

**St. Thomas Poster Abstracts**

**Do Well-Established, Out-Planted Staghorn Corals Host More Diverse Fish Populations?**

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*2016 Graduate Students of the Masters in Marine and Environmental Science Program, Center STT-P1 for Marine and Environmental Studies*

Natural, healthy acroporid corals (*Acroporidae*) are important contributors to the structural complexity and biodiversity of coral reefs. Staghorn corals (*Acropora cervicornis*), a major component of Caribbean reefs, are critically endangered and have declined 80% over the last 30 years due to rising sea temperatures, disease, and anthropogenic stressors. To restore this species, The Nature Conservancy grew *A. cervicornis* in coral nurseries and out-planted >10,000 nursery-grown individuals at shallow reefs around St. Thomas, U.S. Virgin Islands (USVI) during 2012-2016. However, the effect of out-plantings on coral reef communities at these sites is unknown. We hypothesize that well-established out-planted sites, defined by older *A. cervicornis* with high structural complexity and little mortality, will have greater fish biodiversity. We will conduct *A. cervicornis* assessments (including measuring colony size and percent mortality) and fish diversity and site rugosity transects at ten sites out-planted from 2014-2016. We will test for differences in structural complexity, mortality, and fish biodiversity between sites using multiple measures of biodiversity and standard statistical techniques. Our research will identify effects of *A. cervicornis* out-plantings on site biodiversity, which resource managers can use to evaluate the impacts of coral reef restoration locally and in the greater Caribbean region.

**Analysis of Tiger Shark Acoustic Data to Estimate Foraging Patterns and Small Scale Movements**

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STT-P2

*Lauren Arnold, Undergraduate Student, Center for Marine and Environmental Studies*

Between 2007 and 2011, an array of acoustic receivers (VR2W, Vemco) monitored shark movements around Fish Spawning Aggregations (FSAs) and within Mesophotic Coral Ecosystems (MCEs). The acoustic receivers are in 127 different locations just south of St. Thomas, US Virgin Islands. Analysis of 17 tagged Tiger sharks (*Galeocerdo cuvier*), can show fine scale movements within the acoustic array. The individual movement tracks of each shark can be used to estimate foraging patterns between day and night. The hypothesis being tested says that all the Tiger sharks will have a similar track pattern within the array. This is based on the fact that they used the majority of the MCE habitat monitored and were detected over short number of consecutive days throughout the year, interspersed by short absences. Based of preliminary analysis, the sharks are mostly detected in the summer months compared to winter months. Further analysis is being conducted to estimate foraging patterns, small-scale movements, and with the help of satellite data medium-scale movements may be found.

**Diversity affects disease transmission in Caribbean corals**

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STT-P3

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Coral disease can have devastating consequences for coral reef communities. There are several characterized diseases, including black band and white plague that affect multiple species of reef-

building corals. In the Caribbean, species susceptibility to black band and white plague appears to vary among regions and outbreaks of disease are associated with different dominant species. Understanding how species susceptibility varies is important to predicting the future impacts of disease and may help to identify risk factors. This study tracked the prevalence of coral disease among multiple sites over an extended time period and examined the spatio-temporal patterns of species-susceptibility. Laboratory transmission experiments were completed to support whether field patterns indicated true variation in susceptibility or were solely a function of species density. Our results suggest that white plague and black band preferentially affect highly abundant orbicellids and *Siderastrea siderea*, respectively, but that this is a result of greater susceptibility and not just proportionally greater densities of the host species.

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### Mesophotic coral reef refuge potential of the Eastern Caribbean

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STT-P4

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Over the past 15 years much work has been done on the potential for coral and fish refuges—places where heavily threatened coral reef species might cling to life in the face of climate change, pollution, overfishing, and other human threats. Coral reefs in Israel, Panama, Curacao, and St. Thomas have all been identified as potential refuges for coral and fishes amongst so much reef loss. Mesophotic corals living deeper than 100 feet have fared far better against rising ocean temperatures than their shallow counterparts— in the past two decades the USVI have lost roughly 70% of its coral from 0 to 100 feet; in that time we’ve only lost 5% from 100 to 300 feet. The Leeward and Windward Islands of the Caribbean may harbor an incredible diversity of mesophotic coral reefs, but there is very little information on the potential for these deep systems. Here we explore the potential for deep coral reefs in the eastern Caribbean.

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### Clustering of white plague disease at different spatial scales on a mesophotic coral reef in the U.S. Virgin Islands

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STT-P5

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While diseases have been responsible for a great amount of coral mortality in the last 40 years, many diseases remain without a known etiological agent. White plague disease is known to affect many species, including those of the genus *Orbicella*, major reef-builder in Caribbean mesophotic reefs. We repeatedly sampled a 350mx350m tract of continuous mesophotic coral reef with drop camera photos to analyze whether the coral disease white plague tended to cluster spatially during its peak prevalence. Past studies support conflicting theories: that white plague disease is directly transmissible and that it is driven by opportunistic infection

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after environmental stress. Analysis at the “colony scale” was based on radial transect counts of the number of lesioned corals that appeared within 5m of a randomly-selected diseased or healthy-centered coral. Preliminary data and Poisson point cluster modeled data returned higher spatial clustering values, indicating that white plague disease tends to cluster along the reef. These results could narrow the investigation of a causative agent. The results could also inform important management decisions like whether or not to cull infected corals during an outbreak and which areas are most deserving of additional conservation measures.

### **Diversity of the ciguatoxin-producing dinoflagellate genus *Gambierdiscus* on St. Thomas coral reefs**

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STT-P6

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The benthic dinoflagellate *Gambierdiscus* spp. produces the putative precursor toxins that ultimately lead to ciguatera fish poisoning (CFP). The Woods Hole Oceanographic Institution, the University of Texas-Austin and UVI have partnered to sample and analyze *Gambierdiscus* populations at four reef locations south of St. Thomas over the last eight years in an effort to determine patterns in *Gambierdiscus* species diversity, with the ultimate goal of relating *Gambierdiscus* population trends to CFP incidence. Multiple *Gambierdiscus* isolates were established in culture and identified using molecular methods – initially by ribosomal gene sequencing, and then through genetic typing using restriction fragment length polymorphism (RFLP) assays developed for routine *Gambierdiscus* species assignment. Resulting data showed *Gambierdiscus* communities to be extraordinarily diverse, with at least five described *Gambierdiscus* species and one ribotype (*G. belizeanus*, *G. caribaeus*, *G. carolinianus*, *G. carpenteri*, *G. silvae*, and *Gambierdiscus* sp. ribotype 2), as well as several undescribed ribotypes co-occurring at our sites. *Gambierdiscus* spp. abundance varied among and within years, but a strong seasonal effect was observed that appeared to be primarily driven by temperature. The ability to reliably predict food web toxicity and from *Gambierdiscus* spp. community dynamics remains the overarching goal of our research.

### **Palatability of Seagrass Species in Brewers Bay, St. Thomas USVI**

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STT-P7

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Green sea turtles, *Chelonia mydas*, feed on multiple seagrass species in the U.S. Virgin Islands. However, a recent invasion by the seagrass, *Halophila stipulacea*, to the Caribbean has caused

concern regarding its impact on herbivores. This seagrass is found in multiple bays on St. Thomas where *C. mydas* forage, yet few observations of sea turtles consuming it have been made. Furthermore, since its introduction to the Caribbean, there has no information published on the nutrient content of *H. stipulacea*, which is necessary to determine how herbivores will perceive it as a food source. This project is the first to examine the nutritional quality and palatability of seagrasses found in the Brewers Bay foraging ground through chemical analyses, observational surveys, and choice-feeding experimentation. We collected *H. stipulacea* and two native seagrasses, *Thalassia testudinum*, *Syringodium filiforme*, seasonally between 2016 and 2017 to compare nutrient contents overtime. Additionally, weekly snorkel surveys through the bay were conducted to count the number of green turtles present and whether they grazed within monotypic or mixed beds of invasive and native plants. To determine feeding preferences of native species, we used a mesocosm to offer the longspine sea urchin, *Diadema antillarum*, each seagrass species simultaneously for two days. Our results indicate that while seasonal variation between all three seagrasses' nutritional contents are insignificant, sea urchins prefer to consume native plants over *H. stipulacea*. During the snorkel surveys over 80% of all turtles spotted were feeding in native seagrass meadows. Overall, these feeding patterns suggests local herbivores, including sea turtles and urchins, may continue to choose native seagrasses even in the presence of the invading *H. stipulacea*.

### **Habitat Preference and Movement of *Dasyatis americana*: Impacts of the Non-native Seagrass *Halophila stipulacea* and Delineation of Diel Movement Patterns**

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STT-P8

*Michele Donihe, Graduate Student, Center for Marine and Environmental Studies*

It is not uncommon to link foraging, environmental factors and diel patterns to habitat use and preference with several different species of fish. Stingrays have been increasingly becoming an important fisheries resource worldwide, and are considered data deficient by the IUCN Redlist. We utilized acoustic transmitters and a receiver array, along with snorkel surveys, to determine which factors affected southern stingray (*Dasyatis americana*) movement throughout Brewers Bay and part of Perseverance Bay, St. Thomas, USVI. Preliminary data suggest decrease in barometric pressure (increase in rain and storm events) causes southern to exhibit higher rate of movement (ROM), along with high turbidity, suggesting sense of urgency from predation. All rays caught and recorded, for tagging and surveys respectively, were either juveniles or females. Foraging took place all times of the day and data suggest slight preference for the native seagrass, *Syringodium filiforme* to the invasive *Halophila stipulacea*, which was viewed via a minimum convex polygon (MCP) map of surveyed rays within the bay. One ray with a pressure tag (V13P-1H) displayed higher ROM during crepuscular periods, migrating from one place to another within the bay, then settling in foraging or resting areas during the day and night time. Little is known of stingrays in general and shedding some light on movement patterns will aid in the understanding and possible protection of what is considered a keystone species.

