Summer Undergraduate Research Experience Symposium

September 26, 2015 | 9:00 am - 1:00 pm

Join us in celebrating the hard work done by our summer undergraduate research students. Learn more about the benefits of working with a faculty member on scholarship and creative arts and celebrate the accomplishments of some of our research students. This event will feature posters and talks by students from the Summer Undergraduate Research Experience (SURE) Program.

9:00am-10:30am	Open House: Poster Presentations *Alfond Science Center, 2nd and 3rd Floors*
10:30am-12:00pm	Oral Presentations *Alfond Science Center, Room 106*
12:00pm-1:00pm	SURE Lunch for Students and Families *Refreshments available on the 3rd floor of Alfond Science Center*

Presentation schedule enclosed in program

Poster Presentations

9:00am-10:30am

Summer Undergraduate Research Experience Symposium

POSTER 1

Comparative Analysis and Synthesis of Language Spectra

Presenter: Carlos Aguero

Advisor: Michael Arciero

Major: Applied Mathematics; Minor: Political Science

Our work in data signal processing began with understanding the properties of discrete-time signals, and how to construct and analyze them. A discrete-time signal is a sequence, x(n); n = 0; 1; 2; 3; …;N, that is, a real-valued function on the integers. Typically, the integer represents time, and the signal represents measurements of some physical quantity such as voltage, pressure, etc, equally spaced time intervals. In general, we may allow n to range from –infinity to infinity, though all physically realizable signals will be of finite length. In particular, we initially focus on sinusoidal signals, for example, x(n) = Asin(2 * pi * f * n) where A is the amplitude and f is a normalized frequency. All periodic signals can be constructed using simple sinusoidal signals, with their amplitude and frequency as parameters to be estimated. We generated signals consisting of multiple sinusoids and used methods such as the periodogram to estimate the spectrum. We also modeled signals as auto-regressive processes, where a white noise random process is input to the system, and the output consists of a sum of the white noise with a weighted average of past outputs. These models form the basis for classical models of speech.

POSTER 2

Grey Seal Diet Composition

Presenter: Jessica Antonez

Advisor: Kathryn Ono

Major: Marine Science; Minor: Environmental Science

The Northwest Atlantic population of grey seals (Halichoerus grypus) is continuously growing since the enactment of the Marine Mammal Protection Act of 1972. The increased number of seals has created concern over the potential of a larger number of interactions with fisheries. This study was conducted to better understand the proportion that each species of fish make up in grey seal diet through the collection of grey seal scat from Mount Desert Rock in Maine, Monomoy Island, and Muskeget Island in Massachusetts, ranging from 2004 to present. Diet composition was determined through traditional hard part analysis of fish otolith identification, and the utilization of other fish hard parts. Relative Abundance (RA) and Percent Biomass (PB) were used to evaluate scat samples. American sand lance (Ammodytes americanus), white hake (Urophycis tenuis), and silver hake (Merluccius bilinearis) make up 62% of bony fish (Osteichthyes) consumed by grey seals. Bony fish consist of 67% of grey seal diet. Fish size was estimated by otolith length and weight, which determined that the majority of the fish consumed were juveniles. Overall, the diet of the grey seals in this study depict that of an opportunistic feeder.

POSTER 3

Population and Size Data for Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus*) in the Saco River, Maine

Presenter: Jacob Bilsky

Advisor: James Sulikowski

The Saco River Estuary supported an abundant population of Atlantic Sturgeon during the 1800s, however by 1950 they had disappeared from this habitat. Because of this the Saco became unimportant to the study of these fish. That all changed in 2007 when a sturgeon was accidentally caught in a gill net during a research trip. Studies on the population began in 2008, but up until recently valuable data on size, recaptures, nets, and the general state of the watersheds population was left unstudied. Over the course of the summer of 2015, time has been taken to organize and draw conclusions from this data to assess the recovery of the Atlantic Sturgeon in the Saco River.

POSTER 4

The Role of Hsp90 in Regulating Mu Opioid Receptor Signaling

Presenter: Courtney Brann

Advisor: John Streicher

Major: Medical Biology

To successfully treat chronic pain, the development of opioids with fewer side effects is necessary. At the Mu Opioid Receptor (MOR), different ligands can be functionally selective and evoke unique signaling cascades as a response. Functionally selective drugs that regulate specific targets could decrease the undesirable effects seen in opioid pain treatments while still promoting analgesia. A proteomic database was utilized to find the potential MOR regulator Heat Shock Protein 90 (Hsp90), a highly expressed signaling regulator that is altered in the brain during chronic opioid exposure. Initially, Hsp90 was inhibited in CHO, HEK, SH-SY5Y, and U2OS cells using 17-AAG, then treated with DAMGO, an agonist of the MOR. Each cell line showed varying responses, suggesting the importance of Hsp90 in MOR regulation that is highly dependent on context. Mice brains were injected with 17-AAG and DAMGO, and the periaqueductal gray, striatum, and brain stem were all assessed for signaling and protein expression, again showing variability between brain regions. A tail flick test with live, similarly treated mice showed that 17-AAG slightly decreases anti-nociceptive response to DAMGO. Preliminary studies in mice show that chronic opioid dependence in Hsp90 inhibited mice significantly increases urine and feces output during naloxone withdrawal, suggesting that Hsp90 inhibition worsens morphine-induced dependence in mice. Therefore, Hsp90 has a large regulatory role in MOR signaling, and potential Hsp90 co-therapies may be developed to combat negative side effects while taking opioids.

POSTER 5

Sharpnose Shark Age and Growth in the Gulf of Mexico

Presenters: Alicia Brown

Advisor: James Sulikowski

Major: Marine Biology

Due to slow growth and maturity and overfishing Atlantic Sharpnose populations are decreasing. With decreasing populations more research is required to investigate what changes need to be made to current management policies for the species. In collaboration with the National Oceanic and Atmospheric Administration and the Gulf Coast Research Laboratory, Atlantic Sharpnose shark age and growth from the Gulf of Mexico will be investigated by using vertebral samples. Vertebral samples of Sharpnose collected from the east, west, and central regions of the Gulf of Mexico will

be aged and compared for differences in age and growth characteristics. If differences are present, the information can be used for better management of the species in each region of the Gulf of Mexico. The focus last year and this summer was preparing all the vertebral samples for aging. Two vertebral centra from each sample were cleaned, cut and prepared for aging using a Jemsaw and mounted on glass microscope slides. Pictures of each vertebral sample were also taken using a microscope camera to magnify the annuli, or bands, on the Intermedialia and Corpus calcareum of the centra. The next focus is the age determination process which involves investigating the number of translucent and opaque bands on the vertebral centra. This study will be the first to specifically look at the differences of age and growth of Sharpnose sharks in each region of the Gulf of Mexico. This will provide a better understanding of age and growth characteristics that can be used for creating more appropriate management policies of the species.

