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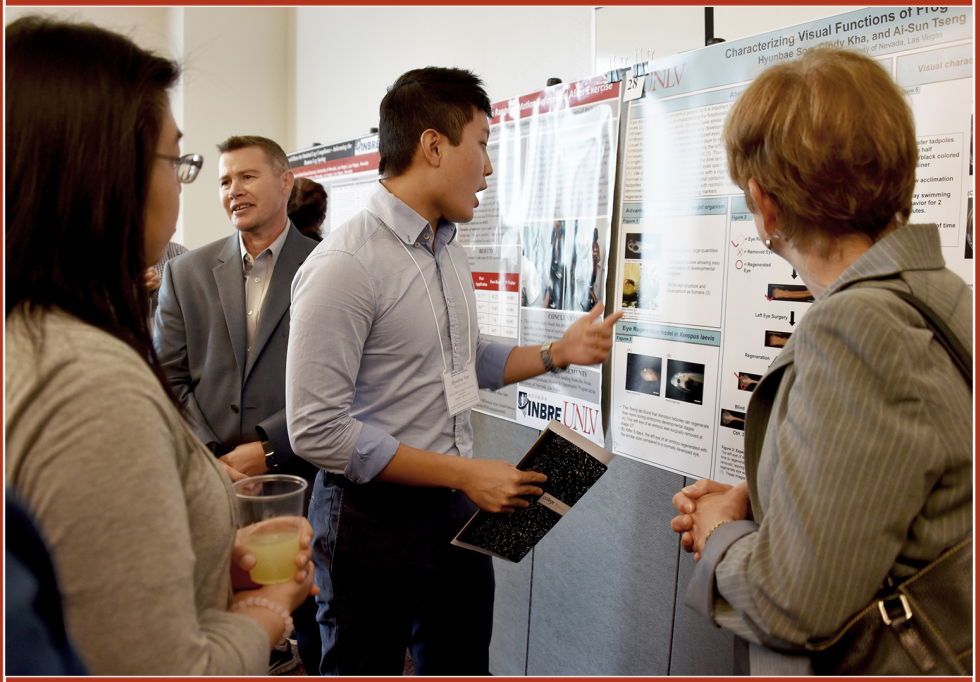
SUMMER UNDERGRADUATE RESEARCH SYMPOSIUM



9 AUG 12-3:30 P.M. SU 208

This event provides a casual setting where undergraduate researchers will meet their research cohort and share their summer work with the campus. This symposium provides an opportunity for students to develop their professional presentation skills by presenting a three minute "quick pitch" of their research. Projects in all academic fields and at all stages of the research process are welcome!

For more information, please visit UNLV.EDU/OUR

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Symposium Schedule

12:00	**Lunch & Check-In**
12:30	**Opening Remarks:** **Dr. Liam Frink,** *Executive Director of Undergraduate Research* **Dr. Mary Croughan,** *Vice President of Research & Economic Development*
12:40	**Lightning Talks:** *SU 207: Presenters 1-12* *SU 209: Presenters 25-36* *SU 211: Presenters 49-60*
1:40	**Break / Poster Presentations:** *SU 208: Poster Presenters 1-14*
2:05	**Lightning Talks:** *SU 207: Presenters 13-24* *SU 209: Presenters 37-48* *SU 211: Presenters 61-73*
3:15	**Closing Remarks**

SESSION I: PRESENTERS 1-12

Student Union Room 207

1 **"Changes in Glial Cell Morphology Mediate the Antidepressant Effects of Electroconvulsive Therapy"**
Elaine Aquino, *School of Life Sciences*

2 **"The Role of Extracellular Matrix Proteins in Protecting *Pseudomonas Aeruginosa* Biofilms From Tobramycin"**
Sophia Araujo-Hernandez, *School of Life Sciences*

3 **"Cyanide Content in Smoothies and Juices Commonly Found in Health Food Stores"**
Adriana Baker, James Stordock, & Ryan Taggart, *College of Southern Nevada, Department of Biological Sciences*

4 **"Does Elevation Affect the Stomatal Density, and Stomatal Spacing Patterns Found in *P. Tremuloides*?"**
Tristan Bakerink, *School of Life Sciences*

5 **"Optogenetic Stimulation of the Thalamic Reticular Nucleus Decreases Arousal"**
Jeffrey Barker, *Department of Psychology*

6 **"Starvation Recovery in *Drosophila Melanogaster*"**
Serena Benito, *School of Life Sciences*

7 **"Effects of Hydrogen Peroxide on Fungal Growth and Germination in *Saccharum Ravennae* Seeds"**
Kevin Berghel, *School of Life Sciences*

8 **"Characterizing the Effect of *Salmonella* Enzymes on ICSP Promoter Activity and the Congo Red Phenotype"**
Scott Billings, *School of Life Sciences*

9 **"Chemical Surface Structure of Cu(in,Ga)Se2 Absorbers for Thin-film Solar Cells"**
Mary Blankenship, *Department of Mathematical Sciences*

10 **"A Skip in the Beat?: Comparing Musical Beat Perception in Children with and without Stutters"**
Da Laina Cameron, *University of Denver*

11 **"Characterizing a Lysogenic Strain of *Paenibacillus larvae*"**
Hector Aviles, *College of Southern Nevada, Department of Biological Sciences*

12 **"Hunting for Holins in the Paenibacillus Larvae Phage Willow Genome"**
Erin Cassin, *School of Life Sciences*

SESSION I: PRESENTERS 13-24

Student Union Room 207

13 **"Histological Analysis of Lung Tissue Features in Rodents Exposed in Areas with Naturally Occurring Asbestos"**
Camille Catelo, *School of Nursing*

14 **"Design and Synthesis of Ionic Liquid Crystals"**
Anthony Chang, *School of Life Sciences*

15 **"Design of a Fluidized Bed Photoreactor for the Application of Advanced Oxidation Processes to Water Treatment"**
Kevin Chau, *Department of Chemistry and Biochemistry*

16 **"Antidepressant Action of 25I-NBOH"**
Chase Colburn, *School of Life Sciences*

17 **"Understanding 5ht2 Receptor Expression to Develop Novel Antidepressants"**
April Contreras, *Department of Psychology*

18 **"The Relationship Between Body Size, Starvation Times and Fecundity in F2 Female Hybrids of Fed Control and Starvation Resistant Lines of *Drosophila Melanogaster*"**
Cassandra Dasmarinas, *Department of Anthropology*

19 **"The Effect of Cold Water Immersion on Running Mechanics"**
Lucas DiBenedetto, *Department of Kinesiology and Nutrition Sciences*

20 **"Anxiolytics Effects of TSPO Ligands"**
Audrey Donald, *Department of Psychology*

21 **"The Effect of Temperature on an Indicator Enzyme in the Protoendothermic Mammal, Tenrec Ecaudatus"**
Nathan Ebiya, *School of Life Sciences*

22 **"Utilization of Waist Circumference To Determine Type 2 Diabetes Risk Among Normal and Overweight Individuals"**
Hayley Esdaile, *Department of Kinesiology and Nutrition Sciences*

23 **"Gut Microbiome Effects on Desiccation Resistance in *Drosophila Melanogaster*"**
Andrea Darby, *School of Life Sciences*

24 **"The Art.Is.T Project"**
Melissa Del Rosario, *Department of Architecture*

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SESSION II: PRESENTERS 25-36

Student Union Room 209

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Elle Ford, *Department of Psychology*

26 **"Classroom as Harbor: Roundtable Discussion"**
Taylore Fox & Tyler Howard, *Department of English*

27 **"Correlation Between Height and Flexibility of the Medial Longitudinal Arch and Shock Absorption"**
Kumiko Hashida, *Department of Kinesiology & Nutrition Sciences*

28 **"The Mexican Oil industry and Underrepresented Communities"**
Alejandra Herrera, *Department of Political Science*

29 **"Effects of HPV-16,18 on Normal Breast Tissue Cells"**
Louisa Heske, *School of Life Sciences*

30 **"The Role of Social influences on Student Efficacy, Belongingness, Achievement and Retention in Stem"**
Alexis Hilts, *School of Life Sciences*

31 **"Assessment of the Production of Hydroxyl Radical Using Nano Zero-valent Iron Embedded in A Meso-porous Silica Matrix"**
Steven Huezo, *Department of Chemistry and Biochemistry*

32 **"Reparation and Structure of Lanthanide Complexes Coordinated To FcCOO and DTBbpy Ligands"**
Natalie Johns, *Department of Chemistry and Biochemistry*

33 **"Examining Changes in Excitation and Inhibition in a Model of Developmental Epilepsy"**
Christina Joya, *School of Life Sciences*

34 **"A Sweet Defeat: Early Detection of Hyperglycemia-linked Memory Deficits"**
Nikki Kaplan, *Department of Psychology*

35 **"Influence of Treated Wastewater in Hydroponic Systems on Contaminant Bioaccumulation in Edible Plants"**
Kristen Kujat, *Nevada State College, Department of Physical and Life Sciences*

36 **"Many Babies: A Collaborative Approach To Replication in Infant Research"**
Melissa Lacro, *Harvard College*

SESSION II: PRESENTERS 37-48

Student Union Room 209

37 **"Evidence for a Two-factor Model of Emotional Awareness"**
Carl Langley, *Department of Psychology*

38 **"Improving a 7-point Stencil Algorithm From Intel With Chisel-based Hardware Encoding"**
Armon Latifi, *Department of Electrical and Computer Engineering*

39 **"10 Seconds Around the World: A Cross Cultural Study on Tempo Perception"**
Jared W. Leslie, *Department of Psychology*

40 **"Design and Synthesis of Polypyridyl Ligands for the Development of Photoluminescent Materials"**
Jessa Li, *School of Life Sciences*

41 **"Effects of Larval Starvation on Adult Lipid Storage in *Drosophila*?"**
Victoria Martinez, *School of Life Sciences*

42 **"Modeling Combined Radiation and Immunotherapy in Cancer Treatment"**
Tiffany Mata, *Department of Mechanical Engineering*

43 **"Movement Analysis in the Discoveries of Novel Neuro-Diagnosis, interventions, and Therapies"**
Kendra McGlothen, *Department of Psychology*

44 **"Characterizing the Antibiotic Resistance of Enterococcus Bacteria in Wastewater Treatment Plants"**
Sean Medina, *School of Life Sciences*

45 **"Determination of Gender Effects on ADH1"**
Kristie Menjivar, *Nevada State College, Department of Physical and Life Sciences*

46 **"Improving the Functionality of a Low-cost Prosthetic Hand"**
Patrick Messimer, *Department of Mechanical Engineering*

47 **"A Novel Behavioral Task for Assessing the Nature of Reward Prediction in Rodent ACC Units"**
Ryan Francis, *Department of Psychology*

48 **"Synthesis of Thio Azaphosphonates with N-Heterocyclic Phosphine-Thioureas"**
Ngantu Le, *School of Life Sciences*

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SESSION III: PRESENTERS 49-60

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Eric Mullins, *Department of Mathematical Sciences*

50 **"Children Synchronize Their Finger Taps To Rhythms Through Iterated Reproduction"**
Jessica Mussio, *Department of Psychology*

51 **"Bowel and Bladder injuries Secondary to intrauterine Device Perforation"**
Ian Ogurek, *Department of Kinesiology and Nutrition Sciences*

52 **"Keeping the Beat When It Is Not Your Own: Testing Cross-Cultural Beat Perception in Children"**
Liza Patrice Paez, *School of Nursing*

53 **"Hotel TVs À La Mode?"**
Sandra Perez, *Department of Sociology*

54 **"Caught on Camera: Who Spends More Time Engaging in Cross-race Interactions?"**
Paula Ramirez, *Nevada State College, Department of Psychology*

55 **"Are Tenrecs 'Primitive' Mammals?"**
Alhan Rezazadeh, *School of Life Sciences*

56 **"Biomarkers of Inflammation"**
Tanya Ricasa, *School of Life Sciences*

57 **"Modeling Species Interactions With Harvesting Using Nonlinear Differential Equations"**
Delon Roberts, *Department of Mathematical Sciences*

58 **"Investigating Music Perception in Diverse Populations Through Online Testing"**
Anthony J. Romero, *Department of Psychology*

59 **"Blood Cell Dynamics in a Protoendothermic Mammal"**
Charles Ronkon, *School of Life Sciences*

60 **"Longitudinal, Linguistic Analysis of Critical Thinking, inquiry, and Communication Skills Development among Second-year Seminar Students"**
Yana Ryjova, *Department of Psychology*

SESSION III: PRESENTERS 61-72

Student Union Room 211

61 **"Invertebrate Utilization of Riparian Plant Communities Restored in a Desert Watershed"**
Nha Trang Vivian Sam, School of Life Sciences

62 **"Regrowing a Tail: Does Regeneration Catch up to Normal Size?"**
Alexis Sauceda-Quintero, *School of Life Sciences*

63 **"Interferon-gamma as a Novel Therapeutic for Depression-like Symptoms"**
Ken Schultze, *School of Life Sciences*

64 **"Directly Testing the Nutrient Assimilation Model for the Evolution of Endothermy"**
Daylin Sigler, *School of Life Sciences*

65 **"Oxytocin and Grandmothering Behavior"**
Lexy Silva, *Department of Anthropology*

66 **"Investigation for Evidence of Active Immunity in Torpid Tenrec Ecaudatus"**
Catlene Jeorgia Smith, *School of Life Sciences*

67 **"Ability and Trait Emotional Intelligence Predict Different Aspects of Academic Success"**
Fae Tahimic & Kaela Palmer, *Multiple Disciplines*

68 **"The Effects of Spanish Imperialism on Bison Migration"**
Jenni Tifft-Ochoa, *Department of History*

69 **"Murine Model of Social Isolation Alters Astrocyte Endfeet Morphology"**
Beatriz Torres, *Department of Psychology*

70 **"Reliability and Validity of the Center of Pressure Measurements for Medilogic Insoles"**
Ashley Trotter, *Department of Kinesiology and Nutrition Sciences*

71 **"Synthesis of Novel Fluorinated Pyronins"**
Brandon Walls, *Nevada State College, Department of Physical and Life Sciences*

72 **"Ethanol Induction of Willow Phage in *Paenibacillus* Larvae"**
Alicia Salisbury, *School of Life Sciences*

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SESSION IV: PRESENTERS 1-14

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1 **"Content Of Degradtion: Biodegradation"**
Amanda Arteaga, *Exploring Majors*

2 **"Effects of Albedo and Spectrum on Photovoltaic Panels"**
Allan Bartolome, *East Career and Technical Academy*

3 **"Hydrologic Watershed Mapping: Returning an Urbanized Watershed to its Pre-urbanized Runoff Parameters"**
Kira Champelli, *Green Valley High School*

4 **"GPS and Heart Rate Monitor Data From Child Foragers among the Hadza of Tanzania: Towards a Better Understanding Food Production among Hunter-Gatherers"**
Regina de Castro, *College of Southern Nevada, Department of Human Behavior*

5 **"GPS Foraging Data among the Hadza: Implications for Understanding the Sexual Division of Labor"**
Deidra Dilworth, *Valley High School*

6 **"Culvert Construction and Its Effects on the Lower Las Vegas Wash"**
Solomon Feinstein, *Valley High School*

7 **"Perchlorate and Chromium Biodegradation Using Emulsified Oils"**
Padmanabhan Krisnaswami**,** *Bannari Amman Institute of Technology*

8 **"A Flying Dexter: The Challenge Of Live Aerial Performer"**
Kalvin Major

9 **"A Flying Dexter: The Challenge of Live Aerial Performer"**
Silver Mendoza-Matute, *Southeast Career Technical Academy*

10 **"An Integrated Ecosystem-level Analysis of the Dissimilatory Nitrogen Cycle in Geothermal Systems"**
Carl Montemayor, *Southwest Career and Technical Academy*

11 **"Assessment of Cufeo as a Solar Absorber Coating for High-temperature Concentrated Solar Power Systems"**
Idalia Soto, *Veterans Tribute Career and Technical Academy*

12 **"Chromium Removal from Waters with Ion-exchange and Granular Activated Carbon"**
Alicia Sun, *Duke University*

13 **"Characterization of Anti-candida Activity by Kluyveromyces Marxianus B0399"**
Caroline Thomas, *Green Valley High School*

14 **"PMBENCH: Benchmark for Accessing System Paging Performance With Low-latency SSDS"**
David Vega, *College of Southern Nevada, Department of Computing and information Technology*

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SESSION I
Abstracts

CHANGES IN GLIAL CELL MORPHOLOGY MEDIATE THE ANTIDEPRESSANT EFFECTS OF ELECTROCONVULSIVE THERAPY

Elaine Aquino
School of Life Sciences

Faculty Research Mentor: Dustin Hines, Ph.D.
University of Nevada, Las Vegas, Department of Psychology

Electroconvulsive therapy (ECT) is a fast-acting and effective treatment for the crippling mood disorder known as major depressive disorder with a long history of clinical use. Despite the history, the mechanism behind the antidepressant effects of ECT are relatively unknown. We propose that the benefits of electroconvulsive shock (ECS, animal model of ECT) comes from it inducing a change in glial cell morphology. Glial cells are a vital component in rapid and effective neuron signaling through their work in regulating ion concentrations as part of the tripartite synapse. This intimate association with neurons leads to their implication in a vast majority of neurological diseases. Our lab has demonstrated how astrocytes contribute to neuron signaling in regulation of affective disorders. In this study we measured changes in astrocyte volume and branching in relation to depressed state before and after ECS treatment. Fluorescently labeled antibodies and light microscopy was used to determine astrocyte morphology. The depression-like state in mice was determined using behavioral tests such as open-field test, force swim test and tail suspension test. A change in astrocyte volume and level of branching in conjunction with behavioral test results would suggest a mechanism of action for ECS.