**Does variability in water temperature and dissolved oxygen influence the movement patterns of two Caribbean fish?**

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STT-P9

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Movement plays an important role in an animal's behavior and life history demographics, and is a key component of ecological processes. Measuring and mapping movement patterns for highly mobile fish species may shed light on habitat space-use requirements, behavioral responses to environmental factors and population dynamics. Changes in ambient water conditions (e.g., temperature, dissolved oxygen, etc.) can influence an individual's physiology and thus movement patterns. While some laboratory studies have examined the effects of environmental factors on fish physiology, few have examined how ambient water conditions affect fish movements in marine habitats. This study investigates the potential influence of water temperature and dissolved oxygen on the movement patterns of Atlantic tarpon (*Megalops atlanticus*) and lane snapper (*Lutjanus synagris*) in Brewer's Bay, St. Thomas, U.S. Virgin Islands. Fifteen fish of each species bearing acoustic transmitters were tracked in an acoustic array and proximal data loggers measured dissolved oxygen and temperature. I expect the movement patterns of lane snapper and tarpon to shift in response to large changes in water condition. This study provides a better insight on which fish species are indicators for environmental variability and thus aiding fisheries managers in making accurate predictions on fish populations.

**Spatial and temporal variations in zooplankton abundance, distribution, and diversity in Brewers, Perseverance, and Flat Cay**

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STT-P10

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Zooplankton are organisms, such as larval fish, copepods, and shrimp, whose distributions, growth, and population dynamics are sensitive to small changes in oceanographic conditions, such as temperature, chlorophyll, turbidity, and salinity. From February 2016 to January 2017, monthly zooplankton samples were taken in Brewers Bay, Perseverance Bay, and the waters around Flat Cay to assess variations in abundance over time and through space. Oceanographic conditions of 33 sites in these bays were recorded using a CTD profiler. Zooplankton were collected at 4 sites and identified to the lowest available taxa. This data will be used to identify both seasonal and spatial changes in zooplankton abundance throughout the bay. In addition we will analyze abundance data in relation to concurrent oceanographic data to establish baseline data on zooplankton habitat suitability. These data will determine if there are seasonal changes in zooplankton composition related to seasonal changes in the oceanographic conditions of Brewers

Bay. Annual patterns and baseline data on zooplankton abundance and distribution can all be used as indicators of the potential impacts of climate change on other vulnerable species, which will have important implications for future research on the impacts of climate change in the USVI.

### **Overgrowth of coral reefs by the encrusting macroalgae *Ramicrusta* sp. in the U.S. Virgin Islands**

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STT-P11

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Caribbean coral reefs are increasingly under stress from external factors, such as climate change and land-based sources of pollution, making them potentially vulnerable to phase shifts from coral-dominated to macroalgae-dominated reefs. Macroalgae of the genus *Ramicrusta* appear to be increasing in prevalence at shallow water reefs in Bonaire, Jamaica, Puerto Rico, and now the U.S. Virgin Islands. This genus is known to form thin, crustose layers that cover corals, gorgonians, hydrocorals, and zoanthids often leading to complete overgrowth and mortality. There is little known about the biology and ecological impacts of *Ramicrusta* sp. or the cause of its recent emergence in the Caribbean. We present here an examination of a long-term coral reef monitoring dataset for the presence of *Ramicrusta* sp., changes in macroalgae cover, and a summary of prevalence and extent of overgrowth on several coral species.

### **Linking planktonic larvae to parrotfish aggregation sites in the USVI**

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STT-R12

*Kristen Ewen, Graduate Student, Center for Marine and Environmental Studies*

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Large bodied parrotfish in the genera *Scarus* and *Sparisoma* are declining rapidly in the USVI due to overfishing. The decline of these herbivores has played a role in deteriorating reef complexity and biodiversity via macroalgae proliferation at the expense of coral growth and recruitment. One strategy in aiding the recovery of parrotfish populations is the protection of reproductive adults and their aggregation sites, ideally providing greater recruitment to local reefs. Using collected parrotfish larva, this study will employ a lagrangian particle dispersion model to determine potential aggregation sites in the territory. Larvae dispersal pathways can be traced back to aggregation sites using larvae morphology (age and size), location of collection and oceanographic factors. Identifying localities of these aggregations allows for improved management in the effort to restore populations of these economically and ecologically essential groups.

**Environmental drivers of mutton snapper (*Lutjanus analis*) movement patterns across a seascape**

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STT-P13

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Coral reef fish, which live in highly heterogeneous environments, move in patterns between habitat types and across physical gradients to take advantage of specific resources. One species likely to show movement patterns across these variables is the mutton snapper (*Lutjanis analis*), a large, generally solitary species of commercial and ecological importance. This study describes fine scale movements of mutton snapper using passive acoustic telemetry, an effective method for quantifying spatiotemporal movements across a seascape for long, continuous periods of time. Eight individuals were tracked using an array of 39 Vemco VR2W omnidirectional acoustic receivers located in Brewers Bay, on the southwestern side of St. Thomas, U.S. Virgin Islands. Preliminary results show high residence time in the bay for most individuals, within a relatively small home range that was differently sized and located for each. Additionally, movement patterns differed between day and nighttime periods. Understanding fish movements, including home range size and habitat requirements, can inform the planning of marine protected areas that will best protect commercially and ecologically important species like mutton snapper. This knowledge is essential to the implementation of effective ecosystem-level management strategies that ensure sustainability and ecosystem health for the long term.

**An assessment of male hawksbill sea turtles (*Eretmochelys imbricata*) in the nesting population of Buck Island Reef National Monument, St. Croix, USVI**

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STT-P14

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Little is known about the number of male sea turtles, especially for Critically Endangered Caribbean hawksbills (*Eretmochelys imbricata*). To gain insight into the life of Caribbean hawksbill males, molecular techniques have been put to use to gather this information. During the female hawksbill monitoring project at Buck Island Reef National Monument (BIRNM) in 2016, which has come to an end, nightly patrols were conducted during which tissue samples were collected from 40 female hawksbills. Tissue samples were also obtained (when possible) from hatchlings that emerged from at least one nest of each of the females (40 nests); this produced 1444 hatchling samples. We compared the genetic identity from tissue samples collected from nesting females and their respective hatchlings using six polymorphic microsatellites. Because there are two alleles at each DNA locus, one belongs to the mother and one to the father and when female and hatchling DNA is compared, the unaccounted-for allele must belong to the father, allowing for breeding adult males to be identified within the population of Buck Island Reef National Monument. In addition, evidence of multiple paternity and an estimation of the operational sex ratio in the Buck Island hawksbill population may be determined. There were no samples taken directly from male hawksbills. Genetic analysis will be conducted at the University of the Virgin Islands as well as at NOAA's Southwest Fisheries Science Center in La Jolla, California. Based on similar studies from Malaysia and the Seychelles we expect a 1:1 adult male

to adult female ratio in the BIRNM nesting population and expect there to be evidence of multiple paternity in 10% or fewer of the egg clutches sampled. Male hawksbills are a crucial and critical component in the conservation and management of this Critically Endangered species. Obtaining estimates of the number of males could play a beneficial role in determining how climate change could affect the already skewed female bias that is a common trend in all sea turtle species, due to temperature dependent sex determination (TSD) in the nest. Keeping long-term track of these numbers could help inform us if climate change is in fact allowing for more females to develop in the nests. Or, if not, having knowledge of the male population will be informative for population surveys. Any knowledge that can be gained about hawksbills in the Caribbean will contribute to refining objectives in the recovery plan and restoring these populations.

### **Resilience of transplanted fused staghorn coral, *Acropora prolifera*, to non-natal habitats shaped by environmental and ecological conditions**

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STT-P15

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Caribbean corals *Acropora cervicornis* and *A. palmata* hybridize to form the fused staghorn coral, *A. prolifera*. Recent studies suggest the combination of adapted traits from both parent species provides *A. prolifera* with novel genetic architecture that may allow it to persist in a wide range of environments. However, it is unclear if *A. prolifera* can persist in non-natal habitats to which they are not adapted. Our objective is to compare the resilience of non-natal *A. prolifera* genotypes to natal genotypes in a unique location. In November 2016, 5 fragments from 8 colonies were collected from Inner Brass (IB), an island north of St. Thomas USVI, and Flat Cay (FC), an island south of St. Thomas (n=40; N=80). Both control and transplanted fragments were planted randomly in two plots (1m-2.5m) at Flat Cay. Growth, mortality, disease, predation and bleaching were monitored monthly. Preliminary results show no disease, mortality, predation, or bleaching except for one fragment from IB that paled, suggesting natal location did not influence hybrid health. Because these data suggest *A. prolifera* can live outside their natal habitat, have unique traits, and robust survival they may be useful in coral restoration efforts.

### **Quantifying Microplastics in St. Thomas Coastal Environments**

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STT-P16

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As plastic waste is exposed to UV radiation, high temperatures, and mechanical weathering, it breaks down into smaller pieces. Plastic pieces less than 5mm in size are characterized as

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microplastics. Microplastics can enter the coastal marine environments through waste water discharge and rain water run-off, and often they are mistaken for food and ingested by sea birds, fish, and corals, causing physical harm. Also, chemical pollutants present in the environment tend to adsorb to plastic surfaces, providing the opportunity to bioaccumulate in the food web if ingested. Many studies have quantified microplastics in coastal environments and ocean surfaces around the world. However, very few studies have quantified them in the Caribbean, and only at regional scales. This study aims to quantify microplastics on beaches, surface waters, and reef associated sediments in embayments around St. Thomas (U.S. Virgin Islands), and test whether microplastics are more abundant in bays with greater anthropogenic activity in associated watersheds. Preliminary results show that microfibers as well as microplastics (1mm - 0.3mm) are present in beach sediment and surface waters in both Perseverance and Brewers Bays on the south side of St. Thomas. Although this project is still being conducted, final results will lead to understanding of the distribution of microplastics around St. Thomas, and their potential to impact reef-building corals and other marine organisms.

### **Impacts of Sponges on Coral Recruitment and Recovery**

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STT-P17

*Tia Rabsatt, Undergraduate Student, Center for Marine and Environmental Studies*

Corals play a major and important role in coral reef ecosystems. Corals provide a habitat and food to other organisms on the reef. However, studies show that coral cover has declined drastically due to natural disasters and anthropogenic activities over the past few decades. In contrast, sponge cover has been increasing. It is hypothesized that the increase in sponge cover is inhibiting coral recruitment and the regrowth of corals. The purpose of this experiment was to investigate whether sponges are inhibiting the recruitment of corals through space occupancy or allelopathy. The experiment consisted of scoring recruits (coral larvae) that landed on recruit plates at six shallow water reef sites and identifying coral, sponge and macro-algae cover in the surrounding area of the plates. Coral recruit density found on plates was found to be positively related to the percent coral cover found around the plate. This study can help identify the impacts of sponges on coral resilience. Funded by EPSCoR.

