SIGMA XI
THE SCIENTIFIC RESEARCH SOCIETY

FAIRFIELD UNIVERSITY CHAPTER

14TH ANNUAL POSTER SESSION

Thursday | April 24, 2014

Barone Campus Center

3:00 p.m. to 5:00 p.m.

Fairfield UNIVERSITY

Sigma Xi acknowledges additional support by the Office of Academic Engagement

Caterina Aiello
Alexa Annunziata
Rachel Beaudoin
Cameron Burke
Colleen Carty
Harry Cintineo
Julie Clothier
Taylor Congdon
Jess Conklin
Jonathan Durgin
Maria Galluzzo
Liam Greaney
Alexis Khursigara
Paige Maloney
Olivia Marola
Katherine Martin
Samantha Matte
Michael Mauro
Samantha Mazzeo
Kerri McPhail
Jillian Muhlbauer
Jillian Ottombrino
Oladotun Oyawusi
Damini Patel
Gregg Perlmutter
Angela Quental
Amanda Rielly
Robert Schwartz
Monica Sciacca
Christina Starsinic
Kyle Tzanetis

BIOLOGY

2013/2014 STUDENT RESEARCH IN BIOLOGY

STUDENT RESEARCHER(S): Alexa Annunziata , Christina Starsinic , Liam Greaney , Kyle Tzanetis

CLASS YEAR: 2014 (CS , LG , KT); 2015 AN

MAJOR: Biology

TITLE OF RESEARCH PROJECT:

Reproductive Cycle of the Green Crab, *Carcinus maenas* in Milford Harbor, Milford, Connecticut

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Dr. Brousseau

DATE OF PROGRAM: Fall 2013 and Spring 2015

SPONSOR:

DESCRIPTION OF WORK (Short Abstract):

The invasive species of green crab, *Carcinus maenas* was introduced to the North Eastern Atlantic Coast in the mid 1800s. From 2009 to 2013 trap data was collected from two dock sites in Milford Harbor (National Marine Fisheries Lab and CT Aquaculture Lab). The purpose of the study was to determine (1) the seasonal reproductive cycle of *C. maenas* in this area and (2) sex ratios in the population. Captured crabs were measured, sexed, tagged, reproductive condition noted, and released. A total of 2,628 crabs were caught, with a sex ratio of 2:1 males to females. Our data indicates that egg-laying females are present in the population in the spring (highest numbers in May) suggesting that this area is a mating ground for *C. maenas*.

2013/2014 STUDENT RESEARCH IN BIOLOGY

STUDENT RESEARCHER(S): Cameron Burke and Jonathan Durgin

CLASS YEAR: 2014

MAJOR: Biology

TITLE OF RESEARCH PROJECT: The Effects of Resveratrol, a Naturally Occurring Polyphenol, on the Formation of *C. ablican* biofilms and Disruption of established films.

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Phyllis Braun PhD

DATE OF PROGRAM: April, 24th 2014

SPONSOR: Lawrence Family Scholars Program

DESCRIPTION OF WORK (Short Abstract):

The adherence of *Candida albicans* to one another and to various host and biomaterial surfaces is an important prerequisite for the colonization and pathogenesis of this organism. Cells established in biofilm formation are of significant concern to human health. Additionally, biofilms contribute to antifungal resistance, making them a further problem in clinical settings. Resveratrol (trans-3,5,4^{l}-trihydroxystilbene), a naturally occurring polyphenol found in red grapes, had previously been reported to arrest the S phase of the cell cycle, which lead to *C. albican* death (Jung et. al 2007). In analyzing the inhibition of resveratrol on biofilm formation and the disruption of preformed films preformed, we utilized the concentrations of: 62.50 µg/mL, 31.25 µg/mL, 15.63 µg/mL, 7.8 µg/mL. Biofilm activity was measured using XTT (2,3-bis(2-methoxy-4-nitro-5-sulfophenyl)-2*H*-tetrazolium-5-carboxyanilide) colorimetric assays. Resveratrol was shown to readily inhibit the formation of biofilms. The most effective concentration of resveratrol used to inhibit the formation of biofilms was 31.25 ug/mL, which produced a reduction of 64%. The least concentrated treatment used, 7.8 ug/mL, inhibited formation by 21%. The most concentrated solution, 62.50ug/mL, reduced biofilm formation by 48%. Overall, resveratrol was less effective at disrupting preformed biofilms. Forty-eight hour cultures were treated with the same concentrations. The most effective concentration to disrupt preformed films was 31.25ug/mL of resveratrol. These cultures experienced a 41% reduction in biofilm formation. A concentration of 7.8ug/mL reduced the amount of biofilm by 40% and 62.50ug/mL reduced biofilm activity by 38%.

2013/2014 STUDENT RESEARCH IN BIOLOGY

STUDENT RESEARCHER(S): Colleen Carty

CLASS YEAR: 2014

MAJOR: Biology

TITLE OF RESEARCH PROJECT:
Lake Lillinonah: 2012 and 2013 Water Quality Comparison and Summary

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Jen Klug

DATE OF PROGRAM: April 26, 2014

SPONSOR: Friends of the Lake

DESCRIPTION OF WORK (Short Abstract):
Lake Lillinonah, an impoundment on the Houstanic River, is a eutrophic system that experiences frequent algal blooms. During the summer months, The Lake Lillinonah Water Quality Monitoring Program volunteers collects data regarding water temperature, secchi depth, debris, scum, recreation potential, nitrogen levels, phosphorus levels, particles, and color of the lake. This data has been used to encourage improved management policies and recreational use. The purpose of this project was to analyze the data from 2012 and 2013 and compare the trends across the sites and years. In 2012, there were five sites; Barkwood Cove, Rt. 133, Lover's Leap, and Shepaug. In 2013, an additional site, Barkwood Point, was analyzed. For secchi depth, nitrogen concentration, and phosphorus concentration, Department of Environmental Protection (DEP) trophic status standards were used. For all other categorical values, % of day for each category was calculated. Overall, the trends that were seen across all sites in 2012 were similar to those observed in 2013. In both 2012 and 2013, normal seasonal temperature patterns were observed, with the highest temperatures occurring in July. For both years, the secchi depth was also relatively low at all sites. For both years, the majority of days recorded recreation potential as being "beautiful" or having "minor aesthetic problems". In terms of secchi depth, most sites were recorded as being eutrophic. Finally, nitrogen and phosphorus levels generally were between mesotrophic and highly eutrophic in 2012 and 2013.

2013/2014 STUDENT RESEARCH IN BIOLOGY

STUDENT RESEARCHER(S): Julie Clothier and Taylor Congdon

CLASS YEAR: 2014

MAJOR: Biology

TITLE OF RESEARCH PROJECT: Analysis of Fairfield University Watershed Quality through Monitoring Chemical and Physical Properties

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: James Biardi

DATE OF PROGRAM: April 24, 2014

SPONSOR: Fairfield University Department of Biology and Environmental Studies Program

DESCRIPTION OF WORK (Short Abstract):
Surface water samples were collected weekly from seven sites on Fairfield campus and tested for chemical and physical properties. The sampling period was from fall 2012 to spring 2014. This data is important in monitoring the effects of anthropogenic contamination. Increases in total phosphorous and nitrogen can negatively affect lakes and streams by causing excessive aquatic plant growth which increase the risk of harmful algal blooms. Concentrations of total phosphorous below 20 μg/l (0.02 mg) should be maintained to deter algal blooms (Shaw, Mechenich, Klessig 2004). Additionally, nitrate concentrations above 0.3 mg/l are enough to support summer algal blooms. For Hopkins Pond, there were more weeks in the fall that exceeded the nitrogen and phosphorus thresholds than the spring. There were no weeks in the fall that were under the oxygen threshold and only one week under for the spring data. For Bellarmine Pond, there were more weeks in the fall that exceeded the nitrogen and phosphorus thresholds than the spring. In addition, a paired t-test was conducted to determine if the ponds were efficient at removing increase in nitrogen and phosphorus caused by anthropogenic contamination. Other important parameters important in analyzing water quality include Oxygen (O_2) and pH. Oxygen concentrations of 5 mg/l are necessary for fish to survive in aquatic habitats. There was a significant amount of weeks in the fall that were under the oxygen threshold while only three weeks were under the oxygen threshold for spring data. Deviations from physiological pH (7) can have negative effects on fish spawning. At water pH of 5.8 lake trout spawning is inhibited and at pH of 6.5 Walleye spawning is inhibited (Shaw, Mechenich, Klessig 2004). There was one major event of high pH and some weeks with pH below 6.0. The general trend over these two years was a drop of about 1 pH unit. Finally, correlations between temperature and salinity during the spring was determined in order to monitor the impact of salt as a de-icer on campus roads and walkways. Analyses of several threshold of various nutrients and oxygen suggest Fairfield University's watershed requires greater attention in improving water quality. Specifically, overall low oxygen levels in some areas can significantly inhibit aquatic organisms ability to thrive in these habitats, furthermore, significantly high numbers exceeding thresholds for nitrate and phosphorous indicate nuissance summer algal blooms which compromise the watershed further.

2013/2014 STUDENT RESEARCH IN BIOLOGY

STUDENT RESEARCHER(S): Maria Galluzzo

CLASS YEAR: 2015

MAJOR: Biology

TITLE OF RESEARCH PROJECT:

Frequency of Nitrogen-Fixing Cyanobacteria and Heterocysts in Lake Lillinonah

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Dr. Klug

DATE OF PROGRAM: April 24, 2014

SPONSOR: Friends of the Lake

DESCRIPTION OF WORK (Short Abstract):

Lake Lillinonah is located in northwestern CT and was formed in 1955 by impounding the Housatonic River. Algal blooms, which release potentially harmful toxins and impede recreational activities, often affect Lake Lillinonah. These algal blooms are made up of cyanobacteria and come about when nutrient levels are high, the temperature of the water is high, and there is a high stability of the water column. In addition, some common cyanobacteria are able to fix atmospheric nitrogen with the use of heterocysts, so they can thrive when nitrogen concentration is low relative to phosphorus. By looking at nutrient concentrations such as phosphorus and nitrogen, water temperature, and water column stability we will show which factors are related to the overall abundance of cyanobacteria as well as the frequency of heterocysts in Lake Lillinonah.