THE ROLE OF EXTRACELLULAR MATRIX PROTEINS IN PROTECTING *PSEUDOMONAS AERUGINOSA* BIOFILMS FROM TOBRAMYCIN

Sophia Araujo-Hernandez, Kenneth Calimlim, & Boo Shan Tseng
School of Life Sciences

Faculty Research Mentor: Boo Shan Tseng, Ph.D.
University of Nevada, Las Vegas, School of Life Sciences

Pseudomonas aeruginosa, an opportunistic bacterial pathogen, thrives in the lungs of cystic fibrosis patients due to its ability to form bacterial communities called biofilms. Notoriously difficult to eradicate, bacteria in biofilms are tolerant to antimicrobial attack than their free-swimming counterparts. This increased tolerance of biofilms is in part due to its self-produced extracellular matrix, which surrounds the bacteria and consists of DNA, polysaccharides, lipids, and proteins. While matrix proteins have been suggested to play protective roles in the biofilm, little is known about this matrix component, and to date, few matrix proteins have been identified. We previously identified 51 matrix proteins and investigated the role of these matrix proteins in the ability of *P. aeruginosa* to produce biofilms. 35 of the 51 mutants had significant defects in biofilm formation, of which 11 had general growth defects. We are now investigating the roles of the remaining 16 matrix proteins in protecting the biofilm from stress, specifically treatment by tobramycin, an antibiotic commonly used in treating *P. aeruginosa* infections.

This research will be presented at 2nd Annual Nevada INBRE Poster Meeting, August 2017.

CYANIDE CONTENT IN SMOOTHIES AND JUICES COMMONLY FOUND IN HEALTH FOOD STORES

Adriana Baker, Douglas Sims, James Stordock, & Ryan Taggart
College of Southern Nevada, Department of Biological Sciences

Faculty Research Mentor: Douglas Sims, Ph.D.
College of Southern Nevada, Department of Physical Sciences

Cyanide occurs naturally in a variety of plants, fruits and kernels [seeds] in the form of cyanogenic glycosides, which are secondary metabolites consisting of an α-hydroxynitrile and a sugar moiety. An assortment of drinks (e.g. smoothies, fruit juices) advertised as healthy and beneficial for the body were analyzed. The highest concentration (341 μg-L-1) was detected in a commercially available smoothies containing flax seeds as one of the ingredients; commonly added for omega-3 acids, antioxidants and fiber. In contrast, smoothies with no flax seed contained negligible or non-detectable concentrations. While an average 70 kg person would have to consume at least 156 smoothies to reach an acute dose, chronic exposure ("sub-lethal doses") of cyanide can lead to adverse health effects including diabetes mellitus, hypothyroidism/goiter, memory impairment, and problems with spermatogenesis. Additionally, a person with a low protein diet, or restricting themselves to natural green drinks will have a lower resistance to cyanide related effects. With the increased demand for raw and natural foods there is a potential exposure to cyanide at the sub-lethal level. Such exposure can lead to a variety of chronic health related consequences.

DOES ELEVATION AFFECT THE STOMATAL DENSITY, AND STOMATAL SPACING PATTERNS FOUND IN *P. TREMULOIDES*?

Tristan Bakerink
School of Life Sciences

Faculty Research Mentor: Paul Schulte, Ph.D.
University of Nevada, Las Vegas, School of Life Sciences

Stomata are found on leaves of plants, and are used for water vapor, and carbon dioxide diffusion. The research that has been conducted is to determine whether elevation plays a significant role in either the spacing of stomata, or the relative number of total stomata in a given area of leaf epidermis. Stomatal spacing has been implicated in patchy water potential in the leaf (if clustered), or more uniform if the stomata are randomly spaced. Stomatal density has been shown to increase as water potential decreases. Stomata spacing at lower spatial scales appears to be spaced away from other stomata, yet at higher spatial scales the stomata are more randomly spaced. Elevation may influence spacing or density, but more samples are needed to confirm.

OPTOGENETIC STIMULATION OF THE THALAMIC RETICULAR NUCLEUS DECREASES AROUSAL

Jeffrey Barker
Department of Psychology

Faculty Research Mentor: Rochelle Hines, Ph.D.
University of Nevada, Las Vegas, Department of Psychology

Arousal impacts critical processes including attention, information processing, and ultimately our general well-being. Arousal can be thought of as a spectrum, ranging from low levels of arousal as seen in anesthesia or sleep, to high levels of arousal such as alertness and anxiety. Low levels of arousal are predominated by inhibitory signaling controlled by the neurotransmitter gamma aminobutyric acid (GABA). The Thalamic Reticular Nucleus (TRN) is an integral contributor to the thalamocortical network in control of arousal. It is known that the TRN is an inhibitory brain center, but the specific GABA receptors involved in its action on other thalamic centers are completely unknown. Recent advances in neuroscience have optimized light activated channels from flagellated green algae to control the activity of neuronal cells in the mammalian brain (Channelrhodopsins). Using a stereotactically administered Channelrhodopsin encoded by adenoassociated virus, we can optogenetically activate the TRN to release GABA with millisecond precision. After injection and implantation in mice, we can measure the impact of activating the TRN using electroencephalography and the Open Field Test as an assessment of arousal. Better understanding of this network can allow for development of more precise therapies of arousal-related issues ranging from anxiety to sleep disorders.

STARVATION RECOVERY IN *DROSOPHILA MELANOGASTER*

Serena Benito
School of Life Sciences

Faculty Research Mentor: Allen Gibbs, Ph.D.
University of Nevada, Las Vegas, School of Life Sciences

The intention of this experiment is to determine how the fruit fly species Drosophila melanogaster will recover after a set period of starvation. For the experiment, six populations of flies were collected: 3 fed control (F) populations and 3 starvation-selected (S) populations. S flies contain much higher lipid levels than F flies. Flies were starved until approximately half of them had died. Survivors were fed normal food and collected every two days over the course of a month. They were then dried for a minimum of 24 hours and weighed. After the initial weighing, they were extracted with hexane over the course of 24 hours and weighed again. The difference in mass from before and after lipid extraction is the lipid content. S flies contained much higher lipid levels before starvation and regained lipid content over a period of weeks after re-feeding. This indicates that S flies have a higher set point for lipid storage that is not affected by starvation.

This research will be presented at the 18th Annual McNair &AANAPISI Scholars Undergraduate Research Symposium & Reception, November 2017.

EFFECTS OF HYDROGEN PEROXIDE ON FUNGAL GROWTH AND GERMINATION IN *SACCHARUM RAVENNAE* SEEDS

Kevin Berghel & Simone Jackson
School of Life Sciences

Faculty Research Mentor: Scott Abella, Ph.D.
University of Nevada, Las Vegas, School of Life Sciences

Saccharum ravennae (ravennagrass) is a large bunch grass invading the delicate ecosystem of Glen Canyon Recreational Area (GLCA), which includes Lake Powell. Ravennagrass will continue to spread throughout GLCA without better knowledge of its life history and in turn effective control methods. Little is known regarding the effects of prolonged seed submersion in water and a long-term inundation experiment is needed to start addressing this matter. However, it is common for fungus growth to inhibit seed germination, potentially skewing the results.

The focus of this study was to find a treatment method to ensure initial seed viability and minimize fungal growth over the length of a larger, long-term inundation study. Hydrogen peroxide (H2O2) is well studied and has been used to prevent fungus growth during germination in some plant species. The treatments consisted of pretreating the seeds for 2 hours in UV light followed by soaking in solutions of 3%, 6%, and 9% H2O2. Control treatments were soaked in purified water. Trials of 10, 20, and 30 minutes were applied to each solution. The seeds were then placed in the germination chamber for one month, after which seed germination was counted and the approximate percent visible mold coverage was recorded. As expected, higher concentrations of H2O2 were more effective at preventing fungal growth, but seed germination was stunted. Results showed that a treatment of 30 minutes in 3% H2O2 best prevented fungal growth with higher germination rates. These results can help provide guidelines for treatment of seeds in future studies.

CHARACTERIZING THE EFFECT OF *SALMONELLA* ENZYMES ON ICSP PROMOTER ACTIVITY AND THE CONGO RED PHENOTYPE

Scott Billings
School of Life Sciences

Faculty Research Mentor: Helen Wing, Ph.D.
University of Nevada, Las Vegas, School of Life Sciences

Shigella flexneri causes bacillary dysentery in humans and primates and kills around 1 million people every year, most of them children. If we can determine alternative pathways that modulate gene expression in these pathogens, it is possible that these can be exploited by pharmaceutical companies. *Shigella* species have a "histone-like nucleoid structuring protein," called H-NS, which interacts with DNA, similar to the way histones operate in eukaryotes. Since these different proteins function similarly, I hypothesize that prokaryotes also utilize epigenetic modification to modulate gene expression. We have been given a set of 11 enzymes capable of chemically modifying macromolecules, and my project this summer is to determine if any of these enzymes are capable of influencing virulence gene expression in the bacterial pathogen *S. flexneri*. To do this, I will employ two phenotypic tests. The first exploits Congo Red binding ability of *S. flexneri* colonies - classically CR+ phenotypes correlate well with *S. flexneri* virulence. The second test will measure the transcriptional regulation of a virulence plasmid borne locus icsP, which is known to be regulated by H-NS and another important regulator of *Shigella* virulence, VirB. Thus far I have focused on two genes, X and Y. The data collected support my hypothesis, as enzyme X produces a distinct change in the Congo Red phenotype of *Shigella* colonies producing this enzyme, and both enzymes X and Y result in a decrease in icsP promoter activity. My next step will be to determine if the 9 other enzymes cause phenotypic change in *Shigella flexneri.*

CHEMICAL SURFACE STRUCTURE OF CU(IN,GA)SE2 ABSORBERS FOR THIN-FILM SOLAR CELLS

Mary Blankenship[1], Bridget Elizan[2], James Carter[2], Dirk Hauschild[2], Monika Blum[2], Lothar Weinhardt[2], & Clemens Heske[2]
[1]Department of Mathematical Sciences
[2]School of Life Sciences

Faculty Research Mentor: Clemens Heske, Ph.D.
University of Nevada, Las Vegas, School of Life Sciences

Cu(In,Ga)Se2-based (CIGSe) thin-film solar cells achieve efficiencies of up to 22.6% on a laboratory scale [1]. In this investigation, the impact of deionized (DI)-water rinsing on the CIGSe absorber surface is studied by comparing a rinsed with an unrinsed sample. For this purpose, x-ray photoelectron spectroscopy (XPS) was utilized to gather information on the chemical structure of the samples at the surface. By analyzing the intensity, energy, and shape of the spectral features, information about the chemical composition and bonding at the surface can be gathered. It is found that the DI-water treatment removes adsorbates like carbon and oxygen from the surface. Furthermore, we find a reduction of metal oxides (i.e., indium oxide and selenium oxide). These findings are important to understand the beneficial effect of the treatment for the final solar cell and help to develop strategies for further solar cell optimization.

A SKIP IN THE BEAT?: COMPARING MUSICAL BEAT PERCEPTION IN CHILDREN WITH AND WITHOUT STUTTERS

Da Laina Cameron[1], Jessica Nave-Blodgett[2], Karli Nave[2], Erin Hannon[2], & Joel Snyder[2]
[1]University of Denver
[2]Department of Psychology

Faculty Research Mentor: Erin Hannon, Ph.D.
University of Nevada, Las Vegas, Department of Psychology

Rhythm and beat are subtle, yet critical aspects of a person's day to day life. Every step we take, every breath we breathe, and every word we say is part of a rhythm. Both music and language are rhythmic in nature and structured in time. When humans listen to rhythmic patterns, they often perceive quasi-isochronous points in time underlying those rhythms: beats. These beats can be heard at multiple periodic levels, organized hierarchically: meter. Meter in music is patterns of strong downbeats and weaker upbeats, while in language it is patterns comprised of stressed or unstressed syllables. Previous studies suggest that individuals who stutter have difficulty forming and maintaining an internal rhythm to pace their speech. Because listeners often mark time in rhythms with beats, this may mean that individuals with stutters may have a lessened ability to identify and internally perceive metrical hierarchies in rhythms. In our lab, we have developed two different paradigms to study the perception of metrical hierarchies and an individual's internally generated beat percept. We have data from over 180 typically-developing children that provides a baseline for the normal development of beat perception. We propose to recruit children participants ages 4-17 that have stuttering disorder to determine if individuals with stutters do not perform the same as typically developing children in beat perception tasks. If we find a difference in their abilities when controlling for age and musical training, this could give us a direction of inquiry for developing pre-screenings and interventions for language disorders.

CHARACTERIZING A LYSOGENIC STRAIN OF *PAENIBACILLUS LARVAE*

Hector Aviles
College of Southern Nevada, Department of Biological Sciences

Faculty Research Mentor: Christy Strong, Ph.D.
University of Nevada, Las Vegas, School of Life Sciences

American Foulbrood Disease is a fatal infection of honeybee larvae caused by Paenibacillus larvae (P. larvae); a bacterium that is devastating agriculture worldwide. We propose treating P. larvae infections with a bacteriophage, a virus that specifically infects certain bacterial species. The Amy laboratory has isolated a bacteriophage designated Willow, which infects and kills P. larvae. Willow has two possible life cycles, a lytic and a lysogenic cycle. As a lytic phage, Willow causes lysis (cell death) in infected bacteria through the release of phage progeny. As a lysogenic phage, Willow remains dormant within the genomic DNA of infected cells. It is noteworthy that the lytic cycle can be induced in lysogenic phage. The goal of my experiments is to optimize the transition between lysogenic and lytic cycles using hydrogen peroxide. Lysis can be induced in infected bacterial cells through oxidative stress of DNA with hydrogen peroxide. Using different concentrations of hydrogen peroxide (2 mM and 3 mM), previously established lysogenic strains of P. larvae (strains 2188 and 3650) were induced into lysis. My optimization experiments have provided my fellow researchers with an increased level of control over their Willow lytic experiments. For example, knocking out certain Willow genes putatively associated with the lytic cycle and then performing a controlled induction using hydrogen peroxide will either confirm or disprove the genes' role in the lytic cycle. Our future research may lead to a better understanding of trigger mechanisms in lysogenic cultures, which then may be used to treat infected honeybee larvae.

HUNTING FOR HOLINS IN THE *PAENIBACILLUS LARVAE* PHAGE WILLOW GENOME

Erin Cassin[1], Alicia Salisbury[1], Hector Aviles[2], Philippos Tsourkas[1], Penny Amy[1], & Christy Strong[1]
[1]School of Life Sciences
[2]College of Southern Nevada, Department of Biological Sciences

Faculty Research Mentor: Christy Strong, Ph.D.
University of Nevada, Las Vegas, School of Life Sciences

Paenibacillus larvae is the causative agent in a fatal honeybee larvae infection known as American Foulbrood Disease. The bacterial spores are highly infectious, contributing to worldwide declines in honeybee populations. Infected bee colonies have traditionally been treated with broad spectrum antibiotics. As a result, antibiotic resistant *P. larvae* is common in commercial hives.

Alternatively, phage therapy has reversed *P. larvae* infections with no adverse effects to bees. Phage are highly-specific viruses which only infect bacteria. Following infection, phage replicate their genome and burst the bacteria in an event called lysis.

Paenibacillus larvae phage Willow can also undergo lysogeny, integrating its genome into the bacterial chromosome. Bacteria containing integrated phage genomes are called lysogens. Established protocols for genetically modifying bacteria are far more prevalent than for phage, which makes lysogenic phage easier to alter than lytic phage.

Published *P. larvae* phage genomes identified three potential holin genes. Holins are phage proteins which puncture holes in bacterial membranes. Our goal is to knockout these genes, disrupting their function using a plasmid Targetron system designed for lysogenized *P. larvae*. Knocking the holin gene out will result in significantly reduced lysis of *P. larvae* during plaque assay. To better characterize Willow's lysogeny for holin knockouts, two experiments were performed. The patch assay verified that *P. larvae* strain 3650 lysogens can spontaneously induce lysis. The sensitivity assay confirmed that genetically similar phages cannot efficiently infect *P. larvae* 3650 Willow lysogens. These results allow us to use Targetron for Willow gene knockouts in *P. larvae* lysogens.

HISTOLOGICAL ANALYSIS OF LUNG TISSUE FEATURES IN RODENTS EXPOSED IN AREAS WITH NATURALLY OCCURRING ASBESTOS

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Faculty Research Mentor: Sean Neiswenter
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Naturally occurring asbestos (NOA) refers to minerals present in rocks and soils that through deterioration become airborne fibers. These fibers cause asbestos-related lung diseases such as pleural plaques, fibrosis and asbestosis. The presence of relatively high levels of asbestos fibers collected around Boulder City in a recent study suggests that people living in the same area could be experiencing ongoing exposure to asbestos fibers. Asbestos fibers accumulate over time in the lung tissue and represent the cumulative effect of all the short term environmental variation that an individual is exposed to. A native wild caught mammal therefore may provide a valuable indicator of the potential health risk of NOA exposure in humans, which would represent the accumulation of fibers under natural exposure. We are going to compare the differences in lung fiber burden and pathology in rodents from an area of high NOA and construction, El Dorado Valley, with those collected in an area with low NOA and no construction, the Red Rock conservation area. Histological preparations include lung tissues to be processed and fixed in paraffin wax, then serially sectioned at 3-5 um and stained with Masson trichrome, Toluidine Blue and Perl's staining. Quantitative analysis of pulmonary fibrosis will be conducted and used for comparison among species and will be done using a scale in which histological features will be assessed by a system of grades from 0-8. We believe that our study will help us identify if there are any negative health-related effects from environmental exposure to NOA.