### **Factors controlling the abundance of the macroalgae, *Dictyota* spp. and their interactions with stony corals in St. Thomas, USVI**

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STT-P18

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Macroalgae, specifically the brown algae *Dictyota* spp., have been steadily increasing on coral reefs due to a myriad of internal and external factors. High nutrient levels and decreased herbivore populations are known to influence *Dictyota* abundance on Caribbean coral reefs. In St. Thomas, USVI the success of *Dictyota* spp. can also be attributed to the ability to fragment, and reproduce asexually and sexually. An herbivory nutrient manipulation experiment using Osmocote fertilizer and herbivore exclusion cages was performed at three sites south of St.

Thomas. This experiment was conducted twice; once measuring average height (cm) of *Dictyota* for four consecutive months and once measuring the average change in biomass over two weeks. During this study, variables such as coral health, temperature, salinity, and swell were recorded at each site for comparison. Preliminary results show no significant difference between treatment type, however, there was an effect of time and location suggesting external factors such as swell and temperature may be controlling the abundance of *Dictyota*. Analysis of reproductive traits determined asexual and sexual reproduction are contributing to the success of *Dictyota*. Results highlight the importance of testing multiple variables to determine factors influencing macroalgae abundance and their subsequent interactions with stony corals.

### Sponges Under Temperature Stress

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STT-P19

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*Marilyn Brandt, Faculty, Center for Marine and Environmental Studies*

One of the climate change threats to coral reefs is the increase of ocean temperatures, which can produce coral bleaching and mortality. While corals are dying, marine sponges have become abundant and are currently an important habitat-forming animal on Caribbean coral reefs. This study evaluates if higher water temperature affects survival, pigmentation and “tissue” regeneration of three species of common Caribbean reef sponges. The sponges were collected from the reef and placed at two experimental temperatures for seven days. For the control tanks, temperature was maintained constant ( $27.0 \pm 0.32^\circ\text{C}$ ), whereas for the stress tanks two peaks of high ( $31.1 \pm 0.58^\circ\text{C}$ ) and low ( $26.5 \pm 0.21^\circ\text{C}$ ) temperatures were simulated. Our results showed that percentage of mortality and pigmentation varied under control and stress temperatures. *Desmapsama anchorata* had higher levels of mortality under temperature stress. *A. cauliformis* maintained their pigmentation over time in both control and stress temperatures. However, more individuals of *A. cauliformis* and *Cliona delitrix* presented diseases under stress temperature. Tissue regeneration occurred in both control and stress temperatures for all three species. This experimental study showed that shorter and more extreme fluctuations differently affect each species. Future studies should focus on temperature stress effects on sponges over longer periods of time.

### Bleaching and depth refuges in the eastern Pacific during the strong 2015-2016 El Niño

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STT-P20

*Tyler Smith, Faculty, Center for Marine and Environmental Studies*

*Viktor Brandtneris, Staff, Center for Marine and Environmental Studies*

The ongoing 2015-16 El Niño is the third severe El Niño to impact coral reefs of the eastern tropical Pacific. These events cause mass coral mortality, and provide lessons to understand other mass bleaching events, such as in the Caribbean in 2005. In the two previous El Niño events in 1982-83 and 1997-98 eastern Pacific communities of *Millepora intricata* died in shallow water, but survived in deeper water (> 12 m depth), facilitating shallow water recovery

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between disturbances. This supported the deep reef refugia hypothesis, which suggests cooler temperatures buffer corals in deep environments. This support, however, lacked temperature observations at depth. We found that in Pacific Panama during the 2015-16 El Niño that depth was a strong refuge from thermal stress in deeper reef areas and was related cool conditions below coral bleaching thresholds. This included *Millepora*, but also five other stony coral species. By April 2016, *M. intricata* had once again been extirpated from shallow water study sites in Panama and other species showed bleaching or mortality. Below 15 m temperatures were cooler and corals were unaffected. These studies are critical to assessing the importance of depth refugia in preventing regional and global coral extinction in a warmer future.

### **Predicting the distribution of threatened stony corals in mesophotic coral reefs using environmental and physical factors**

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STT-P21

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*Daniel Holstein, Postdoctoral Research Associate, Duke University Marine Laboratory*

Mesophotic coral ecosystems (MCEs) in 30-100m waters of the US Virgin Islands (USVI) and wider Caribbean support a refuge for shallow water stony corals. There are contrasting physical and environmental factors that drive the difference in coral assemblages from MCEs to shallow reefs. Using these physical and environmental factors, habitat suitability modeling (HSM) can be used to predict stony coral distribution at mesophotic depths in the Caribbean, thus, locating high cover mesophotic reefs with important ecological attributes. HSMs can provide insight into predicting community composition of MCEs and further provide a tool for managing unexplored reef areas. Boulder star corals of the genus *Orbicella* are threatened in shallow water but abundant in MCEs, and are a focus of this study. Using long-term biophysical datasets from the USVI, survey data characterizing orbicellid populations at mesophotic depths will be compiled along with environmental and physical factors. Environmental predictors and surveys of community composition will be used to create HSMs. The product of the modeling, a map displaying locations of orbicellids, will allow for better characterization of MCEs. Maps of known locations of *Orbicella* throughout the USVI will also be included to compare with predicted locations.

### **The Effects of Invasive Seagrass *Halophila stipulacea* on the Habitat Preference and Health of Juvenile Nassau Grouper *Epinephelus striatus***

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STT-P22

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*Richard Nemeth, Faculty, Center for Marine and Environmental Science*

Nassau grouper, *Epinephelus striatus*, are currently endangered and are dependent on seagrass habitats for the first 1-2 years of development. An invasive seagrass, *H. stipulacea*, has spread throughout the geographic range of Nassau grouper but little is known about the effects of

this invasive seagrass on juvenile development. From June-December 2016, forty-six juvenile Nassau grouper were caught, measured, and weighed in three different bays around St. Thomas, USVI. The condition index of juvenile Nassau grouper was compared between invasive, native and mixed seagrass beds (mixture of *H. stipulacea* and native seagrasses). Habitat preference was analyzed by characterizing the seagrass where each Nassau was found and where they were absent (null sites). Preliminary data show that the condition indices of Nassau grouper were significantly lower in invasive seagrasses than native and mixed seagrass beds. Results showed that canopy height was significantly higher in areas where Nassau were found compared to null sites.

### **Implementing public high school-based research and science communication projects on marine debris in a NOAA Priority Watershed**

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STT-P23

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*Amelie Jensen, Graduate Student, University of the Virgin Islands*  
*Katharine Egan, Graduate Student, University of the Virgin Islands*

Marine debris has negative impacts on coastal communities. A NOAA Marine Debris Grant was awarded to UVI to administer a project and partner with local schools to address the problem of marine debris in the US Virgin Islands. Charlotte Amalie High School Marine Biology students will conduct two beach cleanups in NOAA Priority Watersheds for their transfer project and will record data on the marine debris collected. The students will have the opportunity to compare their findings with the Ocean Conservancy's International Coastal Cleanup historical data for St. Thomas. This is the first time that these historical data will be analyzed and will be presented to the public. The students will create a research project using both the historical marine debris data and their own data and present their findings at Charlotte Amalie High School's STEM Fair and at the University of the Virgin Islands Research Day. After the completion of their research project, students will understand the negative impacts that marine debris have on their community while learning skills such as conducting a research project, analyzing data, and communicating these problems to their peers and the wider community.

### **Spatial Pattern of Burglary in Washington, DC, Using Geographic Information System (GIS)**

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STT-P24

*Avanelle Carbon, Undergraduate Student, College of Liberal Arts & Social Sciences*

Burglary is the unlawful entry of an individual's building structure or vehicle with the intent to commit a crime. Burglary deprives individuals of their property and also serves as an inconvenience to the victim. The police department has the responsibility to ensure that communities are free of such crime. As a result, these departments develop and implement procedures to prevent it. Geographic Information System (GIS) has been utilized by the District of Columbia Metropolitan Police Department to monitor and detect burglary.

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Understanding crime pattern is crucial to creating plans for preventing such crime. The aim of this study is to analyze spatial pattern and spatial dependency of burglary within the District of Columbia by applying GIS techniques. The 2016 burglary data for all the wards for this study was acquired from DC Metropolitan Police Department. Additionally, the 2015 unemployment rate by ward was obtained from the U.S. Department of Labor.

### **Comparing Substance Use Behaviors between UVI Students & Young Adults in the Community**

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STT-P25

*Shaniqua Hodge, Undergraduate Student, College of Liberal Arts & Social Sciences*

*Kimarie Engerman, Faculty, College of Liberal Arts & Social Sciences*

*Doris Battiste, Staff, Caribbean Exploratory Research Center*

Engagement in substance use can lead to an array of problems such as academic difficulties, poor peer relationships, health-related problems, and family crises (Kirst, et.al, 2014). The purpose of this study is to extrapolate differences among young adults on the prevalence of drug use on the University of the Virgin Islands (UVI) campuses and within the surrounding community. This study hypothesized that UVI students will have a higher prevalence of drug use than young adults in the community. The participants are UVI students and young adults between 18-24 years old who completed the CORE Alcohol and Drug Survey. Descriptive and inferential analyses were used to analyze participants' responses. This study is significant in that it provides stakeholders relevant information to better understand substance use on campus and in the community. Also, the information generated is essential to the field of psychology because substance use can have negative consequences and psychologists play a vital role in the recovery process.

### **Rehabilitation Programs and their Effect on Juvenile Recidivism**

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STT-P26

*Terianne John, Undergraduate Student, College of Liberal Arts & Social Sciences*

*Lawanda Cummings, Faculty, College of Liberal Arts & Social Sciences*

Juvenile delinquency is an act committed by a minor that violates the statutory code. In the Virgin Islands, a minor is an individual under the age of eighteen. A minor that repeatedly violates a status offense or crime may be adjudicated a delinquent. Recidivism occurs when a minor repeatedly violates a status offense or crime after release from detention or facilities after an extended period. This study will show the relationship between juvenile recidivism and rehabilitation programs. It will explore gender differences in juvenile recidivism, while also exploring if the continuity of rehabilitation programs influences juvenile recidivism. This data will include the recidivism rates of the juveniles at the Virgin Islands Youth Rehabilitation Center (YRC) on St. Croix for the years 2005-2015. The data collected for this study is secondary and the data is from the Department of Human Services(DHS). A two-way ANOVA analysis will be conducted to analyze the data. The Statistical Package for the Social Sciences (SPSS) program will aid in the analysis of the data. This research hopes to show that juveniles who successfully

attend rehabilitation programs have a lower probability of recidivism. Failure of the continuity of programs may lead to a higher rate of recidivism among juveniles.