2013/2014 STUDENT RESEARCH IN BIOLOGY

STUDENT RESEARCHER(S): Alexis Khursigara and Samantha Mazzeo

CLASS YEAR: 2014

MAJOR: Biology

TITLE OF RESEARCH PROJECT: Jaw Muscle Activation in Freshwater Stingrays

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Dr. Shannon Gerry

DATE OF PROGRAM: Summer and Fall 2013

SPONSOR: Hardiman Scholarship and Fairfield University Faculty Research Grant

DESCRIPTION OF WORK (Short Abstract):
Batoids (skates and rays) have specialized jaws that can function independently due to their cartilaginous skeleton, a lack of a ligamentous connection between the jaws and skull, and the presence of a highly flexible symphysis at the center of the upper and lower jaws. Bilateral implantation of the jaw muscles has lead to a greater understanding of the activity occurring on the left and right sides of the jaw during feeding events. A previous study has shown that skates activate their jaw muscles unilaterally without any activation of the contralateral side when processing complex prey. Therefore, the goal of our study was to investigate pairwise activation of the jaw muscles of a freshwater stingray *Potamotrygon motoro* when feeding on several prey types in order to determine if unilateral activation is a characteristic of batoid feeding mechanisms. We hypothesized that these rays would use synchronous activation when feeding on simple prey and unilateral activation to process complex prey. Electrodes were implanted bilaterally into three of the jaw adductors when the rays were fed three prey items of varying complexity. Two asynchrony indices were used to quantify the duration of muscle activation and the lag, or degree by which muscles are activated out of phase. Contrary to our hypothesis, data from two rays show that muscle pairs are activated synchronously for all prey types: there is no difference in duration or lag indices ($P > 0.05$). However, unilateral was sometimes observed when feeding on more complex prey. Further studies are needed to compare the variation observed in the feeding mechanisms of these two groups of batoids.

2013/2014 STUDENT RESEARCH IN BIOLOGY

STUDENT RESEARCHER(S): Paige Maloney and Rachel Beaudoin

CLASS YEAR: 2015 and 2014

MAJOR: Biology

TITLE OF RESEARCH PROJECT: Friend or Foe: The Andean Condor Study

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Ashley Byun

DATE OF PROGRAM: April 24, 2014

SPONSOR: Department of Biology, Fairfield University

DESCRIPTION OF WORK (Short Abstract):

This research examines the interaction of a male and female Andean Condor (*Vultur gryphus*) located at the Beardsley Zoo in Bridgeport, CT. At the start of the study, the behavior we were concerned with was identifying which condor initiated aggression and the response of the other condor. We had originally believed that it was the male's behavior toward the female that was an act of aggression from our discussions with the zoo staff. Therefore, we investigated if any aggressive behaviors were triggered by a specific event, such as feeding, enrichment, or the zookeeper's presence. After careful weekly observations and examinations of camera trap photos from January 28, 2014 - March 18, 2014, we discovered 39 photos that display actions that could be a form of mimicry or aggression. What was originally considered to be aggressive behavior by the male could actually be a form of mimicry.

2013/2014 STUDENT RESEARCH IN BIOLOGY

STUDENT RESEARCHER(S):: Olivia Marola

CLASS YEAR: 2016

MAJOR: Biology

TITLE OF RESEARCH PROJECT:

Evolution of New Genes: sra and sra-like genes in nematodes
—an example of PSR gene evolution

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Dr. Ashley Byun

DATE OF PROGRAM: Spring 2014

SPONSOR: Department of Biology

DESCRIPTION OF WORK (Short Abstract):

Gene duplication is well accepted to be the primary source of new gene and new gene functions. However, understanding the mechanisms by which duplicate genes evolve into new ones is less understood. Recently, it was hypothesized that protein subcellular relocalization (PSR) could be an important evolutionary mechanism for the emergence of new genes in eukaryotes. Serum resistance-associated (sra) genes show a gene family expansion in C. elegans and C. briggsae. This is potentially an example of protein subcellular relocalization leading to the evolution of novel genes. We aligned all sra nucleotide and protein sequences in C. elegans and C. briggsae, and predicted the subcellular location target of each protein using the program MultiLoc2. We then mapped each predicted location onto our phylogenetic tree. Based on this preliminary analysis, we found at least two instances where sra gene family members switched its subcellular location (perioxisome and ER) from the ancestral location (plasma membrane). Furthermore, examination of RNAi data downloaded from WormBase (vers. WS241) clearly suggests that the peroxisomal and ER sra proteins are functional. Based on these results, it can be concluded that the sra family in these nematode worms may have functionally diversified through PSR. If true, this would provide strong evidence of the importance of PSR in the evolution of new eukaryotic genes.

2013/2014 STUDENT RESEARCH IN BIOLOGY

STUDENT RESEARCHER(S): Olivia Marola and Monica Sciacca

CLASS YEAR: 2016

MAJOR: Biology

TITLE OF RESEARCH PROJECT: Breeding and Social Behavior in Red Wolves

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Ashley Byun

DATE OF PROGRAM: Spring 14

SPONSOR: Department of Biology

DESCRIPTION OF WORK (Short Abstract):
The goal of our research was to gain information on the introduction and mating behaviors of one male and one female red wolf (*Canis rufus*) at the Beardsley Zoo in Bridgeport, Connecticut. We observed the wolves' social behavior and their responses to environmental stimuli such as people walking by, weather, and food availability. We observed that oftentimes the male followed the female around their enclosure, the female was possessive over food, and the female was never observed to exhibit typical active or passive submissive posture. Based on these observations, we hypothesize that the female is dominant to the male. We also observed that the female flagged the male four times, the female exhibited instinctual denning behaviors, the female buried her food, and the female's abdomen appears to be growing larger. Based on these observations, we hypothesize that breeding may have occurred, and the female is pregnant with at least one pup. Using ImageJ digital imagery software, we will be able to measure both wolves for signs of healthy growth and, in the female's case, pregnancy. Further tests will be done to determine if the female is truly pregnant.

2013/2014 STUDENT RESEARCH IN BIOLOGY

STUDENT RESEARCHER(S): Katherine R. Martin

CLASS YEAR: 2014

MAJOR: Biology

TITLE OF RESEARCH PROJECT: The First Minutes at Sea: An investigation of the cue-dependent navigational decisions of hatchling loggerhead sea turtles (*Caretta caretta*)

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Ashley Byun, Ph.D.

DATE OF PROGRAM: Fall 2013-Spring 2014

SPONSOR: Science Institute, Fairfield University College of Arts and Sciences; Fairfield University Department of Biology

DESCRIPTION OF WORK (Short Abstract):
Upon emergence, hatchling loggerhead sea turtles (*Caretta caretta*) use a variety of different sensory cues to move from the beach to the ocean, and to subsequently navigate away from the shore into open water. These cues include the magnetic field of the earth, light, and wave action. Of particular intrigue is which specific cues hatchlings use in the initial moments of their oceanic journey. To investigate the behavior of hatchling loggerheads as they were released from both the surf zone and the open ocean, hatchlings from São Francisco do Itabapoana in the southeast of Brazil were manually tracked with GPS. The results demonstrated that the hatchlings use different sensory cues to navigate in the surf zone than they do in the open ocean. While many studies have investigated the cues used by hatchlings on the beach, or by adults in the open water, these findings offer a more complete and nuanced understanding of what cues loggerhead hatchlings use upon their first entrance into the ocean and how they navigate out to sea. These initial data suggest that the cues hatchlings use are highly dynamic, implying that they evaluate a variety of sensory inputs to navigate in the water.

2013/2014 STUDENT RESEARCH IN BIOLOGY

STUDENT RESEARCHER(S): Michael Mauro

CLASS YEAR: 2015

MAJOR: Biology

TITLE OF RESEARCH PROJECT: Analysis of the relationship between structure and function of the MEL-28 protein in the nematode worm C. *elegans*

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Dr. Anita Fernandez

DATE OF PROGRAM: April 24, 2014

DESCRIPTION OF WORK (Short Abstract):

MEL-28 is an essential, conserved protein that is required for successful embryogenesis in the nematode worm *C. elegans* and in mammals. The protein has multiple roles including controlling passage of materials into and out of the nucleus, chromosome segregation, and maintaining the integrity of the interphase nuclear envelope. The MEL-28 protein also contains two known domains: AT-hooks (needed for DNA binding) and coiled-coil domains (needed for interactions between proteins). Despite these two domains, very little is known about how the MEL-28 protein functions nor what parts of the protein are required for its different roles. To study this, we have been producing different *mel-28* constructs that encode different domains of the MEL-28 protein. These sequences of DNA were fused to a *gfp* gene, which is critical for observing the localization of the MEL-28 variant in live embryos. For example one construct we produced contains the *gfp* gene fused to the sequence of DNA that corresponds to amino acids 827-1784 of MEL-28. This truncated version of MEL-28 does not localize to the nuclear envelope unlike the full-length version, indicting that the nuclear envelope localization domain is contained within this region. After generating worms containing such fusions, we test them for *mel-28* gene function by determining if they rescue the embryonic lethality exhibited by *mel-28* null mutants. Thus the goals of this project are to both create transgenic worms expressing these constructs and to perform rescue assays to determine if the *mel-28* variant contained enough of the protein's function to rescue the mutant phenotype. Pervious work has concluded that the deletion of the AT-Hooks did not effect localization, but destroyed *mel-28* function and removal of coiled coil domain did not affect MEL-28 localization nor its function. Future work will include refining the large domains identified that are required for the nuclear-envelope localization of MEL-28 to determine which smaller pieces within are necessary.

