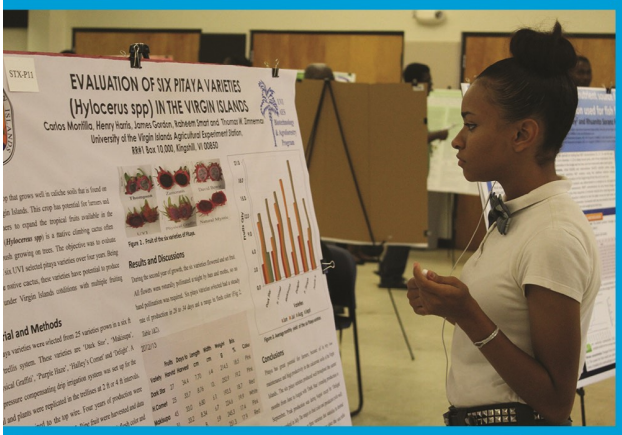
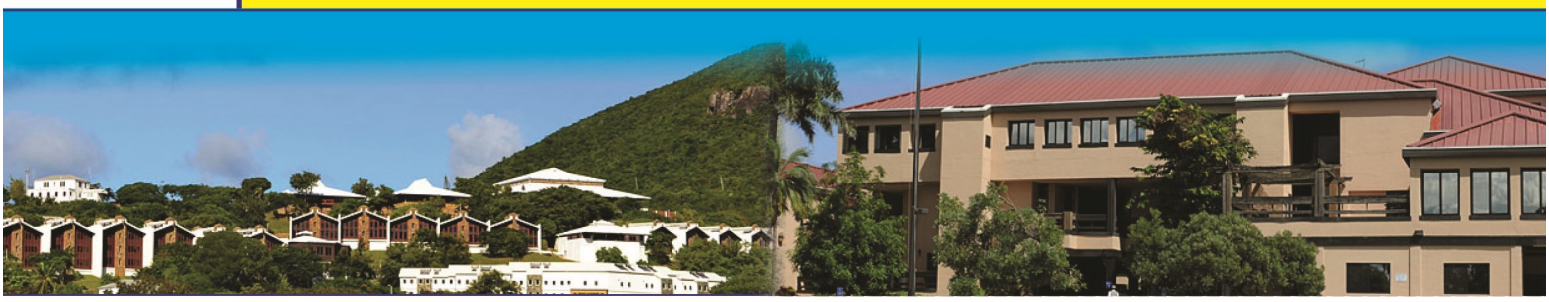


UVI RESEARCH DAY

FRIDAY, APRIL 5, 2019

Sports & Fitness Center, St. Thomas ***Great Hall, St. Croix***



University of the Virgin Islands

The *UVI Research Day* 2019 Committee

would like to express gratitude to the sponsors of

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*Funding provided by the USDA-NIFA Resident Instruction Grants Program for Institutes of Higher Education in Insular Areas Award # 2015-70004-24219.

UVI Research Day 2019

Poster, Roundtable and Demonstration Proceedings

April 5, 2019

St. Croix:
UVI Great Hall, Albert A. Sheen Campus
(9:00 a.m. – 3:00 p.m.)

St. Thomas:
UVI Sports & Fitness Center
(9:00 a.m. – 3:00 p.m.)

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Office of the President

MESSAGE FROM DR. DAVID HALL
PRESIDENT OF THE UNIVERSITY OF THE VIRGIN ISLANDS

It is my distinct honor and privilege to welcome you to our annual ***UVI Research Day***.

Research is the engine for a vibrant and great university. It is the exploration of new ideas and the discovery of new intellectual pathways that give meaning to the academy. UVI is so fortunate to have so many students, faculty and staff who engage every year in outstanding research activities.

What makes Research Day at UVI so special is that it creates a magnificent platform upon which to display the innovative research that exists within our midst. We are thankful to Dr. Frank Mills for cultivating this enormous endeavor for the past seven years. Something created to commemorate the 50th Anniversary of the University has now become a fundamental part of the fabric of UVI.

There is a special energy at Research Day that is created through the brilliance of faculty and students who are sharing ideas that challenge us to explore facets of life that are hidden from us, but yet exist all around us. The researchers are our guides into these new intellectual lands. We always leave more enriched and knowledgeable than we arrived.

May you enjoy the experience this year and be inspired by our pathfinders.

Sincerely,

David Hall

David Hall, SJD
President

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MESSAGE FROM PROVOST AND VICE PRESIDENT FOR ACADEMIC AFFAIRS CAMILLE A. MCKAYLE, PHD RESEARCH DAY 2019

Welcome to Research Day 2019! Research is at the heart of academia. Research leads to improved teaching; improved outreach; and improved lives. UVI is proud to use research not just for increased knowledge within certain fields, but also to inspire our students and the community.

This research day comes on the heels of the launch of a new strategic plan for the university, *Greatness through Innovation*. Throughout the plan, there is an emphasis on innovation and creativity, and you will also see this throughout the Research Day presentations. Of course, many equate research findings with innovation, but there is so much more. When creativity and innovation collide, we get surprising new results, and applications to existing problems or questions. We hope that as you speak with the presenters, you will get a sense for the topics that excite them, and you will also be excited to learn more, or even join in the research enterprise.

One aspect of much of the research presented that should not be overlooked is the relevance to our Virgin Islands Territory, as well as the region. The University of the Virgin Islands utilizes its resources and stature as a university to add value to the Territory by exploring issues and projects in order to add to our understanding of the world immediately around us. These are addressed in a manner and with a rigor that result in publication in journals at the national and international levels. Though our researchers write for experts in their fields, Research Day provides them with an opportunity to communicate their work to a more general audience, and provides attendees with a glimpse into a part of academia that inspires faculty and, in turn, inspires students.

UVI's Research Day epitomizes the University's mission: excellent teaching, innovative research, and responsive community service.

Welcome, enjoy, and be inspired.

Provost, and Vice President for Academic Affairs

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University of the Virgin Islands

Office of the Vice Provost for Research and Public Service

MESSAGE FROM VICE PROVOST FOR RESEARCH AND PUBLIC SERVICE

The official launching of the new Strategic Plan 2017 to 2022—*Greatness Through Innovation*—has ushered in a higher level of research among faculty, staff and students. Much of this research is evident in the list of research abstracts that are contained in this booklet, and even more are apparent in various students' exhibitions at other times in the academic year.

This year marks the eighth straight year that *UVI Research Day* has been presented to UVI and the wider community. One noticeable introduction that has remained a mainstay of *Research Day* is the deliberate effort to include high school youngsters with the singular aim of sparking a light in their youthful minds on the potential fascination that research holds for them. It is a continuing delight to witness the thrill that engulfs some of these young minds.

This year, particular efforts were made to further excite our high school students. We are all aware of the inaugural UVI Hackfest that was launched in 2015 on the St Thomas campus by Distinguished Professor Dr Tim Faley. It was such an outstanding successful event that he was encouraged to develop a similar idea that would have equal appeal to high schoolers. And he has done just that. He has remained mum on exactly what he will present to tantalize the students, and all that he affords us at this time is that high schoolers will work in teams, they will be working on the clock, and they will be rummaging old newspapers provided for this innovative hack. Some form of prize will also be in the offing to compensate their efforts.

