the lower basin supplied 2,990 tons, or 91% of the suspended-sediment load to the Little North Santiam River, whereas the upper basin supplied only 310 tons of sediment. One small, 23-acre earth flow in the lower basin, the Evans Creek Landslide, supplied 28% of the total suspended-sediment load.

THE GLACIOFLUVIAL ENVIROMENT OF LINNEBREEN, SPITSBERGEN, SVALBARD. Simon Pendleton<sup>1</sup>, Steven Roof<sup>2</sup>, Alan Werner<sup>3</sup>, Robert J. Carson<sup>1</sup>, Department of Geology, Whitman College, Walla Walla, WA, <sup>2</sup>School of Natural Science, Hampshire College, Amherst MA, <sup>3</sup>Department of Geology, Mount Holyoke College, South Hadley, MA.

High arctic environments are highly susceptible to even the slightest of climate variations and the glacio-lacustrine environments present at these high latitudes often preserve detailed paleo-climate records in their sediments. The goal of the NSF funded Svalbard REU program is to extract such a record from the Linné valley on the west coast of Spitsbergen, Svalbard. In order to read the lake varves as a high-resolution climate record, the processes and mechanisms that cause the deposition must be clearly understood. This study focuses on the glacier, Linnébreen, its meltwater discharge, and sediment output in response to variations in local weather conditions. From July 21 – Aug. 9, 2010, ISCO water samplers were installed along the meltwater channel to record suspended sediment concentration. Other instrumentation in the channel measured stage, temperature and turbidity while several stations on and around the glacier recorded local meteorological conditions. Collected discharge and suspended sediment concentrations (SSC) both exhibited strong diurnal patterning and are directly related as high SSC matches high discharge. Of all the observed weather conditions, precipitation events have the highest correlation to SSC. The lower SSC sampler measured a marked decrease in SSC from the upper sampler indicating that the glacio-fluvial environment is a sediment sink. This study has established precipitation as the key driver of sediment

output from the glacier, but the presence of a pro-glacial sediment sink interrupts the sediment “signal” produced by the glacier. Periods of strong sediment output are masked by this storage, before being flushed annually by the spring melt.

LATE PLEISTOCENE GLACIATION OF THE EASTERN SAYAN RANGE, NORTHERN MONGOLIA. Gabrielle Vance<sup>1</sup>, Karl Wegmann<sup>2</sup>, Kurt Frankel<sup>3</sup>, Andy de Wet<sup>4</sup>, Robert Carson<sup>1</sup>, Nick Bader<sup>1</sup>, Briana Berkowitz<sup>5</sup>, Daniel Birdwhistell-Rothberg<sup>6</sup>, Esukhei Ganbold<sup>7</sup>, Afshan Shaikh<sup>3</sup>, (1) Department of Geology, Whitman College, Walla Walla, WA, (2) Department of Marine, Earth, & Atmospheric Sciences, North Carolina State University, Raleigh, NC, (3) School of Earth and Atmospheric Sciences, Georgia Institute of Technology, Atlanta, GA, (4) Department of Earth and Environment Studies, Franklin and Marshall College, Lancaster, PA, (5) Department of Geology, Beloit College, Beloit, WI, (6) Department of Geology, Colorado College, Colorado Springs, CO, (7) School of Geology and Petroleum Engineering, Mongolia University of Science and Technology, Ulaanbaatar, Mongolia.

The glacial geochronology of the Eastern Sayan Range of Mongolia’s Hövsgöl province is not well understood. Relative ages of the moraine complexes from late Pleistocene glaciations in the Horoo Gol (river) Valley (51.570° N, 100.462°E) at the northern end of Lake Hövsgöl were determined via field mapping and measurements of boulder frequency, size, and mass strength. Geomorphic data suggest two periods of glacial advance separated by a substantial interval. Twelve forthcoming cosmogenic <sup>10</sup>Be surface exposure ages of granitic boulders on the moraine crests will result in numerical age determinations. The morphology of the valley’s moraines suggests multiple piedmont glaciations or a single surging valley glacier, approximately 47 km long, during the Last Glacial Maximum (LGM). The LGM moraine has a distinct moraine front and abundant large boulders, whereas the downvalley piedmont moraines have more subdued topographic profiles and fewer, more weathered boulders. Toe-headwall altitude ratio and toe-summit altitude method calculations yield a mean reconstructed equilibrium-line altitude (ELA) of 2280 meters for the LGM glacier in the Horoo Gol Valley and 2241 meters for the older terminal moraine complex. Measuring regional variations among ELAs may help determine timing of climatic shifts.

NEW ESTIMATES OF THE MIDDLE MIOCENE ATMOSPHERIC CARBON DIOXIDE MAXIMUM FROM FOSSIL *GINKGO* LEAVES OF IDAHO. Gregory J. Retallack<sup>1</sup>, William C. Rember<sup>2</sup>, Department of Geological Sciences, University of Oregon, Eugene, Oregon, 97403, <sup>2</sup>Department of Geological Sciences, University of Idaho, Moscow, Idaho 83844

By the year 2100, atmospheric CO<sub>2</sub> concentrations are predicted to triple, from pre-industrial levels of 280 ppmv to some 856 ppmv (+70/-101 ppmv) based on scenario A2 of a very heterogeneous

world with continued population growth. Such changes are unprecedented in Quaternary records, but their effects can be assessed by proxies for atmospheric CO<sub>2</sub> deeper in geological time. A middle Miocene greenhouse has proven controversial, because stomatal index and pedogenic carbonate isotopic data suggest a significantly higher than modern level of middle Miocene CO<sub>2</sub>, whereas algal alkenone and foraminiferal boron paleobarometers suggest lower than modern middle Miocene CO<sub>2</sub>. Because there is widespread independent evidence of higher than modern middle Miocene temperature and precipitation, the low alkenone and boron estimates have been taken as evidence of CO<sub>2</sub>-climate uncoupling. These discrepancies are thus a challenge to CO<sub>2</sub>-greenhouse theory, which guides prediction of future global warming. Here we present an additional determination of middle Miocene atmospheric CO<sub>2</sub> using a recent (2009) recalibration of the inverse relationship between atmospheric CO<sub>2</sub> and stomatal index of modern maidenhair trees *Ginkgo biloba* to estimate pCO<sub>2</sub> from fossil *Ginkgo adiantoides*. A single cleared leaf of *G. adiantoides* in the collections of the University of Idaho from below the Grande Ronde Basalt in Musselshell Creek, near Wieppe, Idaho, was counted to yield a pCO<sub>2</sub> estimate (Table 1) comparable with an estimate previously determined (by Retallack) for a leaf from the upper Cedarville Formation at 49 Camp, Nevada, and greater than an previous estimate (by Royer) from leaves below the Grande Ronde Basalt, 5 miles south of Juliaetta, Idaho. The elevated CO<sub>2</sub> indicated by 49 Camp and Musselshell Creek compared with Juliaetta may represent a geologically brief greenhouse spike, as also is apparent from paleosol carbonate isotopic data. The middle Miocene greenhouse spike is estimated by these data to have been comparable with conditions expected by 2100.

Table 1. Stomatal index and pCO<sub>2</sub> estimates from fossil *Ginkgo adiantoides*

Locality	Age (Ma)	Leaves (no.)	Cells (no.)	Stomates (no.)	Stomatal index (%)	pCO <sub>2</sub> (ppm)
Juliaetta ID	16.55 ±0.2	14	2100	210	8.14±0.95	418 <sup>+208</sup> <sub>-172</sub>
Musselshell ID	16.5 ±0.5	1	8372	653	7.23±0.34	612 <sup>+148</sup> <sub>-97</sub>
49 Camp, NV	16.0 ±0.3	1	11623	945	7.6±1.3	508 <sup>+733</sup> <sub>-153</sub>

OREGON'S TWO NEW METEORITES: MORROW COUNTY AND FITZWATER PASS. Richard N. Pugh<sup>1</sup>, Melinda Hutson<sup>1</sup>, Alex Ruzicka<sup>1</sup>, <sup>1</sup>Cascadia Meteorite Laboratory, Portland State University, Department of Geology, Cramer Hall 17, 1721 SW Broadway, Portland OR 97201.

The Cascadia Meteorite Laboratory has a grant-funded outreach program entitled "Meteorites on the Road", which brings public

lectures and meteorite samples to libraries, schools, community centers, and grange halls throughout Oregon, with an emphasis on bringing science to rural communities. As a result of this program, two new meteorites from Oregon have been discovered and classified during the previous year. Prior to 2010, there were four known meteorites from Oregon, all from the western part of the state. The two new meteorites are the first recovered from east of the Cascades. Both meteorites had been picked up by their finders decades ago. One was stored in a coffee can; the other in a flower bed. Both were identified as meteorites as a result of our outreach program. Morrow County is a large (~40 lb) stone, which is classified as an L6 chondrite—the most common type of meteorite observed to fall. However, Morrow County is an oriented (cone-shaped) stone, indicating that it did not tumble as it came through the Earth's atmosphere. Additionally, it has a distinctively colored fusion crust, an odd pattern of weathering (silicate staining with very little metal oxidation), and complex shock melt veins. Fitzwater Pass (65 grams) is classified as an IIIIF iron, one of the rarest of the iron meteorite classes—this is only the ninth IIIIF iron to be identified. “Meteorites on the Road” was funded by NASA grant NNG06GE17G and LEO (Libraries of Eastern Oregon). Classification work was funded by public donations.

**CHARACTERIZATION OF THE CALICHE PALEOSOL OVERLYING THE ANCIENT CATACLYSMIC FLOOD DEPOSITS AT AVERY GRAVEL PIT, WA.** Erica Medley, Justin Ohlschlager, Scott Burns, Department of Geology, Portland State University, 1721 SW Broadway, Portland, OR 97207.

The Missoula Floods left erosional and depositional features behind in eastern Washington, now termed the scablands. At least 89 floods occurred when Glacial Lake Missoula's ice dam repeatedly ruptured and re-formed between 15 to 18 thousand calendar years ago, with 40 of the floods reaching Wallula Gap (Allen et al., 2009). Medley and Burns have hypothesized about older floods throughout the Quaternary. Much of the evidence of these older deposits have been wiped out by the Missoula Floods. However, in some locations, caliche paleosols overlie much older flood deposits, termed the Ancient Cataclysmic Flood deposits. Stages 1 through 6 of calcium carbonate development take longer than 15 thousand years to form in these deposits, dating them earlier than the Missoula Floods. Avery gravel pit, located 10 miles east of The Dalles in Washington, provides an exposure of flood deposits in three stratigraphic layers. Samples collected from the layers were tested for percentages of calcium carbonate. The bottom layer contained 1.62 percent calcium carbonate and the middle contained 0.95 percent, confirming that the paleosol is Stage 1 caliche and an Ancient Cataclysmic Flood deposit. The top layer is a Missoula Flood deposit and contains less than 0.5 percent calcium carbonate.

CATENA ANALYSIS AT SAUVIE ISLAND, MULTNOMAH COUNTY, OREGON. Colin Beck, Sarah Doliber, Department of Geology, Portland State University, Portland, OR.

A soil catena analysis was conducted at Sauvie Island, Multnomah County, Oregon. The purpose of this study was to determine slope-soil relationships, and to test the accuracy of soil maps published by the NRCS Soil Survey. Four soil pits were dug along a catena spanning a representative range of the island's elevations. The soil pits yielded four distinct soil classifications. The summit and shoulder soils exhibit sandy loam textures, with dark mollic epipedons. The summit soil classifies as a Typic Humixercept and the shoulder soil classifies as a Pachic Humixercept, due to a thick A horizon. The upper two sites support vegetation accustomed to well-drained soils, such as White Oak trees. Redoxymorphic features are found in soils at the footslope and toeslope, indicating poorly drained soils. The footslope soil classifies as an Aquic Haploxeroll with a silty loam texture. The toeslope soil classifies as a Fluvaquentic Endoaquoll with a silty loam texture and buried soil horizons. Results indicate that published soil maps for the area are relatively accurate, especially with regard to boundaries between mapped soil units. Although published horizon characteristics did not match with field observations in all cases, general soil characteristics such as texture and drainage properties were consistent with published soil survey data. Topography appeared to be a good indicator of underlying soil characteristics. Well-drained soils are found almost exclusively at upper elevation on the Island. Very poorly drained soils are found mostly in depressions that resembled drained lake beds.

SOIL ANALYSIS OF A CATENA IN ORDER TO UNDERSTAND THE TERROIR AT JOHNSON SCHOOL VINEYARD, WASHINGTON COUNTY, OREGON. Kathryn Nora Barnard, Christopher Madison Beard, Scott F. Burns, Department of Geology, Portland State University, Portland, OR, 97201.

A catena study was conducted across harvest plots at Johnson School Vineyard in Washington County, Oregon in order to understand the soils, the terroir, and possibly find a reason for the fruit ripening rate range within the vineyard. This 39.6 acre vineyard is located in the Chehalem Mountains AVA and owned by Cooper Mountain Vineyards. The Washington County Soil Survey mapped this area as the Cornelius and Kinton or Helvetia Series soils. Six soil pits were dug; four of these were along an east-west catena from 104 to 61 m elevation traversing the mapped soils. This vineyard is located on highly weathered basalt bedrock that is overlain by old loess, creating well-drained thick soils at elevations greater than 85 m. Missoula Flood deposits occur at elevations less than 61 m with a transition zone around 76 m where the soils reflect a combination of having both parent materials. The catena included the Helvetia Series soils



(Ultic Argixerolls) at the top two positions above 76 m and the Woodburn Series soils (Aquultic Argixerolls) at the two lower positions. The Helvetia soils are well drained with abundant iron concretions in the A horizon, thick Bt horizons with moderate medium subangular blocky structure and common prominent clay films. The Woodburn Series is located at elevations less than 76 m and had signs of being somewhat poorly drained because of Btg and Bg horizons. The absence of a fragipan suggests that the Cornelius and Kinton Series are unlikely to occur at this site.