2013/2014 STUDENT RESEARCH IN BIOLOGY

STUDENT RESEARCHER(S): Samantha Mazzeo and Robert Schwartz

CLASS YEAR: 2014 (SM); 2016 (RS)

MAJOR: Biology

TITLE OF RESEARCH PROJECT:
The Curious Case of the Amur Leopard (*Panthera pardus orientalis*)

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Dr. Ashley Byun

DATE OF PROGRAM: April 24, 2014

SPONSOR: Fairfield University, Department of Biology

DESCRIPTION OF WORK (Short Abstract):
The Amur leopard (*Panthera pardus orientalis*) is a critically endangered species, with fewer than 70 individuals left in the wild. One of these leopards resides at the Beardsley Zoo in Bridgeport, CT. In order to preserve rare species, zoos around the world have implemented the Species Survival Plan (SSP), which involves conservation and controlled breeding of critically endangered species. Sofiya, the female Amur Leopard at the Beardsley Zoo is a prospect for the SSP. However, it has been observed that Sofiya displays inexplicable and potentially nervous or anxious behaviors, such as staying indoors in her enclosure and pacing excessively. These behaviors can be considered problematic should Sofiya be considered for mating in the Species Survival Plan (SSP). Data were collected from February to April 2014, largely through weekly observations from a hunter's blind set up across from the leopard's enclosure. We eventually observed that Sofiya was more active between the hours of 2:30 and 4:30 pm than earlier in the day. Data collected during observation, as well information as from the Zoo staff and records, suggest that her behavior may not be influenced by external or environmental cues, as was initially hypothesized.

2013/2014 STUDENT RESEARCH IN BIOLOGY

STUDENT RESEARCHER(S): Kerri McPhail and Damini Patel

CLASS YEAR: 2016

MAJOR: Biology

TITLE OF RESEARCH PROJECT:
Strategies to Minimize Issues of Food Competition in Mixed Species Habitats

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Dr. Ashley Byun

DATE OF PROGRAM: April 24, 2014

SPONSOR: Dr. Ashley Byun

DESCRIPTION OF WORK (Short Abstract):
In mixed species exhibits, food competition is a prominent issue that most Zoos' often encounter. This issue was observed in two separate enclosures within the rainforest exhibit at the Beardsley Zoo. The Red-Rumped Agoutis, *Dasyprocta laporina cayana*, living in two completely different environments had an effect on their personal diet and behavior. In one enclosure, the Agouti (Mac) was permissive which allowed the other species, the Goeldi's Monkies, *Callimico goeldii*, to continually rummage through his buried food storages. In the other enclosure, the brother Agouti (Skippy) had a similar problem with food competition. However, he was very assertive and therefore initiated the food conflict. Surrounded by several tropical bird species and their varying diets, it was easy for Skippy to acquire multiple meals in one sitting. By observing these two issues separately, we were able to test a few different strategies to limit the food competition. In conclusion, by changing the feeding areas of the species affected most by food shortage, we were able to minimize former issues in competition.

2013/2014 STUDENT RESEARCH IN BIOLOGY

STUDENT RESEARCHER(S): Jillian Muhlbauer & Caterina Aiello

CLASS YEAR: 2014

MAJOR: Biology

TITLE OF RESEARCH PROJECT:
"Protective Role of Peroxiredoxin Proteins in MDA-MB-231 Breast Cancer Cells"

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Dr. Shelley Phelan

DATE OF PROGRAM: April 24, 2014

SPONSOR:

DESCRIPTION OF WORK (Short Abstract):
The Peroxiredoxin (Prdx) family of genes encodes thiol-specific antioxidant proteins that protect cells from oxidative stress. Mammalian cells express six different Prdx proteins, and these proteins play a role in cell signaling, proliferation and apoptosis. Recent studies have shown that Prdx levels are elevated in many cancers, suggesting that Prdx upregulation may be an advantageous adaptation to the cancerous state. In the present study, we investigated the role of Prdx proteins in the highly metastatic MDA cell line by using transient siRNA transfection and measuring cell viability in the presence and absence of doxorubicin treatment. We confirmed knockdown using western blot to analyze protein expression, and phase contrast and fluorescent microscopy was utilized to observe cell morphology and apoptosis. Our data show that individual suppression of many of the Prdx proteins leads to increased sensitivity to doxorubicin induced toxicity. In conjunction with previous studies in the MCF-7 cell line, the data supports the protective role of Prdx proteins in breast cancer cell survival and chemotherapy resistance.

2013/2014 STUDENT RESEARCH IN BIOLOGY

STUDENT RESEARCHER(S): Jillian Muhlbauer, Gregg Perlmutter, Caterina Aiello, Harry Cintineo

CLASS YEAR: 2014

MAJOR: Biology

TITLE OF RESEARCH PROJECT: "Elevated peroxiredoxin expression in breast cancer and its protective role in doxorubicin-resistance"

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Dr. Shelley Phelan

DATE OF PROGRAM: April 24, 2014

SPONSOR:

DESCRIPTION OF WORK (Short Abstract):

Peroxiredoxin (Prdx) proteins are thiol-specific antioxidants that protect cells from oxidative stress in various normal and disease states. There are six different Prdx proteins expressed in mammals, each possessing a characteristic tissue and subcellular distribution. Recent studies have revealed elevated Prdx levels in many cancers, suggesting a protective role for these proteins in cancer cell survival. In the present study we analyzed Prdx levels in several human breast tumor samples, and also investigated the function of Prdx proteins in the MCF-7 breast cancer cell line. Analysis of breast tumor and adjacent normal breast tissue from almost 20 patients showed elevated levels of most Prdx proteins in tumor tissue from the majority of patients. To address the role of Prdxs in breast cancer, we used transient siRNA transfections of MCF-7 cells and examined resulting cell viability in the absence and presence of doxorubicin treatment. Our data show that individual suppression of four of six of the Prdx proteins leads to increased cell death, as well as increased sensitivity to doxorubicin-induced toxicity. Finally, we show that clonal selection of doxorubicin-resistant MCF-7 cells by two-week culture in 0.1uM doxorubicin resulted in a marked elevation in the expression of several Prdx proteins. Similar studies are currently underway in the highly metastatic MDA cell line, and possible upstream regulators of Prdx overexpression in these lines are being investigated. Together, these data show a strong protective role for Peroxiredoxins in breast cancer cell survival, and suggest that Prdx overexpression in breast cancer may play a role in chemotherapy-resistance.

2013/2014 STUDENT RESEARCH IN BIOLOGY

STUDENT RESEARCHER(S): Jillian Ottombrino and Oladotun Oyawusi

CLASS YEAR: 2015

MAJOR: Biology

TITLE OF RESEARCH PROJECT:
What Does the Prairie Dog Say? Vocalization and Behavior Patterns of a Captive Prairie Dog Colony

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Ashley Byun

DATE OF PROGRAM: Spring 2014

SPONSOR: Beardsley Zoo of Connecticut

DESCRIPTION OF WORK (Short Abstract): Our research focused on the black-tailed prairie dogs, *Cynomys ludovicians,* at the Beardsley Zoo. The prairie dog colony is a captive group that the Beardsley Zoo has had for over a decade, but little is known about the social structure, burrow system, and vocalizations of this particular colony. This work was conducted to help the Beardsley Zoo better understand this group of prairie dogs. We focused on responses to predator calls and visitors to the zoo. We recorded prairie dog vocalizations and behaviors in response to black footed ferret, red-tailed hawk and humans. We observed alarm calls coming from individuals located in specific holes in the enclosure. Prairie dog vocalizations were analyzed using the sonogram program, RavenLite 1.0. We found that the playbacks elicited a variety of different calls in response to predator call and visitor interactions. There is not one general call for each response as we originally thought.

2013/2014 STUDENT RESEARCH IN BIOLOGY

STUDENT RESEARCHER(S): Gregg Perlmutter and Harry Cintineo

CLASS YEAR: 2014

MAJOR: Biology

TITLE OF RESEARCH PROJECT:

The Effect of Chemotherapy Drugs on Breast Cancer Cell Viability and Peroxiredoxin Expression

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Dr. Shelley Phelan

DATE OF PROGRAM: Fall 2013 – Spring 2014

SPONSOR: Dr. Shelley Phelan

DESCRIPTION OF WORK (Short Abstract):

Peroxiredoxins are a family of proteins expressed in all cell types that are used by the cell to eliminate reactive oxygen species that are produced as a byproduct of normal metabolism. All cells express different amounts and different types of these proteins. These proteins function by donating electrons to ROS to detoxify them. Cancerous cells have developed strategies to upregulate peroxiredoxins that neutralize the excessive amounts of ROS they create through metabolism, thus avoiding apoptosis and continuing to proliferate. Chemotherapy drugs such as doxorubicin induce oxidative damage to cells, and are used to kill cancer cells and prevent their growth. We hypothesized that MDA breast cancer cells upregulate peroxiredoxins and upstream regulators such as Nrf2 in response to doxorubicin in order to increase cell survival and are resistant to chemotherapy treatment. MDA breast cancer cells are a metastatic mammalian cell line. We have previously shown that the non-metastatic MCF7 cell line was resistant to doxorubicin. Western blotting was used to view the levels of peroxiredoxins in cell treatments of different concentrations of doxorubicin and MTS assays were done in order to test cell viability when exposed to different concentrations of doxorubicin. Our results currently show an increase in cell viability when exposed to higher concentrations of doxorubicin, so further investigation needs to be done on this cell line to see if this is the case. Doxorubicin treatments of MDA cells show that some peroxiredoxins are upregulated in response to the treatments at different concentrations. We conclude that doxorubicin may lead to increased antioxidant expression in breast cancer cells as well as increased expression of upstream regulators, protecting these cells from death.