I thank all of the students and faculty alike on both campuses who are competing for prizes in their categories as they have done in the past, and there is every indication that they will be as competitive as in previous years.

Frank Mills

Frank L. Mills
Chair, *UVI Research Day* Steering Committee

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UVI Research Day 2019

Event Program

Friday, April 5, 2019

ST. CROIX

UVI Great Hall, Albert A. Sheen Campus, 9:00 AM – 3:00 PM

Poster presentations and demonstrations	9:00 AM - 3:00 PM
Opening and keynote address	11:00 AM - 11:30 AM

ST. THOMAS

UVI Sports & Fitness Center, 9:00 AM – 3:00 PM

Poster presentations and demonstrations	9:00 AM - 3:00 PM
Opening and keynote address	11:00 AM - 11:30 AM

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UVI Research Day Committee 2019

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Mary Joe Williams, Small Business Development Center

St Croix abstracts

Posters, Roundtables and Demonstrations

Albert A. Sheen Campus

Umbilical Cord Care Treatment in Newborns

Manal Asad
Undergraduate student, School of Nursing
Presentation type: Poster (STX - P1)

Objective: To compare the use of alcohol/antiseptics versus dry cord care to determine which treatment is best in the reduction of adverse events, and time to umbilical cord separation. *Method:* The search for research study articles incorporated the electronic databases MEDLINE, CINAHL, and ERIC. The approach to study selection included studies published between 2010-2018, full text articles, search terms of infant and newborn: birth -1 month, limitations: humans and English studies. After review of the studies, six articles were selected. *Results*: Intervention Studies: Two studies, RCTs, reports the use of antiseptics are useful in the reduction of adverse events, whereas one study reported no statistical difference. Comparison intervention studies: Two studies, RCTs, reported that use of antibacterial usage were not necessary and dry umbilical care was an acceptable intervention in reducing omphalitis. The third study, a pilot study, reported no statistical difference between the use of antibacterial usage and dry umbilical care in reducing adverse events. *Conclusion*: Based on the research studies analyzed, four studies that give the highest level of evidence, support dry umbilical cord care for newborns. Additionally, dry cord care is an easy, straightforward, and safe method of handling the umbilical cord care in healthy newborns.

Keywords: Newborn umbilical cord care, Evidence-based practice

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Economic analysis of vertical integration of tilapia aquaponics in the US Virgin Islands

Donald S. Bailey
Staff, Agricultural Experiment Station
Presentation type: Poster (STX - P2)

The US Virgin Islands are isolated by oceans from other tilapia producing regions and cannot rely on neighboring support businesses for fish stock, feed and processing. Virgin Island farmers must therefore establish vertically integrated farms to be viable enterprises. Vertical integration includes holding of broodfish, spawning and egg collection, egg hatching, fry rearing, fingerling production, adult grow-out and harvest. Additional post-harvest activities include purging, processing and marketing. Other fundamental activities include production of vegetable seedlings and rainwater harvesting and storage, as municipal and well water are not suitable for aquaponic production. Ancillary activities such as feed manufacture by growing Black Soldier Fly, *Hermetia illucens*, duckweed, *Landoltia punctate,* or moringa, *Moringa oleifera*, can reduce the amount of feed imported. Finding economic value in the waste stream of sludge is also a potential area of integration.

Enterprise budgets of the grow-out stage in the UVI Aquaponic System are available but detailed studies of other components of vertical integration are not. This study incorporates those other stages into the economic plan and evaluates viability.

Keywords: aquaponics, business plants, tilapia

Assessing Students' Attitudes towards STEM by Integrating Research in General Chemistry Laboratory

Bernard Castillo II
Faculty, College of Science and Mathematics

Kynoch Reale-Munroe
Faculty, College of Science and Mathematics
Presentation type: Poster (STX - P3)

Previous studies have suggested that integrating research into chemistry curriculum has positively influenced the attitudes of students towards science. Integrating research provides an opportunity to expose students to real-world applications of chemistry concepts and exposure to professional opportunities in the field. A 3-year study (2015-2018) of integrating research into general chemistry classes on the Albert A. Sheen campus showed that students highly favored research activities over traditional experiments. To continue this work, we fully implemented this approach for our Fall 2019 semester. This past semester, we assessed students' attitudes towards STEM, using a validated S-STEM survey in our research integrated chemistry laboratory. Data will be analyzed that will look at the effectiveness the implementation of integrating research if trends relate to attitudes in STEM and 21st century skills. Our ultimate goals in integrating research into chemistry curriculum are to improve teaching methodology, provide students with real world skills, increase attitudes towards STEM and empower students at UVI. Our work will also generate additional research output to STEM faculty and provide input on how to increase student engagement and excitement in the classroom.

Keywords: STEM, chemistry, research

Phenolic Content in Virgin Islands Plants

Angel Cedeño
Undergraduate student, College of Science and Mathematics

Anthony Jolly
Undergraduate student, College of Science and Mathematics

Michael Doliotis
Undergraduate student, College of Science and Mathematics

Selena Parrilla
Undergraduate student, College of Science and Mathematics

Bernard Castillo (Mentor/Faculty advisor)
Faculty, College of Science and Mathematics
Presentation type: Poster (STX - P4)

Phenols are a type of antioxidant that specifically consists of a hydroxyl group bonded to an aromatic hydrocarbon. Phenolic compounds are present in different sources of food like, plants, fruits, vegetables, etc. Phenolic compounds have various health benefits such as anti-inflammatory and anti-allergenic properties. Other health benefits include the reduction in the occurrences of sudden diseases like Alzheimer's disease, and boosts metabolism. The main purpose of this study was to determine the Total Phenolic Content (TPC) of plants found in the Virgin Islands, which are used in food and local drinks. The plants used for this study were Bay Leaf (*Laurus nobilis*), Common Thyme (*Thymus*

vulgaris), Moringa (*Moringa oleifera*), Mint (Mentha spicata), and Lemon Grass (*Cymbopogon citrates*). We hypothesized that there would be a significant difference in the TPC between each plant. We determined the TPC in each plant by Folin-Ciocalteu's method, using a UV-Vis Spectrophotometer to measure the absorbance at 765 nm. Total phenolic contents were reported as mg per grams of Gallic Acid Equivalent (GAE) per grams of dry weight (mg/g GAE/g DW). Out of all our plants, Common Thyme had the highest TPC (55.463 ± 4.792 mg/g GAE/g DW) while Lemon Grass had the lowest TPC (8.564 ± 1.212 mg/g GAE/g DW). A one-way ANOVA test showed significant difference between the mean TPC each plant ($p = 8.0 \times 10^{-8}$). A Tukey *post hoc* test revealed that there was no statistically significant difference between Mint and Bay Leaf ($p = 0.878$), Bay Leaf and Moringa ($p = 0.053$) and Lemon Grass and Moringa ($p = 0.310$), while every other treatment showed a statistically significant difference between each group ($p < 0.05$). For future research, we want to continue investigating total phenolic contents in local crops such as okra, spinach, etc. We also want to test how synergism in Virgin Island plants affects the TPC levels.

This research was funded and made possible by the University of the Virgin Islands Emerging Caribbean Scientist Program, NSF HBCU-UP Grant award #1137472 and NSF ACE Grant award #1623126.

