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ABSTRACT BOOK

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ORAL PRESENTATION ABSTRACTS

BIOLOGY I

Role of SCAMP3 in Amyloid Precursor Protein (APP) Processing
Daniel Cooney (Quyen Aoh), Gannon University - Cell & Molecular Biology

Alzheimer's disease is a neurodegenerative disease associated with loss of memory and cognitive function. The formation of extracellular plaques containing aggregated β-amyloid peptide is related to the proteolytic processing of the amyloid precursor protein (APP). APP is cleaved into two parts, one of which is amyloid beta protein which, in mutant forms, is associated with Alzheimer's pathology. APP can be ubiquitylated in a manner that promotes its sorting into multivesicular bodies and degradation in the lysosome. Current research indicates that the endosomal sorting complexes required for transport (ESCRTs) target APP to be degraded in lysosomes. Disruption of ESCRT function leads to accumulation of β-amyloid. Secretory carrier membrane protein 3 (SCAMP3) interacts with ESCRT proteins to transport and sorting of membrane proteins. Since APP is membrane protein, SCAMP3 may regulate APP trafficking. A protocol for the transfection of APP into HeLa cell line using Mirus Trans-IT X2 was developed. Optimal transfection was obtained using a low density plating and low concentration transfection reagent. We are currently optimizing the protocol for fluorescence microscopy to detect APP in lysosomes and endosomes.

Determination of Heat Shock Proteins in Human Umbilical Veins Endothelial Cells Treated with PBDEs
Austin Grist (Mary Vagula), Gannon University - Cell & Molecular Biology

Polybrominated diphenyl ethers are brominated flame retardants which are contaminating our environment. Though many of them are banned for their toxicity they still continue to enter our environment from the products that are still in use, such as sofas, mattresses, construction material, etc. Heat shock proteins (HSPs) are critical to cellular survival in stressful conditions such as altered pH, temperature, or oxygen levels. Their role is to correct denatured proteins and aid in reformation of their structure. HSPs' maintenance capabilities prevent the formation of cellular protein aggregates that would, if unattended, promote cellular necrosis. Exposure to toxicants has been found to alter the levels of these proteins. Recently, HSPs are found to be involved in a wide range of human cancers and are implicated in tumor cell proliferation and differentiation. Environmental Protection Agency has labeled PBDEs as 'probable carcinogens' as they are reported to cause tumors in some animal studies. In this study we investigated the HSP's profile in BDE-209, BDE-99 and BDE-85 treated human umbilical vein endothelial cells (HUVECs). This presentation reports the comparative toxicity of these congeners in terms of HSPs' levels and expands on the role of these proteins in the cells under this chemical stress. Alterations in the concentration of HSPs indicates increased cellular stress; therefore, the results are expected to signal a direct relationship between PBDE toxicity and number of HSPs present in the cell and can be used as a diagnostic tool to monitor cellular PBDE levels.

Constructing Variants of Human Serum Albumin Reconstituted with Heme and Testing For Nitrite Reductase Activity

Alexandra Alfonso Castro (Dr. Mary Grace Galinato), Penn State Behrend - Cell & Molecular Biology

Human serum albumin (HSA) is a protein abundantly present in our blood and is a repository to many molecules, including heme. In the past, studies have discovered that certain double mutations of HSA, reconstituted with heme, emulate the binding site of the heme enzymes, myoglobin (Mb) and hemoglobin (Hb). Mb and Hb primarily store and transport oxygen in the muscles and blood, respectively. However, they also have a secondary function of producing nitric oxide (NO) through the reduction of nitrite under hypoxic conditions. It is this project's objective to obtain the double mutants I142H/Y161L, I142H/Y161F, and Y161H/L185H of the HSA protein. To date, the single mutants I142H and Y161L have been successfully expressed in E. coli. The variants are achieved by mutating HSA plasmid, pHIL-D2, and introducing into yeast cells Pichia pastoris through electroporation. *Pichia pastoris* cells express the HSA protein as part of their metabolism; the proteins will be collected, purified and reconstituted with heme, making the HSA-heme complex. These complexes will then be tested for their nitrite reductase (NiR) capabilities. At the time, the focus is to obtain the single mutations L185H and Y161H and optimizing electroporation conditions by developing a control procedure.

Mitochondrial Genome Analysis of Two Species of Scale Insects from the Family *Ortheziidae*

Haley Flick (Matthew Gruwell), Penn State Behrend - Genetics

The insect family Ortheziidae is a group of scale insect found in the order Hemiptera in the superfamily Coccoidae. Scale insects survive on a diet of sap from various host plants, which is composed of simple carbohydrates that lack essential nutrients for survival. Ortheziidae is dependent on maternally-inherited endosymbiotic bacteria that reside within the cells. These intracellular bacteria provide essential amino acids for the rest of metabolism. These bacteria have relatively small genomes in comparison to free-living bacteria (~1.2 megabases). Previous studies have shown that insect endosymbiont genomes are dramatically reduced with the expression of psuedogenes. Preserved genes are usually in the area of DNA repair, replication, and amino acid metabolism. In addition these genomes have more Adenine and Thymine base pairs, decreased Tm of the genome, and increased expression of chaperones. The mitochondria of two species of Ortheziidae were investigated to see how the influence of genome degradation through the presence of an endosymbiont affected the mitochondrial genome. Considering how the mitochondrial genome is well conserved in all eukaryotic organisms it would be interesting to see how the relationship between scale insects have been effected. The insect had its genetic material extracted using a Qiagen Dneasy kit that was confirmed that it was indeed from the family *Ortheziidae* to back up the morphological identification through amplifying the COI gene via PCR. The sample was then sent out for ion torrent sequencing. The genome sequences were assembled using geneious software against a closely related insects COI/COII gene. Once the mitochondrial genome has been assembled there is potential to separate out possible endosymbiont(s). The information will be used to understand evolution of how scale insects have evolved to adapt and thrive under these limited nutritional conditions.

Analysis of cpDNA and nrDNA Molecular Markers to Determine Genetic Diversity of the Ventura Marsh Milkvetch *Astralagus pychnostachyus var. lanosissimus*
Megan Maar (Kristen Webb), Allegheny College - Genetics

Outplanting is a conservation technique that takes small colonies of plants from a larger population and transplants them to other locations to begin new populations. Thought to have been extinct for thirty years, the Ventura Marsh Milkvetch *Astralagus pychnostachyus var. lanosissimus* was recently rediscovered. Efforts to reestablish the Ventura Marsh Milkvetch have been challenging as there has been limited success in outplanting efforts. Specifically only one outplanting in Ventura County has been successful while three other attempts at Mandalay State Beach, McGrath State Beach, and the Carpinteria Salt Marsh Reserve have not. While conservationists have studied the morphological characteristics Ventura Marsh Milkvetch, no prior genetic work has been done to determine how diverse individuals of the Ventura population are from one another or how closely related the Ventura Marsh Milkvetch is to its model relative, the Northern Brine Milkvetch *Astragalus pycnostachyus var. pycnostachyus*. This studied performed a phylogenetic analysis by specifically looking at the ITS and *trnfM-trnS1* regions in both the Ventura Marsh Milkvetch and Northern Brine Milkvetch to determine how genetically similar the two variants are to one another as well as assess the genetic diversity within the Ventura Marsh Milkvetch population. With a new genetic understanding of Ventura Marsh Milkvetch, we hope to improve further conservation efforts to reintroduce the Ventura Marsh Milkvetch to other outplanting sites.

Differentiation of Cat Siblings by Means of Sequencing Mitochondrial Target Region
Jeannie Choi (Kristen Webb), Allegheny College - Genetics

In animal forensics, identification of cats has been proven to be helpful, especially in criminal cases. When cat hair is found at a crime scene, it can be used for mitochondrial DNA testing to link the cat to the victim, perpetrator, and/or scene of the crime. Due to the known redundancy of the mitochondrial DNA sequences in a given population, forensic databases representing the genetic diversity of local cat populations are crucial to understanding the evidentiary value of a match between the crime scene evidence and a specific cat. Currently, databases tend to avoid sampling DNA from siblings since it has been established that siblings inherit identical mitochondrial DNA from their mothers. Thus, there would be no method of distinguishing between cat siblings of the same litter utilizing mitochondrial DNA. A recently published study surveyed the mitochondrial DNA of human identical twins ranging from 43-58 years old, and mitochondrial DNA differences were discovered. To examine if this trend is evident in felines, we surveyed a hypervariable region of the mitochondrial genome in pairs of cat siblings ranging in age from 7 months old to 13 years old. This is the first study to survey the mitochondrial DNA for differences between cat siblings. If found, our results would indicate a need for forensics databases to include related individuals so as to not overlook subtle population variation.

Effects of inhaled CO_2 on seizures in the febrile seizure mouse model *Mus musculus*
Daniel Daugherty (Lee Coates), Allegheny College - Neuroscience

Epilepsy is one of the most common neurological problems worldwide. Roughly two million people in the United States suffer from epilepsy and 3% of the general population will have epilepsy sometime in their lives. Epilepsy covers many different syndromes and is defined as a predisposition to recurrent, unprovoked seizures. Febrile seizures are the most prevalent seizure type during childhood with 3-14% of children worldwide from the age of 6 months to 6 years suffering from these seizures. Medical carbogen (5% CO_2) has been proven to terminate seizure activity in animals and humans and could be used as a treatment for children with febrile seizures. Does a percentage lower than standard medical carbogen terminate seizure activity in a similar way? Testing will be done to see if 1-4% carbon dioxide will prevent mice from having seizures during a pretreatment phase. All activity will be recorded for data analysis. If levels lower than 5% effectively terminate seizure activity children could potentially rebreathe their expired air as a treatment for seizures instead of taking benzodiazepines at such a young age.

Probiotics and the Gut-Brain Axis: A Randomized, Placebo-controlled Trial of a Multispecies and Multi-strain Probiotic Supplement on Theory of Mind, Mood, and Cardiovascular Reactivity to Social Stress in Young Adults

Lora Waybright, Elizabeth Sever, Nina Kikel, and Francesca Carra (Sarah Conklin), Allegheny College - Neuroscience

Probiotics are over-the-counter supplements which contain live microorganisms beneficial to the host organism. Previously, probiotics were administered primarily to reduce the negative symptoms of gastrointestinal disorders, however recent research has suggested that they may confer other health benefits as well. The discovery of the gut-brain axis, the biochemical signaling pathway through which the gut microbiota influences brain function and behavior, has sparked a multitude of new investigations into the effects of probiotics. This two-week, randomized, placebo-controlled trial sought to examine the effects of a daily administration of the probiotic VSL#3 (containing a cocktail of species including *Streptococcus thermophilus*, three strains of *Bifidobacterium*, and four strains of *Lactobacillus*) on mood, perceived stress, anxiety, cardiovascular reactivity, and theory of mind. One hundred young adults were recruited to participate in two lab sessions in which they completed the Perceived Stress Scale (PSS), the Center for Epidemiological Studies Depression Scale (CES-D), the State-Trait Anxiety Inventory (STAI), the Toronto Empathy Questionnaire (TEQ), and the Gastrointestinal Symptoms Rating Questionnaire (GSRQ). Cardiovascular reactivity to a social stress task was then measured with a Dinamap (Critikon Vital Signs Monitor 1846) blood pressure recording device, and participants completed an eye-reading task to test the correlation between empathy and theory of mind. Random assignment (blinded to the researchers) determined whether participants consumed either probiotic or placebo capsules daily for two weeks. After two weeks, participants returned to the lab to complete the same questionnaires and tasks. Probiotic consumption is expected to demonstrate significant differences, in mood, cardiovascular reactivity, theory of mind, and perceived stress in comparison to the control group.

BIOLOGY II

2016 Pymatuning State Park Pilot Program: Invasive Species Voluntary Boat Inspections
Dale Snyder[1] and Stacie Hall[2] (Greg Andraso), Gannon University[1] and Pennsylvania Department of Conservation and Natural Resources[2] - Ecology

The spread of invasive species is a serious ecological threat to both land and water resources. Approximately 3 million visitors per year utilize Pymatuning State Park's water resources recreationally. Invasive species threaten to hinder the utilization of these resources by impeding access and negatively impacting the park's warm-water fishery. The potential loss of an estimated $83M in visitor spending each year would be detrimental to the local economy. With limited resources for treating invasive species once introduced, the savings in preventing introduction over the cost of treatment would be tremendous. The purpose of this voluntary survey was twofold: to help prevent the introduction of new species into Pymatuning reservoir, and to prevent the spread of hydrilla (and other aquatic plants considered to be invasive) from Pymatuning into other area lakes not currently affected, including the Great Lakes. Over the course of the survey period, 2181 surveys were completed. 88 boaters (4.0%) choose not to participate. Aquatic species were removed from 148 boats (6.8%) of those surveyed. The following invasive species are known to be present in and around Pymatuning Reservoir: hydrilla, eurasian milfoil, curly-leaf pondweed, rusty crayfish, japanese mystery snail, chinese mystery snail, asiatic clam, american lotus, phragmites, and purple loostrife. Pymatuning is actively treating hydrilla, american lotus, and phragmites to control populations and maintain boating and shoreline access.

Separate vs. combined effects of amphipods, caddisflies, snails, and tadpoles on detritus decomposition in wetlands
Liana Leja (Scott Wissinger), Allegheny College - Ecology

Species diversity affects ecosystem processes, which in turn determine the ecosystem services upon which people depend. Detritus processing plays a major role in nutrient cycling in both terrestrial and aquatic ecosystems. Wetlands are home to a multitude of organisms that impact nutrient cycling—most notable detritivores. Caddisflies are the most commonly identified detritivore in wetlands, and multiple studies have confirmed that they enhance detritus decomposition. Amphipods have also been shown to process detritus, but rarely studied in most wetlands. Moreover, recent studies found that snails and tadpoles (previously described as grazers) might contribute to detritus processing as well. Although wetland food webs are typically assumed to be energetically driven by the abundant vegetation that is often so conspicuous, the dynamics of detritus decomposition are poorly understood compared to the large body of research in streams. The purpose of my study was to determine how these "cryptic detritivores" (snails, tadpoles, amphipods) interact with well-known detritivores (caddisflies), and specifically how they contribute to the detritus decomposition rates in wetlands. I compared the separate and combined effects of these taxa on detritus processing to determine if their effects are additive, more than additive (i.e., facilitative) or less that additive (interference). I hypothesized that because these different taxa used different feeding strategies, they will in combination have synergistic effects on pond ecosystem processes. Alternative hypotheses included 1) the combined effects of these species are less than predicted, which would suggest interference or some other type of competition, and 2) the effects are simply additive. Results suggest that detritus processing rate was greater when caddisflies, amphipods, tadpoles, and snails were together as compared to single-species treatments indicating that there was a synergistic effect.

Green Frog (*Lithobates clamitans*) Tadpole: Ontogenetic Shifts of Food Preference, Foraging Behavior, and their Effect on Detritus Breakdown

Rachael Finigan (Scott Wissinger), Allegheny College - Ecology

Detritus is a major contributor to energy pathways and a food source for some benthic consumers, making it an important basal resource to aquatic food webs. However, the role of generalist feeders on facilitating detritus breakdown, such as tadpoles, remains unknown. Tadpoles go through metamorphosis, so their role in this process has the potential to change as they develop (i.e., they go through an ontogenetic shift). It is possible that tadpoles ontogenically alter the portion of detritus they consume, the biofilm or the leaf matter, as they develop, which would change the way in which they forage. To test the hypothesis that tadpoles contribute to detritus breakdown through abrasion and that they go through an ontogenetic shift in foraging behavior, I observed food preference of tadpoles at both early and late developmental stages. The tadpoles were given a choice between conditioned detritus and biofilm grown on unglazed ceramic tiles, and I measured the breakdown of chlorophyll a and detrital decomposition rate over four weeks. I found that significantly more chlorophyl a was present on the ceramic tiles in tanks with late stage tadpoles compared to both the control and early stage tadpoles. Also, there was a trend of increased detritus mass loss with late stage tadpoles compared to tanks with no tadpoles. Behavioral results show early stage tadpoles to spend significantly more time on detritus compared to late stage tadpoles, and vice versa for spending time near tiles. In addition, tadpoles were observed more often over the course of the experiment near or on detritus than the tiles. Though further studies are needed, these results support the notion that tadpoles play an important role in detritus breakdown and that there is an ontogenetic shift of foraging behavior.

Variation in food habits and pharyngeal morphology among populations of round gobies (Neogobius melanostomus) in Erie County, Pennsylvania

Stephanie Fry, Deen Meah, and Mary Pristello (Greg Andraso), Gannon University - Cell & Molecular Biology

The round goby (*Neogobius melanostomus*) is an invasive fish from the Ponto-Caspian region that is known to prey heavily on dreissenid mussels at many sites in its native and invaded ranges. Round gobies possess robust pharyngeal anatomy that is well-adapted to crushing hard-bodied prey. However, at some sites, round gobies do not prey on dreissenids, apparently due to their unavailability. It is unknown if round gobies that do not prey on dreissenids maintain robust pharyngeal morphology. We compared prey availability, food habits, and pharyngeal morphology of round gobies from three sites in Erie County, PA. Dreissenids are abundant at one site (Presque Isle Bay, PIB) and absent at two sites (Fairview Gravel Pit, GP; and Lake Leboeuf, LL). Dreissenids were the most important prey item to gobies from PIB, whereas crustaceans and insects were the most important prey items from GP and LL, respectively. There was little overlap in the diets among the three sites, but the diets of round gobies from GP and LL were more similar to one another than either was to PIB. Pharyngeal morphology of round gobies from LL and GP appears to be more similar and less robust than that of round gobies from PIB. These results indicate differences among populations in both diet and pharyngeal morphology and suggest that robust pharyngeal morphology correlates with a diet consisting of hard-bodied prey. Differences in pharyngeal morphology may be due to phenotypic plasticity or natural selection acting on these structures in response to prey availability.

A *Pseudomonas* Strain Isolated from Fern Roots Blocks Male Induction and Alters Gametophyte Development in the Fern *Ceratopteris richardii*

Rachel Hiles (Mike Ganger and Sarah Ewing), Gannon University - Ecology

Bacteria represent major players in the soil and are known to interact with plant roots, the nutrient-acquiring organs associated with the sporophyte. Some bacterial species secrete molecules known to influence gene expression and alter lateral root production. While research has concentrated on the relationship between roots and different species of bacteria, research on rhizoids, the nutrient-acquiring organs associated with the gametophyte, is notably absent. The fern *Ceratopteris richardii* serves as a model system for such exploration because *C. richardii* has a free-living gametophytic stage in its life cycle. *C. richardii* is primarily a model system for understanding environmental sex determination since a spore may develop as either a male or hermaphrodite depending upon the presence or absence of antheridiogen. Mature hermaphrodites secrete antheridiogen that influences developing spores to develop as males. When antheridiogen is absent the spores develop into hermaphrodites. Both gametophyte types contain antheridia (sperm-producing structures) and rhizoids, where the latter are produced at the basal end of the thallus, however, hermaphrodites also contain egg-producing structures called archegonia. We have isolated a pseudomonad, identified as *Pseudomonas nitroreducens* (Pn), from fern roots that shows promise in altering gametophyte development. Here we ask if Pn affects 1) spore germination rates, 2) growth and development of male and hermaphrodite gametophytes, and 3) the sex determination system. Pn had no effect on germination rates, but did affect overall growth. Male and hermaphrodite gametophytes grown in the presence of Pn experienced faster thallus and rhizoid growth, with rhizoids growing at a relatively faster rate. The presence of Pn also resulted in a larger percentage of hermaphrodites.

Genetic Analysis of Deer Dispersal Patterns through Mitochondria DNA Sequence Analysis

Brendan McCreath, Catherine Hammes, Juliana Irwin, Samuel Henson, Stephanie Judd, Stephen McLoughlin, and Ethan Conto (Fred Brenner), Grove City College - Ecology

The white-tailed deer (*Odocoileus virginianus*) is both an ecologically and socially important species in the Eastern United States. White-tailed deer affect the environment and crops and are an important game species. Understanding the dispersal patterns of this species is important for its management, since unmanaged deer populations can increase the spread of tick-borne illnesses in an area, cause increased property and crop damage, and cause an increase in the number of deer-related traffic accidents. This project seeks to understand the migration patterns and genetic diversity of the white-tailed deer within the rural and urban habitats of Ohio and Pennsylvania in order to improve the management of this species. Samples of liver and/or muscle were taken from deer from the Dayton Ohio Metro Parks (Germantown, Englewood, and Taylorsville), Mercer County Pennsylvania, and Presque Isle State Park in Erie, Pennsylvania. DNA was extracted from these samples and the mitochondrial displacement loop (D-loop) was examined to allow the maternal lineages and the nucleotide diversity of the herds to be calculated. We expect to find low migration between the deer in the Metro Parks and high migration between the deer in Mercer County.

Modern Checklist of Lichens in Mercer County

Gabrielle Gette (David Krayesky), Slippery Rock University of Pennsylvania - Organismal Biology

Lichens are composite organisms that consist of photobiont (green algae or cyanobacteria) and fungus. These organisms can live on rock, plants, or soil and are important to the ecosystem as they can be indicators of change in the environment and provide habitat for other organisms. The goal of this study was to generate a modern checklist of lichens for Mercer County. Many of the lichen records for Mercer County are more than 75 years old. More than fifty collections of lichens were made in Mercer County at specific locations to sample the lichen flora of the county. A total of 24 lichen species were recorded with a total of three new county records.

Determining the Presence and Possible Effects of Round Gobies (*Neogobius melanostomus*) on Native Benthic Fishes in the French Creek Watershed

Allyson Wood, Hannah Eisemann, Joseph Shultz, and Samantha Williams (Casey Bradshaw-Wilson), Allegheny College - Environmental Science

Round Gobies (*Neogobius melanostomus*), an invasive fish from the Eurasian Black and Caspian Seas, were introduced to the United States in 1990. They have moved from the Lake Erie Watershed into the upper Allegheny River watershed, specifically LeBouef Creek. The impact of Round Gobies in the French Creek watershed, which holds the greatest diversity of fishes and freshwater mussels in the Eastern United States, is poorly understood, but predicted to have negative effects on native fauna. The objectives for this project were to determine if Round Gobies have colonized the main channel of French Creek, to document the extent of their spread since discovery in the watershed in 2013 and to determine if they are displacing native fishes. The great diversity of benthic fishes in French Creek may control or retard its dispersal and colonization of the main channel. Fishes were collected with seines and macroinvertebrates were collected with D-frame kicknets at nine locations throughout the French Creek Watershed in 2016. Fishes were collected, preserved and dissected to remove stomach contents which were identified to lowest possible taxa. Ivlev's electivity index was used to indicate prey consumption relative to environmental availability. To analyze microhabitat partitioning of native benthic fishes and Round Gobies, when present, sites within the watershed were selected, snorkeled and microhabitat observations conducted. Preliminary observations reveal that Round Gobies can tolerate a variety of conditions and have colonized the main stem of French Creek. Observations also indicate that Round Gobies are consuming similar prey items to native benthic fishes. Additionally, the stomach contents of Round Gobies collected in French Creek have had a high proportion of native mussel shells, which is concerning. Round Gobies continued unchecked presence will likely disrupt the lower levels of the trophic system by displacing and outcompeting small, benthic fish, and mussels.

Census of the Bat Population on the Campus of Gannon University, Erie, Pennsylvania
Nick Bengal and Erin Debelak (Steven Ropski), Gannon University - Zoology

For the past seven summers a census of the bat population has occurred on the Gannon University campus in Erie, PA. The numbers for the first three years have held relatively steady, while the past 2 year's data indicates a dramatic decline. White Nose Syndrome was first reported in 2006 in a cave in New York. The disease has killed an estimated 6 million bats in the eastern United States since then and has spread throughout Pennsylvania and into northeastern Ohio. This fungal infection has killed 95% of bats in some caves and may result in the listing of three bat species as endangered in Pennsylvania, including the Little Brown Bat (*Myotis lucifugus*), the predominant bat on the Gannon campus. This study will compare yearly data by building, time of year, building side and species composition to determine how White Nose Syndrome has affected the Gannon campus bats. A decrease in numbers may be partially responsible for an increase in West Nile Virus in the area. The results will also be used to place bat houses at appropriate locations to encourage bat presence on campus.

Analysis of Genetic Diversity in the Pennsylvania State Population of white-tailed deer (*Odocoileus virginianus*) 110 years after Bottleneck and Translocation
Michael Arcieri (Dr. Kristen Webb), Allegheny College – Genetics

In conservation efforts, genetic rescue is an attempt to combat inbreeding depression and genetic drift in bottlenecked populations by translocating genetically novel individuals into the threatened population. While the positive effects of gene flow into isolated populations have been noted in natural populations of otters, adders, and wolves, concerns exist over the long-term consequences of outbreeding depression, an introduction of adaptations ill-suited to a population's current environment. Unregulated hunting has contributed to severe reductions in the population sizes of wild animals, implicating genetic bottlenecks. Translocation has been used to introduce new individuals into threatened populations with the goal of maintaining genetic diversity. Subject to near extirpation at the turn of the century by unregulated European hunters, and followed by extensive translocations, white-tailed deer (*Odocoileus virginianus*) populations in the United States suggest long-term translocation success, with present-day population densities higher than before European settlement. Genetic surveys of white-tailed deer populations in Kentucky and Mississippi reveal genetic diversity levels comparable to populations untouched by European hunting, supporting the genetic success of translocation. Pennsylvania white-tailed deer represent a population which was translocated roughly 110 years ago, nearly 30 years prior to Kentucky and Mississippi. Studying the genetic diversity of the Pennsylvania white-tailed deer population provides another example of the long-term efficacy of genetic rescue. We used microsatellite analysis to assess genetic diversity at two loci across a sample of Pennsylvania white-tailed deer and compared this genetic diversity to that of the Kentucky and Mississippi populations. Current white-tailed deer populations suggest that translocation is a viable means to maintain genetic diversity when increasing population size of a threatened population.

BIOLOGY III - MICROBIOLOGY

Inactivation of Pathogenic Bacteria on Media Containing Juices and Spices Using Radiant Catalytic Ionization

Brittany Benjamin, Rhyan Clark, Brienne Kilbert, Michael Sweeney, Oladapo Afolabi and Adrian Babel (David Fulford, William Mackay, Craig Steele and Naod Kebede), Edinboro University - Microbiology

Food-borne illnesses are exceedingly prevalent and are an unremitting issue. The World Health Organization (WHO) estimates that 2 billion people worldwide are affected by food-borne illnesses yearly. To combat this problem, new sanitizing techniques have emerged in recent years and are being extensively used in a multitude of places to decontaminate contact surfaces. By generating activated oxygen species such as hydrogen peroxide, superoxide anion, hydroxyl radical, and ozone, Radiant Catalytic Ionization (RCI) has come to the forefront of potential solutions for this issue with its countless applications for reducing the number of bacteria. Previous research has shown that RCI causes a 90% killing of food-borne pathogens during a 30-minute exposure. The focus of this study is the examination of the effects of RCI on *Escherichia coli* and *Listeria innocua* grown on different types of media, to simulate common food products. The media that were used for this study include Tryptic Soy Agar (TSA) and TSA infused with ground turmeric, ground cinnamon, garlic powder, or ginger root. The results of both the cabbage juice and the carrot juice plates indicated a 99.9% killing of both *E. coli* and *L. innocua* in 3 hours. The spices, all of which are natural antimicrobial agents (African Journal of Biochemistry Research, 4, 172-173), were chosen to explore the possibilities of a synergistic effect between the spices and the food product in the presence of RCI.

Resistance of *Pseudomonas aeruginosa* environmental isolates from college bathrooms to triclosan and amoxicillin

Laura Pellegrini (Catharina Coenen and Lisa Whitenack), Allegheny College - Microbiology

The antibacterial agent, triclosan, has been incorporated into hand soaps for decades and is also found in other household products, such as plastics and clothing. While hand soaps do not contain enough triclosan to kill most bacteria, they may select for triclosan resistance and for cross-resistance to clinically relevant antibiotics, such as amoxicillin. *Pseudomonas aeruginosa*, a bacterial species that is the leading cause of death from hospital-acquired infections and is famous for displaying high levels of antibiotic resistance as well as the ability to thrive in diverse environments. I hypothesized that *P. aeruginosa* populations in restrooms stocked with soap containing triclosan contain a larger percentage of *P. aeruginosa* cells resistant to amoxicillin and triclosan than populations in restrooms stocked with triclosan-free soap. To test this hypothesis, swab samples from soap dispensers, faucets, door knobs, and light switches will be incubated in soap solutions with or without triclosan and then will be plated on Pseudomonas-selection agar to assess colony forming units. Sub-samples will also be plated on plates containing amoxicillin to assess cross-resistance to this clinically relevant antibiotic. Exposure time to triclosan required to differentiate resistant from non-resistant strains will be determined by using the resistant strain- PAO1. While selection of triclosan-resistant strains of *P. aeruginosa* has been previously demonstrated for soap dispensers in hospital settings, demonstrating similar selection mechanisms in a non-clinical environment would strongly support a role for antibiotic soaps in the selection of antibiotic resistant strains in the population at large and hence provide added impetus for discontinuing the indiscriminate use of this antibacterial agent.