2013/2014 STUDENT RESEARCH IN BIOLOGY

STUDENT RESEARCHER(S): Angela Quental & Jess Conklin

CLASS YEAR: 2014 & 2015

MAJOR: Biology & English Literature and Cultural Studies; Biology

TITLE OF RESEARCH PROJECT:

Title Options:
Phenotypic characterization of interactions between dynein/dynactin and MEL-28 in Caenorhabditis elegans

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Dr. Anita Fernandez

DATE OF PROGRAM: April 24, 2014

SPONSOR:

DESCRIPTION OF WORK (Short Abstract):
In the nematode worm C. elegans, mel-28 encodes a component of the nuclear pore, a complex that controls the entry and exit of materials from the nucleus. To identify genes that work in conjunction with mel-28, RNA interference (RNAi) screening was performed in mel-28 and wild-type animals. Genes were sought that caused novel phenotypes in mel-28 animals. Among the genes identified were genes that encode components of dynein and dynactin complexes. Dynein is a minus-end directed motor required for vesicle transport, organelle positioning, and chromosome segregation, and dynactin is necessary for dynein to bind its cargo. The purpose of this study is to characterize the phenotypes caused by the simultaneous disruption of mel-28 and dynein (or dynactin) in order to better understand how these different functions cooperate. dhc-1 encodes the major component of cytoplasmic dynein. mel-28;dhc-1 double mutants have reduced fertility compared to each single mutant, suggesting that mel-28 and dhc-1 are redundantly required to promote a healthy germ line. In order to determine if normal sperm rescued the reduced fertility phenotype in mel-28;dhc-1 double mutants, we crossed normal males to mel-28;dhc-1 double mutants, and found that brood size was not rescued, suggesting a problem with oocyte production. Examination of embryos from mel-28;dhc-1 double mutants revealed severe defects with the organization of the cells and the composition of the nuclear envelopes; these defects were not observed in either single mutant. Defects caused by a temperature-sensitive allele of dnc-1, which encodes a critical component of dynactin, cause a reduced brood size that is rescued by reduction of mel-28 function. We are continuing to explore the idea that defects caused by crippling the dynactin complex are alleviated by loss of mel-28 function. To do this we are investigating the relationship between mel-28 and a hypomorphic allele of dnc-3, another component of the dynactin complex. Our results suggest that dynein and dynactin have opposing roles in germ-line function.

2013/2014 STUDENT RESEARCH IN BIOLOGY

STUDENT RESEARCHER(S): Amanda Rielly, Katherine Martin, Samantha Matte

CLASS YEAR: 2015 (AR), 2014 (KM, SM)

MAJOR: Biology

TITLE OF RESEARCH PROJECT: Initial Survey of a Captive Black-Tailed Prairie Dog [*Cynomys ludovicianus*] Colony

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Ashley Byun, Ph.D.

DATE OF PROGRAM: Fall 2013-Spring 2014

SPONSOR: Connecticut's Beardsley Zoo

DESCRIPTION OF WORK (Short Abstract):

There is a self-sustaining, captive prairie dog (*Cynomys ludovicianus)* population at the Beardsley Zoo in Bridgeport, CT, with minimal animal-keeper interaction. Prairie dogs are highly intelligent, self-reliant, and wary of humans. In combination with the zoo's restricted resources, very little is known about the group dynamics and social structure of the population. We began by making observations in order to investigate individual prairie dogs and their general behaviors. We estimate that there are approximately 45 to 50 adults in the Beardsley Zoo exhibit. Vaporized propylene glycol was blown into the holes in order to map the subterranean architecture of the burrows. The next step in the study is to capture and mark the prairie dogs in order to distinguish individuals and more closely observe the group dynamics. These initial observations and plans can be used by the zoo in future studies to generate a better understanding of the population.

CHEMISTRY & BIOCHEMISTRY

Bayan Abunar
Kilee Bayne
Sheila Berna
Nicholas Bernier
Derek Cheung
Lily Etemad
Camile Gomes
Amanda Green
Timothy Jacisin
Margaret Siu
Julia Spiridigliozzi
Erin Sullivan
Adalgisa Varuolo
Christine Villa

2013/2014 STUDENT RESEARCH IN CHEMISTRY

STUDENT RESEARCHER(S): Bayan Abunar, Erin Sullivan, Adalgisa Varuolo

CLASS YEAR: Abunar (2014), Sullivan (2014), Varuolo (2015)

MAJOR: Abunar (Biochemistry), Sullivan (Chemistry), Varuolo (Chemistry)

TITLE OF RESEARCH PROJECT:
Nicotine Content in Hookah Tobacco Vapors using Al-Fakher Shisha

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Dr. Matt Kubasik

DATE OF PROGRAM: Spring, 2014

SPONSOR: Department of Chemistry and Biochemistry

DESCRIPTION OF WORK (Short Abstract):
The amount of addictive nicotine was analyzed in hookah vapors using solid-phase microextraction (SPME) combined with Gas Chromatography Mass Spectrometry (GC-MS). Hookah smoking has become increasingly popular in America and other western countries and there is a large misconception that there is no nicotine inhaled while using the apparatus. Thus, using a customized vacuum apparatus we developed a method where hookah vapors were passed through a glass fiber filter to collect nicotine. The contents of hookah vapors were studied to quantify the amount of nicotine inhaled.

2013/2014 STUDENT RESEARCH IN CHEMISTRY

Student Researchers: Sheila Berna, Derek Cheung, Camile Gomes

Class Year: 2014

Major: Biochem, Biochem, Chemistry & Music-Management

Title of Research Project: Spectrophotometric Determination of Cyanide in Fruit Seeds Using Barbituric Acid and Isonicotinic Acid

Host University: Fairfield University

Name of Faculty Research Supervisor: Matthew Kubasik

Date of Program: Spring, 2014

Sponsor: Department of Chemistry and Biochemistry

Description of Work:

It is known that cyanide is a highly toxic ion that can cause adverse health effects if consumed. Cyanide appears in many forms and is also present in some unexpected places such as within seeds of various fruit. A colorimetric assay coupled with a UV-Vis Spectrophotometeric analysis was used to determine the amount of cyanide present within fruit seeds i.e. apple, plum, and peach. The assay of choice works based on the chemistry that occurs between barbituric acid-isonicotinic acid and cyanogen chloride; in the presence of cyanide, the acid solution turns from a colorless liquid into a blue-violet liquid whose intensity correlates to the concentration of cyanide. The cyanide within these seeds are trapped within glycosides and can be released by the endogenous enzyme, beta-glucosidase; some seeds have enough of this enzyme to releases the cyanide from the glycosides efficiently but others do not, so the addition of exogenous enzyme was employed in the method to enhance the release of the trapped cyanide. As a result, without the added enzyme, the concentration of cyanide was lower, however, with the added enzyme, there was a significant increase in the concentration.

2013/2014 STUDENT RESEARCH IN CHEMISTRY

STUDENT RESEARCHER(S) : Lily Etemad

CLASS YEAR: 2015

MAJOR: Chemistry

TITLE OF RESEARCH PROJECT:

Synthesis and Purification of Capture-Tag-Release (CTR) Probes

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Aaron Van Dyke

DATE OF PROGRAM: Spring 2014

SPONSOR: Fairfield University Chemistry Department

DESCRIPTION OF WORK (Short Abstract):

Proteins are involved in essentially all biochemical processes. Protein misregulation often leads to human diseases and thus tools are needed to visualize proteins. We propose the synthesis of a chemical probe that will capture a protein, tag it with a fluorescent label, and release the tagged protein into the cell. Consequently, we have termed this tool a capture-tag-release (CTR) probe. The protein beta-galactosidase will serve as a model system for testing our CTR probe. This protein was chosen because it has a selective inhibitor, is commercially available, and is a robust protein. To date, we have synthesized the chemical bait of our CTR probe from D-galactose. Work is underway to complete synthesis of probe by attaching the release and tagging components. After the synthesis and purification of the CTR probe, we will test its ability to label beta-galactosidase.

2013/2014 STUDENT RESEARCH IN CHEMISTRY

STUDENT RESEARCHER(S): Camile D. Gomes, Margaret Siu, Nicholas A. Bernier

CLASS YEAR: 2014 (CDG), 2015 (MS), 2016 (NAB)

MAJOR: Biochemistry (MS); Chemistry (CDG, NAB)

TITLE OF RESEARCH PROJECT:

Syntheses and NMR Characterizations of Tridentate Pincer SNS Ligand Precursors Using a Microwave Reaction Conditions

HOST UNIVERSITY OR INSTITUTION: Fairfield University

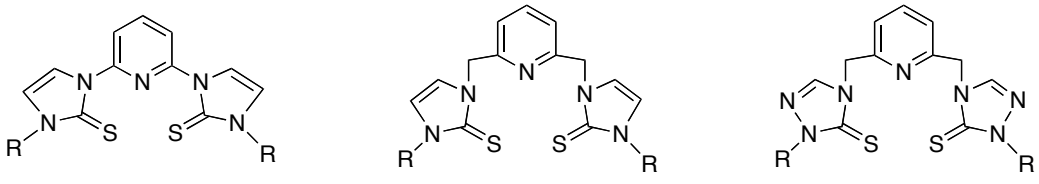
NAME OF FACULTY RESEARCH SUPERVISOR: John R. Miecznikowski

DATE OF PROGRAM: June 2013 to Present

SPONSOR: Kuck Fund and Corrigan Scholars Program

DESCRIPTION OF WORK:

Recently, we have developed and synthesized a series of tridentate pincer ligands, each possessing two sulfur- and one nitrogen-donor functionalities (SNS), based on bis-imidazole or bis-triazole precursors. The tridentate SNS ligands incorporate thione-substituted imidazole or triazole functionalities. We have prepared somewhat rigid ligand systems through the use of 2,6-dibromopyridine as a ligand precursor. In addition, we have prepared more flexible ligand systems by employing the starting material 2,6-(dibromomethyl)pyridine to introduce a methylene linker into the pincer ligand. The thione forming step in the synthesis required five to seven days of heating in refluxing acetonitrile, but only one to four hours of heating at 125 ^{o}C in a microwave reactor. A detailed description of the syntheses, and characterization of the tridentate SNS ligand precursors will be presented.



a **b** **c**

R = *i*Pr, neopenty, *N*-butyl

2013/2014 STUDENT RESEARCH IN CHEMISTRY

STUDENT RESEARCHER(S): Amanda Green and Tim Jacisin

CLASS YEAR: 2014

MAJOR: Chemistry, Biochemistry

TITLE OF RESEARCH PROJECT: Quantitative Analysis of Oleic Acid from Extra Virgin Olive Oil Samples

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Dr. Kubasik

DATE OF PROGRAM: Spring 2014

SPONSOR: Chemistry/Biochemistry Department

DESCRIPTION OF WORK (Short Abstract):
An HPLC was used in order to determine the concentration of oleic acid in three different extra virgin olive oil samples. Extra virgin olive oil is categorized as having 0.8g oleic acid / 100g olive oil, as per the International Olive Council. Oleic acid standards were used to construct a calibration curve using the area underneath the peaks in the chromatogram to calculate unknown oleic acid concentrations. Olive oil samples were extracted using base hydrolysis at reflux conditions and isolated through liquid-liquid extraction. Results will be presented.