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### **Crime Analysis in St. Louis, Missouri**

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STT-P27

*Kalene St Jean-Pierre, Undergraduate Student, College of Liberal Arts & Social Sciences*

According to *worldatlas.com*, St. Louis, Missouri, has the highest violent crime rate in the United States. Violent crimes as defined by the Federal Bureau of Investigations are homicide, aggravated assault, rape and robbery. As a major city in Missouri and having the four violent crimes as listed by the Federal Bureau of Investigations, Geospatial analysis can aid in the identification of crime trends and patterns. The objective of this research is to understand the spatial pattern of violent crimes in St. Louis, as well as the change in pattern or intensity of violent crime in St. Louis over the past five (5) years. This research further seeks to identify 1) when crime is occurring, 2) where crime is occurring as well as answer the question as to whether or not crime is random or is there a pattern. Lastly, this research project will look at indications of any correlation between socioeconomic factors and violent crime.

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### **Senior Immigrant Temporary Employment and Volunteer Program**

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STT-P28

*Andrea Wilson, Graduate Student, College of Liberal Arts & Social Sciences*

This program provides an overview of the Senior Immigrant Temporary Employment and Volunteer Program (SITE-VP) and how it will substantially minimize the growing trend of unemployment among older foreign born citizens living in the USVI. Demographics on the senior population ages 65 and older were provided by the 2013 House and Community Survey. Hence providing statistical significance to the purpose of this program. More than 65% of the aging population living in the Virgin Islands are foreign-born. As stated in the research data, of the 28,154 citizens aged 55 and above, 25% were living below the poverty level. The 2010 census shows an increase in number of senior citizens living below the poverty level. Currently the Senior Community Service Employment Program (SCSEP) only provides a total of 137 positions. Findings from both the 2010 census and the 2013 Virgin Islands Community Survey suggest the need for a program that will assist seniors, particularly foreign-born elderly, to be economically sustained and contributors to community building.

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### **The Impact of a Reading Skills Course on College Freshmen Preparedness**

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STT-P29

*Linda Wymer, Faculty, College of Liberal Arts & Social Sciences*  
*Suzy Harney, Faculty, School of Education*

Nationally, there is an increasing trend among incoming freshmen of having deficiencies in skills that, at one time, were mastered in high school. In response, most higher education institutions

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have created programs to prepare these students for successful achievement in the freshman year and continuing college success.

Yearly, more than 50% of incoming freshmen at UVI are required to enroll in developmental reading, writing or math skill courses, as determined by nationally normed tests or an institutionally administered placement test. Currently, UVI requires no systematic external measures to determine the extent to which skills were achieved during these courses.

As reading ability is the foundation of academic success, this study will determine the value added in an initial reading skills course by analyzing over 10 years of pre- and posttest scores collected using the nationally normed Nelson Denny Reading Test. The Nelson-Denny is used to screen for reading deficiencies, and evaluate the value of educational academic interventions. Identifying the value added for students can be used to inform faculty practice, curricular alignment and administrator decision making as well as facilitate students' preparation for a successful college experience.

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### **Do Inhibitory Synapses Change Throughout The Day?**

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STT-P30

*Lewis Bennett, Undergraduate Student, College of Science and Mathematics*

It is not fully understood how the circadian rhythm and sleep influence cortical plasticity. Previous studies have shown that frequency of mEPSC's increased after wake and decreased after sleep. However, preliminary data from our laboratory indicates that the frequencies of miniature inhibitory postsynaptic currents (mIPSC's) have daily fluctuations, i.e. they do the reverse of mEPSC's. Since cortical plasticity and function are not shaped by excitation alone, but rather by the excitation/inhibition balance, we studied how the circadian rhythm may influence the brain's inhibitory synapses. Our first hypothesis stated that the change in frequency of mIPSC's might be due to a change in the number of synapses. Since each mIPSC result for the spontaneous activation of a single synaptic release site, we also hypothesized that the daily fluctuations may be due to a change in the activity of synaptic release sites. Immunohistochemistry was used to quantify the number of Synaptotagmin-2, (a known marker for parvalbumin positive inhibitory boutons) present in the visual cortex of mice entrained in normal (T0) and reverse (T12) light cycles. Mice entrained in the T12 light cycles showed a significant high number of Synaptotagmin – 2 puncta present while the mice entrained in the T0 light cycle did not. The results obtained can be used to help scientist studying cortical plasticity to set up experiments to obtain optimum results.

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### **Proposed Oxidation of Geraniol and Nerol into Citral A and Citral B, Components of Lemongrass Oil**

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STT-P31

*Yakini Brandy, Faculty, College of Science and Mathematics*  
*Clilia Davis, Undergraduate Student, Department of Biological Sciences*

Citral, the main component in lemongrass oil, is responsible for the oil's multi-medicinal benefits. Citral is a mixture of two isomers, Citral A (Geranial) and Citral B (Neral). Citral A

is found in higher amounts than Citral B (up to 1.5:1.0 ratio) and is mainly responsible for the strong lemon odor. Citral B has a less intense lemon odor but tastes sweeter. Together, the two isomers contribute to the pleasant fragrance and taste of lemongrass. It is unclear, however, which isomer contributes to the medicinal potential of lemongrass or if they work synergistically. In order to determine this, Citral A and Citral B will be individually synthesized for future bioanalyses in comparison to natural Citral. So far, we have successfully synthesized Citral A from its precursor alcohol using  $K_2Cr_2O_7$ . Citral B was not successfully made via this method, presumably because of steric hindrance. Therefore, the goal of this research is to synthesize Citral B via a simple oxidation reaction using a variety of oxidizing agents. The products will be characterized using FTIR, LCMS,  $^1H$  NMR and NOESY, as was previously done for Citral.

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**Optimizing molecular identification techniques for *Stegastes adustus* erythrocytes infected with *Haemohormidium*-like apicomplexan parasites**

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STT-P32

*Nirisha Commodore, Undergraduate Student, College of Science and Mathematics*

Blood cells of Caribbean damselfish, *Stegastes adustus*, are infected with *Haemohormidium*-like apicomplexan parasites related to causative agents of malaria and toxoplasmosis in humans. However, host-to-host transmission of fish protozoan is poorly understood. We aim to establish the complete life cycle of these parasites. First, infected fish must be identified and protozoa isolated. We hypothesize that PCR primers targeting the fish apicomplexan 18S rRNA gene will complement microscopy techniques currently used to identify infected erythrocytes. Fish blood samples were analyzed through microscopy for parasitemia. Next, whole blood samples were fractionated using a Percoll gradient, and DNA extracts from fractions were tested for infection using PCR. Preliminary results indicate infected cells are not separated adequately by the density gradient because protozoan DNA was present in all fractions. The PCR assay rapidly screens for infection compared to microscopy. Detection of infected fractions by PCR will allow us to determine if there is a pattern in fractions from numerous fish. Isolated infected cells could be used for further study including transmission experiments with live fish, as well as ultrastructure analysis.

This research was supported by NIH RISE scholarship to N.C. and NSF VI-EPSCoR Mini Grant award #1301755 to J.R., P.S. and A.C. and NIH NIGMS #5T36GM101995-02 to A.C.

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**Chasing the First Stars from UVI**

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STT-P33

*Antonino Cucchiara, Faculty, College of Science and Mathematics*

*David Morris, Faculty, College of Science and Mathematics*

Gamma-ray Bursts (GRBs) are the most powerful explosions in the Universe. They are produced at the end of the life of stars 30-100 times our sun. Some of these stars can be produced only at a time when the Universe was very young, and only few stars were present. GRB explosions last only few minutes and the subsequent radiation that can be detected from Earth in optical and near-infrared light fades away after one day or so. UVI and the Etelman observatory have

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upgraded the Virgin Island Robotic Telescope, which will be capable to autonomously received “GRB alerts” and perform observations a few minutes after. Once these data are acquired, UVI faculty and students will be able to analyze them in real-time and communicate their findings to other astronomers around the World. Finally, thanks to UVI Physics faculty approved grants, they will be able to investigate these GRB with some of the largest telescopes in the World, the Gemini telescope, in order to determine the exact time of the explosion and study the chemical composition of the Universe in these primordial and unknown epochs.

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### Single-Atom Catalysis in the Gas Phase

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STT-P34

*Sojourna Ferguson, Undergraduate Student, College of Science and Mathematics*

Transition metal nanoclusters have found widespread application as catalysts in numerous industrial-scale chemical reactions. However, the rational design of these heterogeneous catalysts, with tailored activity and selectivity, is still elusive. Recently, surface-supported single-atom catalysts have been shown to have higher activity, selectivity and stability than their nano-sized analogues. While these early results are exciting, further studies on the metal-support and metal-substrate interactions are needed to fully understand these systems. Gas-phase experiments are particularly convenient for investigating the vibrational behavior, and thus identity, of metal-substrate complexes. These experiments provide a well-defined environment that is free from the perturbing effects of surface supports, solvents, counter ions and matrices. In addition, ions can be size-selected, facilitating the systematic investigation of their structures and reactivity directly and via comparison with theory. Moreover, these experiments can provide benchmark data for comparison to computational chemistry calculations. In this study, we investigate the interactions of a single vanadium cation with acetylene molecules using infrared laser photodissociation spectroscopy and Density Functional Theory. This combined experimental and theoretical study provides evidence for the metal-catalyzed trimerization of acetylene to form benzene, as well as the formation of exotic metallacycles. Single-atom catalysts are the new frontier in heterogeneous catalysis and these studies provide a unique lens through which insight into their reaction mechanisms and pathways can be obtained.