**ARSENIC AND LEAD LEVELS IN NORTHWEST OREGON SOILS.** Tracy Ryan Ricker, Department of Geology, Portland State University, Portland, OR 97201.

Arsenic and lead are heavy metals that cause serious health problems when a person is exposed. In this study, A and B horizon soils at 84 sites in northwest Oregon were sampled and tested for arsenic and lead content. Because of the significant health hazards, the Oregon Department of Environmental Quality (DEQ) has set mandatory cleanup levels for soils that contain these contaminants. The mandatory cleanup level for arsenic in an occupational setting is 1.7ppm per DEQ standards. The returned data show 85 percent of the arsenic samples are high in comparison to this cleanup level and would require remediation. The mandatory cleanup level for lead in a residential setting is 400ppm and none of the tested samples contained lead in excess of this value. Arsenic values ranged from 0 to 13.9ppm in the A horizon and 0 to 20.4ppm in the B horizon. When A and B horizon samples were compared, 58 percent of the sites had higher arsenic content measured in the B horizon. The average difference between the arsenic content of the A and B horizon is larger at sites where the B horizon showed a higher level of arsenic (3.55ppm) as compared to sites where the A horizon showed a higher contamination level (1.62ppm). Lead levels in the A horizon ranged between 3.87 and 218ppm, and between 0 and 51.8ppm in the B horizon. Lead levels were higher in the A horizon in 95 percent of samples.

## **GEOLOGY – POSTER PRESENTATIONS:**

**GEOCHEMICAL AND PETROLOGIC STUDY OF THE BASAL LOWER OLIGOCENE COLESTIN FORMATION NEAR THE SISKIYOU SUMMIT FAULT, SOUTHERN OREGON.** Jad D'Allura, Kacy Carlson, and Alex Schoebel, CPME Department, Southern Oregon University, Ashland, Oregon 97520.

Basal tuff, conglomerate, and tuff-breccia of the Colestin Formation, an early Oligocene (33.13-28 Ma) dominantly volcanoclastic unit, were deposited on the faulted and eroded Upper Cretaceous marine siliciclastic Hornbrook Formation. The depositional surface was one

of little topographic relief since the basal units extend for nearly 10 km as discrete mappable units. Silicic crystal-vitric tuff (some moderately welded) and vitric-lithic tuff-breccia dominate, contain zoned plagioclase showing complex crystallization histories, no k-spar, occur with or without quartz, and, like rare lava flows, may contain pyroxenes. Field and petrographic observations disclose early violent silicic volcanism within the fault-bound Colestin basin and, except for clasts and rare flows, minor mafic to intermediate compositions. Geochemical characteristics indicate the rocks are medium-K, calc-alkaline, and show an iron-enriched "Cascade" trend while trace elements exhibit lower Ti, P and higher Ba and Y than average continental margin volcanic products, suggesting possible melting of garnet in the source area, a steeper dipping subduction zone (influenced by the proximity to the Klamath Mountains), rise through thick continental crust, and crystal fractionation. Oblique normal (up to the NW, right slip; 4.5 km net slip) movement along the Siskiyou Summit fault post-dates deposition, dragging rocks into near parallelism with the fault zone. The zone is intruded by mafic dikes dissimilar in composition to rare Colestin lava flows.

FIRST OBSERVATIONS ON DAM REMOVAL EFFECTS ON ASSOCIATED WETLANDS, GOLD RAY DAM, JACKSON COUNTY, OREGON. Eric Dittmer, Robert Coffan, Paul Blanton, Aleece Richter, Josh Harris, Kacy Carlson, Katelyn Chisholm, Charles Lane, Department of Environmental Studies, Southern Oregon University, Ashland, OR 97520.

As water was drained from Tolo Slough on the Rogue River on the morning of August 11, 2010, a narrow spit between the main stem of the Rogue River and Tolo Slough gave way upstream of a temporary coffer dam connecting the spit to the center of Gold Ray Dam. The breach was unexpected, but occurred only a week before the scheduled breaching of the coffer dam. Within hours the major sloughs (Kelly and Tolo) were essentially emptied, their reservoirs adding to a spike in total discharge on the Rogue past the partially-deconstructed dam. Five piezometer nests were established in the Kelly Slough area prior to dam removal and monitored both pre- and post-removal. The two upstream piezometers indicate likely groundwater gaining conditions in the upper Kelly Slough. The three downstream indicate losing conditions in the slough. Temperature data also support a spring-fed source of water in the upper Kelly Slough. . Geomorphic analysis through use of ArcView GIS indicates a net wetted area decrease on the main stem of the river (i.e., development of new bars and islands) of approximately 30% in the near-upstream reach. The wetted area decrease in the slough areas is dramatically more pronounced: a decrease in Kelly Slough of -252%, and nearly an order of magnitude decrease in Tolo Slough (-810%, essentially dewatering the slough). Future work remains on volumetric analyses of the water bodies, groundwater contributions,

and channel reactivation. However, significant hydrologic and habitat change is likely in the upstream wetlands environment.

LITHOLOGICAL CONTROLS ON NON-TECTONIC ROCK CRACKS, MOJAVE DESERT, CALIFORNIA. Sarah Evans<sup>1</sup>, Martha Cary Eppes<sup>2</sup>, Robert Carson<sup>1</sup>, Nicholas Bader<sup>1</sup>, Ivy Smith<sup>3</sup>, Kiernan Folz Donahue<sup>4</sup>, Joshua Cavender<sup>5</sup>, Anthony Layzell<sup>2</sup>, Jennifer Aldred<sup>2</sup>, Department of Geology, Whitman College, 280 Boyer Avenue, Walla Walla, WA 99362, evanssg@whitman.edu, <sup>2</sup>Department of Geography and Earth Sciences, University of North Carolina at Charlotte, 9201 University City Blvd, Charlotte, NC 28223, <sup>3</sup>University of Alaska Southeast, PO Box 211176, Auke Bay, AK 99821, <sup>4</sup>St. Norbert College, 612 Sawmill Brook Pkwy, Newton, MA 02459, <sup>5</sup>Juniata College, 1700 Moore St, Huntingdon, PA 16652.

Physical weathering affects erosion rates, sediment production, and atmospheric concentrations of CO<sub>2</sub>, yet non-tectonic related crack formation is poorly understood. Thermal stresses related to diurnal directional insolation may play the primary role in initially generating cracks, but it is unknown how specific rock properties affect this process. In this study we utilized field data from the 130 ka Providence Mountain alluvial fans and the ~140 ka Cima Volcanic Field basalt flows in the Mojave Desert to determine if crack population characteristics vary as a function of lithology. We measured crack density and orientation for more than 400 rocks along 19 transects. Our analysis suggests that rock type influences crack density, size, and orientation. Basalt clasts have a median crack density of 15 c/m<sup>2</sup> (cracks per square meter), and metavolcanics have 35 c/m<sup>2</sup>. Generally about 70% of all rock types excluding basalt contained one or more cracks while only 38% of basalt clasts contained at least one crack. As the density of vesicles increases in basalts, the average number of cracks per clast decreases, possibly due to heat dissipation and reduction of thermal stresses. All rock types display preferred crack orientations with the majority of mean crack orientations toward the northeast. The lone exception to this trend is limestones with a southeast trend. The differences in orientations may be due to differences in mineralogy, heat capacity, and/or other thermodynamic properties of different rocks and minerals, making them susceptible to cracking at different times of the day or year.

GEOMORPHOLOGY AND HOLOCENE OPTICALLY STIMULATED LUMINESCENCE AGE ESTIMATES OF DUNES ON THE WESTERN SHORE OF LAKE MICHIGAN, DOOR COUNTY, WISCONSIN. Matt Hanson<sup>1</sup>, J. Elmo Rawling III<sup>2</sup>, Paul Hanson<sup>3</sup>, <sup>1</sup>Department of Geology, Whitman College, Walla Walla, Wa 99362. <sup>2</sup>Department of Geography and Geology, University of Wisconsin-Platteville, Wi 53818. <sup>3</sup>Department of Geography, University of Nebraska-Lincoln, Lincoln, NE 68583.

A detailed study of the dunes at Whitefish Dunes State Park, Door County, Wisconsin was conducted. Three-meter LiDAR, aerial photographs and field observations reveal a series of parabolic dunes superimposed on an 800-m-wide strand plain that separates Lake Michigan from Clark Lake. There are two distinct sets of dunes: larger dunes (18-24 m relief) adjacent to Lake Michigan and smaller dunes (3-7 m relief) farther inland. Closer to Clark Lake are a series of approximately 1-m-tall beach ridges. The parabolic dunes show a paleowind direction of SSW. Percent coarse sand composition along transects between the modern beach and dunes distinguish between eolian sediment (~2.7%) and beach sediment (~18%). Particle-size analysis along with ground penetrating radar distinguished dune and beach strata. Sixteen samples were collected for Optically Stimulated Luminescence (OSL) from paleo-beach sediment (n=2) and dune crests (n=14). These samples were processed using the single-aliquot regenerative method with 90-180  $\mu\text{m}$  quartz grains. OSL ages are 4.6 ka for a beach ridge landward of the dunes and 4.4 ka for beach sand underlying the dunes. OSL ages of the dune crests ranged from 7.8 to 1.9 ka. Eight dune ages fell between 5.2 and 4.0 ka, which correlates with the Nipissing Lake High Level (6.0-4.3 ka). The similarity between the dune and beach sediment ages suggests rapid dune formation and stabilization. Three dune ages between 2.6 ka and 1.9 ka suggest that some dune activation may have been associated with the Algoma Transgression (3.3-2.3 ka). This research was made possible by the DUGG Project, a NSF REU.

**LiDAR USES MULTIPLY: HIGH-RESOLUTION TOPOGRAPHY AND STEREO 3-D ENABLES GEOLOGIC MAPPING AND ENGINEERING GEOLOGIC STUDIES.** B.G. Hicks, Consulting Engineering Geologist, 190 Vista Street, Ashland, OR 97520.

The recent American Geophysical Union (AGU) program for the 2010 Fall Meeting in San Francisco (19,000 attendees) displayed an example of the expansion of LiDAR usage as shown by the papers presented. In a wide range of the 27 technical sections (from Atmospheric Sciences to Volcanology) some 260 abstracts contain the word LiDAR in their titles or text. (Including a session entitled titled LiDAR for Analysis of Earth-Surface Processes.) The purpose of this Poster Session and is to show by recent AGU abstract, abstract titles, and views of imagery -- some of the types of work being studied using LiDAR. In addition, I will primarily describe geomorphologic and geologic interpretations that digital imagery greatly enhances. Copies of some recent AGU abstracts will be available for viewing. I will demonstrate some simple uses of LiDAR imagery (on laptop) and also project images onto a large screen for viewing. I began using digital imagery about seven years ago -- primarily using 10 and 30 meter DEM's and began to find that this type of information was essential for all my projects. More recently my work has included LiDAR imagery interpretation.

Throughout all my work I utilized the specialized software, i.e., TopoMorpher from 18software.com. Faulting and other geomorphologic controlling features are strongly enhanced by use of this digital imagery software. This imagery has been especially helpful in my bedrock water well searches. Dr. Frank Kilmer in a recent use of LiDAR in the coastal area south of Florence, Oregon considers such imagery very useful for mapping faulting and stratigraphy in that area. The integration of LiDAR data into earth science education is reported (at AGU 2010) as indispensable in the study of earthquake hazards. Landslide and fault movement studies using LiDAR are also described as well as geologic mapping using multispectral imagery and LiDAR in ophiolitic terrain of Cyprus (AGU 2010).

CATION LEACHING IN PALEOSOLS OF THE COLUMBIA RIVER BASALTS. Isabel Hong, Nicholas E. Bader, Department of Geology, Whitman College, Walla Walla, WA 99362.

Our understanding of ancient climates can help us understand present and future climate change. However, long continental climate records are sparse. The Columbia Plateau is an ideal setting for conducting climate research due to the numerous distinct paleosols developed on basalt flows. Temperature and moisture can be partly reconstructed from paleosols, fossilized soil layers, by quantitative analysis of climate-dependent soil forming processes. I quantified leaching in a paleosol of the Columbia River Basalt Group in the Blue Mountains of Oregon and north of Dayton in Washington. I used a portable X-ray fluorescence meter (pXRF) to measure element concentrations along vertical profiles. Leaching of elements occurred during soil formation. Future research will link this analysis to other paleosols to develop a more temporally and spatially complete picture of Miocene climate in the Columbia Basin.

THE ROLE OF LOW-TEMPERATURE THERMOPHILES IN SILICEOUS SINTER FORMATION. Shana L. Kendall<sup>1</sup> (slk@pdx.edu), Sherry L. Cady<sup>1</sup> (cadys@pdx.edu), Department of Geology, Portland State University, 1721 SW Broadway, Portland, Oregon 97207.

The role of low-temperature thermophiles in siliceous sinter formation is the focus of this new study. Our field site is Queen's Laundry hot spring, a silica-depositing hydrothermal ecosystem located in Sentinel Meadows in Yellowstone National Park, USA. Samples of the visually distinct *Calothrix*-dominated microbial mats and sinter were collected for various types of microscopy. The aim of work is characterization of the low-temperature biofacies to determine the different types of biosignatures left behind by microbial life in this type of hydrothermal setting (i.e., silica depositing, low - temperature outflow channel). Our analysis of the silicified low-temperature mats that make up the ridges of the micro -

terraces is presented. Optical microscopy analysis revealed that the microterraces are characterized by a layered microstructure. Various stages of mineralization of microbial cells were documented and silicification of the filaments was observed to increase with depth. Fewer silicified sheaths and moulds were observed in the weathered sinter, though sheath preservation was still observed. The SEM-EDS spectroscopy results were inconclusive as the modern and weathered sinter samples are highly porous and consist of a heterogeneous mix of biological remains and primary mineraloids. It appears that the organic remains at the surface of the thin section were likely destroyed during sample preparation, and that the pore spaces provide a way to concentrate grinding compounds used during thin sectioning polishing. Future work will involve new sample preparation methods, such as the use of focused-ion beam thinning.