2013/2014 STUDENT RESEARCH IN CHEMISTRY

STUDENT RESEARCHER(S): Timothy Jacisin and Ada Varuolo

CLASS YEAR: 2014 (TJ) 2015 (AV)

MAJOR: Biochemistry (TJ); Chemistry (AV)

TITLE OF RESEARCH PROJECT:

Application of Microwave Synthetic Methods
to Preparation of Oligomers of alpha-aminoisobutryic Acid

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Prof. Matt Kubasik

DATE OF PROGRAM: Spring, 2014

SPONSOR: Department of Chemistry and Biochemistry

DESCRIPTION OF WORK (Short Abstract):

Oligomers of the residue of alpha-aminoisobutyric acid (Aib) are known to adopt dominantly 3_{10} helical structures in solution and in the solid state. This structural property is being exploited for enzyme mimetic and nanotechnological applications. Unfortunately, synthetic preparation of oligomers of Aib is difficult, requiring long reaction times and high reaction temperatures. We have applied microwave technology to accelerate the pace of production of Aib oligomers. Results of our studies will be presented.

2013/2014 STUDENT RESEARCH IN Chemistry

STUDENT RESEARCHER(S): Julia Spiridigliozzi

CLASS YEAR: 2014

MAJOR: Chemistry

TITLE OF RESEARCH PROJECT: The Introduction and Verification of a Handheld Chemical Identification System, Ahura Scientific FirstDefender®, in a Forensic Laboratory Setting

HOST UNIVERSITY OR INSTITUTION: Union County Prosecutor's Forensic Laboratory, Westfield, New Jersey

NAME OF FACULTY RESEARCH SUPERVISOR: Richard Costa, Senior Forensic Chemist

DATE OF PROGRAM: Thursday, April 24, 2014

SPONSOR: Professor Harper-Leatherman, Fairfield University

DESCRIPTION *OF WORK (Short Abstract):*

The objective of this research was to introduce and verify the uses of a handheld chemical identification system into a forensic laboratory setting for the detection and identification of controlled dangerous substances. The handheld system was used to determine the composition of unknown solid and liquid substances. This instrument utilizes Raman spectroscopy for scanning and analysis, which can be a complementary technique to infrared spectroscopy and gas chromatography mass spectrometry in a forensic laboratory. The efficiency, accuracy, and ability of the instrument to correctly identify controlled dangerous substances were measured. Mixtures, fluorescent compounds, and dark-colored substances gave less accurate results. However, the instrument is fast, easy-to-use, non-destructive and requires minimal sample prep making it a useful preliminary analysis technique. Further research is needed to confirm these results and to properly evaluate the handheld system for use in forensic laboratories.

2013/2014 STUDENT RESEARCH IN CHEMISTRY

STUDENT RESEARCHER(S): Erin Sullivan

CLASS YEAR: 2014

MAJOR: Chemistry

TITLE OF RESEARCH PROJECT:

Fragmentation Pattern and Bulk Spectrum of 1-ethyl-3-methylimidazolium tetrafluoroborate Ionic Clusters

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Dr. Gary H. Weddle

DATE OF PROGRAM: April 24, 2014

SPONSOR:

DESCRIPTION OF WORK (Short Abstract):

The fragmentation pattern of 1-ethyl-3-methylimidazolium tetrafluoroborate was determined using Fourier Transform Ion Cyclotron Resonance Mass Spectrometry in order to provide information about the stacking structures of the cations and anions of this ionic liquid. The collisional activation of 1-ethyl-3-methylimidazolium tetrafluoroborate with argon gas results in the loss of an imidazolium unit in a sequential manner for positive ion spectra. Activation occurred via the introduction of inert argon gas into the ICR cell and the application of a resonant radiofrequency pulse to the ions. An exercise in instrument operation was performed in which the chirp rate, activation RF amplitude and frequency, and time delay for introduction of inert argon gas were varied and the resultant spectra observed.

2013/2014 STUDENT RESEARCH IN CHEMISTRY

STUDENT RESEARCHER(S): Christine E. Villa, Margaret Siu, Camile D. Gomes, Nicholas A. Bernier and Kilee A. Bayne

CLASS YEAR: 2014 (CEV, CDG, AND KAB), 2015 (MS), 2016 (NAB)

MAJOR: Biochemistry (CEV, KAB, MS); Chemistry (CDG AND NAB)

TITLE OF RESEARCH PROJECT:

Syntheses, X-Ray Crystallographic, Spectroscopic and Electrochemical Characterizations of Three and Five Coordinate SNS Copper (I) and (II) Complexes: Effect of Pincer Ligand on Coordination Geometry

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: John R. Miecznikowski

DATE OF PROGRAM: June 2012 to Present

SPONSOR: Kuck Fund and Corrigan Scholars Program

DESCRIPTION OF WORK:

Recently, we have developed and synthesized a series of tridentate pincer ligands, each possessing two sulfur- and one nitrogen-donor functionalities (SNS), based on bis-imidazole or bis-triazole precursors. The tridentate SNS ligands incorporate thione-substituted imidazole or triazole functionalities. We have prepared somewhat rigid ligand systems through the use of 2,6-dibromopyridine as a ligand precursor. In addition, we have prepared more flexible ligand systems by employing the starting material 2,6-(dibromomethyl)pyridine to introduce a methylene linker into the pincer ligand. We have metallated these ligand precursors to form zinc(II) complexes containing these tridentate ligands. In an effort to learn about the reactivity of the ligand precursors with other metal salts, we have metallated these ligand precursors to form copper(I) or copper(II) complexes. A detailed description of the syntheses, and characterization (X-ray diffraction, electrochemistry, UV-Vis, and EPR spectroscopy) of the SNS copper complexes will be presented.

ENGINEERING

Brian Arpie
Mitchell Bell
Rema Bhatti
Samantha Canosa
Frank Carnovale
Arodi Cruz
Nicole D'Addio
Rob Garrone
Robert Governale
Slawek Guzierowicz
Richard Howley
Richard Kovach
Kaitlin Maciejewski
Diego Mamani
Joseph Mastroluca
Darren Mondezie
Joseph Musubire
Colin Nerich
Margaret Osmulski
Alex Peras
Brendan Peters
Claudele Pierre
Katherine Pitz
Michael Raymond
Yenny Rua
Sharoz Seyal
Chris Smith
Eric Stephen
Stephanie Sutherby
Fred Wedley
Timothy Young

2013/2014 STUDENT RESEARCH IN ENGINEERING

STUDENT RESEARCHER(S): *Brian Arpie, Richard Kovach, Arodi Cruz, Richard Howley*

CLASS YEAR: 2014

MAJOR: *Computer Engineering (BA RK AC); Electrical Engineering (RH)*

TITLE OF RESEARCH PROJECT: EMduino

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Dr. Douglas Lyon

DATE OF PROGRAM: April 24, 2014

SPONSOR:

DESCRIPTION OF WORK (Short Abstract):

Arduino embedded microcontrollers represent a top interface contender in the future quantified world of sensors. EMduino is a modular add-on shield focused on providing energy to Arduino shield compatible products through smart ultra low power harvesting. As a primary input, solar energy is harvested and stored in a robust manner using super capacitors. The harvested energy is then used to switch the remotely located Arduino microcontroller board on and off at set intervals to allow for regular in-field sensor data collection. An onboard communication module allows the collected to data to be wirelessly transferred to a secondary base station Arduino where it may be processed and utilized. Clever ultra low power circuitry insure the attached Arduino always operates in a stable fashion, while a secondary input will allow for future expansion as we forward our efforts in the realm of electromagnetic energy harvesting.

2013/2014 STUDENT RESEARCH IN ENGINEERING

STUDENT RESEARCHER(S): Mitchell Bell, Frank Carnovale,
Margaret Osmulski & Fred Wedley

CLASS YEAR: 2014

MAJOR: Mechanical & Electrical Engineering

TITLE OF RESEARCH PROJECT:

Development of a Venturi Vacuum Pump for the Retraction of Golf Balls from Diverse Golf Course Hazards

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Dr. Brendan Mascarenhas
Dr. Shahrokh Etemad

DATE OF PROGRAM: September 2013 - May 2014

SPONSOR:

DESCRIPTION OF WORK:

The Golf Flow team, consisting of mechanical engineering seniors Mitchell Bell, Margaret Osmulski and Fred Wedley, and electrical engineering senior Frank Carnovale, have recognized the market potential for a cost-effective and efficient device that can retrieve these golf balls that are lost underwater. Their plan is to utilize pumps to provide low-velocity flow from an inlet head to a discharge head. The low-velocity water discharge within the main pipe is supplied via pipes that connect to the side of the main intake pipe within the system. This creates a suction action that draws water from the intake head in order to retrieve any entrained solids, such as golf balls from the bottom of the hazards to the intake piping system. Hitting a golf ball into a water hazard is a frequent occurrence in the great sport of golf, and water hazards provide a difficult obstacle for any golfer. The golf ball retrieval apparatus will provide golf courses with the opportunity to make a one hundred percent profit on golf ball retrieval using a cost-efficient product that retracts submerged golf balls from water hazards of various shapes and sizes. Development of this device will provide a cost-effective and efficient to golf course owners to retrieving golf ball from their hazards in an innovative way.

2013/2014 STUDENT RESEARCH IN ENGINEERING

STUDENT RESEARCHER(S): Nicole D'Addio, Rema Bhatti, Darren Mondezie

CLASS YEAR: 2014

MAJOR: Mechanical Engineering (ND); Electrical Engineering (RB, DM)

TITLE OF RESEARCH PROJECT: Robot Assisted Ribbon Bender

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Dr. Hadjimichael

DATE OF PROGRAM: September 2013 – May 2014

SPONSOR: Northeast Laser

DESCRIPTION OF WORK (Short Abstract):

This project and its poster describes the industrial/automation design in which the components of electro-mechanical systems are used to create an efficient way for bending metallic ribbons. A sequence of steps through robotics will be taking place in order for the ribbon to be bent correctly, by integration of a Mitsubishi Robot and Cognex camera to create an autonomous process. The design project is co-sponsored by the Northeast Laser Company.