Keywords: Plants, Antioxidant

Plant Health and Production and Plant Products: Using Floral Bud Length to Predict Sorrel Harvest Date

Imhotep Charles
Undergraduate student, Agricultural Experiment Station

Thomas W. Zimmerman
Faculty, Agricultural Experiment Station
Presentation type: Poster (STX - P5)

Sorrel (*Hibiscus sabdariffa*) is an important crop during the holiday season for the red calyx used to make a flavorful juice. Breeding work at the University of the Virgin Islands has developed sorrel varieties to extend the season of this sought-after fruit. The objective was to study length of expanding floral sorrel bud development from October through December to predict days to harvest. Two varieties and two hybrids were used. Seeds were planted in August and length data collected weekly of developing floral buds up to anthesis. Harvest was predicted two weeks from anthesis. August planting of sorrel resulted in floral induction within a month after planting. Developing floral bud length can be used to predict harvest date for these sorrel varieties and hybrids. This research was supported by USDA-NIFA-Multistate Hatch and USDA-NIFA Insular Tropical Grant funds.

Keywords: Hibiscus sabdariffa, Sorrel, Roselle

We an' Dem" and "Oneness" in Caribbean Music

Chenzira Davis-Kahina
Staff, Virgin Islands Caribbean Cutural Center

Dara Monifah Cooper
Staff, Cooperative Extension Service

Anthony Laurent
Undergraduate Student, College of Liberal Arts and Social Sciences

Brittany Steele
Undergraduate Student, College of Liberal Arts and Social Sciences
Presentation type: Roundtable discussion (STX - R1)

In mass media, music in the Virgin Islands Caribbean and global communities have received increased coverage in recent decades. One music category that has received significant airplay within mass media networks supports global attitudes of opposing camps, with one side being the "source of" and the other being the "solution for" society's problems. Mass media broadcasts create dividing camps of "We an' Dem" songs. Other songs receiving less airplay promote world unity with integration, communion and "Oneness." This roundtable will explore causes and effects of promotion and listenership of "We an' Dem" complementary to "Oneness" music through innovative experiential learning and exploratory research methods with scientific analyses for understanding music perceptions popularized in the Virgin Islands Caribbean.

Keywords: Media, Cultural Attitudes, Mass Communications, Caribbean Music

Migration to St. Croix: The Preservation of Puerto Rican Cultural Identity

Tiara DeCosta
Undergraduate student, College of Liberal Arts and Social Sciences
Presentation type: Poster (STX - P6)

This qualitative study aims to learn more about Puerto Rican immigrants to the island of St. Croix and their stories. The intent is to learn how they have preserved their culture throughout the generations and how they have adapted to the Crucian culture. There has been little research on Puerto Rican identity in St. Croix. The accessible population are those people currently residing on St. Croix whose ancestors or themselves migrated from Puerto Rico. Snowball sampling will be used until the data are saturated. The study will be carried out through face-to-face interviews with participants. The interview will be based on aspects of culture. The data will be analyzed by coding the interviews and extracting themes.

Keywords: ethnic identity, Puerto Rican identity, Crucian Rican

Crucians' perceptions of post-hurricane sources of stress

Asha DeGannes
Faculty, Eastern Caribbean Center

Frank Mills
Faculty, Eastern Caribbean Center

Deshona Williams-Liburd
Staff, Eastern Caribbean Center
Presentation type: Poster (STX - P7)

In September 2017, the US Virgin Islands experienced catastrophic natural disaster events, as two Category five hurricanes (Hurricanes Irma and Maria) devastated the infrastructure of all three islands. Hurricane Irma most affected the St. Thomas-St. John district and damaged St. Croix as well. Hurricane Maria most affected St. Croix. These disasters led to the displacement of thousands of residents, as their homes were damaged or destroyed. One year after the storms, the Eastern Caribbean Center hosted four round-table discussion sessions (two on St Croix and two on St Thomas) to facilitate conversations around residents' experiences immediately before and after the storms. Participants were asked to complete a short questionnaire, which asked about their current sources of post-storm related stressors. The Rasch Rating Scale Model (RSM) was applied to the survey data to transform raw data from an ordinal into an interval scale with the measurement property of equal units. RSM analysis revealed that St Croix residents endorsed financial difficulties (i.e., ability to pay bills and pay for food and basic items) as the most stressful, enduring result of the disasters. This project explores participants' perceptions of various storm-related sources of stress, through the lens of an RSM analysis of the survey items.

Keywords: hurricane, stress, Rasch Rating Scale

Wee Insects Rule

Amy J. Dreves
Staff, Cooperative Extension Service

Lamani Santiago
Undergraduate student, Cooperative Extension Service
Presentation type: Poster (STX – P8)

Some plant pests are just too small to see or hard to detect in the young immature growth stage. The ideal habitat and attractiveness of plants to tropical pests has long been recognized. Pest biology and weather conditions (wind, temperature, rain, humidity) are closely-related to promote pest activity. Acknowledging seasonal pest populations, early recognition of pest signs, proper identification of culprit, and diagnosing types of damage is a key proactive approach to reducing injury levels and managing a pest problem.

Keywords: plant-eating insects, seasonal weather conditions, pest management

Multiculturalism and Its Impact on our Cultural Identity: What is the Virgin Islands Culture?

Kimarie Engerman
Staff, College of Liberal Arts & Social Sciences

Kenny Hendrickson
Faculty, College of Liberal Arts & Social Sciences

Kula Francis
Faculty, College of Liberal Arts & Social Sciences

Angelina Prince-Jeffers
Faculty, College of Liberal Arts & Social Sciences

Sharon Honore
Faculty, College of Liberal Arts & Social Sciences

Nisha Clavier
Faculty, College of Liberal Arts & Social Sciences

Verleen McSween
Faculty, College of Science & Mathematics

Dara Hamilton
Faculty, College of Liberal Arts & Social Sciences

Eddie Gordon
Faculty, College of Liberal Arts & Social Sciences

Meria Marcel-Lewis
Faculty, College of Science & Mathematics

Barbara Flemming
Faculty, School of Business
Presentation type: Roundtable discussion (STX – R2)

The things they believe in, the way they act, and the principles they live by are a few things that define the culture of a group. The group's culture gives identity, allowing members to feel a sense of belongingness. Yet this sense of belonging is based on historical events, communication style, physical appearance, political conditions, as well as social and psychological factors. With the Virgin Islands being a melting pot of various cultures, what is its true cultural identity? Therefore, this roundtable will attempt to answer that question from an interdisciplinary perspective.

Keywords: Culture, Cultural Identity, Virgin Islands

Predictors of Healthy Eating Self-Efficacy in Elementary School Youth

Dyann Godown
Undergraduate student, College of Liberal Arts and Social Sciences
Presentation type: Poster (STX – P9)

This study aims to identify predictors of healthy eating self-efficacy. Self-efficacy relates to healthy eating in that individuals who have high self-efficacy possess the confidence to make healthy food choices on their own. The alternative hypothesis states that age, sex, and Hispanicity are predictors of healthy eating self-efficacy. I will use secondary data from an after-school healthy-living program operated by the University of the Virgin Islands Cooperative Extension Service, funded by the United States Department of Agriculture. Since 2015, age, sex, Hispanicity and the Healthy Eating Self-Efficacy Scale have been obtained for approximately 100 elementary-school youth. Using de-identified data, a multiple regression analysis using the personal variables to predict healthy eating self-efficacy will be conducted.

