9:00am-10:30am	Open House: Poster Presentations
10:30am-12:00pm	Oral Presentations
12:00pm-1:00pm	SURE Lunch for Students and Families

Presentation schedule enclosed in program

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-

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.

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

monitor the growth of both species throughout the summer growing

infections in humans. Some strains of , such as methicillin-resistant (MRSA) are resistant to many antibiotics, and therefore there is great need for development of novel therapeutics to treat 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, and . 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 (MSSA).

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.

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.

Mytils edulis

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.

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.

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-

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.

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.

Spartina alterniflora

primarily dominated by a single species of grass, , 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 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 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 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.

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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.

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.

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.

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.


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