POSTER 6

Expression of Transcription Factor, ATF3, Following Lacrimal Gland Excision in Mice Trigeminal Ganglia

Presenter: William Bushey

Advisor: Ian Meng

Major: Medical Biology

The cornea is one of the most densely innervated parts of the body. Consequently there is a vital need to maintain an adequate corneal surface for proper function and innervation. Upon disequilibrium to the natural environment of the cornea and surrounding epithelium, such as during Dry Eye Disease, the ophthalmic nerves projecting from the trigeminal ganglia wane. Expression of the transcription factor ATF3 is thought to play a role in the healing process of the degenerated neurons. This research investigates the protein expression in the trigeminal ganglia following Lacrimal Gland Excision, which induces an environment similar to the one seen in Dry Eye Disease. Corneal neurons were visualized using a neuron membrane stain applied to the cornea that allows For retroactive tracing of the ophthalmic neurons of the trigeminal ganglion, which were dual Stained with anti-rabbit ATF3 antibody (Santa Cruz Biotechnologies), to mark for nerve regeneration. Total trigeminal ganglia cell body populations were also quantified using NeuN neuronal marker. Due to time constraints data was not completely collected and quantified so no conclusions can be made at this time.

POSTER 7

Dose-dependent Exposure of 17α-ethinylestradiol Impacts on Threespine Stickleback Boldness

Presenter: Brennah Campbell

Advisor: Teresa Dzieweczynski

Major: Psychology; Minors: MHRTC and Philosophy

Endocrine disrupting chemicals like 17α-ethinylestradiol (EE2) are prevalent in aquatic ecosystems worldwide and have the ability to decrease the fitness of aquatic organisms because they can cause alterations in the way organisms forage, find and protect mates, fight and explore, and react to predators. Since boldness looks at the risk organisms are willing to take to attain those resources, this study organized male and female threespine sticklebacks into either a control group (no EE2), a low-dose group (5 ng/L EE2), or a high dose group (10 ng/L EE2) to see the impact EE2 can have on boldness. Fish were run in four different assays (shoal, empty, foraging, and environment tank) for three weeks and their behavior was compared over time and across treatment groups. By making the public aware of the negative impact EE2 has on aquatic organisms it gives people the power to change their behavior and limit what waste is released into aquatic ecosystems.

POSTER 8

Non-invasive Genotyping of Nutria via Fecal DNA: a Pilot Study

Presenter: Austin Coco

Advisor: Zach Olson

Major: Marine Science; Minor: Political Science

Nutria, a large invasive rodent, can cause massive damage to native wetlands through feeding, and is therefore the target of widespread eradication efforts in the United States and elsewhere. However, eradication efforts can be impaired when accurate population estimates are unavailable. Because nutria individuals are indistinguishable under normal field conditions and the most accurate methods of population estimation rely on individually recognizable animals, estimating nutria population size is difficult. Non-invasive genotyping of individual nutria via DNA from their fecal pellets is a potential solution. A successful non-invasive genotyping method requires the optimization of three steps: field preservation of pellets, DNA extraction, and amplification of hypervariable genetic markers called microsatellites. We collected fecal pellets from the field in either a DET buffer or an EtOH buffer to test the effectiveness of two preservation methods. We tested a number of fecal DNA extraction methods, and conducted iterative trials to optimize amplification conditions. In preservation trials, DET buffer and EtOH buffer preserved samples equally well, but EtOH required fewer steps in DNA extraction. The final extraction method yielded sufficient quantities of genomic DNA to amplify a six-locus microsatellite panel. With final amplification conditions we were able to identify individual nutria in a population (P(ID) was approx. 1.9x10-5; P(ID)sibs was approx. 0.012). This pilot study was successful in obtaining at least partial genotypes in 13/15 samples, and full genotypes (6/6 loci) in 9/15 samples. Combined, our methods represent the first successful attempt to identify individual nutria from their fecal pellets.

POSTER 9

Investigating the Cage-Effect Property of Ionic Liquids Using the Photo-Fries Reaction

Presenter: Andrew Diorio

Advisor: Amy Keirstead

Major: Chemistry; Minor: Mathematics

Ionic liquids (ILs) have gained a great deal of attention in recent years, in part because they are considered to be a “green” alternative to traditional organic solvents. These novel media have an array of applications from being a solvent for synthesis and separation of compounds to electrolytes in dye-sensitized solar cells; however, when ILs are used in this latter application, the cells are not as efficient as predicted which could be due to the cage effects of the ionic liquid. Our work attempts to quantify the cage effects of ILs using a photochemical probe reaction called the photo-Fries reaction, where the ratio of products from the reaction (analyzed by gas chromatography-mass spectrometry) can inform on the environment in which the reaction occurs. Previous work carried out in our group using 1- and 2-naphthyl acetate in imidazolium ionic liquids showed that the cage effect of ionic liquids was quite significant. However, one flaw of this study was that one of the primary photoproducts (ethane) could not be isolated and observed. Thus, current work is aimed at carrying out analogous studies using other naphthyl esters (benzoate, pivalate, myristate) to better quanitfy the cage effect. This poster presents work done to date on this second phase of the project, including synthesis and characterization of the esters and some preliminary photolysis studies.

POSTER 10

Probiotic Bacteria Reduce *Salmonella javiana*-induced Epithelial Cell Cytotoxicity and Decrease Virulence Gene Expression

Presenter: Lauren Gileau

Advisor: Kristin Burkholder

Major: Nursing

Salmonella enterica is a foodborne bacterial pathogen that causes severe gastrointestinal infections. A new strain of Salmonella enterica, S. enterica Javiana, has recently emerged as a leading cause of deadly Salmonellosis, but little is known of its mechanisms of pathogenesis or of ways to limit infection. Because S. Javiana possesses toxin genes not found in other strains of S. enterica, we evaluated the pathogen's potential cytotoxic effect on human intestinal epithelial cells. We also evaluated the potential inhibitory effect of lactic acid "probiotic" bacteria, including Lactobacillus acidophilus, Lactobacillus rhamnosus, Lactobacillus casei, Lactobacillus plantarum and Lactobacillus mesenteroides, on S. Javiana-induced cytotoxicity. Cytotoxicity assays revealed that S. Javiana has a strong cytotoxic effect on host cells, and when host cells were pre-treated with L. rhamnosus, L. acidophilus or L. casei prior to infection, S. Javiana-induced cytotoxicity was significantly reduced. We further sought to determine the mechanism by which these probiotic bacteria decreased S. Javiana-induced cytotoxicity, and found that the probiotic bacteria had no effect on S. Javiana viability, or on S. Javiana adhesion to or invasion of host cells. However, S. Javiana exposed to L. acidophilus and L. rhamnosus did exhibit decreased expression of genes pltA, cdtB and invA, which encode toxins and a toxin secretion system. Data suggest that L. acidophilus and L. rhamnosus might be useful if taken as prophylactics to reduce incidence or severity of S. Javiana Salmonellosis, and that these probiotics may work by preventing S. Javiana from producing key toxins that would otherwise damage host intestinal cells.