Keywords: youth, age, sex, Hispanicity, healthy eating, CYFAR, self-efficacy, multiple regression

The Relationship Between Job Stress and Employee's Performance

Kibibi Jackman
Undergraduate student, College of Liberal Arts and Social Sciences
Presentation type: Poster (STX – P10)

The main objective of this study is to examine the relationship between self-esteem, job stress and employee's performance in a fast-food restaurant. This research identifies three independent variables (self-esteem, workload, and underutilization of skills) which will be evaluated to discover what kind of impact these factors have on job performance in the workplace. A minimum of 76 people who work at McDonald's on St. Croix will be the participants. A standardized test of self-esteem and previously-used measures of work overload, underutilization of skills and job stress will be administered through an online survey. This study will determine if self-esteem, underutilization of skills, and work overload play a role in employee performance. The data will be analyzed using linear multiple regression.

Keywords: Job stress, employee performance, self-esteem

Unfiltered Port Analysis (UPA): Self-Defense for Online Hazards

Timothy Kentopp
Faculty, College of Science and Mathematics
Presentation type: Poster (STX - P11)

The scale, frequency, and impact of malicious network attacks increases exponentially. Lacking the means to develop online survival instincts, advanced persistent threats (APT) target consumer devices, using hapless citizens to pivot attacks into their work environments. Consumers require practical, discrete, incorruptible, cost-free methods to diagnose connection hazards for connected devices. Unfiltered port analysis (UPA) systematically scales network security options as basic tests are performed. Just as x-rays reveal the unseen, UPA exposes hazards obscured by network terrain. A basic catalog of network profiles for a variety of personal devices are directly correlated with connection exposures. A UPA pattern that matches catalog criteria positively identifies one or more potential connection hazards.

Keywords: online hazards, self-defense, UPA

Local Cyberspace Should be Safe!

Lorenzo LaPlace
Undergraduate student, College of Science and Mathematics
Presentation type: Poster (STX - P12)

Many Internet users are needlessly exposed on the Internet. Their devices may not have full port filtering/stealth enabled or available, such as mobile devices that have no built-in firewall. This research was conducted to bring attention to the problem of hackers and their avenues of attack. To begin this research, I performed system resets using best practices to establish a known baseline. Tests using several devices across varying networks in St. Croix were performed. The objective of this research was to assess the level of user exposure given the known state of recommended measures: stateful firewall (FW), subnetting, and Network Address Translation (NAT). A variety of network scanning tools were utilized, the main two being nmap and GRC ShieldsUp. Results were exceptional indicating broad security exposures. While many users have a moderate level of protection on their network, they are still vulnerable to probing by hackers.

Keywords: Cybersecurity, Cyberspace/Internet, Computer Science

Comparisons of Six Native *Eugenia* species found on St Croix, Virgin Islands

Kervin Mathurin
Undergraduate student, Agricultural Experiment Station

Michael Morgan
Staff, Agricultural Experiment Station

Thomas W. Zimmerman
Faculty, Agricultural Experiment Station
Presentation type: Poster (STX - P13)

The *Eugenia* genus of the Myrtaceae family is one of largest amongst woody native plants in the Virgin Islands. The six native *Eugenia* species found on St. Croix, US Virgin Islands are: *E. axillaris*, *E. cordata*, *E. foetida*, *E. ligustrina*, *E. monticola,* and *E. procera.* It is difficult to tell each of the species apart. The objective of this research was to develop a picture and leaf measurement based dichotomous key to distinguish the six species. *E. axillaris* has the largest fruit with a diameter of 1 cm and the flowers occur in the leaf axils hence *axillaris*. *E. cordata* has heart shaped leaves. *E. foetida* has leaves that exude a faint skunk like smell. *E. ligustrina* possesses privet shaped leaves. The largest species is *E. monticola* which reaches a height of up to 50 feet (15m). The last species is *E. procera* has fruit in groups of three under each pair of leaves. These characteristics in addition to the photos and measurements will aid in field identification of these six native Virgin Islands species.

Funding is provided by the USDA McIntire-Stennis grant and the USDA-NIFA Insular Islands Research Grant.

Keywords: Small Trees, Dichotomous Key

An evaluation of STEM attitudes and STEM career interest in minority pre- nursing students

Verleen McSween
Faculty, College of Science and Mathematics

Meria Marcel-Lewis
Faculty, College of Science and Mathematics

Bernard Castillo II
Faculty, College of Science and Mathematics

Michelle Peterson
Faculty, College of Science and Mathematics
Presentation type: Poster (STX - P14)

Previous studies have demonstrated a positive relationship between student attitudes toward science, technology,

engineering, and math and student interest in science- related fields. A student's attitudes toward STEM and self- efficacy beliefs regarding STEM ability may predict whether a student is able to successfully participate in the STEM workforce. The purpose of this study is to measure and evaluate STEM attitudes and STEM career interests in minority pre- registration nursing students. The Middle/ High S- STEM Survey (Unfried, *et al*., 2015) was used as a validated measurement instrument to measure STEM attitudes or STEM self- efficacy and career interests in STEM related fields in pre- nursing students. This survey was administered to participants enrolled in a 200- level science course, and conducted via an online format using a standard learning management platform. The main body of the survey consisted of five- point Likert scaled statements related to STEM self- efficacy and student beliefs about their abilities in STEM, four- point Likert scaled descriptions of potential careers related to STEM, and relevant demographic information. The study included 14 female participants who belong to groups that have been historically underrepresented in STEM disciplines. Pre- nursing students demonstrated more interest in medicine, than in medical science or science-related fields like biology and chemistry, and mathematics. However, among STEM related fields, students showed the most interest in biology and the least interest in mathematics. These data indicate that minority pre-nursing students have variable attitudes toward STEM related careers. However, the trend indicates that student perceptions regarding STEM are not positive. Targeted interventions should be conducted to improve student attitudes regarding STEM, which may lead to an increase in minority student interest in STEM related careers.

Keywords: STEM attitudes, STEM career interest, pre- nursing student

White Cedar (*Tabebuia heterophylla* (DC.) Britton, A Caribbean Tree with Landscape and Ecological Restoration Potential

Michael Morgan
Staff, Agricultural Experiment Station

Thomas W. Zimmerman
Faculty, Agricultural Experiment Station
Presentation type: Poster (STX - P15)

White Cedar is a native tree that is both attractive and drought resistant. It is a medium sized, mostly deciduous tree with beautiful masses of pink trumpet shaped flowers. Some of its advantages are: fast growth, and precocious flowering. *Tabebuia heterophylla* grows under a wide variety of soils and climatic conditions. On degraded and xeric soils, it can form pure stands, accelerating forest succession by preparing the site for colonization by more demanding plant species. The species should be used more widely in landscape plantings and ecological restorations. This poster describes best way to propagate the tree, how it grows in field trials, species ecology, and its uses and limitations in landscape plantings. The USDA McIntyre-Stennis program funded this research.

Keywords: landscape plantings, ecological restoration, *Tabebuia heterophylla*

Artificial Intelligence - Are You For Real?