DESIGN AND SYNTHESIS OF IONIC LIQUID CRYSTALS

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Ionic liquid crystals are a class of relatively new materials that have the combined properties of both of ionic liquids and liquid crystals. They can potentially be used in production of electrolytes in components involving battery applications. As electrolytes, they have been used for ion conductivity in solar cells, and energy efficient electrochromic displays. They can be prepared through the modification of anion exchange of 1,1′-dibutyl-4,4′-bipyridinium dibromide salt aka as viologen. Due to its high melting point, and decomposition at high temperatures, this viologen does not show liquid crystal properties by itself. In this project, we synthesized and characterized a series 4-alkylbenzene sulfonic acids of varying carbon chain lengths. The synthesis of these sulfonic acids was carried out by sulfonation reaction of the respective 4-alkylbenzenes. They were then purified and characterized for use in the subsequent ion exchange reaction. As a result of the ion exchange reaction aka metathesis reaction, new series of viologens with new counterions were synthesized and characterized to be explored for their liquid crystal properties. After metathesis reaction, extensive washing and recrystallization in organic solvents were conducted to purify. They were identified using experimental techniques including FTIR, 1H, 13C NMR spectrometer and elemental analysis.

DESIGN OF A FLUIDIZED BED PHOTOREACTOR FOR THE APPLICATION OF ADVANCED OXIDATION PROCESSES TO WATER TREATMENT

Kevin Chau
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Faculty Research Mentor: Erick R. Bandala Gonzalez, Ph.D.
Desert Research Institute

Water is one of the most valuable resources in Southern Nevada. In order to conserve its quality, contaminated water must undergo various treatment methods for the removal of contaminants. Among these, Advanced Oxidation Processes (AOP's) have emerged as an alternative to conventional water treatment technologies for the removal of highly persistent contaminants. AOP's include the photo-assisted Fenton reaction where ferrous iron is coupled with H 2 O 2 and UV radiation for the production of highly oxidant species, hydroxyl radicals (HO •), for the degradation of contaminants. In this study, copper slag, a iron-rich industrial waste, was used as heterogeneous catalyst conducting the photo-assisted Fenton process in a fluidized bed photoreactor. The photoreactor was designed taking into account different variables such as the copper slag particle's weight, size and porosity in the Carman-Kozeny equation. Different hydrogen peroxide concentrations (e.g., 1, 2.5, 5, and 10mM) and the presence or absence of UV radiation (100 W/m 2) were used to determine the production of hydroxyl radicals using the N,N- dimethyl-p- nitrosoaniline (pNDA) probe. The experimental results confirmed that Fenton reactions are achievable with heterogeneous catalysts like copper slag and that H 2 O 2 concentrations in the range between 2.5-5.0 mM and UV radiation were the best conditions for the reaction to operate at its peak efficiency. The results also suggested that copper slag must be activated with water before any reaction to commence. Thus the hydroxyl radical production was achieved with the right amount of radiation and water flow rate circulating in the fluidized bed.

ANTIDEPRESSANT ACTION OF 25I-NBOH

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Faculty Research Mentor: Dustin Hines, Ph.D.
University of Nevada, Las Vegas, Department of Psychology

Major Depression is a heterogeneous disorder with a high lifetime prevalence. It affects about 10-30% of people worldwide, and is predicted to become one of the leading causes of disability in the coming decades. Symptoms of Major Depression include depressed mood, anhedonia, and suicidality, among others. Despite its prevalence, there is a lack of expedient and efficacious treatments. For example, classic antidepressants have near instant neurochemical effects, yet their therapeutic action takes weeks. There is a need for novel, fast-acting, and efficacious antidepressants. We propose 25i-NBOH, which our preliminary data shows to have expedient antidepressant action. 25i-NBOH is a highly specific, and potent, serotonergic agonist. It acts upon 5-HT2A, a postsynaptic serotonin receptor. However, unlike classic antidepressants, 25i-NBOH shows antidepressant effects in as little as two days after administration. This is supported by our behavioral data, which included the Open Field Test (OFT) and Forced Swim Task (FST). Additionally, we investigated the electrophysiological effects of 25i-NBOH, which showed significant neurological changes immediately after injection of the drug. Together our behavioral and EEG data show promise, for the efficacious and expedient antidepressant action of 25i-NBOH.

UNDERSTANDING 5HT2 RECEPTOR EXPRESSION TO DEVELOP NOVEL ANTIDEPRESSANTS

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According to the World Health Organization (WHO), at least 300 million people suffer from major depression worldwide. Although the pathophysiology behind depression is unclear, the monoamine neurotransmitter serotonin (5HT) is known to be involved in mood regulation, and may play a role in symptoms of depression. Commonly used antidepressant medications, such as selective serotonin reuptake inhibitors (SSRIs), take at least two weeks to alleviate depressive symptoms, and consumers tend to report adverse effects like insomnia and sexual dysfunction. In recent groundbreaking clinical trials, hallucinogenic agents acting on the 5HT2 receptor subtype have been shown to alleviate depressive symptoms in patients more rapidly, robustly, and with longer lasting effects than SSRIs.

5HT receptors can be found in the cortex, limbic structures, and basal ganglia. These receptors are involved in modulation of both excitatory and inhibitory neurotransmission, as well as mediation of psychoactive drug action. Through the present studies we hope to better understand 5HT2 subtype selective drugs and their potential as antidepressant agents. We will quantify 5HT2 receptor expression in the cortex and limbic structures to accurately understand their distribution in both glutamatergic and GABAergic terminals, as well as in surrounding astrocytes and microglia. Preliminary results from our study show that 5HT2A receptors may be found in both parvalbumin-positive interneurons in the prefrontal cortex, and Iba1-positive microglia throughout the brain. Understanding the localization of these receptors will promote development of targeted therapies that may alleviate depression more quickly, and for longer periods of time than current treatments.

This research was presented at the Spring 2017 Undergraduate Research Forum at the University of Nevada, Las Vegas, April 21, 2017.

THE RELATIONSHIP BETWEEN BODY SIZE, STARVATION TIMES AND FECUNDITY IN F2 FEMALE HYBRIDS OF FED CONTROL AND STARVATION RESISTANT LINES OF DROSOPHILA MELANOGASTER

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Fruit flies of the genus Drosophila have emerged as a model system for investigating the physiological adaptation that occurs during starvation. Previous studies on D. melanogaster have found that starvation selected fruit flies tend to have larger body-sizes, longer survival times, and reduced fecundity compared to fed (control) lines. However, reasons for these differences are still poorly understood. One hypothesis suggests that these traits are affected by a single physiological process and fewer genes, causing organisms to devote more energy to one process than another. A second hypothesis suggests that starvation resistance is more complex and may be controlled by multiple physiological processes and genes. We investigated whether body-size, fecundity and survival are controlled by a single gene or multiple independent genes using an F2 genetic recombination study between starvation resistant and fed control lines provided by Dr. Allen Gibbs. We collected body size measurements and performed egg-laying and starvation resistance assays on two fed-starved F2 lines of female fruit flies. We then analyzed correlations between all three traits measured. Strong correlations between traits suggest that they may be controlled by simpler physiological systems and fewer genes, while weak correlations support the complex model for starvation resistance in these flies.

THE ART.IS.T PROJECT

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Purpose: The Art.IS.t Project is a short film series of interviewing several different artists to attain a better understanding behind the meaning of art, from visual to performing artists to art designers to filmmakers and architects.

Method: I personally conducted interviews with each artist. The interviews ranged from 30 minutes to 3 hours of footage with a controlled set of questions and an example of their work. The controlled set of questions include:

"Who are you, What type of artist?"; "What is Art?"; "How would you describe your art?"; 'What inspires you as an artist?"; "Where do you see your art industry/field going in the next 100 years?"; 'When did you first consider yourself an artist?"; "What tips/advice would you give other aspiring artists?"; "What is the biggest struggle you have personally experienced as an artist?; How do you feel when you receive negative criticism?"; "Describe your process."; and "What is the best/worst part of being an artist?"

I then took the footage and edited the interviews together to form the Art.IS.t Project.

Conclusions: Art varies from every perspective. The interviews show similar themes when it comes to defining art, yet remains diversified from discipline to discipline. In watching the different clips, I learned how art affects individuals and the community and how individuals within the community have the ability to create their mark through art and hope that others can learn from it as well.

THE EFFECT OF COLD WATER IMMERSION ON RUNNING MECHANICS

Lucas DiBenedetto, Kristyne Wiegand, Kumiko Hashida, & Julia Freedman Silvernail
Department of Kinesiology and Nutrition Sciences

Faculty Research Mentor: Julia Freedman Silvernail, Ph.D.
University of Nevada, Las Vegas, Department of Kinesiology and Nutrition Sciences

Many populations use cryotherapy as a common treatment for minor, acute injuries to a joint or muscle. The purpose of this study was to investigate the effects of cold water immersion on running mechanics. Fifteen healthy adults (age 18-65) reported to the UNLV Sports Injury Research Center once. After providing informed consent, age, height, weight, and body composition were recorded. Participants completed a 5-minute treadmill warm up at a self-selected pace before reflective markers were attached to the lower extremities. Participants were asked to run at a preferred pace along a 10-m force platform-embedded runway while kinetic and kinematic data were collected. After ten successful trials, defined as when the dominant foot made full contact with the force platform, the markers on the dominant leg were removed and the lower leg was submerged in cold (10°C/50°F) water for twenty minutes. Markers were re-applied and 10 additional running trials were collected. Water and surface skin temperature were measured using an infrared thermometer at seven time points during and after icing: before ice, in 5-minute increments during ice, immediately after ice, post-marker application, and post-run. The data will be exported to Visual3D for analysis. Ankle angle and peak joint power during late stance will be calculated in Visual3D. These data will be compared between the ice and no ice conditions to determine the effects of cryotherapy on running mechanics. The results of this study may impact the decision to use cryotherapy as a treatment for acute injuries before resuming physical activity.

ANXIOLYTICS EFFECTS OF TSPO LIGANDS

Audrey Donald
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University of Nevada, Las Vegas, Department of Psychology

Anxiety is one of the most common mental illnesses in the US and affects 40 million people in the US. Signaling between the fear processing region (amygdala: AMG) and the decision making center (prefrontal cortex: PFC) of the brain is corrupted causing stress related behaviors. Medications given to help treat anxiety target GABA receptors in an inhibitory manner. However, these medications only work for a brief period of time. Studies have shown that desensitization of medications given in animal models can occur over a brief period of time. The likelihood of being free of medications that help regulate behavior becomes uncertain. For this study, animals will be observed by exhibiting these types of behavior in their closeness in objects in space. To study this, animals will be observed in how they move in a given time period and how much time they spend in the center and on the outside of their environment.

THE EFFECT OF TEMPERATURE ON AN INDICATOR ENZYME IN THE PROTOENDOTHERMIC MAMMAL, *TENREC ECAUDATUS*

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School of Life Sciences

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The common tenrec, *Tenrec ecaudatus,* is a protoendothermic mammal from Madagascar. There is tremendous physiological and metabolic plasticity in this species. Tenrecs maintained at 12 °C may have core body temperatures from 12-32 °C. At the same time, oxygen consumption may be remarkably variable. Contrary to what might be expected, tenrecs maintained at 12 and 20 °C and maintaining a similar body temperature of ~28 °C have similar oxygen consumption rates. Metabolic activities, such as oxygen consumption, follow the Q10 effect where activity is expected to change by a factor of 2-3 for every 10 °C change in temperature. Citrate synthase (CS) is a key enzyme for cellular respiration in the citric acid cycle. Thus, CS activity should mirror oxygen consumption. We determined CS activity as a function of assay temperature. CS is less temperature sensitive than expected. These data are consistent with the notion that tenrecs are able to perform aerobic respiration at seemingly low body temperatures.

UTILIZATION OF WAIST CIRCUMFERENCE TO DETERMINE TYPE 2 DIABETES RISK AMONG NORMAL AND OVERWEIGHT INDIVIDUALS

Hayley Esdaile
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Faculty Research Mentor: Jessica Knurick, Ph.D
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Prevalence of type 2 diabetes is rapidly increasing in the United States, and has reached epidemic levels. Obesity is a common risk factor associated with the development of type 2 diabetes, and it has been well studied that central, rather than lower body fat distribution, has a stronger correlation to greater risk of metabolic complications of obesity. This central adiposity is measured using waist circumference or waist-to-hip ratio measurements. Often times, metabolically obese, lean patients are overlooked as not being at risk for developing type 2 diabetes because they do not possess a major risk factor such as being classified as obese. This cross-sectional study will investigate the use of waist circumference measurements with fasting glucose levels of subjects with a body mass index of 18.5-29.9 kg/m2 to indicate a correlation with risk of developing diabetes. Utilizing waist circumference measurements in a clinical setting will help us to identify more of these at risk individuals, and place them on an intervention plan to prevent development of type 2 diabetes.

This research will be presented at 2nd Annual Nevada INBRE Poster Meeting, August 2017.

GUT MICROBIOME EFFECTS ON DESICCATION RESISTANCE IN DROSOPHILA *MELANOGASTER*

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The microbiome is the collection of microorganisms that occupy an individual's skin and intestines, and it has many potential effects on an animal's physiology. Studies on the gut microbiome indicate that bacteria impact the host's physiology and expression of genes. Any alteration to it is associated with an organism's ability to tolerate certain stressors such as starvation. To our knowledge, no study has yet examined whether gut bacteria have any impact on an organism's ability to tolerate dry conditions, which is important to understand how animals native to arid environments react to a drier climate. The Gibbs lab has reared 225 generations of desiccation resistant (D) *Drosophila melanogaster*, as well as non-desiccated control (F) populations. I investigated the relationship between desiccation-selected fruit flies and their gut microbiome. D and F flies had similar numbers of gut bacteria. I also studied how flies react to the absence of their gut flora. Axenic flies were generated by bleach washing the eggs, and the adults were submitted to a desiccation survival assay. The axenic desiccation (D) and fed (F) flies were larger and survived ~20% longer than the controls. These results suggest that the gut microbiome may affect insect survival in arid environments.

SESSION II
Abstracts

ANTHROPOMETRY AMONG HADZA CHILDREN AND JUVENILES: IMPLICATIONS FOR UNDERSTANDING HUMAN BIOLOGY AND BIOLOGY

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Department of Psychology

Faculty Research Mentor: Alyssa Crittenden, Ph.D.
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Understanding growth and development trends among small-scale foraging populations is critical to furthering our understanding of human evolution. While a large body of literature focuses on growth studies cross-culturally, very little data on basic anthropometrics of contemporary hunters and gatherers exist. As the few remaining foraging populations around the world are rapidly transitioning to mixed subsistence economies, these data are time sensitive. Here, we report anthropometric data collected from the Hadza of Tanzania to determine whether current World Health Organization (WHO) growth standards represent populations like this one. We report data on basic anthropometric measurements among children and juveniles, including height, weight, body mass index, and body fat percentage. The goal of this project is to calculate child and adolescent height, weight, body mass index (BMI [weight (kg)/ height2(m)]), and percent body fat (BF%) for a group of Hadza foragers living in the bush. Data, which were collected in five camps over three field seasons during 2004 and 2005, consisted of biological sex, estimate of age, and measurements of height to 0.5 cm, weight to 0.5 kg, and BF% to 0.1%. These data are critical for comparisons with other small-scale foraging populations, allowing human biologists and anthropologists to generate cross-cultural growth references. Furthermore, they can be used to measure fitness of Hadza children and adolescents as they continue the nutrition transition from foraging to a diet dominated by domesticated cultigens.

This research will be presented at the 18th Annual McNair &AANAPISI Scholars Undergraduate Research Symposium & Reception, November 2017.

CLASSROOM AS HARBOR: ROUNDTABLE DISCUSSION

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Our roundtable discussion entitled "Classroom as Harbor," at the MELUS Conference, explored how classroom dynamics have changed as a result of the 2017 election and how the changing social climate has affected students' and teachers' abilities to engage in uncomfortable dialogues, such as race or religion. Our panel consisted of four undergraduate students and six professors from various universities around the United States. All four undergraduates were UNLV students. The purpose of the panel was to not only discuss university professors' viewpoints on how to use the classroom as a harbor, but to showcase student perspectives on how educators could improve the dynamic of their classrooms. Since UNLV has a diverse student population, each student had a unique perspective on the classroom as a safe harbor. We questioned the type of students that safe spaces are designed for; the limitations of safe spaces; the dynamics in different colleges within the university; the dynamics within different universities; as well as how to create safe space.

This research was presented at the 31st Annual MELUS Conference at the Massachusetts Institute of Technology, Cambridge, MA, April 27-30 2017.

CORRELATION BETWEEN HEIGHT AND FLEXIBILITY OF THE MEDIAL LONGITUDINAL ARCH AND SHOCK ABSORPTION

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It has been suggested that the structure of the foot arch may play a role in shock absorption and other force parameters, such as loading rate. Some researchers believe that changes in these parameters, when applied over time during activities, may contribute to injury. However, the relationship between foot arch type and these force parameters is still not clear. Therefore, the purpose of this study was to examine the relationships between foot arch height, foot arch flexibility, shock attenuation, and loading rate during running. Fifteen healthy runners (age 18-45) reported to the UNLV Sports Injury Research Center for a single data collection. After providing informed consent, the participants' height, weight and age were recorded. The medial longitudinal arch was measured in weight bearing and non-weight bearing positions using both a goniometer and the JAKTOOL Arch Height Measurement Index System. After a 5-minute treadmill warm up, accelerometers were secured to the forehead and distal right tibia. All participants wore neutral laboratory shoes and were asked to run over-ground at 3.5 meters per second for 10 successful trials. A successful trial involved the right foot striking the force platform completely without targeting. Shock attenuation and loading rate were calculated using a custom MATLAB code. The relationships between foot arch height, foot arch flexibility, shock attenuation, and loading rate will be examined using multiple linear regression. The results of this study may be helpful for understanding how differences in foot arch height and flexibility may influence shock absorption and loading rate.