Genetic Analysis of Cytochrome *b* and Cytochrome *c* Oxidase Subunit III Genes of *Cytauxzoon felis* in Domestic Cats (*Felis catus*) from Georgia

Megan Rodrigues (Kristen Webb), Allegheny College - Genetics

Cytauxzoon felis, a protozoan parasite, typically infects bobcats, but in recent decades the number of infected domestic cats has increased significantly. Although it is almost never fatal in bobcats, if left untreated, domestic cats will die of the infection within a few days. Treatment for *C. felis* includes atovaquone and azithromycin therapy. Previous research has shown that domestic cats infected with *C. felis* bearing specific cytochrome *b* genotypes respond best to treatment. However, research to discover why this occurs has yet to be pursued. A potential reason is that the cytochrome *b* gene shares a relationship with neighboring genes in the mitochondrial genome leading to a change in treatment response across genotypes. Domestic cats infected with *C.felis* bearing the cytochrome *b*1 genotype had increased survival rates when treated with atovaquone and azithromycin. It was also hypothesized that the cytochrome *b*3 genotype would respond in similar ways to increase survival rates. Research on *C. felis* has primarily been focused on creating accurate detection assays for veterinarians to quickly diagnose domestic cats while cytochrome *b* research has only begun within the past few years. In this project, we determined and compared the genotypes of cytochrome *b* and a neighboring gene, cytochrome *c* oxidase subunit III. This will give us insight towards understanding the differences in treatment responses among domestic cats infected with *C. felis* bearing certain cytochrome *b* genotypes. If patterns between genotypes for the two genes are found then detection assays that also look for genotypes can be designed which would lead to the creation of treatments specific to certain genotype patterns.

Targocil, a Wall Teichoic Acid Synthesis Inhibitor, Activates the DesK-DesR Two-Component System of *Bacillus anthracis*

Alex Metzger (Devin Stauff), Grove City College - Microbiology

Our research on the pathogenic bacterium *Bacillus anthracis* seeks to elucidate the identity and function of sensor systems that regulate cell membrane fluidity. One way that *B. anthracis* monitors membrane integrity is through the use of two-component sensor systems. A two-component system consists of a histidine kinase sensor in the cell membrane which phosphorylates a cytoplasmic response regulator that alters transcription. Targocil, an antibiotic-like molecule which inhibits wall teichoic acid synthesis in *Staphylococcus aureus*, was found to induce transcription of the *B. anthracis* operon *desQPKR*, which encodes a transporter and a two-component system that is thought to sense changes in membrane fluidity. We hypothesized that targocil induces an alteration in the cell membrane which activates DesKR, the two-component system, and that this system responds to restore cell envelope integrity. To test whether targocil induces DesKR activation, we developed a strain of *B. anthracis* in which DesKR activation leads to expression of the reporter enzyme XylE. Targocil greatly increased XylE expression, supporting our hypothesis. Next, we sought to determine how DesKR senses targocil. Our current hypothesis includes the presence of an unidentified system in *B. anthracis* which is perturbed by targocil and is essential for normal membrane fluidity. To identify this system, we developed a genetic screen that is designed to select for disruptions in unknown systems required for targocil-dependent activation of DesKR. We plan to perform whole-genome sequencing on mutant strains to locate the mutations, thereby indicating the identity of additional systems. Delineating the pathway from targocil to the activation of DesKR could provide further insight into the details of uncharacterized signaling pathways, ultimately leading to a more detailed understanding of how *Bacillus* species maintain membrane fluidity.

***Pseudomonas aeruginosa* Biofilm Formation on Common Catheter Materials in Response to Glucose**
Rachael Taylor (Catharina Coenen), Allegheny College - Microbiology

Catheter-associated urinary tract infections (CAUTIs) are the most common hospital acquired infections and a leading cause of death in elderly patients. Risk for acquiring a CAUTI within an intensive care unit is increased five-fold by Diabetes Mellitus, suggesting that increased concentrations of glucose in the urine may increase bacterial colonization of catheter surfaces, and hence the formation of antibiotic-resistant biofilms. Novel approaches, such as coating of catheters with antimicrobials, have been ineffective against gram negative bacteria, such as *Pseudomonas aeruginosa*, but interactions between catheter materials and glycosuria have not been investigated. To assess effects of glucose at concentrations found in diabetic patients on colonization of catheter materials, I compared *P. aeruginosa* growth and biofilm formation, in a nutrient rich media, M63, and in artificial urine media (AUM). On the polystyrene surface of a standard microtiter dish, glucose increased both growth and biofilm formation in M63, it only increased growth in AUM and not biofilm formation. Biofilm formation on common catheter materials will be assessed in the presence of absence of glucose by inserting catheter sections into the wells and determining biofilm growth per area through staining with crystal violet and quantification of dye retained on the catheter. Interactions between glucose and catheter materials may provide a basis for a clinical comparison of particular catheter materials in patients with Diabetes Mellitus.

***Streptococcus mutans* Biofilm and Growth Inhibition by Lactic Acid-Producing Bacteria in the presence of Garlic and Ginger Extracts**
David Lynn (Catharina Coenen), Allegheny College - Microbiology

The oral bacterium *Streptococcus mutans* is one of the leading causes of dental caries, also known as cavities. Caries are directly correlated to biofilm formation. Once plaques, or biofilm, are created, *S. mutans* is able to metabolize sugars through glycolysis and fermentation. This process produces an acidic environment on the tooth surface, which allows for the degradation of calcium phosphate from the tooth enamel. Oral health, as well as dietary habits, has an influence on oral flora composition. Some probiotic oral lactobacilli have been shown to inhibit growth and biofilm formation of pathogenic bacteria. Garlic and ginger are common dietary products known to exhibit some antimicrobial properties and disrupt growth of various bacterial species, including *S. mutans*. Probiotics, garlic, and ginger can be found together in some foods, like kimchi and certain cultures consume these foods with nearly every meal. To assess whether synergistic effects between lactobacilli, garlic, and ginger may disrupt establishment of *S. mutans*, I quantified biofilm formation of *S. mutans* in the presence of garlic and ginger extracts in isolation, or combined with lactobacilli species *L. rhamnosus* and *L. reuteri*. If treatment with both garlic and ginger extract enhances the disruption of biofilm formation by lactobacilli, an epidemiological study on the correlation between kimchi consumption and dental caries may be warranted.

CHEMISTRY

Thermodynamic and Structural Impact of α,α-Dialkylated Residue Incorporation in a β-Hairpin Peptide

Shelby Schettler, Gabrielle Gette (George Lengyel), Slippery Rock University - Chemistry

Peptides are short sequences of amino acids that can mimic the shape, and therefore function, of larger proteins. Peptide therapeutics can potentially be used for the treatment of a wide range diseases such as HIV, diabetes, and cancer. Peptides are naturally broken down by enzymes within the body through a process called proteolysis, but the introduction of unnatural amino acids into the sequence can slow this process, potentially increasing the lifetime of peptide therapeutics. We have examined the impact of the incorporation of a,a-dialkylated amino acids, unnatural amino acids in which the α-proton is replaced by an alkyl side chain, into short, b-hairpin peptides. Four a,a-dialkylated amino acid derivatives with varying side chain lengths were incorporated into peptides using Fmoc solid-phase peptide synthesis. These peptides were then analyzed using homonuclear multidimensional-NMR spectroscopy to determine the propensity of the unnatural amino acids to promote a b -hairpin folded conformation. These analyses showed that the α-alkylated amino acid with two side chains consisting of one carbon unit completely disrupted the folding population of the model system. However, increasing the side chain length of the α-alkylated amino acids to two or more carbon units restores some of this folded stability.

Novel Method for the Hydrolysis of a Nickel Schiff-Base Complex Using Conditions Suitable for Retention of Acid-Labile Protecting Groups

Tanner Geibel, Cory Bontrager (George Lengyel), Slippery Rock University - Chemistry

Polypeptides are sequences of amino acids that can fold into secondary structures such as alpha helices and beta sheets. The formation of these secondary structures is directed by the specific sequence of amino acids. The folding of alpha helices and beta sheets can be influenced by the incorporation of unnatural amino acids, which are amino acids containing side chains beyond those seen in nature. Many unnatural amino acids can be synthesized through hydrolysis of a nickel schiff-base complex. Standard decomposition techniques of this complex require refluxing with hydrochloric acid. These harshly acidic conditions can remove acid-labile side chain protecting groups, which are required for solid phase peptide synthesis. To circumvent this issue and to provide synthetic access to additional unnatural amino acids with side chain protecting groups, we have devised a novel method of hydrolysis using EDTA, a chemical chelating agent that can sequester metal ions. The use of EDTA allows for hydrolysis of the nickel schiff-base complex using much more benign conditions, which prevents the loss of acid-labile side chain protecting groups.

Development of a Gold Nanoparticle Based Sensor for Lead(II) Ions in Water

Erin Cumming (Alice Deckert), Allegheny College - Chemistry

Development toward a lead detecting sensor through nano-engineering gold nanoparticles on a glass surface was undertaken. Trisodium citrate dihydrate was used as a reducing and capping agent toward synthesis of gold nanoparticles. Glass slides were cleaned and functional with amino-propyl triethoxysilane (APTES), allowing subsequent attachment of gold nanoparticles to the surface. 4'- aminobenzo-15-crown-5 was attached as an ionophore for detecting lead. Soak times for attachment were 4 hours in APTES, 3 hours in gold nanoparticle solution, 24 hours in crown and lead. LSPR shifts were monitored with UV-vis spectroscopy. Peak shifts occurred when sensor was exposed to crown solution and aqueous solution of Pb2+. Peak shifts were used to make a calibration curve. Detection limits will be obtained from the calibration curve.

Technological Integration in the Chemistry Laboratory at Penn State Behrend
Nick Banner and Shannon McDonnell (Luciana Aronne, Andrew George), Penn State Behrend - Chemistry

Undergraduate students at Penn State Behrend enrolled in introductory chemistry laboratory courses often lack the necessary technical skills to perform the experiments successfully and safely. Since introductory chemistry courses at Behrend are taught by a variety of full and part-time instructors, there is lack of conformity in pre-laboratory instruction. The purpose of this research is to determine if pre-laboratory videos will be beneficial in rectifying the problems associated with this non-conformity. This is important for students who are visual learners, learn at a slower pace, or where English is a second language. There are eleven sections of the introductory chemistry laboratory course in the spring semester of 2016. Six sections will have a pre-laboratory video and five sections will have a pre-laboratory talk by the instructor. The anticipated outcome is an improvement in laboratory efficiency, safety, and necessary technical skills for the students who view the pre-laboratory videos. The data collected to assess the project will be through results of a safety quiz administered during the first week of the laboratory class, results of a brief quiz after each pre-laboratory presentation, and tracking the amount of time the students use to perform the laboratory experiments.

Effects of Ultrasound on the Digestive Enzyme Pepsin A
Kathyrn Kapp, Rebecca Hetz, and Steven Pham (Keith Krise), Gannon University - Chemistry

Many medical procedures use high frequency sound waves for both treatment and imaging. Even with regular use of ultrasound, there remains an incomplete understanding of its molecular level effects on biological macromolecules. Ultrasound results in acoustic cavitation, the formation, expansion, and violent, implosive collapse of bubbles within a liquid containing dissolved gas. High pressure results in shear-stress and high temperatures (up to 5000°C) at the site of bubble collapse can cause thermally-induced breakdown of the water molecule generating reactive free radical species. Both shear-stress, high temperatures, and free radical reactions, may denaturation nearby biomacromolecules. To more completely understand potential molecular-level effects of ultrasound on biological macromolecules and the operative mechanism of denaturation, the activity of the digestive enzyme pepsin (a 35 kDa protein with primarily beta-sheet secondary structure) was measured as a function of sonication time using a stop-point assay of hemoglobin degradation. After a one-hour sonication, enzyme activities typically decreased by 40%, suggesting a sonochemically-induced structural change to the enzyme active site. To assess whether free radicals were responsible for loss of enzyme activity, pepsin was sonicated in the presence of the free radical scavengers n-butanol up to 0.1 M. Enzyme activity decreases was significantly less (< 5%) in the presence of scavenger which showed that radical reactions that alter the enzyme structure are the principle mechanism for enzyme denaturation. The compact shape and relatively small size of pepsin likely protects the enzyme from significant shear-stress.

Refinement of Synthesis Parameters for Fluorescent Silver Nanoclusters Templated with Double Stranded DNA
(Contains proprietary information – no abstract included)
Robert Passerotti, Ian Campbell (Bruce Wittmershaus), Penn State Behrend - Chemistry

Hydrogen Adsorption and Storage on Carbon Nanotubes
Christian Gamboa (Ron Brown), Mercyhurst University - Chemistry

Carbon nanotube research has become an essential debate when talking about efficient, alternative, environmental-friendly fuel resources due to its capacity to adsorb and store hydrogen on its surfaces. The research presented is theoretical work that explores carbon nanotubes and their ability to transport electrons across a system, especially in the presence of a defect site on their surfaces. Density Functional Theory is used to calculate energies of the optimized systems, comparing nanotubes with and without the defect, as well as those same nanotubes with and without Hydrogen(s) adsorbed onto their surfaces. Initially, small nanotube systems were studied using high levels of theory. Current studies expanded the lengths of the carbon nanotube where a convergence point was found to find an optimal nanotube length, and QM/MM methods are used to find the energies of the system. Comparing these, the average energy to adsorb Hydrogen may be obtained comparing the defective carbon nanotubes to the non-defective, showing a more efficient storage (lower change in energy) capacity for the Hydrogen, in either system.

Using Electric Conductivity Measurements to Determine Concentration of Electrolytic Contaminants in Commercial Water-Soluble Polymers
Levi Kalka, Dylan Michalski, Joshua Norman (Keith Krise), Gannon University - Chemistry

Synthesis of polymers often includes formation of byproducts such as electrolytic compounds. Use of such polymers may require knowing the concentration of such contaminants. Because of residual electrolytes, many commercially available water-soluble polymers show a high inherent electric conductivity. To determine the electrolyte concentration in commercially available polymers, specifically polyvinyl alcohol (PVA) and polyethylene glycol (PEG), electric conductivity measurements on both dilutions of electrolyte and aqueous polymer solutions were made. Gradual dilution of electrolytic contaminants in both aqueous electrolyte and aqueous polymer solutions were expected to show a linearly decrease in electric conductivity as ion concentration decreased. This was observed for aqueous solutions; however, in polymer solutions, this was only true as the polymer concentration approached zero. Therefore, a tangent line to the electric conductivity versus polymer concentration data when polymer concentration equaled zero was used to determine the electrolyte concentration in aqueous polymer solutions up to 10% (w/w). To confirm the validity of this method and that the electrolyte concentration in the 10% aqueous polymer solution (w/w), several dilutions of 10% aqueous polymer (w/w) were prepared while maintaining the electrolyte concentration in each. As the polymer concentration decreased from 10% to 0.5% (w/w), the measured electric conductivity increased to the electric conductivity value predicted by the tangent and measured in the electrolyte aqueous solution.

Electrochemical Investigation of Human Serum Albumin-Heme Enzyme with Proximal Tyrosine to Evaluate its Conversion of Nitrite to Nitric Oxide
Gary Fye (Jason Bennett, Mary Grace Galinato) Penn State Behrend - Biochemistry

Prior studies reveal that a group of heme-containing enzymes catalyze the conversion of nitrite (NO2-) to nitric oxide (NO) via an oxygen-limited nitrite reductase mechanism. Among these heme-containing systems are myoglobin, a protein responsible for being an oxygen carrier for skeletal muscles, and Cytochrome P450, a protein responsible for catalyzing the synthesis of sterols. Both are monomeric proteins with the former bound to protoporphyrin-IX (heme) via proximal histidine, while the latter is bound to heme via proximal cysteine. However, no known hemoprotein has been demonstrated utilizing proximal tyrosine. Application of a tyrosine bound heme complex could have pharmaceutical application for the recovery of ischemia-reperfusion injuries due to its nitrite reductase capabilities and low susceptibility to reduction. Therefore, this work will utilize Human Serum Albumin (HSA) to study the impact of proximal tyrosine attachment to heme. HSA is the most abundant protein found in human blood, typically responsible for the regulation of oncotic pressure, and is capable of binding and transporting many ligands including heme. Due to the nature of the binding site of heme on HSA, it is believed that the nitrite reductase activity is identical to that of myoglobin. The research presented will utilize electrochemical methods to compliment previous spectral data and help understand the nitrite reductase activity of heme-coordinated HAS (HSA-Heme). HSA is reconstituted and exposed to protoporphyrin-IX forming a pentacoordinated complex via tyrosine 161 (HSA-Heme) with a reduction potential of -230 mV Vs. Ag/AgCl. Nitrite reductase activity was confirmed using cyclic and square wave voltammetry comparing HSA-Heme reduction in the presence of NO2- and NO to that of the heme complexed to myoglobin.

COMPUTER SCIENCE

Effectiveness of Multimodal Notifications for Disaster, Catastrophe, and Home Disaster Events
Lauren Orzechowski (Terri Lenox), Westminster College - Computer Science/Software Engineering

The purpose of this study is to determine whether or not bimodal notifications will elicit faster response times, more accurate identifications, and better subjective responses compared to unimodal notifications. Effective communication is one of the most important things when designing a warning signal or system. In situations like severe weather conditions or home incidents, it is important to consider the mode in which a homeowner is notified to ensure that it grabs their attention and informs them of the situation. In order to distinguish the most effective notification modality in a disaster or home disaster incident, experiments were conducted where the participants completed a mundane task and they were interrupted by the notification and were asked to respond accordingly. The experiments consisted of either text (the control group), visual, auditory, or the combination of auditory and visual cues in order to compare the differences between modalities. The main experiment was followed by a subjective and recall questionnaire. This study will analyze the response times, subjective ratings, and accuracy of recall in order to determine the most effective mode.

Computer Science Outreach and Study: Difference in Interest and Aptitude raised in elementary students through Computer Science Unplugged as Standalone Learning Activities and Activities Supplemented with Lectures

Bryan Gallo (David Shaffer), Westminster College - Computer Science/Software Engineering

This project contributes to the research done on the collection of computer science learning activities called Computer Science Unplugged. Specifically, it will compare two methods of teaching Computer Science Unplugged; as standalone learning activities and as learning activities supplemented with lectures. A comparison between students' interest and aptitude in computer science in both the lecture and non-lecture group will be explained in an oral presentation.

A Comprehensive Security Assessment of the Westminster College Unix Lab

Jacob Shodd (David Shaffer), Westminster College - Computer Science/Software Engineering

In this project, I looked into and testing various cyber security aspects of the Westminster College Unix lab. Utilizing the Kali Linux operating system and the variety of tools provided by it, I will present the results of testing features and services of the lab to ensure user privacy and data integrity. Examples of these services include, but are not limited to LDAP, PostgreSQL, VNC, and NFS. This is type of testing is critical to both universities and business organizations alike, because without it, major vulnerabilities could go unnoticed for extended periods of time and the user's private information may be affected. I will present on many techniques used in this project including various network scans using NMAP, looking for commonly found vulnerabilities using the Metasploit Framework, and searching for security flaws specific to the lab's configuration, such as attempting to listen in on VNC sessions to obtain private information.

Exploring Altruism in Emergent Behavior of Evolving Cooperative Robtos

Anthony Groves (C. David Shaffer), Westminster College - Computer Science/Software Engineering

We will discuss the results of an experiment using genetic algorithms to evolve teams of simulated robots to perform a task cooperatively, and we examine teams that are encouraged to behave altruistically with teams that are not. Our simulation runs in a spatially and temporally discrete virtual environment. The task is designed to require the teams to cooperate to successfully complete it. In addition to the cooperative teams, the simulation has pursuer robots that pursue the cooperative robots and inhibit their ability to perform the given task. Each cooperative robot has the ability to save the other cooperative robots from the pursuers, allowing altruistic behavior to emerge. We use two different types of teams, one that is encouraged to behave altruistically from its genetic algorithm and one that is not, to experimentally analyze whether a team is more effective if altruism is a forced behavior instead of an emergent behavior. Since successfully completing the task requires cooperation, and the genetic algorithms should evolve successful strategies, the genetic algorithms should steer the robots toward cooperation.We will present an analysis of emergent self-organization in the resulting teams.

Monte Carlo Price Forecasting and Portfolio Optimization
Garrett Ashbaugh (David Shaffer), Westminster College - Computer Science/Software Engineering

People have often used historical data of stocks to try to simulate future stock return. This study used historical close prices of stocks to create a distribution of returns. The distribution was then randomly sampled from to project the price of the stock the next day and then repeated to create a Monte Carlo simulation. The projected prices of these stocks were then analyzed to optimize a portfolio. I will discuss the results of the performance of the backtest (done in Quantopian). The performance will also be compared to the return of the S&P 500 and a risk-free asset.

Finding the Difference in Change of Aggression Between the Sexes After Playing Violent Video Games
Rustin Casteel (Terri Lenox), Westminster College - Computer Science/Software Engineering

Much research has been done into whether violence in video games is a causes an increase in aggression in people. Evidence has determined that there is a correlation between video game violence and increases in aggression. However, the research into how violence in video games may affect males and females differently is not nearly as expansive. The research focuses on four topics, violence in video games, gender differences in video games, how to test aggression, and previous research done on the subject. The question addressed here is whether there is a difference in the level of aggression between genders after playing violent video games. Using the information researched, a test will be done to determine if there is a difference in the change of aggression between males and females after playing a violent video game. The test will involve both genders playing a video game for a time period. Before and after playing the video game, participants will be asked to fill out the State Hostility Scale (SHS) to determine their aggression levels. After collecting all the data from the research, it will be reviewed to determine the changes in aggression for both genders and a conclusion will be made.

COMPUTER SCIENCE, ECONOMICS, AND ENGINEERING

Crime Rates and Income in Erie, PA
Natalie Szalajko (Ken Louie), Penn State Behrend - Economics

The relationship between crime rates and income is a fuzzy one at best, however this experiment intends to enlighten the relationship and expects that an increase in income will have an inverse effect on crime rates. Income was measured using several different variables related to both income and upward mobility. These variables were put through a test of multicollinearity and regressions resulting in four final variables to be used in an official model. Of the four final variables, three returned significant. Both income per capita and percent of households living in poverty returned at a 1% level significance, and the unemployment rate returned at a 5% level significance. The entire model was deemed significant at a 1% level and was able to explain 35.05% of the variation in the dependent variable.

Data Mining for Chronic Kidney Disease Prediction
Ryan Markle (Faisal Aqlan), Penn State Behrend - Engineering

Chronic Kidney Disease (CKD) is one of the most widespread illnesses in the United States. Recent statistics show that twenty-six million adults in the United States have CKD and million others are at increased risk. Clinical diagnosis of CKD is based on blood and urine tests as well as removing a sample of kidney tissue for testing. Early diagnosis and detection of kidney disease is important to help stop the progression to kidney failure. Data mining and analytics techniques can be used for predicting CKD by utilizing historical patient's data and diagnosis records. In this research, predictive analytics techniques such as Decision Trees, Logistic Regression, Naive Bayes, and Artificial Neural Networks are used for predicting CKD. Preprocessing of the data is performed to impute any missing data and identify the variables that should be considered in the prediction models. The different predictive analytics models are assessed and compared based on accuracy of prediction. The study provides a decision support tool that can help in the diagnosis of CKD.

Crime Analysis, Prediction and Visualization
Howie Setyono, and Mohamed Badawy (Faisal Aqlan), Penn State Behrend - Engineering

Crimes are rampant across cities and towns throughout the world. Order needs to be established to control and reduce them. Using crime analysis, law enforcement agencies are able to pinpoint areas that have high crime rates and determine methods to reduce them. Furthermore, analytics models can be used to predict crimes so that they can be prevented before they happen. This paper focuses on developing analytics models for crime analysis and prediction in Erie City, Pennsylvania. More than 26 thousand data points were obtained by the Erie Police Department. The proposed framework consists of data preprocessing, descriptive analytics, and predictive analytics. Data preprocessing step consists of removing the outliers, fixing invalid addresses, and calculating the longitudes and latitudes. Descriptive analytics focuses on analysis of crimes per crime type and region as well as developing heat maps for the crimes. Predictive analytics focuses on using predictive modeling techniques to predict the crimes in the different regions based on historical data. The results provide decision makers with valuable insights into crime prediction and prevention.

Ergonomic Assessment of Backpack Carriage among High School Students
Christopher Lashway (Faisal Aqlan), Penn State Behrend - Engineering

Ergonomically unsuited backpacks tend to cause spine and bone structure based dysfunctionalities, especially on an average high school student's fast developing skeleton. Carrying heavy backpacks by school students should be avoided to prevent musculoskeletal disorders. In this paper, we study the ergonomic risks among high school students in a local school district. The research includes literature review, survey design, data collection, data analysis, digital human modeling (DHM), and recommendations. The survey includes 21 different questions under three categories: human physical characteristics, health history, and school and backpack information. DHM simulations are created to assess the impact of the different factors such as backpack weight, carrying, position, and human physical characteristics. The results provide recommendations for avoiding ergonomic risks caused by carrying backpacks among high school students.

Patient Flow and Overcrowding in Emergency Departments
Erica Coval, Alyssa Andrzejewski, and Hannah Saunders (Omar Ashour), Penn State Behrend - Engineering

This project presents a study at the emergency department (ED) of UPMC Hamot. UPMC Hamot has a comprehensive ED. Currently, the ED consists of 35 beds for patients. The ED is overcrowded most of the time. Overcrowding is an international problem that has adverse effects on the quality of health care, increased risk of in-hospital mortality, longer wait times, etc. Reducing the overcrowding will help decrease the overall patient LOS that will positively be reflected on the safety and quality of care at UPMC Hamot. The areas where to decrease time will be analyzed through process mapping, collecting time data, and evaluating delay reasons. Overcrowding definitions, reasons, effects, measure, and solutions is explored in the literature. The overall outcome of this project is to recommend a solution to reduce the time spent in the ED (LOS) and to decrease the boarding and overcrowding of patients. This will improve patient satisfaction, quality of care, and the overall flow of the emergency department at UPMC Hamot. Process maps have been identified for patients with different acuity levels. The other portion of our data is the data given by UPMC Hamot. Due to different healthcare laws and regulations, UPMC has to collect data on patient to bed wait times, over boarding, the levels of their capacity at different times, and time stamps data that could be used to analyze their overcrowding problem. Currently, the research team is exploring literature on overcrowding and investigating scholarly definitions and equations that represent overcrowding. In the future, the research team plans to collect more data in the hospital and continue to analyze the data given to provide recommendations, on how to predict crowding and what are different strategies that can be used to reduce its impacts.

Patient Flow Analysis at UPMC Hamot's Cardiology Outpatient Clinic
Nicholas Bowers (Omar Ashour), Penn State Behrend - Engineering

This project presents an analysis of patient flow at UPMC Hamot's ambulatory clinics. UPMC Hamot has two geographical areas for short-stay patients: the Women's Hospital and three outpatient units. The research will focus on one of the outpatient units, i.e., cardiology. The cardiology department includes three main laboratories: Catheterization lab, Electrophysiology lab, and Transesophageal Echocardiogram lab. Despite the advancement and growth of outpatient procedures that require less recovery times, the labs have experienced excessive delays and increased workloads. This has led to increased patients and staff dissatisfaction and increased workload and care requirements by nursing staff. This research aims to understand and improve outpatient clinics system and its processes by implementing process improvement and waste reduction techniques, and discrete event simulation. Data has been collected by performing time studies and interviewing health care staff and patients. Data has also been obtained from Hamot's own data collection systems. Based on data analysis, potential areas of improvements have been identified such as implementing a separate outpatient preparation area in order to avoid congesting lab areas with preparatory work. Collected data will also be used to create a simulation model that will allow proposed changes to be tested. Simulation will allow minimal interference with the daily operations of the outpatient labs until a better solution can be found. Other needed data that is available on the hospital's database will be analyzed as well. The expected outcomes of this projects are improved patient flow, reduced waiting times, reduced length of stay, reduced clinic end time, and improved patient satisfaction. Moreover, it should be noted that the methodology followed in this project can be extended to other units and other hospitals as well.

Surgery Time Estimation Using Statistical Methods for Cardiology Department at UPMC Hamot
Jessica Hocsman (Omar Ashour), Penn State Behrend - Engineering

Today's biggest problem to the hospitals is the wasted time and high costs due to inefficiencies in the hospitals' processes. Unrealistic scheduling of surgeries that are based of unrealistic procedure time causes inefficiencies and delays in hospitals' processes. This problem causes patients to be unsatisfied with the service provided by hospitals, unnecessary costs and increase of the workload for the hospital staff. UPMC Hamot is a tertiary-care hospital in Erie that has been experiencing a rise in the number of non-invasive surgeries carried out. In this scenario, patients are recovering relatively faster and being discharged safely within 24 hours but the benefits from it are not being seen. Even though the work/time put in by the hospital staff has decreased, the waiting time for patients has increased. The study will take place at UPMC Hamot within the cardiology department. The objectives of this study are to identify the factors correlated with procedure time, develop a model and use statistical analysis methods to improve surgery time estimation.