2013/2014 STUDENT RESEARCH IN ENGINEERING

STUDENT RESEARCHER(S): Rob Garrone, Joseph Musubire, Michael Raymond, Stephanie Sutherby

CLASS YEAR: 2014

MAJOR: Engineering

TITLE OF RESEARCH PROJECT: Bone Densitometer and Photoplethysmograph

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Dr. Ryan Munden

DATE OF PROGRAM: April 24, 2014

SPONSOR: Dr. Shahrokh Etemad

DESCRIPTION OF WORK (Short Abstract):

Team BoneSmart looks to further develop a previous project that was devoted to the monitoring of bone mineral density and blood flow. Prolonged exposure to microgravity negatively affects bone mineral density in astronauts, leading to increased risk of bone fracture. This device will be wearable, non-invasive and compact to provide a method of monitoring bone mineral density loss and blood flow in astronauts over a period of time. It may also help determine the relationship between bone mineral density and blood flow in a microgravity environment and could potentially lead to a better understanding of the effects of microgravity on physical health.

The method in which we will be measuring bone mineral density utilizes infrared light wavelengths. Different light wavelengths are absorbed by bone to varying degrees and can be set in a ratio. This ratio is calculated by observing the small increase in absorbance by the first wavelength, $\lambda 1_1$, due to more dense bone, and comparing it to the larger increase in absorbance by the second wavelength, $\lambda 2_2$, due to less dense bone. This absorbance ratio has a positive correlation with bone density. Research shows that 850nm and 1050nm wavelengths yield the best results for this particular purpose. A third wavelength, 810nm, was chosen to measure the blood flow through the bone to act as a photoplethysmograph. The more light that is absorbed by blood in the bone, the more blood flow there is through the bone and this may correlate to bone density.

2013/2014 STUDENT RESEARCH IN ENGINEERING

STUDENT RESEARCHER(S): Colin Nerich, Claudele Pierre, Sharoz Seyal, Robert Governale

CLASS YEAR: 2014

MAJOR: Mechanical Engineering & Electrical Engineering

TITLE OF RESEARCH PROJECT: SpinLeaf

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Dr. Shanon Reckinger

DATE OF PROGRAM: April 24, 2014

SPONSOR:

DESCRIPTION OF WORK (Short Abstract):
SpinLeaf is designing and building an Electric Greens Spinner for Stone Gardens Farm, a small-scale family farm in Shelton, CT. The farm is responsible for growing a large variety of seasonal produce, as well as raising grass-fed beef, poultry and pork. One of the farm's important and time-consuming tasks is the process of cleaning the loose leaf greens. Currently, the cleaning duty includes first soaking the greens in water, followed by a rinse cycle inside the farm's produce spinner. While the present process works, there exists some health concerns, as well as, many areas with potential for improvement. The owners of the farm are in need of a new, safer, and more reliable greens spinner. The main function of the new apparatus will be to not only dry, but also clean the greens, all in one cycle. The new model will be made of food safe material, and include safety features not present on the current model. The new design is based off the current spinner, but includes updated features to improve efficiency, quality of product, and the overall safety of the operator.

2013/2014 STUDENT RESEARCH IN ENGINEERING

STUDENT RESEARCHER(S): Brendan Peters, Alex Peras,
Joseph Mastroluca, Diego Mamani

CLASS YEAR *2014*

MAJOR: Electrical Engineering (BP DM), Mechanical Engineering (AP JM)

TITLE OF RESEARCH PROJECT: Automated Manufacturing Delivery System

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Dr. Jeffrey Denenberg,
Dr. Shahrokh Etemad,
Mr. George Warman

DATE OF PROGRAM: 4/24/2014

SPONSOR: Energizer Holdings, Inc.

DESCRIPTION OF WORK (Short Abstract):
The goal for this project is to design a cost effective, off-the-shelf, sustainable control for a manufacturing system vehicle. The parts used in the original design are old, and they are becoming more expensive and difficult to replace. Two different designs are being implemented for prototyping. The first design utilizes a programmable logic controller (PLC) and is our primary design. The second design utilizes a microcontroller, and will be implemented as a backup design. The first design option is to use a small PLC to control the vehicle. We are using the Siemens Simatic S7-1200 for its compact size. The second design will utilize the Mosaic Industries PDQ Board, which utilizes a HCS12 microcontroller for instrument control. The design team will provide drawings for any brackets or mounting fixture designs to be added onto the existing system. Mechanical designs will ensure structural stability and provide protection from environmental factors such as vibration, dust, and hydraulic fluid atmosphere. The power requirements for the control system and motor are compatible with existing machine voltages. New components used in the design, such as power converters and relays, will be easily replaceable and affordable off-the-shelf components. This project will result in a prototype unit and a workable solution accompanied by test results. The design team will provide a completed bill of materials, assembly drawings, source code, and schematics. We will provide a detailed test plan for the unit, incorporating a new test fixture interface.

2013/2014 STUDENT RESEARCH IN MECHANICAL ENGINEERING

STUDENT RESEARCHER(S): Katherine Pitz and Samantha Canosa

CLASS YEAR: 2015

MAJOR: Mechanical Engineering

TITLE OF RESEARCH PROJECT:

HOST UNIVERSITY OR INSTITUTION: Fairfield University & Hofstra University

NAME OF FACULTY RESEARCH SUPERVISOR: Shanon Reckinger
Christopher Sanford

DATE OF PROGRAM: October 2013 to Present

SPONSOR :

DESCRIPTION OF WORK (Short Abstract):

This research involves analyzing the feeding habits of an Amia fish, also commonly known as a Bowfin fish. The Amia fish catches prey through suction feeding which is the rapid expansion of the oral cavity, drawing prey into the mouth. Overtime, through Darwin's theory of natural selection, the Amia fish's mouth has evolved into a circular shaped mouth compared to its previous wedge shaped mouth. The key event in the evolution of fishes that allowed for this is the Maxilla decoupling form skull which is the cause of a circular mouth rather than wedge shaped during suction feeding. To create a wedge shaped mouth, minor surgery is conducted on the fish to manipulate the maxilla. Amia fish are used because they are easily accessible in this region and recover from surgery quickly. The hypothesis is that the circular shaped mouth has allowed for a greater flow rate which is more efficient for suction feeding. The goal is to understand this mouth shape evolution by analyzing experimental data and developing computational models.

2013/2014 STUDENT RESEARCH IN ENGINEERING

STUDENT RESEARCHER(S): Yenny Rua and Kaitlin Maciejewski

CLASS YEAR: 2016 (YR) 2015 (KM)

MAJOR: Mechanical Engineering and Mathematics; (YR), Mechanical Engineering(KM)

TITLE OF RESEARCH PROJECT:
The Relationship between Sodium Hydroxide pH and 3d Printed Support Resin Dissolution

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Dr. Shanon Reckinger

DATE OF PROGRAM: January 2014-April 2014

SPONSOR: Fairfield Engineering, Clare Booth Luce Foundation, REbound Technology

DESCRIPTION OF WORK (Short Abstract):

Rua et. al. [1] investigated the limitations of additive manufacturing for printing microfluidic heat exchanger parts using the Objet Eden 250. The study focused on understanding the geometric limitations of the printer, the impact of printing orientation, and how the small interior channels could be most efficiently cleaned. Gravity-based and complete submersion cleaning methods were tested using solutions at different temperatures and concentrations.

A solution of sodium hydroxide was used for cleaning because this is the method recommended by the Objet Eden 250 instructions. The recommended concentration from Objet was 2% but others have found that 7% was more efficient [2]. Rua et. al. investigated the effect of 7%, 17%, and 27% concentrations and various temperatures of solution on the cleaning process.

The work presented sets out to improve upon the slowest of the cleaning methods attempted in previous experiments, soaking in sodium hydroxide solution. Rather than just submerging a part in sodium hydroxide solution, the solution was continuously monitored for changes in pH and the part was weighed regularly to track changes in mass. It was hypothesized that once the solution reached a neutral pH then the acid base reaction that occurs between the slightly acidic support material and the basic sodium hydroxide would be complete. This neutralization of the sodium hydroxide cleaning solution was hypothesized to be the limiting factor in the cleaning process and the cause of slow cleaning for the soaking method. The part would be placed in fresh sodium hydroxide solution when the solution was neutralized in order to continue the effectiveness of the reaction.
Every two hours the pH of the sodium hydroxide solution was recorded and the heat exchanger part was weighed in order to determine how much support material had been dissolved. Although the relationship between the weight of the heat exchanger parts and the pH of the sodium hydroxide was strong, at this point no true correlation can be made.

References:

[1] Rua, Y., R. Muren, S. M. Reckinger. “Limitations of Additive Manufacturing on Microfluidic Heat Exchanger Components.” Journal of Manufacturing Science and Engineering. (2014), unpublished.

[2] Objet, 2007, "Models Cleaning Procedure using NaOH (Sodium Hydroxide) ," Objet Geometries Inc., Billerica, MA, from http://www.tritech3d.co.uk/images/contentitems/67_1_1.pdf.