ANALYSIS OF DEBRIS FLOW HAZARDS FOR MOUNT ST. HELENS, WASHINGTON BASED ON THE MAJOR RAINFALL EVENT OF NOVEMBER 6-9, 2006. Keith Olson, Department of Geology, Portland State University, Portland, OR 97201.

The November 6-9, 2006 rain event that precipitated over 50 cm of rain onto the flanks of the central Cascade Range volcanoes caused many debris flows. This “Pineapple Express” event, as it is known in the Pacific Northwest, are common and caused by moisture saturated winds blowing in from the Pacific Ocean. On Mount St. Helens, there were at least three large debris flows reported and possibly a total of 12 affected drainages. Two large flows affected infrastructure near June Lake and Blue Lake on the west and south flanks of the mountain, respectively. At Blue Lake about 0.5 mi of roadway including the parking lot were buried under boulders and other material. A third debris flow was observed to partially fill the channel carved in the lahar deposits of the Muddy River channel near the Lava Canyon parking area on the eastern flank of the mountain. These debris flows are gravity induced mass movements of material transported by fluvial processes through steep alpine drainages. They are common on the volcanoes of the Cascade Range. Ongoing research is being conducted into the extent of existing debris flows with the goal of producing an inventory map. This summer, initiation zones will be characterized for each drainage and samples taken. Next, characterization of the hazard level for each drainage basin using the criteria developed by Pirot (2008) will enable the production of a susceptibility map for the Mount St. Helens volcano.

STREAM EROSION AND BEACH DEPOSITION DURING THE DECEMBER 2007 STORM, HOOD CANAL, WASHINGTON. Elizabeth Phillips, Robert Carson, Nicholas Bader, Department of Geology, Whitman College, Walla Walla, WA 98380.

A strong winter storm hit western Washington and Oregon in the first week of December 2007. An accumulation of snow was closely followed by high sustained winds with gusts up to 80 mph, much warmer temperatures, and about 300 mm of rain, causing record flooding, substantial tree blowdown, and significant damage to roads and property. An example of the geomorphic effects is an area along Hood Canal just north of Dewatto Bay where abnormal discharges along high-gradient streams (12°-17°) in small drainage basins (0.073-0.259 km<sup>2</sup>) resulted in severe erosion and the deposition of large fans (313-4985 m<sup>2</sup>) onto beaches. Storm waves quickly cut scarps up to 1.5 m high into the alluvial fans; at some fans longshore currents deposited beach ridges at the high tide line. The correlation between drainage basin area and the estimated volume of sediment deposited is inconsistent and therefore best investigated on a case-by-case basis bearing in mind such factors as substrate, vegetation, land use, and road and culvert placement. We hope to put the event in perspective with respect to past storms and potentially contribute to the discussion of global climate change.

## **HEALTH SCIENCES**

### **Section Chair:**

Satin Salehi  
*Oregon State University*

### **HEALTH SCIENCE – ORAL PRESENTATION:**

OREGON COMMERCIAL CRAB FISHERMEN SAFETY SURVEY AND PFD EVALUATION. Gary Rischitelli<sup>1</sup>, Erika Zoller<sup>1</sup>, Janice Camp<sup>2</sup>, Gerry Croteau<sup>2</sup>, Marty Cohen<sup>2</sup>. <sup>1</sup>Center for Research on Occupational and Environmental Toxicology, Oregon Health & Science University, Portland, OR 97239. <sup>2</sup>Field Research and Consultation Group, University of Washington, Seattle, WA 98105.

The fatality rate in the Northwest Dungeness crab fleet is 463 deaths per 100,000 full-time workers, according to a 2008 report by the National Institute for Occupational Safety and Health (NIOSH). This fatality rate is 4 times the national average for all commercial fishing and over 100 times the general fatality rate for all workers. Over 7 years, 2003-2009, the Oregon Fatality Assessment and Control Evaluation (OR-FACE) program recorded 14 worker fatalities in 8 incidents involving crab boats along the Oregon Coast: 3 of the 8 incidents involved a worker falling overboard at sea and the

remaining 5 involved capsized boats while crossing a bar or in the surf near shore. Two risk factors stand out in the Oregon incidents. First, according to OR-FACE research, none of the victims wore a personal flotation device (PFD) or a survival suit when they entered the water. Second, all the capsized crab fishing boats were small vessels (below 79 feet), and four of the five involved vessels under 50 feet long. In response to the exceptionally high fatality rate and unique risk factors among Oregon commercial crab fishermen, our team surveyed 82 fishermen at the primary crab port in Newport, OR, about their experiences and views related to five areas of concern: (a) bar crossings, (b) PFD use, (c) vessel stability reports, (d) US Coast Guard dockside examinations, and (e) safety training and readiness. The results provide a view of this population's behavior and beliefs relative to critical safety issues.

## **HEALTH SCIENCE – POSTER PRESENTATIONS:**

**MECHANISMS OF BILE TRANSPORTATION AND EXCRETION IN THE SEA LAMPREY *Petromyzon marinus*.** Victoria Smith<sup>1</sup>, Shi-Ying Cai<sup>1,3</sup>, Maya De Groot<sup>1</sup>, Daniël Lionarons<sup>1</sup>, Weiming Li<sup>2</sup>, Chu-Yin Yeh<sup>2</sup>, and James Boyer<sup>1,3</sup>, <sup>1</sup>Mount Desert Island Biological Laboratory, Salsbury Cove, ME 04672, <sup>2</sup>Department of Fisheries and Wildlife, Michigan State University, East Lansing, MI 48824, <sup>3</sup>Department of Internal Medicine, Yale University School of Medicine, New Haven, CT 06520.

The sea lamprey (*Petromyzon marinus*) undergoes a stage of metamorphosis during which it loses its bile ducts and gall bladder. It is unknown whether the lamprey undergoes cholestasis, but its inability to secrete bile shares a direct link to patients with biliary atresia. Although, in contrast to human infants facing biliary atresia, who develop progressive cholestasis and eventual liver failure, the lamprey will continue to grow and develop regardless of their lack of bile ducts. In our initial investigations we examined bile salt concentration and excretion methods in adult migrating lampreys as well as the regulation of vital bile salt transporters between pre and post-metamorphosis lampreys. Our results indicate that the sea lamprey is a unique cholestatic animal model that employs novel methods of excretion in order to adapt to the loss of the biliary tree.

**ANTIBACTERIAL ACTIVITY OF SIX BIOACTIVE GLASSES AGAINST ORAL BACTERIA.** Satin Salehi, John Mitchell, Division of Biomaterials and Biomechanics, Department of Restorative Dentistry, Oregon Health Science University, Portland, OR 97239.

The aim of this study was to determine the antibacterial activity of six bioactive glasses (which were prepared by the solution sol-gel synthesis method in our laboratory) against two clinically important bacteria species, *Streptococcus mutans* ATCC25175 or *Enterococcus faecalis* ATCC19433. This was done by co-incubating each microbe



in a BHI suspension, in the presence of bioactive glass in powder form ( $<38\mu\text{m}$ ) for 4 or 24 hours. At each time point, the viability of the control and samples were determined. At 4 hours, all bioactive glasses produced significant reduction in *E. faecalis* bacteria. On the other hand, the 85S and 81S showed no antibacterial effects on *S. mutans* compared to control but the bioactive glasses 65S, 62S, 75S, and 71S demonstrated a considerable antibacterial activity against *S. mutans*, and 65S and 62S were more effective than 75S, and 71S. After 24h, the approximate mean percentage kills of both bacterial species were 82% to 100% for different compositions of bioactive glasses. After 24h, a raise in the pH of the Bioglass extracts, pH 9.5, was observed which could also have been responsible for the bactericidal effect. Since, a media of BHI with pH of 9.5 exerted a significant antibacterial effect against both bacteria. Therefore, the findings of the present study clearly suggest that the effect of bioactive glass extracts are not merely related to pH effects, but are also linked to an effect of liberated ions from the surface of bioactive glasses.

## MATHEMATICS AND COMPUTER SCIENCE

### Section Chair:

Timothy Thompson  
*Oregon Institute of Technology*

### MATHEMATICS – ORAL PRESENTATION:

MAKING DATABASE ACCESS MORE OBJECT-ORIENTED WITH THE ACTIVE RECORD PATTERN. Christopher T. Mitchell, Jens Mache, Department of Mathematical and Computer Sciences, Lewis & Clark College, Portland, OR 97219.

Web applications are frequently written in object-oriented languages, but database access is often at odds with object-oriented coding style. The Active Record pattern enables row-level database access through objects and increases cohesion with object-oriented design. We discuss the advantages, disadvantages, and implementation concerns of the Active Record pattern and examine its use in the context of a gradebook web-application. Using the active record pattern can reduce the chances of designing incorrect database queries, and provide an intuitive interface for accessing the database.

# PHYSICS

## Section Chair:

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### PHYSICS - ORAL PRESENTATIONS:

USING GEOMETRIC AKAIKE INFORMATION CRITERION FOR THE ENHANCEMENT OF CRYSTALLOGRAPHICALLY PROCESSED SPM IMAGES BY QUANTIFYING SUBGROUP-SUPERGROUP RELATIONSHIPS. Taylor Bilyeu, Jack Straton, Peter Moeck, Department of Physics, Portland State University, Portland, OR 97207.

Crystallographic image processing (CIP) can be used to assist in the calibration of, and enhance the quality of periodic images taken by a scanning probe microscope (SPM). The techniques involved in such processes rely on the mathematical theory of two dimensional (2D) plane groups (or wallpaper groups); all 2D periodic images belong to one of 17 such plane groups, which consist of their own unique set of symmetry operators. Problems arise due to the fact that not all 17 groups are disjoint from one another. That is, there are 'subgroup' and 'supergroup' relationships amongst certain groups, where a supergroup contains all the symmetry elements of a subgroup plus at least one additional unshared element. When determining which of the 17 plane groups an SPM image most closely resembles using CIP, a supergroup is almost always favored over a subgroup, requiring a heavier reliance on user intuition and pre-existing knowledge of the sample being imaged. This problem of disjointness is common amongst pattern recognition algorithms. The Geometric Akaike Information Criterion (GAIC) has shown some success in model selection involving non-disjoint groups. For instance, it has been used to distinguish between non-disjoint quadrilaterals, such as squares and rectangles. The same concept has been applied to the 7 (linear or 1D) frieze groups. We discuss the application of GAIC to plane groups, and its usefulness to processing of SPM images in particular. We point out several issues neglected in past attempts to generalize GAIC to wallpaper groups.

PATTERNING OF NANO GEOMETRIES USING A VERSATILE AND REUSABLE STENCIL MASK FOR FABRICATING FUNCTIONALIZED SURFACES AND PATTERNED NANOTUBE GROWTH. Fredrick M. DeArmond, Derek Nowak, Jeff Doughty, Mohan K. Vattipalli, Erik Sánchez, Department of Physics, Portland State University, Portland, OR 97207.

For a number of years researchers have investigated myriad ways of producing nanoscale patterns. Currently, photolithography represents the dominant method for accomplishing this goal. However, photolithography can be a chemically intensive method requiring specialized skills and facilities to produce patterns. In addition, the cost of producing photolithographic masks is quite high and once a mask has been produced it cannot be modified. We present in detail, a method for fabricating a mask capable of high fidelity patterning that can also be reused several times and lends itself to modification. In addition to the mask fabrication, results are presented demonstrating the efficacy and versatility of the method. Our results include patterned growth of carbon nanotubes, and progress towards creating a functionalized substrate for fluorescence imaging of dilute samples. The latter will be accomplished by utilizing the signal enhancement properties of the thin metallic film patterns deposited through our masks.

FINITE DIFFERENCE TIME DOMAIN MODELING AND THE CONVERSION OF FREQUENCY DOMAIN MATERIAL PARAMETERS. Jeff Doughty, Derek Nowak, Erik Sánchez, Department of Physics, Portland State University, Portland, OR, 97207.

Finite Difference Time Domain (FDTD) modeling has become a workhorse for the electromagnetic field modeling community. This is due to the simplicity in its use and the ability to model asymmetric geometries that are difficult in other methods. However, any FDTD model is only as good as the material parameters you supply. These material parameters define how light interacts with any given material. There are some issues with these parameters and FDTD in that typical frequency domain values are readily available in the literature. However, FDTD works in the time domain, so a conversion from frequency to time domain is needed. There are many commercially available software packages that will do FDTD modeling; however, some packages fall far short of mimicking optical responses, near the electronic resonance, that are similar to experimental results, especially when dealing with the nanoscale, with the visible spectrum and concepts such as surface plasmon resonance and Mie scattering. Due to this, an examination of a

variety of FDTD packages was performed and modeling data was compared to experimental data readily available in the literature. This talk will examine the basis of the frequency domain values; the complex permittivity, and different ways in which to convert into the time domain.

**SYNTHESIS OF TERNARY QUANTUM CIRCUITS WITHOUT ANCILLA BITS.** Maher Hawash, Marek Perkowski, Computer and Electrical Engineering Department, Portland State University, Portland, OR 97207.

A ternary valued  $m$ -variable reversible logic function maps each of the  $3^m$  input terms to a unique output term; or in mathematical terms, it is an *onto* and *one-to-one* function. The problem of synthesizing a reversible circuit is to create a cascade of reversible gates which map each said input to its corresponding unique output. Existing synthesis algorithms of ternary reversible logic circuits take a long time to compute, produce inferior circuits and some never converge. In this paper we present a synthesis method, which synthesizes arbitrary ternary reversible functions into near optimal circuits with respect to quantum gate count following similar algorithmic steps as our previous efforts in the binary domain. A main advantage of the algorithm is the reasonability of time required to construct such circuits on a modern personal computer and its adaptability to multiprocessing platforms, which could explore a wider swath of the search space and, as a result, yield better results in a shorter period of time. Naturally, the issue of algorithmic convergence is covered extensively with a step-by-step proof of convergence for any random ternary reversible function.