John Munro
Faculty, School of Business
Presentation type: Roundtable discussion (STX - R3)

Science-fiction robots attempted to take control of space exploration missions, and even well-trained robots followed certain rules to protect their human "co-workers" (Asimov, 1942). Data sciences and related technology have reached a stage where such robot behavior (actions, reactions, and interactions which impact humans) results not only from training or programming, but now can be "self-learned". A virtual on-line roundtable during much of the day will collect information and perspectives from attendee participants to update and modify AI material presented to subsequent participants. This process is enabled using AI assessment software (Hubert.vi, 2019). This dynamic roundtable will present (or confront) us with one real example of artificial intelligence, here and now.

Keywords: artificial intelligence, machine learning, automated assessment

The Impact of Sleep on Academic Performance

Sabreen Noubani
Undergraduate student, College of Liberal Arts and Social Sciences
Presentation type: Poster (STX - P16)

The purpose of this study is to answer the question "What is the impact of sleep on academic performance?" Ninety-one participants will be selected using convenience sampling from the University of the Virgin Islands, Saint Croix campus. Participants will complete the Pittsburgh Sleep Quality Index and be texted daily for 14 days, asking about their sleep and rise time. The independent variables are sleep quality, sleep time, rise time, sleep duration and daytime sleepiness and the dependent variable is the cumulative GPA (which will be obtained from Institutional Research). The study will determine how sleep is related to academic performance. Data will be analyzed using correlation and multiple regression.

Keywords: sleep patterns, cognitive function, college students, sleepiness, academic performance

Virgin Islands Culture and Project Management: How does it Impact the Implementation and Success of Island Projects?

Abigail Romain
Undergraduate student, School of Business
Presentation type: Poster (STX - P17)

This research identifies the impact that culture has on project management success and implementation in the Virgin Islands along with the greater Caribbean. In many instances, projects in small communities suffer and tend to fail. This paper seeks to reveal key areas that needs development in project management and whether it is true that the subconscious behaviors and actions of Virgin Islanders do play a role in local project prosperity. Throughout this research, it will be discovered that the challenges project team members are faced with are not only culturally derived but also stemmed from the underlying impact the environment has on the people and ultimately the project. Not all

project failures are due to the cultural barrier between individuals and their ability to produce on the job, but rather from situations including lack of resources, motivation, and most importantly opportunities for growth.

Keywords: Project management, culture

Living Homeless and Severely Mentally Ill in St. Croix

Wanda Rosario
Undergraduate student, College of Liberal Arts and Social Sciences
Presentation type: Poster (STX - 18)

This study will determine if the prevalence of severe mental illness in the homeless population on St. Croix is the same as national prevalence and tell the lived experiences of the homeless with severe mental illness from the perspective of the treating psychologists. The first research question will utilize a quantitative design will compare the January 2019 Point-In-Time count that will be conducted on St. Croix with national data**.** The second research question will use open-ended interviews with licensed psychologists who treat people who are homeless and have severe mental illness. The interviews will be recorded, transcribed, coded and themes identified. This study will inform policy to improve the lives of people who are homeless and severely mentally ill.

Keywords: homelessness, schizophrenia, psychologists, treatment, St. Croix

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Organizational Identification and Corporate Social Responsibility: Predictors of Workplace Ethics in the United States Virgin Islands

Robert Thompson
Undergraduate student, College of Liberal Arts and Social Sciences
Presentation type: Poster (STX - P19)

The purpose of this correlational study will be to investigate whether an organization's corporate social responsibility and an employee's organizational identification predict employee ethical behavior. Due to the processes of social identity theory, an individual identified with an organization is motivated to act in accordance with the standards of social responsibility of that organization. I will survey a cluster sample of employed Virgin Islanders on St. Croix. I will then perform a multiple linear regression analysis to determine the relationships between organizational identification and corporate social responsibility as well as ethical behavior.

Keywords: corporate social responsibility, ethical behavior, moral identity, organizational identification, social identity theory

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Evaluating alternative mulching methods with conservation tillage for weed-suppression in tropical organic watermelon cropping systems

Stuart Weiss
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Jessica Ewer
Staff, Agricultural Experiment Station

David Hensley
Staff, Agricultural Experiment Station

Michael Hurak
Staff, Agricultural Experiment Station
Presentation type: Poster (STX – P20)

The aftermath of Hurricanes Irma and Maria deposited large quantities of woody debris across the Virgin Islands, presenting the opportunity to recycle the material as a mulch for local agriculture. Simultaneously, climatic changes and land-use change in the Amazon valley have resulted in blooms of *Sargassum spp*. seaweed entering waters where they are historically uncommon, including near the Virgin Islands. This seaweed piles up on beaches and is considered a nuisance, but this too presented the opportunity to use the seaweed as a mulch in agriculture. We analyzed the impact of five mulch treatments on watermelon production: the wood mulch and seaweed mulch along with hay mulch, no-till no-mulch, and plastic fabric in conservation tillage, micro-irrigated systems. These strategies were compared with a tilled, non-mulch control. Results show all three organic mulching strategies performing as well or better than the control in total melon production.

Keywords: Sargassum seaweed, woody debris, mulching

Sex, Ideal and Self Body Perceptions, Depression, and Obesity in United States Virgin Islands' Adolescents

Azriel A. Williams
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Janis Valmond
Faculty, Caribbean Exploratory Research Center

Aletha Baumann
Faculty, College of Liberal Arts and Social Sciences
Presentation type: Poster (STX - P21)

This study examines the association between sex, body-perceptions, depression and obesity among USVI adolescents attending public schools on the east end of St. Thomas, USVI, in May 2015. Students completed the School Physical Activity and Nutrition (SPAN) survey, adapted and determined reliable with USVI youth. Of 111 11^{th}-grade participants, 60% were female and 90% were African-American. Although 11.7% of males were classified as obese, only 6.5% perceived themselves as obese. Among females, 28.4% were obese, but 16.9% perceived themselves as obese. Sex ($p < .001$) and female self-perceived obesity ($p < .001$) were significantly associated with obesity. Females were more likely to be obese and had body self-perceptions consistent with obesity. There was no association between depression and obesity.

Funder Acknowledgement: I would like to thank the Emerging Caribbean Scientists program at the University of the Virgin Islands. This study was supported, in part, by NSF HBCU-UP Scholars. Grant Number 1137472 to the University of the Virgin Islands.

Keywords: depression, obesity, body image, youth

Mapping Drainage Infrastructure in the U.S. Virgin Islands

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Undergraduate student, College of Science and Mathematics

Greg Guannel
Staff, Caribbean Green Technology Center
Presentation type: Poster (STX - P22)

Properties all over the Virgin Islands regularly experience flooding during heavy rainfall. A lack of understanding of the complex watershed processes and the hydrologic connectivity between structures and natural features, and the absence of an inventory of the drainage infrastructure are a few reasons why this occurs. We propose implementing a geo-referenced inventory of the engineered drainage infrastructure in the Virgin Islands. By collecting, digitizing, and geo-mapping existing infrastructure, we will create a geodatabase. This geodatabase can then be used to model the effectiveness of storm water systems which in turn, can provide recommendations for improvement. The work proposed will create much needed dataset to build a safe and efficient draining system in the Virgin Islands.