2013/2014 STUDENT RESEARCH IN MECHANICAL ENGINEERING

STUDENT RESEARCHER(S): Timothy Young, Slawek Guzierowicz, Eric Stephen, Chris Smith

CLASS YEAR: 2014

MAJOR: *Mechanical Engineering*

TITLE OF RESEARCH PROJECT: Development of Advanced Carbon Fiber Impact Absorption Structure for Formulae F Race Car

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Professor Roux (Advisor), Professor Etemad (Mentor)

DATE OF PROGRAM: 9/3/13-Current

SPONSOR: Professor Roux and The School of Engineering

DESCRIPTION OF WORK (Short Abstract):

Today's cars are built to protect the driver from any injury during a car crash. They have crumple structures that are created to absorb the energy of a crash. In Mid-Engine Formula F races, the most common crash scenario is when the car strikes an obstacle nose first, or at a slight angle. The nose of the car is typically a fiberglass or carbon fiber body piece optimized for aerodynamics. Crush structures need to be included in the design to attenuate energy in a controlled way. The level of injury to the driver can be directly related to how well the crush structure attenuates energy. In this project, we have studied the state of the art for carbon fiber attenuators and have completed the necessary calculations to design a carbon fiber nose cone that also functions as an attenuator. In addition, design modifications to the front bulkhead attachments have been presented to select the new attachment method. With the new geometry of the improved attenuator, the attachment locations have been relocated and customized to assure that the attachment is not compromised before the attenuator crushes. The design must result in a lower combined weight and must be economically feasible for an amateur racing budget. The new impact attenuator will contain at least two layers of carbon fiber on each side of a layer of balsa wood to make the nosecone more rigid and to meet the rules and regulations set forth by The Sports Car Club of America. The work has included elements of systems engineering, CAD design, FEA and some fabrication. Ansys finite element software has been utilized to mimic the dynamic loading of a car crash for the current aluminum impact attenuator. A model of the new carbon fiber impact attenuator will be created in Ansys and tested in the same situations as the aluminum impact attenuator. The steps moving forward for the remainder of the senior design course are to compile all data from FEA modeling and confirm that in the transition from the existing fiber glass nose cone to the new state of the art carbon fiber nose cone/attenuator combination the energy absorption properties are maintained. A scale model will be created and tested to ensure that the calculations are correct and to confirm the technical theories put into practice. Once our pre-production analysis is complete, a full-scale model of our improved impact attenuator system will be manufactured to begin testing. With that complete, the attachments and the attenuator itself will be manufactured to be installed on the racecar before the start of the 2014 racing season.

MATHEMATICS

Lisa Naples

2013/2014 STUDENT RESEARCH IN MATHEMATICS

STUDENT RESEARCHER(S): Lisa Naples

CLASS YEAR: 2014

MAJOR: Mathematics

TITLE OF RESEARCH PROJECT:
Spectral Theory for Expanding Maps with Countable Markov Partitions and Holes

HOST UNIVERSITY OR INSTITUTION: *Fairfield University*

NAME OF FACULTY RESEARCH SUPERVISOR: Mark Demers

DATE OF PROGRAM: Summer 2013

SPONSOR: Fairfield University REU and NSF Grant DMS 1101572

DESCRIPTION OF WORK (Short Abstract):

We study expanding maps of the unit interval that admit countable Markov partitions after the introduction of a hole. We prove that the transfer operator associated with such open systems is quasi-compact and admits a spectral gap on an appropriate function space. In this context, the eigenfunction corresponding to the maximal eigenvalue represents a physically relevant quasi-invariant distribution for the open system. As a by-product, we prove that there exists a bound for the essential spectrum of the transfer operator that scales as a function of this maximal eigenvalue after the introduction of the hole. In this way, the spectral gap does not deteriorate as the hole gets larger as long as a mixing condition is satisfied.

Erica Trombly

NURSING

2013/2014 STUDENT RESEARCH IN NURSING

STUDENT RESEARCHER: Erica Trombly

CLASS YEAR: 2014

MAJOR: Nursing

TITLE OF RESEARCH PROJECT:

The Impact of an Educational Intervention on Knowledge of Type 1 Diabetes Among Senior Baccalaureate Nursing Students

HOST UNIVERSITY OR INSTITUTION: Fairfield University School of Nursing

NAME OF FACULTY RESEARCH SUPERVISOR: Dr. Alison Kris
Dr. Sally Gerard

DATE OF PROGRAM:

SPONSOR:

DESCRIPTION OF WORK (Short Abstract):

The number of Americans living with diabetes has increased by 450% in the past 20 years (CDC, 2010). With this population growing rapidly it is crucial that nurses are well versed in the different types, interventions, and complications of diabetes. Unfortunately, previous research demonstrates that nurses' knowledge of Type 1 Diabetes (T1D) has been suboptimal. The purpose of this study was to a) determine the baseline knowledge of T1D in senior undergraduate nursing students and to b) determine the impact of an educational intervention aimed at improving their comprehension on the subject. A total of 46 students were tested at baseline and again following the educational intervention. Results indicated that students had poor knowledge of T1D at baseline, however they demonstrated substantial and statistically significant improvements following the educational intervention ($p=0.001$). The research shows that the simple addition of one lecture on Type 1 Diabetes can increase the knowledge base of nurses.

2013/2014 STUDENT RESEARCH IN NURSING

STUDENT RESEARCHER: Erica Trombly

CLASS YEAR: 2014

MAJOR: Nursing

TITLE OF RESEARCH PROJECT:

The Impact of an Educational Intervention on Knowledge of Type 1 Diabetes Among Senior Baccalaureate Nursing Students

HOST UNIVERSITY OR INSTITUTION: Fairfield University School of Nursing

NAME OF FACULTY RESEARCH SUPERVISOR: Dr. Alison Kris
Dr. Sally Gerard

DATE OF PROGRAM:

SPONSOR:

DESCRIPTION OF WORK (Short Abstract):

The number of Americans living with diabetes has increased by 450% in the past 20 years (CDC, 2010). With this population growing rapidly it is crucial that nurses are well versed in the different types, interventions, and complications of diabetes. Unfortunately, previous research demonstrates that nurses' knowledge of Type 1 Diabetes (T1D) has been suboptimal. The purpose of this study was to a) determine the baseline knowledge of T1D in senior undergraduate nursing students and to b) determine the impact of an educational intervention aimed at improving their comprehension on the subject. A total of 46 students were tested at baseline and again following the educational intervention. Results indicated that students had poor knowledge of T1D at baseline, however they demonstrated substantial and statistically significant improvements following the educational intervention ($p=0.001$). The research shows that the simple addition of one lecture on Type 1 Diabetes can increase the knowledge base of nurses.

PHYSICS

Bayan Abunar

Michael Reilly

2013/2014 STUDENT RESEARCH IN PHYSICS

STUDENT RESEARCHER(S): Bayan Abunar

CLASS YEAR: 2014

MAJOR: Biochemistry

TITLE OF RESEARCH PROJECT:

Ultrafast Optical Spectroscopy of Novel Fluorescent Probes for Sensing Reactive Oxygen Species for Cancer Treatment

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Dr. Bidyut Das

DATE OF PROGRAM: September 2013-December 2013

SPONSOR:

Fairfield University College of Arts and Sciences
National Institute of Health (NIH)

DESCRIPTION OF WORK (Short Abstract):

The involvement of H_2O_2 in cellular signaling and disease states has motivated our group to study the photo physical properties of novel chemical tools for understanding how cells produce and funnel H_2O_2 into specific signaling pathways in living systems giving emphasis to neurodegenerative diseases and cancer. In this collaborative research program we study fluorescence decay kinetics of two novel chromene and stilbenes based hybrid boron containing probes to detect the concentration of Reactive Oxygen Species (ROS). Time-resolved measurements were performed to find fluorescence decay times at 395nm excitation with 100 fs laser pulses. The emission was measured with a 10ps streak camera. This study is expected to help clinicians to identity the stage of tumor and subsequent decisionmaking process to use chemo and radiotherapy. These compounds not only have the potential to be used as diagnostic agents, but also as chemotherapeutic agents as pro-drugs.

2013/2014 STUDENT RESEARCH IN PHYSICS

STUDENT RESEARCHER(S): Michael Reilly

CLASS YEAR: 2015

MAJOR: Physics

TITLE OF RESEARCH PROJECT:

Photothermal Microscopy study of cancer and non-cancer cell nuclei

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Dr. Min Xu

DATE OF PROGRAM: March and April 2014

SPONSOR: DOD Prostate Cancer Research Program, National Institutes of Health, Research Corporation for Science Advancement

DESCRIPTION OF WORK (Short Abstract):

A pump-probe Photothermal microscope was implemented and used to study cancer and non-cancer cell nuclei. A nanosecond laser pulse was used to heat the cell nucleus and the heat dissipation was recorded with a probing beam by measuring the refractive index alteration due to heating. We find that cancer nuclei dissipate heat more slowly than non-cancer nuclei. This Photothermal signature may be used to probe the nuclear structure and distinguish between benign and malignant cancer.

PSYCHOLOGY

Sarah Birney
Jessica Caputo
Monique Goguen
Hannah Horvath
Kaitlyn Krauss
Samantha Krivensky
McKenna O'Shea
Katelyn Parisi
Emily Peters
Amina Seyal
Ariel Sordillo
Anne Marie Teti

2013/2014 STUDENT RESEARCH IN PSYCHOLOGY/NURSING

STUDENT RESEARCHER(S): Sarah Birney, Monique Goguen, Kaitlyn Krauss, Emily Peters

CLASS YEAR: 2014 (MG, EP); 2015 (SB, KK)

MAJOR: Psychology (SB, MG, EP); Nursing (KK)

TITLE OF RESEARCH PROJECT:

The Presence of Cognitively Enriched Environments for Nursing Home Residents with Dementia

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Dr. Alison Kris
Dr. Linda Henkel

DATE OF PROGRAM: April 24, 2014

SPONSOR: Interdisciplinary Health Scholars Program at Fairfield University

DESCRIPTION OF WORK (Short Abstract):

In animal models, the construction of enriched living environments has been shown to mitigate the effects of Alzheimer's disease and to improve cognitive function following brain injury. This preliminary research suggests that the construction of enriched environments may have a similarly beneficial impact among cognitively impaired older adults. The purpose of this research is to describe and evaluate the care environment of cognitively impaired nursing home residents. Qualitative data from 23 nursing home residents in two Connecticut nursing homes will be presented. Results from field notes centered on two main themes a) the types of memory cueing items present in resident rooms and b) efforts to make the facility more "home-like". Based on descriptions from field note data, the level of enrichment in resident rooms could be classified as rich (n=9), moderate (n=7), or poor (n=7). There was significant variation in the level of enrichment between the two nursing homes.

2013/2014 STUDENT RESEARCH IN PSYCHOLOGY/NURSING

STUDENT RESEARCHER(S): Sarah Birney, Monique Goguen, Kaitlyn Krauss, Emily Peters

CLASS YEAR: 2014 (MG, EP); 2015 (SB, KK)

MAJOR: Psychology (SB,MG, EP); Nursing (KK)

TITLE OF RESEARCH PROJECT:
What are the Functions and Value of Reminiscence for Nursing Home Residents?