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### Comparison of Fluorescence Spectra of Toxic and Non-toxic Fish

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STT-P35

*Jamisha Francis, Undergraduate Student, College of Science and Mathematics*

*Paul Jobsis, Faculty, Center for Marine and Environmental Studies*

Ciguatera fish poisoning (CFP) is the most common marine non-bacterial food poisoning in the USVI; about 3 of every 1,000 people poisoned in the USVI. CFP in the VI is caused by the consumption of local reef fish that consumed other fish with toxin present. Small fish consume the dinoflagellate *Gambeirdiscus toxicus* species that is the known to produce the ciguatoxin (CTX). Prior studies showed that CTX is composed of a long chain of cyclic molecules. Cyclic molecules usually fluoresce; this led us to attempt to measure the fluorescence spectrometer of fish to look at differences between toxic and non-toxic fish spectra. Fish samples were mashed

with water at a 2:1 ratio with a mortar and pestle. Supernatant was placed in Cary fluorescence spectrometer for analysis. After data comparison, we noted the similarities between Barracuda and Tilapia at wavelengths peaks of  $420\pm 2.5$  and  $500\pm 2.5$ . In the Cero Mackerel however, we noted the same peaks at both  $420\pm 2.5$  and  $500\pm 2.5$ , but there was also peak at  $460\pm 2.5$ . The similarities in the Tilapia and Barracuda in-situ samples led us to believe that there is a possibility that fluorescence spectroscopy could be used to identify the presence of CTX in fish tissue.

### **Estimating the Risk of Alcohol Onset Soon After Cannabis Onset: A Triggering Process?**

STT-P36

*Villisha Gregoire, Undergraduate Student, College of Science and Mathematics*

*James C. Anthony, Faculty, Department of Epidemiology & Biostatistics, College of Human Medicine, Michigan State University*

*Karl Alcover, Graduate Student, College of Human Medicine, Michigan State University*

*Hui Cheng, Staff, College of Human Medicine, Michigan State University*

**Background:** In the world and in the United States, alcohol is one of the most commonly used legal drugs and cannabis is the most commonly used internationally regulated drug (NIAAA, 2016; NIDA, 2015). Recently, in the United States (US), epidemiological estimates for prevalence of use of most internationally regulated drugs have stabilized, but this has not been the case for prevalence of cannabis use, which is increasing somewhat (NIDA, 2015). Both alcohol and cannabis are psychoactive drugs. As such when they are taken prematurely primarily during early teens (12-17 year olds), there are concerns about toxic effects on the developing central nervous system and associated impairments in cognitive functions. At present, early teen cannabis use raises the possibility that cannabis use now starts first, and then triggers onset of drinking alcoholic beverages. In this study we aim to determine whether cannabis onset changes alcohol use using the epidemiologic case-crossover design in which cases serve as their own controls.

**Methods:** Estimates are from newly incident alcohol and cannabis users (combined  $n=51,122$ ), whose month and year of first use are known from the US National Surveys on Drug Use and Health (NSDUH), 2002-2014. NSDUH annually assesses non-institutionalized US residents aged 12 years and older. For the case-crossover analysis, we used the month prior to the month of alcohol onset as the ‘hazard’ interval, while two months prior to the month of alcohol onset served as the ‘control’ interval. The association is measured by the epidemiologic “case-crossover” (CCO) method, obtained using the McNemar’s test of matched data.

**Results:** Relative risk (RR) estimates were statistically robust for individuals 12 years and older as well as for both 12-17 year olds and 18-21 year olds. RR 95% CI for each age group does not entrap the null value (RR=1.0).

**Conclusions:** We found evidence that cannabis onset now may be a trigger for onset of drinking alcohol. Future research on the short horizon short-term horizon is to stratify by Sex (in addition to these age stratifications) while on a long-term horizon would entail prospective and longitudinal studies, with bio-samples to confirm self-report of use, as well as randomized controlled trials to estimate the degree to which prevention or delay of cannabis onsets is followed by reduced risk of underage drinking.

### **Species Diversity and Structural Differences between Dry and Wet Guts**

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STT-P37

*Kyle Jerris, Undergraduate Student, College of Science and Mathematics*

Guts are natural drainage systems that transport stormwater and they are one of the primary connections between the terrestrial habitats, upland activity, and the marine environment. My study aims to characterize the differences in structure and species diversity between dry and wet guts. Dry guts are those that do not receive consistent water input; wet guts retain water, either in pools or as intermittent flowing streams. We conducted surveys in dry and wet segments of two guts on St. Thomas, U.S. Virgin Islands. We compared topography of dry and wet guts by measuring rugosity along 2 10m transects in each gut. We expect higher rugosity in wet guts because constant water flow erodes terrain resulting in higher structure. We evaluated the diversity of trees in both dry and wet guts by identifying species and measuring size parameters of trees at 5m intervals along a 30 m transect. We expect to see more diversity in the dry guts based on an intermediate disturbance theory with intermittent rainfall providing the disturbance events. We predict differences in community assemblages between the two guts due to differences in the availability of water as a resource.

### **Exploring the Impact of Campus-Wide Experiences on SCI 100 students**

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STT-P38

*Nastassia Jones, Faculty, College of Science and Mathematics*

For over two decades, institutions of higher education have committed significant resources into First Year Experiences (FYE) programs to address retention and recruitment of students. The FYE programs are composed of key core academic courses as well as extracurricular components to facilitate social interactions among students and to integrate these students into the university community. Studies have shown that the institutional environment has a large impact on whether students continue to persist in academic programs. Therefore, the goal of the present study is to explore the impacts that the extracurricular aspect of a general science course has on the experience of first year students. This component, known as Campus Wide Experiences, is an extra credit opportunity for students to attend extracurricular activities and then to reflect on those experiences. Students report that CWEs allow them to attend seminars and workshops in topics that they would have never otherwise attended. Additionally, although some experiences are reported to be boring and a waste of time, students find out what they are or are not interested in pursuing early in their college career. Overall, CWEs are a course component that students value at extra credit opportunities to expand their involvement on campus.

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### Extracting DNA from *Halophila stipulacea* Plants around the Virgin Islands

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STT-P39

*Shantae Lewis*, Undergraduate Student, College of Science and Mathematics

*Krislen Tison*, Undergraduate Student, College of Science and Mathematics

Invasive species pose a threat to the ecosystems that they invade by outcompeting native species for resources. The seagrass *Halophila stipulacea* is one of these invasive species. It originated in the Indian Ocean and has invaded the waters of the Virgin Islands; if it is not stopped or at least controlled it can lead to the extinction of our native species, which would be tragic for our fishes, because they prefer to eat the seagrass that is native to us. The goal of our project is to find the genetic variability of *H. stipulacea* and to use that information to create an invasion history model. In doing this we hope to gain more knowledge on the seagrass, and to understand the source of invasion and how it was spread on St. Thomas and around the Virgin Islands. In order to achieve this goal we had several smaller objectives including: extracting high yield DNA samples and making them into libraries, finding a protocol that would give the most DNA yield, and determining their genetic structure and colonial diversity of the seagrass. The first step was to collect leaf samples of *Halophila stipulacea* from eight different sites around the Virgin Islands. After the leaves were collected they were cleaned to get rid of epiphytes and debris; then they were stored in silica gel to dry. During the summer the plants were extracted using one leaf and the DNeasy mini kit by Qiagen. The yields we received from this were varying from one extreme to the other; they showed no trends to draw results from whether they were extracted fresh or using more leaves. Later we found that the DNA quantities from our samples were much lower than we needed them to be and so all samples had to be re-extracted. The regular CTAB procedure was used; it produced good yields but they were still not high enough. Extractions are now done using plants with 15 to 25 leaves or that weigh about 0.1 gram when dried. These new extractions are done using the *Halophila* Next Generation DNA Extraction Protocol. So far ten (10) of the larger samples have been made into libraries and are in the process of having their DNA sequenced. Additionally, we have re-extracted 47 of the remaining 54 samples. Using this new protocol our DNA from the gel electrophoresis resulted in much brighter bands; they are less sheared and streaky than previous extractions. We also received some bands with high molecular weight, the highest amount being approximately 1 microgram with the lowest being about 300 nanograms. We have begun the protocol to make libraries for the rest of our cleaned samples. Based on where we are, we have not had the chance to test our hypothesis which states that the genetic variability of the seagrass, *Halophila stipulacea*, will be lower than that of its place of origin.

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### A Bioinformatics Approach to Classify Viruses Using a Decision Tree Model

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STT-P40

*Samuel Liburd*, Undergraduate Student, College of Science and Mathematics

Viruses serve as one of the most efficient vectors for death and disease, killing millions worldwide and mutating uncontrollably. In order to identify and understand viruses, a classification system was created based on features such as virus size, shape, genome structure, and mode of replication. To better understand this system and possible implications in machine learning, I hypothesized that it was possible to classify viruses biologically using genomic features and machine learning techniques. To do so, I analysed 511 (+) ssRNA virus genomes for unique genetic characteristics that

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identify them. The six virus families to be classified were Flaviviridae, Potyviridae, Betaflexaviridae, Virgaviridae, Picornaviridae, and Tombusviridae. Based on my literature review, I wrote a Python script that extracted features for performing the classification task: genome length, adenine, guanine, cytosine, and thymine count, the number of start codons, G-C and A-T percentages, host organisms, the number of proteins encoded, and the number, if any, of segmentations in the genome. The relevance of these attributes was then ranked using the Correlation-based Feature Subset Eval and Best First algorithms available in the data mining package Weka. The most relevant subset of attributes (genome length, A, C, and G counts, G-C percentage, host organism, and number of proteins formed) was selected with C4.5 classification algorithm. The training method used 66% of the genomic datasets to create a decision tree model. The tests were conducted on the remaining datasets and the results obtained shown that 99.4% of the remaining viruses were accurately classified. This accuracy level encouraged and supported my initial hypothesis that it is possible to classify viruses using machine learning techniques and genomic based features. In the future, I plan to expand this approach using machine learning techniques such as support vector machines and artificial neural networks that could serve as powerful tools to monitor and update changes to viral genomes.

This research project was funded through the UVI NSF/HBCU-UP SURE grant #1137472.

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### **Using Convolution of Measures to Approximate the Migration of Yellowfin Groupers**

STT-P41

*DeWein Pelle, Undergraduate Student, College of Science and Mathematics*

This project seeks to assess a probable location within the Grammanik Bank seasonal closure for habitation by the *Myteroperca venenosa*, a coral reef fish that is prevalent within the western Atlantic Ocean and the Caribbean. A related study utilized passive acoustic telemetry to track and monitor several factors of copious specimens. Whereas, this project seeks to utilize existing data to extend the abovementioned study through the application of several probability distribution functions (PDF's), operations used to define the probability of any quantifiable information and its possible outcome, to analyze plausible location for fish spawning. Also, the study will include a convolution of measures as a preliminary mathematical investigation to look at the detection ranges for the fish migration probability. These methods with the dataset, we were able to identify probable fish location. Furthermore, the completion of this project assists in the zoning of the *Myteroperca venenosa* for proper cultivation whilst finding an amendable agreement to allow sustainability for the fishing industry in an avid attempt to avoid the yellowfin grouper's extinction within the Virgin Islands territory.