This research will be presented at 2nd Annual Nevada INBRE Poster Meeting, August 2017

THE MEXICAN OIL INDUSTRY AND UNDERREPRESENTED COMMUNITIES

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When it came to Mexican oil in the early 1900s, many foreign investors wanted to be a part of the thriving industry that was established by Mexican President Porfirio Díaz. One of those foreign investors was, American oil tycoon, Edward L. Dohney. Dohney made a fortune in Mexico due to his interaction with the Mexican oil industry. His interests in oil, like that of many other investors, had an influence on the manipulation of Mexican land and Mexican policy by Mexican presidents. Legal code, in regards to underrepresented communities, has often been ignored or trampled upon to benefit those in power. The emphasis of this paper will be on the historical impact of petroleum extraction and property rights on indigenous and underrepresented communities in Mexico in the early 1900s.

EFFECTS OF HPV-16,18 ON NORMAL BREAST TISSUE CELLS

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HPV-16 and 18 have been found in the oral cavity and have been significantly linked as causative agents of oral cancer. Research has shown the effects of HPV on breast cancer cells. Recently, HPV-16 and 18 have been found in normal breast tissue. The carcinogenic effects of HPV on oral and breast tissues have been demonstrated; however, the effect of HPV on non-cancerous breast tissue cells has not yet been studied.

Objectives: The objective of this study was to evaluate the effects of HPV on normal breast tissue.

Methods: HPV16 and HPV18 strains were used to infect normal, non-cancerous breast tissue cell lines Bst-Hs578 and 18485 in vitro. Cellular growth and viability was evaluated to determine if HPV mediated any of these cellular phenotypes. Cells were plated into 96-well assay plates to measure proliferation. Viability was measured using a BioRad TC20 automated cell counter.

Results: Bst-Hs578 plus HPV-16 resulted in 619% increase in proliferation compared to control cells (no HPV) and viability increased by nearly three-fold (18.2% vs. 54%). Bst-Hs578 plus HPV-18 resulted in 806% increase in growth compared to the control after one week of incubation with viability increasing by more than two-fold (18.2% vs. 40.2%).

Conclusion: Although studies have demonstrated that HPV can modulate oral and breast cancer cells, no studies have demonstrated that HPV has the potential to mediate the growth of non-cancerous breast tissue. This study may be among the first to demonstrate that HPV is capable of modulating these phenotypes in normal, non-cancerous breast tissue.

THE ROLE OF SOCIAL INFLUENCES ON STUDENT EFFICACY, BELONGINGNESS, ACHIEVEMENT AND RETENTION IN STEM

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Faculty Research Mentor: Matthew Bernacki, Ph.D.
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This project was aimed at expanding and improving the different measures of social support and understanding the role that social support has on a student's feelings of competence and relatedness in STEM, with specific attention given to first generation students, females, and minority students. This study used data collected from an undergraduate introductory biology class to conduct reliability analyses to assess the measure of social support and the differences in perceived competence, relatedness, achievement, and retention between underrepresented groups and their majority counterparts through multiple analysis of variance tests. The findings from this study serve to better understand the role social support has on retention and achievement of underrepresented students in STEM.

ASSESSMENT OFTHE PRODUCTION OF HYDROXYL RADICAL USING NANO ZERO-VALENT IRON EMBEDDED IN A MESO-POROUS SILICA MATRIX

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Faculty Research Mentor: Erick R. Bandala Gonzalez, Ph.D.
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Zero-Valent Iron (Fe0) has been shown to detoxify water by creating hydroxyl radicals through Fenton-like reactions combined with hydrogen peroxide (H2O2) to get rid of organic contaminants. Nano-sized zero-valent iron (n/ZVI) in combination with oxidants and UV radiation, has been reported can increase the Fenton reaction rate and make water detoxification more effective. In this work, the production of reactive oxygen species, particularly hydroxyl radicals, was assessed for the heterogeneous photo-assisted Fenton-like reaction using nZVI embedded in a mesoporous silica matrix, hydrogen peroxide, and UV-A radiation. The experiments consisted of preparing a 10 μM solution of N, N-dimethyl-p-nitroaniline (pNDA, used as HO• radical probe) in 100 mL of water and adding the silica-embedded nZVI at three different loads (please include loads of Zvi in the SBA-15)with or without H2O2, and/or UV-A radiation (λmax= 365 nm). The absorbance of the pNDA was measured and compared to that of clear, deionized water. The trials consisted of using immobilized nZVI alone, immobilized nZVI/H202, and immobilized nZVI/H202/UV.From the experimental results, we have seen that the best conditions for hydroxyl radicals production measured as pNDA bleaching are by the combination of immobilized nZVI/H2O2/UV despite nZVI, UV-A radiation and hydrogen peroxide alone were capable of bleaching pNDA to a certain extent. The use of the H2O2/UV system reached a plateau in hydroxyl radical production after 20 min of reaction. Two kinetic models are proposed to fit experimental data for the different reaction conditions tested and the obtained results were capable of fitting experimental data fairly good meaning that the proposed reaction mechanisms may occur within the reaction mixture to some extent. This novel material was found with interesting capabilities to produce reactive oxygen species, particularly hydroxyl radicals, under photoassisted conditions and high potential for further photocatalytic applications in water treatment.

This research will be presented at the 18th Annual McNair & AANAPISI Scholars Undergraduate Research Symposium & Reception, November 2017.

PREPARATION AND STRUCTURE OF LANTHANIDE COMPLEXES COORDINATED TO FcCOO AND DTBbpy LIGANDS

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Faculty Research Mentor: Frederic Poineau, Ph.D.
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Studies of divalent metal (Zn2+, Cd2+, Pb2+) complexes containing ferrocenecarboxylate (FcCOO-) and 4,4'-ditert-butyl bipyridyl (DTBbpy) ligands were recently reported. The DTBbpy moiety is known for having excellent luminescent properties and high catalytic activity while the ferrocenyl moiety has rich redox properties; those complexes are expected to have applications in optics and electronics. Complexes containing trivalent metals (lanthanides, actinides or transition metals) coordinated to DTBbpy and FcCOO- ligands have not yet been reported. The goal of this work is to investigate the preparation and properties of trivalent lanthanides complexes coordinated to FcCOO- and DTBbpy ligands. Here, we report the preparation and structure of five new complexes. The new complexes exhibit the stochiometry Ln2(FccpCOO)4(DTBbpy)2(NO3)2 . CH3CN (Ln = La, Ce, Sm, Eu, Tb) and were prepared from the reaction of FcCOONa and DTBbpy with Ln(NO3)3·xH2O in acetonitrile. Single crystal X-ray diffraction (SCXRD) analysis was used to study the structure of these complexes and confirmed the formulation of Ln2(FccpCOO)4(DTBbpy)2(NO3)2. The SCXRD analysis also revealed that the complexes contain dimeric Ln26+ unit (La…La = 4.0357 Å, Tb…Tb = 3.966 Å). The structural, spectroscopic and electrochemical characterization of the remaining complexes is currently in progress. Specifically, we will study how DTBbpy affects the luminescence properties of the lanthanides as compared to divalent metal (Zn2+, Cd2+, Pb2+) complexes.

EXAMINING CHANGES IN EXCITATION AND INHIBITION IN A MODEL OF DEVELOPMENTAL EPILEPSY

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Faculty Research Mentor: Rochelle Hines, Ph.D.
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The Epilepsy Foundation estimates that 150,000 people will develop epilepsy each year. Epilepsy is associated with dysregulation of the ratio of excitatory to inhibitory signaling within the brain, due either to excess excitation or deficient inhibition. Inhibitory signaling in the adult brain is controlled by the neurotransmitter gamma aminobutyric acid (GABA) acting on GABAA receptors, and many forms of epilepsy have been linked to GABAA receptor dysfunction. We have developed a mouse model that displays developmental epilepsy and early mortality resulting from mutation in the GABAA receptor α2 subunit (Gabra2-1). We plan to characterize the cellular and molecular changes that underlie the developmental epilepsy phenotype in Gabra2-1 mice. Our studies will examine the excitatory to inhibitory synaptic ratio in the frontal cortex of Gabra2-1 mice using immunohistochemistry with antibodies for the vesicular glutamate transporter (VGluT) and the vesicular GABA transporter (VGAT). Sections will be examined using confocal microscopy to quantify the density and intensity of staining for the excitatory (VGluT) and inhibitory (VGAT) terminals. Future experiments will examine the utility of agents that augment GABAA receptor function (benzodiazepines) in normalizing the excitatory to inhibitory ratio and the incidence of seizures in Gabra2-1 mice. Implications of this study may lead to progress on early treatments for developmental epilepsy.

A SWEET DEFEAT: EARLY DETECTION OF HYPERGLYCEMIA-LINKED MEMORY DEFICITS

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Knowing where to go and where you have been is essential for survival. In neuroscience, we refer to this function as spatial working memory and when compromised the consequences can be dire. Damage to either the hippocampus (HC) or the medial prefrontal cortex (mPFC) or disconnections between the two areas impair behavior in spatial working memory tasks like delayed alternation on a T-maze. In intact animals, we can measure interactions between neural areas by observing oscillations in the local field potentials. During spatial working memory tasks, there are strong interactions between the HC and mPFC in the theta band (7-12Hz). However, when spatial working memory errors are committed, weaker theta band synchrony is observed. This task is ideally suited to assess network interactions between the two critical brain areas of interest, since by manipulating the length of the delay one can directly challenge spatial working memory systems. Using our delayed alternation task, we will explore whether memory-related complications in diabetes can be detected via changes in HC-mPFC theta band interactions. We hypothesize that such memory decline is due to disruptions in synchronized theta oscillations. Such findings should manifest in subjects running the T-maze with significantly less accuracy, with choices based upon random guesses instead of calculated memory-based decisions. Such findings when paired with impaired HC-mPFC theta interactions imply a breakdown in spatial working memory processes, that may later manifest into more wholesale memory dysfunction associated with other neurodegenerative disorders that have been linked with diabetes, such as Alzheimer's disease.

INFLUENCE OF TREATED WASTEWATER IN HYDROPONIC SYSTEMS ON CONTAMINANT BIOACCUMULATION IN EDIBLE PLANTS

Kristen Kujat
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Growing vegetables in the desert is challenging due to insufficient natural water sources, desert soils that are organic matter poor, and high temperatures in the summer. Using treated wastewater in an indoor hydroponics system is a feasible alternative to overcome those challenges and reduce our carbon footprint. However, treated wastewater contains low levels of pharmaceuticals, also known as contaminants of emerging concern (CECs), including antibiotics and antidepressants. CECs could bioaccumulate in the edible plant tissues, which we tested by growing cherry tomatoes in an aeroponic system irrigated with treated wastewater. We compared plant growth between a control group irrigated with tap water, and an experimental group irrigated with treated wastewater. Twice a week we measured water chemistry in the reservoir supplying the plants. We also measured plant growth characteristics such as time to germination, number of stems, stalk diameter, plant height, and root length. Samples were collected for future analysis for CECs, as well as determination of microbial community composition of the rhizosphere using high-throughput sequencing. We generated excitation-emission matrices (EEMs) using a fluorometer as a surrogate measure of bulk CEC concentrations in water samples. These preliminary findings will help determine how treated wastewater influences plant growth, and whether it will be safe for human consumption.

MANY BABIES: A COLLABORATIVE APPROACH TO REPLICATION IN INFANT RESEARCH

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Faculty Research Mentor: Erin Hannon, Ph.D.
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Infancy is an exciting time in human development full of rapid changes. However, developmental research studies offer their own challenges. Recruiting children and infants is challenging and costly, leading to smaller sample sizes and lower statistical power. Oftentimes, child studies have a lower retention rate compared to adult studies due to fuss-outs or task difficulty. However, replication offers an ideal that tries to solve the inherent problems of developmental research by attempting to validate previous results or test hypotheses on different populations. The UNLV Auditory Cognition and Development Lab is part of the first multi-lab, registered replication effort in developmental research. Together, over seventy developmental psychology labs worldwide are collaborating to replicate theoretically-central phenomena of developmental psychology, starting with the basic infant preference for infant-directed speech over adult-directed speech. This preference has been demonstrated in several studies, but the conditions in which the effect was observed have differed. Stimuli will be standardized across labs, but other variables, like sample demographics and testing conditions, are going to vary. The goal of the Many Babies project is not only to replicate prior findings, but most importantly, explore why labs get different experimental results while using the same set of methods. By participating in a worldwide, large-scale, multi-lab replication effort, our lab will be contributing to one of the largest and potentially most impactful replication efforts to date. Infant research is incredibly variable, but understanding the factors that contribute to this variability can help us create effective studies and discover more about development.

EVIDENCE FOR A TWO-FACTOR MODEL OF EMOTIONAL AWARENESS

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Faculty Research Mentor: Kimberly Barchard, Ph.D.
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Emotional awareness -- the ability to accurately recognize and describe the emotions of oneself and others -- is of tremendous social and occupational value. Six subcomponents of emotional awareness may influence scores on the Levels of Emotional Awareness Scale (LEAS): emotional precision, emotional complexity, emotional granularity, perspective taking, emotional verbosity, and emotional breadth. We administered the LEAS to 341 UNLV undergraduates (198 female, 143 male). We conducted an exploratory factor analysis to test our hypothesis that these six subcomponents and three methods of determining overall LEAS scores were indicators of a single underlying factor. The first factor had salient loadings from emotional precision and from the three overall measures of emotional awareness; we named it Emotional Specificity. The second factor had salient loadings from emotional verbosity, emotional granularity, emotional complexity, emotional breadth, and perspective taking; we named it Emotional Granularity. Females scored higher on both factors, consistent with previous research that has found females to score higher on overall emotional awareness. Future scoring of the LEAS should include both overall emotional awareness scores and scores for Emotional Specificity and Emotional Granularity. These variables may have different developmental courses, be differentially related to psychosocial deficits, or have different impacts on emotional functioning.

This research was presented at 26th Annual Nevada Psychological Association Conference in Las Vegas, NV, May 5, 2016.

IMPROVING A 7-POINT STENCIL ALGORITHM FROM INTEL WITH CHISEL-BASED HARDWARE ENCODING

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Though former studies have improved the efficiency of a given algorithm through software-based development, the same algorithm can be refined with high-level hardware description language (HDL). Using a C-based HDL called Chisel, the hardware specific to the architecture of the algorithm will be coded, transferred to a field-programmable gate array device (FPGA), and then tested. By creating this custom hardware, the algorithm can be run faster and with less resources using design-specific hardware instead of the general-purpose hardware of a CPU. The custom hardware will expedite performance.

10 SECONDS AROUND THE WORLD: A CROSS CULTURAL STUDY ON TEMPO PERCEPTION

Jared W. Leslie, Anthony J. Romero, Jessica Nave-Blodgett, Joel S. Snyder, & Erin Hannon
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Faculty Research Mentor: Erin Hannon, Ph.D.
University of Nevada, Las Vegas, Department of Psychology

Music has often been called a "universal language." It has facilitated group tasks such as hunting and cooperative construction, to combining the experiences of thousands of people at music festivals. While music may be a human universal, the musical languages are just as diverse as spoken languages across the globe. Because our perception of information in our environment is affected by our experience and upbringing (language, culture, etc.), a single type of music may not be a "universal language." Instead, how we perceive music may be dependent on our prior experience. Music and speech are both rhythmic patterns of auditory information: is the perception of both affected by experience and familiarity? Previous work has shown that listeners perceive speech from a foreign language as spoken faster than their native language: this phenomenon is called the "Gabbling Foreigner Illusion." This may be because our lack of experience with unfamiliar sound patterns does not allow us to find the underlying temporal organization of the speech. If so, we would expect to find the same effect in music, with listeners unable to accurately estimate the speed of unfamiliar musical styles.. We have designed a truly cross-cultural online study to address this question: we will present music from five different cultures (West African, American, Indian, Turkish, and Latin) to participants from all five cultures, and have them rate the relative speed of musical excerpts. With this project, we hope to start a comprehensive cross-cultural examination of the effects of experience and cultural background on how the brain organizes and processes information in its environment.

DESIGN AND SYNTHESIS OF POLYPYRIDYL LIGANDS FOR THE DEVELOPMENT OF PHOTOLUMINESCENT MATERIALS

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Polypyridyl ligands are a class of efficient light emitting ligands, which can be used in coordination with transition metal ions. Together, they act as solar cells to convert solar energy into chemical energy for human energy consumption to help solve the energy crisis. Due to the short nature of this project, I focused on the synthesis of polypyridyl ligands. The usual preparation of these compounds involves a laborious process including long reaction times, harsh reaction conditions, and purification through column chromatography. I have synthesized six of these ligands in a one step process using substituted benzaldehydes and isomeric acetylpyridines, followed by purification by recrystallization from organic solvents. The nitrogen positions in acetylpyridines were manipulated in ortho- and para- positions, whereas the R-group in benzaldehydes were substituted to various groups. The purity of the compounds have been verified with Fourier transform infrared, 1H, 13C nuclear magnetic resonance spectra and elemental analysis. The differential scanning calorimetry and thermogravimetric analysis were performed to determine their melting transitions and thermal stabilities, respectively. Furthermore, their UV-Vis absorption spectra showed λ_{abs} values in the range 240-346 nm and light emission spectra showed λ_{em} values in the range of 341-692 nm.