Computational Modeling of Seasonal Circulations Patterns for Lake Erie
Justin Drehs, Alicia Massara, and Mahboobe Mahdavi (David Gee), Gannon University - Engineering

Aquatic ecosystems require sufficient nutrients in order to sustain balanced biodiversity. Agricultural- and urban-use fertilizers containing phosphorus and nitrogen can run-off into lakes thereby contributing two vital nutrients for plant growth. However, Lake Erie "and other lakes " are periodically inundated with excess nutrients leading to a condition known as eutrophication. Under these conditions, plant growth can be explosive and algal blooms can cover significant portions of the lake's surface. Some of these blooms are toxic, and eventually the decay of plant matter can induce hypoxia (oxygen-depleted zones). During photosynthesis and as part of the Calvin Cycle, the plant synthesizes glucose which is used for different processes, including growth. In the cycle, a phosphate ion attaches to 3-phosphoglycerate creating 1,3-biphosphoglycerate. The molecule is reduced via NADPH (Nicotinamide adenine dinucleotide phosphate) forming glyceraldehyde 3-phosphate (GA3P). At this point, GA3P can be used to form glucose (a monosaccharide sugar) which can be transported to other plant cells, or stored as a polysaccharide. The purpose of this study is to determine seasonal water circulation patterns for the lake by using a computer model which accounts for factors including lake geometry, bathymetry, fluid turbulence, and wind shear. The Environmental Fluid Dynamics Code (EFDC) is capable of simulating environmental flows with variable density. The hydrodynamic module solves the turbulent equations of motions using orthogonal curvilinear coordinates in the horizontal plane, and stretched or sigma coordinates in the vertical direction. The model can calculate a free surface displacement consistent with mass conservation. In addition, the module can be used to solve the energy equation, and equations governing transport of species. Hence, assuming that nutrients follow circulatory patterns, we may be able to correlate water circulation and the appearance of algal blooms.

ENGINEERING I

Design and Development of a Battery Internal Short Circuit Test Machine
Mary Burbules and Scott DeLaney (Adam Hollinger), Penn State Behrend - Engineering

Lithium-based batteries have earned a dominant role in the market for powering portable devices due to their high energy density and long cycle-life. However, the energetic property of these cells has presented safety concerns due to their lower abuse tolerance compared to standard battery designs. Internal short circuits present one of the more dangerous abuse situations since there is a great potential of thermal runaway leading to fire and explosion. Field failures and recalls associated with internal short circuits demonstrate the risks of lithium batteries. As lithium battery use in modern technology has grown, designing safer cells and battery containment as well as establishing well-defined battery safety standards has become the main objective to ensure consumer safety. Understanding the response of lithium cells under internal short circuit conditions is of great importance to ensure the safe development of lithium battery application. In this work, an internal short circuit test machine was designed to conduct nail penetration tests of lithium chemistry cells. The penetrating method of inducing an internal short circuit is attractive as it allows for direct testing of multi-cell configurations and the placement of sensors within commercially-available cells during the short circuit event. Unlike conventional internal short circuit test machines, the presented design allows for the accurate control of the penetrating nail's position and velocity. The small-scale size and portability is another main advantage of this design over industry standard models. The test machine successfully provides the required force to allow for multi-cell penetration. Ultimately, the experimental testing performed will be used to support the development of models to simulate the mechanism of internal short circuits of lithium cells.

Effects of Polarity and Current Path in Electrically Assisted Single Point Incremental Forming of 2024-T3 Aluminum
Tyler Grimm (John Roth and Ihab Ragai), Penn State Behrend - Engineering

Incremental forming (IF) is a sheet material forming process with great potential in the rapid prototyping and low-volume production industries. IF's primary benefit over comparable sheet forming methods is its ability to form geometries without the use of dedicated dies. This inherently reduces material consumption and assists in prototyping of parts due to the adaptability of the process. Traditionally, IF is accomplished through use of a hemispherical punch, which traverses over the sheet material at incremental depths until the final geometry is achieved. This particular process has several limitations, though, to include springback, limited formabilty, and poor surface finish. However, many improvements have been made to IF through variations in the forming process. One such variation is electrically assisted incremental forming (EAIF), which utilizes an electrical current in-situ with forming. This results in reduced springback, increased formability, and higher part accuracy. Conventionally, the electric current is passed through the forming tool into the sheet material. In order to maximize the effects of EAIF, all parameters of the method must be investigated, including the polarity of the current passing through the part and the path that the applied current takes. The effects of altering these two parameters is the primary investigation in this research. It was determined that, in order to optimize springback reduction and formability during EAIF, the tool should be assigned the positive electrode and the center of the workpiece should be assigned the negative electrode. Additionally, the mechanism behind the spalling effect inherent to EAIF is discussed.

Experimental Investigation of the Reuleaux Triangle Tube Forming Process with Steel Tubes
Hayden Seibert and Laurentiu Petrut (Chetan Nikhare), Penn State Behrend - Engineering

Tube Forming is a category of manufacturing in which the cross sectional geometry of a thin walled circular metal tube is deformed to a desired shape. This paper details experiments in which the cross sectional geometries of 1018 steel tubes were formed into a square shape using the "Reuleaux Triangle Tool" Tube Flaring process. In the experiments, a steel tool with a Reuleaux Triangle shaped cross section was driven and rotated into the ends of circular tubes in such a way that it formed square cross sections along some length of the tube samples. This process was then compared to the traditional "Square Tool" Tube Flaring in terms of force requirements, formability, wall thinning, and final tube end shape.

Experimental Investigation on Carbon Diffusion in Plain Steel Using Electricity
Gary Schultz (Chetan Nikhare), Penn State Behrend - Engineering

There is a substantial amount of research and experimentation that has never been conducted before on electrically assisted diffusion. The concept of this project is that there are different ways to alter the energy properties of various elements. So far, thermally assisted diffusion is the only method used to transmit elements into steel. The question now is what will happen in the diffusion process when the variables of the experiment are changed. The first variable to be analyzed is the current density. Varying the current density of the electricity that passes through the steel is the core concept that will be tested. The second variable to consider is the amount of time that the current is passed through the specimen. After each test using the electrical current method, the results will be compared to data collected from using the thermally assisted method under similar conditions. Finally, the end goal is to observe if there is a difference in the material properties between the thermal and electrical test samples. The results of these tests will determine if there are any advantages of using the electrical method opposed to the thermal method.

Study on Residual Formability of Single Point Incremental Forming
Jonathan Warren (Chetan Nikhare), Penn State Behrend - Engineering

Single point incremental forming is a rapidly advancing manufacturing process in sheet metal forming. Because of this, there are many areas of research that can be explored. Both hole flanging and springback with single point incremental forming have been analyzed by others. However, residual formability of single point incremental forming has not been explored in detail. The research conducted in this work will be looking at the effect of the residual formability of aluminum when using single point incremental forming as a means of shaping sheet metal. The process will be done by annealing sheet aluminum at 500 °C for 5 minutes. The sheet metal will then be shaped using single point incremental forming, and then annealed again at 500 °C for 5 minutes. After this, the metal will be formed using traditional sheet metal operations. The results of the research will be analyzing the formability after single point incremental forming. The anticipated outcome would be to find that there is high residual formability after single point incremental forming, which would open the door for being able to form more complex structures in sheet metal forming.

Experimental investigation of springback during bending-reverse-bending of aluminum alloy
Hunter Andree (Chetan NIkhare), Penn State Behrend - Engineering

There is an extensive amount of information that has yet to be discovered in the research of springback during bending-reverse-bending. The spring-back of a material is the elastic recovery after being unloaded from an outside force. Springback is considered as a manufacturing defect as due to geometric distortion the part gets difficulty to place in an assembly which results in a wastage or expense to secondary operation. To cut this unwanted expense an understanding of springback is necessary for a material in various loading condition. In this work an investigation of springback during bending-reverse-bending will be done. The process of bending-reverse-bending will provide the elasticity after the material is bent once and then re-bent in the opposite direction. This is considered as one cycle. After each stage the springback will be measured and presented. In addition, the force required to bend the material at each stage will be acquired and analyzed. It is expected that the springback will reduce after each cycle of bending-reverse-bending.

Analysis of Cryogenetically Treated Sheet Nylon 6/6
Derek Shaffer and Cody Reinstadtler (John Roth and Ihab Ragai), Penn State Behrend - Engineering

When manufacturing polymer and rubber products, the parts are frequently exposed to cryogenic temperatures after molding or forming in order to improve the ability to remove excess material and flash. However, there has been very little investigation into the effect that cryogenic temperatures may have on polymers. As such, the goal of the research described herein is to examine the effect of this type of treatment on the properties of one such polymer, Nylon 6/6. More specifically, the temperature of the environment surrounding Nylon 6/6 is decreased at two different rates into the cryogenic temperature range, allowed to soak, and then returned to ambient. Whereupon the material properties of the treated Nylon are compared to baseline. This testing demonstrates that the exposure to the cold environment resulted in a decrease in the yield and ultimate tensile strength of the Nylon while leaving the area reduction and strain after necking roughly unchanged. Examination of the surface condition of the treated specimens did not bring to light corresponding cracking from the treatments, thereby indicated that the resultant change in mechanical behavior is likely caused by structural changes within the Nylon. Additional testing of the Nylon, with respect to frequency response, further demonstrated that exposure to cryogenic temperatures resulted in decreases in the Nylon's natural response at the structure's dominate mode. These initial findings indicate that the conventional technique of lowering a part's temperature to enhance the ability to remove flash does, in fact, result in measurable changes in the mechanical behavior of the Nylon product.

ENGINEERING II

Control of Thermal Enviroment Using Solar Power Application
David Albrecht, Emmanuel Fale, Katie Besselman, and Sabrina Kosnik (David Gee), Gannon University - Engineering

Most people are aware that our Sun is an almost unlimited source of clean, renewable energy. Solar radiation powers our climate and is the source of photosynthetic life. In order to accomplish these tasks, nearly 600 million tons of hydrogen are fused each second, with most of the hydrogen being transformed into helium. In the process, energy is released in the form of electromagnetic radiation (e.g., visible light). It is estimated that just one second of the Sun's energy output would be sufficient to power the U.S. for the next 9 million years. In fact, semiconducting materials which exhibit the photovoltaic effect "the ability to convert light into electricity" can be used to harness some of this abundant energy. Photovoltaic cells or solar panels are currently being used to generate electricity in power plants, on orbiting spacecraft, in personal residences, and even for terrestrial-based solar-powered vehicles. The research focus of the team has been centered on understanding the capabilities and limitations of solar technology. Areas explored included the panel's structure and components, band-gap energy, and the effect of environmental conditions on energy production. In the application discussed here, we have designed and built an enclosure that receives simulated solar energy. In order to control the enclosure's temperature, we have designed and implemented a stand-alone air-conditioning system using components found in a typical air-conditioning system. The system consists of a 12V compressor, accumulator, evaporator, condenser, and thermal expansion valve. Heat transfer via forced convection should be sufficient to control the interior temperature within the desired range. The system draws power from a deep-cycle battery which is charged exclusively by a single 100 W solar panel. Hence the system is designed to operate even when direct illumination is not possible. The solar panel itself is a first-generation, off-the-shelf monocrystalline silicon panel.

SEM Characterization of Carbides in Low Temperature Tempered (LTT) Advanced High-Strength Low- Alloy (HSLA) Steels
Tyler Rigby (Paul Lynch), Penn State Behrend - Engineering

A study was carried out to document carbide growth progression for various low alloy steel chemistries across a range of low tempering temperatures and times. All of the steels of interest contained less than 0.45% carbon and under a total 8% alloy content to be considered low alloy steels. These steels are of interest because the lower alloy content makes them more cost effective than their high alloy counterparts. There are different stages of carbide progression throughout the tempering cycle. Five high strength low alloy steels were fully heat treated and tempered at five different tempering temperatures from 350°F to 1150°F from 4 to 24 hours. SEM images were captured for 60 different samples in an effort to show the carbide nucleation and growth progression for the different alloys at the various tempering temperatures and times. The high strength low alloy steel literature showed evidence of changes in impact toughness for these steels as tempering temperatures are increased from 350°F to 1150°F. As a result of this study, a full visual depiction of the carbide progression has been developed to coincide with the impact toughness vs. tempering temperature curve displayed in the literature. The SEM images along with quantitative carbide size measurements show clear evidence of the carbide growth slowing abilities of silicon in these steels. Results show that temperature is the significant variable driving the transformation and growth of these carbides during low temperature tempering. The growth of cementite responsible for tempered martensite embrittlement (TME) in these high strength low alloy steels is shown to occur when the tempering temperature is increased from 350°F to 550°F.

Hole Expansion and Strain Evolution During Biaxial Tension
John Roger Nolan (Chetan Nikhare), Penn State Behrend - Engineering

There has been an advancement in materials in recent years along with the discovery of various metallurgical phases on the composite mechanical properties. This discovery brings about the occurrence of sudden failure on both the surfaces and edges. Most of these failures occur in the plane- loading condition. The Hole Expansion process is a mechanical characterization process which provides the indication of deformation on the edge and cracking and tearing. The two types of hole expansion which will be employed during this research will be the conventional punch test and unconventional biaxial tension test. For the punch test, a hemispherical punch was placed on the arm which expanded an predrilled hole in the specimen of cruciform geometry. A Biaxial machine, developed by staff at Penn State Behrend, will pull the sample in the +-x and +-y direction equally in both force and speed. Everything about the samples are held constant in the two types of tests. Results should be similar in both tests but things like friction in the punch test may play a role. As far as the samples go, four separate hole diameters ranging from 2.5 mm to 10 mm increasing by 2.5 mm. These samples are pulled at speeds of 5mm/min, 25mm/min, and 50mm/min. Aluminum and Steel were used in the experiments and variations in the two materials will be explored. The strain evolution and the hole expansion ratio is compared with the simulations.

Experimental Investigation of Annealing Effect on Spring back of Aluminum Alloy
Jon Cavalier (Dr. Chetan Nikhare), Penn State Behrend - Engineering

There are many different aspects that can be tested in order to determine the changes in the springback of annealed aluminum 5083 (AA5083). The reasoning behind this research is to find a resolution for the highly elastic nature of lighter metals like aluminum after they are annealed and permanently deformed. Bending a metal after it is annealed is no new process, but the use of AA5083 in sheet metal forming is a relatively new concept in the automotive industry. This is an industry that needs to find more efficient ways to predict the drastic springback nature of AA5083. The purpose of this process in the industry will be to reduce costs of sheet metal forming due to the higher expense of using steel and other heavier material. To find a resolution to this problem, this research project will run tests that involve the changing of annealed time, temperature, and different quenching methods as well as 3 different angles of cut with respect to rolling direction of the annealed metal. Once rolled the grains follow a uniform direction called the rolling direction. The sheet metal will be cut at 0 degrees, 45 degrees, and 90 degrees in the direction of which it was rolled. The metal specimen will then be heated at different temperatures and then cooled or quenched with different medium. Depending on the medium it would result in different cooling times, which causes the metal to strengthen externally and remove internal stresses. After annealing the metal it will be pressed in a compression machine. The metal is then bent back to its original flat shape and immediately traced. The metal should try to spring back to the shape that was formed when the metal was first compressed. The experiment will be comparing the effects that anneal time, temperature, and different quenching method have on the spring back distances of specimens of the same angle of cut. The research seeks a better understanding of the springback distance in order to better predict the springback distance after the material is unconstrained.

Theoretical Study of the Mechanical Properties of Nanoporous SiC
Lai Hin Lam (Blair Tuttle), Penn State Behrend - Physics

Nanoporous silicon carbide is widely used in electronic devices as a dielectric between transistors due to its relatively low polarizability. The mechanical properties of nanoporous silicon carbide are important for understanding stability of these materials during stress that may occur during device processing. In this presentation, I report my calculations of the mechanical properties of model nanoporous SiC systems. Specifically, I report lattice constant, density and bulk modulus. I examined the relationship between these three properties to the amount of hydrogen in the material. The calculations employ empirical potential and ab initio methods. My results show that the bulk modulus and density decreases as the concentration of hydrogen increases, consistent with experiments.

Experimental Investigation of Bend-Unbend Mechanics in the Tube Flaring Process
Bradley Pier (Chetan Nikhare), Penn State Behrend - Engineering

The growing demand for lighter weight vehicles force the automotive industry to efficiently design the material processing techniques. Sheet metal components share a large percentage of the vehicle weight which is used as body-in-white and as structural parts. In the sheet metal category, mainly thin tubular components are used for structural purposes. To process these tubular components, tube forming is one of the main manufacturing technique which is further subdivided depending upon the tube expansion and reduction. One of the tube forming techniques is a flaring process. Most applications for flaring tube ends utilized a conical tool flaring the tube to some point up until failure occurs. Our investigation focuses on the bend-unbend mechanics of the tube flaring and of the forces required that characterize the tube flaring process. The relationship between the flaring and the outer diameter of the tube was characterized by experimental data and then extrapolated flaring limits for a variety of tube sizes. Once an accurate relationship of force and displacement requirements are gathered, a new method utilizing a stepped tool to more gradually flare the tube by bending and bending the tube wall and create larger and/or more stable flarings without failure when compared to a standard conical tool. This process adapts a commonly used technique with the promise of much greater range of uses due to the ability to manipulate the tube flarings more than previously achievable by mechanical methods.

Effect of Perform on Pressure During Low Pressure Tube Hydroforming
Ashley Trott (Chetan Nikhare), Penn State Behrend - Mechanical Engineering

Tube hydroforming is the manufacturing process of lightweight automotive and aerospace components by using a fluid medium to form a component using high or low internal pressure. This process has gained popularity due to its many advantages such as part consolidation, quality of the formed part and the possibility of unique shapes with indents or angles. In low-pressure tube hydroforming, during the closing of the die the tube is marginally pressurized to a fixed volume. Tube hydroforming can produce many geometric options which reduces the need for welding operations. The success of the tube hydroforming process is contingent on the ideal combination of material properties, process limitations, process sequence, and die geometry. The focus of this paper is to investigate the effect of preform on the pressure requirement during low-pressure tube hydroforming. For this, a plain strain 2D model was created and hydroforming process was simulated. The tube was preform to various width and then hydroformed using low pressure. The effect of acquired strain in the preform tube on the pressure requirement to fill the shape was analyzed. In addition the influence of buckling in the tube on the pressure requirement was investigated.

ENVIRONMENTAL SCIENCE

Design Of Portable Water Filtration Device For Arsenic Removal In Developing Countries
Anna Barr and Sidney Smith (Dr. Rick Diz), Gannon University - Environmental Science

The goal of this project is to design a low-tech portable filter to reduce the arsenic concentration in potable water. Arsenic is a naturally occurring heavy metal known to cause adverse health effects with prolonged exposure. In some areas of the world, surface water is unsafe to drink due to biological contaminants, and so the population must use groundwater as their primary source of water for drinking, cooking, and bathing, such as Bangladesh and eastern India. In these areas, the concentration of arsenic in groundwater exceeds 0.2 mg/L, which is well above the US EPA's maximum contaminant level (MCL) of 0.010 mg/L and their own national standards of 0.050 mg/L. The MCL represents a safe concentration of a specific chemical for chronic exposure over an average lifetime. The performance goal of the filter would be to lower the concentration of arsenic below national standards. Our design requirements recognize that a treatment device must be inexpensive, not require the use of electricity, be effective over an acceptable period of time, and not require high technology support or parts, while reducing the arsenic concentration in the water to an acceptable level. The device will use ferric oxyhydroxide, a known sorbent for arsenic, which comes from the rusting of iron. The media will be tested in our own prototype to ensure effectiveness.

Green Roof Design And Analysis For Gannon University's Nash Library
Amanda Hennessy and Diana Munoz (Dr. Rick Diz), Gannon University - Environmental Science

This project focused on the design of a green roof for Gannon University's Nash Library, its cost, and the ecological and storm water benefits that come with it. The roof of the Nash Library was selected for a green roof because it is currently undergoing a comprehensive renovation. Located on the corner of Sixth and Sassafras Street in Erie, Pennsylvania, it provides a good location for a green roof because of its large flat surface area, with a significant amount of sunlit surface area. Gannon University is located in the heart of downtown Erie. As an urban campus, there is limited space for traditional garden areas; so it is a perfect location to obtain the benefits that come with a green roof, such as storm water flow reduction, air quality improvements, and the mitigation of urban heat island effects. Many green roofs are constructed in warm climates, but this project explored the challenges of designing a green roof for the demanding Erie, PA, climate with heavy snows and a long winter. Important factors included selection of plant species, density of plantings, and soil/subsurface profile. Plants attractive to pollinizers were favored when possible. To evaluate alternatives, test plots were constructed and deployed under artificial lights. Runoff flow and quality will be measured. Based on documented benefits, campus officials may decide to add green roofs/gardens at additional sites around the Gannon campus.

Presence of Agricultural Herbicide Atrazine in Water, Foods, and Human Urine Samples
Anthony Concilla (He Liu), Gannon University - Environmental Science

Atrazine is a commonly used water-soluble agricultural herbicide in the United States. In this study, we measured the atrazine levels in water, beverages, foods, and urine samples obtained from young students at an urban university. The effects of physiological and behavioral factors were examined. Our results show that water samples obtained from Lake Erie and tap water both contained very low level of atrazine. Beverages and foods had various levels of atrazine contamination. Atrazine was also detected in the urine samples and mid-term physical activity appeared to be a factor to reduce the atrazine level in these subjects.

Heating and Pollution Potential of Various Biomass Fuels
David Bovkun and Matthew Loughner (Dr. Rick Diz), Gannon University - Environmental Science

The use of split logs and wood fuel pellets for heating homes and businesses has increased in recent years due to the rising cost of petroleum-based fuels. Often, homeowners in rural areas have little or no guidance in the selection of the best woody fuels. The burning of woody fuels in in-home or outdoor furnaces in rural areas often results in widespread air pollution and persons residing in such areas may experience burning eyes and difficulty breathing. Recently, the Pennsylvania Department of Environmental Protection has decided to regulate outdoor wood furnaces as an important source of air pollution. This project investigated which type of biomass fuel yields the most energy output while emitting the least amount of pollution to the environment. The materials evaluated were wood pellets, dried hardwood logs, and hard-shelled corn. Laboratory apparatus used in this project included a calorimeter for energy content analysis, a custom-built furnace based on a 'kettle smoker-cooker', and gas chromatography for exhaust gas analysis. Factors investigated included burn time and combustion temperature, energy output, and the concentration of pollutants emitted during the combustion process.

Aquaponics for Food Production on an Urban College Campus
Drew Grabigel, Jeff Miller, Jacob Norton, and Max Onyenwe (Dr. Rick Diz), Gannon University - Environmental Science

This project developed a conceptual plan for a large scale aquaponics system capable of providing food to the Erie downtown community, and created a pilot-scale version for demonstration purposes. Aquaponics is the merging of aquaculture and hydroponics to create an alternative to traditional land farming. The system operates on the concept that the nitrogenous waste produced from fish can be used as fertilizer for plants grown hydroponically. The plants then purify the water for the fish, providing a self-sustaining relationship. Aquaponics systems are especially useful in areas where the soil may not be suitable for traditional farming. For example, the City of Erie is established on mostly clay-like soil which makes it very difficult for vegetation to grow. An urban aquaponics system would benefit the community in many aspects: it would provide a source of food production to help combat the pressing issue of "food deserts"; it would provide a chemical and pesticide-free alternative to traditional farming; an indoor system would provide a year-round food yield which would be beneficial during harsh seasons; and it would provide job opportunities in areas struggling with high unemployment rates. To complete this project it was necessary to analyze waste production, growth rate, and the commercial and nutritional value of a variety of fish. The maintenance, growth, and nutritional value for a variety of vegetables were also examined. The design of a full-scale system was also conducted and will be presented.

Effects of Biochar and Salt on *Festuca arundinacea* (Tall Fescue)
Jacob Marfin (Pamela Silver), Penn State Behrend - Environmental Science

Increased use of deicing salt has raised concern about its environmental impacts. Deicing salt has negative effects on soil quality, plant development, and plant growth. Biochar has been observed to mitigate the negative effects of deicing salt in soils and on plants. My objective was to analyze how effective biochar was at mitigating the negative effects of salt on three life stages of *Festuca arundinacea*. I designed the experiment as a 3-factor ANOVA: two levels of salt (0 mg/L or 9.36 mg/L); two levels of biochar (0% or 10% biochar to soil ratio by volume); and 3 age classes (seeds, seedlings, and adults) in a fully crossed design. Salt levels were administered through watering while biochar was added to the soil surface. Both treatments began at the beginning of the experiment. I repeated this design three times and watered plants daily with the appropriate water for 10 weeks with the appropriate treatment. I measured above-ground biomass, survival, and soil conductivity. Salt significantly reduced germination, survival, and above-ground biomass. Biochar did not mitigate salt effects on germination or survival, but improved biomass in the absence of salt compared to the non-salt, non-biochar treatment. Soil conductivity was higher in the salt treatment. My results are unable to reject my null hypothesis that biochar would not have mitigated the effects of deicing salt on *Festuca arundinacea*.

Varying Reflective Materials for Low Cost, Organic Light Concentrating in Flexible, Photovoltaic Devices
Melissa McCann (Ian Carbone), Allegheny College - Environmental Science

The objective of the research was to fabricate and characterize new devices for solar power generation. These devices consisted of monocrystalline silicon solar cells attached to a flexible transparent base with a reflective surface. The solar cell and materials were arranged into configurations that concentrated light onto the solar cell and increased power production. The finished devices were flexible and planar and could be scaled up to produce sheets of power-producing fabric. Polydimethylsiloxane (PDMS), an optically clear, flexible, silicon-based polymer, was used as the medium for the base. The photovoltaic devices incorporated a reflective coated ridge design to redirect the maximum amount of sunlight to the solar cell by utilizing total internal reflection. Silver, aluminum alloy, and reflective mylar were compared as possible reflective surfaces for the devices. All the devices yielded an increase in overall efficiency in energy output with increased surface area exposure. Silver performed the best as a reflective surface and produced devices with efficiency increases 30 times greater than a single solar cell. The research was successful in increasing the efficiency of a light-concentrating device by utilizing reflective materials, while keeping the relative cost of the device low. These types of monocrystalline planar devices could have widespread applications in agriculture and urban settings.

MATHEMATICS

Heroin Epidemic Modeling with PDE's
James Richardson and Allison Torsey (Saziye Bayram), Buffalo State College - Mathematics

A heroin epidemic has overtaken the country in recent years. According to the National Institute on Drug Abuse (NIDA) the total number of U.S. heroin overdose deaths has seen an over 6 fold increase between 2002 and 2015. The standard epidemiological SIR model has been adapted to describe heroin usage. Expanding upon an ODE framework provided by the White-Comiskey model, PDE's are applied to account for spatial as well as temporal factors in a heterogeneous population to improve accuracy. Equilibrium conditions are considered and a sensitivity analysis is performed to test robustness and inform decision-making.

Bridge Tournament Scheduling Problem
Oliver Miles (Paul Olson), Penn State Behrend - Mathematics

Originally viewed as an opportunity to tease out an interesting solution, the Bridge Tournament Scheduling Problem is its own puzzle and is so much more than an interesting question. The problem, based on the idea of a 6-night tournament with 24 players, asked: is it possible for each night to have wholly unique teams of players such that no single person ever plays with someone they already played with before? The original problem: every night 6 groups, each consisting of 4 players, meet to play. Within each group teams of 2 form and, during the course of the night, all possible team combinations compete. Thus, each member of a group was considered to have played with every other member of the group. In an attempt to narrow the scope of the problem, permutations of the 24 player problem were considered. Maintaining 4 player groups, as a facet of bridge, was required and, consequently, led to considering 16 player and 20 player tournaments. As a person in a 16 player tournament can at most play with the 15 other persons and with 3 other persons per night, the maximum number of unique possible nights is 5 for a 16 player tournament. Compared to 6 nights for 20 players or 7 nights for 24 players, this shrinking of complexity is why smaller tournaments were considered. Ultimately, several 5 night solutions for the 16 player problem were found using a variety of techniques. These strategies include: Latin squares, geometry, tracking allowable pairings of players, bicycle lock assignments, option trees, and the template approach. The template approach, in particular, seems to contain aspects of all these techniques. Understanding and explaining the template approach has been the most investigated avenue to solving higher order problems. This problem has proven to be non-trivial in both scale and complexity. In the presentation, the process by which 16 player solutions were generated will be explained with focus on the template approach and on Latin squares.

Examining the Methods for Partial Fraction Decomposition
Lauren Minner (Antonella Cupillari), Penn State Behrend - Mathematics

First, we define the concept of partial fraction decomposition. Then, from previous publications, we amass a myriad of different techniques on the subject. Individually, we examine each technique to determine their complexity and usability. Then we compare them to the methods commonly taught in the classroom, identifying which techniques could potentially be useful to students, and which may be too complex but effective in finding a general method for partial fraction decomposition. Finally, we postulate some future directions.