POSTER 11

Assessment of the Winter Flounder (*Pseudopleuronectes americanus*) Stock of the Saco River Estuary, Maine

Presenter: Lars Hammer and Riley Austin

Advisor: James Sulikowski

Major: Marine Science

Winter flounder (*Pseudopleuronectes americanus*) are considered one of the most well-known groundfish in the Gulf of Maine (GOM). Additionally, winter flounder are commercially and recreationally valuable in this region. However, heavy fishing pressure and habitat destruction over the past 20 years have caused winter flounder stocks to drastically decline. The Saco River estuary (SRE) is an established nursery ground and habitat for over 60 marine, diadramous, and freshwater fish species, including winter flounder. Although the general fish assemblage of the SRE has been well studied, winter flounder community data is lacking. In order to learn how the SRE may be serving as an essential habitat for winter flounder, beach seines and VI Alpha tags are being used within this river system to assess abundance of young of the year individuals. To date, 8 winter flounder have been tagged and released. Ultimately, recapture of tagged juvenile individuals would confirm that winter flounder are returning to the estuary, suggesting that the SRE is an essential habitat for the species.

POSTER 12

Building Capacity for Seaweed Aquaculture in Saco Bay, Maine: Nursery Creation and Sporulation of *Saccarhina latissima*

Presenter: Melissa Henderson

Advisor: Adam St. Gelais

Majors: Marine Science and Medical Biology

Aquaculture of Sugar Kelp (*Saccarhina latissima*) may aide in erosion mitigation in the Camp Ellis area, which loses two or three feet of beach annually because of wave energy reflected by the jetties at the end of the Saco River. It is hoped that the kelp may dampen the wave energy and slow sediment transport to help maintain the beaches. Additionally, the kelp grown will provide a source of seed for aspiring kelp farmers and for further study at the University of New England (UNE). Kelp aquaculture is an emerging industry in Maine, and is particularly relevant in Saco Bay due to its potential for job creation, consumer products, erosion mitigation, and other ecosystem services. In summer, 2015 kelp cultivation was initiated at UNE in support of future applied research with the intention of future erosion mitigation research and to provide sustainable food for students. To build macroaglal research capacity at UNE, a sporing nursery was designed and constructed in the Marine Science Center during summer 2015. The nursery is designed to be a sterile room in which sporing and seed production occurs, and researchers can conduct controlled experiments on various types of seaweed in addition to *S. latissima*. Initial *S. latissima* sporing will begin in fall, 2015. *S. latissima* spores will settle on PVC seeding spools, which will later be transferred to an offshore experimental site to provide proof of concept for future erosion and ecosystem services research.

POSTER 13

Shortnose Sturgeon in the Saco River Estuary: An Assessment of Critical Habitat

Presenter: Cameron Hodgdon

Advisors: James Sulikowski

Majors: Marine Science and Applied Mathematics

The shortnose sturgeon is an endangered fish that inhabits river systems along the eastern coast of the U.S. (NMFS 1998). With endangered species, it is important to determine critical habitats: areas where a fish species feeds, finds shelter, spawns, and/or grows to maturity (NMFS 1998). Given this need to understand habitat use for shortnose sturgeon, the goals of my research were to examine relationships that this fish has with the Saco River estuary. Using acoustic telemetry data collected since 2010, movement patterns in the Saco River were catalogued and analyzed. This data was then compared with Atlantic sturgeon movements of the same river. Segregation between the two species was found to exist and preliminary data suggests that this is due to the sturgeons' differences in diet preferences. Preliminary data also suggests that the upstream Saco River is an ideal foraging location for the shortnose sturgeon and, because of this characteristic, would show it to be a critical habitat for the species.

POSTER 14

The Development of a Method to Assess Attentional Bias: The Emotional Stroop Task

Presenter: Benjamin Katz

Advisor: Patricia Long

Major: Psychology; Minor: MHRTC

Attentional bias is defined as an individual's tendency to selectively attend to certain stimuli over

others (MacLeod, Mathews, & Tata, 1986), and is a cognitive process that has been widely examined in the etiology and maintenance of psychopathology. While this phenomenon has been extensively studied in individuals with Obsessive-Compulsive Disorder (OCD) and Generalized Anxiety Disorder (GAD) (Novara & Sanavio, 2001; Becker, Rinck, Margraf, & Roth, 2001), research examining attentional biases in victims of childhood sexual abuse is still in its infancy. It was the goal of the researchers to develop a method to assess attentional bias, specifically in victims of childhood sexual abuse. The Emotional Stroop Task (EST), a modified cognitive task (adapted from the classic Stroop task; Stroop, 1935), was developed. This computerized task assesses participants' reaction times to color-name stimuli of differing emotional valence. Stimuli were developed and normed, and the task was piloted with volunteers. Visual inspection suggests that the computerized task used for collecting data worked effectively. Future directions will be discussed.

POSTER 15

Biological Control of Mosquitoes on UNE's Biddeford Campus

Presenters: Haley LaMonica

Advisor: Noah Perlut

Majors: Animal Behavior and Environmental Science

Mosquitoes are known vectors of diseases such as West Nile Virus and Eastern Equine Encephalitis ('Triple E'). In 2013, the University of New England's Environmental Health and Safety Department partnered with Facilities and the Department of Environmental Studies to reduce human exposure to these diseases by increasing biological control of mosquitos—a plan that used birds, bats and natural insect repellent plants. In 2013, 24 bird and 25 bat boxes were strategically set up on campus in an attempt to control mosquitoes in high human traffic areas; in 2015 an additional 11 bird boxes were established. In 2015, 33 planters containing mosquito repellent plant species such as *Citrosa*, *Ocimumbasilicum*, *Melissa officinalis* and *Lavandula* were placed around campus, particularly near doorways and walkways. The number of occupied bird boxes increased from 3 in 2013 to 22 in 2015. In 2015, the bird boxes attracted three species, successfully fledging 68 chicks. This program is a successful example of biological mosquito control, and importantly, how the entire community of students, faculty, staff and administrators can form successful collaborations.