EFFECTS OF LARVAL STARVATION ON ADULT LIPID STORAGE IN *DROSOPHILA*

Victoria Martinez
School of Life Sciences

Faculty Research Mentor: Allen Gibbs, Ph.D.
University of Nevada, Las Vegas, School of Life Sciences

The purpose of this research in Drosophila was to see if starvation in earlier stages of life affected the fly's later weight and lipid content. I used a fed control group and a starvation-selected group. Both groups contained different population A-C, therefore having [FA-FC] for feed, and [SA-SC] for starved. The F populations pupate when they are four days old, but the S populations eat and grow for over 24 hours longer. The groups started out at egg form in food media. Once the F larvae began wandering the S populations were taken out of food and put into agar, thereby starving them when they would normally become obese. Once the F and S populations were adults they were both put into fresh food media. The S populations were put back on food to see if they would stay at the same weight as the F population, or become obese as they normally do. The process was to take ten females and males from each population, dry them, weigh them, extract them in hexane, and weigh them again. Lipid content was calculated as the difference between the two weights. The F populations stayed at normal or average weight of a fruit fly, while S flies gained weight in the form of lipids. We conclude that S flies have a genetically determined lipid setpoint that is not affected by starving them at a young age.

MODELING COMBINED RADIATION AND IMMUNOTHERAPY IN CANCER TREATMENT

Tiffany Mata
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Faculty Research Mentor: Francis Cucinotta, Ph.D.
University of Nevada, Las Vegas, Department of Health Physics and Diagnostics

Cancer has affected many individuals for the past decades. According to the National Cancer Institute, 39.6 percent of both genders will be diagnosed with cancer at one point of their lives. So far, there has been no cure for cancer. There are different approaches to treat cancer including immune-therapy, chemo-therapy, radiation, surgery, and genetic therapy. I am focusing on combining immuno- and radiation for the treatment of cancer. Immuno-therapy considers incorporating the immune system to combat cancer cells meanwhile different types of radiation (such as, gamma rays, x-rays, protons, and carbon) can be used with differential effects to cancer and normal cells to improve cancer treatment. Clinical trials are important for cancer research but because it costs a lot of money and time, mathematical modeling is an efficient approach. You may learn from the mathematic model on how you would conduct the treatment, such as what dosage or type of radiation to use. MatLab is a software used to create models and simulations. I initially used MatLab to see how different doses of radiation affected cancer cells, as well as fractionation. Predictions were made for the surviving fraction of cells for three types of radiation (x-rays, protons, and carbon) and for hypoxic and aerobic cells that have different radiation sensitivities and occur within a tumor. I then commenced coding differential equations to determine the interaction between the immune system and tumors. The point of combining immune-therapy and radiation is to consider new more successful treatment approaches.

MOVEMENT ANALYSIS IN THE DISCOVERIES OF NOVEL NEURO- DIAGNOSIS, INTERVENTIONS, AND THERAPIES

Kendra McGlothen & Dustin Hines
Department of Psychology

Faculty Research Mentor: Dustin Hines, Ph.D.
University of Nevada, Las Vegas, Department of Psychology

The diagnosis of neurodevelopmental disorders are on the rise, yet very little is known about the pathophysiology of these complex disorders. Diagnostic criteria for developmental disorders such as Retts syndrome are primarily based on impairments in social functioning and communication skills (DSM-IV _ TR & ICD-10). However, there is a growing appreciation of motor deficits in developmental disorders thought to be related to cortical dysfunction. The cortical theory of movement control states that the cortex is critical for planning, sequencing and executing movements. Using a murine model of Retts syndrome we tested the cortical theory of movement using the open field task and a novel social interaction paradigm. Measures of distance, speed and time spent in the periphery (a measure of anxiety) will compare a genetic model of Retts syndrome to wildtype control mice. Our results suggest that Retts mice have less spatial and temporal organization to their movements along with potentially higher levels of anxiety. In general these results suggest that while although Retts mice are capable of most movements, it is the planning and sequencing of these movements that is largely impaired. Additionally, the analysis of movement and the cortical theory will be critical in the discoveries of novel neuro-diagnosis leading to unexplored interventions and possible new therapies.

CHARACTERIZING THE ANTIBIOTIC RESISTANCE OF ENTEROCOCCUS BACTERIA IN WASTEWATER TREATMENT PLANTS

Sean Medina
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Faculty Research Mentor: Daniel Gerrity, Ph.D.
University of Nevada, Las Vegas, Department of Civil and Environmental Engineering

The proliferation of microbial communities in wastewater can lead to serious problems in the community. Most of the treated wastewater in Las Vegas directly leads to the Las Vegas Wash, but a small portion of this wastewater is used for public parks and golf courses. With various community uses of the treated wastewater, it is important to study the effects of microbial communities in the wastewater to evaluate the degree of development of antibiotic resistance in individual microbes. The research project will primarily focus the investigation of antibiotic resistance bacteria among *Enterococcus* bacteria in wastewater treatment plants (WWTPs). *Enterococcus* bacteria are known to be opportunistic microbes that have the potential to cause pathogenic diseases among people. Recent data have shown that microbial communities in wastewater evidently develop antibiotic resistant genes (ARGs) post-treatment.

My research project will compose of two experimental procedures to evaluate the antibiotic resistance of *Enterococcus bacteria* before and after the disinfection stage in WWTPs. These two experimental procedures are the use of culture-dependent techniques and minimum inhibitory concentration (MIC) assays. The culturing technique will measure the number of microbial colonies that form in the pure culture of *Enterococcus bacteria*. The MIC assay aims to measure the actual concentration of antibiotic substance that will inhibit the growth of the bacteria. Based on the data that presents the development of ARGs in microbial communities during wastewater treatment, I predict that the *Enterococcus* bacteria used in this research project will also develop antibiotic resistance.

DETERMINATION OF GENDER EFFECTS ON ADH1

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Faculty Research Mentor: Amber Howerton, Ph.D.
Nevada State College, Department of Chemistry

Alcohol dehydrogenase 1 (AHD1) is the oxidative enzyme that metabolizes alcohols within the liver. From previous studies, it has been reported that the metabolism of ethanol is lower in alcoholic women than in men. This is believed to be true due to the decrease ADH1 activity that helps contribute to the elevated blood alcohol concentrations.

For this research project, I plan to inspect female and male cells to help determine their ability to regulate ADH1. The cell lines I plan to use for my male cells, specifically, will be human hepatoma G2 cell lines while my female cell lines will be based on Human Female Hepatocyte. Hep G2 and Human Female Hepatocyte cells will be treated with bile salts to understand and compare the expression levels within a population of female and male cells. The ADH1 protein expression levels will be determined by whole protein extraction and Western Blot analysis.

This project can hopefully help reveal findings about the expression of ADH1 and allow for the comparisons of alcohol metabolism between sexes. It may also help illustrate important differences that may exist between the genders concerning alcohol related illnesses.

IMPROVING THE FUNCTIONALITY OF A LOW-COST PROSTHETIC HAND

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Faculty Research Mentor: Brendan O'Toole, Ph.D.
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In 2014, a team of UNLV engineering students and staff produced a prosthetic hand for four-year-old Hailey Dawson who was born with Poland Syndrome. The UNLV hand was a modified version of two public domain prosthetic designs: Robohand and Flexyhand. The prosthetic was a 3D-printed structure that used Hailey's wrist rotation to open and close the fingers. Since then, engineering faculty, student researchers, and senior design students have continuously worked to improve the prosthetic hand design. The mechanical engineering department now seeks to produce prosthetics for other children in the community; however, the process for producing the current prosthetic is time demanding and difficult. Current research work is being directed towards designing an improved prosthetic that it is simpler to produce, assemble, and modify. The new prosthetic will be easier to assemble because it reduces the number of tight fit connections in the prosthetic's assembly. In addition to improving the physical design, researchers are also improving the methods used to produce the CAD files which are required to manufacture the 3D printed parts. The files are being constructed so that researchers will be able scale and modify the prosthetic components more efficiently. This research also contributes towards the goal of creating a more advanced and functional prosthetic that will use electric motors actuate the fingers.

A NOVEL BEHAVIORAL TASK FOR ASSESSING THE NATURE OF REWARD PREDICTION IN RODENT ACC UNITS

Ryan Francis
Department of Psychology

Faculty Research Mentor: James Hyman, Ph.D.
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Our lab recently discovered novel signal generation in the rodent anterior cingulate cortex (ACC), resulting from outcomes in a probabilistic reversal learning task. Firing rates of ACC units track and predict probabilistic outcomes, however additional research is needed to uncover what drives these predictions. To investigate this, we designed a novel learning maze where reward is always certain, but the location of reward is within one of two horizontally-opposed reward ports. This maze is in the shape of a "J", and in the bottom section, a yellow LED activates over a port when a trial starts. Upon trial start, our rodents nose-poke the port, spurring the release of a scent that indicates whether to go left or right on the top section of the "J" for the reward. With this design, we can hopefully record internal reward-side predictions in the rodent ACC and orthogonalize the neural firing patterns of experiencing reward from predictive firing, thus allowing us to confirm that ACC units record actual prediction.

SYNTHESIS OF THIO AZAPHOSPHONATES WITH N-HETEROCYCLIC PHOSPHINE-THIOUREAS

Ngantu Le, Hai Huang, & Jun Yong Kang
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Faculty Research Mentor: Jun Yong Kang, Ph.D.
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Thio azaphosphonates and their derivatives have received significant attention in recent years owing to their both biological properties and pharmaceutical applications. Herein, bifunctional N-Heterocyclic Phosphine (NHP)-Thioureas have been designed and applied in the synthesis of thio azaphosphonates. This improved reaction here takes place at room temperature under metal-free conditions and exhibits good functional group tolerance. The key to success is that thiourea group can act as an excellent leaving group due to its nucleophilic property, which was artfully combined with N-Heterocyclic Phosphine (NHP) moiety.

SESSION III
Abstracts

DIFFERENTIATION POTENTIAL OF DENTAL PULP STEM CELLS (DPSC) IN VITRO

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Faculty Research Mentor: Karl Kingsley, Ph.D.
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Dental pulp stem cells (DPSC) have been the focus of many recent studies to advance tissue and bioengineering for potential treatments. The pluripotency and multi-lineage potential of many DPSC isolates is currently being explored. Recent evidence suggests that three specific growth factors may induce DPSC to differentiate into bone – which may be useful for dental implants or treatments for osteoporosis.

Objectives: The objective of this study was to evaluate the effects of three growth factors on previously isolated DPSC cell lines.

Methods: Using previously characterized DPSC cell lines (dpsc-11836, dpsc-11418, dpsc-8124, dpsc-5423, dpsc-8604, dpsc-3882, dpsc-4595), Bone Morphogenic Protein (BMP-2), Vascular Endothelial Growth Factor (VEGF) and Mineral Trioxide Aggregate (MTA) were added to in vitro cell cultures. Cellular growth, viability, and biomarkers of differentiation were evaluated to determine if these factors induced changes to DPSC cellular phenotypes. Cells were plated into 96-well assay plates to measure proliferation. Viability was measured using a BioRad TC20 automated cell counter.

Results: Three DPSC cell lines exhibited changes to cellular growth and viability (dpsc-8124, dpsc-3882, dpsc-11836) in response to VEGF, while dpsc-8604, dpsc-11836, and dpsc-418 exhibited responses to BMP-2 administration. Cellular morphology and biomarkers of bone differentiation (expression of Dentin Sialophosphoprotein, DSPP and alkaline phosphatase ALP) are currently being evaluated.

Conclusions: These data may be among the first to describe the potential to induce bone differentiation in DPSC isolates in vitro. More research will be needed to describe the pathways controlling these phenotypic behaviors, which may be useful in determining potential therapeutic uses for DPSC.

CHILDREN SYNCHRONIZE THEIR FINGER TAPS TO RHYTHMS THROUGH ITERATED REPRODUCTION

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Faculty Research Mentor: Erin Hannon, Ph.D.
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Rhythm is ubiquitous to human communication. The ability to speak with a native accent or play music depends on listeners' ability to perceive, remember, reproduce and synchronize with rhythmic patterns. Previous research has shown that rhythm perception and production appear to be constrained such that longer intervals are related to shorter intervals by simple integer ratios such as 2:1. In a recent study, participants listened to a rhythm that had a non-integer ratio of intervals, and on each successive trial, they were presented with the iteration of the rhythm that they had tapped on the previous trial. Results showed that participants' tapping converged onto integer ratios. No one has investigated whether children's tapping also converges on integer ratios when listening to non-integer rhythms. In the proposed study, children ages 4- to 9 years will listen to a musical rhythm and synchronize to it by tapping their finger. On each trial, they will be presented with the tapping iteration they produced on the previous trial. If preference for integer ratios changes across development, then we would expect older children's (7-9 years) tapping to converge on integer ratios of the rhythms more quickly, compared to younger children (4-6 years). In addition, it is possible that younger children have not developed preference for rhythm integer ratios, and thus will not show any convergence after successive iterations of the rhythm. Results will have implications for the development of rhythm processing and will pave the way for subsequent studies of rhythmic tapping in children.

This research was presented at the Spring 2017 Undergraduate Research Forum at the University of Nevada, Las Vegas, April 21, 2017.

BOWEL AND BLADDER INJURIES SECONDARY TO INTRAUTERINE DEVICE PERFORATION

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[4]School of Medicine

Faculty Research Mentor: David Howard, M.D., Ph.D.
University of Nevada, Las Vegas, Department of Sociology

Objective: To conduct a preliminary systematic review of case reports of bowel and bladder injuries secondary to intrauterine device(IUD) perforations.

Data Sources: Searches were conducted using PubMed with the following medical subject heading and text words: "bowel and IUD," "bowel complications with IUD," "bladder complications with IUD," and "bladder IUD."

Methods: Included case reports were screened based on their abstract, then further filtered based on method of diagnosis, management and outcome. Studies were excluded if they were not in English.

Results: We reviewed 33 cases of either bladder(n=18) or bowel complications(n=15) secondary to IUD perforation. The 33 women ranged in age from 24 to 50. In 20/33 case reports the type of IUD was described. In 17 out of these 20 cases, the perforating IUD was a copper IUD. Out of the 33 total case reports reviewed, 22(66.7%) required multiple modes of imaging as part of the diagnostic work-up. The majority of the patients (29/33) were managed with minimally invasive surgical methods with the remainder requiring laparotomy. All but 1 patient(32/33) made a full recovery post-operatively.

Conclusion: When an IUD perforates the uterus and injures the bowel or bladder, multiple imaging modalities are frequently required as part of the diagnostic workup. The overwhelming majority of these reported cases involve the copper IUD. Finally, minimally invasive surgical methods are almost always sufficient and almost all patients appear to have a full recovery.

This research was presented at 43rd Society of Gynecologic Surgeons Annual Scientific Meeting in San Antonio, TX, March 26-29, 2017.

KEEPING THE BEAT WHEN IT IS NOT YOUR OWN: TESTING CROSS-CULTURAL BEAT PERCEPTION IN CHILDREN

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Experience shapes our perception. What people hear, see, and learn during development affects how they perceive their world. Humans' ability to find the beat (periodic pulse) in music is influenced by experience. This begins in infancy: babies prefer music with culturally-familiar beat patterns over culturally-unfamiliar beats. In our lab, we have shown that young children can maintain a beat percept after listening to music with a beat pattern common in their culture, even after the music becomes ambiguous. However, there are few studies that investigate if children can internally maintain a beat when it is culturally unfamiliar. Using our current paradigm, we will present children with culturally familiar and unfamiliar music with different beat patterns. We will recruit 4-9 year old children from the United States, and have them listen to music with familiar and unfamiliar beat patterns. The musical rhythm eventually becomes "beat ambiguous", meaning that the listener can hear it with either the familiar or unfamiliar beat pattern. Finally, a drum probe comes in, and the child must indicate whether the drum matches to the music. If children are influenced by which beat patterns are common in their culture, then they should have higher accuracy when the musical beat is more familiar compared to when the musical beat is culturally unfamiliar. This study will help us understand how children's ability to sustain an internal beat percept is affected by their cultural background.

HOTEL TVS À LA MODE?

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Faculty Research Mentor: Si Jung Kim, Ph.D.
University of Nevada, Las Vegas, Department of Entertainment Engineering and Design

Around 46 million people visited Las Vegas in 2016, that is almost the total population of Spain. The Las Vegas Strip is an area of 4.2 miles on Las Vegas Boulevard, where people experience state of the art IT installations, art pieces, and live productions. This led me and Professor Si Jung Kim, my faculty advisor, to investigating the metadata of the Las Vegas Strip as well as hotel television experiences in Las Vegas.

We conducted online surveys as qualitative studies that consisted of 21 questions. All the data was analyzed by descriptive and inferential statistical methods.

As a result, there are a total of 34 hotels on the Strip, 65000 hotel rooms, and every hotel room in the Las Vegas Strip has at least one television. The two main reasons for visiting Las Vegas include family vacations and conferences. The average length of time watching TV is 105 minutes while the median is 120 minutes. The major reason for TV watching is to relax. TV experience is likely enjoyed during people's hotel stay; cellphone and internet use during TV-time is frequent, it is likely that less time would be spent watching TV during the next stay. Many participants prefer watching TV programs on mobile devices, and said that a TV is less likely to be needed in a hotel room.

From this study, we identified that some ways in which we can improve TV experience is by having more free content, smart TVs, and TVs with interactive user interfaces.