Improved Bounds on a Variation on the Classical Waring's Problem
Paul LeVan (David Prier), Gannon University - Mathematics

Waring proposed a problem in 1770 asking whether every natural number is expressible as the sum of at most r kth powers of natural numbers. We consider the opposite direction in expressing natural numbers as the sum of r or more kth powers of distinct natural numbers. We will discuss improved bounds on finding the smallest number past which this property always holds and potential future connections that may be made in the explicit solution of the problem. A connection into the application of Generating Function techniques will be discussed.

PSYCHOLOGY

Relationship between Physiological Responses and Participant Self-Report on Bystander Intention to Intervene: Does Relationship to Participants Matter?

Kameron Landers, Allison Gage, and Rachel Zimmerman (Dr. Melanie Hetzel-Riggin), Penn State Behrend - Psychology

Bystander intervention is when a witness can recognize and intervene in a potential sexual assault situation (McMahon, 2013). Researchers and intervention programs continue to implement the bystander intervention model as a primary resource for preventing sexual assault. The current study used a lab-based sexual assault vignette to assess physiological responses throughout a potential sexual assault scene. We also assessed how a previous relationship to the perpetrator or the victim affected responses to the scenario. Participants completed a packet of questionnaires that assessed bystander efficacy, rape myth acceptance, coping strategies and intent to help strangers and friends. Next, electrodes for physiological recording were attached to the participant and they read one of four scenarios (knowing victim, knowing perpetrator, knowing neither, or knowing both). Psychophysiological and self-rating scores were measured continuously for each vignette. Outcome variables of interest are how early potential bystanders are noticing risk and when they choose to intervene. Data collection is currently ongoing (n=30). The results of this study will inform the literature about participants' recognition of the need to intervene, when they decide to intervene, and factors that may moderate intervention decisions. Limitations include: the study was conducted in a laboratory setting, smaller sample size, and lack of diversity in race of participants.

Animal Videos and their Influence on Stress Management for College Students

Jordan Harakal and Austin Harris (Victoria Kazmerski), Penn State Behrend - Psychology

Animal-assisted therapy has been shown to be an effective method in treatment of certain stress disorders. Patients have benefitted from the effects of specially trained animals being included into their therapy. There is a gap in the current literature surrounding the use of animal videos in place of the physical presence of animals in therapy sessions. The purpose of this study is to determine if this stress-reducing effect can be triggered through the mere presence of a video of an animal. Participants will be equipped with an Apple Watch in order to record their heart rate. They will then take the PANAS stress inventory as a baseline measure of their stress levels. Participants will be randomly assigned to either a no-video group, cute animal video group, or scary/wild animal video group and will be shown the corresponding video while attempting to complete the n-back task. Lastly, they will retake the PANAS stress inventory and their heart rate will be recorded. It is hypothesized that the participants in the cute animal video group will be significantly less stressed and will have a slower heart rate than the participants in the scary/wild animal video group and the control (no video) group, and the participants in the scary/wild animal video group will be significantly more stressed and will have a faster heart rate than the participants in the cute animal video group and the control (no video) group. Heart rate is being measured in addition to the PANAS so that both physiological and self-reported data can be analyzed. Implications include methods for stress management and optimization of environments for stress minimization, such as in a hospital or in a room where an academic exam is being proctored. For instance, in populations where stress management is critical such as those with autism, this could enable them to potentially mitigate stress on their own, independent of therapy sessions led by a professional.

Examining the Effectiveness of the Captain McFinn Anti-Bullying Program among Erie Elementary Schools

Taylor Morris, Chelsea Ptak, Christina Murzynski, and Rebecca Dinsmore (Charisse Nixon and James Hodge), Penn State Behrend - Psychology

The Captain McFinn program was designed to decrease aggressive behavior and increase prosocial behavior and emotion recognition among elementary-aged youth. The primary aim of the current research is to evaluate the effectiveness of the Captain McFinn curriculum in influencing these desired outcomes. Prosocial behavior and emotion recognition were measured in kindergarten and first grade students enrolled in four Erie elementary schools before and after implementation of Captain McFinn. Classrooms were scheduled to receive the curriculum at one of three time periods: Fall 2016, Winter 2017, or Spring 2017. Data were then collected after each respective time period during the 2016-2017 academic year. Currently, only data from Time 1 and Time 2 have been collected; the third time of measurement is scheduled for March 2017. In addition to data collected from students, researchers also collected data on each child from teacher report measures at all three times of measurement. Based on these data, we hope to examine the effect of the Captain McFinn program on empathy, emotion recognition, and aggression from the perspectives of both students and teacher observers. Preliminary data show promising results. Moderation analyses revealed greater pre-post increases in empathy and emotion recognition (teacher measures) for students in the McFinn treatment than the control. Importantly, these effects were most robust for students with lower emotional processing skills (student measure) at baseline. Upon final data collection and analyses, researchers anticipate that the Captain McFinn curriculum will continue to be associated with positive developmental outcomes in elementary-aged young.

Effects of Oral Contraceptives on Emotional Memory Recall - A Literature Review

Margaret Dunlap (Victoria Kazmerski), Penn State Behrend - Psychology

Due to the popularity of hormonal contraceptives as a form of birth control amongst women, it is important to fully understand its effects on memory and emotional regulation. Findings thus far have indicated that women on hormonal contraceptives have enhanced recall for gist, whereas naturally cycling women have enhanced recall for details, when given an emotional story (Nielsen et al., 2011). Research has also shown that women on oral contraceptives do better on measures of verbal memory while on the active pill phase than on the inactive (Mordecai et al., 2008). While there has been research done on the effects of oral contraceptives on emotional memory recall, different types of oral contraceptives have not been tested. This literature review will help prepare for our study, where we will compare the performance of young women on different hormone compositions of oral contraception on a memory test for emotional stimuli while recording event-related potentials.

More than Just a Pet Peeve- The Possible Cardiovascular Repercussions in a College Sample Exhibiting Misophonic Symptoms

Natasha Torrence (Sarah Conklin), Allegheny College - Psychology

Misophonia is a poorly understood phenomenon that afflicts a selection population of people. Characterized by impulsive anger and stress to innocuous everyday auditory stimuli (i.e.: chewing), misophonia often causes significant distress to sufferers (Schröder et al., 2013; Cavanna & Seri, 2015). Much of the current research on misophonia has focused on prevalence and characteristics of this phenomenon. (Schröder et al., 2013; Cavanna & Seri, 2015; Wu et al., 2014). Due to the dearth of research, the author of the current study aims to investigate the possible long-term physical health implications of those who exhibit misophonic symptoms.The goal of this study is to examine whether a history of misophonic symptoms and symptom severity have an impact on cardiovascular reactivity to misophonic trigger stimuli. Using a cross-sectional, within-subjects design, this experiment examines both prevalence of misophonia in a college sample and blood pressure reactivity within a group exhibiting misophonic symptoms. Participants are asked to fill out the Misophonia Questionnaire (Wu et al., 2014) to evaluate types of trigger stimuli, behaviors, and severity of symptoms. Cardiovascular reactivity is evaluated in a lab using a blood pressure cuff (Dinamap Critikron 18465X, Tampa FL) where systolic and diastolic blood pressure will be measured discontinuously every three minutes during a baseline, stress phase and recovery phase (all being ten minutes in length). During the stress phase, participants listen to misophonia auditory stimuli and are asked to rate the aversiveness of each sound. The misophonia stress task will be a ten-minute audio clip containing the most commonly reported misophonia triggers according to peer-reviewed research. Once data collection has convened (March 5th), results and implication of this study will be discussed.

Vicarious Embarrassment and Reluctant Student Participation in Classrooms

Emily Galeza (Carol Wilson, Victoria Kazmerski), Penn State Behrend - Psychology

The purpose of this study is to examine a group of students who play a largely unknown role in a typical and uncomfortable classroom situation called the Silent Classroom scenario. In this scenario, a teacher asks the class for participation through a question and receives no response despite the students knowing the answer and being asked multiple times. Eventually, as the awkward classroom atmosphere grows, a student reluctantly raises their hand to participate and the normal atmosphere resumes. I propose that the reason these particular students eventually participate is due to feeling vicarious embarrassment, a feeling of personal embarrassment because of the perceived or actual embarrassment of others, on behalf of the professor or ones' peers. This study attempts to recreate this Silent Classroom scenario using a first-person choose-your-own-adventure-style story to determine what type of participation a student has. I then examine whether the students who are reluctant to participate have the correlates of vicarious embarrassment found in previous research, such as more empathy and embarrassability than those who participate immediately, as well as other possible personality factors. ANOVAS are used to compare the 3 types of students (immediate responders, reluctant responders, and non-responders), as well as the students' genders and the gender of the professor in the choose-your-own-adventure-style story. Preliminary results found students who were reluctant to participate in class and those who refused to participate had higher scores of embarrassability, higher scores of chronic shyness, and lower scores on extraversion, as well as gender differences in multiple areas. There were no significant results pertaining to empathy, however, suggesting that other factors besides vicarious embarrassment may also be influential in describing these student's behaviors in the Silent Classroom scenario.

Advertisement Effects on Gender Role Perception

Tina Rexhepi, Ashley White, and Claire Petrun (Victoria Kazmerski), Penn State Behrend College - Psychology

Gender roles can be prevalent in advertisements and may influence the personal gender role perceptions of the viewers. Social Cognitive Theory asserts that gender roles are learned through modeling, enactive experience, and direct teaching, but through the learner's preconceptions. On the other hand, the Cultivation Theory focuses on the importance of the extensive amount of influential messages the media is exposing to the public in their everyday lives. In this study, male and female participants were recruited through the Penn State SONA survey pool system. They were primarily students enrolled in an introductory psychology course who were 18 years of age or older and English-speaking. They took part in a pretest with Bem Sex Role Inventory questions to determine their existing gender role perceptions. The Bem Sex Role Inventory is known for its strong validity and reliability in its traditional gender role adjectives for feminine, masculine, and neutral categories. Once the pretest was completed, this study presented the participant with several images for 30 seconds each (either five highly-stereotyped ads or five minimally-stereotyped ads) and then asked questions to analyze post-condition perceptions of gender roles. The researchers of this study hypothesized that participants who received the high gender role advertisement pictures would express a greater belief in traditional gender roles. Because traditional gender roles can lead to lower self-esteem, adjustment difficulties, and even career dilemmas, the results of this study can be useful for society as it may increase awareness for gender role perpetuation. It may also lend further support for Social Cognitive Theory.

Exploring the Unknown: The Student Perspective on Embedded Travel

Grace Waldfogle and Jacob Benedict (Dawn Blasko, Heather Lum, and Victoria Kazmerski), Penn State Behrend - Psychology

In post-graduation surveys, two experiences stand out as having the most lasting impact on undergraduate psychology majors; presenting research at a professional conference and studying abroad. Only a small number of U.S. undergraduates study are able to study abroad, 1.5% according to a recent NAFSA report. Only 11% of students travel to Asia where both language and culture may be farther from a U.S student's experience. In this presentation, we explore in depth the experiences of fifteen students who participated in the International Congress of Psychology (ICP) in Yokohama, Japan. The conference experience was embedded in a 6-week course that included 18 days traveling and studying in Japan.The goal was for students to become more aware of the diverse world we live in and to experience the cultural etics and emics first-hand. Prior to the trip, students attended cultural workshops from a Japanese student, covering topics ranging from simple Japanese phrases to cultural norms. Students were also required to actively post on a personal blog, as well as journal throughout the course. The final component of the course was the eighteen-day travel throughout Japan. All students attended the conference and eight students presented their undergraduate research. Two student researchers conducted six-month post-trip interviews with students to examine the retrospective impact of the course and to identify ways to improve future embedded travel courses. The analysis showed that students were worried most about communicating with non-English speakers but found that it was less a barrier than expected. Not surprising, the most commonly noted topic was the very different food, with both positive and negative experiences on this dimension. Our ability to collect qualitative data gave us insight into how students truly feel about embedded travel, and provided details that might not have been reported directly to the professors.

Mind and Body Responses to Performing Tasks in Contrasting Environments

Cassandra Vandemerwe and Alexis Cobb-Eckstrom (Heather Lum), Penn State Behrend - Psychology

Previous research has looked at the psychological and physiological stress reactions inside a classroom and analyzed the effects it has on children (Wålinder, Gunnarsson, Runeson, & Smedje, 2007). In the classroom study, negative side effects were found on hearing ability in school and it was also noted that noise negatively affects concentration, performance, reading and memory. The purpose of our experiment was to determine if a distracting environment versus a silent environment caused a person to feel more frustrated when performing a difficult task, an upper level Sudoku Puzzle, versus an easy task, a low level Sudoku. This was compared to a baseline of how the individual normally feels. It was hypothesized that frustration levels and blood pressure will rise due to a difficult task or distracting environment, regardless of the participant's assigned task all together. Researchers hypothesized that the participant would be the most frustrated in the distractive environment while completing the difficult task. Participants were randomly assigned to one of the four conditions, which included a distracting environment while completing a difficult task, a distracting environment while completing an easy task, a silent environment while completing a difficult task, and a silent environment while completing an easy task. Frustration was measured through elevated blood pressure as well as a high score on the self-evaluation frustration scale, known as the NASA-TLX. This research can be applied within educational realms where schools can help children learn in a more relaxed environment, which can help lower their frustration levels. The results can also be used to help better analyze workplace situations for adults to lower the levels of frustration they feel while performing a particular task at work.

POSTER PRESENTATION ABSTRACTS

BIOLOGY I

1. HMA Induces Changes in the Nuclei and Mitochondria of BHK21 Cells in a Caspase3-Independent Manner

Elizabeth Peterson[1], Michael Judy[1], and Zachary Murphy[2] (Elisa Konieczko[1]), Gannon University[1], University of Rochester Medical Center[2] - Cell & Molecular Biology

Apoptosis, also known as programmed cell death, is common control mechanism required for regulating the number and function of cells, and is characterized by morphological changes in the plasma membrane, mitochondria, and nuclei of cells. Previous studies examined the maturation of erythroblasts, a process similar to apoptosis. This research examined apoptosis in Baby Hamster Kidney (BHK21) cells, an adherent cell line. To induce apoptosis, cells were incubated with hexamethylene amiloride (HMA). Control cells were incubated with dimethyl sulfoxide (DMSO). HMA-treated cells exhibited fewer cells per ml than stock cells. Cells were stained with MitoTracker (MT), fixed with formalin, permeabilized, and then stained again with an antibody directed against Caspase 3. Finally, cells were stained with 4,6'-diamidino2-prenylindale (DAPI). Additional controls consisted of cells stained with two of the three markers (Fluorescence Minus One [FMO] controls). All cells were analyzed by multispectral imaging flow cytometry and IDEAS software v6.2 (Amnis Corporation, Seattle, WA). Compared to DMSO-treated cells, HMA-treated cells exhibited a higher mean fluorescence intensity (MFI) for DAPI and MT, indicating changes in the nuclei and mitochondria, respectively. There was no change in the MFI for Caspase 3 in HMA-treated cells, as compared to DMSO-treated cells, suggesting that Caspase 3 was not involved in HMA-induced changes in BHK21 cells. Brightfield images of HMA-treated cells revealed slightly more rounded cells, as compared to control cells. However, the majority of HMA-treated cells exhibited no significant plasma membrane changes. These results suggest that the observed HMA-treated cells are not undergoing apoptosis in a caspase-dependent manner. Further studies will examine possible activation of other caspase enzymes in HMA-treated cells and inducement of apoptosis in BHK21 cells using staurosporine or etoposide, reagents used to cause apoptosis in other cell lines.

2. Role of Ent3 in Put4 Trafficking from the trans-Golgi Network to the Plasma Membrane

Gabbrielle Acosta (Quyen Aoh), Gannon University - Cell & Molecular Biology

In cells, nitrogen is necessary for the production of many essential cellular products, such as proteins and nucleic acids. Often, nitrogen sources, such as amino acids, are imported from the extracellular media through transporters. For the brewer's yeast, *Saccharomyces cerecisiae*, a major source of nitrogen is proline. Several studies suggest that the expression and transport of Put4 to the cell surface is regulated much like the general amino acid permease Gap1. Our preliminary data shows that the deletion of the clathrin adaptor ENT3 reduce the growth rate of yeast grown in proline, suggesting that it regulates Put4 trafficking. In this study, we will tag Put4 with Green Fluorescent Protein (GFP) and determine if Ent3 is required for its trafficking to the cell surface.

3. Utilizing Live Cell Imaging in Drosophila Cells to Identify Stressors that Induce Protein Misfolding
Annette Choi, and Mengqi Wang (Martin Buckley and Stacy Hrizo), Slippery Rock University of Pennsylvania - Cell & Molecular Biology

Exposure of cells to various environmental, chemical and physical stresses can cause protein misfolding and aggregation. In turn, this can disrupt the functions of proteins, threatening the viability of organisms. To combat cellular stress, a battery of transcription factors, including the master activator HSF (heat shock factor) are recruited to the promoters of heat shock protein genes, including Hsp70, to induce gene transcription. This leads to the production of heat shock proteins that function as molecular chaperones to facilitate refolding of proteins. Here we describe the development of a laboratory exercise in which students observe GFP-tagged HSF binding to the heat shock protein genes in living Drosophila salivary gland nuclei as an output of stress induced protein misfolding. Using this imaging platform, students will test if various putative stressors induce the HSF stress response pathway. To this end, we have shown that several chemicals known to cause protein misfolding (diamide, dithiothreitol and peroxide), trigger the recruitment of GFP-HSF to the Hsp70 loci in living salivary gland cells to a similar level as heat shock stress. These results serve as a critical control for future studies evaluating unknown stressors. These results also lay the ground work for future student projects that examine how different stressors may impact mechanistic aspects of heat shock protein gene expression.

4. Role of SCAMP3 in B-Amyloid Production and Secretion
Jeremy Santarelli (Quyen Aoh), Gannon University - Cell & Molecular Biology

Alzheimer's disease is a neurodegenerative disease associated with loss of memory and cognitive function. The aggregation of extracellular plaques containing B-amyloid is related to the processing of the amyloid precursor protein (APP). The degradation of APP is regulated by the endosomal sorting complexes required for transport (ESCRTs) and disruption of ESCRT function leads to accumulation of B-amyloid. Previous studies have shown that secretory carrier membrane protein 3 (SCAMP3) interacts with ESCRTs that function in APP processing. We hypothesize then that SCAMP3 functions in trafficking of APP. In this study, I will use a well-established ELISA assay to determine if RNAi-induced knockdown of SCAMP3 promotes or inhibits B-amyloid production.

5. The Role of SCAMP3 in Regulating CXCR4 Trafficking
Priscilla Thomas (Quyen Aoh), Gannon University - Cell & Molecular Biology

The chemokine receptor CXCR4 is highly expressed in breast cancers and increased levels are associated with metastasis. The inability to downregulate CXCR4 increases cell growth and promotes cancer. One important mechanism to downregulate CXCR4 is ubiquitin- dependent endocytosis and trafficking of the receptor to the lysosome, where it can be degraded. We have preliminary data that suggests that the Secretory Carrier Membrane Protein 3 (SCAMP3) interacts with the ubiquitin-dependent trafficking machinery that regulates CXCR4 degradation. In addition, SCAMP3 is known to be involved in transport of the epidermal growth factor receptor (EGFR) to the lysosome, which follows a similar degradation pathway as CXCR4. I hypothesize then that SCAMP3 is involved in CXCR4 degradation. In this study, I will use RNA interference to knock down SCAMP3 expression and determine its effects on CXCR4 downregulation.

6. Determining the Prevalence of *Borellia burgdorferi* in *Ixodes scapularis* in Presque Isle State Park
Robert Wood (Sara Turner), Mercyhurst University - Cell & Molecular Biology

Tick samples collected from Presque Isle state park and the greater Erie region were collected and identified by species, life stage, and sex. Collected samples were then halved and subjected to digestion with Proteinase K, followed by DNA extraction and subsequent Polymerase Chain Reactions (PCR). The PCR was used to amplify and isolate a genetic sequence of the tick and spirochete bacterium *Borellia burgdorferi*, which is the causative agent of Lyme disease. PCR amplified samples were analyzed using gel electrophoresis to detect the presence of tick DNA and *B. burgdorferi* in its tick vector. To date, 723 ticks have been collected and results have shown that 30 % of ticks analyzed have tested positive for the presence of Lyme disease spirochete. This study can help to determine the prevalence of B. burgdorferi in Erie County and provide insight into the pattern of infection rate and endemicity of Lyme disease over multiple years in the local area.

7. The Effects of 1,4-Dimethylnaphthalene on *Fusarium* Cultures Isolated from the Surface of Stored Potato Tubers
Maria Pirritano and Rachael Adams (Michael Campbell), Penn State Behrend - Cell & Molecular Biology

Agriculture industries are constantly striving for new ways to extend the shelf life of their products. A compound such as 1,4-dimethylnaphthalene (DMN) inhibits meristematic proliferation of tubers, thus prolonging the storage life of potatoes. However, the effects of DMN on the microbiome of the potato is currently unknown. *Fusarium solani*, a fungus commonly found on potatoes, is responsible for the disease known as *Fusarium* wilt and it is not known if DMN can alter the growth of *Fusarium* on tubers treated for sprout suppression. Potatoes were scraped onto *Fusarium* selective Nash-Snider plates, were let flourish, and were then transferred to more nutritionally complex Potato Dextrose Agar plates (PDA). The established fungal strains were then maintained on PDA. DNA isolations were performed on each of the fungal isolates using a PowerSoil DNA isolation kit (miobio.com). In order to confirm the *Fusarium* species and fungus, PCR was carried out using strain selective primers (e.g. FusEF1, FusEF2, 7cr, 5F2, ect.). The mode of action for the inhibitory effects of DMN on *Fusarium* has been hypothesized to be through the inhibition of spore germination. Further analysis of varying concentrations and exposure times of DMN on *Fusarium* spores will be made upon identification of the particular strain of *Fusarium*.

8. Prevalence of Chytridiomycosis in Amphibian Populations on Presque Isle
Natalie Popielski (Sara Turner), Mercyhurst University - Cell & Molecular Biology

Batrachochytridium dendrobatidis is a widespread fungal pathogen that causes the cutaneous infection chytridiomycosis in amphibian populations. Presque Isle is home to approximately 13 species of amphibians. This fungus has been documented in areas surrounding Erie, Pennsylvania and in close proximity to Presque Isle. The population decline and increased mortality of infected individuals could endanger any or all of the populations on Presque Isle. The prevalence of *B. dendrobatidis* on Presque Isle is currently unknown. By using qPCR to test for the presence of chytrid zoospores on collected skin swabs, we propose to determine the presence and extent of chytridiomycosis on Presque Isle. This information can be used in future studies to determine methods to protect the amphibian population on the peninsula from future infection and possibly to devise methods to increase survival in infected populations on Presque Isle.

9. Effects of prenatal nicotine and caffeine exposure on the respiratory response to hypercapnia in neonatal mice: a possible link to SIDS

Jasmine Nguyen (Lee Coates), Allegheny College - Organismal Biology

Sudden Infant Death Syndrome (SIDS) is the leading cause of postnatal infant mortality in the United States. This study was based off the three factors established by the Triple-Risk Model for SIDS. Carbon dioxide is an exogenous stressor. Nicotine and caffeine are possible contributors to one's underlying vulnerability. Caffeine can cross the placental barrier; it is associated with stunted fetal growth and low birth weight. Nicotine can cross the placental and fetal blood brain barrier; it depresses ventilatory drive, delays arousal response to hypercapnia, increases the risk of apnea, and reduces birth weight. The relationship between nicotine, caffeine, and pregnancy is complex because nicotine speeds up and pregnancy slows down the metabolism of caffeine. It is hypothesized that neonatal exposure to both nicotine and caffeine will result in a greater attenuation of the ventilatory response to CO_2 compared to neonatal mice exposed to either nicotine or caffeine alone. This study used three experimental groups—Caffeine (C) (3.2mg/8ml/day), Nicotine (N) (0.02mg/8ml/day), and Nicotine & Caffeine (N&C) (0.02mg Nicotine/8ml/day and 3.2mg Caffeine/8ml/day)—and a control group to study how newborn pups respond to three minutes of increasing levels of CO_2 (0%, 2%, 4%, and 6%) on Days 1, 3, 5, 7, 9, and 11. A "head out" plethysmograph chamber measured frequency and tidal volume. Pups' weights were measured every day. Apneas, periods of non-breathing lasting longer than two breaths, were counted. A difference in pup weights between experimental groups was not found. Minute ventilation of the C group increased with age. Minute ventilation of the N group remained constant over time. Minute ventilation of the N&C group attenuated over 11 days. Minute ventilation is supposed to increase over time; these results suggest that fetal and neonatal exposure to nicotine and caffeine lead to greater attenuation of the ventilatory response to increasing levels of environmental CO_2.

10. Rescuing Ethanol Induced Phenotypes in Zebrafish with Derivatives of Folic Acid

Trina Laffey (James Warren), Penn State Behrend - Organismal Biology

Fetal Alcohol Syndrome (FAS) is a human condition that causes numerous developmental defects in newborns of mothers who consumed alcohol during pregnancy. Zebrafish have been a good system to use to model FAS, since exposing zebrafish embryos to ethanol during early development reproduces many of the defects seen in this human condition. Our lab has also characterized folic acid metabolism in zebrafish, and this study investigates what role folate metabolism may have in ethanol induced phenotypes in zebrafish. To study if folic acid could rescue FAS phenotypes, embryos were exposed to ethanol one hour post fertilization, and then treated with different concentrations of folic acid, folinic acid, or tetrahydrofolate. The embryos were then examined, looking at different defects related to FAS such as trunk deformations, enlarged heart sacs, and defects in the nervous system. Our lab, as well as others have shown that smaller eye diameter is a repeated and easily quantified sign of ethanol exposure, therefore, eye diameter was measured. This was repeated with different amounts of ethanol, as well as different types and concentrations of folic acid to see which would work the best at rescuing the phenotypes of ethanol exposure. We have also started to analyze the rescue of ethanol induced nervous system defects using immunohistochemical and confocal microscopic studies.

BIOLOGY II

11. Temporal Variation of the Amphibian Fungal Pathogen *Batrachochytrium dendrobatidis* in Northwest Pennsylvania

Logan Billet, Carissa Lange, and Bryce Olson (Matthew Venesky), Allegheny College - Ecology

The temporal abundance of parasites varies through time and among species. Many environmental factors, such as temperature, are associated with temporal variation of parasites. The amphibian chytrid fungus, *Batrachochytrium dendrobatidis* (Bd), is one of the primary drivers of amphibian population declines and extinctions around the world. Like many parasites, Bd has temperature-dependent growth and thus has a high degree of temporal variation. However, Bd does not impact all amphibian populations equally and the temporal patterns of Bd prevalence in areas without known amphibian declines are unknown. To address this gap in knowledge, I conducted field surveys to examine the temporal patterns of Bd in northwest Pennsylvania over a 2-year study period. Surveys took place in the summer of 2015, the summer of 2016, and the fall of 2016 at two ponds in the greater Meadville area. For all surveys, amphibian skin swab samples were collected from each site at a regular interval and analyzed for the presence of Bd zoospores using qPCR analysis. Water temperature data was collected during all three surveys, and amphibian length data was collected during the survey in the fall of 2016. Bd infection tended to decrease with season temperature rises and increase with seasonal temperature declines during these surveys. Additionally, in the fall of 2016 there was a correlation between Bd infection and bullfrog tadpole length. These results show that Bd infection trends in northwest PA are similar to those in areas where Bd infection is of higher concern. This suggests that the environmental factors that influence the seasonality of Bd are not a main driver for spatial variation in virulence.

12. Arbuscular Mycorrhizal Fungal Colonization in Competitive Distributions of Goldenrod, *Solidago canadensis*

Jeannie Showers (Ellen Yerger), Indiana University of Pennsylvania - Ecology

All plants need assistance with deriving nutrients from soil, in order to increase nutrient uptake plants associate with arbuscular mycorrhizal fungi (AMF). Current research indicates that the percent colonization rate comparing plants growing in a mixture versus a monoculture have higher AMF colonization rates. While cross species comparisons between invasive and non-invasive plants have been conducted, intraspecies comparisons of plants that grow in clusters have not. In studying *Solidago canadensis*, a plant that can grow in clusters, we hypothesize that the plants growing in the middle of the cluster will have lower percent colonization rates of AMF compared to plants growing closer to the edge of the cluster. The patterns of AMF colonization rate in plant clusters will be similar to plants growing in a monoculture versus a mixture. Intraspecies competition of plants that grow in clusters might provide better insight on how invasive and noninvasive plants utilize AMF association for a competitive advantage.