POSTER 16

The Role of Genotypic Diversity of *Spartina alterniflora* Against Invasive *Phragmites australis*

Presenter: Jeremy Lessard

Advisor: Steven Travis

Major: Environmental Science; Minor: GIS

New England's salt marshes face many modern-day threats, including invasion by *Phragmites australis*, or common reed, which has the potential to drastically alter their structure and function. Since biodiversity is one mechanism that may affect the stability and resilience of marsh ecosystems, I conducted a study designed to test the effects of genotypic diversity of a native foundational salt marsh plant, *Spartina alterniflora*, on competitive interactions with *P. australis*. Specifically, I constructed 60 mesocosms with both species growing together in 4 gallon pots filled with a sand/peat mixture. I equally divided these mesocosms between two *S. alterniflora* diversity levels of 1 and 4 genotypes. In addition, equal numbers of mesocosms received *P. australis* from each of three field locations. The mesocosms we placed in flow-through sea-water tanks at the Marine Science Center, where they were continuously bathed in sea water up to 4 inches above the tank floor, and regularly provided with fresh water by hand-watering from above. I planned to

monitor the growth of both species throughout the summer growing season. My latest round of measurements were taken one month after my experiment was set up, and showed sizable growth differences of *S. alterniflora* between the two genotypic diversity levels, with the diversity of 4 plants growing more than the diversity of 1 plants. Less of an effect was apparent for *P. australis*. These measurements are ongoing, with the final round of measurements scheduled for the end of the annual growing season in October.

POSTER 17

Diet Affects Pain Sensitization in *Drosophila*

Presenter: Sarah Libby

Advisor: Geoff Ganter

Major: Medical Biology; Minor: Applied Mathematics

Chronic pain is a growing public health concern in the United States with substantial economic, social, and medical parameters. It affects approximately 100 million Americans and leaves an estimated societal cost of $600 billion per year (NIH 2014). Current treatments are not ideal; opioid abuse, overdose, addiction, and side effects are stirring the nation to find a better solution. Our work aims to find alternative drug targets for chronic pain using Drosophila melanogaster, the common fruit fly, as a model organism. Nociceptor neurons encode and process potentially noxious stimuli of either thermal, mechanical, or chemical origin through a process called nociception. An increased sensitivity to an innocuous stimuli in and around damaged tissues is a type of sensitization called allodynia. It is thought that some types of chronic pain may result from a misregulation of the sensitization system. To test this, third instar larvae are treated with a dose of UV light and assayed with a thermal probe 24 hours later at a previously innocuous warm temperature. While adopting the sensitization and behavioral methods, it was found that the food on which larvae are reared affects both sensitization and baseline nociception. Literature suggests that diet can influence chronic pain, headaches, and inflammation.

POSTER 18

CB2 Receptor Agonist Induces Breast Cancer Reduction via Immune Cells in-vivo

Presenter: Taylor Littlefield

Advisor: Katherine Hanlon

Major: Medical Biology

The primary goal this summer in the Hanlon lab was to determine the effects of CB2 agonist drugs GP1a and JWH-015 on breast cancer tumor reduction and immune manipulation, particularly macrophage differentiation, in murine models. The task entailed an investigation of the predominant physiological target of the administered cannabinoid agonist drug in a murine model. We hypothesize that the immunological target manipulates M2 macrophages to induce an adaptive T cell-mediated immune response against tumor cells; therefore, we have and will continue to collect data to test this hypothesis.

POSTER 19

Antimicrobial Compounds in Macroalgae *Fucus vesiculosus* and *Ulva lactuca* Kill Strains of *Staphylococcus aureus*

Presenter: Erica Lloyd

Advisor: Kristin Burkholder

Major: Medical Biology

Staphylococcus aureus is a common bacterial pathogen that causes serious skin and soft tissue

infections in humans. Some strains of *S. aureus*, such as methicillin-resistant *S. aureus* (MRSA) are resistant to many antibiotics, and therefore there is great need for development of novel therapeutics to treat *S. aureus* infections. In recent years, attention has focused on potential utility of natural products, such as extracts of marine macroalgae, as a source of novel antibacterial compounds. Therefore, we sought to evaluate the antibacterial capacity of extracts obtained from two species of algae native to coastal New England, *Fucus vesiculosus* and *Ulva lactuca*. In two separate studies, crude methanolic extracts were prepared from each algal species and, using antimicrobial disk diffusion assays and minimum inhibitory concentration (MIC) assays, extracts were tested for antibacterial activity against several clinically-relevant strains of MRSA and methicillin-sensitive *S. aureus* (MSSA). *F. vesiculosus* extracts were inhibitory against MRSA strains USA300, Col, and MSSA strains SH1000 and Newman, and mg/ml concentrations of crude extracts prevented bacterial growth. *U. lactuca* extracts were tested against a broader range of MRSA and MSSA strains, and were found to be inhibitory against MRSA USA100, USA200, USA300, USA400, USA500, USA600 Col, and MSSA SH1000 and Newman, at concentrations ranging from µg/ml to mg/ml. Interestingly, data from the *U. lactuca* study suggest that the lunar phase at which algae are harvested may affect the antimicrobial activity of the extracts. Future work will focus on characterization of specific antimicrobial compounds present in *F. vesiculosus* and *U. lactuca*.

POSTER 20

The Effects of Global Warming, Snail Herbivory, and Nutrient Addition on Salt Marsh Plant Production and Microbial Decomposition

Presenter: Destiny Martin

Advisors: Ursula Roese

Major: Medical Biology

In its natural environment the brown algae, *Fucus vesiculosus* is damaged repeatedly by tidal waves and herbivores. In order to survive after getting injured, *F. vesiculosus* must have antimicrobial properties to prevent infection by microbes in the water. Previous work by Dr. Roese has shown that it may be possible to induce the production of several defense compounds in the algae through mechanical injury and application of plant hormones (Arnold et al. 2001). The defense compounds produced by the algae may also have antimicrobial properties against human pathogens. For example, reports show defense compounds produced by brown algae *Eisenia bicyclis*, have inhibited the growth of Methicillin-resistant *Staphylococcus aureus* (MRSA) (Eom et al. 2011). An initial study from my advisor indicated that methanol extracts from stress induced *F. vesiculosus* may also inhibit the growth of several human pathogens including MRSA.