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### **Seasonality of *Elysia crispata*, the solar-powered lettuce sea slug, on the North and South sides of St. Thomas, U.S. Virgin Islands**

STT-P42

*Zola Roper, Undergraduate Student, College of Science and Mathematics*

*Elysia crispata* is a common herbivorous benthic marine invertebrate known as the lettuce sea slug. The lettuce sea slug is studied because it has the unusual ability to sequester chloroplasts

from algal cells and utilize them for energy and coloration. Because of the importance of photosynthesis for *E. crispata*, the seasonality of this organism is being investigated. I hypothesized that the abundance of slugs would be higher in January to April (dry season) and lower in October to December (wet season) due to turbidity. This study is ongoing. Each month, a 30 m x 1 m belt transect is censused 2-4 m in depth in both Brewers Bay (south side) and Lerkenlund Bay (north side) parallel to the shore. The number of slugs along the transect, as well as the type of algae/substrate that slugs are found on are recorded. Results support that there is a higher abundance of slugs during the dry season. *E. crispata* is also more abundant in Lerkenlund Bay versus Brewers Bay for unknown reasons. Geographic Information System (GIS) mapping will be used to compare algal food abundance with slug distribution between both bays. These results suggest that this tropical species, *E. crispata*, is seasonal.

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### **Machine Learning Approach for the Prediction of Dissolved Oxygen Concentration**

STT-P43

*Cassia Smith, Staff, College of Science and Mathematics*

*Robert Stolz, Faculty, College of Science and Mathematics*

*Jonathan Jossart, Undergraduate Student, College of Science and Mathematics*

Dissolved oxygen (DO) is necessary to a multitude of life forms in aquatic ecosystems as most living organisms require oxygen for their basic metabolic processes. Healthy marine environments maintain a delicate balance between anoxia & hypoxia; DO concentration is one of the main indicators in assessing water quality. As such, the ability to forecast oxygen (O<sub>2</sub>) levels will be invaluable in monitoring the health of local marine areas and analyzing the effect of bio phenomenon and human interference. This project seeks to construct an accurate model for predicting DO concentrations in the lagoon area within Brewers Bay, St. Thomas and to explore what may influence DO fluctuations. A machine learning approach via MATLAB software will enable the development of a stepwise linear regression model and several other regression models in the future (neural networks, decision trees, generalized linear models).

I would like to thank the Emerging Caribbean Scientist (ECS) program for supporting me and enabling me to participate in research experiences. Funding provided by NSF/HBCU-UP grant # 1137472.

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### **A Mathematical Investigation into the Effects of Temperature, Salinity, and Currents on Coral Disease Dispersion**

STT-P44

*Elangeni Yabba, Undergraduate Student, College of Science and Mathematics*

*Star Matthew, Undergraduate Student, College of Science and Mathematics*

Coral reefs are in global decline and deteriorating at alarming rates, with coral diseases increasing both in prevalence and in space. Many studies have been done regarding how diseases spread between coral. The question that we are trying to answer is how coral disease dispersion is affected by currents, salinity, and temperature. We hypothesize that, not only is dispersion controlled by the currents, salinity, and the temperature, but it is controlled through a direct

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relationship between the diffusion/mortality constant (the rate at which the disease spreads) and the temperature and salinity of the water. In order to do this, we are utilizing data from NOAA and the University of the Virgin Islands' Center for Marine and Environmental Studies that includes information on salinity, currents, temperature, latitude, and longitude. Our approach captures the dynamics of coral disease both in space and time, and accounts for the highly seasonal nature of the annual outbreaks. We applied a combination of spatiotemporal statistics to study the disease progression by creating a connectivity graph between the various coral sites. The results have implications for designing management policies appropriate for coral reef conservation. Future work of this study consists of assessing the stability of the different numerical methods and strengthening our model.

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**Are Virgin Islanders more Successful Here in the V.I. or on the U.S. Mainland?**

STT-P45

*Ayishih Bellew, Staff, Eastern Caribbean Center*

A number of persons from the Virgin Islands emigrate to the U.S. mainland in search of better opportunities, an easier life and a higher standard of living. While some may achieve this, it is not a guarantee for all emigrants. This paper seeks to determine if a Virgin Islander residing in the continental U.S. is actually more successful than their counterpart who decided to stay in the V.I. Success is measured by six socio-economic factors. These factors of Virgin Islanders abroad are compared with a control group of Virgin Islanders that continue to live in the USVI. The t- test for two independent samples and the chi-square test will be used to determine the significance of the differences between the two groups.

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**Beginning a longitudinal analysis of UVI student information literacy skills: 2012-2016**

STT-P46

*Twanna Hodge, Staff, ITS/Library*  
*Celia Prince-Richard, Staff, ITS/Library*  
*Sherna Gumbs, Staff, ITS/Library*  
*Elroy Richard, Staff, ITS/Library*  
*Jonell Johnson, Staff, ITS/Library*

The project to assess UVI freshman information literacy skills began in Fall 2012 with the collection of baseline data from incoming students. Using the Standardized Assessment of Information Literacy Skills (SAILS), 266 students were assessed on 45 items in eight skill sets. The data collected established a benchmark of performance among incoming UVI students, to answer the question: "What are our students' strengths and weaknesses in regard to information literacy?" Information literacy instruction designed to address the gaps identified in the 2012 results was delivered to the students, who enrolled in FDS 100, SCI 100, and SSC 100 during the semesters since Fall 2012. In Fall 2014, when sophomore and junior students were assessed, the overall scores showed improvement in all skill sets. During Fall 2016, UVI Seniors again participated in the SAILS testing. A total of fifty-one (51) students from the St. Croix campus and fifty-six (56) from the St. Thomas campus took the test. Comparing UVI student scores from

2012 to 2016, there was an increase in all areas except Using Finding Tool Features. Students on the St. Thomas campus underperformed compared to their St. Croix counterparts; the change was over a 10% increase. On St. Croix, the improvements were more varied.

### **Would using a PBL to teach cell division meet the needs of students in a differentiated learning environment?**

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STT-P47

*Michealrose Ravalier, Teacher, Ivanna Eudora Kean High School*

*Nadia Monroe, Part-time Faculty (advisor), College of Science and Mathematics*

As in many schools, at the high school where I teach, science is not one of the popular required courses. I was faced with the challenge of teaching General Biology One students, who were introduced into my Honors Biology One course. I was forced to find effective strategies to teach concepts that students find difficult. Research article written by Vanessa Vega (May 23, 2012) supports the success of PBL as seen in the Manor New Technology High School. According to this research, science had the most gains in graduation rates from 2006 – 2011. Hence, I decided as part of my Action Research in Mathematics project to apply PBLs to my unique situation. The research question was “Would using a PBL to teach cell division meet the needs of students in a differentiated learning environment at the IEKHS during the 2016 / 2017 school year?” Phase one of the project included making *physical models* of the stages of cell division and completing the online textbook animation / simulations. Phase two included the creation of *comic strips and digital animation videos* that demonstrate their understanding of the concept in a platform and language appealing to adolescent learners. Finally, at the conclusion of the project, students submitted a reflection.

### **Attitudes & Effects of Cannabis Legalization in Society: A U.S. Perspective**

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STT-P48

*Sean Benjamin Jr., Undergraduate Student, College of Science and Mathematics, School of Business*

Cannabis has been used by many cultures around the world for thousands of years for purposes including spiritual, medicinal, nutritional and industrial. The plant is used for making items such as clothing, medicine, food, paper, rope, and plastic. In the U.S. and many other countries it has been illegal for over a hundred years, only becoming legalized or decriminalized in recent decades. The purpose of this study is to evaluate the effects and the attitudes associated with legalization and decriminalization of Cannabis in the United States. By comparing and contrasting the rates of Cannabis related factors such as crime and drug abuse both pre- and post-legalization/decriminalization, determinations can be made about whether such action will pose a risk or benefit and the resulting impacts to society.

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**The Impact of Human Development on Frog Population Distribution in the Virgin Islands**

STT-P49

*Sean Benjamin Jr., Undergraduate Student, College of Science and Mathematics, School of Business*

Amphibians are important members of the eco-system. Animals in this group such as frogs and toads are good indicator species of changes in the environment. The purpose of this study is to determine the impact of human development on the distribution of frog and toad populations in the Virgin Islands. Using spatial analysis techniques and V.I. Frog Count data to map locations of frog populations and human development will allow the creation of a geographic representation. This will enable the data to be compared and contrasted in order to find and display any correlation between the two variables in determining whether human activities have an effect on the frog and toad habitats and by extension the environment.

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**Student Perceptions on the Evaluation of Course Experiences**

STT-P50

*Suzy Harney, Faculty, School of Education*

Assessment, a fundamental aspect in all education fields, has become a method of both internal and external accountability in higher educational institutions. Most of this assessment is of students; although, in many institutions, assessment of course experiences by students is routine. Assessment of course experiences typically is used for internal purposes only, i.e., feedback to faculty. It is likely that most course/faculty evaluations are designed, overwhelmingly, by faculty and administrators, even though the students are the evaluators. Instead of asking students to evaluate course experience items, the aims of this study are geared toward learning what influences student ratings of course experiences, extent of participation, barriers to participating, ways to encourage participation, and student perception of the value of course experience feedback to faculty and institutions. In order to engage students in the research process and encourage input from students and faculty, the ‘think aloud’ technique will be employed in real-time during UVI Student Research Day 2017. The input from participants will also be shared in real-time so that the conversations between the researchers and participants will evolve throughout the session.

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**Can percentage of high school graduates be predicted from a linear combination of state preschool education funding and percentage of three- and four-year-olds enrolled in such preschool programs?**

STT-P51

*Sarah Dillie, Graduate Student, School of Education*

As high school graduation rates rise across the nation (82.0%) and in the USVI (67.7%), it's important to search for factors relating to this positive trend. Research shows there is a positive connection between attending preschool and graduating high school. How much money is spent per student varies greatly by locale. While the recent national average spent on each student

is \$10,700, the USVI is nearly \$15,000. Since the economic recession, states have decreased funding to preschools while student enrollment increases. This study's purpose is to investigate the possible connection of preschool enrollment and preschool funding to graduation rates. State statistics were compiled regarding the 2015-2016 graduation rate, the 2002-2003 percentage of 4-year-olds enrolled in preschool programs (14-year timespan reflecting a virtual cohort from preschool to high school graduation), and preschool funding for 2002-2003.