**DEVELOPMENT OF A NEAR-FIELD KERR OPTICAL MICROSCOPE FOR READING AND WRITING MAGNETIC DOMAINS.** A. J. Lawrence, Derek B. Nowak, Erik J. Sánchez, Department of Physics, Portland State University, Portland, OR 97207.

We present the development of a near-field Kerr optical microscope. Kerr microscopy is a technique which exploits the magneto-optic Kerr effect (MOKE), a phenomenon in which light incident on a magnetized surface undergoes a polarization shift upon reflection. This is the same process by which magneto-optic drives are capable of detecting magnetic data. A careful comparison of the incident and reflected optical signals reveals the magnetic nature of the sample. By increasing the power of the incident light and applying an external magnetic field, we can heat the sample beyond the Curie temperature

and realign the magnetic domains. The system is built on an inverted optical microscope which supports an AFM scan head, allowing the system to be adapted to a near field scanning optical microscope (NSOM). NSOM, a technique which circumvents the diffraction limit by illuminating through an optical fiber, will ultimately provide us with an instrument capable of reading and writing magnetic domains at resolutions never before demonstrated in Kerr microscopy.

CRYSTALLOGRAPHIC IMAGE PROCESSING APPLIED TO SCANNING PROBE MICROSCOPE IMAGES OF TWO-DIMENSIONAL PERIODIC OBJECTS. Bill Moon, Jack Straton, Taylor Bilyeu, Peter Moeck, Nano-Crystallography Group, Department of Physics, Portland State University, Portland OR 97207.

The known mathematical procedure, “Crystallographic Image Processing” (CIP), which was originally designed for the analysis of high resolution transmission electron microscope images of crystals, can also yield valuable results when applied to images of two-dimensional (2D) periodic objects taken with scanning probe microscopes. It is known that 2D periodic images can be improved by translational averaging, or the averaging of each unit cell of the entire image. All 2D periodic images possess one of 17 possible 2D symmetries (plane groups). Especially with the help of some prior knowledge of the sample, CIP enforces an appropriate symmetry on the image and thus averages fractions of unit cells, resulting in more averaged terms than translational averaging (which is the equivalent of enforcing  $p1$  symmetry). This improves signal-to-noise ratio more effectively than translational averaging, an improvement which can be quantified. An additional application of CIP still under investigation is the acquisition of information about the scanning probe instrument itself by imaging a calibration standard of known 2D symmetry and then enforcing that known symmetry upon the image. The difference between the raw image and the enforced image (most easily calculated in Fourier space) is the point spread function of the instrument, almost all of which is due to double, multiple, or blunt tips, and which can then be used to correct other images of 2D periodic objects with similar symmetry taken under approximately similar experimental conditions.

CONTINUOUS WAVE MULTI-PHOTON EXCITATION MICROSCOPE FOR ULTRA-HIGH OPTICAL RESOLUTIONS IN AMBIENT CONDITIONS. Derek B. Nowak, A.J. Lawrence, Erik J. Sánchez, Department of Physics, Portland State University, Portland, OR, 97207.

We present the development of a versatile spectroscopic imaging tool to allow for imaging with single molecule sensitivity and high spatial resolution. The microscope allows for near-field and sub-diffraction limited far-field imaging by integrating a shear force microscope on top of a custom inverted microscope design. The instrument has the ability to image in ambient conditions with optical resolutions on the order of tens of nanometers in the near-field. A single low-cost computer controls the microscope with a field programmable gate array data acquisition card. High spatial resolution imaging is achieved with an inexpensive CW multi-photon nonlinear excitation source using an apertureless probe and simplified optical pathways. The high resolution combined with high collection efficiency and single molecule sensitive optical capabilities of the microscope are demonstrated with a low cost CW laser source and mode-locked laser sources. More information discussing the microscope design and functionality can be found at <http://ansom.research.pdx.edu>.

ENVIRONMENTAL NANOBIOLOGY AT THE AIR-WATER INTERFACE: THE INTEGRATION OF PHYSICS, MICROSCOPY, BIOLOGY, CHEMISTRY AND GEOLOGY, AND THE EMERGENCE OF MICROSCOPIC STRUCTURE FOR FLOATING IRON OXIDE SURFACE AS A COMPONENT OF AQUATIC SURFACE FILMS AND SURFACE MICROLAYER FILM COMPLEXES. Randall W. Smith and Erik J. Sánchez, Department of Physics and the Environmental Sciences and Resources Program, Portland State University, P.O. Box 751-PHY, Portland, Oregon 97207

The microscopic comparison of structure and function as revealed by comparative methods in microscopy and spectroscopy suggests that the term Environmental NanoBiology more accurately describes the framework for surface films at the air-water interface. One of these components is the silvery, floating iron-oxide surface film of wetlands and surface waters. As a biogeochemical feature of the air-water interface, and as a part of the biogeochemical cycling of iron and related minerals, these metallic surface films demonstrate the interacting roles of structure and ultrastructure to habitat and function. As a common feature of coastal wetlands, pools, estuaries, ponds, springs, seeps and sometimes from disturbed or contaminated sites, floating iron-oxide films have a structural basis for comparison.

These have been described as a mixed-valent iron oxide, as part of the surface microlayer, although there are doubts about the mineralization involved. We have found that besides iron, manganese may be incorporated into the film structure, and that other metallic oxide films, such as copper, may form in selected environments. Standard biological stains were used to improve optical contrast for biological and chemical features of these films. Several microscopical instruments and methods were used to develop a comparison of the framework that researchers have developed for several types of surface films. Scanning Electron Microscopy (SEM) and Energy Dispersive Spectroscopy (EDS) were used in combination with Differential Interference Contrast (DIC) optics to demonstrate the diversity of these surface films from several natural environments. Previous work shows differences in structure at high resolution (HRTEM), but here we compare the contribution of biological components and organic materials revealed by biological staining methods.

## **PSYCHOLOGY**

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### **PSYCHOLOGY- ORAL PRESENTATIONS:**

TIME WON'T LET ME GO: THE EFFECTS OF DIVERSITY AND TIME ON COHESION AND DECISION MAKING. Colton Christian<sup>1</sup>, Michael Naumes<sup>1</sup>, Department of Psychology, Southern Oregon University, Ashland, OR, 97520

Diversity and performance (Horwitz& Horwitz, 2007) and their effects on ratings of cohesion have been examined in past research. More recently, Christian and Naumes (2011) discovered that learning style of the facilitator and diversity score (which takes into account biological [gender] and task related traits [learning style]) can affect objective outcome measures provided by the facilitator of the group;

diversity influenced productivity and time efficient and effective decision making. In the present study, the effects of diversity score and cohort on group cohesiveness are the primary focus. 548 participants were recruited and then assigned a group that met for the remainder of the term. Participants completed the group cohesion scale and researchers computed a diversity score for each group. ANOVAs demonstrated that diversity had an effect on ratings in response to the statement, "The members of my group get along well together," ( $F(2, 131) = 3.80, p = .025, \eta^2 = .058$ ). Furthermore, diversity ( $F(2, 130) = 3.90, p = .023, \eta^2 = .060$ ), as well as cohort ( $F(1, 130) = 6.01, p = .016, \eta^2 = .046$ ) had an effect on responses provided to the statement, "This group used effective decision-making techniques (for best use of our time)." Finally, a trend towards an interaction between diversity and cohort on the statement, "I believe I had a lot of influence on the group's discussion," was indicated, ( $F(2, 132) = 2.07, p = .130, \eta^2 = .032$ ). Limitations, future research and the above interaction are discussed herein.

THE EFFECTS OF ORDER OF AUTHORSHIP AND SELF-PERCEIVED RATINGS OF FAIRNESS ON INDIVIDUALS' LIKELINESS TO COLLABORATE PROFESSIONALLY. Jeffrey Whitaker<sup>1</sup>, Colton Christian<sup>1</sup>, Department of Psychology, Southern Oregon University, Ashland, OR, 97520.

While prior research has evidenced that order of authorship may affect how individuals perceive two authors, research in this area is incomplete at best. Researchers have documented a recency effect in the presentation of author names, but have rarely looked at self-perceived personality or emotional variables of participants. The present study examines the relationships between order of authors (on a curriculum vitae [CV]) and self-perception of fairness on the participants' likeliness to collaborate professionally with or recommend the individual described in the CV. Participants ( $n = 176$ ) were recruited and provided with one of six possible curriculum vitae. Participants' self-perceived ratings of fairness were binned into low, medium and high categories and two-way ANOVAs considering fairness and order of authorship were calculated. The medium category ( $M = 5.539, SD = 1.213$ ) rated the likeliness of collaborating professionally more favorably as compared to the low category while the high category ( $M = 6.136, SD = 1.094$ ) rated the likeliness more favorably than both the low category ( $M = 4.875, SD = 1.238$ ) and the medium category ( $M = 5.539, SD = 1.213$ ),  $F(2, 158) = 12.266, p = .000, \eta^2 = .129$ . The high category ( $M = 5.333, SD = 1.843$ ) rated the likeliness of writing a letter of recommendation for the individual described more favorably as compared to the low category ( $M = 4.031, SD = 1.875$ ),  $F(2, 158) = 4.906, p = .009, \eta^2 = .055$ . Future research, limitations and implications are discussed herein.



COSLEEPING: BENEFITS AND RISKS. Blair Tyler and Jane Tram, School of Professional Psychology, Pacific University, 222 SE 8<sup>th</sup> Ave, Hillsboro, OR, 97123.

A comprehensive literature review of cosleeping leaves many questions unanswered. ‘Cosleeping’ is defined as a child sleeping in the same bed as an adult within arm’s reach. Proponents of cosleeping assert research demonstrates support for the benefits of cosleeping. Bedsharing is believed to be positively correlated with breastfeeding. With increased breastfeeding comes increased mother-infant bonding and a reduced rate of SIDS. An anthropological perspective illuminates related species’ cosleeping patterns and claims cosleeping to be natural for humans in order to enhance closeness and safety. A common argument wonders why with the high prevalence rate of cosleeping in most other countries is it not the norm in the United States as well? The opposing side believes that cosleeping may be detrimental. Proponents of this perspective assert that cosleeping is associated with a higher risk of SIDS. When children cosleep they are at risk of suffocation, entrapment, overlaying, and rebreathing carbon dioxide. Additionally, this side of the argument points out that cosleeping rates in the United States are not comparable to other countries because the cultural values implemented in childrearing are differing (collective vs. autonomous). Researchers from this perspective suggest cosleeping may be stressful causing greater arousals during the night, less deep sleep, and interruptions in neurological development. There is some research to support both sides of the cosleeping argument. The limited longitudinal studies that have been conducted have not found lasting positive or negative effects of cosleeping. Examining this question further can provide us with additional insight into this controversial issue.

EXPOSURE TO EXPOSURE: A REVIEW OF GROUP-BASED EXPOSURE THERAPY FOR POSTTRAUMATIC STRESS DISORDER. Samantha Forsythe, Katherine Fox, Katie Diershaw, School of Professional Psychology, Pacific University, Hillsboro, OR 97123.

Exposure treatment is one of the most empirically supported treatments for Posttraumatic Stress Disorder. Group-based exposure treatment has been supported as effective in the treatment of various anxiety disorders including social phobia, specific phobia, panic disorder and obsessive-compulsive disorder. Group-based treatment has many inherent psychological benefits including cohesion, support, interpersonal skill building and the universality of human conditions. Historically, Posttraumatic Stress Disorder groups have been process in nature to help with re-integration, support, cohesion and interpersonal skill building. Despite the benefits of group therapy and the effectiveness of exposure therapy, the two have been rarely combined or researched. This poster will outline several

group-based exposure treatments for PTSD, related research, and suggestions to increase group effectiveness. Some concerns regarding the combination of these two treatment modalities is the aspect of vicarious trauma. This poster will explore the possibility that vicarious trauma is a positive component of the group exposure process and inherent to already established group-based exposure treatments for other anxiety disorders.

**COMPETITIVENESS, EXPERTISE, AND GROUP DEVELOPMENT AS PREDICTORS OF GROUP DECISION-MAKING.** Lucrecia A. Lawer, Chelsey S. Asbury, David A. Foster, Victor Savicki, Psychology Department, Western Oregon University, Monmouth OR 97361.

Recent research on group performance has focused on the processes groups use to make decisions. It's been found that group members who are dispositionally competitive are more likely to see others as being competitive and are thus more likely to elicit competitive behaviors from others. Such competition amongst group members may negatively affect information sharing, thereby limiting the quality of decisions. The present study examined how the effects of dispositional competitiveness, in combination with individual member expertise impacted the quality of group decision-making under different conditions of group development (i.e., forming and feedback). Data were collected from 112 participants who completed two survival decision-making tasks. For each task, participants rank ordered ten items in terms of their importance for the group's survival both individually and then as a group. Before beginning the tasks, the participants completed a number of personality measures including a competitiveness inventory. A 3X3 experimental design involving both a forming activity and feedback manipulated group development. Univariate analysis of variance showed that groups where the most expert member was more competitive than the least expert had higher group added value compared to groups where the most expert member was less competitive than the least expert member ( $F(1,94) = 4.02, p < .05$ ). The results also showed that the effects of competitiveness relative to group member expertise were moderated by both forming and feedback ( $F(4,82) = 2.37, p = .06$ ). Implications will be discussed.

**PSYCHOLOGY ALUMNI REFLECT ON INVOLVEMENT, SATISFACTION AND ACADEMIC ACHIEVEMENT.** Chehalis M. Strapp, Irina M. Granov, Kevin J. Dixon, Psychology Division, Western Oregon University, Monmouth, OR. 97361.