CAUGHT ON CAMERA: WHO SPENDS MORE TIME ENGAGING IN CROSS-RACE INTERACTIONS?

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Faculty Research Mentor: Laura Naumann, Ph.D.
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There is a large literature examining the benefits of engaging in cross-race, or interracial, friendships (Toosi, Babbitt, Ambady, & Sommers, 2012), but little research has examined the predictors of having and maintaining cross-race friendships. Furthermore, much of the research on interracial friendships has heavily relied on experimentally-manipulated friendships (e.g., lab-studies; assigned roommates) or self-reported friend networks. While informative, the generalizability of findings is limited due to artificially-created relationships or because participants over-report the number of friendships with people of different races (Galupo & Gonzalez, 2013; de Souza Briggs, 2007). The present study examines naturally-occurring friendships and identifies whether the friendships are same-race or cross-race friendships. To identify the naturally-occurring relationships, we used new camera technology that captures photographs of participant's surroundings every 30 seconds and then coded the photos to determine the amount of time the participant spent with others, the average level of engagement with others, and the composition of interaction partners (e.g., gender, race, and age). We will examine the relationship between aspects of the participant's self-reported personality, the likelihood of engaging in more cross-race interactions, and if there are differences in friendship quality as a function of type of interaction. We hypothesize that people who are more extraverted and more open to experience will spend more time in cross-race interactions, and this will be especially true for White participants. This study aims to capture naturally-occurring behavior that is less subject to response or memory biases to examine who is most likely to engage in cross-race interactions.

ARE TENRECS 'PRIMITIVE' MAMMALS?

Alhan Rezazadeh, Claudia Silva Rubio, Lori McFadden, Michael Treat, & Frank van Breukelen
School of Life Sciences

Faculty Research Mentor: Frank van Breukelen, Ph.D.
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Tenrecs are poorly known placental mammals that have many 'ancestral' type features. For instance, tenrecs have a cloaca, a common urogenital opening, normally associated with animals like fish, reptiles, and birds. The phylogeny (evolutionary origins) of placental mammals is poorly resolved. Despite the sequencing of 39 mammalian genomes, there are three major competing hypotheses for the deep rooting of placental mammals. It should be noted that retroelement insertion analyses (old RNA viruses that insert into genomes) support all three hypotheses. However, these data should be mutually exclusive meaning that genomic data are unlikely to resolve how placental mammals evolved. As such, the rooting of placental mammals may require revision. Our morphological study sheds light on the phylogeny of placental mammals by comparing the features of Tenrec ecaudatus with the hypothetical placental mammal ancestor, Shrewdinger. Features such as a lack of zygomatic arch, the presence of a cloaca, a lissencephalic brain and the location of the testes near the kidneys all suggest that T. ecaudatus possesses more ancestral features than even the presumed placental mammal ancestor. Our findings warrant a revision in placental mammal phylogeny.

BIOMARKERS OF INFLAMMATION

Tanya Ricasa
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Faculty Research Mentor: Barbara St. Pierre Schneider, Ph.D.
University of Nevada, Las Vegas, School of Nursing

Purpose: To determine leukocyte infiltration patterns within muscle fibers after 24–48 hours of a crush injury.

Background: Skeletal muscle accounts for nearly 50% of body tissue, and skeletal muscle is critical for our mobility, the completion of our normal physical activities, and engagement in recreational physical activity. However, skeletal muscle is easily injured by a variety of insults, including trauma, and consequently, skeletal muscle injury can hinder our mobility and physical activity. When skeletal muscle is injured, the process of inflammation occurs. Leukocyte migration is fundamental in the inflammatory response. Within injured muscle fibers, leukocytes as evidenced by specific protein expression can exhibit different distribution patterns. That is, leukocytes may be distributed (a) only along the periphery of an injured muscle fiber, (b) at the both periphery and center of the injury fiber, or (c) only in the center. By determining the infiltration patterns of leukocytes within injured muscle fibers, we will have an increased understanding of the leukocyte response to muscle injury. This increased understanding may lead to the development of interventions to ensure the timely and complete recovery of muscle injury so we can quickly return to our normal mobility and physical activity after muscle injury

Methods: Ten-micron thick serial cross sections (n = 4 per muscle) of injured muscle were immunolabeled with antibodies that recognize specific leukocyte proteins, CD11b and CD68. After immunolabeling, image analysis was used to track the CD11b and CD68 protein expression within injured fibers.

This research will be presented at the 18th Annual McNair &AANAPISI Scholars Undergraduate Research Symposium & Reception, November 2017.

MODELING SPECIES INTERACTIONS WITH HARVESTING USING NONLINEAR DIFFERENTIAL EQUATIONS

Delon Roberts
Department of Mathematical Sciences

Faculty Research Mentor: Monika Neda, Ph.D.
University of Nevada, Las Vegas, Department of Mathematical Sciences

The purpose of our research is to create more sophisticated mathematical models of two interacting species consisting of one predator and one prey either of which may be harvested from the environment. We are creating our models using a coupled system of nonlinear differential equations. Due to the complicated nature of the system, numerical methodologies must be employed to understand how the system behaves. Quantitative methods can only be used with the simplest systems and therefore quickly become burdensome.

Numerous numerical methods presently exist for solving differential equations, some of which we are using in our research. Though unfortunately, methods of solution for differential equations may alter drastically with small changes in the form of the equation. In addition, some of the present numerical algorithms are either not very accurate or take large amounts of computational time. We are therefore studying how to create more computationally robust algorithms to more effectively solve our systems of differential equations.

To attain our research goals we are using Matlab and C++. Both languages are well known to have many numerical algorithms for solving differential equations. We will also employ partial differential equations to better model species interactions in the near future. Due to the extreme difficulties in solving most PDE's, we began our research studying ODE's.

Due to a preliminary analysis, we expect to find that more robust computational algorithms may be created to better understand the qualitative nature of the system. Improvements in numerical analysis are similar to improvements in other fields such as automotive engineering: the product will always be able to be improved upon.

INVESTIGATING MUSIC PERCEPTION IN DIVERSE POPULATIONS THROUGH ONLINE TESTING

Anthony J. Romero, Jared W. Leslie, Jessica Nave-Blodgett, Joel Snyder, & Erin Hannon
Department of Psychology

Faculty Research Mentor: Erin Hannon, Ph.D.
University of Nevada, Las Vegas, Department of Psychology

Music is a universal feature of human experience. Its ubiquity makes it a useful tool to investigate the effects of culture and experience on perception. Our perception of things in our environment, like music, is influenced by a lifetime of regular experiences with familiar things. Every culture has music, but just like human languages, each musical "language" varies widely: we are best at understanding and interpreting the musical "languages" we are most familiar with. Previous work has shown that listeners can perceive a beat in music, but they are best at this with culturally familiar music. When testing how experience affects perception, it is ideal to test people with varied experiences: diverse cultural backgrounds and/or music and dance training. However, traditional subject pools are often limited to Western, college-aged students. Therefore, we wanted to replicate and extend our laboratory work on music perception by accessing new populations. We developed and launched an online version of our music perception study, and gained access to new, non-college aged samples with greater demographic variation. We replicated prior, in-laboratory results in a nontraditional environment for data collection, suggesting that high-quality data can be obtained outside of a controlled setting. However, with new methods come new challenges: generating engagement, confronting higher dropout rates, and accessing samples without internet access. Our next steps will be to translate the study into different languages and conduct cross-cultural research targeting groups of interest (e.g., dancers, musicians, specific cultural groups, etc.) so that findings can be generalized more broadly.

This research was presented at the Society for Music Perception and Cognition Meeting in San Diego, CA, July 30-August 3, 2017.

LOOD CELL DYNAMICS IN A PROTOENDOTHERMIC MAMMAL

Charles Ronkon & Frank van Breukelen
School of Life Sciences

Faculty Research Mentor: Frank van Breukelen, Ph.D.
University of Nevada, Las Vegas, School of Life Sciences

In classic models of hibernation such as the ground squirrel, there is a marked leukocytopenia during torpor wherein white blood cells (WBC) are sequestered to lymphoid tissues. Common tenrecs (Tenrec ecaudatus) have a novel form of hibernation. We asked if a similar leukocytopenia was present in torpid tenrecs. We determined hematocrit (PCV), total and differential (based on type) WBC abundance, clotting time (CT), and overall cell morphologies. We examined the effect of both torpor status and body temperature (Tb). Surprisingly, we found no simple effect of torpor status or Tb. Similar to what has been found in the monotreme platypus, WBC abundance varied from 0-77,220 cells•µl-1. We found sequestration of WBCs to the splenic trabeculae of the white pulp. Tenrec hematocrit varied from 15-46% (mean = 31±2.3%). There is remarkable variability in morphology of WBCs and red blood cells in tenrecs. We developed a model to explain the variability in WBC abundance. We suggest that increased endothermy/homeothermy may have allowed for a more consistent availability of WBCs and improved immune function.

LONGITUDINAL, LINGUISTIC ANALYSIS OF CRITICAL THINKING, INQUIRY, AND COMMUNICATION SKILLS DEVELOPMENT AMONG SECOND-YEAR SEMINAR STUDENTS

Yana Ryjova
Department of Psychology

Faculty Research Mentor: Matthew Bernacki, Ph.D.
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Many postsecondary institutions offer first- and second-year seminar courses to promote retention, help students transition to college, and improve academic outcomes. This study examined the impact of a second-year seminar on learning outcomes of communication, inquiry, and critical thinking by analyzing student writing samples at two times points in a semester using LIWC text analysis software. Results found that students showed significant improvements in written communication, inquiry, and critical thinking skills as a result of the course. Results also indicated that improvements were most pronounced for women and first-generation college students, subgroups that performed significantly worse at the start of the semester. The findings have important implications for universities seeking to improve the second-year experience, and develop student's learning outcomes.

INVERTEBRATE UTILIZATION OF RIPARIAN PLANT COMMUNITIES RESTORED IN A DESERT WATERSHED

Nha Trang Vivian Sam, Matthew W. Rader, & Scott R. Abella
School of Life Sciences

Faculty Research Mentor: Scott Abella, Ph.D.
University of Nevada, Las Vegas, School of Life Sciences

Sixty thousand acres of land have been exposed due to receding water levels at Lake Mead National Recreation Area. While this is alarming in terms of water storage, this exposed land acts as new habitat for many terrestrial plants and animals. A previously inundated riparian-desert area along the Las Vegas Wash is dominated by stands of non-native Tamarisk (Tamarix ramosissima), with few scattered individuals of native Fremont cottonwood (Populus fremontii), Goodding's willow (Salix gooddingii), and seepwillow baccharis (Baccharis salicifolia), and was chosen as our study site. In January 2017, UNLV students and volunteers from the local community carried out preliminary plantings of native trees in order to begin developing experimental techniques for augmenting native vegetation establishment in this unique environment. Invertebrates have since been inventoried from the site to collect pre-treatment data for future restoration experiments and to gauge the habitat value of the newly exposed land. Invertebrate species, such as insects, are critical to ecosystems, as they pollinate plants, provide a food source to other species, and recycle materials. With this information, we can better gauge the stabilization of ecological communities, enhance pollinator habitat, and develop management techniques to conserve native species.

REGROWING A TAIL; DOES REGENERATION CATCH UP TO NORMAL SIZE?

Alexis Sauceda-Quintero & Ai-Sun Tseng
School of Life Sciences

Faculty Research Mentor: Ai-Sun Tseng, Ph.D.
University of Nevada, Las Vegas, School of Life Sciences

Limb regeneration is a process that animals like X. laevis frog tadpoles can accomplish. X. laevis tadpoles are a strong candidate to address regeneration issues because they are able to regrow their tails, which is composed of complex tissues such as spinal cord, notochord, and muscle. Despite the extensive research done on the mechanisms of tail regeneration, it is unknown whether the regenerate tail grows to the same length as a normally grown tail. Tail regeneration is needed for the tadpole to continue performing its biological needs like swimming and coming up to the surface for air, but is it needed to fully regrow a normal-sized tail? To gain insight on this topic, this project focuses on determining if regenerate tails result in similar length to a normal tadpole tail. Different groups of tadpoles will have their tails amputated. The tail, regenerate tail, and full tadpole lengths will be measured 7 and 14 days after amputation. Group 1 will be the control group, and these tadpoles will not undergo tail amputation. Group 2 and 3 will have 1/3 and 2/3 of their tails amputated, respectively. The measurements obtained will be compared to measurements of normally developed tails. Preliminary experiments suggest that regenerate tails are different in size than normally grown tails. Understanding this question will address whether regeneration is needed to restore only function or both function and size.

INTERFERON-GAMMA AS A NOVEL THERAPEUTIC FOR DEPRESSION-LIKE SYMPTOMS

Ken Schultze
School of Life Sciences

Faculty Research Mentor: Dustin Hines, Ph.D.
University of Nevada, Las Vegas, Department of Psychology

Major Depressive Disorder (MDD) is a pervasive and persistent affective disorder that afflicts a large population of the world. Despite the prevalence of the disorder, current therapies lack long term efficacy. The current prevailing theory, the Monoamine Hypothesis, accounts for an impressive proportion of medication prescribed even though it can be ineffective for therapeutics. Additionally, patients placed on current medications for MDD have a low chance of remission and typically rebound back to pathophysiology. However, a recent trend to discover rapid acting antidepressant therapies has led to the examination of the immune system and the role it plays in MDD, looking at the relationship between the pathways implicated in MDD and related mechanisms of the immune system. These immune mechanisms have been identified through small molecules released by the immune system such as cytokines. Our lab examined a novel cytokine singling ligand, interferon-γ and its relationship to MDD etiology, using mouse models of depressive like behaviors, electroencephalography (EEG) and intracerebral infusion of interferon-γ. Our results show an increase in brain activity at specific frequencies associated with sleep. This change in brain activity resulted in antidepressant like behaviors as shown in rodent tasks associated with depression like behaviors. In conclusion, our results suggest that interferon-γ could be a possible novel therapeutic target for the treatment of depression-like behaviors in patients with inflammatory status.

DIRECTLY TESTING THE NUTRIENT ASSIMILATION MODEL FOR THE EVOLUTION OF ENDOTHERMY

Daylin Sigler & Frank van Breukelen
School of Life Sciences

Faculty Research Mentor: Frank van Breukelen, Ph.D.
University of Nevada, Las Vegas, School of Life Sciences

Most mammals have a high degree of body temperature (Tb) regulation known as endothermy. Endothermy can be defined as an increase in metabolism which leads to an increase in Tb. One hypothesis for the evolution of endothermy is the nutrient assimilation model. This model suggests the warmer the animal, the more nutrients are extracted from food and the shorter the gut transit time. Tenrec ecaudatus, the common tenrec, is a great model system due to their highly variable Tbs ranging from 12-34 C. The gut transit time component of this hypothesis was tested by determining when defecation events took place with the use of cameras and fluorescent powder given with their food five days out of the week. The tenrecs were placed in different ambient temperatures to achieve an established range of body temperatures. This allowed for the determination of gut transit time as a function of Tb. The definition and methods by which gut transit time was determined will be discussed.

OXYTOCIN AND GRANDMOTHERING BEHAVIOR

Lexy Silva
Department of Anthropology

Faculty Research Mentor: Peter Gray, Ph.D.
University of Nevada, Las Vegas, Department of Anthropology

Oxytocin has been shown to promote social bonding between related individuals, romantic partners, and parents and their offspring. Grandmothers are a large source of alloparental care all around the world and the presence of a grandmother has been shown to improve a child's chances of survival. Testing oxytocin levels in grandmothers can give us a better understanding of the biological motivators behind grandmothering behavior. We hypothesize that grandmothers will experience a rise in oxytocin after spending time with their grandchild. This study tests grandmother's oxytocin levels both in a control situation and after a bonding session with their grandchild. We are still collecting samples at this time.

INVESTIGATION FOR EVIDENCE OF ACTIVE IMMUNITY IN TORPID TENREC ECAUDATUS

Catlene Jeorgia Smith, Frank van Breukelen, & Lori McFadden
School of Life Sciences

Faculty Research Mentor: Frank van Breukelen, Ph.D.
University of Nevada, Las Vegas, School of Life Sciences

Administration of lipopolysaccharide (LPS) is a common method used to induce pyrexia (fever) in animals. Previous studies demonstrate that LPS injection during hibernation resulted in pyrexia only during the subsequent periodic arousal between torpor bouts. However, hibernating tenrecs do not experience these arousals. I will determine if tenrecs are able to invoke a pyrexia following LPS injection.

ABILITY AND TRAIT EMOTIONAL INTELLIGENCE PREDICT DIFFERENT ASPECTS OF ACADEMIC SUCCESS

Fae Tahimic[1], Kaela Palmer, Joanne Angosta,& Kimberly A. Barchard[2]
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Faculty Research Mentor: Kimberly A. Barchard, Ph.D.
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Educational institutions and financial aid organizations often look for ways to predict which students will have the most academic success. Our paper examines the relationship between academic success and emotional intelligence (EI). There are two approaches to EI: Ability and Trait EI. Ability EI is the ability to perceive one's own and others' emotions and understand this information so emotions can be used and regulated productively. It is usually measured using maximum-performance tests. Trait EI is the non-cognitive capacity to successfully cope with environmental demands and pressures, and is usually measured using self-report assessments. We conducted a literature review of the relationship of Ability and Trait EI with three measures of academic success: GPA, standardized exam scores, and student conduct.

Ability EI has moderate correlations with GPA and SAT scores. However, little research has examined the relationship between Ability EI and student conduct. In contrast, Trait EI has weak correlations with GPA and standardized tests, but predicts which students will be truant or expelled in secondary school, and which students will remain in university.