Keywords: Drainage, Mapping, Geo-database

Saving the Federally Endangered Rare Virgin Islands Thorn Lily (*Catesbaea melanocarpa)* by Tissue Culture

Thomas W. Zimmerman
Agricultural Experiment Station
Classification: Faculty

Michael Morgan
Classification: Staff
Presentation type: Poster (STX - P23)

Catesbaea melanocarpa, a federally endangered tree, found only on St Croix, is related to coffee. The objective was to investigate tissue culture to micropropagate seedlings and maintain genetic diversity. Sterilized seeds placed on basic agar nutrient medium germinated over four months. After two months of growth, seedlings were cut into two node segments and transferred to media containing a plant growth regulator to promote shoot proliferation. The medium containing 10 uM Benzyl Aminopurine resulted in 5.8 shoots as compared to 0.8 from the control without a plant growth regulator. Tissue culture can be used to propagate and save genetic diversity of a federally endangered local tree species. This research was funded by the USFWS Foundation and USDA McIntire Stennis program.

Keywords: Catesbaea melanocarpa, Thorn Lily, federally endangered, micropropagation, tissue culture

St Thomas abstracts

Posters, Roundtables and Demonstrations

St Thomas Campus

PTEN Phosphatase Activities in Large Unilamellar Vesicles

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Arne Gericke
Department Head of Chemistry and Biochemistry, Worcester Polytechnic Institute

Alonzo Ross
Professor Emeritus, University of Massachusetts Medical School/Biochemistry and Molecular Pharmacology
Presentation type: Poster (STT - P1)

Phosphoinositides (PIPs) are very minor components of the plasma membrane (2 mol%), but they are essential molecules in a large array of biological processes such as cell signaling, protein transport, and cell migration. It is well established that phosphatase and tensin homolog located on chromosome ten (PTEN) is a tumor suppressing protein deleted on chromosome 10 in human cancers. PTEN plays a critical role in the Phosphatidyl-3-Inositol kinase (P13K) pathway by converting phosphatidylinositol (3,4,5) trisphosphate (PIP3) to phosphatidylinositol (4,5) bisphosphate (PIP2), inhibiting PIP3-dependent kinases, such as Akt. Therefore, we hypothesized that in large unilamellar vesicles, the hydrolysis of PIP3 by PTEN should be observed. To mimic the inner leaflet of the plasma membrane, the model was composed of POPC (phosphatidylcholine), POPS (1-palmitoyl-2-oleoyl-sn-glycero-3-phospho-L-serine), PIP2, and PIP3 (54/30/8/8). In this project, we successfully demonstrated the phosphatase activities of PTEN in these model membranes. Following the fabrication of the model membrane through extrusion, we used a rapid colorimetric phosphatase assay to demonstrate that both POPS and PIP2 are essential for PTEN to bind to the vesicle and/or to find its substrate (PIP3), which allows it to be converted into PIP2. This research was funded by the NSF REU.

Keywords: Membrane, Phosphoinositide, PTEN

Post-Coral Mortality: Analysis of Organism Recruitment and Mechanisms of Succession

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Marilyn Brandt
Faculty, Center for Marine and Environmental Science

Tyler Smith
Faculty, Center for Marine and Environmental Studies

Alexandra Gutting
Graduate Student, Center for Marine and Environmental Studies
Presentation type: Poster (STT – P2)

Coral reefs around the world are experiencing mortality at unprecedented rates due to various factors including rising ocean temperatures, pollution, and overfishing. With this in mind, one might wonder what comes next? What happens to the areas that once featured living corals? This project was designed to investigate what settles in the area after a coral has died and identify factors that may play a role in the succession of the following organisms. The project analyzed the change in percent cover of common benthic organism types within permanent photo plots at two reef sites in the United States Virgin Islands between 2010 and 2016. The image analysis software CPCe was used to quantify benthic cover in areas where corals experienced total mortality. New recruitment of corals to the dead areas was rare. In many cases, the dead corals were ultimately replaced by the encrusting red algae *Ramicrusta* spp*,* which is not suitable for coral recruitment. The results of this project will complement long term monitoring activities in the region and will provide insight into future reef communities.

Keywords: Corals, mortality, succession

Effect of major wind disturbances on the resilience of Magens Bay Arboretum, an altered basin moist forest

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Olivia Diana
Courtney Gomez
Naomi Huntley
Jessica Levenson
Amanda Long
Sonora Meiling
Daniel Mele
Jessica Michael
Kaliegh Schlender
Graduate students, Masters of Marine and Environmental Science
Presentation type: Poster (STT - P3)

Wind disturbance is a major driver of forest community dynamics. In September 2017, two category five hurricanes hit St. Thomas, USVI, decimating the Magens Bay Arboretum. We evaluated the resilience of the Arboretum by measuring resistance and recovery from these events for native, non-native, and invasive tree species. Post major wind disturbance events, we expected: 1) non-native and invasive trees to have more damage than native trees, 2) tree composition to have lost canopy and leaf density, 3) native trees to have recovered more quickly than non-native trees, and 4) invasive tree species to have more new growth than non-native and native tree species. These results are relevant to the territory and inform on-going management decisions within the Arboretum.

Keywords: Resilience, Recovery, Resistance

Could Social Media Be Making Its Users Lonely?

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Presentation type: Poster (STT - P4)

Studies on the link between social media use and loneliness indicate characteristics of individual users and how the user's utilization of social media moderates this relationship. This study will examine the relationship between social media use and loneliness in a Caribbean sample, and the moderating roles social and cyber ostracism may have on this relationship. The target sample will consist of UVI students between the ages of 18 to 24 years who use social media regularly. It is expected that social ostracism will attenuate the relationship between social media use

and loneliness, while cyber ostracism will exacerbate it. The study hopes to engender further interest among researchers about the consequences of social media use among Caribbean residents.

Keywords: social media use, loneliness, ostracism

Synthesis, Characterization, and Catalytic Studies of Lignin Model Compounds with Cobalt(III) Cubane Complexes

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Graduate student, Old Dominion University

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Faculty, Old Dominion University
Presentation type: Poster (STT - P5)

Finding sustainable resources is a global initiative. Lignin, a plastic-like polymer, has been identified as an alternative fuel source. Phenolic lignin can be used in many industries, such as fine chemicals, pharmaceuticals, food processing, and resin manufacturing. Many environmentally harsh strategies such as, base-catalyzed, acid-catalyzed, reductive, and thermal are used for the depolymerization of lignin. Here, we report the catalytic oxidation of the lignin model compounds in mild conditions. A series of Co_4O_4 cubane cluster catalysts, $[Co_4O_4(CH_3CO_2)_4(py)_4]$ (**1**), $[Co_4O_4(C_6H_5CO_2)_4(py)_4]$ (**2**), $[Co_4O_4(O_2CCF_3)_4(py)_4]$ (**3**), and $[Co_4O_4(CH_3CO_2)_4(2,3,4,5,6\text{-}pyF_5)_4]$ (**4**) (py = pyridine, and pyF_5 = 2,3,4,5,6-pentafluoropyridine) were synthesized. Likewise, four lignin model compounds 2-(2-methoxyphenoxy)-1-(4-methoxyphenyl)ethan-1-one (**MPME-one**), 2-(2-methoxyphenoxy)-1-(4-methoxyphenyl)ethan-1-ol (**MPME-ol**), 3-hydroxy-2-(2-methoxyphenoxy)-1-(4-methoxyphenyl)propan-1-one (**HMMP-one)**, and 2-phenyloxyacetophenone (**PPE-one)** were also synthesized. We hypothesized that the electron transfer reaction between electron-rich lignin models with the cobalt(III) catalysts will form a radical cation which can then break the lignin structure into smaller molecules via C-O/C-C bond cleavage. Catalytic studies were carried out using **HPPE-one**, piperidine, tert-butyl hydroperoxide, and catalysts **1** or **2.** We have obtained conversion rates of the lignin model into an oxidized product ranging from 8 to 20%.