Previous research suggests that involvement in academic and co-curricular activities is related to academic performance and satisfaction with the college experience. The purpose of this study was to examine these relationships in a sample of psychology alumni. It was hypothesized that involvement would mediate the relationship

between satisfaction and academic performance. Recent alumni who graduated between 2001 and 2010 from a psychology program at a small university in the Pacific Northwest were surveyed about their experiences in the program. Initially, 663 surveys were mailed out; 125 completed surveys were returned. Involvement in the program was assessed using a 10-item index asking respondents to indicate whether they had engaged in an activity or not. Satisfaction with the program was assessed using a 9-item index assessing satisfaction with various facets of the psychology program. Academic performance was operationalized as overall grade point average (GPA) at the time of graduation. Results indicated that involvement was significantly related to satisfaction  $r(116) = .245, p < .007$ . Additionally academic achievement was also related to involvement  $r(118) = .257, p < .005$ . Conversely, satisfaction was not related to academic achievement  $r(116) = .096, p < .303$ . Additional investigation indicated that different types of involvement were associated with satisfaction in various aspects of the program. These results suggest that involvement is an important factor related to satisfaction with undergraduate experiences.

MENTOR EFFICACY AND BELIEFS: WHEN ARE BENEFITS PERCEIVED? Chehalis M. Strapp, Kenna R. Papen, Adam D. Lamb, Anne E. Spalding, Psychology Division, Western Oregon University, Monmouth, OR. 97361.

Mentoring involves a dyadic relationship in which an older individual provides support, guidance, and encouragement to an unrelated, younger person (Rhodes, 2002). Although mentoring programs are popular (Portwood & Ayers, 2005) little is known about how mentors benefit (Terrior & Leonard, 2007) or how specific mentor characteristics (i.e., expectations, self-efficacy) predict successful mentoring relationships (Karcher, Nakkula, & Harris, 2005). The current study describes a longitudinal assessment of undergraduates ( $N = 24$ ) serving as mentors for at-risk middle school "mentees" in a school-based mentoring program. Undergraduate psychology students ( $M_{age} = 21.64, SD = 2.80$ ) mentored middle school students four hours per week, across six months. Prior to mentoring, mentors completed measures to assess expectations regarding the mentee (Karcher, Nakkula, & Harris, 2005), expected benefits of mentoring (Allen, 2003; Ragins & Scandura, 1999), self-efficacy (Denzine & Anderson, 1999; Riggs, 2000), flexibility (Connor & Davidson, 2003), and empathy (Cushner, 1986). Mentors were again assessed at three and six-month intervals to measure changes across time. At the conclusion of the program, mentors evaluated the mentoring relationship (Karcher et al., 2005), reported negative mentoring experiences (Eby, Durley, Evans, & Ragins, 2008), and rated perceived benefits of mentoring. As expected, mentors experienced significant changes in mentee-perceptions and self-efficacy across time, with scores at six months being significantly more positive

relative to pre-mentoring and at three months. Finally reported benefits of mentoring included increased understanding of personal strengths and weaknesses, increased desire to help others, and hands on experience (Brooks, 2002; Clary & Snyder, 1999).

**MINDFULNESS IN COMBAT; A PREVENTIVE MEASURE FOR POSTTRAUMATIC STRESS DISORDER.** Robert D Laxson<sup>1,2</sup>, Amanda McCabe<sup>1</sup>, Kimberly Coppersmith<sup>1</sup>, Jared Mull<sup>1</sup>, Lisa R Christiansen<sup>1</sup>. School of Professional Psychology, Pacific University, Hillsboro, OR 97123<sup>1</sup>, Portland VA Medical Center, Portland, OR 97201<sup>2</sup>.

Mindfulness is a mental mode characterized by full attention to present-moment experience without judgment, elaboration, or emotional reactivity (Jha, et al, 2009). Mindfulness-based treatments are an effective therapeutic tool used to treat Posttraumatic Stress Disorder (PTSD) (Chopko & Schwartz, 2009), and are accumulating evidence as an effective way to improve operational effectiveness (Stanley & Jha, 2009). The authors propose that Mindfulness could also be utilized peri-deployment to help prevent PTSD, and maintain levels of operational effectiveness. The authors have found three key facets of Mindfulness that would likely be most beneficial for military personnel deployed in combat. Awareness is key in countering avoidance, which is a predictive and maintenance factor of PTSD. Secondly, acceptance allows an individual to tolerate his or her thoughts and feelings without needing to change these thoughts. Needing to change and restructure thoughts and feelings at times requires changing one's situation, which is rarely possible for deployed military personnel. Thirdly, with the use of Mindfulness, increased cognitive flexibility allows individuals to better notice and acknowledge emotions without needing to act on the urges that may also be present. Lastly, mental health services have a well-documented stigma in the military that acts as a barrier to help-seeking behavior. A preventive measure may allow for the possibility of working around the negative stigma related to seeking treatment by reducing the likelihood treatment will be needed. Finally, the authors propose specific ways to incorporate Mindfulness training into the daily lives of military personnel in combat situations to prevent PTSD.

**SELF-MONITORING, EXPERTISE, AND FEEDBACK AS PREDICTORS OF GROUP DECISION QUALITY.** Bethany L. Wilson, David A. Foster, Victor Savicki, Western Oregon University, 345 N. Monmouth Ave. Monmouth, OR 97361

Previous research on self-monitoring, an individual's ability to sense social cues and modify behavior in response to those cues, has shown that high self-monitors better perceive and perform to group requirements by seeking outside feedback regarding their performance. This study examined the effects of self-monitoring

relative to individual expertise and feedback on group decision quality. Data were collected from 112 participants who completed both a desert and winter survival decision-making task. Participants rank ordered various items in terms of their importance for survival, both individually and as a group. Before beginning the survival tasks, participants completed a number of different personality measures including the Self-Monitoring Scale. Prior to starting the second task, participants received performance, process, or no feedback. Groups receiving performance feedback were publicly informed how their individual rankings of the items compared to the rankings of experts and how their group rankings of the items compared to the rankings of other groups. Groups receiving process feedback were publicly informed how much information they shared with each other and how much time their group took in solving the problem. Participants in the control condition did not receive any feedback. Univariate analysis of variance showed that there was a significant interaction effect between self-monitoring relative to individual expertise and feedback ( $F(2,83) = 2.84, p = .06$ ). Groups where the most expert member was higher in self-monitoring than the least expert member and received performance feedback outperformed other types of groups across all feedback condition. Implications will be discussed.

EFFECTS OF NEED FOR STRUCTURE OF MINORITY OPINION MEMBER ON GROUP DECISIONS. Stephanie M. Gerhardt, Kyleigh M. Gray, David A. Foster, Victor Savicki. Department of Psychology, Western Oregon University, 345 N Monmouth Ave, Monmouth, OR, 97361.

Recent research on group performance has focused on the processes groups use to arrive at decisions. The quality of these decisions has been found to depend on the ability of individuals to share and merge information. The present study examined how minority opinion member (MOM) influence, combined with MOM task expertise and personal need for structure (PNS), impacted the quality of group decision making under different conditions of group development (i.e., forming and feedback). Data were collected from 112 participants who completed two survival decision making tasks. For each task, participants rank ordered ten items in terms of their importance for the group's survival both individually and then as a group. Before beginning the tasks, the participants completed a number of personality measures including the Personal Need for Structure scale. A 3x3 experimental design involving both a forming activity and feedback manipulated group development. Univariate analysis of variance showed that groups where the MOM was the least expert group member performed significantly better than groups where the MOM was the most expert group member ( $F=19.77, p<.001$ ). Additionally, the effects of the minority opinion member's expertise was moderated by their personal need for structure and forming intervention ( $F=1.98, p=.08$ ). Within groups in which the most expert member was not the MOM and higher in PNS than the

least expert member of their group; groups that experienced turn taking forming had significantly lower levels of group added value compared to groups that experienced random turn or no forming. Implications will be discussed.

**MEXICAN IMMIGRANTS IN THE KNOW OF U.S. CULTURE: WHAT WE KNOW AND DON'T KNOW.** Kathryn L. Thompson, Irina M. Granov, Andrea Padilla-Orozco, Psychology Division, Western Oregon University, Monmouth, OR 97361.

Bicultural identity is a positive resolution (Santrock, 2010). Identity with a group occurs as people share commonalities (Niemann, Romero, Arredondo & Rodriguez, 1999). This study was designed to update the assessment of commonalities (knowledge, attitudes, and behaviors) of U.S. culture in Mexican immigrants by using scales designed to measure commonalities in a 2003-2004 sample. Hypotheses were that consistent with earlier findings (Thompson, Mill, Granov, & de Kanter, 2010), U.S.-born participants would score higher on commonalities than Mexican immigrants and that age of immigration and English fluency would predict Mexican-born participants' scores. Scales from the earlier studies were given to 29 Mexican-born and 36 U.S.-born participants. Results were consistent with earlier findings for the scales measuring knowledge of U.S. culture and adherence to U.S. traditions. The current data differed on the scale measuring support of U.S. policy with a one-way independent MANOVA indicating a significant effect of cultural group on scores, Wilk's lambda = .59,  $F(3, 54) = 12.62$ ,  $p < .0005$ , partial eta squared = .41, with the U.S.-born scoring significantly higher than the Mexican-born on all scales except national policy support. Although age of immigration and English fluency did not explain a significant proportion of the variance in the Mexican participant's scores on the combined scales, a significant proportion of the variance was explained when the measure of national policy was omitted,  $R\text{-squared} = .36$ ,  $F(2, 26) = 7.22$ ,  $p = .003$ . Identification of stable indicators of commonalities is emphasized in the assessment and facilitation of a bicultural identity.

**THE REACTIONS TO LOSS SCALE: FINDING RESILIENCE IN COLLEGE BEREAVEMENT.** Devan Buckingham, Karly Carlson, Nawwal Moustafa, Ashlee Tidwell, Dionne Verba, Kayla Willhite, Psychology Division, Western Oregon University, Monmouth, OR 97361.

Experiencing loss has traditionally been thought to lead to prolonged grief and/or adjustment problems. Recently, researchers such as Bonanno have found most individuals experience loss without long-term negative outcomes. Furthermore, little research has been done on a college population regarding non-death related losses and their repercussions. In this study, college students' reactions to a specific loss were examined in relation to the emotional resolution of that

loss. College students (N = 169) were presented with a list of both death related and non-death related losses from which they selected their most significant loss over the last 12 months. Regarding their experience, students rated their current feelings on a preoccupation scale and on an emotional reaction scale representing three factors: Negative Feelings, Regret, and Positive Feelings. In a longitudinal design, feelings and preoccupation about their loss were assessed over an eight-week span. The Reactions to Loss Scale (RTL) was used at Time 1 to measure positive reappraisal, loss of control, and avoidance. Results indicate that individuals who reported greater use of positive reappraisal strategies increased their positive feelings about the loss. Participants with fewer reported reactions of feeling overwhelmed and out of control following the loss also reported reduced negative feelings concerning their loss. Avoidance strategies were related to lowered levels of preoccupation with the loss. Findings suggest that resilience is multidimensional with different pathways leading to different emotional and cognitive aspects of resilience.

DEVELOPMENT AND RELIABILITY OF A SAFETY AND HEALTH ASSESSMENT TOOL FOR HOME CARE WORKERS. Ryan Olson<sup>1</sup>, Brad Wipfli<sup>1</sup>, Rob Wright<sup>2</sup>, Layla Garrigues<sup>1</sup>, David Meier<sup>1</sup>, Center for Research on Occupational and Environmental Toxicology. Oregon Health and Sciences University, Portland, OR 97239, <sup>2</sup>Department of Psychology, Portland State University, Portland, OR 97207.

Millions of individuals work as direct care health providers in the United States in professions that include registered nurses, nursing aides, and homecare workers. These workers have a lost time injury rate that is nearly four times the United States average for all occupations and the second highest incidence rate of musculoskeletal disorders. Of this group homecare workers are unique in that they often work alone, have limited access to safety training, regularly perform dangerous lifting and transferring tasks without mechanical assistance, and have a dual relationship with their clients who are also their employers. Previous safety assessment research with healthcare workers has primarily been conducted in hospitals and long-term care facilities. In order to address the gap in safety surveillance data we set out to develop and evaluate a safety self-assessment tool for homecare workers. Our project involved three-phases: a literature review and focus groups, self-assessment tool development on palm-held computers, and a daily diary study to evaluate tool reliability and validity. Seven focus groups were conducted with workers recruited at Oregon Home Care Commission safety training events. Guided by focus group results and historical Oregon workers compensation claims, we selected seven work task categories for inclusion in the safety self-assessment tool. The daily diary study is in progress with homecare workers completing 10-14 days of daily self-monitoring using the safety self-assessment tool. Evaluations of the reliability of

worker self-assessments vs. researcher observations will be presented, as well as some preliminary analyses of daily associations among variables.

THE MEDIATING ROLE OF BEHAVIOR IN HEDONIC AND EUDAIMONIC CONCEPTIONS OF WELL-BEING AND ACTUAL WELL-BEING. Lindsey M. King, Kevin J. Dixon, Ethan A. McMahan, Department of Psychology, Western Oregon University, Monmouth, OR 97361.