Although there was no relationship between per state preschool enrollment and graduation rate, there was a positive relationship between preschool funding and the corresponding high school graduate rate. This study will show whether the USVI investment in preschool will result in a comparable graduation rate.

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### **Pre-Service Teachers' Perceptions and Attitudes of Inclusion**

STT-P52

*Taliah Bryan, Undergraduate Student, School of Education*  
*Dian John-Brown, Undergraduate Student, School of Education*  
*Lenay Brooks, Undergraduate Student, School of Education*  
*Cigdem Alagoz, Faculty, School of Education*

Inclusion in education is teaching students with and without disabilities in the same classroom. To provide a successful inclusive early childhood education for all, teachers need to be trained and supported. Teachers need to feel competent in addressing the needs of all the children in the classroom. In this study, we investigated the perceptions and attitudes of pre-service teachers about successful inclusive early childhood education. The study will describe the inclusive early childhood teacher education preparation program. In service teachers who are also students at UVI will be interviewed about their practical concerns in inclusive early childhood education. Their insights on the practical problems and the appropriateness and usefulness of the preparation program's trainings will be reported.

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### **Determining Lipid Content**

STT-P53

*Shabree Anthony, Undergraduate Student, University of the Virgin Islands*

Lipid quantification is critical for understanding phenomena as different as the choices of consumers, the potential of algae for biofuels, health disparities related to obesity, and the onset of multiple diseases. This research aims to determine the most accurate method to measure lipid content on algal and plant material by comparing three widely used methods: 1) the gravimetric method of Folch et al. (1957), 2) the colorimetric vanillin method, and 3) the colorimetric charring method. These methods will be used to quantify predetermined amounts of purified commercially available lipids, lipid content of field-collected algae and plants, and lipid content of edible market-bought seaweed, for which results can be compared to label nutritional specifications. Algae/plants from St. Thomas will represent all major eukaryotic algal groups: *Ulva fasciata*, *Acanthophora spicifera*, *Sargassum polyceratium*, *Padina gymnospora* and *Halophila stipulacea*. It is predicted that the vanillin method will allow for better elucidation of

St. Thomas Campus

lipids because it allows quantification over a very wide range of lipid amounts. Funded by the National Institute of Health Grant #GM061325.

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### **Use of GIS in Flood Risk Mapping of St. Thomas, Virgin Islands**

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STT-P54

*K'Shana Battiste, Undergraduate Student, University of the Virgin Islands*

Flooding influences many parts of the world. Floods can cause damage and disruption to housing, living conditions, infrastructure, and the local economy. Every year through flooding there has been a loss of human lives and billions of dollars spent in damage and repair of property. These dangers and misfortunes can be avoided and lessened by recognizing the risk shown in flood inundation maps. Flood inundation maps are very essential for municipal planning, emergency action plans, flood insurance rates, and ecological studies.

GIS applications in flood risk mapping range from storing and managing hydrological data to generating flood inundation and hazard maps to assist in flood risk management. This study will focus on population risk and property value in designated flood hazard areas in St. Thomas Virgin Islands. The Flood Insurance Risk Map from the Federal Emergency Management Agency will be utilized to identify current and future flood risks. Socioeconomic data from the U.S. Census will be utilized to characterize the flood areas. This knowledge would be benefit to homebuyers, financial institutions and policy makers.

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### **Extraction and Purification of Potential Anti-Sickling Agents from Lemongrass**

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STT-P55

*Clilia Davis, Undergraduate Student, University of the Virgin Islands*

Sickle Cell Disease (SCD) is an inherited blood disorder in which the abnormal hemoglobin molecules (hemoglobin S) modify the erythrocytes to sickle shape. Due to this physiological alteration, a host of clinical implications arise including: strokes, kidney dysfunction, increased susceptibility to infectious diseases, and vascular occlusion. Patients are subjected to a cocktail of drugs, antibiotics and/or hydroxyurea. Hydroxyurea promises less frequent crises, once taken daily, but generates deterrent life-threatening side effects. Previous research identified alternative anti-sickling agents like Citral, even though the mechanism of action remains unknown. Since the aforementioned anti-sickling agent is found in natural products, this research ultimately seeks to identify a treatment method to reverse sickling and alleviate symptoms associated with SCD, subsequently, identifying the mode of action.

The West Indian Lemongrass (source of Citral) was dried and the crude extracted via hot percolation with various solvents using the Soxhlet apparatus. Each material was successively washed with hexane, ethyl acetate and methanol in 24-hour intervals. The extract was concentrated then successfully fractionated via flash chromatography.

Hot percolation proved to be an easy and reliable method to extract components based on solvent polarity. In itself, it also fractionates the sample for easier chromatography. Future research includes biological analysis of Citral to determine its anti-sickling activities.

## **Hydrophilic Antioxidant Activity in Parent and Hybrid strains of Sorrel (*Hibiscus sabdariffa*)**

STT-P56

*Anayah Ferris, Undergraduate Student, University of the Virgin Islands*  
*Narome Belus, Undergraduate Student, University of the Virgin Islands*  
*Torhera Durand, Undergraduate Student, University of the Virgin Islands*

Antioxidants are substances that protect cells against damage from oxidizing molecules, known as free radicals. Antioxidant activity also appears to be important to disease prevention. Sorrel (*Hibiscus sabdariffa*) is grown in tropical regions, and known widely for its nutritional value and being a source of antioxidants. The University of the Virgin Islands (UVI) Biotechnology and Agroforestry Program grows and crosses sorrel lines in an attempt to study various functional properties, but there is no information on how the antioxidant activity of sorrel differs among parent and hybrid varieties. The objectives of this study were to determine and compare the Hydrophilic Antioxidant Activity (HAA) in parent and hybrid daughter strains of sorrel. We hypothesized that (1) the hybrid strains will have a higher HAA than the parent strains and (2) the hybrid strains will have a higher HAA in both the fresh and dried sorrel samples. Fresh and oven-dried samples of three different sorrel varieties were used in this study: TTB (parent), KDN (parent), [(KDN x TTB) x TTB] F5 (hybrid). All strains were grown at the UVI, Albert Sheen Campus. Hydrophilic antioxidants from these samples were extracted in an aqueous pH = 7 phosphate buffer solution. The ABTS/H<sub>2</sub>O<sub>2</sub>/HRP decoloration method was used to measure the antioxidant activity. The samples were monitored at 730 nm in a UV-VIS Spectrophotometer over a course of 5 minutes. HAA was expressed as  $\mu\text{mol}$  of Trolox equivalent per grams of dry weight ( $\mu\text{mol TE/ g DW}$ ). It was observed that the dried samples of all sorrel varieties had significantly higher antioxidant activity than the fresh samples. Furthermore, the HAA for the fresh [(KDN x TTB) x TTB] F5 was in between that of the fresh parent samples. TTB had the highest HAA for the fresh samples (1487.12  $\mu\text{mol TE/ g DW}$ ) and KDN had the lowest (355.09  $\mu\text{mol TE/ g DW}$ ). [(KDN x TTB) x TTB] F5 had the highest HAA for the dry samples (32162.67  $\mu\text{mol TE/ g DW}$ ) and KDN had the lowest (999.28  $\mu\text{mol TE/ g DW}$ ).

This research is funded by NSF HBCU-UP Grant # 1137472.

## **The Relationship between Hours of Sleep & Grade Point Average among Students at the University of the Virgin Islands**

STT-P57

*Nathalia Henderson, Staff, University of the Virgin Islands*

The main objective or purpose of the study is to assess the hours of sleep and academic performance among students at UVI, and to examine if students at UVI are in need of an intervention program pertaining to sleep. The second objective of the study is to determine if students at UVI experience the same issues pertaining to sleep as other students at institutions of higher learning in the U.S. The results of the study conducted at UVI will be analyzed to see if students are in need of a possible sleep intervention program. The issue of sleep is not really a factor that is given a high extent of attention among individuals who make up the UVI community. Many other institutions, like UVI, have not paid attention to the factor of sleep

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deprivation as a problem among students who attend their institution of learning. The University of the Virgin Islands is located on very small islands in the Caribbean. There is no information about the quality of sleep among students at the University of the Virgin Islands. As the principal investigator of this study I aim to demonstrate the prevalence of sleep issues among students attending UVI. I also aim to help the UVI community to become more aware of the prevalence of sleep issues in the UVI community if any exists. I also plan to learn about the other factors that play a role in sleep issues and the consequences these factors cause UVI students to experience.

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### **The Presence of Fecal Coliform near the Beaches of St. Thomas and St. John Over Time**

STT-P58

*Dylan Jobsis, Undergraduate Student, University of the Virgin Islands*

The aim of this study is to analyze the water quality of the beaches on St. Thomas and St. John over the past two years. The first step will be to look for any temporal shifts that may exist either annually or seasonally or any linear shift from then to now in the water quality of the beaches. To do this weekly swim advisory fecal coliform assessment performed by the Department of Planning and Natural Resources will be used. A map or maps will be generated using ArcMap and GIS that show any trends uncovered and show what beaches in general are safer or more hazardous to swim at. From there data proximal to weather events like hurricanes can be checked to determine which beaches are more affected in this regard by extreme amounts of rain. If this is still not enough GIS shapefiles exist that were used by other faculty at UVI which mark off watersheds to see if there are any patterns among beaches that share watersheds. This sort of map would be especially useful to beach-goers who want to avoid hazardous swimming conditions especially in relation to specific events or times of the year.