13. Early Campanian Elasmobranch Assemblage from North Carolina with Paleoecological and Paleobiogeographical Implications
Taylor Kightlinger and Gerard R. Case (Todd Cook), Penn State Behrend – Paleontology

Chondrichthyans are cartilaginous fishes separated into two subclasses: (1) elasmobranchii, which includes sharks, rays, skates, and sawfish, and (2) holocephali, which includes chimeras. The fossil record of these vertebrates is well known, but largely restricted to teeth, scales, and spines, since these are the only hard elements of their anatomical structure that can be preserved. The dental morphology of elasmobranchs is species specific and is used in the identification process. Through recognition of certain species, an indication of ecological and biogeographical features during their period of existence can be made. Recently, a new sclerorhynchid sawfish, Borodinopristis shannoni, was described from an early Campanian (± 80 million years ago) fossil site near Elizabethtown, Bladen County, North Carolina, USA. At the time of recovery, a large assemblage of additional elasmobranch remains, mostly teeth, was also collected. Preliminary examination of the fossil material revealed a rich diversity of shark and ray species in this region of the eastern seaboard, pertaining to this particular stage of the Cretaceous period that had not been previously well-assessed. By comparing this Elizabethtown assemblage to slightly younger assemblages, changes in regional faunal composition over a relatively short amount of geological time were inferred. These Elizabethtown fossils were also evaluated with contemporaneous assemblages from Europe, northern Africa, and Australia to determine whether a species had cosmopolitan or regional ranges.

15. Genetic Diversity of Brook Trout Populations in the West Branch Susquehanna River Watershed
Benjamin Rittenhouse, Daniel Rittenhouse, and Katelyn Hess (Frederic Brenner), Grove City College - Genetics

The purpose of this study is to assess the degree to which acidic discharge from abandoned mine drainage is impacting the isolation of Eastern Brook Trout (*Salvelinus fontinalis*). The Brook Trout is the only Salmonid species native to Pennsylvania and their presence throughout the watershed indicates high water quality. Acidic mine drainage (AMD) has limited the movement of *Salvelinus* in West Branch Susquehanna tributaries. Consequently, the isolation has decreased gene flow among populations of brook trout resulting in a genetic bottleneck. Analyzation of microsatellite markers in the brook trout gene provides the ability to determine the degree of isolation.

16. Ancient freshwater sharks from the early Maastrichtian of southern Alberta, Canada
Robert McCrea Jr (Todd Cook), Penn State Behrend - Organismal Biology

The Western Interior Seaway was a large intercontinental sea that divided North America into two landmasses during the Late Cretaceous (100–65 Ma). Very little is known about the freshwater and brackish vertebrate faunas that inhabited the river systems draining into the seaway during the early Maastrichtian (66–72 Ma). Numerous shark dentitions were recovered from fluvial and freshwater deposits of the St. Mary River Formation of Alberta, Canada. The assemblage appears to have been dominated by sharks from the family *Orectolobidae* (wobbegong sharks). Identification of the species in this assemblage from the St. Mary River Formation will assist in the paleo-reconstruction of this non-marine community and provide important insights into the paleo-distribution of these long extinct fishes.

17. Small Mammal Population Census of the Habitat Islands at the Tom Ridge Environmental Center at Presque Isle State Park, Erie Pennsylvania

Lauren Reilly and Yasmine Mamani (Steven Ropski), Gannon University - Zoology

The principal objective of this research was to obtain a diverse sample of the mammal population using the habitats created in the parking lot of the Tom Ridge Environmental Center. There are ten islands throughout the parking lot containing native plant species. Sixty-five small and large Sherman box traps were evenly distributed throughout the ten islands and baited using peanut butter and oatmeal. The traps were checked and re-baited every morning. Animals were marked using non-toxic paint and then released. This process spanned the time period of 14-17 June, 5-8 July, 3-5 August, and 12-16 October 2016. The majority of animals found were male *Peromyscus leucopus* (white footed mice). This project is the continuance of an ongoing study that collected data from the spring, and summer for the years 2014 and 2015 for comparison. Past data indicates extremely similar results. This research will provide valuable information regarding whether these habitat islands can successfully be used as natural mammal habitats.

18. Nematode Infections of Ruffed Grouse (*Bonasa umbellus*) in Pennsylvania.

Erin Debelak, Hannah Widlicka, and Justin Brown (Edward Phillips), Gannon University, Pennsylvania Game Commission Animal Diagnostic Laboratory - Zoology

Ruffed grouse (*Bonasa umbellus*) were collected from 14 counties in Pennsylvania. Necropsies were performed on the intestines and ceca of the grouse to remove parasitic nematodes. Two species of nematodes were collected, *Ascarida bonasae* from the intestines and *Heterakis sp*. from the cecum. The prevalence (% of birds infected) and intensity (mean infection per infected bird) of both species of nematode were analyzed in all birds combined, by county of harvest, and by sex and age of the bird. Grouse from 8 of 14 counties were infected with *A. bonasae*, and birds from 12 of 14 counties were infected with *Heterakis sp*. Overall infection rates showed that 53.7% of grouse were infected by an average of 4.5 *Ascarida bonasae*, with 21 worms being the heaviest infection of a single bird. The overall infection rate of *Heterakis sp*. was 82.9%, with a mean infection of 50.9, and the most heavily infected bird had 291 *Heterakis sp*. Analysis using t-tests showed no significant difference in prevalence or intensity of infection based on sex or age of birds.

19. The Curious Dental Morphology of an Extinct *Echinorhinus* Species

Stephen Wells (Todd Cook), Penn State Behrend - Ecology

There are only two known extant *Echinorhinus* species, *E. brucus* and *E. cookei*. The former is commonly known as the "bramble" shark and latter is frequently referred to as the "prickly" shark. These species inhabit continental and insular shelves and slopes of the Atlantic, western Indian, and Pacific Oceans. The fossil record of this genus extends back approximately 100 million years to the Lower Cretaceous period. At least 13 extinct *Echinorhinus* species, identified based on unique dental morphology, have been reported from African, South American, European, and North American deposits. Herein, we describe an unknown late Cretaceous *Echinorhinus* species that reveals both sexual dimorphism and ontogenetic change in its dentition.

BIOLOGY III

20. *Musca domestica* Transmits Viable *Haemophilus ducreyi*

Leah Krainz and Jordan Gaston (Tricia Humphreys), Allegheny College - Microbiology

Haemophilus ducreyi is a bacterium that has long been known to cause chancroid, a genital ulcer disease. In the past few decades, *H. ducreyi* has been shown to cause ulcerative limb ulcers. Genomic analyses of strains associated with genital ulcers and strains associated with limb ulcers show no significant genetic differences, leaving the reason for the niche difference unknown. Synanthropic flies (*Caliphore, Musca, Sarcophaga*), known to associate with open lesions, have been shown on *H. ducreyi* limb ulcers in images. Thus, we hypothesized that synanthropic flies may facilitate the transmission of limb ulcer *H. ducreyi*. Our investigation relied upon *Musca domestica*, the common house fly, as a model organism. Flies were exposed to *H. ducreyi* and collected at six time points post infection. An *H. ducreyi*-specific qPCR assay measuring the presence of the pal gene was used to quantify the number of *H. ducreyi* cells present. Flies exposed to *H. ducreyi* exhibited a time-dependent decrease in bacterial load. Bacteria were detectable until one day post infection but were present in undetectable amounts at four days post infection. These data suggest that house flies may be vectors of *H. ducreyi*. Further experiments are required to assess the viability of *H. ducreyi* spread by house flies.

21. Effect of Palladium Salts on *Pseudomonas aeruginosa*

Rachel Pell and Rose Kerr (Deborah Aruguete), Penn State Behrend - Microbiology

Globally, there is an increased use of platinum group elements (PGEs) due to deposition from burning of fossil fuels and use in industry. PGEs are the active component of catalytic converters in automobiles. Deposition from regular wear of catalytic converters adds to the rising levels of PGEs in environmental systems, especially in urban and industrial areas. In roadside environments salted during the winter months and saline environments, PGEs released into the environment can be mobilized by interactions with Cl- and NH_3 to form soluble complex ions such as $PdCl_4(NH_3)_{22}$-. Once PGEs are complexed, they are more toxic than in their metallic form. One important platinum group element is palladium (Pd). While research has shown that Pd is mobile and present in surface environments, its effects on microorganisms and their roles in Pd cycling is largely unknown. This is important because microorganisms' have a dominant role in environmental processes, including control of metal cycling, redox and pH conditions, and much more. This poster presentation will discuss the effects of Pd salts on *Pseudomonas aeruginosa*, a gram-negative bacterium that is ubiquitous in the environment. We grew bacterial cultures in a minimal medium that more similarly mirrors their conditions in the environment. Then, we conducted a series of minimum inhibitory concentration (MIC) tests to determine the smallest concentration of Pd salt that inhibited growth of *P. aeruginosa*. We report here results from preliminary studies.

24. Population Frequency of Group 1 Pilin Producing *Pseudomonas aeruginosa* in Environmental Isolates

Samantha Runser (Tara Allison), Gannon University - Microbiology

Pseudomonas aeruginosa is a Gram-negative, rod shaped microbe naturally found in the environment. It produces type IV pili that are responsible for twitching motility by this organism. The type IV pili are composed of five individual monomers called pilin. The predominant pilin proteins fall into the first two groups, Group I and Group II. Group I pilins are modified with a sugar which further increases its twitching motility. The pilus fiber and its modification of the group I pilin contributes to its virulence, specifically in a medical setting. The current research is being conducted to determine whether the proportion of environmental samples producing the pilin is less than those in a clinical setting. If so, it would indicate that there is a selective process occurring within the hospital setting. Isolates of *P. aeruginosa* were identified by growth characteristics and further confirmed by morphological characteristics seen after Gram staining. Further protein and DNA identification techniques will confirm the production of the group I pilin among these isolates. Previous studies involving *Pseudomonas aeruginosa* isolates indicate that the group I pilin is the most commonly produced pilin seen in environmental samples, and highly contributes to the pathogen's virulence and biofilm formation ability. However, these studies involved small sample sizes of less than thirty environmental samples. The current work seeks to confirm this among a larger sample size and to compare the proportion of group I pilin producing isolates from the environment to the number in a hospital setting.

25. How do Aquatic Bacteria in our Local Streams Respond to Agion Silver Technology

Anthony Popoff, and Abhisek Nandy (Beth Potter), Penn State Behrend - Microbiology

Over the past ten years there has been a significant increase in the use of silver-based antimicrobial products, but there is a limited amount of studies looking at the effectiveness of the technology outside of laboratory conditions and the impact on the environment. For instance, the disposal of silver-containing antimicrobials leads to the introduction of silver to aquatic ecosystems and terrestrial environments. Bacteria are critical to this ecosystem, and various forms of silver have been shown to inhibit the important metabolic processes performed by nitrifying bacteria and other beneficial soil micro-organisms. Thus, in this study we would like to determine whether bacteria found in local streams that feed in to Lake Erie contain bacteria that are susceptible or resistant to silver Agion technology. This technology relies on silver ions encased within a zeolite carrier and when released the silver ions attack the microorganism by inhibiting cell division, preventing respiration by inhibiting transport functions in the cell wall, or by disrupting the cell's metabolism.

26. Identification of the microflora found on the feathers of Purple Martins compared to the microflora found on eggs

Gabriel Imler, Kristen Webster, and MaryAnn Mason (Beth Potter), Penn State Behrend - Microbiology

Previous work in our lab has focused on determining the composition of the microflora found on the surface of Purple Martins (*Progne subis*) eggs. Interestingly, the bacteria identified from the egg surface were more similar to those found on the surface of House Wrens and Pied-Flycatchers rather than members within the same family including Tree and Violet-Green Swallows. Since Purple Martins and Tree and Violet-Green Swallows tend to share similar breeding habits and diets, we believe the differences in bacterial composition are due to differences within the uropygial gland secretions of these birds. We are beginning to look at this possibility by first identifying bacteria found on the feathers of mothers and babies and have preliminary data revealing the composition of the microbial flora.

BIOLOGY IV

27. How Have the Microbial Populations Found on Door Handles Coated with Agion Silver Technology Changed

Lauren Blachowski and Caitlin Hartman (Beth Potter), Penn State Behrend - Microbiology

Now that antibiotics resistance issues are plaguing the medical field, a renewed interest in silver has been initiated. Agion technology specifically focuses on the entrapment of silver ions within zeolite carriers that can be incorporated into various materials. With this technology, silver ions can be exchanged for other cations in the environment, allowing for the release of the silver ions and the targeting of microorganisms. Silver ions can destroy bacteria by disarming their multiple layers including the cell wall, cell membrane, and DNA. Though such silver technology has been implemented in various applications there is still a lot unknown about bacterial resistance to silver, links to allergies, safe exposure limits to silver, and effects on the environment; thus it is critical to thoroughly determine the effectiveness of silver products. For the past six years we have examined the effectiveness of Agion silver technology on 50 door handles (25 silver-coated/25 control) within four different buildings located on the Penn State Behrend campus over six week periods in both the fall and spring semesters. A significant difference was observed between the bacterial populations isolated from silver and control-coated door handles. However, bacteria were consistently isolated from silver-coated door handles suggesting that the silver zeolite was only effective against a portion of the bacterial populations.

28. Antifungal Effects of 1,4-dimethylnaphthalene

Stephen Drozda and Kelly Miller[2] (Michael Campbell[1]), Penn State Behrend[1] and Wesley College[2] - Microbiology

1,4-Dimethylnaphthalene (DMN) is a compound naturally secreted by potatoes to prevent sprouting. DMN is commercially synthesized and sprayed on potatoes prior to shipment. The purpose of this research is to determine the antifungal effects of DMN. Previous research showed that DMN inhibited *Saccharomyces cerevisiae* at a concentration of 100 ÂµM and inhibited 10 species of pathogenic fungi at 10 mM. DMN is currently being tested against 10 different species of fungi at varying concentrations to find the minimum inhibitory concentration. Spores are isolated from each fungus and suspended in sterile water, and each suspension is adjusted to the same turbidity. DMN is added directly to the suspension, and then each suspension is plated and colony counts are performed. Research is ongoing, and DMN is being tested against each fungus at lower concentrations. The results thus far suggest that DMN will inhibit or kill many different species of fungi. Future research should investigate the mechanism of action of DMN.

29. Antimicrobial Effects of Benzisoxazole Compounds

Patrick Stevens, John John McCrea Jr, and Aimee Duda (Martin Kociolek, Ph. D[1] and Kelly Miller, Ph. D[2]), Penn State Behrend[1] and Wesley College[2] - Microbiology

As the name suggests, a benzisoxazole is a benzene ring attached to an isoxazole ring via two adjacent carbons on the benzene ring. Traditionally, derived benzisoxazole compounds are used as "atypical antipsychotics", such as risperidone and paliperidone, and act as "potent antagonists to D2 dopamine receptors and blocks 5-HT2A receptors"[1]. Research with N-oxide compounds has also shown that there are possible antimicrobial effects of these compounds[2]. Given that a benzisoxazole is an N-oxide compound, the purpose of this ongoing study is to ascertain if various mono and di substituted benzisoxazole compounds have antibacterial properties against strains of bacteria such as *Staphylococcus aureus* (*S. aureus*), *Escherichia coli* (*E. coli*), methicillin-resistant *Staphylococcus aureus* (*MRSA*), and other bacteria species. *S. aureus* is a common Gram-positive organism and human pathogen. *MRSA* is an *S. aureus* strain that has become resistant to treatment with methicillin[3]. *E. coli* is a common Gram-negative organism found in the large intestine that can become pathogenic if it is found anywhere else in the body[4]. Current research is focusing on other common pathogenic bacteria previously tested with the 2-OH-2-Ph benzisoxazole using the unsubstituted 2-CH_3 compound and halogen containing benzisoxazole compounds.

30. Antibacterial Effects of 1,4-dimethylnaphthalene

Destiny Davis and Kelly Miller[2] (Michael Campbell[1]), Penn State Behrend[1] and Wesley College[2] - Microbiology

Recent research has shown that the compound 1,4-dimethylnapthalene (DMN) is a natural antimicrobial released by potato tubers to prevent sprouting. The purpose of the present research was to determine which bacterial pathogens DMN will inhibit and the concentration at which it will do so. DMN was tested against the following bacteria: *Staphylococcus aurues,* Methicillin-Resistant *Staphylococcus aureus, Staphylococcus epidermidis, Proteus mirabilis, Enterococcus faecalis, Escherichia coli, Shigella sonnei, Pseudomonas aeruginosa,* and Vancomycin-resistant *Enterococci,* to determine minimum inhibitory concentrations (MICs). The serial tube dilution method was used to determine the In Vitro susceptibility of DMN on the bacteria. Experiments were performed several times in triplicate and the viable count method was used to quantify colony forming units (CFUs) which were used to determine the MICs. Results indicate that DMN is more effective inhibiting Gram-positive bacteria than Gram-negative bacteria. Cidal effects of DMN have been observed for the following species: *S. aureus* at 0.78 mM, Methicillin-Resistant *S. aureus* at 0.78 mM, *S. epidermidis* at 6.25 mM, Vancomycin-resistant *Enterococci* at 3.125 mM, *E. faecalis* at 7.5 mM, and *P. mirabilis* at 250 mM. However, DMN has not had any effect on *P. aeruginosa*, *E. coli*, and *S. sonnei*, all of which are Gram-negatives. The goal of future research is to determine the mechanism of DMN and explain why Gram-positives are more susceptible to DMN than Gram negatives.

31. Complementary Genetic Screens Reveal Inactivating and Constitutively Activating Mutations in Two-Component Systems of *Bacillus anthracis*
Michelle Chu, and Ellen Upton (Devin Stauff), Grove City College - Microbiology

Two-component systems (TCS) are sensor-regulator pairs ubiquitous among bacteria. The canonical TCS consists of a membrane-localized histidine kinase that undergoes phosphorylation in response to its cognate signal and transfers phosphate to a cytoplasmic DNA-binding response regulator. This response regulator, in turn, alters the behavior of the cell by regulating the transcription of a set of target genes. In many cases, the upstream pathways leading to activation of a given histidine kinase or the identity of its ligand are unknown. Here, we present results from dual, complimentary genetic screens aimed at identifying upstream regulators of two independent TCS in the pathogen *Bacillus anthracis*. Along the way, we identify a set of inactivating mutations as well as constitutively activating mutations in these TCS. Our results solidify the role for both TCS in regulating the expression of their target promoters, and allow us to refine our screen for the future identification of regulators that interface with either or both TCS.

32. Evaluation of Thiazolidine-2-thiones for Bacterial Growth and Biofilm Inhibition
Sidney Wallin (Todd Eckroat), Penn State Behrend - Microbiology

Biofilms exist when bacteria attach to a surface and grow encased in a polysaccharide matrix. Bacteria in biofilms, which are seen in about 80% of chronic infections, are less susceptible to antibiotics and cells of the immune system. Thus, biofilms are a key contributor to the growing problem of antibiotic resistance, and novel drugs are needed to control their formation. This study is an evaluation of the properties of novel thiazolidine-2-thiones on bacteria that form biofilms. Thiazolidine-2-thiones are structural analogs of fimbrolides, a class of natural products that have interesting antibiofilm properties. Minimal inhibitory concentrations (MICs) will be determined for these compounds against planktonic cells of *Pseudomonas aeruginosa* and *Streptococcus mutans* to get a baseline for antimicrobial effectiveness. After establishing a protocol for biofilm growth and measurement, assays will be performed to determine whether or not the same compounds are effective against biofilms. MICs of planktonic cells will be compared to activity against biofilms. It is hypothesized that the thiazolidine-2-thiones will show the ability to disrupt biofilm formation while having minimal effects on planktonic cells.

33. Effects of Media Containing Spices on Pathogenic Bacteria using Radiant Catalytic Ionization
Ryan Clark, Brienne Kilbert, Maura Mobilia, and Christopher Pasky (William Mackay, David Fulford, and Craig Steele), Edinboro University of Pennsylvania - Microbiology

Food-borne illnesses have become a major concern worldwide; the World Health Organization (WHO) estimates that they affect two billion people yearly. New techniques have been produced that can be used to decontaminate contact surfaces of the microbes that cause these diseases. Radiant Catalytic Ionization (RCI) generates activated oxygen species such as hydrogen peroxide, superoxide anion, hydroxyl radical, and ozone, which has been established as a potential solution for this problem by reducing bacterial counts. Previous research has shown that RCI causes a 90% killing of food-borne pathogens during a twenty-minute exposure. This study focuses on the effects of RCI on *Escherichia coli* and *Listeria innocua* on different media types to stimulate common food products. The media chosen for this study include Tryptic Soy Agar (TSA) and TSA infused with organic ginger spice and organic garlic spice. These two natural antimicrobial agents were chosen to test the possible synergistic effects between the spices in the presence of RCI.

34. Understanding Student Perspectives Regarding Handwashing and Vaccinations
Luke Patten (Beth Potter), Penn State Behrend – Social and Behavioral Sciences

Washing one's hands is the easiest and cheapest way to keep yourself healthy, but many of us do not wash our hands correctly or as much as we should. Another mechanism to keep us healthy are vaccinations. The latter has been a controversial topic since an error-prone study was published suggesting links between vaccinations and autism. To help educate our student population on these two topics, students enrolled in Introduction to Microbiology Laboratory (MICRB202) participated in a service learning project to help students learn how to properly wash their hands and learn more about the vaccinations, specifically highlighting changes to the immunization requirements for Penn State students. To develop a greater understanding of the public health predispositions of the Behrend community and aid in refining this activity in future semesters, Behrend students were asked to fill out and surveys on both handwashing techniques and their beliefs and feelings towards vaccinations. The goal of this project is to electronically organize all the data collected and to run statistical analyses on the collected data.

BIOLOGY V

35. Chronic Deep Brain Stimulation: an Investigation of the Nucleus Accumbens and the Lateral Habenula and their Inhibitory Effects on Cocaine Reinforcement Measured using Conditioned Place Preference
Brittany Bowes (Jeff Hollerman), Allegheny College - Neuroscience

We examined the effect of chronic deep brain stimulation (DBS) of the rat nucleus accumbens (NAc) and the lateral habenula (LHb) on cocaine reinforcement. 18 adult rats were divided into three groups, which included a NAc DBS group (n = 6) a LHb DBS group (n=6) and a control group (n = 6). The DBS electrode was stereotaxically implanted into either of the target areas. Rats were injected i.p. with cocaine or saline on alternating days a total of 5 injections of each during conditioned place preference establishment. Cocaine dosage was 10mg/kg (at 10mg/ml saline concentration); saline administration of the corresponding volume (0.1ml/100g). Each animal was placed into the center chamber of the conditioned place preference box and was allowed to move freely through all chambers for 900 seconds. The time spent in each chamber was measured. The ratio of time spent in the cocaine-paired versus the saline-paired chamber was used as a measure of conditioned place preference. After showing conditioned place preference to the chamber associated with the administration of cocaine the rats were placed in the conditioning chambers for 1 h, this time with no cocaine administration. When exposed to the DBS the rats should no longer prefer the chamber that was associated with the drug. This experiment is still in progress. The number of people suffering from addiction is expected to rise from 1.7 million people in 2000 to 4.4 million by the year 2020 (Yadid et al, 2013). The significant increase is alarming especially because there is no reliable and consistent treatment for addiction. This may be because addiction is a chronic relapsing brain disorder. There are also many areas of the brain involved in this mechanism, therefore, it is necessary to comprehend their functions together and individually in this process. The mechanisms that underlie addiction are important for us to understand so that we can recognize the best way to approach addiction with cures and treatments.

36. Investigation of the Dose-Dependent Response of the Suppression of hSlo1.1 Activity by Intracellular and Extracellular Monomeric AB42: Possible Insight into Alzheimer's Disease

Natalia Han (Lauren French and Lee Coates), Allegheny College - Biochemistry

Amyloid beta proteins are found in the post-mortem Alzheimer's brain as insoluble, extracellular states known as plaques. Furthermore, these plaques as well as highly aggregated, fibril conformations of the amyloid beta peptide have been considered the most plausible pathological explanation for Alzheimer's disease (AD). However, recent research have shown that less aggregated, soluble oligomeric forms of the amyloid beta protein also contribute to neurotoxicity underlying AD, suggesting the mechanism of Abeta's role in the degeneration of of neurons may take place in an earlier stage before the protein actually aggregates. For my undergraduate thesis I am investigating whether there is a dose-dependent effect of unaggregated amyloid beta monomers on the electrophysiological activities of the calcium-activated big conductance potassium channel, hSlo1.1. I am currently in the process of studying the intracellular and extracellular effects of a range of monomeric amyloid beta concentrations: 1µM, 10µM, 50µM, and 100µM. My hypothesis was that greater concentrations of monomeric amyloid beta would lead to a greater suppression of the maximum current expressed by the BK channel, hSlo1.1 and that intracellular applications of amyloid beta would suppress channel activity to a greater extent than extracellular amyloid beta. Thus far, my results have shown to support my hypothesis that the suppression of hSlo1.1 activity is dependent on the concentration of amyloid beta monomers.

37. Effects of Resveratrol Treatment on a Drosophila melanogaster Model of a Progressive Neurodegenerative Disease, TPI Deficiency

Austin Shirk, Darren Kuhn, Katie Skolnick, and Kaitlyn McNamara (Stacy Hrizo), Slippery Rock University - Neuroscience

Triose phosphate isomerase deficiency (TPI deficiency) is a glycolytic enzymopathy that is a progressive neurodegenerative disease in humans. A missense mutation causes the recessive disorder associated with neurodegeneration, elevated oxidative stress levels, hemolytic anemia, increased vulnerability to disease and a reduced lifespan. It is important to note the exact mechanism of pathogenesis for TPI deficiency is not fully understood. Fortunately, a TPI deficiency model has been made in Drosophila melanogaster, the fruit fly. The mutant flies contain a recessive missense mutation in its TPI gene commonly known as sugarkill or sgk. Mutant flies exhibit symptoms similar to that of human TPI deficiency, such as neurodegeneration and a reduction in longevity. Interestingly, flies containing the mutant TPI allele exhibit paralysis in response to mechanical stress and exposure to high temperature. This study aims to identify the effects of a polyphenol known as Resveratrol on the TPI sugarkill mutants. This anti-oxidant is found in the skin of red grapes and is believed to reduce oxidative stress. Assuming the oxidative stress levels are reduced upon administration, there should be a correlating improvement in stress related paralysis. For temperature sensitive paralysis, it is hypothesized that Resveratrol treatment will increase the time it takes for the flies to succumb to paralysis in response to exposure to high heat. For mechanical stress induced paralysis, it is hypothesized that Resveratrol treatment will reduce time of paralysis in response to mechanical stress observed in the TPI sugarkill flies by reducing the oxidative stress levels.

38. Effects of Glial and Apoptosis Inhibitors in a Modified Controlled Cortical Impact (CCI) Model in Juvenile Male Rats

Colleen Bodnar (Jeff Cross and Jeff Hollerman), Allegheny College - Neuroscience

Over 50,000 people in the United States die annually from traumatic brain injury (TBI) and even more people are diagnosed with a TBI of varying severities. The only current treatments for TBI are palliative in nature. Understanding how to prevent progressive post-injury symptoms holds significance for improving recovery from TBI. A major pathology that can be targeted through various avenues following TBI is increased inflammation leading to cell death. Microglia in the injured brain take on a pro-inflammatory pathology which hinders axonal regeneration. Minocycline, a tetracycline antibiotic, has been found to decrease this pro-inflammatory pathology of microglia. Astrocytes also become activated after TBI and work to repair damage. However, they often become dysregulated which leads to dysfunction of neurons and neuronal circuits. Decreasing astroglial activation post injury through the administration of propentofylline has been shown to promote repair in the brain. Damage to neurons following TBI also leads to cell death through apoptotic processes. By increasing bcl-2, an inhibitor of the proapoptotic protein, Bax, through administration of 4-phenyl 1-(4-phenylbutyl) piperidine maleate (PPBP), has been found to increase neuroprotection in ischemia models. As glia can be responsible or both neuroprotective and neurodegenerative mechanisms, there may be a small effective temporal window for treatment. The present study was an attempt to determine if modification of neurodegenerative processes at the level of glia and cell death processes can improve functional outcome and degeneration of neurons in the ipsilateral cortex following brain injury. Treatment with the glial and apoptosis modifiers propentofylline, minocycline, and PPBP occurred ten minutes after the induction of injury. All drug treatments significantly improved motor and spatial learning behaviors following CCI. Histological outcomes from each treatment groups will be presented.