POSTER 21

Assessing Reproductive Steroid Hormone Concentrations in Shark Species Captured off the Coast of Southern Florida

Presenter: Erin Mohr

Advisor: James Sulikowski

Major: Marine Science

Worldwide, shark species are experiencing a decline in population due to various human activities such as: loss of habitat, overfishing, and incidental bycatch. As K-selected species, sharks display slow growth, late maturation, long gestation, and low fecundity. Due to a lack of knowledge of these characteristics, specifically reproduction and its associated hormones, it has become crucial to expand our understanding for conservational purposes. Typically, lethal sampling is used to collect reproductive data, but with recent declines in shark populations, non-lethal methods such as

circulating plasma steroid hormones are favored. Therefore, this research being conducted involves using steroid hormone analysis by radioimmunoassay to determine the amount of estradiol, progesterone, and testosterone present in the plasma of five different shark species found off the southeast coast of the United States. The values obtained will be used to predict the sexual maturity or reproductive state of these shark species, which include bull, lemon, blacktip, sandbar, and hammerhead sharks. This data will then be combined with other research techniques such satellite telemetry for aid in conservation purposes.

POSTER 22

The Role of the Perirhinal Cortex in the Formation of Fearful Memories in the Developing Rat Brain

Presenter: Crystal Nason and Victoria Eaton

Advisor: Michael Burman

Major: Neuroscience; Minor: Psychology

This experiment looks at the role of the perirhinal cortex in the formation of fearful memories in developing rats on postnatal day (PD) 17 and 24. To do this rats were fear conditioned, meaning they received a neutral stimulus (tone) repeatedly paired with an aversive stimulus (footshock) to form an association between the two. Following conditioning the rats underwent surgery to remove the perirhinal cortex. On following days their fear to the tone that predicts the shock and the context in which they were conditioned in was measured through freezing behavior. It was hypothesized that, without the perirhinal cortex, rats would not demonstrate as much fear on testing days because the path of memory formation was disturbed, disrupting memory recall in return.

POSTER 23

The Effect of Probe Strand Length on DNA Hybridization via Monte Carlo Molecular Simulation

Presenter: Lenny Pelletier

Advisor: John Stubbs

Major: Biochemistry

DNA microarrays are a collection of single DNA strands attached to a solid surface which function as a sensor by selectively binding to their complements. DNA microarrays can be used to genotype multiple regions of a genome, or to measure the expression levels of large numbers of genes in a single trial. Nevertheless, this binding does not always occur as expected due to the surface, which can be explored and better understood through computer simulations. The method of study chosen for this work was Monte Carlo molecular simulation. The purpose of this experiment was to discover the effect of surface strand length on DNA hybridization. In this experiment DNA strands of 10 and 15 bases were chosen to hybridize with a complimentary strand of 25 bases in solution and on surface over a range of temperatures. Results were analyzed in terms of energetic and structural properties.

POSTER 24

Species-specific Stable Isotope Fractionation Baseline Between Oysters and Algae

Presenter: Katherine Perry

Advisor: Carrie Byron

Major: Marine Science

Stable isotope analysis is used in ecology to gain a more comprehensive understanding of food

webs, species dynamics, and trophic level interactions. Light isotopes react/metabolize faster than heavy isotopes. Therefore, stable isotope analysis focuses on an organism's enrichment of heavy isotope, also called fractionation (Dubois, 2007). The common assumption for all species in many different trophic levels throughout the stable isotope community is that nitrogen fractionation values are at about 3.4‰ (plus or minus 1.1‰), and carbon fractionation values are at about 0.8 ‰ (plus or minus 1.1 ‰) (Dubois, 2007). This grand assumption will be tested to see if it is accurate or if a species-specific fractionation value should be established for different organisms in different food webs. This knowledge will also help us to understand trophic level dynamics and food web interactions. The goal of this experiment is to see the trophic-step fractionation values between oysters and algae, and to gain a better understanding of how these species relate to each other and their trophic levels. Gaining knowledge of the specifics of an oyster's diet, such as the nutritional and digestive impact that algae has on them, could lead to advancements in the aquaculture industry. Learning more about their diet and feeding habits will make oyster farming more efficient and could lead to potential new farms along the coast. We would expect to find values that were within the assumed values, however, there is potential for high variability in both nitrogen and carbon values.

POSTER 25

The Computational Power of Cyclin-Dependent Kinases

Presenter: Megan Perry

Advisor: Craig Tennenhouse

Majors: Biochemistry and Applied Mathematics

Many systems within the body are capable of computation that has never been explored in a mathematical way before. Cyclin-dependent kinases help to regulate the cell cycle by associating with cyclins and phosphorylating sites to signal for the cell to pass through certain checkpoints and continue on replicating. They are highly regulated systems that follow specific pathways, some of which are still unknown. Due to this tight regulation, it makes sense that systems involving cyclin-dependent kinases would be able to follow a certain "rulebook" and be capable of computation. In this manner cyclin-dependent kinases may be able to function as a Turing Machine, which is a theoretical computational model with a certain set of instructions and a tape on which to write. In this model, a substrate can be the tape and the cyclin-dependent kinase is the read/write head that follows the instructions and alters the tape. The main summer research goal was to show that cyclin-dependent kinases are Turing Equivalent, meaning that they are capable of the same level of computation as Turing Machines.

POSTER 26

Can the Saco River Estuary be Used as a Source of Mussel (*Mytils edulis*) Seed for Aquaculture?

Presenter: Gillian Prostko

Advisor: Carrie Byron

Major: Ocean Studies and Marine Affairs; Minor: Applied Mathematics

The Saco River Estuary (SRE) area is a closed area for harvests. Due to poor water quality the mussels and other bivalves cannot be harvested and used to support their respective industries. Mussel seed can be collected using a rope system and then the law permits that after a six-month cleansing period, in clean waters, the mussels can be used for aquaculture, harvested and sold. If mussel seed can be taken out of the closed areas not only can it make the areas profitable, but also increase the stock for the mussel farmer. This project looks at the number of mussel larvae in the water in the Saco River and how they can be used in aquaculture. Research was conducted using

sets of rope collectors over the course of two months. Seed was collected and quantified in three areas of the Saco River Estuary. Plankton tows were done to look at the larvae in the water. Settlement plates were deployed to look at competition of settlement in the area, and transect surveys were taken to research mussels that have already settled in the area. Over the course of eight weeks, the settlement of mussels less than one millimeter in size increased. A larger settlement event was seen in July. There is potential for mussel seed to be gathered from the area and used for aquaculture.