Conceptions of well-being are defined as a system of beliefs concerning the nature of well-being and are believed to be a potentially important component of one's worldview. It has been recognized that individual conceptions of this nature generally fall into distinct, but overlapping, categories that revolve around two general philosophies: hedonism and eudaimonism. The hedonic approach to well-being emphasizes pleasure as indicative of well-being. Alternatively, eudaimonic approaches view well-being as consisting of the realization and fulfillment of one's potential and living a purposeful life. The current study examined whether prospective reports of hedonic and eudaimonic behavior mediated associations between conceptions of well-being and self-reported well-being. A survey protocol was used, and conceptions of well-being, prospective behaviors, and prospective well-being were measured using self-report instruments. Results indicated moderately strong associations between eudaimonic conception dimensions, eudaimonic behavior, and well-being. Structural equation modeling (SEM) indicated that eudaimonic conception dimensions were significantly associated with well-being and that eudaimonic behaviors partially mediated this relationship. Results indicated no significant associations between hedonic conception of well-being dimensions, hedonic behaviors, and well-being. In sum, the findings of the current study generally indicate that eudaimonic behaviors are one route through which eudaimonic conceptions of well-being are associated with actual well-being. Findings further indicated no significant associations between hedonic conception dimensions and well-being. The current study thus provides support for the notion that eudaimonic approaches to well-being may be particularly beneficial for positive psychological functioning.

THE ETHICAL IMPLICATIONS OF EMAIL AND PSYCHOTHERAPY. Jade Kost and Jane Tram, School of Professional Psychology, Pacific University, 222 SE 8th Ave., Hillsboro, OR 97123.

As technology continues to advance and proliferate, clinical psychologists and similar health professionals are faced with new and complex ethical considerations. In 2002, the American Psychological Association (APA) revised their Ethical Principles of Psychologists and Code of Conduct. At the time of revision, only a small portion of the APA Ethics Code included guidelines regarding the use of



technology. A comprehensive review of the literature indicates the need for greater acknowledgment of the impact of technology on the field of professional psychology, as well as underscores the necessity of establishing such standards as a means of ensuring beneficence and nonmaleficence. Specifically, synchronous and asynchronous communication should be explored further. Synchronous communication is instantaneous and includes mediums such as instant messaging, videoconferencing, and more recently, Skype. Alternatively, asynchronous mediums such as email and text messaging have an inherent time delay. For this reason there are ethical considerations unique to client-therapist interactions occurring at different points in time. Additionally, more information is needed to better understand the benefits and limitations of computer-mediated psychotherapy. Areas typical of concern in psychotherapeutic practice like competence, confidentiality, informed consent, boundaries, record keeping, and the duty to warn and protect each deserve greater attention relevant to computer-mediated delivery.

**PESTICIDE SAFETY TRAINING IN AN AGRICULTURAL COMMUNITY: TRENDS IN PERFORMANCE.** Andrew Kirk, Tara Moomey, W. Kent Anger, Cassandra Dinius, Nick Classen, Diane S. Rohlman Center for Research on Occupational and Environmental Toxicology, Oregon Health and Science University, Portland, OR.

People living in an agricultural community are at risk for exposure to both occupational and residential pesticide exposure. Although training on pesticide safety is required for agricultural workers, training is not readily available for community members who may also be at risk. Safe Workplace, Safe Home/Sitio de Trabajo Seguro, Hogar Seguro, a computer-based training program, was developed to present information to community members on ways to reduce exposure from occupational and residential pesticide use. Participants (N=373) living in an agricultural community were recruited at a county fair to complete the training. More than half of the participants reported working in agriculture at some time in their lives. The training was provided in both English and Spanish, and participants completed a thirteen item pre- and post-test to evaluate training effectiveness. While pre-test scores were generally high, improvement varied. Years of education and survey language (Spanish or English), had the largest impact on pre- to post-test comparisons. Participants having a high school diploma or greater performed better (8% vs. 5%), and Spanish language participants declined in performance (-7%) compared to English (9%). The training was well received in objective evaluations of both the information and format. The decline in knowledge among Spanish-speakers is concerning, as the vast majority of these participants (91%) have a history of work in agriculture and many report working with occupational pesticides. Future research is needed to investigate

if this decline was due to format, the lower education level of this group, or the training content.

**NEUROBEHAVIORIAL PERFORMANCE AND PESTICIDE EXPOSURE OVER THE LIFETIME.** Tara Moomey, Elliot Hohn, Martha Fuchs, Silvia Huszar, Diane S. Rohlman. Center for Research on Occupational and Environmental Toxicology, Oregon Health and Science University, Portland, OR 97239

Neurobehavioral (NB) tests are used to evaluate the central nervous system functions of cognition and motor performance. These tests were utilized to evaluate the effects of low level pesticide exposures on neurobehavioral performance in children. Seventy-two children residing within an agricultural community participated in Year 1 of the study. Forty-four children came from families whose parents were currently working in agriculture and 28 from families not working in agriculture. A Life History Questionnaire, administered to parents, employed visual markers on a calendar to stimulate recall by the parents about potential pesticide exposure throughout the child's lifetime (e.g., living next to agricultural fields, occupational and residential pesticide). Dust samples from the same families' homes were also analyzed for pesticide residues. Children of agriculture workers have a higher risk of exposure to pesticides than the general population because of take-home exposures (e.g., on clothes) and, often, proximity of their homes to fields where pesticides are applied. Scores on the Life History Questionnaire that reflected pesticide exposure ranged from 47 to 766, indicating that even the children whose parents did not work in agriculture had experienced potential exposure to pesticides throughout their lifetime. Significantly higher scores were found for the agricultural children than the non-agricultural children ( $p < 0.01$ ), based on their parents' responses. The impact of potential pesticide exposure based on the Life History Questionnaire will be related to NB test performance.

**COMPUTER-BASED TRAINING ON FAMILY AND MEDICAL LEAVE – THE ROLE OF THE SUPERVISOR.** Naima Laharnar<sup>1</sup>, Nancy Perrin<sup>2</sup>, Ginger Hanson<sup>2</sup>, Nancy Glass<sup>3</sup>, W. Kent Anger<sup>1</sup>. <sup>1</sup>Center for Research on Occupational and Environmental Toxicology, Oregon Health and Science University, Portland, OR, 97239, <sup>2</sup>Kaiser Permanente Center for Research, Portland, OR, 97227, <sup>3</sup>School of Nursing, Johns Hopkins University, Baltimore, MD, 21205.

The "Family and Medical Leave Act (FMLA)" was passed in 1993 as the first federal law to address family leave. Covered employers are required to grant up to 12 weeks of leave to eligible employees with qualifying family or medical reasons. Previous surveys (2000 Westat Surveys) have shown an increased usage of the leave but also a lack of awareness of the law (16% of covered establishments don't know that they are covered, 49% of covered employees don't know

whether the law applies to them). Supervisors are usually the first to learn about an employee's condition and should therefore be educated to inform and guide the employee. We developed a 45-minute computer-based "Family Medical Leave" training and provided 793 county supervisors from 26 Oregon counties with it. The supervisors demonstrated significant improvement in test performance from pre-test to post-test (61% to 94%,  $p < .001^{**}$ ; see figure 1b) with greatest improvement in questions about defining a protected leave law, benefit coverage, employer responsibilities and military leave regulations. This and the large effect size ( $d$ ) of 2 indicated a high degree of training effectiveness and learning. Also, the training received good or excellent ratings from 74% - 86% of the participants (see figure 1a). Thus the training achieved high scores on the first two levels (Reaction, Learning) of Kirkpatrick's (1998) "Four Level of Evaluation" Pyramid for training programs. The last two levels (Behavior Changes, Results) will be investigated by comparing pre- and post-intervention data from workplace surveys, workplace observations and county leave data.

DOMESTIC VIOLENCE AND WORKPLACE SUPPORT. Kendra Evans<sup>1</sup>, Nancy Glass<sup>2</sup>, Nancy Perrin<sup>3</sup>, Ginger Hanson<sup>3</sup>, Elliot Hohn<sup>1</sup>, Andrew Kirk<sup>1</sup>, W. Kent Anger<sup>1</sup>. <sup>1</sup>Center for Research on Occupational and Environmental Toxicology (CROET), Oregon Health & Science University, Portland, OR, 97239; <sup>2</sup>The Johns Hopkins University, Baltimore, MD <sup>3</sup>Center for Health Research, Portland, OR.

Intimate Partner Violence (IPV), more commonly known as domestic violence, is well established as a widespread problem with negative health, social and cost consequences for the victims, perpetrators, the workplace and community. The objectives of this research are to determine the impact of Domestic Violence and the Workplace training on supervisor knowledge, workplace culture toward IPV, and intention to address IPV in the workplace using randomized trial design. We recruited service organizations with 100 or less employees throughout the state of Oregon and provided training by one of three different methods: 1) CBT (18 businesses,  $n=64$  supervisors) received 45-minute computer-based training (CBT) with interactive quizzes featuring feedback during training; 2) Web (16 businesses,  $n=39$ ) received a internet-based training (identical in content to 1) but without interactive quizzes; and 3) Brochure (16 businesses,  $n=63$ ) received a standard state-developed brochure on domestic violence in the workplace and received CBT at a 3-month follow-up. Both intervention groups showed significant improvement from pre-test to post-test, with CBT (pre-test = 72%, post-test = 94%) showing the most improvement, and Web (pre-test 71%, post-test 83%) showing less. The Brochure group scored 74% on the post-test. Among all participants, 81% reported the training changed motivation to address domestic violence in the workplace, with the highest percentage of participants (86% reporting motivation

to change) from the CBT group and the lowest (76%) in the Brochure group. Results suggest that use of interactive quizzes with feedback during training produces increased knowledge acquisition and motivation to address intimate partner violence.

PROTECTIVE LEAVE LAW: IS IT PRACTICAL FROM A VICTIM'S POINT OF VIEW? Cassandra Dinius<sup>1,2</sup>, Naima Laharnar<sup>1</sup>, Nancy Glass<sup>3</sup>, Diane S. Rohlman<sup>1</sup>, W. Kent Anger<sup>1</sup> <sup>1</sup>Center for Research on Occupational and Environmental Toxicology, Oregon Health and Sciences University, Portland, OR, <sup>2</sup>Department of Psychology, Western Oregon University, Monmouth, OR, <sup>3</sup>School of Nursing, Johns Hopkins University, Baltimore, MD.

One out of every three women in Oregon report being a victim of domestic violence. Domestic violence impacts not only home life, but also extends to the workplace. Individual interviews were conducted with employees and supervisors from eight counties to evaluate the Oregon Victims of Certain Crimes Leave Act. Counties were classified according to population as high-density or low-density to assess access to resources. Initial analysis of 10 interviews revealed that all employees in high-density counties had heard of the OVCCLA, compared to 29% of employees in low-density counties. Employees were more likely to cite financial troubles as the primary deterrent from using the law, which suggests that an unpaid leave law may not be practical. All participants believe supervisors should receive further training on the domestic violence leave law. Additionally, a computer-based training about the protected leave law was administered to supervisors (N=522) in 14 counties. Pre- and post-test scores revealed significant improvement on knowledge of the law following training ( $p < 0.01$ ). These data indicate that further training on the protected leave law is desired and needed.

HEALTH BELIEFS OF AN AGRICULTURAL COMMUNITY. Andrew Nilsen, Elliot Hohn, Tara Moomey, Lindsay Nakaishi, Naima Laharnar, Kendra Broadwater, Gwen Schulze, Silvia Huszar & Diane Rohlman. Center for Research on Occupational and Environmental Toxicology, Oregon Health & Science University, Portland, OR 97219.

Studies of agricultural workers' health beliefs have been used to identify and reduce barriers to implementing measures that reduce organophosphorus pesticide (OP) exposure in farmworkers. However, there is no research examining the health beliefs of an entire agricultural community. OP pesticide levels in home dust samples indicate that all members of agricultural communities, especially those living near fields where pesticides are applied, can be at risk to pesticide exposure. A 68-question survey assessing pesticide knowledge and beliefs was developed and administered to community members (N=505) at a county fair in an agricultural community in Oregon. Participants completed the survey in either English (N=420) or Spanish (N=85). Demographic information,

pesticide knowledge, health beliefs, and agricultural work practices were assessed, and the health beliefs of participants in relation to the agricultural work status and their preferred language were examined. The participants included 222 non-agricultural workers, 283 workers with agricultural experience (current and former). Results indicate higher perceived risk among Spanish speakers than English speakers, as well as a greater perception of pesticide related illnesses among agricultural workers than their non-agricultural neighbors. There are empirically-supported ways to reduce pesticide exposure, and educating members of agricultural communities is important not only to help them be safe, but also feel safe. Community-wide education is important, as much information regarding pesticide exposure is gained through informal social networks, not all of it accurate. An understanding of health beliefs held within a community aides in constructing educational materials that are relevant and appropriate for specific populations.

OPEN SOURCE SCIENCE: PSYCHOLOGY EXPERIMENT BUILDING LANGUAGE, A DEMONSTRATION. Reid H. J. Olsen, Daphnee Berteau-Pavy, Yuli Kobel, Brian J. Piper, Department of Behavioral Neuroscience, Oregon Health & Science University, Portland, OR 97239

Computerized test batteries offer the advantage of standardization of administration as well as data acquisition, but the specifics of the hardware or software may also impose monetary, physical and logistic constraints which have often offset the benefits. As technology has become more portable and ubiquitous, the potential usefulness of computerized neurocognitive tests has become a reality. Whereas one might have needed to purchase expensive proprietary components useful for only one test (e.g. pursuit rotor), the personal computer, in tandem with specialized software, has become a veritable Swiss Army knife of testing—portable and pliant. Today, there are a number commercial psychometric software packages each with its own advantages although frequently they are as expensive as the physical version of the classical neurobehavioral test they emulate. A major example is the Cambridge Neuropsychological Automated Battery. The Psychology Experiment Building Language (PEBL) is an open source project started and maintained by Dr. Shane Mueller at Michigan Technological University. PEBL is a simple programming language, easily modifiable, open source and downloadable free of charge, with a large and ever expanding battery of tests ([pebl.sourceforge.net/](http://pebl.sourceforge.net/)). PEBL offers many of the same advantages as proprietary psychometric computer programs, but is more customizable. This presentation will tie together the compatibility of the pursuit of scientific knowledge with the “information wants to be free” ethos of open source, and demonstrate the user friendliness and simplicity of PEBL, citing data with new versions of classic measures from experimental psychology and neuropsychology.