39. Effects of Omega-3 and Vitamin B12 on Subchronic Mild Social Defeat Stress Mice as a Model for Possible Treatment of Depression

Melinda McCorkle (Lee Coates), Allegheny College - Neuroscience

Major depressive disorder (MDD) has become an increasingly prevalent disorder, and research on food and herbal products, specifically the functional ingredients Omega-3 and Vitamin B12, may help uncover safe and effective antidepressant agents that can be used as treatment. The most common animal model used for depression is the subchronic mild social defeat stress model. In this study, I aimed to test the antidepressant-like effects of Omega-3 and Vitamin B12 using sCSDS mouse models for depression. I hypothesized that stressed mice would exhibit increased weight gain, water intake, food intake, and social avoidance behavior compared to control non-stressed mice. Of the stressed mice, I expected mice treated with Omega-3 diets and Vitamin B12 diets to display much faster improvements in depression symptoms than untreated mice. A 14-day stress establishment protocol, based off of the Goto et al. (2014) protocol, was used throughout the entirety of the study. Following stress establishment of 3 groups of mice (n=18), behaviors were tested using the Open Field (OF) test and the Social Interaction (SI) test. One group of stressed mice (n=6) was given B12-enhanced water, one group of stressed mice (n=6) was given Omega-3-enhanced rodent chow, and the last group of stressed mice acted as a control stressed group (n=6), remaining on normal diet and water. Following diet intervention, all mice were behaviorally tested two more times, resulting in behavioral data initially before food intervention, mid-way through food intervention, and at the end of the experiment. A group of non-stressed, normally-housed mice (n=6) acted as the control group throughout all experiment and behavioral testing. The remainder of data for this study have not been collected or analyzed yet, so the results and conclusions are to be determined.

40. 17-B Estradiol Attenuates Inflammatory Mediators in Rats after Traumatic Brain Injury
Olivia Dack (Jeffrey Cross), Allegheny College - Neuroscience

Traumatic brain injury (TBI) is one of the leading causes of disability and death, accounting for 1.7 million cases and 52,000 deaths annually in the United States. While mortality after TBI has been reduced, a high proportion of severe TBI survivors may suffer long-term physical, cognitive, and psychological disorders. Activated astrocytes and microglia are a hallmark of TBI and represent a physiological response to CNS injury to minimize/ repair damage. Although the basic state of microglia and astrocytes are tolerant and pro-homeostatic, under sustained activation, these cells often show increased immunoreactivity. Thus, chronic glial activation could link the inflammatory profile of TBI and its functional outcome. Furthermore, neuroprotection implies the protection of glial cells from exerting potentially detrimental responses over otherwise healthy tissue. Estrogen (E2) has been shown to be a promising neuroprotective agent. Despite the overwhelming experimental evidence for the neuroprotective effects of E2, there is paucity in clinical data. Thus, more work is needed to define the circumstances under which E2 can be expected to show its neuroprotective potential. The present study sought to determine if the administration of E2 yielded neuroprotection against TBI mechanisms in the ovariectomized rat brain. It was hypothesized that the timing of E2 therapy post-ovariectomy would dictate the efficacy of its neuroprotective and anti-inflammatory actions observed through improved behavioral and anatomical outcomes as compared to control animals. Rat subjects were assigned to one of five groups, which determined whether they received ovariectomy, TBI, and/or E2 treatment. Rats were anesthetized and secured in a stereotaxic instrument. A CO2 pistol delivered a single blast of compressed CO2 above a craniotomy placed on the right somatosensory cortex. Histological analyses of the trauma region from subjects in all treatment groups are presently in progress.

41. Testing the specificity of Aβ-42 suppressive effects on hSlo1.1 to ion channels Cav 3.2 and Kv 4.2
Lilly Appiah-Agyeman (Lauren French and Lee Coates), Allegheny College - Neuroscience

Alzheimer's Disease (AD) is a neurodegenerative disorder characterized a degradation of neurons and synapses in areas of the brain involved with memory. Unfortunately, there is not a known cure for AD, in part because verifying a person's AD can only be done by locating Amyloid beta (Aβ) plaque deposits in the brain during postmortem examination. Aβ-42, the most prevalent isoform of Aβ, is linked to Alzheimer's because it has two hydrophobic amino acids (Isoleucine and Alanine) that give it the ability to aggregate with other Aβ to produce different forms (oligomer, fibril, etc.). These forms can eventually become the Aβ plaques that are readily expressed in AD patients and localized in areas of the brain involved with memory. It is not clear the exact neurological pathway Aβ-42 undergoes to induce symptoms of AD. However, one possibility is through its interaction with ion channels. In fact, Aβ-42 has been found to suppress BK channels, a calcium-activated potassium ion channel. Although, this link has been established, it is not clear whether Aβ-42's suppressive effects on BK channels can be extended to other potassium channels. In addition, Aβ-42 has been theorized to cause an imbalance in calcium homeostasis through indirect interaction with a calcium ion channel. I hypothesize that the suppressive effect of the monomeric form of Aβ-42 will be specific to the BK channel hSlo1.1 expressed in Xenopus oocytes as compared to Kv 4.2, a voltage-gated potassium channel and Cav.3.2, a t-type calcium channel. To test this, I individually expressed each channel RNA in individual Xenopus oocytes and conducted TEVC recordings, depolarizing the oocytes' membrane potentials from -50mV to +40 mV in increments of +10mV and measuring current at each step. Aβ-42 is applied both intracellularly and extracellularly to test which administration has the greatest suppressive effects. Data is currently being collected and will be analyzed in the upcoming weeks.

CHEMISTRY, MATHEMATICS, AND PHYSICS

42. Investigating a Conjecture about Integrals from Probability Theory
Bridget Torsey (Peter Mercer), SUNY Buffalo State - Mathematics

In 2009, a conjecture, pertaining to the lower bound for the mean value of a function, was proposed but not yet proved in a paper written by D. Quadling. The conjecture was then proved in 2015 by P.T. Krasopoulos, he provided a proof using a method found to be similar to that of Mitrinovic's proof of Steffensen's Inequality, a famous inequality. Krasopoulos's proof, although accurate seems very narrow to this specific situation. The main goal of this research project was to create a broader and simpler proof of the conjecture that could be more applicable within the field of probability theory. The conjecture has now been formed into a broader theorem and a proof that is applicable to a wider range of situations has been found during this course of this project. Aside from creating a new proof, throughout the project a numerous amount of discoveries surrounding the conjecture were found, one of these discoveries being a second theorem and proof which can be used to find the upper bound for the mean value of a function. This additional theorem was discovered after a relationship between the conjecture and Steffensen's Inequality was found. Overall this research project was extremely successful and the findings were more plentiful than expected.

43. From Partitions to Specht Modules
Allison Ganger (Craig Dodge), Allegheny College - Mathematics

Given a positive integer, n, $\lambda=(\lambda_1,\lambda_2,...,\lambda_s)$ partitions n if and only if the sum of the λ_i is n, for i ranging from 1 to s. A Young Diagram corresponding to (lambda) is a diagram with s rows, and each row having a number of boxes equal to λ_i. Arranging the numbers 1 through n in these boxes yields a λ-tableau. A tabloid is the set of all tableaux whose rows have the same numbers. A polytabloid is a sum of tabloids constructed from a tableau; these polytabloids form the basis for the Specht Module. The goal of the research was to determine when the Specht module is decomposable into the trivial module. This was achieved by working with a matrix A whose columns are the standard polytabloids and solving AX=b for X, where $b=[1,1,...,1]^T$. These calculations were aided by the computer algebra system, MAGMA. We were able to confirm for partitions of the form $\lambda=(a,1^b)$, the decomposability of S^λ is dependant on the parity of $[(a+b-1)(a+b-2)...(a)]/(b)$.

44. Bayesian Parameter Estimation of Burr Type III distribution by Maximum Likelihood Estimation and Monte Carlo Markov Chain (MCMC) Procedure with Real Data Analysis
Kallie Simpson, Rebekah Bright (Woosuk Kim), Slippery Rock University – Statistics

In 1942, Burr introduced Burr type III distribution for modeling survival data or lifetime data. Burr type III distribution has been applied in areas of statistical modeling such as meteorology, reliability, and forestry. Dr. Woosuk Kim estimated two parameters c and k of Burr type III distribution under dual generalized order statistics (DGOS) in his 2016 paper. With 10 lower record values from Burr type III distribution, he obtained maximum likelihood estimates and Bayes estimates of two parameters c and k. Using Monte Carlo simulation, he concluded that maximum likelihood estimates are much more accurate than Bayes estimates. In the poster presentation, we want to show how to estimate two parameters c and k directly from Burr type III distribution with the same 10 lower record values. We will use Maximum likelihood estimation and the MCMC procedure to estimate them. Using Monte Carlo simulation, we will compare these estimates directly obtained from Burr type III distribution with the estimates under DGOS. Moreover, we will include a real data analysis from 50 arthritis pain relief times which are from a Burr type III distribution.

47. Synthesis of Silver Nanoparticles for Metal-Enhanced Fluorescence
(Contains proprietary information – no abstract included)
Briana Young and Joel Solomon (Bruce Wittmershaus), Penn State Behrend - Physics

48. Increasing the Area of a White Diffusive Background can Increase the Power Output of a Luminescent Solar Concentrator
(Contains proprietary information – no abstract included)
Jonathon Schrecengost (Bruce Wittmershaus), Penn State Behrend - Physics

49. Green Chemistry Demonstrated Through the Copper Cycle
Megan Wilt, Kelly MacRae, and Krissy Esch (Katherine Shaffer), Penn State Shenango - Chemistry

In CHEM 111, the copper cycle experiment was conducted, studying the conversion of copper (II) sulfate pentahydrate to solid copper to copper (II) oxide. This semester, the experiment was expanded upon to complete the cycle, taking the copper (II) oxide back to copper (II) sulfate pentahydrate. Several of the 12 principles of Green Chemistry were demonstrated. In addition, this experiment also reinforced many concepts from the first semester of Introductory Chemistry while providing experience with standard laboratory techniques and equipment. There was a 67.5% overall recovery of copper (II) sulfate pentahydrate. Little waste was generated and the recovered copper (II) sulfate pentahydrate could theoretically be used to complete this cycle continuously. If this experiment was adapted for larger campuses such as University Park, the amount of waste generated in the chemistry laboratory would be significantly reduced.

50. Thermostability Analyses of Broad-Spectrum Antibiotics Cephalexin and Ciprofloxacin via Liquid Chromatography-Mass Spectrometry
Aerial Pratt (Matthew Heerboth), Gannon University - Chemistry

Cephalexin and ciprofloxacin are broad spectrum antibiotics that are used to treat common bacterial infections in humans. Cephalexin is considered a beta-lactam antibiotic, specifically part of the cephalosporin class of antibiotics. The antibiotic targets the bacterial cell wall and inhibits its growth. It is most effective in treating Gram-positive cocci. Cephalexin is commonly used to treat skin, ear, and urinary tract infections, as well as pneumonia and other respiratory tract infections. Cephalexin can also be used for patients who are allergic to penicillin. Ciprofloxacin is part of the fluoroquinolone class of antibiotics. It targets and inhibits the bacterial enzyme DNA gyrase, preventing DNA replication. Unlike cephalexin, it is more effective in treating Gram-negative bacteria. Ciprofloxacin is used to treat bacterial infections of the skin, lungs, bones, urinary tract, and also patients exposed to anthrax. Antibiotics have recommended storage temperatures in order to maintain their reliability in treating bacterial infections. Cephalexin has a prescribed storage temperature of 35.6°F-46.4°F (2°- 8°C). Ciprofloxacin is recommended to be stored at a temperature of 35.6°F- 77°F (2°C-25°C). Higher temperatures can lead to chemical degradation of the antibiotic, rendering it ineffective. When used routinely, antibiotics may be inadvertently stored at temperatures higher than the suggested range. Therefore it is necessary to determine the thermostability of these antibiotics when exposed to elevated temperatures. Thermostability data will be obtained via liquid chromatography-mass spectrometry, an established analytical technique for detecting a wide array of antibiotics. The data will be analyzed for temperatures ranging from 90°F-200°F (32°C-90°C), simulating temperature conditions in which antibiotics may be incorrectly stored. The data will be used to determine if the prescribed storage conditions for cephalexin and ciprofloxacin are valid.

COMPUTER SCIENCE AND ENGINEERING I

51. The Implementation of an Automatic License Plate Recognition (ALPR) Engine and the Review of the Performance

Zhongtian Hu (Ken Wang), University of Pittsburgh at Bradford - Computer Science/Software Engineering

Automatic License Plate Recognition (ALPR) technology may be applied in various computer applications for business, security, law enforcement, etc. This project investigated the principles of ALPR and the implementation thereof based on OpenCV - an open source library of computer vision functions. The processes of an ALPR engine, including framing, orientation, sizing, normalization, character segmentation, optical character recognition (OCR), and syntactical and geometric analysis, were studied and discussed. An open-source ALPR engine was implemented on Amazon Web Services(AWS) for testing, performance evaluation, and serving as a web service for various mobile and desktop applications.

52. Development of FGPA-based Flight Control System for Unmanned Aerial Vehicles

Mason Long (Tarek Elarabi), Penn State Behrend - Computer Science/Software Engineering

The proliferation of drones, also known as unmanned aerial vehicles (UAVs), has provided both consumers and industry with tools to approach problems in a way that was previously impractical in many cases. Applications ranging from entertainment, photography, and disaster relief efforts can be aided through the use of drones. At the heart of these devices is a flight control system. Using various sensors and accepting the pilot's commands, this system receives and processes input about the drone's environment in order to adjust its flight behavior and maintain stable flight. Without this, the pilot of the drone would experience great difficultly operating their UAV. By leveraging the flexibility of field-programmable gate arrays (FGPAs) and the portability of hardware description languages, we plan to develop and implement a flight control system that can be used with a wide range of hardware at varying price points and expanded by its designers as needed. Given the portable nature of our proposed work, future research and development will be able to build upon the foundation provided by our system, encouraging additional research on the application of drone technology.

53. Microscale Fuel Cells For Portable Applications
Kelly Miller, Mary Beth Burbules, and Scott DeLaney (Adan Hollinger), Penn State Behrend - Engineering

The development of microscale fuel cells has been motivated by the increasing demand for high power density, portable electronic devices (i.e., smartphones, tablet computers) with a fast recharge. In comparison to rechargeable batteries, microscale fuel cells demonstrate superior energy densities and the potential to provide longer off-grid run times. Additionally, fuel cells enable nearly instantaneous recharging by refilling or replacing a liquid-based fuel cartridge. However, due to the size constraints and power demands of modern portable electronic devices, microscale fuel cells must be optimized to produce sufficient power for as long as possible before requiring refilling or replacing of a self-contained fuel cartridge. To perform this optimization, parameters such as catalyst area, catalyst loading, fuel molarity, temperature, and flow rate, electrolyte molarity and flow rate, and electrode geometry are modified, isolated, and tested experimentally until maximum performance is achieved. Because the aforementioned process is laborious, we present a mathematical flow and diffusion model to simulate the effects of the experimental parameters. The model outputs performance data, confirmed by experimental data, over a range of parameters without the use of curve fitting, resulting in significantly improved simulation accuracy compared to simple curve fits. The model is adjusted to replicate the experimental results for a given set of parameters by adjustment of a set of internal variables. Utilizing a design of experiment (DOE)-based analysis of the model's governing equation, the model is modified to simulate other experimental parameters accurately, resulting in a tool for microscale direct methanol fuel cell (DMFC) optimization. DOE experimental protocol reveals interactions between parameters and ultimately, a more complete understanding of DMFC performance parameters.

54. Assessment of Patient Handling and Transfer Using Lean Techniques and Digital Human Modeling
Anton Benedikt (Faisal Aqlan and Omar Ashour), Penn State Behrend - Engineering

Lifting patients manually is the most frequent reason for work related back pain in the healthcare industry. Repeated manual patient handling activities can cause musculoskeletal disorders to the nurses who do the handling. Furthermore, other ergonomic risk factors can exist such as awkward postures, lifting heavy loads, and exerting high forces. Continuous assessment of patient handling ergonomic risks is important to avoid injuries and musculoskeletal disorders. This research project focuses on utilizing Lean tools and techniques along with Digital Human Modeling (DHM) to assess ergonomic risks and provide efficient and safe patient handling. The project will study the patient transfer process from start to finish in order to identify the wastes and the value-add activities. DHM will then be used to model the patient handling processes to identify the safety and ergonomic risks and provide recommendations for improvement. The project will be implemented at a local hospital. The undergraduate student will visit the hospital multiple times to watch the patient transfer process and collect data. The outcomes of this project will be presented to and discussed with the hospitals leaders to improve their patient transfer process.

55. Solar Eclipse High Altitude Balloon System

Kaitlyn Babiarz, Maia MacKellar, Donovan Starks, Stephen Karpinsky, Alejandro Ferrero, Tenger Batjargal, , Lauren Reilly, Carter Miller, Jessica Jessica Moukoro, and Kangxu Wang (Wookwon Lee, Nicholas Conklin), Gannon University - Engineering

We present a work-in-progress design of a high-altitude balloon system. The team at Gannon University is developing a ballooning system that will send a set of payloads to an altitude of ~24 kilometers during the August 21, 2017 solar eclipse. The balloon system comprises of four systems: 1) the baseline balloon system, 2) the baseline ground station, 3) the Multiband Tracking System (MTS) payload, and 4) the MTS mobile station. The baseline balloon system consists of four standard payloads. The first two, the Iridium and Cut-Down System, are responsible for Global Positioning System (GPS) tracking and the cutting of the tethers when the flight is to be terminated. The third payload is for video streaming of the solar eclipse and uses a Raspberry Pi, a camera, and a 5 GHz RF modem. The fourth payload is for still image and utilizes the same processor but a separate RF modem operating at 900 MHz. All four payloads are monitored through the baseline ground station. The ground station collects the data from the payloads through a set of antennas. The still image payload uses both Yagi and Patch antennas, while the video data is collected through a Dish antenna and utilizes Wi-MAX for wireless connection. The antennas can be dynamically steered horizontally and vertically to properly receive the signals from the payloads. All data collected is transferred to a ground station laptop where multiple software applications are running to display video or still image as well as the position of the balloon system. The MTS payload consists of three spot trackers to ensure recovery in Kentucky's tough terrains. The methods of tracking in the MTS payload will include a 900 MHz RF system and an Automatic Packet Reporting System (APRS) operating at ~150 MHz. A cellphone-based tracking system operating at ~2 GHz will also be used to track the payload.

56. Investigations into Civilian Drone Flight Stability

Lillian Reynolds, Amanda Holskey, and Nickalas Reamer (Krishna Mukherjee), Slippery Rock University - Engineering

Interest in drone capabilities is skyrocketing, leading to major advancements in the field of drone technology. Drones are used every day by militia, government organizations, and various companies such as Amazon, BBC, and Shell Oil Company to complete tasks such as delivering packages, recording images in the field of cinematography, and monitoring gas leaks around Shell's fracking pads. Drones are unique because they are structured aircraft that do not include their pilots on board. This project addresses the need for acute precision and accuracy that surrounds whatever task the drone is completing. We will examine how the weather affects the ability of the drone to fly in high wind areas without being blown off course. The drone that we are using, the DJI Phantom 4, includes an inertial measurement unit in its programming. It senses the forces from the wind and counteracts appropriately to maintain flight stability. We will also be testing the stability of the PowerUp 3.0 paper drone in order to witness the innovative qualities of this cutting-edge drone technology. We will determine how well these unmanned aerial vehicles accomplish these tasks. The journals we will be studying include Nature and Robots and Robotic Devices.

57. Improving Industrial and Mechanical Engineering Student Satisfaction, Motivation, and Performance in Manufacturing and Design Courses

Amanda VanBuskirk and Gina DeMeo (Paul Lynch and Shraddha Sangelkar), Penn State Behrend - Engineering

This research work combines two ongoing research initiatives in the School of Engineering at Penn State Behrend. Now more than ever manufacturing in the Erie region needs a workforce with a blend of both strong hands on trade skills and the technical problem solving skills typically learned through the completion of a B.S. Industrial or Mechanical Engineering program. This research focuses on a holistic approach being taken in an industrial and mechanical engineering program to increase student interest and satisfaction in manufacturing and design. A new teaching methodology has been developed and implemented within the School of Engineering at Penn State Behrend. The "Interact, Cultivate, and Deliver" method, also known as the "I-C-D" method, implements eleven significant factors found to increase undergraduate student motivation and satisfaction. A pilot study of this method was implemented into an IE classroom and it was found that when the significant factors were implemented into the classroom, the satisfaction and motivation were significantly better than in courses where the methodology was not implemented. In addition to the new teaching methodology, ongoing work is being carried out to understand student motivation in design using the Motivated Strategies for Learning Questionnaire (MSLQ) survey. This specific research seeks to incorporate both the ICD Methodology and the outcomes of the MSLQ survey work in an effort to develop the "I-C-D-M" methodology to optimize student satisfaction, motivation, and performance in their manufacturing and design courses. The results reported will show the effectiveness of the I-C-D (Interact, Cultivate, and Deliver) model for undergraduate course delivery while also highlighting the results of the MSLQ survey in an engineering design course. The results of work carried out as an extension to the I-C-D methodology seeking to optimize instructor-student communication in engineering courses are also displayed.

58. Study of Acoustic Emissions on Austenite from Multi-quenching

John Findlay (Chetan Nikhare), Penn State Behrend - Engineering

A cutting edge idea that has recently been a topic of interest for many experts, is the process of analyzing the non-destructive acoustic emissions that are discharged from the quenching of a metal. For this proposed research we would analyze the correlations between the acoustic emissions produced and the physical properties produced through the process of multi-quenching a steel sample. The acoustic data will be collected with an acoustic camera and NoiseImage software. The steel sample will be heated to the eutectoid temperature to produce austenite. Once the steel has reached the desired temperature, it is then quenched by placing it into a medium, such as water. During the quenching process, the sound that is emitted will be analyzed. The acoustic data that will be collected can be varied depending on the rate at which the sample is cooled. This process will then be repeated multiple for each sample. The microstructure and properties of the steel sample will then be analyzed, and compared to the acoustic date collected. The results of this research could extend the acoustic emission research, and potentially prove very valuable for the manufacturing industry.

59. Acoustic Noise Emission Data Collection for quenching process
Samantha Muhhuku (Chetan Nikhare, David Loker, and Ihab Ragai), Penn State Behrend - Engineering

The proposed research heavily concerns the eternalization of non-destructive acoustic emission monitoring techniques for industrial application. Audible emission data processes have become a growing area of research in recent years, especially in monitoring heat treatment and quenching processes. Data will be collected with the use of the acoustic camera system and NoiseImage software. An electrical testing fixture was developed to evaluate and help with the automation process. Quenching conditions will be varied, as explained in this work, to enable proper mechanical properties' analysis. Additional applications will be investigated for collecting noise data. The outcome of the analyzed data and devised algorithms could lead to new advancements for the monitoring techniques for multiple industrial operations.

60. Java Based, Web Deployed GUI for the Human Cardiovascular System
Ben Murphy (Elisa Wu), Penn State Behrend - Engineering

Human cardiovascular system is a very complicate pipe system, which starts from the heart, branches from aorta, to large arteries, capillaries, small veins, veins, and then back to the heart. The understanding of this system is not only important for students in medical field, but also for student in the biomechanical field. There are many conditions that affect the response of human cardiovascular system, such as the strength of the heart muscle, activity level, etc. Although the hemodynamics of the human cardiovascular system have been well studied, most textbooks or references are all text based. A complicated numerical simulation package has been developed using Matlab/Simulink (Mathworks, MA). However, a user without expert level of understanding of Matlab/Simulink or without the access to Matlab/Simulink will not be able to use it effectively. One method of increasing the simplicity and availability of the simulation without sacrificing its complexity would be to create a GUI in a more accessible language such as Java. Using the NetBeans and SceneBuilder development environment is the current approach to bridging the language barrier between Matlab/Simulink and Java. The presentation would show how to convert the Matlab/Simulink code into a format that another language can understand, why Java, NetBeans, and SceneBuilder were chosen, how to correctly format and set up environmental variables for both Java and Matlab, and the current model for the Java based GUI. In addition, the presentation would elaborate on how any user can enable their Matlab/Simulink simulation to communicate with a Java based GUI as well as what errors they might encounter and how to go about solving them.

61. Ergonomic Assessment of Snow Shoveling using Digital Human Modeling
Katherine Collins and Carly Wolkiewicz (Faisal Aqlan), Penn State Behrend - Engineering

Snow shoveling can cause ergonomic issues to the back and shoulders and results into musculoskeletal Disorders (MSDs). This project focuses on assessing the ergonomic risks associated with the snow shoveling process by utilizing Digital Human Modeling (DHM). Several designs for shovels will be considered and assessed using DHM. Moreover, different postures for the shoveling process will be studied. Design of Experiments (DOE) will be used to study the different related factors such as shovel design, snow amount, methods of shoveling, gender, and body mass index (BMI). The results will provide recommendations for avoiding ergonomic risks that can be caused by snow shoveling.

ENGINEERING II

62. Experimental Investigation of Springback During Bending-Reverse-Bending of Aluminum Alloy
Hunter Andree (Chetan Nikhare), Penn State Behrend - Engineering

There is an extensive amount of information that has yet to be discovered in the research of springback during bending-reverse-bending. The spring-back of a material is the elastic recovery after being unloaded from an outside force. Springback is considered as a manufacturing defect as due to geometric distortion the part gets difficulty to place in an assembly which results in a wastage or expense to secondary operation. To cut this unwanted expense an understanding of springback is necessary for a material in various loading condition. In this work an investigation of springback during bending-reverse-bending will be done. The process of bending-reverse-bending will provide the elasticity after the material is bent once and then re-bent in the opposite direction. This is considered as one cycle. After each stage the springback will be measured and presented. In addition, the force required to bend the material at each stage will be acquired and analyzed. It is expected that the springback will reduce after each cycle of bending-reverse-bending.

63. Effects of Rapid Heating on Material Properties
Andrew Heitzenrater (Ihab Ragai and John Roth), Penn State Behrend - Engineering

Rapid heating is being tested because it provides a faster method of achieving a desired temperature. One way this could be used in industry is in the process of heat treating and annealing. Rather than sticking the part in the furnace and waiting for it to reach the desired temperature, it could be rapidly heated instead. Rapid heating is performed by passing a large current though a test sample to increase the temperature of the sample in a short period of time. In this research, rapid heating is first used to test a hypothesis that the energy added to a test sample will equal the energy from the added current minus the energy lost from conduction, convection, and radiation. If this statement proves to be true then the equilibrium equation can be used to predict the temperature change of the sample more accurately. Rapid heating is then used in compression testing where the material properties and microstructures of the test sample will be analyzed after. The materials being analyzed include steel, aluminum, titanium, and nickel. All of the testing will be compared to a more conventional method of furnace heating.

64. Optimum Process Parameters for Springback Reduction of Single Point Incrementally Formed Polycarbonate

William Edwards (Ihab Ragai), Penn State Behrend - Engineering

Many industries and researchers are attempting to minimize manufacturing costs of forming low volume components. Forming a part is when the shape of the material is changed without adding or subtracting material, such as cutting, sawing, or welding. Single point incremental forming (SPIF) is forming a single piece of material using a CNC mill, in which a tool path for the desired geometry is created to guide the tool in incremented steps to deform a thin sheet of material. The material is attached to the mill using a frame like fixture while the hemisphere-shaped tool passes over the material, following the contours of the desired geometry at incremental depths. Each time around the tool path, the tool is lowered a fraction of an inch, slowly deforming the part into the desired geometry. Throughout this process, residual stresses accumulate, causing springback to occur after the fixture is no longer constraining the material. This springback is an issue because it alters the final shape from the desired geometry. The residual stresses are stresses present in an object without any external force applied. They are caused by the combination of deformation of the material and the fixture that holds it in place. This research experiments with the effect of SPIF forming parameters on the springback of polycarbonate sheets. The parameters being studied include rotational spindle speed of the tool, feed rate of the tool, step size of the tool path, and heat. The spindle rotational speed and feed rate experiments show a decrease in springback; however, applying heat proved to be most effective when reducing springback.

65. Effects of Single Point Incremental Forming on 2024 Aluminum Tensile Properties

Sean Sehman and Derek Shaffer (John Roth), Penn State Behrend - Engineering

The automotive and aerospace industries are required to manufacture multiple different parts from sheet metal. The current process entails using a geometry-specific die for each individual part manufactured from sheet metal. This method is neither energy nor time efficient, as it takes high input energy to operate each die and every die is specific to only one part. Industries that use this stamping method are currently progressing toward implementation of incremental forming in place of this current method. With the technological advancement of incremental forming, one machine is capable of producing an infinite number of parts from undeformed sheet metal. The process of incremental forming begins with a computer-code that sets a path for a CNC machine to travel, forming the desired geometry. The code controls the path taken by a hemispherical tool, which applies pressure to a sheet of material as it follows the path in a circular motion. With each pass, the pressure is amplified, further deforming the material into the desired geometry. The effects of incremental forming on the deformed product are currently being studied. In this paper, the effects incremental forming has on tensile properties will be explored and compared to post-deformation tensile effects resulting from the current method of stamping. Data from both methods will be collected from sheets of 2024 aluminum deformed into the same geometry. These results will also be compared to tensile properties of undeformed 2024 aluminum sheet metal as well. Providing this comparison will yield valuable data to the industry when tensile properties of a sheet metal part are critical.