Keywords: lignin degradation, cubane catalysts, mechanism

Disease in the Deep: Coral White Plague Impacting Mesophotic Coral Reefs in the US Virgin Islands

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Staff, Coral World

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Presentation type: Poster (STT - P6)

In the US Virgin Islands, both shallow reefs and Mesophotic coral ecosystems (MCE) experienced declines in coral cover following the 2005 mass bleaching event due in large part to the disease white plague. However, declines on shallow reefs were more drastic, while MCE continued to support high cover of the same species. Since the 2005 event, white plague has only occurred sporadically on shallow reefs, while continuous levels of disease in MCE are hindering regrowth of coral. Our spatial data also suggest that the white plague is clustered at multiple scales. We hypothesize that continuous levels of white plague in MCE are due to density-dependent transmission dynamics and that a lack of hosts is limiting transmission in shallow reef systems.

Keywords: coral reefs, coral disease, mesophotic coral reefs

In Silico Analysis and Molecular Docking studies of cancer-promoting, Mycoplasma chaperone protein, DnaK inhibition using L-asperuloside, Alizarin, and Aucubin found in the roots of *Morinda citrifolia L.* (Noni tree)

Hairol Breton
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Neelam Buxani
Faculty, College of Science and Mathematics
Presentation type: Poster (STT - P7)

The purpose of this study is to analyze the inhibitory efficiency of L-asperuloside, alizarin, and aucubin discovered in the roots of *Morinda citrrifolia L.* (Noni) against Hsp70 chaperone protein, DnaK, found in different strains of mycoplasma. These compounds have been proven to contain anti-bacterial properties in scientific research. In recent studies, this protein has been evident as cancer promoter in host, by reducing the expression of poly-ADP ribose polymerase-1 (PARP1), DNA-PKCS (enzymes responsible for DNA repair) and affecting the various functions of tumor suppressant protein p53. The crystallographic structure of the target protein would be obtained from Protein Data Bank (PDB) database. Computational docking analysis would be performed using Auto dock Vina tool imbibed within UCSF Chimera.

Keywords: DnaK, USCF Chimera

"A Broken Song": The Effects of Anthrophony on the Red-Eyed Coqui

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Jessica Nagel
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Presentation type: Poster (STT - P8)

Frogs are vertebrates that use sound to communicate for breeding and territorial defense. While vocalizing, there are other sounds in the environment that can influence frog behavior, such as wind blowing, crickets chirping, or cars driving by. We want to know if sounds produced by humans, specifically those of cars, have any influence on frog calling activity, which could affect breeding success. If frogs are disturbed by cars enough to reduce calling activity, this may decrease their ability to attract females, and breeding success may decrease. We tested the hypothesis that the sound of cars does not influence frog calling activity by recording frogs in two locations with moderate traffic, using an SM3BAT bioacoustics recorder set to capture sound within the audible frequency range of frogs.

Keywords: Anthrophony, Frogs, Coqui

Smart Power Grids: An Overview and Intrusion Detection Techniques

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Mentors: **Marc Boumedine** and **Joanne Luciano**
Faculty, College of Science and Mathematics
Presentation type: Poster (STT - P9)

Smart Grids are the merger of communication networks and the electrical power grid. This approach allows gathering and monitoring critical data and information about the state of the grid. This information is analyzed to inform and improve power generation, transmission and distribution. As many plants are transitioning to smart grids, the risk for malicious intrusion increases. With the threat of system breach comes the possibility of blackouts and other system failures which can have catastrophic impacts. The goal of this research is to review security frameworks in Smart Power Grids and introduce Intrusion Detection Systems as an approach to prevent and detect intrusion from bad actors. We will also introduce representative anomaly detection approaches as a way to determine extreme cases (outliers) by analyzing large data sets representing the state of the system.

Keywords: K-Nearest Neighbor, K-Means Cluster, classification

How has the concept of the American Dream evolved through music from the African American perspective?

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Advisor: Professor Siobhan Lyons
Coordinator: Professor Harkins-Pierre
Presentation type: Roundtable discussion (STT - P10)

During the years of slavery, Africans could not partake in the things that they enjoyed. They were oppressed and did not have the privilege to enjoy the things that brought them joy, such as their own cultural music and dance. Today, some African Americans do not appreciate the sacrifice and hardship our ancestors went through for us to have equal rights, individuals see what others have and want it no matter the price or sacrifice, they are only worried about having nice things, which they do not want to work hard for. As African American music culture evolves, so has the idea of the American dream. Throughout this research project, the researcher will examine the broad theme Reframing the World Through a Humanities Perspective and what is the American Dream and how it played a role in the African American Culture, and, the relationship and influence it has in music. The proposed project will include a poster board and audio recordings.

Keywords: Music, American Dream, African American

The Search for Disintegrating Planets Orbiting White Dwarfs

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Presentation type: Poster (STT - P11)

White dwarfs are the end state for low to medium mass stars like our Sun. Once a star leaves the main sequence, mass loss occurs which can disturb the orbital path of objects within its gravitational influence. In some cases, the star's planets will fall into a much closer orbit and begin to disintegrate which can occur either though destructive gravitational forces or through the vaporization of rocky surface material. This material can then be accreted onto the surface of the white dwarf where it can be analysed to gain a better understanding of the composition of the objects which were destroyed. Here we present a search for a disintegrating system through optical data collected by both ground and space-based surveys. Our search utilizes white dwarf databases which have identified thousands of white dwarfs and cataloged their coordinates. The NASA Exoplanet Archive was used for the retrieval of photometric data for targets which were observed by the SuperWasp, KELT, and K2 exoplanet surveys. The light curve data is then processed using a Fourier analysis to reveal any periodic dips in stellar flux which would indicate the possible presence of a transiting body.

Keywords: White Dwarf, Exoplanet Detection

Little difference in pollutants in Mangrove Lagoon, St. Thomas East End Reserves, U.S. Virgin Islands, between 2011 and 2018 and mangrove versus lagoon sediments

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Sdyney Nick
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Presentation type: Poster (STT - P12)

Mangrove Lagoon sediments have high levels of polychlorinated biphenyls(PCBs), dichlorodiphenyltrichloroethane(DDT), heavy metals, and tributyltin(TBT). In 2018, we collected 38 samples (19 each, lagoon and mangroves) to test if mangroves intercept contaminants entering the lagoon, including resampling seven lagoon sites from 2010-2011 to understand pollutant mobilization following the 2017 hurricanes. Analysis, using paired t-tests and wilcoxen's signed ranks tests, included grain size, TBT, and metals; re-sampled sites were analyzed for polycyclic aromatic hydrocarbons(PAH), PCBs, and DDT. Selenium($p=0.016$), mercury($p=0.0416$), chromium($p=0.0312$), and silicon($p=0.0063$), had significantly higher concentrations in 2010-2011 than 2018. Aluminum($p=0.0072$), cadmium($p=0.00141$), silver($p=0.0288$), nickel($p=0.0012$), and TBT($p=0.0027$) were greater in lagoon sediments and antimony($p=0.0002$) was greater in mangrove sediments. The hurricanes did not change pollutant levels and mangroves may not be intercepting pollutants.