USING THE PSYCHOLOGY EXPERIMENT BUILDING LANGUAGE (PEBL) TO EXPLORE EXECUTIVE FUNCTION IN YOUNG ADULTS, Hannah Gandyse\*<sup>1</sup>, Donna Nolan\*<sup>1</sup>, Sari Matisoff\*<sup>1</sup>, Reid H.J. Olsen\*<sup>2</sup>, Vera Warren\*<sup>1</sup>, Brian J. Piper<sup>2</sup>, & Jeremy K. Miller<sup>1</sup>, <sup>1</sup>Department of Psychology, 900 State Street, Willamette University, Salem OR 97301, <sup>2</sup>Department of Behavioral Neuroscience, Oregon Health and Science University, Portland OR, 97239.

Currently, when researchers in many sub-fields of psychology and medicine want to assess the cognitive functioning of a patient or research participant they often have to purchase costly proprietary testing instruments. The costs associated with these instruments can be prohibitive, particularly for smaller laboratories or international researchers, especially for assessment batteries which may involve 5-15 short tests (\$100-1000/test). Further, for computerized versions of the assessments, the underlying programming that determines how each dependent measure (e.g. attention in Conner's Continuous Performance Test) is calculated is frequently unavailable to the individual investigator as this is proprietary information. The goal of the current project was to determine normative behavior on a recently developed, open access, freely available collection of computerized neurocognitive tests, the Psychology Experiment Building Language Battery version 0.6. A battery of tests consisting of PEBL versions of several classic neuropsychological tests designed to measure executive function were administered to a sample of Willamette University undergraduates. The findings will be discussed in relation to previously published norms using proprietary versions of the tests.

NOVEL-IMAGE NOVEL-LOCATION: VALIDATION WITH OTHER NEUROCOGNITIVE TESTS. Andrew Perschetti, Anthony Linn, Chris Fox, Reid Olsen, Jonathan Popejoy, Brian J. Piper Department of Behavioral Neuroscience, Oregon Health & Science University, Portland, OR 97239

Recognition memory is a fundamental cognitive process. The Novel-Image, Novel-Location task (NINL) is a computer-based object recognition test we have developed in our lab using the Psychology Experiment Building Language (PEBL) program. We use NINL as part of a neurobehavioral battery to test cognitive functioning and development in children between the ages of 9-11 years old. Our sample includes girls and boys who were exposed prenatally to drugs and alcohol, as well as those who were unexposed. The data we have gathered from NINL shows strong intra-test correlations, and correlations with other cognitive tests in our battery including the PEBL fine-motor tapping test, Colorado Assessment Tests Memory Cards, and Wechsler Abbreviated Scale of Intelligence Matrix Reasoning. NINL is an easily administered test that could be very useful in future research into cognitive development, gerontology, psychopathology or any other area that requires neurocognitive assessment.

EMPLOYEE STRENGTHS AND JOB SATISFACTION. Kristi Morrish, Washington State Department of Personnel, Olympia, WA 98504, Mike Raich, Olympia, WA 98506.

Employee strengths have been shown to be related to a variety of important individual and organizational outcomes. The *Clifton StrengthsFinder* instrument assesses individuals on 34 strengths or themes of human talents. The tool developed by the Gallup organization has been administered to over two million people. However, its proprietary scoring method can present challenges for research. In the current study, 103 employees of a western state government evaluated themselves on the *Clifton StrengthsFinder* instrument and immediately received a written description of his or her five greatest strengths. They attended a two-hour workshop at a later date. The workshop leader discussed the topic of strengths before participants formed small groups to discuss applying their strengths on the job. At the end of the workshop participants rated their job satisfaction along with how frequently each of their five greatest strengths was used at work. Results showed that as use of these strengths increased so did job satisfaction. Supervisors did not differ from non-supervisors in how frequently they used their strengths. However, supervisors did show greater job satisfaction. Gender and the number of years in the current position were unrelated both in the use of strengths and job satisfaction. The paper discusses how employees and supervisors can make more effective use of employee strengths.

THE EFFECTS OF A SELF-EVALUATION TASK ON THE P300 EVENT RELATED POTENTIAL. Justin Karr<sup>1</sup>, Tyler Grindstaff<sup>1</sup>, Joel Alexander<sup>1</sup>, And Ronald Alexander<sup>2</sup> <sup>1</sup> Division of Psychology, Western Oregon University, Monmouth OR, 97361, <sup>2</sup> Department of Philosophy, Wartburg College, Waverly IA, 50677

It has been shown that P300 amplitude is sensitive to self-identity stimuli (e.g., name) and emotional self-evaluation (Alexander, et al., 2005). The present study is a replication of the Alexander et al. 2005 study with more electrode locations and participants. The study was designed to capture an introspective moment during a task that required emotional self-evaluation related to an infrequent, random stimulus void of self-identity qualities. The design of the study was different from previous stimulus-driven self-identity stimulus studies in that the base sensory discrimination task was constant across all conditions. Participants started with a standard tone discrimination task (oddball) during condition 1. In conditions 2 and 3 participants completed a secondary cognitive task in addition to the oddball task where they made a second stimulus-related judgment after their initial response. Condition 2 required subjects to index a mental count if the tone was a target, in addition to oddball. Condition 3 required subjects to self evaluate if they were surprised by the occurrence of the target, given the random/infrequent nature of the

target tone presentation. During these conditions, ERPs were recorded across 32 electrode sites. Similar to the self-identity stimulus studies, results indicated a large increase in P300 amplitude during the condition with the self-evaluation component compared to the other conditions. The increase in recording sites allowed for the delineation of the Parietal lobe being the location of the greatest increase in P300 Amplitude. These results imply that self-evaluation may utilize more cortical resources than non-self related cognitive-discrimination tasks.

## **SCIENCE EDUCATION**

### **Section Chair:**

Karen Bledsoe  
*Western Oregon University*

### **SCIENCE EDUCATION – ORAL PAPERS**

OSTA SCIENCE PARTNERSHIPS: DEVELOPING A BLENDED MODEL OF PROFESSIONAL DEVELOPMENT. Karen Bledsoe, Biology Department, Western Oregon University, Monmouth, OR 97361; Heidi Kellar, Northwest Evaluation Association, Portland, OR.

OSTA Science Partnerships is a three-year professional development project funded by a Department of Education Math-Science Partnership grant. The goal of the project was to develop an effective blended model of online and face-to-face professional development to improve the science content knowledge and science teaching effectiveness among elementary science teachers in the Bend-LaPine School District, a model that might later be ported to other, more rural school districts in the state. An evaluation of the initial two-year blended professional development program demonstrated significant science content learning gains and an increase in the use of reform-based teaching methods among the participant teachers. However, while teachers saw value in the face-to-face portion of the professional development, the online portion was used much less than anticipated. The online portion of the model will need revised and strengthened before the model will be ready to serve teachers in remote areas of the state. In its current and third year, the project is testing a one-year model.



ACTIVE LEARNING IN AN UNDERGRADUATE MAJORS-LEVEL INTRODUCTORY BIOLOGY LECTURE COURSE. Kristin L. Latham and Sarah M. Boomer, Biology Department, Western Oregon University, Monmouth, OR 97361.

This study examines how well students learn and retain course content when part of the lecture is set aside for active learning activities. The first course in our year-long introductory series for biology majors encompasses four learning units covering basic cell biology, metabolism, genetics, and regulation/biotechnology. Without prerequisites, many of the approximately 150 students who begin this series do so with minimal biology or chemistry, and thus struggle with course concepts. Here, we compare data from 2009 when the course was solely lecture-based to data from 2010 which contained pre-designed active learning activities in addition to lecture. Pre- and post-test content questions were given to students for each course unit, then data compared quantitatively and qualitatively. Our findings show that students made some gains in retaining information, over the previous year, when active learning techniques were used. Students also self-reported more satisfaction with the course and their own learning during the term that active learning was incorporated. However, the retention of students who continue to the second term of this sequence was not changed. These preliminary results indicate that the use of active learning activities during lecture may have helped some students, however by itself was not enough to reduce the number of students who drop or fail the course. These issues will need to be addressed if we intend to grow our group of students majoring in biology.

ONLINE DISCUSSIONS IN UNDERGRADUATE SCIENCE COURSES: OBJECTIVES, APPROACHES AND BEST PRACTICES. Cub Kahn, Dept. of Geosciences, Oregon State University, Corvallis, OR 97331.

This presentation illustrates strategies and best practices for the use of discussion assignments in online undergraduate science courses, with particular reference to general education courses in geography. The number, duration and value of discussion assignments; learning objectives associated with discussion assignments; discussion formats; the instructor's communication of discussion expectations; grading rubrics; writing standards; and the instructor's role(s) in online discussions are examined. Examples of online discussion assignments are presented, and best practices from the literature for the design and implementation of online discussions are summarized.

A SHORT HISTORY OF THE FOOTPRINTS PUZZLE. Charles R. Ault, Jr., Department of Teacher Education, Lewis & Clark Graduate School of Education and Counseling, Portland, OR 97219.

Introduced in 1969 as an exercise in the Earth Science Curriculum Project (ESCP) for teaching about trace fossils, this puzzle has

become an icon for teaching a distinction between observation and inference. The puzzle, which features two sets of intersecting tracks admitting to multiple interpretations, has appeared decade by decade as a resource for illustrating the processes, the nature, or the culture of science. Even the Oregon Zoo's Cascade Canyon Trail features a version of this puzzle. The puzzle descends with modification from the fossil record of multiple species of dinosaurs trodding a shoreline in early Cretaceous time in what is now Texas. These fossils have been interpreted in different ways by paleontologists (most recently through comparisons with trackways of modern beasts, such as fighting hippos) leading to a debate about whether they do or do not record the attack of a predator. Instructional materials exaggerate the pattern of the tracks and typically present them as a "mysterious footprints" puzzle with minimal context. Not just a misleading oversimplification, this approach reinforces the tendency to separate content from process, leading to the design of generic assessments of inquiry of dubious authenticity. Its focus of attention on observing and inferring in the abstract also distorts the role of knowledge in making observations. Critique of the footprints puzzle is intended to foster debate regarding the unity or disunity of the sciences with implications for the design of instruction.

THE FAILURE OF EVOLUTION EDUCATION. Charles J. Kunert, Department of Math & Science, Dean of the College of Theology, Arts, & Sciences, Concordia University, Portland, OR.

Despite extensive efforts to promote the teaching of evolutionary theory by organizations such as the American Academy for the Advancement of Science, the National Science Foundation, and the National Science Teachers Association, recent surveys indicate that a very large proportion of U.S. citizens do not support a view that organisms found on earth today are the result of evolutionary forces. In particular, the idea that humans are the product of evolutionary processes is rejected by a majority of Americans. This presentation will reflect on the reasons this may be so and offer some suggestions for how evolutionary concepts might be taught in a more effective manner. Audience participation will be encouraged.

INVESTIGATING THE NATURE OF STAFF-FACILITATED LEARNING AT A SCIENCE CENTER. Scott Pattison, Science and Mathematics Education Department, Oregon State University, Corvallis, OR 97331.

Educators, docents, and volunteer interpreters are an important component of the learning experiences at many informal science education (ISE) institutions, including museums and science centers. There is growing recognition that, like classroom teachers, these staff members need training and ongoing professional development in order to effectively support science learning for the public. Unfortunately, very little research has been done to describe the work

of informal science educators or to identify effective teaching strategies appropriate to these settings. This study addressed this need by investigating the nature of staff-facilitated learning at the Oregon Museum of Science and Industry, Portland, OR. Sixty-three staff-family interactions were video and audiotaped over the course of four days at four different staff-facilitated activities. Drawing from a sociocultural perspective on learning and human interaction, the video was transcribed, inductively coded, and used to develop a framework for describing staff-facilitated ISE experiences. The qualitative analysis highlighted three important dimensions of the interactions: staff initiation, staff and visitor teaching strategies, and the introduction of new learning goals by staff. Aligned with prior research on family learning in museums, adults played a critical role in shaping the nature of the interactions. The encounters were often characterized by strong role negotiation between staff and adult visitors. The study has implications for the work of science educators in a variety of settings, as well as future research efforts.

VISITOR MEANING-MAKING with GLOBAL SPHERICAL DATA VISUALIZATIONS. Kathryn Stofer<sup>1</sup> and Shawn Rowe<sup>2</sup>, <sup>1</sup>Department of Science and Mathematics Education, Oregon State University, <sup>2</sup>Oregon Sea Grant and Department of Science and Mathematics Education, Oregon State University, Corvallis, OR 97330.

Scientists often portray data as visualizations in order to reveal salient patterns. Rowe's previous work indicates that scientific conventions in these images need translation for the public to make sense of the information, just as technical jargon needs translation to lay language in stories in the news media. Here, we investigate visitors to a marine science center as they use an exhibit to try to make meaning of these visualizations presented in a spherical display with interpretive text and images. We draw on both a constructivist framework that suggests, in order to make meaning, visitors must use prior knowledge and experiences, and a sociocultural perspective that postulates visitors make meaning through dialogue and the use of tools such as the images. Using unobtrusive and videotaped and interviews with video-stimulated recall, we ask whether these visitors 1) work to make meaning as groups, 2) recall details presented in accompanying text, 3) understand the color schemes used in the images, and 4) have more interactions with and/or better understand particular images. Our findings indicate that many visitors did talk together about the exhibit content, but that the images still remained obscure due to unfamiliar color schemes and lack of geographic markers. Though many did verbalize prior knowledge during their interactions, most groups were unable to recall details presented in the interpretive text. While the spherical display with interactive kiosk proved engaging, more work to scaffold meaning-making from the images by reducing processing spent on less-relevant contextual details is warranted.

INTERACTIONS BETWEEN VISITING FAMILIES AT A TOUCH POOL IN AN AQUARIUM: WHAT MAKES THE DIFFERENCES IN THE VISITING AND LEARNING EXPERIENCES BETWEEN THE U.S. AND TAIWANESE GROUPS? Chi-Chang Liu, Shawn Rowe, Department of Science and Mathematics Education, Oregon State University, Corvallis, OR 97331.