66. Determining Material Properties of Nanotube Filament

Noah Shinn, Adam Giovanelli, and Patrick Campoli (Krishna Mukherjee), Slippery Rock University - Engineering

Nanotube is a term used to refer to a very small chain of carbon atoms that have a hollow and circular structure. Nanotubes have unusual physical properties compared to other structures of carbon, such as increased strength. This comes from their unique geometry. Due to the nanotubes essentially being one long molecule, the strength of covalent bonds between the carbon molecules keeps them together, without compromising flexibility or increasing weight. In contrast, materials like steel are crystalline in nature, thus reducing their strength to weight ratio. No one has done extensive research on the effectiveness of this filament aside from small studies done by the manufacturer. In order to test and expand on the claims by the manufacturer, we are designing small configurations of Nanotube infused plastic with CADD software and producing them with the Physics Department's 3D printers. We will then apply various forms of stress tests on our samples to determine the strength of the Nanotube compared to similar printing materials like PLA and ABS plastic. These stress tests include hanging weights from sheets of the materials, and applying instantaneous force by dropping weight onto the same sheets. We will also compare other properties like chemical resistance to a variety of acids and bases, as well as thermal and electrical conductivity. The objective is to determine the suitability of Nanotubes for various types of industrial and commercial purposes.

67. Biaxial Tensile Testing of Welded Cruciform Specimens

Daniel Sills (Ihab Ragai, John Roth, and Chetan Nikhare), Penn State Behrend - Engineering

The main challenge in the metal forming industry is predicting failure of a material. The forming process typically involves subjecting a piece of metal to a biaxial stress state; therefore, it is crucial to understand how the part will deform under these loading conditions in order to properly design them. Biaxial tensile testing of materials is becoming more prevalent in industry to determine the mechanical properties of the material in a multi-axial state rather than the tradition uniaxial tension. Primary reasons for using the biaxial tensile test instead of the uniaxial tensile test is that uniaxial tensile testing only determines the mechanical properties in one direction and is often inadequate for the biaxial loading of the forming process. It is common to form structural components using joints sheets that have different properties. Therefore, the focus of this research was to investigate the mechanical properties of welds by using the biaxial tensile test machine. There were three types of welds tested, metal inert gas welding (MIG), tungsten inert gas welding (TIG) and flux shielded arc welding (Stick). The specimens used in this research were made out of 1018 steel and cruciform shape with a weld at 45 degrees across the center of the specimen. These specimens were loaded into the machine and deformed at 5 different velocity ratios and stretched until they fractured. These velocity ratios were used to create three deformation modes, uniaxial, biaxial, and plane strain. A digital image correlation system (DIC) was used to develop the deformation plots and a finite element analysis of each test were developed for comparison.

68. Experimental Investigation of Welding caused by a Flow Drilling Process
Christopher Ruppen (Chetan Nikhare), Penn State Behrend - Engineering

Flow Drilling is a new concept that is just being introduced into many different industries. The concept is different than how a typical drill bit looks and works. A typical drill bit is shaped into a helix or a sharpened blade, whereas a Flow Drill bit is tapered to a point. Instead of cutting into the material, Flow Drilling utilizes its increased surface area and friction to create heat in the metal. Once the metal is hot enough, the bit can push through the metal, causing it to flow away from the Flow Drill bit. Since the metal becomes hot enough to be pushed out of the way, drilling through two plates of metal simultaneously will cause a union between the two. To drill through two plates at once, more friction is needed to produce more heat for a stronger bond. One way to create more heat is to have a faster rotational speed of the bit. To test this theory, the rotational speed will be changed as the feed speed will remain constant. The force that is required for the bit to go through the plates will be monitored. It is expected that a higher rotational speed will produce a smaller reaction force, and a better union.

69. Characterization of Advanced High Strength, Cost Effective Steels
Tyler Rigby, Dan Smith, and Joseph Helbling (Paul Lynch), Penn State Behrend - Engineering

High strength low alloy steels with increased silicon content have the potential to significantly increase the affordability of various military components and steel castings used on mining equipment, digging equipment, and rail car components. Recent successes in the development of low cost, high strength low alloy steels have been attributed to the experimental work carried out on optimizing the heat treatment process of these materials. Continued experimental work and computational modeling is needed to fully characterize and optimize the chemistry and heat treatment processes for high strength low alloy steels. This work is necessary to understand the driving forces behind the precipitation mechanisms responsible for strength and toughness in these materials. The integration of these low cost materials into manufacturing supply chains will significantly benefit steel foundries and the U.S. military. The scope of this particular work was to study the carbide growth progression during low temperature tempering of high strength low alloy steels, possible tempered martensite embrittlement (TME) within these steels, and the effects of silicon content on carbide growth. The results of this study showed that tempering temperature is the dominant driving force for carbide growth in these steels. It is seen both visually and statistically that going from a tempering temperature of 350°F to 550°F has a significant effect on the size of intralath carbides. The results also clearly show the formation of cementite and the onset of TME in these steels when tempering temperatures are increased from from 350°F to 550°F. Finally, this study validated the hypothesis in the literature that silicon slows down the coarsening and growth of these carbides during low temperature tempering.

70. Study of the Elastic Recovery and Residual Hoop Stress in Steel-Aluminum Rings
Jacob Alexander (Chetan Nikhare), Penn State Behrend - Engineering

A common problem that has approached the automotive industry, is the need to join together two dissimilar metals. Due to their vast differences it makes joining them difficult, and with the ever growing demand for more lightweight vehicles and more efficient designs, new joining techniques that can more efficiently and effectively join together two dissimilar metals must be explored. One possible solution could be found in using the difference in the elastic recovery between dissimilar metals. For this research we will examine the effects of using compression to join together steel and aluminum rings. The study of friction will also be involved to analyze how higher friction values effect the radius of curvature of the interface between the two metals. It is expected to find that a higher value, or friction will cause a lower radius of curvature. An experiment to analyze the amount of ejection force needed to separate the two rings will also be conducted. Again it is expected that with a lower radius of curvature, there will be a greater ejection force needed.

ENVIRONMENTAL SCIENCE

71. Assessing Monthly Changes to the Degradation of Terrestrially Derived Dissolved Organic Carbon in a Temperate Lake
Sarah Magyan (Christopher Dempsey), Gannon University - Environmental Science

Aquatic ecosystems are known to release significant quantities of carbon dioxide (CO2) to the atmosphere. In the past, it has been thought that heterotrophic microbial communities were responsible for processing dissolved organic carbon (DOC) into carbon dioxide through a process known as biodegradation. Recent research in Arctic ecosystems showed that sunlight is also capable of processing DOC to CO2 through photo-degradation. This study focuses on how terrestrially sourced DOC from three temperate lakes was processed on a seasonal basis. Changes in DOC concentration were measured and absorbance scans (800-200 nm) were generated to assess qualitative changes to the DOC. Samples were collected for the months of June, July, and August from shallow groundwater lysimeters installed near the lakes. After collection, samples were deployed at the surface of Lake Lacawac. The goal of this project was to understand if the terrestrial DOC source changed seasonally and whether photo-degradation or biodegradation was more important to the processing of DOC. The amount of DOC in groundwater as it was obtained from lysimeters increased throughout the summer for two of the study lakes (Giles and Waynewood), and decreased for the lake (Lacawac) with the highest DOC concentrations. Our data showed that the treatments that allowed both photo-degradation and biodegradation together processed the largest concentration of DOC. This was followed by the photo-degradation only samples and then by the biodegradation samples. This trend was observed across all three lakes that were sampled during the summer of 2016. DOC specific absorbance at 320 nm (SUVA320) decreased in samples exposed to sunlight, while the spectral slope (Sr) increased in those same samples. These results have important implications for DOC in temperate lakes as they show how important sunlight is to the processing of DOC and that variable quality DOC can be produced from photo-degradation.

72. Plants Compatible with Urban Gardening in a Pennsylvania Green Roof Setting
Jennifer Greiner (Holly Travis), Indiana University of Pennsylvania - Ecology

Green roofs have various benefits; internal temperature maintenance reduces energy use in buildings by decreasing the need for central heating and air conditioning and improves air quality by capturing pollutants and filtering noxious gasses (Green Roof Benefits). The question at hand is, can the use of companion crops and irrigation in green roof settings increase reliability of food production? The production of crops within the boundaries of an urban center (Whittinghill and Rowe, 2013), termed urban agriculture, developed as a way to adapt to increasing population trends with limited land for agriculture. Minimal studies have been done to test green roofs' ability to act as urban gardens, and to what success. Most crops struggle to grow in green roof settings due to adverse climate conditions, especially periods of extreme drought, heavy rain, and harsh temperatures. This study will look at companion plants' ability to grow in a green roof setting, as well as the effectiveness of adding a retention layer below the soil. If there is viable crop production due to companion planting, then it is possible that with the development of planting patterns, green roofs can become a sustainable source of food production in an increasingly urbanized world.

74. Presence of Glyphosate in Urine Samples
Joshuva John (He Liu), Gannon University - Environmental Science

Glyphosate is a systemic herbicide containing the organophosphorus compound phosphonate that is used to kill weeds. Specifically glyphosate is used to kill annual broadleaf weeds and grasses that often compete with crops. As a result glyphosate is found in commonly consumed foods in the Western diet such as genetically modified (GM) sugar, corn, soy, and wheat. In recent years the impact of glyphosate on the human body has been studied. Glyphosate has been seen to cause extreme disruption of the microbe's function and lifecycle. Specifically in bacteria, glyphosate allows pathogens to overgrow and take over by inhibiting the function of beneficial bacteria. Glyphosate has only recently come into the scope of research as a danger to human health and as a result the FDA does not apply a maximum contaminant level. In this study, urine samples were gathered from students at Gannon University and tested for glyphosate levels. Our results show that glyphosate is present in most of the samples. Correlation between glyphosate levels and other factors such as gender, age, and dietary preferences is currently investigated.

75. Assessing Penn State Behrend stream health through analysis of leaf decomposition
Emily M Brown, and Megan M Palko (Dr. Pamela Silver), Penn State Behrend - Environmental Science

In winter, salt is applied to Penn State Behrend's pavements for the safety of pedestrians and vehicles. During melting periods, salty runoff enters streams on campus directly via storm drains and elevates stream conductivity. A leaf pack experiment was done to determine the impact of salt input on stream health. Decomposition rates were expected to be negatively correlated with conductivity. Large-mesh (1 cm) leaf packs were constructed using approximately 3.00 g of slippery elm leaves. Fifteen packs were deployed at each of 5 forested locations in Trout Run and Glenhill streams on the Behrend campus between 11 November 2016 and 8 January 2017. Three random packs were collected from each site at exponential intervals. Contents of the packs were washed through two #10, 120, and 130 mesh sieves immediately after collection and all macroinvertebrates were preserved in 70% ethanol. Leaves were air-dried for a minimum of 48 h, and dry mass remaining was measured. Leaf shredders were found in only 3 of 75 leaf packs. Percent mass remaining ranged from 65 to 30%, and decomposition rates ranged from -0.001 to -0.024 g dry mass/d. Conductivities ranged from 900 to 2500 μS/cm, with the highest values at sites receiving high volumes of runoff from storm drains. Higher conductivity streams had lower decomposition rates (r-value: 0.149, p-value: 0.008). The input of salt appears to be negatively affecting the rate of decomposition in Behrend streams, likely by making the habitat unfit to support leaf shredders in the stream.

76. Effects of Long-Term Nitrogen Deposition on Cation Concentrations in a Hardwood Forest
Alexandrea Rice (Rich Bowden), Allegheny College - Environmental Science

Over the past century, acid rain has increased due to the use of agricultural fertilizers, burning of fossil fuels, and industrial emissions. The difference in depositional concentrations is related to the proximity to urban areas, and altitude. High concentrations of nitrogen in acid rain increases soil acidity. This increase in pH has caused important plant nutrients to be leached from the soil. More acidic soils suppress enzymatic production from bacteria and fungi, which decreases the rate of decomposition. Nutrients such as Ca, K, and Mg are important for building and maintaining cell functions, storing energy, and photosynthesis. When these cations are held up in litter from decreased decomposition, plants are unable to uptake them, causing a decline in terrestrial ecosystem productivity. Our objective is to quantify the total base cations in the soil, their availability to plants, and the exchange capacity since these amounts will be affected by the decrease in decomposition. At the Bousson Experimental Research Reserve, decreased decomposition rates were found with increased nitrogen inputs. With cations being held up in the fallen material, we expect to see an increase in total cations in the nitrogen fertilization plots, but a decrease in their availability to plants in the Bousson Experimental Research Reserve.

77. Cataloging Plant Biodiversity on the Penn State Behrend Campus with Emphasis on Identifying Rare Plants and Observing Spacial Patterns in Plant Growth
David Hersh (Paul Barney and Michael Naber), Penn State Behrend - Environmental Science

The Penn State Behrend campus has over 800 acres of forested land. Among this forested land, the varying land features such as Four Mile Creek, perched wetlands, and steep slopes allow for a large variety of plant species to thrive. Cataloging the plant diversity serves as a reference for the current status of plant species on campus and a means to track the changing biodiversity in the years to come. Species such as Wild Leeks (*Allium tricoccum*) and American Ginseng (*Panax quinquefolius*) are found on the Behrend campus. These species are economically valuable and therefore, could be overharvested and extirpated from the campus if left unmonitored. Certain species are found in very low numbers (<10 individuals), which should be tracked over time. Furthermore, observations of biodiversity include determining optimal habitats for each species. This study provides an evaluation of diversity on the property. Future study should aim for a continuation as well as an emphasis on monitoring invasive plant species. Among the numerous invasive species found, only a few are considered to be of significant threat to biodiversity. One of these species is Garlic Mustard (*Allaria petiolata*), which is found in small, isolated populations in Wintergreen Gorge. Species such as Garlic Mustard should be given special consideration in future work due to the potential for rapid spreading.

78. *Lotus cornicutlatus, Eutrochium fistulosum,* and *Echinacea purpurea* on a Green Roof Setting
Jessica Vallee-Vasquez (Holly Travis), Indiana Univeristy of Pennsylvania - Environmental Science

Green roofs are an environmentally and aesthetically satisfying way to reduce carbon footprints in buildings. Their increasing popularity brings up questions about what plant species are the most efficient. On the roof of Weyandt Hall of Indiana University of Pennsylvania, native western Pennsylvania plants are being studied. In specific, Birdsfoot Trefoil (*Lotus cornicutlatu*), Joe Pye Weed (*Eutrochium fistulosum*) and Cone Flower (*Echinacea pururea*) species are being observed. Each species is grown in soil and peat mixed growth medium. These three species are optimal in a green roof study because of their drought resistant qualities. Plants were minimally watered to understand effects of a low maintenance green roof. The objective of this study is to determine how these three species adapt to surviving on a green roof. The effects of the setting are quantified by survival rates and height of an individual plant. Green roofs are an environmentally and aesthetically satisfying way to reduce carbon footprints in buildings. Their increasing popularity brings up questions about what plant species are the most efficient. On the roof of Weyandt Hall of Indiana University of Pennsylvania, native western Pennsylvania plants are being studied. In specific, Birdsfoot Trefoil (*Lotus cornicutlatu*), Joe Pye Weed (*Eutrochium fistulosum*) and Cone Flower (*Echinacea pururea*) species are being observed. Each species is grown in soil and peat mixed growth medium. These three species are optimal in a green roof study because of their drought resistant qualities. Plants were minimally watered to understand effects of a low maintenance green roof. The objective of this study is to determine how these three species adapt to surviving on a green roof. The effects of the setting are quantified by survival rates and height of an individual plant.

79. Effects of Herbicides On Organisms and Their Environment
Kasey Celestin (Nina Thumser), Edinboro University - Organismal Biology

Recent studies have shown that weed control products that are glyphosate based, such as Round-Up, effect soil organisms especially earthworms. Three fields with different glyphosate treatment histories were tested and compared for species abundance and diversity of soil macrofauna. In addition, the soil samples from these fields were tested and compared for levels of macronutrients, pH, and texture. The field with the most recent glyphosate treatment had the highest diversity but least abundance, while the field without any recent glyphosate treatment had the lower diversity but the greatest abundance. There was little difference in the macronutrients and pH among the three fields. The soil texture was found to vary among the three treatments.

PSYCHOLOGY I

80. Active processing of Musical Mnemonics and its effect on Verbal Memory in young adults.
Benjamin Thomas (Allison Connell), Allegheny College - Neuroscience

Music is a fundamental part of our daily lives and has multiple uses for the different tasks that we work to accomplish. However, one area that can improve the use of music is in the area of learning. In our formative years, individuals learn multiple topics through music such as the alphabet, the states, and much more, yet as we mature, people rely more heavily on a memorization-based technique. The literature has shown that memory recall has been improved when music is paired along with a sample of connected text compared to just listening to the text itself. Yet, where these studies are lacking is when looking to see if this effect holds when the text is unconnected and also if actively singing along amplifies these learning effects compared to just listening. By utilizing the technique of musical mnemonics, individuals can recall a new set of information by pairing it with a familiar melody. In this study, participants were placed in 3 different groups and either listened to 39 spoken words, listened to these same 39 words paired with the melody of "Twinkle Twinkle little Star", or listened and sang along with the melody. When finished listening, participants wrote down as much information as they could recall. A total of three separate trials were run for each participant. Recall patterns, in the form of serial and semantic clustering, were also observed in responses to see how individuals organized the information they were presented. Differences over trials as well as the interaction between trial and condition were significant. By utilizing this information, we can make learning more efficient for both teachers and students so that important information is effectively stored in our long term memory and can be accessed when in a stressful situation.

81. Visual and Auditory Neural Activation for the Multimodal Integration in Visual Word Processing
Rebecca Sheley and James Dickinson (Christopher McNorgan), The State University of New York at Buffalo - Psychology

Reading is a multimodal process requiring a reader to make a transformation from orthographical input to a phonological interpretation. The current study used functional neuroimaging (fMRI) to investigate the role of visual word processing in a rhyming judgment task. We compared brain activity in young readers (8-11 years old) for rhyming words with high orthographic similarity (e.g. CAKE/RAKE) and high orthographic contrast (e.g. JAZZ/HAS). Preliminary contrasts between these conditions indicate differences in neural activity and cortical areas recruited for visual word processing. Further, our results suggest that these areas of the brain work together in concert to integrate the visual and auditory components of reading. Although the nature of the task is to judge words based on how they sound, the degree of orthographic similarity between words plays a large role in neural activity.

82. The Benefits of Professional Music Performances as Perceived by Students, Teachers, and Community Members

Heather Fortsch, Abigail Jantzi, Emily Ferraro, Anna Downey, and Cassie Vandermerwe (Kimberly Corson and Nicole Rosen), Penn State Behrend - Psychology

The purpose of the study is to determine the impact and perceived benefits of university sponsored musical performances on local middle school students composed predominately of New Americans and children of refugees. Method of data collection includes age appropriate, semi-structured interviews of students (23), teachers (11), and community members and surveys of adult community members and college students (5). Preliminary data has revealed a multitude of perceived student benefits as reported by students themselves, their teachers, and members of the community. Data suggests that students have an appreciation for the opportunity to experience the diversity of the musical performances. As reported in an interview by one student; "We get to listen to music that usually other schools don't have it. But this is one of the schools that do." This study also means to examine the similarities differences between the perceived benefits that students report as compared to those that teachers and adult community members report. Given the cultural diversity at the school, teachers report that in addition to being entertained, their students learn additional lessons from the musical performances. Specifically, the musical performances expose the students to a college campus, proper audience etiquette, and cultural music and instruments. Community members report that the performances give students an opportunity to venture outside of the classroom where they "otherwise would not make it to the other side of the city". They also voice the importance of the musical exposure in fostering an interest in music. These findings will be discussed in comparison with student reports of benefits. Implications of the findings can inform understanding of the role music education plays in child development and the importance of music in creating a better community environment for both children and adults. Continuing research of the impact and similarities and differences between student and adult reports will help better tailor musical performances to students' interest and learning opportunities.

83. Auditory Stimulation Effects on Task Completion

Leslie Hasty and Alyssa Burnett (Heather Lum), Penn State Behrend - Psychology

Music can be a reflection of our feelings and mood. Researchers investigated if music can affect frustration levels in a person. This was done by completing a task in which the participant had to unscramble a set of 30 words. Half of the words were impossible to unscramble. The participants had 20 minutes to complete the task. There was a control group in which participants did not listen to music while completing the task. There were two experimental groups, the first one listened to calming music (60 beats per minute), and the second listened to up-beat music (120 beats per minute). The researchers predicted that frustration levels would be less in the music groups compared to the non-music (control) groups. Researchers hypothesized that in the experimental music group; the calming music would report lower frustration levels compared to the up-beat music group. We also predicted that participants in the calming music group would complete as many tasks compared to the up-beat music group. The participants were given the NASA-Task Index Load before and after the completion of the task, which was used to measure frustration levels of each participant. An ANOVA was used to analyze the data and although the results were not significant, researchers still found that participants did report lower frustration levels in the music group compared to the control group. It was also noted that juniors and seniors reported lower frustration levels compared to freshmen and sophomores. With these results, it can be concluded that there are alternative methods to help reduce frustration levels in college students.

84. Effect of Musical Key on Compliance

Mackenzie Phillips, Amanda MacNeil, and Meghan Terwilliger (Luke Rosielle), Gannon University - Psychology

Background music can be found in various contexts throughout everyday life. Music can be heard in the background of advertisements, television shows and movies, and in establishments such as waiting rooms and restaurants. The purpose of this background music is to in some way alter or influence an individual's disposition through their mood, thoughts, feelings or even behavior. Research has found an inherent difference in the way that we perceive music conducted in the major versus minor key (Ziv 2016). Music in the major key is perceived to be pleasant and harmonious, while that same piece of music transposed in the minor key is perceived as discordant and even jarring. Music that is positively perceived is expected to reflect positive and pro social reactions and behaviors. Conversely, music that is perceived as unpleasant is expected to elicit a negative set of responses and behaviors. In this study, we are interested in examining the potential effect of background music played in the major or minor key on compliance when asked to partake in an uncomfortable social situation.. After completing a filler task while listening to music in the minor or major key, we asked subjects to dismiss a confederate who pretended to arrive late for the study. We are interested to see if the key of the music played has an effect on compliance in what is perceived as an uncomfortable social situation.

85. A Unique Psychophysiological Measure of Emotional Engagement During Imagery

Rachel Zimmerman, Sinara Hinton, Tiffany Barker, and Alyssa Pollo (David Herring and Victoria Kazmerski), Penn State Behrend - Psychology

Previous studies indicate that startle probe P300 brain waves of the event-related potential have a decreased amplitude for emotional (pleasant and unpleasant) compared to neutral stimuli. Therefore, these data suggest the processing of emotional images requires greater attentional resources thus leaving fewer resources to attend to auditory probes occurring at the same time. Given different induction and recording techniques engage different neural processes indicated by unique physiology (e.g., startle electromyography versus electroencephalography), we investigated whether these probe P300 event-related potentials during emotional imagery would be similarly decreased relative to the same brain waves during neutral imagery, thus suggesting similar mechanisms to those found in prior literature in visual perception. Eighteen participants recruited at Penn State Behrend underwent a narrative script-driven emotional imagery procedure including pre-written scripts and personalized stimuli to ensure relevance to their own experiences. Presentation of scripts were followed by an active imagery period during which 95 dB startle probes were presented. Similar to results found in visual perception studies, the probe P300 brain wave amplitudes were reduced during emotional relative to neutral imagery. These data suggest that despite distinct differences in peripheral physiological mechanisms during emotional imagery and visual perception, attention is allocated similarly to emotional stimuli during these both induction techniques as indicated through similar neural mechanisms. Given these results, the probe P300 may prove useful as a measure of emotional engagement during script-driven imagery. Future implications of this research may include furthering diagnostic criteria of anxiety-spectrum disorders and contributing to more informed assessments of treatment outcomes for clinically anxious individuals.

86. Thrilled but Unfulfilled: Individual Differences in Sensation Seeking in Relation to the Processing of Semantically-Matched Embodied Metaphors

Andrew Faytak, Rebecca Misterovich, Anthony Mackulin, Jessie Kibbe and Rachel Mooney (Dawn Blasko, Victoria Kazmerski, and Shariffah Dawood), Penn State Behrend - Psychology

Sensation seeking is a personality trait characterized by the search for exciting and novel stimuli. As a result, high sensation seekers are often prone to boredom due to their increased desire for new and intense sensations. Past research has extensively examined the concept of sensation seeking, but has left its relationship with language processing nearly unstudied. Recent research on metaphors has revealed their embodied nature, suggesting that they may help bridge the gap between physical experiences and mental representations. Consequently, the present study examined individual differences in sensation seeking tendencies in relation to the comprehension of semantically-matched embodied metaphors. The metaphors in the present study all embodied an action or motion, e.g., *The costume was a slam-dunk*. Participants viewed a photo for 500 ms before reading each metaphor at their own pace and rating it for meaningfulness. Participants rated the meaningfulness of the metaphors on a scale from one to five, with five being the most meaningful. The content of the photos either semantically-matched the action word at the end of the metaphor, or did not correspond semantically with the metaphor. Theories of embodiment of language suggest that participants will rate semantically-matched embodied metaphors as more meaningful than metaphors that are not semantically-matched. Past research has suggested that high sensation seekers may be prone to greater evaluation and appreciation of stimuli. For this reason, it is predicted that individual differences in sensation seeking may moderate the meaningfulness ratings and reaction times of participants.

87. Comparison of Breathing Techniques and Art Therapy on Stress Reduction

Alyssa Tobin, Shelby Seidler, and Katerina Simon (Victoria Kazmerski), Penn State Behrend - Psychology

Many college students are unaware of effective techniques to reduce stress, despite the prevalence of college-related stress.This study examined the effects of art therapy and breathing techniques on undergraduate college students at Penn State Behrend. Participants were recruited through SONA, an experimental online management system. The BioPac Student Lab system was used as a physiological measure, which recorded heart rate with electrocardiography (ECG). The ECG reflected the fluctuations in electrical activity which helped monitor changes in heart rate. A pre- and post-test questionnaire was administered to the participants to evaluate the perception of their stress levels. Stress was induced using a word scramble task. The participants were then randomly assigned to a treatment or control group, where they either colored a mandala or performed a breathing exercise, and the participants in the control group completed no task. The participants in both treatment groups completed each task for 10 minutes, and the participants in the control group sat in a room with no task for 10 minutes. It was predicted that both the breathing exercise and coloring the mandala would significantly reduce heart rate and perceived stress scores. The results from this study will indicate that performing a breathing exercise and/or coloring a mandala are both effective in reducing stress. These results can help spread awareness of the effective techniques to reduce stress in college students who may be struggling with test anxiety, acute stress, and overall stress.

88. Physiological Reactivity to Mindfulness on Anxiety
Desmond Kane, and Kameron Landers (Victoria Kazmerksi), Penn State Behrend - Psychology

Anxiety is an issue that occurs quite often in everyday life. People have contended with recurring intrusive thoughts when presented with stress. These thoughts could cause avoidance of situations and physical symptoms such as sweating, dizziness, or rapid heartbeat. There are multiple types of anxiety disorders including Generalized Anxiety Disorder, Panic Disorder, and Phobias (Kazdin et al., 2000). Experts have developed methods for reducing anxiety such as Mindfulness Based Stress Reduction (MBSR). MBSR is known to help individuals cope and process issues in their lives, by instructing them to remain in the present. In the current study, physiological measures were used to show connections between one-time exposure to mindfulness techniques and anxiety levels. Mindfulness techniques was applied to an anxiety provoking situation while the participant's physiological readings were recorded. Two physiological measures, heart rate (HRV) and skin conductance response (SCR), were used to measure anxiety. There were two conditions: control group and mindfulness techniques. HRV and SCR were recorded while participants completed the Sing-a-Song Stress Test (SSST) where the participants were unexpectedly asked to sing any song they know. The mindfulness technique condition involved the awareness focusing task. The control condition involved non-stimulating situation which participants read an article. Heart rate was recorded until levels returned to baseline. The expectation is that a system of mindfulness could influence the intrusive thoughts that caused anxiety and lessen the physiological effects before they become overwhelming and deterred someone from doing their best. We anticipate that mindfulness will reduce physiological anxiety levels after a one-time exposure. The current study could provide support on medical use and allow for those who do not support medication, with an alternative.

89. "She Keeps Finding Me"; An Exploration of Children's Confidants and Hiding Places
Cassandra Vandemerwe, Leslie Hasty, Abigail Jantzi, Heather Fortsch, Emily Ferraro, Ashley Buzzell, and Anna Downey (Kimberly Corson), Penn State Behrend - Psychology

Limited research exploring non-traumatic secret telling among children indicates a need to investigate children's understanding of secrecy, with whom they share their secrets and what information and spaces they consider private. Previous research suggests that children tell secrets and physically hide as a form of play, but also express a desire to be seen or found (Corson & Colwell, 2011; Corson et al., 2014). Hiding places such as under the covers, behind the curtain or in a closet, serve as places of solitude, whereas being seen or found serves as a sense of safety and enjoyment for younger children (Colwell et al., 2015; Corson et al., 2014). The current study involves semi-structured interviews with children about their secret hiding places and hide and seek play behavior conducted with 3-10 year olds at multiple YMCA of Greater Erie locations. Children were given the opportunity to draw a picture of places they liked to hide and then asked to "tell a story about them". Drawings give children a concrete reference point for discussion and allows for longer and more intricate interviews. The purpose of this study was to add to the previous literature by investigating developmental differences between "good" hiding places and between types of confidants. The implications of trust, privacy, and boundaries involved in secret telling and hiding places will be discussed. Preliminary results indicate that common confidants for young children include family and "best friends," and that certain people are allowed into their spaces. Implications can be found for children's social and emotional development. These findings can be applied in the family, school and clinical settings, allowing parents, teachers, and other caregivers to better accommodate children's social and emotional needs.