This review demonstrates that Trait and Ability EI predict different criterion variables. However, the review also highlights gaps in the literature. Most studies of student conduct used Trait EI measures. Additional research using Ability EI measures is needed. Moreover, Ability EI is correlated with verbal ability and Trait EI is highly correlated with personality. For example, students that exhibit deviant behavior usually have different personalities than their classmates. Thus, incremental predictive validity studies should be emphasized.

THE EFFECTS OF SPANISH IMPERIALISM ON BISON MIGRATION

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Faculty Research Mentor: Jeff Schauer, Ph.D., & Miriam Melton-Villanueva, Ph.D.
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Although there has been extensive research about the effects of the railroad and United States military on the near extinction of the North American Bison, little is known about the effect of the Spanish Empire on the species that was fundamental to the survival and continuity of Indigenous states and societies. This study focuses on how the Spanish Empire's east Texas mission system altered bison migration through its construction of large cattle ranches and its inadvertent introduction of bovine disease to bison herds. Archaeological research, primary documents detailing daily life in the missions, and financial records shed light on the drastic shift in bison migration during the 17th century when the east Texas mission system was being built and was fully operational. This project will contribute to additional research on similar projects focusing on the intersectional space of the Spanish Empire, Environmental, Borderlands, and Indigenous history. Researching the effects of the east Texas mission system on the migratory patterns of the North American Bison will help us better understand the relationship between the Indigenous peoples of the southwest and the European imperial powers.

MURINE MODEL OF SOCIAL ISOLATION ALTERS ASTROCYTE ENDFEET MORPHOLOGY

Beatriz Torres
Department of Psychology

Faculty Research Mentor: Dustin Hines, Ph.D
University of Nevada, Las Vegas, Department of Psychology

Major depression is a highly prevalent and lethal disorder. The neurobiology of the disease is poorly understood but exposure to chronic stress is recognized to be a significant risk factor for the development of depression. Changes in cell morphology and signaling are thought to be the mechanism at the root of this dysfunction. While changes in neurons from exposure to stress have been extensively examined, considerably less is known about the effects on glial cells. Research has shown that each of the different types of glial play an important role in both brain and behavior. Astrocytes are positioned to play an important role in behavior because of their tight coupling with synapses termed the "tripartite synapse.' This study employs a murine model of social isolation (SI) as a passive stress model to examine morphology and signaling changes in astrocytes. We hypothesize that astrocytes will play a critical role in behaviors relating to SI. Mice were socially isolated post weaning for a duration of 2-4 weeks followed by behavioral assessments including the Forced Swim Test and Open Field Test. Using antibody markers and fluorescence microscopy we later measured the cell density, morphology, and end-feet changes of astrocytes. Alterations in the volume of astrocytes following SI suggest that glial cells are important modulators in the development of depressive behaviors. These findings demonstrate the necessity of tight coupling between both glial cells and neuronal cells to maintain neurotypical behavior.

This research was presented at the Spring 2017 Undergraduate Research Forum at the University of Nevada, Las Vegas, April 21, 2017.

RELIABILITY AND VALIDITY OF THE CENTER OF PRESSURE MEASUREMENTS FOR MEDILOGIC INSOLES

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Faculty Research Mentor: Janet Dufek, Ph.D.
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Accurate center of pressure (COP) data can help clinicians and researchers gain valuable knowledge that can be used to treat patients or expand the field of research. We aimed to validate the COP measures of Medilogic ® pressure-measuring insoles (60 Hz) against the measures of Kistler ® force platforms (1000 Hz). A total of 29 subjects (6 male, 23 female, 24.3 ± 6.7 years, 70.4 ± 23.9 kg, 1.66 ± 0.11 m) gave consent to participate in this study. The participants were fitted with a pair of insoles, which were placed against their foot inside a pair of socks. They were then asked to perform the following tasks: (1) Sit and lift feet off the floor for 5 seconds; (2) Stand stationary for 10 seconds; (3) Sit again, and lift feet off the floor for 5 seconds; and (4) Walk for 5 meters over a pair of sequential force platforms. A successful trial was defined as the completion of all the tasks with distinct foot contact on each force platform. The variables calculated were the maximum mediolateral excursion for the x-axis, path length for the y-axis, standard deviation (x and y directions), and rectangular area (maximum excursion by path length). We've concluded that there were no significant differences ($p<0.05$) for COP standard deviation in the Y direction or for any variable for insole 41-42. The results indicate limitations in the COP measurements of the insoles and that more research is needed to determine the sources of error.

SYNTHESIS OF NOVEL FLUORINATED PYRONINS

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Faculty Research Mentor: Zachary Woydziak, Ph.D.
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Pyronins are fluorescent molecules used as staining agents for nucleic acids such as DNA and RNA. Current pathways to produce these fluorophores result in a wide array of impurities. Pyronins also commonly exhibit low fluorescence intensity, and easily photobleach. In prior studies, the addition of fluorine atoms to the fluorescent core of fluorescein derivatives improved the overall photophysical properties of the compound. Under the guidance of Dr. Woydziak, we seek to complete our synthesis of a library of novel fluorinated pyronin derivatives and obtain the characterization and photophysical properties necessary to generate a publication.

ETHANOL INDUCTION OF WILLOW PHAGE IN *PAENIBACILLUS LARVAE*

Alicia Salisbury[1], Erin Cassin[1], Hector Aviles[2], Philippos Tsourkas[1], Penny Amy[1], & Christy Strong[1]
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Faculty Research Mentor: Christy Strong, Ph.D. University of Nevada, Las Vegas, School of Life Sciences

American Foulbrood Disease (AFB), a bacterial disease of honeybee larvae, has global economic significance. This disease spreads throughout colonies killing the next generation of bees. The causative agent, Paenibacillus larvae, is treated with antibiotics or by burning infected hives and exposed materials. The former method is complicated by antibiotic resistance and bacterial sporulation, while the latter method carries severe financial liability for beekeepers.

One alternative treatment is the use of bacteriophages, viruses that infect and destroy bacteria. Bacteriophage co-evolve with their host, unlike antibiotics, making resistance less of an issue. Characterizing these phages will be key to future successful phage treatments of infected hives.

The *P. larvae* phage, Willow, presents as a temperate phage, capable of two life cycles, lysogenic (allow the infected bacterium to remain viable) and lytic (kill the infected bacterium). Currently, we have established and confirmed Willow lysogeny in two different *P. larvae* strains, 2188 and 3650.

The bacteriophage field has established that the lytic cycle is generally induced in response to cellular stress. Our laboratory seeks to establish a controlled lytic induction system for future experiments. I hypothesize that Willow's lysis of infected bacteria should be inducible in a predictable range if the bacteria are presented with a controlled cellular stress. One established stress method is chemical induction. I applied a chemical stressor, ethanol, to lysogenic strains 2188 and 3650, which induced lysis as compared to my controls. Experiments involving phage gene characterization related to the lytic/lysogenic cycle can now proceed.

SESSION IV
Abstracts

CONTENT OF DEGRADATION: BIODEGRADATION

Amanda Arteaga
University of Nevada, Las Vegas, Exploring Majors

Faculty Research Mentor: Jacimara Batista, Ph.D.
University of Nevada, Las Vegas, Department of Civil and Environmental Engineering and Construction

Perchlorate is a chemical that can be naturally occurring or it can be man-made. Most commonly it is man-made. It is usually found in things such as fireworks and explosives. It can also be found in some household items such as bleach. Perchlorate is a dangerous and harmful chemical that can and will affect the biological systems of humans and animals if ingested. Perchlorate is now also found in groundwater, finding its way into organically grown fruits and vegetables. The goal of the research was to see what bacteria is in perchlorate. By getting an idea of what bacteria is in the perchlorate that makes it dangerous, this can help us target it and we can destroy that bacteria. To find what elements can get rid of perchlorate is the ultimate goal. With elements such as nitrate or chromium, the groundwater will be mixed in with it to see what can kill off the perchlorate in the water. Over the six weeks, the groundwater was mixed with a few things: nitrate, chromium, or chloracne. This test is known as finding the TDS, or total dissolved solid using methods that were provided in the lab. The results that were wanted were to show that perchlorate can be removed by using simple elements.

EFFECTS OF ALBEDO AND SPECTRUM ON PHOTOVOLTAIC PANELS

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Faculty Research Mentor: Robert Boehm, Ph.D. University of Nevada, Las Vegas, Department of Mechanical Engineering

The goal was to calculate how the different surfaces and their corresponding albedo and the spectral irradiance curves vary the performance of a bifacial PV panel. It focuses specifically on the effects that the differences in electromagnetic spectrum and albedo have on PV panels. Albedo refers to the ratio of sunlight that gets reflected off of the ground and the global horizontal irradiance. Using an albedometer, researchers were able to collect how much irradiance hits the horizontal plane and how much irradiance is reflected off the ground. The albedometer was placed on top of different surfaces to measure their albedo. In addition to albedo, we also measured the global horizontal spectral irradiance and the spectral irradiance of the light reflected off the ground. Spectral irradiance represents the power per unit area of a given wavelength, measured in watts per square meter per nanometer. Using the quantum efficiency of a PV cell and its glass encapsulant of the module the generated module current was calculated from the different ground reflected spectral irradiance curves and compared.

HYDROLOGIC WATERSHED MAPPING: RETURNING AN URBANIZED WATERSHED TO ITS PRE-URBANIZED RUNOFF PARAMETERS

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Faculty Research Mentor: Sajjad Ahmad, Ph.D. University of Nevada, Las Vegas, Department of Civil and Environmental Engineering

Large amounts of runoff that are generated in urbanized areas during rainfall events cause a multitude of problems, these problems warrant methods of diverting rainwater to avoid flood damage. The landcover of urbanized areas is higher in imperviousness than natural soil which can cause damaging amounts of runoff during large rainfall events. It is the purpose of this project to design a detention basin that would replicate the pre-urbanized runoff conditions of a plot of land after the plot has been made more impervious by concrete from urbanization. Using 100-year rainfall data for the Las Vegas basin, the program HEC-HMS is used to simulate the effect that the rainfall event would have on a watershed within the Las Vegas Valley either before or after urbanization. The hydrograph that is generated can give a lot of insight as to the number and dimensions of structures such as detention basins that could be used to prevent flooding and damage to buildings. In this study, a plot of land that is 2 square miles in area is selected to serve as a location for a school and a park with a recreational facility. Taking the topographical data from the unurbanized plot of land, the program HEC-HMS is used to run a simulation to determine the runoff potential that the pre-urbanized land has, and thus determine the goal hydrograph that the adequate set of detention basins will create once the land has been urbanized. This hydrograph is then used to design the detention basins as a recommendation of runoff control.

GPS AND HEART RATE MONITOR DATA FROM CHILD FORAGERS AMONG THE HADZA OF TANZANIA: TOWARDS A BETTER UNDERSTANDING FOOD PRODUCTION AMONG HUNTER-GATHERERS

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Faculty Research Mentor: Alyssa Crittenden, Ph.D.
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The degree to which children collect food to provision themselves and others is considered to be a characteristic trait of human childhood. The life history stage of childhood is unique compared to other apes and compared to mammals because it's an extended period of development where sub-adults are dependent on adults for at least a decade. Another unique aspect of human childhood is that children in small-scale non-industrial populations spend large amounts of time in food collection and processing. Here, we report data on child foragers among the Hadza – a population of hunters and gatherers in Northern Tanzania. We provide an overview of their foraging behavior and present data from handheld global positioning systems (GPS) that tracked the distance they went to forage during 37 days of data collection. We found that, on average, children traveled approximately 4.3 kilometers. There were differences in age - where older children tended to travel longer distances. Such food collection activities offer not only economic benefits, but is also part of their larger play complex.

GPS FORAGING DATA AMONG THE HADZA: IMPLICATIONS FOR UNDERSTANDING THE SEXUAL DIVISION OF LABOR

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Faculty Research Mentor: Alyssa Crittenden, Ph.D.
University of Nevada, Las Vegas, Department of Anthropology

Studying the activity and energy expenditure of hunter-gatherer groups helps us learn more about ourselves and the biological adaptations that have taken place throughout human evolution. With analysis of data on foraging treks, heart rate, and the body mass indexes (BMI) among contemporary foragers, connections can be made between such foraging groups and how our hominid ancestors evolved. Furthermore, we can compare these data to the average working US or European city dwellers. Here, we report foraging data collected among the Hadza hunter-gatherer tribe of Northern Tanzania. A total of 28 trips were recorded using handheld global positioning systems (GPS) that recorded distance traveled, moving time, and average walking speed. These data are presented here in order to increase our understanding of the distances traveled when foraging. We found that women, on average, traveled 4.16 kilometers whereas men, on average, traveled 4.45 kilometers. This suggests that such differences are part of the overall sexual division of foraging labor – which is considered to be one of the hallmarks of human evolution. Women focus their foraging collection on plant foods, like tubers and berries, and men focus on hunting birds and game animals or collecting honey. These data are important because they tell us that task specific division of labor does not support the stereotypic view of subsistence activities. Males and females, while they target different food, travel nearly the same amount of distance and expend the same amount of energy. The sexual division of labor is crucial to the hunter-gathering lifestyle as it's founded upon the ideas of sharing and provisioning. Looking at the accumulation, women procure more reliable foods, whereas men procure more energy dense foods, which is equally as important. Task specific division is not as reliant on capabilities of a certain gender as it is on the purpose of the food and who it's being provided for.

CULVERT CONSTRUCTION AND ITS EFFECTS ON THE LOWER LAS VEGAS WASH

Solomon Feinstein
Valley High School

Faculty Research Mentor: Sajjad Ahmad, Ph.D.
University of Nevada, Las Vegas, Department of Civil and Environmental Engineering

The purpose of this research is to see how the building of a culvert across the Las Vegas Wash at Sloan Lane will affect the flow rate of the channel. The carrying capacity of the channel will be deduced, taking into consideration the hypothetical culvert proposed, and the inflow of the Flamingo Wash upstream of the proposed culvert. USGS reports on the current streamflow at a station upstream of the location (the confluence of the Flamingo Wash and Las Vegas Wash) and downstream (the Las Vegas Wash at Vegas Valley Rd.) will be taken into consideration and utilized within the data as well. Furthermore, the purpose also includes analyzation of the hydraulic behavior for future improvements of the selected vessel of water. This investigation includes the use of the program known as HEC-HMS, to derive certain data points of reaches of the channel, and the program HEC-RAS, to map and analyze water flow within the specific reach. The scope of this research zeroes in on the change in and effects of flow with the introduction of the proposed culvert, the topography of a channel, and the hydraulic behavior within said channel. There are a multitude of aspects within this research. A segment of channel, known as a reach, was chosen to be analyzed. The reach selected for this project is a reach in the Las Vegas Wash between the confluence of the Las Vegas and Flamingo Washes and the crossing of Vegas Valley Road on the Las Vegas Wash.

PERCHLORATE AND CHROMIUM BIODEGRADATION USING EMULSIFIED OILS

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Faculty Research Mentor: Jacimara Batista, Ph.D.
University of Nevada, Las Vegas, Department of Civil and Environmental Engineering

Hexavalent chromium (Cr6+) and perchlorate (ClO4-) contamination in water poses serious threat to the living organisms. This contamination is a result of dumping certain wastes generated in the manufacturing and testing of rockets, missiles, rocket fuel etc. an over the years these chemicals have seeped into the ground and has polluted the ground water. Various techniques have been developed for reducing such pollutants and bioremediation is one such technique. The term bioremediation by definition is the technique that uses organisms to reduce a hazardous material to a less toxic or non-toxic form. The lab scale experiments are done using columns that replicate the environment at the site. Additional nutrients (EOS-Pro, phosphate and ocean spray) are also added to promote bacterial growth within the columns. The objective of this research is to treat the groundwater that is contaminated with chromium (C6+) and perchlorate. Chromium in its hexavalent state being toxic is reduced to non- toxic trivalent state. Perchlorate on the other hand is reduced to chlorate by the bacteria. The influent mix is changed every day and the effluent is sampled and tested for chromium (Hach Method), nitrate (Hach Method), ammonia (Hach Method), COD (Hach Method) and phosphate (Hach Method). Perchlorate is tested using a Dionex ICS-2000 Ion chromatograph.

A FLYING DEXTER: THE CHALLENGE OF LIVE AERIAL PERFORMER

Kalvin Major, Silver Mendoza-Matute, & Si Jung Kim

Faculty Research Mentor: Si Jung Kim, Ph.D.
University of Nevada, Las Vegas, Department of Mechanical Engineering

The use of drones in everyday life is becoming more and more prevalent. With Amazon's talks and launches of a drone package delivery system, to some Cities implementing aerial drone surveillance by their respective Police Departments. Our goal is to bring the widespread use of drones to the field of Entertainment Engineering, in the form of an aerial performance.

Using a drone, we would create a flying character. This character would move as if it were a puppet in a show. The end goal of our project is to create a full performance using character drones. This idea is a recent one, but is limited in its capabilities. With all hands on experience, we have created our own tricopter, using an open source example. The Design for the aforementioned character has been completed. We will begin testing with a rough model before we begin full construction.

During our research, we have stumbled upon a couple of hiccups. Between needed parts, software issues and one minor lab injury, we are very close to completing our project. We have documentation of every step and setback we have had during our research. We hope that this documentation will be useful to others who may wish to continue or repeat our research.

Throughout the experience we have looked for competitions, symposiums, and other such demonstrative opportunities so that we may improve our knowledge and experience with both expert and peer inputs.