POSTER 27

Structure and Stability of DNA Duplexes with a Central Mutation in a Model Microarray System

Presenter: Brea Rivard

Advisor: John Stubbs

Majors: Chemistry and Applied Mathematics

DNA microarrays are used to help scientists diagnose genetic disorders among other applications. A microarray consists of a single strand of DNA attached to a surface, also known as a probe strand, which is then submersed in solution containing fluorescently labeled potential compliments. Once the probe strand finds a compliment, known as a target strand, they bond to form a stable helix which can be detected using fluorescence microscopy. This topic was chosen to be studied because of the lack of understanding of microarrays' unexpected behavior when exposed to potential target strands. For this research, Monte Carlo simulations were used to simulate duplexes free in solution and attached to the surface for a range of temperatures. It was found that the end of the probe strand near the surface is destabilized when compared to solution. The neighboring bases around a central mutation also become distorted due to the mutation.

POSTER 28

New Technologies and Learning

Presenters: Zoe Roberts

Advisor: Jennifer Stiegler-Balfour

Major: Psychology; Minor: MHRTC

The current study investigates whether new technologies can have an impact on how we read and comprehend written discourse. Even though most studies indicate that learning outcomes for e-textbooks and traditional textbooks are the same, students continue to prefer traditional textbooks over e-texts when given a choice. For example, Woody, Daniel, & Baker (2010) showed that regardless of easy access and an in-class demonstration of the e-book, 90% of students who were given the choice between using an e-book or a printed textbook chose to use the printed textbook, which was more expensive. The current set of experiments will investigate whether there are differences in the mental representations that are generated from text of varying mediums as well as whether general reading comprehension ability influences comprehension of text from different mediums. More specifically, we will measure reading times and retention levels for expository text read on three different mediums (i.e., iPad, laptop or hard copy). Additionally, the Multimedia Comprehension Battery will be administered to determine whether general reading comprehension ability moderates the effect of different mediums on reading comprehension.

POSTER 29

The Prevention of Partial Auto-Flocculation of Microalgae: a Preliminary Study

Presenter: Alanna Sachse

Advisor: Carrie Byron

Major: Ocean Studies and Marine Affairs; Minor: English

This preliminary study focused on how Flocculation, the process in which microalgae cells coagulate or adhere to one another, is affecting phytoplankton. This study was conducted as a base to find what physical parameters affect phytoplankton flocculation to be used to prevent the flocculation of algae so it can be easier to feed to shellfish and other filter feeders. Tests were done on a specific algae culture to see what is a contributing factor in phytoplankton that causes spontaneous auto-flocculation. Data will be used as a base for further testing to determine how to prevent cell adhesion from happening in future cultures.

POSTER 30

Characterization of Pain Associated Behaviors in a Rat Model of Temporomandibular Disorder

Presenter: Sebastien Sannajust

Advisor: Tamara King

Major: Medical Biology; Minor: Business

Temporomandibular Disorder (TMD) is a musculoskeletal orofacial disorder within the masticatory system. Pain is the primary reason patients seek treatment, and reduction in pain is generally the primary goal of therapy. Orofacial pain has been demonstrated to alter meal-eating behaviors, with preclinical studies demonstrating that inflammation and nerve injury-induced pain prolong meal duration without altering overall amount of food consumed. We characterized a rat model of TMJ osteoarthritis in which monosodium iodoacetate (MIA) is injected into the TMJ. We tested the hypothesis that MIA injection into the TMJ alters meal eating behavior, induces tactile hypersensitivity and produces ongoing pain.We assessed tactile hypersensitivity and changes in eating behaviors overnight in rats with osteoarthritic jaw pain induced by unilateral (left TMJ) monosodium iodoacetate (MIA) (4.0 mg/50 µl) injection. Preliminary data indicates that injection of MIA into the TMJ produces robust tactile hypersensitivity within 7 days that continues through 14 days post-injection. Administration of lidocaine 14 days post MIA reversed the tactile hypersensitivity within 60 min post-lidocaine. Analysis of meal eating behaviors indicates no overall change in meal duration or number of meals eaten across the 12 hr observation period. In addition, meal pattern analysis indicates no differences in the time spent during each meal between the MIA and saline treated rats. These observations indicate that either that eating does not induce pain or the animals were able to adapt.

POSTER 31

The role of genetic diversity in the response of *Spartina alterniflora* to nutrient loading and invasive snails

Presenter: Eric Scouten

Advisor: Greg Zogg

Major: Environmental Science

Studies have shown that species diversity promotes resilience of an ecosystem to disturbances, with more diverse an ecosystem is the more likely it is to be resilient. Some ecosystems don't have many different species, but the species that are present are genetically diverse. For example, salt marshes typically have an area of lower elevation that is flooded twice daily by the tides, and is

primarily dominated by a single species of grass, *Spartina alterniflora*, which can handle the salinity of the water. The purpose of this study is to determine if genetic diversity can be a substitute for species diversity in the defense against disturbances, such as nutrient loading and herbivory from an invasive snail. *S. alterniflora* were collected from a marsh in Dover, NH and grown in flow through seawater tanks to simulate a tidal cycle. There was a low diversity of one clone and a high diversity of four clones of *S. alterniflora* and they were exposed to three levels of nutrients which are none, low and high and two levels of snail exposure, low and high. The levels of exposure are similar to what the plants would experience in nature. The study has yet to finish, but preliminary data has been collected and it appears that the higher diversity of *S. alterniflora* is growing better under the stress of the treatments than the low diversity. The study is to continue through the completion of the growing season which will be in late September or early October.

POSTER 32

"I Want You to Want Me": Mate-value Threat Predicts Sexual Partners, Cosmetic Surgery, and Self-Esteem in Women

Presenter: Janelle Sherman

Advisor: Julie Peterson

Majors: Psychology and English; Minor: MHRTC

In this study we examined how women respond to a mate-value threat. More specifically, because the Sociometer Theory stipulates that self-esteem is a gauge of one's social inclusion and serves as a motivator for repairing one's relational value, we examined female participant's self-esteem and the ways in which females are then motivated to re-establish their value as a mate after threat. In line with the Sociometer Theory and research suggesting that female mate-value is tied to physical attractiveness (Buss, 1989; Pass et al., 2010), we hypothesized that female participants exposed to a mate-value threat condition (vs. control) would have significantly lower state self-esteem in both appearance and social domains, but not performance domains. We also hypothesized that female participants will attempt to re-establish their mate-value in these domains by increasing the number of future sexual partners they desire and by becoming more approving of cosmetic surgery. Lastly, because research has shown that narcissists react particularly negatively to romantic threat (Peterson & Dehart, 2014; Campbell & Foster, 2011), we hypothesized that narcissism would moderate these effects. Overall results revealed that female participants in the mate-value threat condition (vs. control) had significantly lower appearance and social esteem. However, the results suggest that it is the narcissistic females that are willing to go to behavioral extremes to repair their threatened mate-value, as female participants high in narcissism desired significantly more sexual partners and were significantly more accepting of cosmetic surgery for intrapersonal reasons when exposed to the mate-value threat (vs. the control).