Touch pools have been proven as one of the most popular and memorable exhibits in aquariums, and with their popularity, touch pools seem to be a great teaching tool for marine science. Parents in a free choice learning setting such as touch pools often serve as facilitators who serve as a “bridge” which connects the gaps between their children’s ability to understand the content and the knowledge behind the exhibits. Language, as a physical and psychological tool, affects the engagement of learners by creating different socio-culturally meaningful types of interaction within which learning occurs. In our study, we compared the visiting experiences between the regular U.S. and Taiwanese visiting families using questionnaires, discourse analysis of video recorded behaviors and in depth interviews at Hatfield Marine Science Center in Oregon, USA. For this study, we focused on the interactions between parents and children through dialogue and the role of parents as facilitators in their children’s learning. We documented the differences of interactions between non-native (Taiwanese) and native English speaking families in an English-based free choice learning setting and the socio-cultural meanings of visiting children’s learning experiences. Our findings on the roles of languages and cultural backgrounds play in the families’ visiting and learning help us better understand the visiting experience of our visitors and might be applied to exhibit design and the implementation of learning events in order to facilitate science learning in free choice settings and enhance the public’s scientific literacy in general and marine science literacy in particular.

DEVELOPING AN INTERACTIVE EXHIBIT ABOUT ESTUARY CURRENTS AND MODELING. Emily Lemagie<sup>1</sup>, Shawn Rowe<sup>2</sup>, James Lerczak<sup>1</sup>, Nancee Hunter<sup>2</sup>, College of Oceanic and Atmospheric Sciences, 104 COAS Administration Building, Corvallis OR, 97331, <sup>2</sup>Hatfield Marine Science Center, 2030 SE Marine Science Dr., Newport, OR 97365.

Physical oceanography and modeling have recently become priorities in national and state-level goals for science and math curriculum as well as ocean literacy. We are developing an inquiry based exhibit to educate the public about the variability of currents in an estuary and how scientific models can be used to study estuary dynamics. The exhibit theme used to introduce these topics is Olympia Oyster restoration in the local Yaquina Bay Estuary. The interactive game component mimics a method for native oyster restoration, depositing oyster shells removed during harvesting back into the estuary to create habitat for oyster larvae to settle upon. The estuary dynamics

component of the game is based upon a numerical model developed specifically for this estuary and exhibit. The site for prototyping and evaluation of the exhibit is the Hatfield Marine Science Center (HMSC) in Newport, Oregon. Research on the effectiveness of the exhibit at reaching its educational outcomes is in the initial stages. We will present front-end evaluation results including surveys and interviews conducted at HMSC to determine the public's background knowledge, and feedback from initial exhibit drafts.

**PRESERVICE TEACHERS' RESEARCH: COGNITIVE PROCESSES INVESTIGATION OF SCIENCE AND MATH CONCEPTS.** Ronald Narode, Panel Moderator, Panel Presenters: Annie Bergman, John Hammond, Donovan Kim-Nebrensky, Patrick Lind, Shannon Maschinchi, Lauren Neal, Charissa Stair, and Stephanie Van Raden ; Portland State University, Department of Curriculum & Instruction, Portland, Oregon, 97207-0751

Students in the Portland State University, Graduate Teacher Education Program conduct research into the cognitive processes of students in middle and high school science and mathematics as part of their teacher preparation. Topics range across much of the curriculum advocated in national and state standards and include, causes of illness and infection; water and acids in our environment; food and the macromolecules that make it; kinematics and inertia; body mechanics in human action; and electrochemistry of batteries and bulbs, and in mathematics; student understanding of systems of equations and of mathematical estimation. Carefully constructed interviews were recorded and analyzed to reveal preconceptions and alternative conceptions from students, many of whom have had instruction on the topics. Results have alerted teachers to their students' prior knowledge, imaginative thinking, and language usage (with emphasis on student literacy). Interviews provide insight into what students believe and also help teachers look critically at how they pose questions. A series of brief presentations will describe the most salient aspects of the research as well as indicate the instructional relevance of the findings. Audience questions and suggestions are welcome.

**ROUND TABLE: USING REGIONAL PEDAGOGICAL COMMUNITIES TO IMPROVE STEM LEARNING ENVIRONMENTS.** Marlene Moore<sup>1</sup>, Barbara Stebbins-Boaz<sup>2</sup>, Jeanne Narum<sup>3</sup>, Gary Reiness<sup>4</sup>, <sup>1</sup>CLA Dean, <sup>2</sup>Department of Biology, Willamette University, Salem, OR 97301, <sup>3</sup>The Independent Colleges Office, Washington, DC 20036, <sup>4</sup>Associate Dean, Lewis and Clark College, Portland 97219.

Project Kaleidoscope (PKAL) created five different kinds of regional networks to provide communities of practice that support institutionalization of pedagogical reform in STEM disciplines. This work was based on the hypothesis that regional networks lead to more rapid dissemination and adaptation of research-based STEM

pedagogical approaches than isolated efforts. In this round table discussion, the facilitators will: (a) share a set of *lessons learned* from the national pilot study and (b) use a case-study model to explore challenges encountered in building a regional network. The case-study will be based on experiences establishing the Willamette Valley Biological Education Network (WVBEN). WVBEN's goal is to be sustained over time, collaborative, and based on evidence about student learning. Participants will apply the *lessons learned* to the case-study, and share their own experiences relative to forming sustainable, collaborative communities of practice across institutions.

## **SOCIOLOGY, POLITICAL SCIENCE, AND ANTHROPOLOGY**

### **Section Chair:**

Cheleen Mahar  
*Pacific University Oregon*

### **SPSA – ORAL PRESENTATIONS:**

#### **NONTRADITIONAL TRANSGENDER NARRATIVES AND THERAPY.**

Dylan E. Waller, Portland State University, Portland, Oregon 97214.

There is an overwhelming need for quality mental health services for those within the transgender community, including gender variant individuals. Individuals who do not conform to society's gender norms are susceptible to a range of psychological issues that could benefit from the help of a therapist. This study's assessment of gender variant individual's experiences within the therapy setting may influence therapists to reevaluate their effectiveness in fully providing for their client's needs. The author argues that traditionally therapeutic practices along with the interconnected legislative processes have been discriminatory. These forces, in tandem with a social environment, which strongly rejects gender non-conformity and gender deviance, work to reinforce a binary. This binary both intellectually and experientially harms the psychology and social well-being of gender variant individuals. This study's significance further lies in its ability to affect practices within the mental health community. This thesis involves an analysis of twelve in-depth interviews. The author conducted interviews with gender variant individuals across the United States. Individuals were selected based on their identification with a gender other than the one that corresponds to their assigned sex. They were theoretically sampled

with a selection criterion of not fully embracing gender dichotomies and/or an expressed perception that they themselves do not fit into the male-female binary. Many, though not all, participants in this study self identified as “genderqueer” or “gender-neutral.” Interviews focus specifically on the individual’s evaluation of their experience in gender therapy. Participant’s perceptions of their therapist’s reactions to alternative gender identities are also analyzed. Specific attention is paid to the transformation and preservation of gender identity among gender variant individuals while undergoing therapy.

**ENVIRONMENTAL IMPACTS AND PERCEPTIONS IN SRI LANKA: DOES GENDER MATTER?** Katy E. Griffin, Department of Sociology, Portland State University, Portland, OR 97207.

This gendered analysis of natural resource management in a rural Sri Lankan village investigates the question of how the gendered division of labor impacts natural resource management in buffer zones of governmentally protected natural areas that suffer from Human Elephant Conflict (HEC) in Sri Lanka. This Case Study utilizes semi-structured in-depth interviews to uncover the linkages between gender, poverty and governance. Implications for better natural resource governance involves increasing trainings for both women and men regarding both alternative livelihoods and environmental conservation awareness as tools for mitigating the effects of HEC. Intentional forest fires, tree cutting by non-residents, unstable income sources and lack of water perceived by residents are significant issues in these areas. The study supports the notion of women’s importance in participation in natural resource strategy development and implementation. As HEC escalates due to increased development of the market economy, mitigating strategies become increasingly important. Negative wildlife interactions and increased destruction of habitats threaten both the survival of the Sri Lankan Elephant and the social sustainability of rural communities dealing with these conflicts. Examining women and men’s roles in the village household as they relate to the gendered division of labor may reveal the potential for villagers to have differential environmental views. Future research may examine how men and women conceptualize issues of environmental degradation for purposes of discovering mitigating techniques to solve Human Elephant Conflict.

**POSTMORTEM CARE: A RITUAL CREATED BY MEDICAL SUBCULTURE.** Leia Franchini, Cheleen Mahar, Department of Anthropology, Pacific University Oregon, Forest Grove, OR 97116.

American culture primarily functions in a scientific belief system, where all phenomena can be explained via the natural sciences, and death is the end of biological life. If death is the termination of life; death is also the cessation of the “American dream.” Subsequently,

death becomes an act of deviance and is ostracized to the medical institution. American rituals associated with the human corpse have been lost. Healthcare providers are now the primary caregivers to the dying and the corpse. Since death rituals are no longer supplied by American culture, medical professionals have created their own rituals in the form of medical procedures. This research seeks to understand how postmortem care, a scientifically based medical procedure, is a ritual utilized by healthcare providers to normalize, and assign meaning to, death in a culture where death is rejected. Data is gathered qualitatively via participant observation and interviews. Analysis of data relies heavily on the discipline of thanatology as well as incorporating theories of symbolic anthropology and social interactionism.

THE CREATION OF ARTISTIC SPACE. Sarah Hawkinson, Cheleen Mahar, Department of Anthropology, Pacific University Oregon, Forest Grove, OR 97116.

It is hard to imagine having the motivation to sit hours upon hours and create new ideas. It is this relationship with the artist's own constructed space that might hold a key to understanding the deeper secrets of inspiration and motivation. Is it a personal passion or is it more? Does the constructed space include a physical component or is it created through the artistic process? Understanding how artists remain inspired opens a window onto the cultural/spatial center of the creative process. This project is a pilot study, which investigates the relationship between professional artist's creative production and the physical space they use to work. Through qualitative methods, I used structured interviews, and ethnographic fieldwork to draw on the perception and experience of five professional performing and visual artists to explore how their creative space is consciously constructed to inspire or continue their creative and artistic production. This research suggests an important connection between the physical and imaginary space of working artists and their artistic production. It illuminates a complex dynamic between the constructed workspace of the professional and how space is shaped to continue to promote self-discipline.

COMING HOME: REUNION EXPERIENCES ON JOINT BASE LEWIS MCCORD. Summer Steenberg, Department of Anthropology, Pacific University, Forest Grove, Or, 97116.

Military life demands that families navigate between long distance (LDRR) and close proximity relationships. Following our entrance into the War on Terror, the Army has seen a rise in the number of high op-tempo bases. With increased deployments and ways around the required stabilization time, military families are experiencing repeated, elongated separations. As a rapid deployment instillation,



Joint Base Lewis McChord (JBLM) deployed a record number of their troops during 2008 – 2009. Utilizing qualitative research methods including participant observation, personal interviews and focus groups, this study seeks to understand how JBLM spouses navigate between single and dual adult household. An emphasis is placed upon how individuals create an identity as a military spouse, utilize coping mechanisms, use behavioral modeling and reinvent roles.

**THE ROLE OF THE MAHADEVI IN THE HINDU PATRIARCHY.** Samantha Stych. Department of Anthropology, Pacific University, Forest Grove, OR 97116.

Shakti is the divine creative feminine force within Hinduism. Shakti is manifested into the form of the Mahadevi, the supreme goddess. Some of her avatars, such as Durga and Kali, are fierce warrior goddesses whose primary mythological function is to combat demons who threaten the stability of the universe. While both are fierce, only Durga exists in the state of Svatantrya, the ultimate state of self-sufficiency and independence from all things in the universe. The Hindu patriarchy promotes a submissive feminine ideal which identifies women in relation to their fathers, husbands, and sons. In this paper I examine the role of this fully independent female deity, Durga, plays within the male dominated Hindu society. Through researching texts, participant observations, and interviews with both male and female Hindus, I have begun to understand Durga's role as a symbol of feminine power. Female Durga devotees use her to express their independence as mothers; however, they do not seem to directly express this independence in relation to male relatives. They exercise this independence over children and other women in the household. Paradoxically, this independence is also expressed by female politicians, often in direct defiance of males. But this independence comes at a cost. This cost is that when women express this independence, they lose their "femininity" as defined by the Hindu patriarchy. This paper will explore the complex, often paradoxical, role of the goddess Durga as a symbol of femininity.

**SOCIAL BEHAVIOR AND THE UNSPOKEN RULES OF GOLF.** Cathryn Heath, Pacific University Department of Anthropology, Forest Grove, OR, 97116.

Individuals interact with one another by learning, understanding, and following the rules, and social norms, that are within one's society. People must learn these norms and regulations in order to understand the acceptable actions within a sports environment. My main objective was to investigate how individuals learn the numerous unspoken, yet enforced, rules of golf etiquette. The research goals of this study were: (1) to examine how individuals learn the diverse

array of unspoken, and enforced, rules of golf, (2) to determine how and why individuals who break these rules are directed to the appropriate behavior in an ambiguous golf situation, (4) to verify how people recognize social norms that are not enforced through written rules; such as those rules in the golf etiquette handbook, and (5) to determine ways in which people who play golf look for clues within the situation in order to understand how to behave. Data was gathered by using both face-to-face interviews and non-participant observations on both the course and within the clubhouse. I chose to use a qualitative research design. A collection procedure in qualitative research involves observations, content analysis, interviews, document, and visual images. My final goal, once I have finished with my research investigation, is to convey in the results how, and why, individuals behave when certain elements of the situation, and social expectations, are uncertain.