A FLYING DEXTER: THE CHALLENGE OF LIVE AERIAL PERFORMER

Silver Mendoza-Matute, Kalvin Major, & Si Jung Kim
Southeast Career Technical Academy

Faculty Research Mentor: Si Jung Kim, Ph.D.
University of Nevada, Las Vegas, Department of Mechanical Engineering

Drone use in the field of entertainment is becoming more prevalent. However, expressing gestures by a drone is still challenging but has a great potential for various purposes. This project is about the design and creation of a character drone that generates gestures and motions by a built-in articulated structure on the top of a drone.

Our approach is, rather than simply be given a pre-built drone for our use, to build the drone using do-it-yourself guidance and techniques created by instructables.com. More so, taking individual parts of the drone and assembling them allows us to apply basic engineering practices and creativity to build a moving character.

Therefore, our project is concentrated on the concept and application of just that: assembling a drone, documenting the process and results, and adding on the entertainment portion. The end results are the drone with a character and immersive experience of being a researcher and engineer.

Documentation is also an important part of the program as it is advised to keep track of current progress as well as obstacles in order to maintain a database of the project for future usage. Recording each objective and sketching are another element to documentation. Keeping note of the failures is just as important as keeping note of success because it demonstrates what works and what should be avoided.

AN INTEGRATED ECOSYSTEM-LEVEL ANALYSIS OF THE DISSIMILATORY NITROGEN CYCLE IN GEOTHERMAL SYSTEMS

Carl Montemayor[1], Brian Hedlund[2], Jose R. de la Torre[3], Brandon Biggs[4], Jeremy Dodsworth[5], Shreya Srivastava[6], Senthil Debian, Bruce Hungate[7], & Kiona Ogle[7]
[1]Southwest Career and Technical Academy
[2]School of Life Sciences
[3]San Francisco State University
[4]University of Alaska, Anchorage
[5]California State University, San Bernardino
[6]Miami University
[7]Northern Arizona University

Faculty Research Mentor: Brian Hedlund, Ph.D.
University of Nevada, Las Vegas, School of Life Sciences

It is well-established that microbial diversity is inversely proportional to temperature in terrestrial geothermal systems. However, the effects of this loss of diversity on ecosystem function are poorly understood. In this study, we tested the hypothesis that the dissimilatory nitrogen cycle, and organisms performing key steps in the cycle, are sensitive to high temperature. Five circumneutral pH springs in Tengchong County, Southwest China were investigated using a combination of ecosystem rate measurements and metagenomic analysis. Ecosystem rate measurements of chemolithotrophic ammonia oxidation and nitrite oxidation were measured using the 15-N nitrate pool dilution approach, including separate measurements for the production of 15-N nitrate/nitrite (ammonia oxidation) and 15-N nitrate (nitrite oxidation). Furthermore, various bioinformatics tools were used to analyze the metagenomic data and to annotate the pathways in the Nitrogen Cycle. Ammonia-oxidizing archaea (AOA), ammonia-oxidizing bacteria (AOB), and nitrite-oxidizing bacteria (NOB) from the springs in China were also analyzed for abundance and diversity. By comparing the diversity and abundance of these microbes within the springs' metagenomes, the effects of high temperatures on the microbes can be assessed. These results will answer questions concerning microbial diversity and the importance of the nitrogen cycle in these geothermal springs.

ASSESSMENT OF CUFEO AS A SOLAR ABSORBER COATING FOR HIGH-TEMPERATURE CONCENTRATED SOLAR POWER SYSTEMS

Idalia Soto[1], Jaeyun Moon[2], & Dale Karas[2]
[1]Veterans Tribute Career and Technical Academy
[2]Department of Mechanical Engineering

Faculty Research Mentor: Jaeyun Moon, Ph.D.
University of Nevada, Las Vegas, Department of Mechanical Engineering

Concentrated solar power (CSP) systems are used for generating renewable energy throughout southern Nevada. In the full CSP process, large mirrors direct sunlight onto a solar receiver that is coated with a special absorbing material to improve solar-thermal energy conversion. The large amount of heat generated from the concentrated solar irradiation is stored in the solar receiver that contains molten salts, which can then be used to drive conventional engines that create electricity. To increase the energy efficiency and cost-competitiveness of CSP systems, bimetallic inorganic oxide coatings, specifically copper-containing spinels, were fabricated for their feasibility as a solar absorber material. Using hydrothermal processes, inorganic oxide materials are first synthesized as nanoparticles. In a subsequent phase, these nanoparticles are ported to a slurry solution at an ideal viscosity for deposition onto corrosion-resistant high-temperature Inconel substrates. To verify the quality and morphology of the material, scanning electron microscopy (SEM), x-ray diffraction (XRD), and optical absorptance measurements were taken on prepared substrates. Copper ferric oxide was characterized against other copper-containing materials developed in previous syntheses. This class of materials has shown no degradation after annealing for 1000 hours at high temperatures (~750°C), which are promising results for future CSP solar-absorbing coating technologies.

CHROMIUM REMOVAL FROM WATERS WITH ION-EXCHANGE AND GRANULAR ACTIVATED CARBON

Alicia Sun[1], Amanda Tanaka, & Jacimaria Batista[2]
[1]Duke University
[2]University of Nevada, Las Vegas, Department of Civil and Environmental Engineering

Faculty Research Mentor: Jacimara Batista, Ph.D.
University of Nevada, Las Vegas, Department of Civil and Environmental Engineering

Hexavalent chromium (Cr6+) is a highly toxic metal that is commonly found in groundwater. Cr6+-contaminated water is typically produced in industrial processes such as electroplating, leather tanning, and textile manufacturing. Contact with such water is dangerous to humans because compounds of hexavalent chromium are strong oxidizing agents, giving them toxic and corrosive properties that can irritate tissue and increase the risk of certain cancers. The objective of this project is to evaluate the effectiveness of Filtrasorb 400 (F400) granular activated carbon (GAC) and ion-exchange resins – ResinTech SIR 700 and SBG1-OH – for ex-situ chromium removal. Aliquot volume of chromium-contaminated wastewater with 10 mg/L of Cr6+ was fed through two columns containing GAC and two columns containing SIR700 and SBG1-OH. Samples were collected every 4 hours and tested for Cr6+ following Hach Method 8023. The project is currently in progress. However, IX resins are expected to be more effective compared to GAC because of its selectivity for chromate (i.e. as Cr6+).

CHARACTERIZATION OF ANTI-CANDIDA ACTIVITY BY KLUYVEROMYCES MARXIANUS B0399

Caroline Thomas[1], Lara A. Turello[2], Ana Backović[3], Paola Lovrovich[3], Alessandro Turello[3], & Brian Hedlund[2]
[1]Green Valley High School
[2]School of Life Sciences
[3]Turval Laboratories, Scientific and Technological Park, Udine, Italy

Faculty Research Mentor: Brian Hedlund, Ph.D.
University of Nevada, Las Vegas, School of Life Sciences

Since the discovery of yeast-antagonism over one hundred years ago, yeasts have played an increasingly vital role in food production and probiotic development as antifungal agents. The growth of Candida albicans, the opportunistic yeast that causes candidiasis, can be inhibited by Kluyveromyces marxianus B0399 (TURVAL® B0399®); however, the nature of this inhibition is unknown. We investigated whether C. albicans is inhibited via a killer toxin secreted by K. marxianus B0399, or if another mode of inhibition was responsible. Zones of inhibition in an agar diffusion assay revealed that K. marxianus B0399 inhibits the growth of C. albicans ATCC 10231 and C. albicans ATCC 90028, but only when these C. albicans strains are at a 103- and 104-fold lower concentration (CFU/mL) with respect to the concentration of K. marxianus B0399. Our well-test assays were not able to demonstrate the existence of a killer toxin or other soluble factors secreted by K. marxianus B0399. This suggests that anti-Candida activity by K. marxianus B0399 might be due to resource competition or a specific mechanism requiring direct cell-cell contact. To further our understanding of the anti-Candida activity of K. marxianus B0399, we plan to conduct the agar diffusion assay under a range of temperatures and pHs, as well as performing it under anaerobic and low nutrient conditions. These tests should reveal insight into the physiological conditions required for maximal anti-Candida activity by K. marxianus B0399, which will be valuable for understanding the mechanism of action and guide biotechnological development of K. marxianus B0399 as a nutritional probiotic.

PMBENCH: BENCHMARK FOR ACCESSING SYSTEM PAGING PERFORMANCE WITH LOW-LATENCY SSDS

David Vega
College of Southern Nevada, Department of Computing and Information Technology

Faculty Research Mentor: Jisoo Yang, Ph.D.
University of Nevada, Las Vegas, Department of Computer Science

Pmbench is a program that was developed at a UNLV Computer Science laboratory, tracks system paging performance by memory access operations and quantifies microsecond latencies during fault intensive memory operations. Pmbench collects memory access latencies while using up quantities of memory to simulate paging activity. It measures the time taken for each memory access. It is versatile and deployable to popular operating systems using NAND SSD and a prototype low-latency SSD (Solid State Drive) as a swap device. A swap device is used when the physical memory (RAM) is full. The system needs more memory to process applications, inactive pages in memory are moved to this swap device so it can assist the system with RAM to perform its processes. In deploying Pmbench on Microsoft Windows 10 and common Linux distributions. Results showed that the NAND SSD workload exceeded available physical memory making it unsuitable for Dynamic Random Access Memory (DRAM) most commonly found RAM on computers, but NAND SSD efficiently increased performance on tasks yet its fault service latency thrashed the system more easily. Thrashing occurs when a computers virtual memory is in a constant state of paging causing the performance of the computer to degrade until addressed. The low-latency SSD encourages a better alternative as DRAM. Low-latency SSD outperformed the NAND SSD on both operating systems due to lower media access latency. Low-latency media illustrates that a higher percentage of fault latency can be attributed to software. During our Linux trial the low-latency SSD paging was notably better then Windows 10. Windows 10 was much slower by 8.7 times in handling faults during low-memory conditions. Both these platforms can improve by using Pmbench to locate system bottlenecks that hinder system performance. Our results have shown that low-latency SSDs can be used as a fast paging device and could be a cost-effective solution to large quantities of DRAM in systems. By using Pmbench these finding cannot move forward until steps are taken to improve the lack of performance by current operating systems to low-latency devices when paging is required by the system. This program can be used to identify the source of slowed performance and examine possible solutions.

SUMMER *Funding*

PLEASE NOTE: Summer research funding & opportunity deadlines typically occur early in the spring semester.

CSUN Scholar Program:
Research and Development Scholarship

The Research and Development Scholarship was created for the purposes of recognizing students who display academic abilities and potential. Under this scholarship, two (2) undergraduates will be admitted into the Scholar Program. Eligible students that complete the application will be considered to receive a scholarship of $3,000 per academic year. Recipients inducted to the Scholar Program will be invited along with their family to attend an honorary banquet at the start of the fall semester.

CSUN Scholar Program:
Undergraduate Research Stipend

The CSUN Undergraduate Research Stipend was created for the purpose of supporting students who display research ability and potential by providing financial support while they actively engage in a research project. A primary function of this scholarship is to reduce financial barriers that students may face while completing undergraduate research activities by decreasing the need for outside employment.
Under the CSUN Undergraduate Research Stipend scholarship, funding will be awarded to six (6) undergraduate students: 3 recipients from the Social Sciences, Fine Arts, and Humanities, and 3 recipients from STEM fields. Eligible students that complete the application will be considered to receive a scholarship of $5,000 per academic year, to be disbursed in two $2,500 increments during two semesters of the recipient's choosing (fall and spring, fall and summer, or spring and summer terms).

For information on CSUN opportunities, visit
unlv.edu/csun/scholarships

National Science Foundation's Experimental Program to Stimulate Competitive Research Undergraduate Research Opportunity Program (NSF EPSCoR UROP)

The Undergraduate Research component of the current NSF EPSCoR award provides lab and field research experiences, through summer scholarship programs and annual fellowship opportunities, to full-time NSHE undergraduate students. These programs fund eligible students either majoring in mathematics, science, or engineering, or majoring in education and specializing in teaching K-12 in the fields of mathematics, science, or technology. Research is conducted under the guidance of NSHE faculty mentors. The hands-on experience gained through these programs has proven to supplement classroom learning and serve as gateways to new and exciting opportunities for all participants.

For more information about this opportunity, visit **unlv.edu/sciences/urop/epscor**

Nevada IDeA Network of Biomedical Research Excellence Undergraduate Research Opportunity Program (INBRE UROP)

The Undergraduate Research component of the current NSF EPSCoR award provides lab and field research experiences, through summer scholarship programs and annual fellowship opportunities, to full-time NSHE undergraduate students. These programs fund eligible students either majoring in mathematics, science, or engineering, or majoring in education and specializing in teaching K-12 in the fields of mathematics, science, or technology. Research is conducted under the guidance of NSHE faculty mentors. The hands-on experience gained through these programs has proven to supplement classroom learning and serve as gateways to new and exciting opportunities for all participants.

For more information about this opportunity, visit **unlv.edu/sciences/urop/inbre**

University Libraries Lance & Elena Calvert Undergraduate Research Awards

The Calvert Award recognizes undergraduate students who demonstrate sophistication and originality in research projects. Up to five prizes will be awarded in three categories: Emerging Scholars with a $750 prize, Advanced Undergraduate and Creative Works with a $1000 prize. roject length will be dictated by the course instructor or project advisor who supports the application. Projects by individual or groups in all formats are eligible including: research paper or thesis, design portfolio, theatre designs, visual/fine arts performances accompanied by program notes, creative work (writing, art in any format), film/digital media, & poster presentations.

For more information, visit **library.unlv.edu/award#criteria**

UNLV McNair Scholars Summer Research Insitute

During the UNLV Dr. Ronald E. McNair Summer Research Institute, student scholars work on the research projects that they propose and design under the guidance of faculty research mentors. Scholars come from virtually all academic disciplines, such as the fine arts, social sciences, life sciences, engineering, hotel administration, and business. To be eligible for consideration to participate in the UNLV McNair Scholars Summer Research Institute, applicants must be active participants in the UNLV McNair Scholars Post-Baccalaureate Program, and must be classified as a junior with no less than 60 credit hours.

For more information about the McNair Scholars Program and the Summer Research Insitute, visit **caeo.unlv.edu/mcnair/**

UNLV Office of Undergraduate Research Travel Funding

The Office of Undergraduate Research (OUR-UNLV) is accepting applications for OUR-UNLV Travel Funding. This award allocates up to $500 to assist undergraduate student researchers with travel to an academic conference, symposium, or other venue to present their scholarly work, or travel for resarch purposes (e.g., data collection, sample analysis, etc.).

2017 -2018 Application Deadlines:
Fall 2017 (travel from 08/29/17 - 12/17/17):
Due by September 1, 2017

Spring 2018 (travel from 12/18/17 - 5/13/17):
Due by November 20, 2017

Summer 2018 (travel from 08/29/17 - 12/17/17):
Due by April 20, 2018

For more information and to apply,
visit unlv.edu/our

UNLV Office of Undergraduate Research Summer Undergraduate Research Funding (OUR SURF)

The Office of Undergraduate Research (OURUNLV) is accepting applications for the newly created Summer Undergraduate Research Funding program (OUR SURF). OUR SURF awards support undergraduate students as they work on their research, scholarship, entrepreneurial, performance or visual art projects in the summer months. Currently enrolled undergraduate students at UNLV, Nevada State College, or College of Southern Nevada working with an NSHE Faculty Research Mentor during summer 2017 are eligible for consideration.

For more information visit,
unlv.edu/news-story/our-funding

Publication Opportunity: Nevada State Undergraduate Research Journal

The mission of NSURJ is dedicated to educating, supporting, and providing a competitive edge for all students in the NSHE system. This is accomplished by providing an accessible, student run, and highly selective peer reviewed research journal specifically for undergraduate students.
As an interdisciplinary journal, NSURJ accepts many forms of submissions. All manuscripts must be thesis driven. A literature based research manuscript is appropriate as it pulls current data and opinion in a thesis driven way that offers something original and unique to the field. The standard of a manuscript is expected to be higher than that of a college research paper. Because new protocols and experiments are often developed, NSURJ includes such development as publishable material.

For more information about how to publish your original work in the Journal, visit **http://nsurj.com/**

RESEARCH *Awards*

Each year, the Office of Undergraduate Research (OUR-UNLV) recognizes outstanding students for their accomplishments in research, scholarship, and performance/visual art, and faculty for their dedication to undergraduate researchers.

2017 OUR Director's Research Mentor Award

Winner:

Hines Group

Represented by Dr. Rochelle Hines & Dr. Dustin Hines, Department of Psychology

2017 CSUN Scholar Program

Research & Development Award

Winners:

Zoe Wilbur, *Department of Geoscience*

Jessa Li, *School of Life Sciences*

Undergraduate Research Stipend

Non-STEM Winners:

Katie Randolph, *Department of Psychology* (Double Major)

Mary Blankenship, ***Department of Economics*** (Double Major)

Alexis Hilts, *Department of Political Science* (Double Major)

STEM Winners:

Michelle Quizon, *Department of Mechanical Engineering*

Sophia Araujo-Hernandez, *School of Life Sciences*

Cilla Jose, *School of Life Sciences*

2017 OUR-UNLV Outstanding Undergraduate Researcher Award

Winner:

Angela Garcia

Honorable Mention:

Michelle Quizon

THANK *You!*

Dr. Erica Marti and Johana Iglesias

Faculty Research Mentors

Student Union Event Services

Student Presenters

Summer REX Participants

The Division of Research & Economic Development

The Office of the Executive Vice President & Provost

UNLV Office of Undergraduate Research Staff

Volunteers

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