POSTER 33

Scavenging and the Ecology of Fear: Does Carrion have Indirect Effects on the Landscape?

Presenter: Cathleen Steinbeiser

Advisor: Zach Olson

Major: Animal Behavior

Carrion has many known effects on the landscape, one being the attraction of scavengers to the area. Because most common scavengers are also predator species, it has been proposed that prey animals may be indirectly affected by carrion that attracts scavengers. The ecology of fear states that predators can affect their prey in two distinct ways: directly causing changes in abundance

through predation, and indirectly causing behavioral changes that stem from increased fear of predation. Our objective was to examine how scavengers affect small mammal's perceived predation risk. Giving Up Density (GUD) stations were used in 6x6 grids to measure foraging decisions. Each station included an aluminum tray with a clear plastic lid, sifted playground sand as substrate, and dried millet. Two grids were used for each replicate: a control grid and a treatment grid that received the addition of a large mammal carcass. According to the ecology of fear, small mammals were expected to decrease foraging in grids with carcasses that attracted scavengers. Of four replicates completed during summer 2015, two yielded no significant difference in foraging whereas foraging changed significantly in the other two replicates in a way that supported the hypothesis. These mixed results suggest a limited, ephemeral effect of scavengers on how small mammals perceive the risk of predation. It is likely that the cascading effects of carrion are not as strong as previously proposed.

POSTER 34

The Potential for the Waved Whelk (*Buccinum undatum*) in Aquaculture

Presenter: Dylan Turner

Advisor: Jeri Fox

Majors: Marine Science and Aquaculture and Aquarium Sciences

Buccinum undatum is the largest edible whelk species in the North Atlantic. The market for *B. undatum* is a newly emerging fishery on the coast of Maine. Unfortunately, this species has been over fished and the fishery has been in decline in certain areas. *Buccinum undatum* has a relatively low position on the food chain being an opportunistic scavenger, having a diet of polychaetes, bivalves, urchins, and will also readily consume sources of carrion including dead fish and a multitude of invertebrates. This makes the species an inexpensive one to feed in an aquaculture setting; it can eat inexpensive and readily available food products. The study of finding an inexpensive food that maximizes growth could lead to a large profit margin if marketing the species. The goals and aim of the project is to better understand the potential for *B. undatum* in an aquaculture setting starting with the development, growth, and reproduction of the organism. Understanding development with respect to temperature, mostly egg development, seeing if elevated temperature could increase egg development without increasing mortality. Also gonadal development and how the whelks would develop gonads in captivity or if they require other environmental factors for reproduction. As of now no significant results have been recorded but we are still continuing research and will begin to look at methods of induced spawning.

POSTER 35

Optimizing Methods for the Hormone Analysis of Betta Fish Excretions Using Gas Chromatography-Mass Spectrometry

Presenter: Lora Walsh and Molly Wright

Advisor: Amy Keirstead

Major: Chemistry; Minor: Applied Mathematics

Major: Biochemistry; Minor: English

In a recent study done by Dr. Teresa Dzieweczynski, it was found that, within Siamese Fighting Fish (*Betta splendens*) populations, an increased exposure to the hormone ethynylestradiol resulted in a decrease in interactive behavior between fish. Considering that ethynylestradiol is a prominent component in oral contraceptives and is accumulating in waterways daily, a depression in interactive behavior between *Betta* fish could indicate dire consequences for the future of aquatic

life as well as the many organisms and environments it comes into contact with. In this research project, our goal is to analyze the hormone composition of the urine of bettas exposed to ethynylestradiol in the aforementioned studies to correlate to the observed behavior patterns. In addition to optimizing the parameters for the primary analytical technique (gas chromatography-mass spectrometry), the methods for extraction and derivatization of the hormones from the urine samples have been developed. This poster presents our preliminary work on this project and outlines future endeavors towards determining the endocrine responses spurred in the Betta fish during ethynylestradiol exposure.

POSTER 36

Progressive-ratio Operant Schedules as Behavioral Endpoints for the Characterization of Motivation and Pain in Rodents

Presenter: Emily Warner

Advisor: Glenn Stevenson

Major: Neuroscience; Minor: Sociology

There has been recent interest in the pain research community for developing preclinical assays that measure affective dimensions of pain-like states in rodents, and in particular, pain-motivation interactions. The current set of experiments assessed the effects of an incisional post-operative pain manipulation on food-maintained responding under a progressive-ratio (PR) operant schedule. Independent variables included pain manipulation (incision or anesthesia control) and reinforcer type (grain pellet or sugar pellet). Once responding stabilized on the PR schedule, separate groups of rats received a single ventral hind paw incision or anesthesia (control condition). Half the rats in each condition were trained to respond for grain pellets, and the other half for sugar pellets. Parallel studies examined mechanical allodynia under using von Frey monofilaments. For rats responding for grain, the incisional pain manipulation produced significant reductions in breakpoints and decreases in mechanical thresholds across 2 days. For rats responding for sugar, the incisional pain manipulation produced no change in breakpoints and a transient decrease at 6 hr. The NSAID analgesic, diclofenac (5.6 mg/kg) completely restored incision-depressed PR operant responding and tactile sensitivity.