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Dr. Linda Henkel
Dr. Alison Kris

DATE OF PROGRAM: 4/24/2014

SPONSOR: Interdisciplinary Health Scholars Program at Fairfield University

DESCRIPTION OF WORK (Short Abstract):
Why do people reminisce about their past, and what functions and values does reminiscing and sharing one's life experiences and memories with others have? The present study examined the functions of reminiscence for older adults living in nursing homes. The study focuses particularly on the frequency and value of reminiscence in the nursing home setting and with whom reminiscence occurs. Residents ($n = 23$; $M_{age} = 87.7$ years) from two local nursing homes in Fairfield County answered questions about why, when, and with whom they reminisce and completed a battery of measures of their mental health, well being, and cognitive functioning. Results showed that the nursing home residents reported intimacy, nurturing social bonds, and teaching others as predominant reasons for reminiscing with others. They reported relatively low rates of reminiscing for the purpose of preparing for death or solving problems. Residents reported enjoying opportunities to reminisce. They tended to reminisce alone, and were more likely to engage in reminiscence with family than with other residents of the nursing home. Reminiscence with health care providers was rare, although residents did report a desire to do so more often. Correlational analyses revealed that residents engaged in reminiscence to serve particular purposes (e.g., emotion regulation, making sense of the present, and reducing boredom) in relation to their levels of morale, depression, and loneliness.

2013/2014 STUDENT RESEARCH IN PSYCHOLOGY

STUDENT RESEARCHER(S): Jessica Caputo, McKenna O'Shea

CLASS YEAR: 2015 (JC) , 2016 (MO)

MAJOR: Individually Designed Behavioral Neuroscience (JC) Psychology (MO)

TITLE OF RESEARCH PROJECT:

Studying Autism in Rodents: The Effects of Early Exposure to Valproic Acid and Environmental Enrichment on Autistic-Like Behaviors in Male Rats

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Shannon Harding, PhD

DATE OF PROGRAM: Spring 2014

SPONSOR: The Brinkman Foundation

DESCRIPTION OF WORK (Short Abstract):

Valproic Acid (VPA) is an anticonvulsant drug used to treat epilepsy in humans. Previous research has demonstrated a link between prenatal exposure to high levels of VPA and autistic like social behaviors in male offspring. There is also research indicating that environmental enrichment may reduce anxiety levels and increase social interactions in male rats. The current study was designed to test whether (1) a moderate dose of VPA would induce autistic like behaviors and (2) whether environmental enrichment after weaning using the high dose of VPA could rescue abnormal phenotypes. Pregnant female rats were injected with VPA (350 mg/kg) or saline on gestational day 12.5. After birth, dams were tested for maternal behavior when pups were 13 days old. Pups were later assigned to two conditions: enriched or standard housing from P21 to P35. This resulted in four groups: VPA- Standard (n= 11), VPA-Enriched (n=11), Control-Standard (n=10) and Control-Enriched (n=13). Young male rats were tested for anxiety using several behavioral tests: Elevated Plus Maze, Social Preference, and Emergence. VPA exposed rats showed different behaviors from saline rats on all behavioral tests. The findings suggest that even a moderate dose of VPA may create a model for autism in rodents, and that enrichment may rescue some behaviors (emergence). This research has important implications for the treatment and testing of autism in children.

2013/2014 STUDENT RESEARCH IN PSYCHOLOGY

STUDENT RESEARCHER(S): Samantha Krivensky

CLASS YEAR: 2014

MAJOR: Psychology

TITLE OF RESEARCH PROJECT:
Timing is everything: The Development of Conditioned Attitudes and Social Evaluations

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Dr. Michael Andreychik

DATE OF PROGRAM: September 2013 to May 2014

SPONSOR: Fairfield University

DESCRIPTION OF WORK (Short Abstract):

Many theories in psychology consider attitudes to be the product of an individual's evaluation of a stimulus. For example, an individual evaluates the behavior or status of a social group and then creates an attitude that is either positive or negative as a response. However, recent research has shown that attitudes can be developed first, without the individual's knowledge, through evaluative conditioning (i.e., the development of unconscious positive or negative associations with novel stimuli). I aim to further investigate these claims, and see whether explanations for the positive and negative behaviors of newly-encountered social targets are created after the fact as justifications meant to uphold the unconscious attitudes. I predict that subjects who are negatively conditioned will develop a negative unconscious association with the novel social group, and as a result will explain the group's behaviors in a manner that justifies this unconscious negative attitude (e.g., explaining negative group actions in terms of internal deficiencies of the group). Vice versa, subjects who are positively conditioned will develop a positive unconscious association with the group, and will explain the behaviors of the group in a way that upholds this unconscious positive attitude (e.g., explaining negative group actions in terms of environmental factors that "forced" the group to behave negatively.

2013/2014 STUDENT RESEARCH IN PSYCHOLOGY

STUDENT RESEARCHER(S): Katelyn Parisi

CLASS YEAR: 2014

MAJOR: Psychology

TITLE OF RESEARCH PROJECT:

"Here's Looking at Me:
The Effects of Seeing Oneself in a Photo on Memory Reconstruction"

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Dr. Linda Henkel

DATE OF PROGRAM: Fall 2013

SPONSOR: Fairfield University's Psychology Department

DESCRIPTION OF WORK (Short Abstract):

This study examined how seeing oneself in photos affects subsequent memory for factual details about the scenes, as well as the phenomenological qualities and visual perspective of the remembered experience. Subjects were taken on a museum tour through three exhibits, where objects were either photographed with the subject standing next to them, without the subject in the shot, or not at all. Subjects then reviewed photos that were taken and later their memories for factual details and phenomenological characteristics were assessed. Results revealed that viewing photos increased ratings of observer perspective memories at recall and this occurred regardless of whether one was in the photo or not. Furthermore, viewing a photo without oneself produced greater memories for factual details than viewing no photos at all. These findings suggest that seeing photos of any type can affect the visual perspective of memory but not memory for details. The implications and limitations are discussed.

2013/2014 STUDENT RESEARCH IN PSYCHOLOGY

STUDENT RESEARCHER(S): Amina A. Seyal

CLASS YEAR: 2014

MAJOR: Psychology

TITLE OF RESEARCH PROJECT:

Perception of Domestic Violence
as a Function of Traditional vs. Nontraditional Gender Roles

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Dr. Judy Primavera

DATE OF PROGRAM: April 24, 2014

SPONSOR: Dr. Judy Primavera

DESCRIPTION OF WORK (Short Abstract):
73 Fairfield University students participated in a study in which they answered questions following a reading of one of two possible scenarios. Both scenarios contained the same situation in which a woman experiences an incidence of domestic violence by her male partner. The difference between the two conditions was that in one, the woman who experienced domestic violence was characterized with a gender traditional persona, whereas in the other, the woman was characterized with a gender nontraditional persona. Preliminary analyses have been conducted and there are marked gender differences in responses to questions as well as various differences in responses between the two gender traditional versus gender nontraditional conditions. Further more detailed analyses are being conducted to measure where blame and responsibility for the incidence was placed; data is also being collected from a sample of students at a local community college for comparison.

2013/2014 STUDENT RESEARCH IN PSYCHOLOGY

STUDENT RESEARCHER(S): *Ariel Sordillo*

CLASS YEAR: 2014

MAJOR: Psychology

TITLE OF RESEARCH PROJECT:

Correlates of perpetration and victimization of romantic relationship violence in college students

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Dr. Margaret McClure

DATE OF PROGRAM:

SPONSOR:

DESCRIPTION OF WORK (Short Abstract):

Dating violence (DV) is a serious problem among college students. We examined DV, childhood trauma (CT), and early maladaptive schemas (EMS), in 76 undergraduates. For women, abandonment and sexual abuse correlated with perpetrator scores, and physical abuse correlated with recipient scores. For men, abandonment and failure correlated with perpetrator scores, while emotional neglect and social isolation correlated with recipient scores. This suggests that DV relates to both CT and EMS differently for males and females.

2013/2014 STUDENT RESEARCH IN PSYCHOLOGY

STUDENT RESEARCHER(S): Anne Marie Teti & Hannah Horvath

CLASS YEAR: 2014

MAJOR: Psychology

TITLE OF RESEARCH PROJECT:

Comparing the Effects of Ethanol Exposure During Adolescence and Adulthood on Reproductive Behaviors in Male Rats

HOST UNIVERSITY OR INSTITUTION: Fairfield University

NAME OF FACULTY RESEARCH SUPERVISOR: Dr. Shannon Harding

DATE OF PROGRAM: Fall 2013

SPONSOR:

DESCRIPTION OF WORK (Short Abstract):

Adolescence is a critical period of brain development that often coincides with alcohol (ethanol) consumption, with 72% of 12th graders reporting some experience with drinking before high school graduation in the United States. However, the long-term effects of early exposure on adult patterns of behavior have not been fully explored. The effects of ethanol on reproduction, including sexual arousal and motivation, also remain unclear. The present study was designed to (1) examine the effects of repeated ethanol consumption during adolescence on reproductive behaviors and (2) to compare these findings with ethanol consumption in adulthood. Twenty-six adolescent (Young) and eighteen Adult male Long Evans rats were used in this study. Rats received 3g/kg of ethanol (Young-EtOH, n=14; Adult-EtOH, n=8) or water (Young-Control, n=12; Adult-Control, n=10) via gavage twice a week for 8 weeks. Sexual performance was assessed with tests for copulation, and other aspects of reproductive behavior were assessed with partner preference tests and 50kHz vocalization tests. Behavioral tests were conducted after consumption in weeks 3-8 and again after a 4-week abstinence period to assess long-term effects. Data analysis suggests that this binge-like ethanol consumption is associated with impairments in copulation, partner preference, and vocalizations. However, the patterns of impairment vary as a function of age, and long-term effects are moderate and seen only in the adolescent EtOH group. These data have important implications on the reproductive success of individuals exposed to alcohol early in development when the brain is undergoing important structural changes.