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### **Bioavailability of Methylmercury in Rice Cereal and Fish**

STT-P59

*Genique Nicholas, Undergraduate Student, University of the Virgin Islands*

Methylmercury (MeHg) is known as a contaminant worldwide and a potent neurotoxin that is harmful to the neurodevelopment in infants. MeHg is formed from inorganic mercury by the action of microbes that live in aquatic systems and then bioaccumulated through the food chain. Traditionally, consumption of fish or fish-based food was considered as the major pathway of MeHg exposure to humans. A lot of effort has been made to study the concentration, bioaccessibility, and bioavailability of MeHg in fish. However, the recent finding that rice could also accumulate MeHg in its grain prompted our interest in studying the MeHg level and bioavailability in rice and rice products due to the high consumption of rice products around the world, especially for human infants. Infants who do not directly consume fish or rice, however, could still be exposed to MeHg due to the consumption of breast milk and rice or fish-based baby food such as rice cereal. There is a very limited information available regarding MeHg in rice cereal and the potential exposure of infants to MeHg. Therefore, the main objectives for this research are to: 1) determine the amount of MeHg in rice cereals, 2) estimate the bioaccessibility

of MeHg in rice cereals, and 3) compare the bioaccessibility of MeHg in rice cereal and fish. To achieve these goals, experiments have been designed and conducted. Twelve commercially available rice samples were purchased from a market and tested. Preliminary experiments have shown that rice cereals do contain considerable levels of MeHg. To evaluate the bioaccessibility of MeHg in rice cereals, in vitro gastrointestinal digestion procedure was used to simulate the digestion process followed by acidic KBr extraction and analysis using cold-vapor atomic fluorescence spectrometry. The MeHg concentrations were recorded in ng/g. The results showed that the MeHg concentrations were lower than that of recorded concentrations for fish (ranging from  $14.3 \pm 13.9$  ng/g to  $527.4 \pm 84.1$  ng/g in seafood samples). The results show that out of the samples we tested the average MeHg concentration was  $5.6 \pm 4.19$  ng/g, and the average bioaccessibility was approximately 50%. Considering the great amounts of rice cereal consumed by infants, the MeHg intake through rice cereal may post potential health risks to infants. MeHg bioavailability in the rice cereal samples and also fish samples will be conducted in order to compare the bioavailability between MeHg in rice and in fish.

This research was funded by the NSF-REU Site grant No: 15560375.

### Synthesis, characterization, and electrochemical studies of Cobalt(III)-containing species

STT-P60

*Brianna Scotland, Undergraduate Student, University of the Virgin Islands*

As the human population rises, so does the demand for energy. Currently, energy is being supplied through fossil fuel which is no longer sustainable. Subsequently, research has provided a solution through hydrogen production by the reduction of water molecules. The overall goal of this research is to successfully coordinate various ligands to  $[\text{Co}(\text{phen})_2(\text{H}_2\text{O})_2](\text{NO}_3)_3$  by substituting the aqua ligands to form  $[\text{Co}(\text{phen})_2(\text{N-N})](\text{NO}_3)_3$  (where N-N represents 2-2'-bipyridine (dpa), di(pyridine-2-yl)amine (dpa), 1,10-phenanthroline (phen), 2,2'-Dipyridylketone (dpk), 1,10-phenanthroline-5,6-dione (phendione), and 2-(2'-pyridyl) benzothiazole) (pbt)). The main hypothesis of this study is as follows: **The chemical environment around the cobalt(III) metal center of each complex should be different for every cobalt(III)-containing complex synthesized and should be reflected in the  $^{59}\text{Co}$  NMR spectra.** In addition to this, all complexes synthesized in this study was characterized via  $^1\text{H}$  and  $^{59}\text{Co}$  NMR spectroscopies as well as through the uses of electrochemistry. Characterization of the various complex displayed coordination of the N-N ligands such as phendione, dpk, and pbt successfully coordinated to the Co(III) complex, which was converted from a  $\text{NO}_3^-$  salt to a  $\text{PF}_6^-$  salt. Element analysis of the  $[\text{Co}(\text{phen})_2(\text{dpa})](\text{PF}_6)_3$  complex further confirmed the coordination of the dpa ligand to the Co(III) metal center with a small  $\text{PF}_6$  salt impurity. From the electrochemical studies with  $[\text{Co}(\text{phen})_2(\text{dpa})](\text{PF}_6)_3$ ,  $E_{1/2}$  values were observed at +0.28, -1.08, and -1.75 V which corresponds to the  $\text{Co}^{\text{III}/\text{II}}$ ,  $\text{Co}^{\text{II}/\text{I}}$ , and the  $\text{Co}^{\text{I}/0}$  redox couples, respectively. Additionally, through spectroelectrochemistry the spectral changes that were observed as  $[\text{Co}(\text{phen})_2(\text{dpa})](\text{PF}_6)_3$  was reduced to the Co(I) species, as well as  $[\text{Co}(\text{phen})_2(\text{H}_2\text{O})_2](\text{PF}_6)_3$  and  $[\text{Co}(\text{phen})_3](\text{PF}_6)_3$  showed major absorbance changes circa 420 nm and into the near-infrared region. In conclusion, a different chemical environment was observed when phendione, dpk, and pbt ligands were coordinated to the Co(III) metal center.

**Integrating STEM with the Arts to Motivate Middle School Students**

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STT-P61

*Shem Matthew, Teacher, VI Institute for STEM Education Research & Practice/VI EPSCoR/  
College of Science & Mathematics*

*Michele Guannel, Postdoctoral Research and Teaching Associate, VI-ISERP/VI EPSCoR/  
College of Science and Mathematics*

*Nastassia Jones, Faculty, VI-ISERP/VI EPSCoR/College of Science and Mathematics*

The framework for 21st century skills highlights the need for developing a range of functional, critical thinking, and interpersonal skills in ICT (information, communications and technology) literacy to ensure that citizens are prepared to be effective in the work place. To improve these skills, the overall goal of this project is for middle school students to use the Elements and Principals of Art to create children's picture books geared towards grades 4-8. The children's books will be an amalgamation of student's individual and group work, representing an integration of Math, Science, and the Visual Arts. This will be achieved with a focus on Project-based learning that meets criteria of a driving question: "How does creating an original children's book shift the attitudes of middle grade students towards STEM subjects?" This was done in three classes of students, totaling 55 students. Within groups of approximately six students, students were given the roles of writers, artists, and researchers. Observations so far have been that students recognize the connection between art and other subjects (Math, English, and Science). By the end of this project, students will have created STEAM storylines that integrate a variety of technology with STEM content related to national standards.

**St. Thomas Roundtable Abstracts**

### **Damselfish as a model organism for human protozoan drugs**

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STT-R62

*Deborah Smith, Graduate Student, Center for Marine and Environmental Studies*

Apicomplexa are obligate intracellular parasites that have a variety of vertebrate hosts, including humans and fish. The relationship between infections and host organisms is severely understudied, and there are few decent model systems that study human apicomplexan diseases. Dusky damselfish (*Stegastes adustus*), which exhibit high incidences of infection, can be used as a model organism to test the antibiotic capacity of human protozoan drugs. Rifampicin, doxycycline, and ciproflaxin will be supplied to the water of infected fish in differing dosages. Blood smears will be used to identify occurrences of infection in fish a minimum of three days after initial dosing. This project will allow a new treatment model for apicomplexan infections to be produced and applied to various human diseases such as malaria and toxoplasmosis.

### **How Faculty Design Assessments and How Students Prefer to be Assessed**

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STT-R63

*Ayopha Stalliard, Staff, UVI-CELL*  
*Suzy Harney, Faculty, School of Education*

Many assessment methods are described in the field of education (e.g., option-selection, statement completion, essay, project, performance; group-work, timed tests, resources allowed, “take-home”). However, little academic literature exists as to: (1) what types of assessment methods faculty actually use or (2) student preferences for assessment methods. This lack of information applies not only to assessment methods, but also to the depth of knowledge assessed within the various methods (e.g., recall/reproduction, concept/skill application, strategic thinking, extended/higher-order thinking). Therefore, this study will investigate the (1) extent to which various assessment methods are preferred by students at UVI, (2) extent to which UVI faculty employ various assessment methods, (3) knowledge levels preferred by students when being assessed and (4) knowledge levels embedded into assessments designed by faculty. In order to engage students in the research process and encourage input from students and faculty, the ‘think aloud’ technique will be employed in real-time during UVI Student Research Day 2017. The input from participants will be shared in real-time so that the conversations between the researchers and participants will evolve throughout the session.

**St. Thomas Demonstration Abstracts**

**Demonstration of Research Currently Conducted in the UVI Coral Reef Health Laboratory**

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STT-D64

*Marilyn Brandt, Faculty, Center for Marine and Environmental Studies*  
*Andia Chaves-Fonnegra, Staff, Center for Marine and Environmental Studies*  
*Lauren Olinger, Graduate Student, Master of Marine and Environmental Science*  
*Danielle Lasseigne, Graduate Student, Master of Marine and Environmental Science*  
*Elizabeth Brown, Graduate Student, Master of Marine and Environmental Science*

This demonstration will highlight coral reef-related research currently being conducted in Dr. Marilyn Brandt's Coral Reef Health Laboratory at the University of the Virgin Island's Center for Marine and Environmental Studies. Research includes identifying drivers of coral disease incidence, analyzing competitive interactions among corals, macroalgae, and sponges, and documenting the distribution of microplastics entering the marine environment. The demonstration will include 3D images produced from coral reef scans, microscopes highlighting the types of microplastics found in the U.S. Virgin Islands, and the opportunity to touch dried sponge and coral skeletons.

**Red Mangroves: The Tree of Life**

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STT-D65

*Howard Forbes, Staff, Center for Marine and Environmental Studies*  
*Jarvon Stout, Undergraduate Student, Center for Marine and Environmental Studies*

The red mangrove (*Rhizophora mangle*) provides ecosystem services that are essential both ecologically and economically. At our table, visitors will be presented with interactive stations, from which they will learn about the many roles that red mangroves have within our territory. These will include: 1) how mangroves protect our shorelines, 2) an in-depth look at the similarities and differences between lagoon and beach sediment, 3) the variation of physical features amongst mangrove species, 4) and ways that the community can do their part to help reestablish these ecosystem engineers in the wild.

**We're getting muddy! How and why we sample mud in coastal habitats**

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STT-P66

*Kristin Grimes, Faculty, Center for Marine and Environmental Studies*

*Sydney Nick, Staff, Center for Marine and Environmental Studies*

*Allie Durdall, Graduate Student, Masters of Marine & Environmental Science*

*Amelie Jensen, Graduate Student, Masters of Marine & Environmental Science*

Blue carbon ecosystems (mangroves, seagrass meadows, and salt marshes) remove significant amounts of carbon from the atmosphere and store most of this carbon belowground in their roots and in the sediment. This demonstration will show the methods we use to collect and measure sediment carbon from geologic cores, and will feature sediment samples from some of these habitats for participants to touch and explore. The demonstration will also feature a game that will ask participants to rank habitats by the total carbon stored, which will assist participants in discovering how blue carbon habitats compare to each other and to other ecosystems, like temperate forests and rainforests. Preliminary results that compare sediment carbon in native seagrasses to a new, invasive seagrass, *Halophila stipulacea*, will be shared.