PSYCHOLOGY II

90. Perception of Straight vs. Gay Victims

Lillian Peterson and Katlyn Walters (Dr. T. Andrew Caswell and Dr. Luke Rosielle), Gannon University - Psychology

We present a poster describing our ongoing research concerning the way in which gay victims of rape are viewed in comparison with the way in which straight victims of rape are viewed. We asked participants to read one of four vignettes with either a straight male, straight female, gay male, or lesbian female as a victim of rape. In each of the four scenarios, the perpetrator was always a male. This study included the Modern Homonegativity Scale (Morrison & Morrison, 2002) to assess the extent to which participants view gay victims more or less negatively than straight victims. The Revised Religious Life Inventory (Batson & Schoenrade, 1991) assesses religious biases that may contribute to a participantâ€™s homonegative views. Lastly, we included the Acceptance of Modern Myths about Sexual Aggression (Gerger, Kley, Bohner, & Siebler, 2007) scale to gauge participantsâ€™ endorsement of sexual assault myths. Our hypothesis is that gay victims of rape will be viewed more negatively than straight victims of rape.

91. Coming Out in Stages: How Ages of Disclosure to Peers and to Family Differentially Impact Gay Men

Alyssa Lisle (Ryan Pickering), Allegheny College - Psychology

The coming-out process differs from person to person. However, little is known about the consequences of coming-out on people at different developmental stages. This is especially so as coming out may differ depending on who they come out to. Some studies, such as D'Augelli and Grossman (2001), measure coming out to anyone rather than distinguishing between peers and family (p. 1008). Others utilize more separation in their operational definitions, distinguishing between mother and father or family, religious groups, and everyday life (Mohr & Fassinger, 2003, p. 486; Balsam & Mohr, 2007, p.309); however, this does not account for the age of disclosure to these groups. Coming out of the closet tends to be a multi stage process, and carrying the weight of telling some but not others might negatively impact psychological and physical health. Research has mixed results regarding age of disclosure and how it relates to physical and psychological health. Research has shown that younger gay men report higher levels of depressive symptoms, but their age was not correlated with a sense of belonging (McLaren, 2013,p. 7). Participant age was also significantly negatively associated with mental distress (Shilo, 2012, p 317). However, this does not mean that the age at which they are studied is when they disclosed their sexual orientation. One study by D'Augelli, et al. (2001) found that the earlier participants disclosed their sexual orientation, the more victimization they experienced, which caused lower self-esteem (p. 1021). To try to clarify existing research and consider the more true-to-life experiences of disclosing sexual orientation to peers versus disclosing to family, we used an online survey of gay men (n= 283) to measure the impact of age of disclosure to peers and to family on a number of variables, including perceived control (e.g. "In the last month, how often have you felt that you were on top of things," 7 items, alpha = .89), perceived stress (e.g. "In the last month, how often have you felt nervous and stressed," 9 items, alpha = .92), self-esteem (e.g. "On the whole, I am satisfied with myself," 10 items, alpha = .91), health (e.g. "I am as healthy as anyone I know ," 5 items, alpha = .84), etc. The results from this data were numerous and complex. For example, we found a significant negative relationship between age of disclosure to both peers and family and both perceived stress and perceived stigma. There was also a significant positive relationship with self-esteem. This implies that when men come out at older ages, they may perceive less stress and stigma and show higher self-esteem. Non-significant relationships were also informative. For example, perceived sense of control, perceived health, and positive affect were not significantly related to age of disclosure to peers or to family. These findings may have important implications for therapists, counselors, friends and/or LGBTQ+ individuals themselves in thinking about consequences and assuaging fears of coming out of the closet one step at a time.

92. Gender and its Effects On Conformity
Samantha Jackson and Tatreas Porter (Heather Lum), Penn State Behrend - Psychology

The purpose of this study was to investigate the likelihood of someone conforming to a group of individuals even if they personally do not agree. Conformity is used in everyday life when dealing with perception; people use the reactions of those around them as cues to determine appropriate behaviors. Participants were recruited from Penn State Behrend and placed in groups based on gender. The researchers created fake participants in which the actual participants communicated with, within a group chat. They were then asked 10 questions from the civics test. An independent samples t-test was used to distinguish any significant differences in gender conformity. The predicted outcome was that females would conform more than males. There was a difference in the mean values of conformity between males and females. Among the 24 male participants in the study, conformity occurred 40.83% of the time. Among the 9 female participants, conformity occurred 53.33% of the time which would suggest that females conformed more over all. However, due to such a large difference sample sizes, it is unclear if the hypothesis was supported. Further research needs to be run to determine if there is a significant difference in conformity levels among males and females. Conformity is essential for the survival of human race, being accepted in a group has an impact on our social-identity.

93. Gender Stereotypes in Video Game Characters
Austin Kobylinski, Kayla Redd, and Brock McCullough (Victoria Kazmerski), Penn State Behrend - Psychology

The gender bias found in video games has been researched extensively since the early 2000's. Past research has shown that gender bias against males and females exists in video games, and that this is influenced partly by the media. Research has also shown that players use video games to explore alternate selves or to create idealized selves. The purpose of this study was to determine if cultural stereotypes of masculinity and femininity influence character building in video games. By conducting this study we demonstrated how the player uses stereotypes they have obtained from outside sources and apply them to video games. Participants were first asked to fill out a Bem Sex-Role Inventory based on themselves. They created a character in the video game The Sims 4, and filled out another inventory based on that character. We chose The Sims 4 because it gives players more customization choices than other simulation games. Furthermore, it is more realistic, as players only objective in the game is to fulfill their Sim's needs and aspirations. This procedure was repeated for a character of the opposite sex. We predicted that gender bias would still be present in character creation. Fifteen volunteers coded the possible choices the participants could make as either masculine, feminine or androgynous. They based this on how a typical person would view that choice. We hypothesized that males would create female characters with more feminine characteristics and male characters with more masculine characteristics, whereas females would create more characters with both characteristics. We also hypothesized that females would create characters that are significantly different from themselves on the Bem Sex-Role Inventory, while males would create characters that resemble themselves. To begin to change stereotypical ideologies, we must first address the gender stereotypes ingrained in our society, and that was what we hoped to do by conducting this study.

94. Positive Impacts of Outdoor Recreation may be Moderated by Gender
Caitlin Kearney (Ryan Pickering), Allegheny College - Psychology

Understanding environmental concern has been described as "one of the key necessary conditions to make sound public policy and promote citizens' engagement in proenvironmental behaviors" (Liu, Vedlitz, & Shi, 2014). One variable that consistently predicts environmental concern in research is gender (Zelezny et al. 2000, Milfont & Sibley, 2016). In particular, women have been shown to have more environmental concern than men (Zelezny et al., 2000, Frazin & Vogl, 2013). There may therefore be a more complex relationship between the positive impacts of outdoor recreation and gender. The current study examines the relationship between gender, recreational activity, environmental concern, stress, and happiness through data collected via an online survey (N = 248). Recreational activity was measured by the frequency of participation per year in specific outdoor activities such as hiking, biking, and wildlife-watching. Environmental concern was measured using a five item measure adapted from the New Ecological Paradigm (Dunlap et al., 2000; e.g. "I am concerned with the effects of global warming", alpha=.81). Stress was measured using six items adapted from the Chronic Stress scale (Wheaton, 1991, cited in Turner, Wheaton, & Lloyd, 1995; "I am anxious that I will fall short of my responsibilities and obligations;" alpha = .75). Contrary to expectations, results revealed that there was not an overall difference between environmental concern and gender, $t(243) = 1.35$, $p = .18$. However, it was found, among women, outdoor recreation was related to higher levels of environmental concern and happiness (both $ps < .05$). Outdoor recreation was also marginally associated with lower levels of stress for women ($p = .057$) but not for men (all $ps > .48$). This moderating effect of gender may help to explain previous conflicting research on the benefits of outdoor recreation and also points to a potentially unique relationship between women and nature.

95. The Impact of Media on Body Type Perception and Preference
Katie Miller, Francesco Nati, and Kylie Schoen (Luke Rosielle), Gannon University - Psychology

Our study investigates the relationship between traditional and social media consumption on body type preferences and body image. We replicated a previous study examining body preferences and further explored how media impacts individuals' perception of body shapes (Fallon, 1990). We administered an online survey which consisted of images of nine different body types of both males and females. Participants viewed the images and selected the body type they found most attractive and that they felt most closely matched their own body type. We also asked participants to indicate the amount of time spent watching TV and using social media. We hypothesize that individuals who spend more time on media are more likely to prefer skinnier body types and view themselves as having a heavier body type.

96. Money Conflicts Between Romantic Partners
Emma Walton, Leanne Confer, Leslie Hasty, and Skyler Ferringer (Carol Wilson), Penn State Behrend - Psychology

One of the most difficult topics for romantic partners to discuss without conflict has been found to be money. Previous studies show that priming individuals with money can cause them to become more self-oriented, less helpful to others, less apt to depend on others, and more physically distant. To our knowledge, there have been no studies to date that examine these effects on romantic couples and the way they make decisions. In the current study, romantic partners separately engage in a task to earn money (money condition) or vacation time (control condition). Partners are then reunited to participate in a joint decision-making task that is videotaped to allow for future coding. We expect to find that those in the money condition show more negative effects than those in the control condition. We also expect to find differences in behavior and reactance within the money condition, depending on the amount of money earned by each participant.

97. Squeezing into Society's Pants
Emma Walton and Erin Fedorko (Heather Lum), Penn State Behrend - Psychology

Body satisfaction issues and self-esteem issues are common amongst young adult women. The present study examined the idea that there would be a significant difference in perceptions of body satisfaction and self-esteem when presented with photos of average-sized models, idealized models, plus-sized models, and neutral photos. Specifically, researchers hypothesized that females presented with "idealized" images of models would report lower body satisfaction than those presented with the average sized, plus-sized and neutral images. In order to investigate this hypothesis, participants were part of a study that involved several images of women that are prominent in society, followed by body satisfaction and self-esteem questionnaires. The data accumulated from this experiment that the images had no significant effect on the participants' body-satisfaction and self-esteem ratings.

98. Manifestation of jealousy across attachment styles regarding modern technology
Anana Tinnhe, Alexandria Johnson, and Jemmerio Harper (Heather Lum), Penn State Behrend - Psychology

The research presents the results of a one semester length study on the effects of attachment styles on the manifestation of jealousy, specifically regarding romantic jealousy and partner's use of modern technology (social media, and other forms of mobile communication). First participants were given administered a standard adult attachment scale in order to place them in the most fitting attachment style. Researchers then used multiple modified survey scales in an online based questionnaire format, to gauge participantâ€™s cognitions about general relational jealousy, and relationship dynamics revolving around technology use and social media monitoring. The results suggest that there is in fact a correlation between average jealousy scores and attachment styles. Despite the hypothesis the Pearson coefficient revealed that secure attachment style participants were positively correlated with jealousy scores. This implies that the participants that scored higher in the jealousy scales, also scored in the upper range of the attachment scale. On the other hand, anxious and avoidant, attachments styles were negatively correlated with jealousy scores. Researcher intend on presenting findings at Penn State Behrend - Sigma Xi Undergraduate Research and Creative Accomplishments

99. Effects of the Big Five Personality Traits on Conformity
Cassandra Gengler and Brianna Strohmeyer (Heather Lum), Penn State Behrend - Psychology

This study aimed to look at the big five personality traits in regards to an individual's likelihood to conform. The researchers hypothesized that individuals who score high on neuroticism would show the highest levels of conformity, in addition to those who score high on agreeableness due to these personality factors being highly impressionable. Researchers also hypothesized that women will show higher levels of conformity than men. The authors defined conformity for the purposes of this experiment as "the number of times which a participant agrees changes his or her answer on logo naming test to match the confederates answer". The researchers based this current study off that of Asch's 1951 experiment on conformity. Prior to beginning the experiment, participants completed a questionnaire regarding the Big Five personality traits. After this was completed, participants completed four trials of naming logos while discussing the logos with confederates on an online chatroom. Confederates attempted to influence answers on six of the questions. Conformity was measured by whether participants changed their answers on these six questions. It was found that no significant relationship was found between any of the five personalities and conformity as well as gender and conformity. Findings of this study will be reported via poster presentation at Sigma Xi. This study, even though it may not be as profound of a contribution to conformity research as Asch's experiments, may still be helpful in the study of what types of people tend to conform.

PSYCHOLOGY III

100. The Effect of Ego Depletion on Spatial Attention: The Role of Individual Differences
Monessha Jayabalan and Alan Cuevas Villagomez (Allison Pensky), Allegheny College – Psychology

Willpower is an exhaustible resource. The role of stress in this process is still being determined. Participants completed a Perceived Stress Scale, an ego depletion manipulation, and performed a spatial-cueing task. We will discuss effects of individual differences on the relationship between willpower and attention.

101. VR-Induced Short Term Anxiety, and its Effects
Tiffany Barker, MacKenzie Bronson, and Ashley Moyak (Heather Lum), Penn State Behrend - Psychology

The incorporation of modern technology, specifically the use of Virtual Reality (VR), into traditional treatment methods would be beneficial, seeing as technology is used with almost everything we do today. Virtual reality, through the use of the HTC Vive headset, can be used to treat many different forms of anxiety disorders. These disorders have previously been treated with traditional cognitive behavioral exposure therapy, but researchers feel the use of virtual reality would be less threatening and more beneficial to patients. Researchers of this study wanted to assess anxiety that can be induced through the use of virtual reality. To test this, participants used a virtual reality headset, and were visually exposed to either an anxiety inducing condition, mild condition or a neutral condition. The participants had their heart rate monitored to test anxiety levels as well as indicate their personal levels of anxiety pre and post test. Researchers expected to find that the virtual reality headset will effectively induce anxiety, furthering the research on the use of virtual reality for exposure therapy. Researchers used a random sample of 53 students, 47 of which were male and 6 of which were female, all of which attended Penn State Erie, the Behrend College. Using a repeated-measures ANOVA, researchers evaluated the effects of an anxiety-inducing visual stimuli on both heart rate and self reported anxiety levels. Researchers found a statistically significant increase in heart rate and change in self-reported data used to assess anxiety, but it did not significantly different across conditions. Currently, most anxiety-related disorders are being treated with traditional forms of Cognitive Behavioral Therapy. With the new forms of technology available, specifically VR, these treatments can be modified and possibly improved with the use of technology.

102. Examining Attitudes about Pharmaceutical Cognitive Enhancement in College Students
Rebecca Dinsmore, Skyler Ferringer, and Alyssa Velez (Victoria Kazmerski), Penn State Behrend - Psychology

The use of pharmaceutical cognitive enhancers (PCEs), such as Adderall, Vyvanse, and Ritalin, is becoming more common among college students. This study aimed to identify what factors lead students to use PCEs and find them acceptable. Researchers utilized hypothetical scenarios to serve as an analogue setting for PCE use. Participants were asked to answer questions regarding sets of conditions depicting current grade, peer use, and academic setting. Vignettes were created and normed for validity to allow experimental manipulation. Variables that were manipulated include peer use percentages (either 5% or 95%), the student's current grade in the class (either A or D), and whether the student was studying for class or about to take a final exam. Participants in this study read through the eight vignettes and answered questions indicating how acceptable the use of PCEs were in each scenario based on the drug's abilities to improve alertness, mood, focus, and memory. Additionally, participants indicated their likelihood to use PCEs after reading each scenario. We predicted that increased peer use following the vignettes would result in a higher propensity of participants' hypothetical use of PCEs. Researchers further hypothesized that higher neuroticism, low agreeableness, and low conscientiousness would be related with higher use of PCEs. Most importantly, we expected that a higher rating of likelihood to use PCEs to be correlated with higher participant ratings of motivations to use PCEs. The findings of this study add to the general knowledge on real PCE use behaviors among college students, which may lead to the discovery of more effective methods to prevent PCE abuse.

103. Family, Peer, and Extracurricular Activities Related to Binge Drinking in College Students
Emily Bly, Caroline Mashyna, and Brittany Dougan (Victoria Kazmerski), Penn State Behrend - Psychology

Binge drinking is a common occurrence on college campuses. Multiple factors can affect the presence of binge drinking behavior in college students. We plan to measure the external factors on students and their binge drinking behaviors by conducting a survey on students at Penn State Behrend. The survey will be a combination of questions from other reliable and valid surveys. The survey will include questions about drinking behaviors, peer influences, family influences, extracurricular activities and demographics. We plan to survey at least 100 students consisting equally of male and female. We will recruit students through the Behrend SONA system and by sitting outside the dining hall, Bruno's. Students recruited through SONA will take the survey through Qualtrics and be given class credit for participating. The students that are recruited outside Bruno's will take the survey on a tablet and will be given a piece of candy for participating. We hypothesize that the closer family relationships, the less students will participate in drinking. Our second hypothesis is that the more involvement in social organizations, the more a student will engage in drinking. We also expect that more prosocial behavior among peers will show less drinking, while negative behavior will show more drinking. If our hypothesis that the closer family relationship, the less a student will drink is found significant, it could result in parents being able to reach out to their child before drinking behavior starts and possibly prevent binge drinking behavior all together. Students can be more cautious about the people they choose to surround themselves with if they become aware of the amount of binge drinking that occurs under certain peer influences. Also, if we find that the more extracurricular activities one is involved in the more they will participate in binge drinking, students could be more aware of the groups and organizations that are more notorious for binge drinking behaviors.

104. Pets and Social Support as Predictors of College Adjustment
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Social support and well-being are multi-faceted abstract concepts. Although they have been extensively studied, little research has been done in the area of college student adjustment with regard to pets. This study was designed to analyze the relationship between pet ownership and attachment as predictors of positive student adjustment to college in relation to social support. Research has elucidated pets as mediators of adverse life circumstances. Pets also maintain promotive factors pertaining to human well-being. On the other hand, social support acts as a protective factor against inhibitory factors directly associated with college, including stress and homesickness. Specifically, it was hypothesized that pets would be comparable to social support in acting as predictors of positive college adjustment. A multiple survey design was used to assess this prediction. The process began with a confidentiality statement followed by four consecutive surveys. First, a demographic survey assessed student's current academic standing as well as their pet interaction and potential ownership. The Lexington Attachment to Pets survey assessed student attachment to pets. The Multidimensional Scale of Perceived Social Support assessed student perception on received social support from four groups (significant other, family, friends, and total or overall social support received). Finally, the Student Adaptation to College Questionnaire reviewed overall college adjustment in four categories, academic adjustment, social adjustment, personal-emotional adjustment, and goal-committed-institutional attachment. The SACQ was associated with the PERMA (positive emotions, engagement, relationships, meaning, and achievement) model as outlined by well-being theory. Students in the college adjustment process often encounter inhibitory factors such as homesickness and stress, while these were not directly measured, they are crucial for understanding inhibitions to positive college adjustment.

105. Playing Your Way to Success: Mental Mapping Using Pokémon Go
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The way that we navigate our environment has changed in recent years and cognitive scientists are following this trend of offloading skills such as our sense of direction, attention, and navigation to our mobile devices. Clearly, these devices have many benefits, such as keeping us connected with each other, and helping us identify destinations and getting us up and moving around. There is little doubt that the more we use these devices the more efficient we become at their use, but do these skills come at a cost to some cognitive skills that evolved over millions of years to help us learn and live in our environment? The purpose of the present study was to examine the cognitive processes of novices and experts while playing Pokémon Go; an interactive game that requires players to walk around various locations and "catch" Pokémon on a smart phone. Analyzing actions performed in these games can give us insight into individual differences in spatial thinking, especially mapping and navigation. Participants were given 20 minutes to explore the environment on a college campus and capture as many Pokémon as possible. Researchers tracked the participants' speed, distance and paths by simultaneously running the Map My Run app. They completed multiple surveys and a map task involving them drawing the campus buildings and pathways from a bird's eye view. The results of this study showed that the spatial skills of the two groups were well matched and they reported equivalent senses of direction. Those with experience playing Pokémon Go traveled the same distance as novices, but were much more efficient, finding more Pokémon and scoring more points. They also reported that playing Pokémon Go even for as short a time as 20 minutes, improved their mood. They also thought the game itself was more immersive and enjoyable. The next step is to examine the differences in play between solitary and group players and manipulate the variable of cooperation and competition.

106. Slicing Through the Truth. Immersion, Workload, and Game Play
Richard Greatbatch and Donald Fromknecht (Heather Lum), Penn State Behrend - Psychology

Immersion and engagement with technology can be easy to subjectively identify, but difficult to empirically measure. However, previous theoretical examination of such constructs has identified paths and barriers to full and proper engagement that are produced by various game design aspects. The goal of virtual reality is to make the user feel as though what they are doing feels as close to a real life experience as possible. Understanding how to get users through the barriers to engagement and into an immersed state will enhance the ability that designers can have to create immersion in video games, as these same barriers detract from the focus that is inherent and necessary to immersion. More empirical work is needed to understand just how immersive virtual reality really can be. The current study utilizes these concepts to establish support for the possible reasons for a variety of immersion levels between a virtual reality setting and an interactive gaming experience. During the study, participants played Fruit Ninja on both the HTC Vive virtual reality headset and the Xbox Kinect. Participants answered surveys to assess self-reported workload, emotion scales, as well as demographic information. Researchers hypothesize that participants will feel a greater level of immersion in the virtual reality condition in comparison to the Xbox Kinect. Also participants are expected to report lower levels of self-reported mental load when in the VR condition. Finally, participants will report higher levels of physical workload when in the Xbox condition. The result of this study will help look into variations that may have an influence on the participant's immersion levels. This can be translated to real world situations involving training programs for the military as well as for clinicians to treat a variety of mental disorders.

107. Effect of Ego Depletion on Spatial Attention: The Roles of Individual Differences
Olivia Spinelli (Allison Connell Pensky), Allegheny College - Psychology

As previous research has indicated, individual differences may play a role in mental processes. We were interested in whether the specific individual difference of sleep quality, perceived stress, vividness of visual imagery, personality, and depression are correlated with two specific mental processes (self control and spatial attention). Participants first completed a number of measures of individual differences (VVIQ, PSQI, PSS, BBF, & CESD). Following from previous research, participants performed a congruent (control) or incongruent (ego depleting) Stroop task to tax their self control. In Experiment 1, participants then completed a Predictive spatial-cueing task. Participants were instructed to maintain fixation at the center of the screen, an informative arrow appeared at fixation pointing at the left or right location. A letter target appeared in the indicated location 80% of the time. Regardless of its location, participants indicated the identity of the target. Response times were measured on valid (where the cue pointed) and invalid trials. In Experiment 2, participants completed a Nonpredictive spatial-cueing task following the Stroop manipulation. The difference here was that they were instructed to ignore the spatial cue and the cue was accurate only 50% of the time. We performed a bi-variate Pearson Correlation analysis to assess the possible role of these individual differences in the relationship between ego depletion and spatial attention. In a small sample, many of the results failed to reach significance. We will discuss the interactions between the various individual differences, self control, and spatial attention.

108. Effect of Ego Depletion on Spatial Attention: The Possible Role of Sleep Quality
Olivia Spinelli and Jacelyn Alberts (Allison Connell Pensky), Allegheny College - Psychology

Previous research has indicated that sleep quality has an effect on performing mental processes. We were interested in the correlation between sleep quality and two specific mental processes (self control and spatial attention). Participants first completed a sleep quality survey (PSQI) as well as a number of other measures of individual differences. Following from previous research, participants performed a congruent (control) or incongruent (ego depleting) Stroop task to tax their self control. In Experiment 1, participants then completed a Predictive spatial-cueing task. Participants were instructed to maintain fixation at the center of the screen, an informative arrow appeared at fixation pointing at the left or right location. A letter target appeared in the indicated location 80% of the time. Regardless of its location, participants indicated the identity of the target. Response times were measured on valid (where the cue pointed) and invalid trials. In Experiment 2, participants completed a Nonpredictive spatial-cueing task following the Stroop manipulation. The difference here was that they were instructed to ignore the spatial cue and the cue was accurate only 50% of the time. We performed a covariate analysis to assess the possible role of sleep quality in the relationship between ego depletion and spatial attention. In both studies, the effect was small. We will discuss the interactions of self-control, attention, and sleep.

109. Attentional Shifts Related to Task Difficulty and Gameplay
Rachel Mooney and Alysha Simmons (Victoria Kazmerski), Penn Sate Behrend - Psychology

In a culture where multi-tasking seems necessary, the topic of inattentional deafness has become increasingly more salient. Inattentional deafness refers to how the mind actively ignores seemingly irrelevant auditory information to prevent sensory overload (Giraudet, St-Louis, Scannella, & Causse, 2015). Utilizing an oddball paradigm, this study investigated characteristics influencing the ability to detect novel sounds when interspersed between frequent and rare tones while attending to an easy or hard game playing task. Auditory stimuli consisted of frequent tones (350Hz), rare tones (650 Hz), and novel sounds, including musical and natural noises. The frequent tones were presented 80% of the time at 75dB. The rare tones and novel sounds (25 sounds) were presented each 10% of the time at 90 dB (Fabiani et al., 1996). Event-related potentials (ERPs) were recorded during this task and differences in the N1s and P3s were noted for amplitude and latency between sound types. Results show N1 latency was significantly decreased for novel sounds at Pz in relation to other central electrode sites. Also, N1 amplitude was more negative to novel sounds than rare tones at Cz and Pz. Finally, P3 latency was earlier for novel sounds than rare tones. Participants also completed a recognition task. Accuracy and reaction times were not significantly different between old and new sound types or task difficulty groups. These results partially supported our hypotheses. As predicted, reduced latency and increased amplitude for novel sounds compared to rare sounds was seen. However, this pattern was only seen at N1 and not P3. Also, there was no difference in accuracy or response time on the recognition task between the easy and hard task groups or sound type. These differences could be due to unpredicted variables such as repeatedly losing the game task and having to restart.

110. Evaluation of Behavior Changes in Children with Developmental Disorders through Dog Therapy and a Structured Classroom Environment

Emily Galeza and Julia Gabrys (Heather Lum and Victoria Kazmerski), Penn State Behrend - Psychology

Animal-assisted therapy has been shown to help children with physical, behavioral, and cognitive disabilities, especially in an educational setting. However, most of the evidence is anecdotal or poorly controlled. To track the effectiveness of a dog therapy program in a local school for children with autism and other developmental disabilities, eight sessions with a therapy dog and a comparative, structured group activity were video recorded in two classrooms. The recordings were coded for eleven behaviors in the areas of social skills, language and communication skills, body control, emotion control, and attention. There was significant improvement in the social skill of rule following over the eight weeks that was specific to the interaction with the dog. Other improvements were not unique to the dog therapy sessions, and certain behaviors worsened, possibly due to the interactive nature of the dog therapy and the setting. Additionally, all parents completed a survey prior to their child's participation, although low return-rate limited analysis on the post-participation surveys. When parents had initially rated their child's current skill levels in different areas, based upon a 5-point scale, multiple parents rated their child as low (marked as a 1-2) in language/communication skills, in emotional control and social skills, and low in body control and paying attention. Comparatively, in the area of following verbal commands, some parents rated their child as having a high skill level (marked as 4-5), as well as cognitive control. Analysis of these surveys have also shown that parental support of this program is strong, and that parents believed that the dog therapy would be a great tool for their children. This leads to an interesting comparison, as the belief in the dog therapy's effectiveness is matched against the observed behavioral data which shows a significant, but limited impact of dog therapy to rule-following.

111. Inhibition of Automatic Spatial Attention Causing Depletion

Hannah Smith and Alexandera Zielinski (Allison Connell Pensky), Allegheny College – Neuroscience

Ego depletion was measured after performing a Predictive or Nonpredictive spatial-cueing task. A central cue pointed to a box to the left or right of fixation. In the Nonpredictive task, participants were instructed to ignore the cue and identify a subsequently presented target. Participants in the Predictive task were told to orient to the location indicated by the cue, because the target most likely would appear in that location. We were interested in whether these tasks would lead to a differences on a measure of self-control. Nonpredictive cueing could be thought of as requiring self-control to inhibit automatic orienting to the cue. While Predictive cueing requires volitional, controlled orienting to the cued location. Self-control was measured by presenting participants with a package of candies and a product analysis survey. The weight of the candies was measured before and after the survey. A greater difference in change of weight would mean that participants ate more candies, and would represent a reduction in self-control (ego depletion). We found that participants in the Nonpredictive task ate significantly more candies ($p = .02$), suggesting that inhibiting an automatic reflex is more taxing than voluntary processing of an informative cue. We will discuss the limited nature of both self-control and attention and how they interact.