POSTER 37

Validating the use of Giving Up Density Stations to Measure Foraging Decisions by Small Mammals in Forested Landscapes

Presenter: Carolyn Wawrzynowski

Advisor: Zach Olson

Major: Animal Behavior; Minor: Art

Ecology of Fear theory states that predators have two effects on prey; prey can either be affected directly by predators through mortality, or influenced to alter their behaviors to minimize the risk of predation. Perceived predation risk in small mammals is commonly measured by using Giving Up Density (GUD) stations, but GUD stations have not been used extensively in forested ecosystems. We deployed modified GUD stations in forests near UNE, and conducted tests to validate their use. Stations were made of aluminum basting pans with clear lids to keep out rain and debris and each station was filled with 500mL of sifted sand and 4 grams of dried millet. We measured the amount of millet remaining after 2 d trials, and noted the presence of footprints and fecal pellets in stations. We used cameras to document foragers, measured foraging attributable to invertebrates by excluding vertebrates, and quantified measurement error using sealed stations. Cameras revealed

that mice and voles were the only vertebrate foragers. Invertebrates removed 0.07 ± 0.06 g (mean ± 1SD) of millet from stations, and measurement error was 0.16 ± 0.07 g. Field measures of foraging (3.06 ± 2.58 g) were considerably greater than what could be attributed to invertebrates or measurement error. Given the small removal amounts and relative stability of invertebrate foraging, small and consistent measurement error, and the abundance of small mammals foraging in our stations, we conclude that GUDs can be effectively applied to measure perceived risk by small mammals in temperate forest ecosystems.

POSTER 38

Assessing Reproductive Steroid Hormone Concentrations in Shark Species Captured off the Coast of Southern Florida

Presenter: Nora Wells

Advisor: James Sulikowski

Major: Marine Science; Minor: Mathematics

In recent years, elasmobranch populations have been in decline due to human activity such as bycatch, shark culls, and overfishing. To better conserve these species, it is crucial to understand elasmobranch life history, which includes reproduction. Traditionally, lethal methods have been used to study reproduction in elasmobranchs. With the decline of elasmobranch populations, the use of non-lethal methods of research has become increasingly important. This study uses the non-lethal method of analyzing steroid hormones in the blood plasma of sharks to better understand the reproduction of these species. Blood plasma was collected from several shark species captured off the coast of southern Florida by a team from the RJ Dunlap Marine Conservation Program of the University of Miami. Measurements, location, sex, and other pertinent information was also recorded for the study. At the University of New England, the target hormone was extracted from the plasma sample. Radioimmunoassay was then used to calculate the standard curve and used to compare the standard curve to the samples' hormone levels. Results are still pending for this study's specific samples. The results will then be used alongside the tracking data from the University of Miami to aid in conservation efforts for the species.

Summer Undergraduate Research Experience Symposium

Oral Presentations

October 18, 2014 | 10:30am-12:00pm

Oral Presentations

10:30am-12:00pm

Summer Undergraduate Research Experience Symposium

ALFOND SCIENCE CENTER ROOM 106 *Listed in order of appearance*

ORAL PRESENTATION **10:30 AM - 10:50 AM**

Temperature Effect on Behavior and Neurological Development of the Little Skate (*Leucoraja erinacea*)

Presenter: Melanie Kolacy

Advisor: James Sulikowski

Major: Marine Biology; Minor: Animal Behavior

Previous research suggests that in the Gulf of Maine the sea surface temperature has increased around 2 ˚C over the past 45 years and is estimated to increase approximately another 2 ˚C in the next 70 years. Oviparous (egg-laying) elasmobranchs (skates, rays, and sharks) are poikilothermic, where their body temperatures fluctuate along with their external environment. Recent research has concluded that little skate eggs deposited and raised in warmer temperatures have shorter gestations and higher mortality rates. This project uses the little skate to investigate possible connections between increasing sea surface temperature to behavioral and neurological development in elasmobranchs and how this relates back to survivability. Oviposited eggs from a captive breeding stock are equally divided into two separate conditions in lab. One group of egg cases is held at ambient temperature conditions with flow-through seawater from the Saco Bay, while the second condition simulates an elevated temperature condition of 5 ˚C above the ambient temperature. After hatching in these conditions, each little skate is tagged and measured. Differences in behavior are assessed using four assays; foraging, tap-startle reflexes, space use, and activity levels. Their behavior is tested in group and individual settings. Once the behavioral experiments finish, the brains of the specimen used in these trials are dissected and histologically processed to identify any morphological differences. If current temperature trends continue, the resulting effect from neurological differences could potentially result in overall lower survivability for oviparous elasmobranchs in the GOM and worldwide.

ORAL PRESENTATION **10:50 AM - 11:10 AM**

Where's All the Food?: Changes in Organic Material Along MSC Pipes System

Presenter: Aubrie Pillsbury

Advisor: Carrie Byron

Major: Oceanography

The University of New England's Marine Science Center uses a pump system comprised of pipes and holding tanks in order to transport water into the building and support the growth and study of marine organisms in a controlled laboratory environment. This study was developed in order to quantify the changes in particulate organic material (POM) and chlorophyll a (chla) from the beginning of the pump system to the end where it enters the lab and the tanks of marine animals and also to evaluate the change in water quality between the outside environment and the artificial habitats within the MSC.

ORAL PRESENTATION **11:10 AM - 11:30 AM**

Refreshing Recursive Relief: An Analysis of Writing Textbooks and their Relationship to Current Composition Scholarship

Presenter: Josh Powers

Advisor: Michael Cripps

Majors: English and Liberal Studies

This SURE project, motivated by my work in the Writing Fellows program, provided an exploration into the field of composition studies. Initially intended to develop a revised identification of the writing process, this project also analyzed the composition textbooks used in ENG 110. In order to revise the current-traditional writing process, I needed a vocabulary and a familiarity with a field I knew little about. I looked to leading composition scholars, notably Mike Rose, Nancy Sommers, Linda Flowers, and John R. Hayes, while also exploring process theory, its origin, and its critiques. With a familiarization of the field, I turned towards the composition textbooks, noting how writing is described and presented, as a process or not, and chiefly, my focus had been on the presented linearity of the identified process of writing and whether or not there are implicit references to writing's non-sequential nature and its sporadic recursivity. Chronologically concluding with interviews with Michelle Clark, executive editor for Bedford/St. Martin's, and Marilyn Moller, editor and Vice President for W.W. Norton & Company, I discussed the representation(s) of writing process(es) in the textbooks and their motivations for such presentations, while looking ahead to future aims of composition studies.

ORAL PRESENTATION **11:30 AM - 11:50 AM**

The Stranger and The Man with Two Graves: Interning at Victoria Mansion

Presenter: Shannon Cardinal

Advisor: Elizabeth DeWolfe

Majors: History and English; Minors: Education and Women and Gender Studies

Over the course of my internship, I built an exhibit on Fashion and Industry in the Nineteenth Century, an interactive game on Maine Civil War lore and an education panel on Cannons complete with a "make your own projectiles" activity. Through these projects, I offer patrons at Victoria Mansion a range of exciting ways to engage with history, delve into their own interests and explore Victorian New England in a new light. Meanwhile, I engaged with history by performing guided historic tours, cataloging artifacts and working at a small museum which has been called the "jewel of Portland."