Keywords: Pollution, Heavy Metals, Hurricane

Evaluating differences in microbial communities of white plague diseased and healthy colonies of major reef building Caribbean corals

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Marilyn Brandt
Faculty, Center for Marine and Environmental Studies
Presentation type: Poster (STT - P13)

White plague disease (WPD) is one of the most destructive coral diseases in the Caribbean. WPD affects upward of 40 coral species; however, little is known about both the cause and how different species respond to disease. Corals are known to react differently to disease based on their life history strategies and selective pressures that have influenced their immune characteristics. Few studies have focused on species-specific microbial communities associates with coral disease even though they may provide insight into the etiology of diseases like WPD. This project tests differences in microbial assemblages of multiple species of corals involved in WPD transmission experiment where species susceptibility was found to vary. Profiling microbial communities in multiple species creates a framework to understand why susceptibility to disease differs among coral species.

Keywords: Coral Disease, Coral Reef Ecology, Microbiology

Mythical Realism in Derek Walcott's *Ti-Jean and His Brothers* and *Dream on Monkey Mountain*

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Presentation type: Roundtable discussion (STT – R2)

For Humanities 498, students had to choose a topic relating to the class theme of Alternate Realities. In this research paper, you will find that I have conducted a substantial amount of research regarding mythical realism. I have decided to focus on mythical realism present in famous Caribbean poet and playwright, Derek Walcott's plays *Ti-Jean and His Brothers* and *Dream on Monkey Mountain*. Mythical Realism played a large role in both plays and pulled from common and cultural mythical stories and characters. One of the characters mentioned in my paper is the Devil. Derek Walcott brilliantly intertwined these mythical characters into a rich plot to express a reality that most, if not all Caribbean people can relate to.

Keywords: Mythical Realism, Caribbean Literature, Derek Walcott

Virtual Reality in the Classroom: New Tools to Address 21st Century Educational Landscape

Antonino Cucchiara
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Presentation type: Demonstration (STT - D1)

The development of new technologies have opened new windows of opportunity for educators, at all levels, to approach their classroom and engage their more tech-savvy student population. Also, with the students' attention span necessary shortening due to information overload it is imperative to provide new, engaging, and stimulating learning environments to make sure that 1) content is opportunely delivered and absorbed 2) minimize the opportunities for disengagement 3) take advantage of the content enhancing technologies that is becoming more familiar to the young generations.

In this context I will provide an example of Virtual Reality (VR) settings using the Physics program Google Expedition Kit and lead the visitors to pre-defined tours of several astronomical environments: from other planets, to the International Space Station. I will also give a tour of the Etelman Observatory and show how with simple examples and pictures educators can create their own "lesson plan."

Keywords: Astronomy, Virtual Reality

UVI GREAT: The First Satellite for Cosmic Exploration Built at UVI

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David Morris
Faculty, College of Science and Mathematics

Presentation type: Poster (STT - P14)

The UVI Gamma-Ray Experiment for Astrophysical Transients (UVI-GREAT) will be the first ever satellite designed and built in the U.S. Virgin Islands. This satellite is designed to identify the most energetic cosmic explosions in the Universe, called Gamma-ray Bursts (GRBs). UVI-GREAT is a 3U nano-satellite (dmiensions 30x10x10 cm) and it includes 2 CsI scintillator crystals, VHS antennas and solar panels capable of energizing the on-board computer for as long as 18 months. In collaboration with NASA scientists, UVI Physics faculty will develop the entire payload and, after opportune testing at NASA facilities will move to a launch date in 2023. UVI-GREAT will detect around 30 GRBs per year and will transmit their position on the ground-base at UVI so that the explosions can be follow-up by other facilities around the world, like the Virgin Island Robotic Telescope in St. Thomas or the Las Cumbres Observatory Network.

UVI students from the Physics and Dual-Degree program will acquire the necessary skills and knowledge leading to the development and assembly of UVI GREAT (e.g. mechanical/electrical engineering and astronomy skills). Also, B.S. Physics students will have the opportunity to practice their data analysis skills and acquire further insights on astrophysics research.

Keywords: Astronomy, satellite, NASA

Characterization of Metastatic Progression

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Saeed Akhand
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Michael Wendt
Principal investigator, Department of Medical Chemistry and Molecular Pharmacology, Purdue University
Presentation type: Poster (STT - P15)

During breast cancer metastasis, cancer cells break off from the primary tumor and invade other tissues and organs throughout the body. This causes increased disease progression and accounts for 90% of all breast cancer related deaths. One pathway proposed to be a driving force behind metastasis is epithelial to mesenchymal transition (EMT). EMT is caused by changes to the cell environment that disrupt their polarity and cause them to become morphologically altered mesenchymal cells. They then invade surrounding tissue, have lowered immunogenics and can remain dormant for years before reverting to their normal epithelial state and establishing a secondary tumor. In this work we investigated the presence of EMT markers within our 4T07 metastatic progression series, which consists for three isogenic cell lines of increasing metastatic potential, derived via sequential *in vivo* tumor growth and subculture. We hypothesized that the expression of EMT markers and programmed death ligand 1 contributed to increased metastasis and proliferation of the 4T07 cell lines. We used Western Blot analysis, immunohistochemistry, and flowcytometry to determine the presence of these markers within each cell line. By identifying the mediators of metastasis, we hope to devise therapeutic strategies capable of preventing disease progression.

Keywords: Cancer biology, metastasis

Water Quality and Bleach Watch

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Shamoy Bideau
Undergraduate student, College of Science and Mathematics
Presentation type: Poster (STT - P16)

Water quality includes the physical, biological, and chemical aspects of water and effect all marine organisms. The coastal areas within the St. Croix East End Marine Park has been to subject to disturbances, not just from human induced activities but from the watershed runoffs. Tests were conducted to further monitor the conditions of sites with known poor water quality and provide baseline data for future monitoring. Five sites within the East End Marine Park were tested for eight different parameters. Several times a week, tests were conducted to find: coliform bacteria, dissolved oxygen, biochemical oxygen demand, nitrate, pH, phosphate, salinity and temperature. The parameters were scored according to a ranking system which indicated the level of water quality - that is, from poor to excellent. The sum of each parameter ranking indicated the daily total scores. Surveys were conducted in attempt to assess the overall health state of coral colonies at reefs within four bays that are part of the STXEEMP. Observations on percent coral cover, coral species identification, other surrounding benthic structures, impacts (bleaching, paling or diseased) and mortality were recorded. Turner Hole had the highest percentage of hard coral cover, but the lowest levels of species diversity.

Keywords: Macroalgae, Coral bleaching, Corals

Factors influencing coral reef resilience in the US Virgin Islands

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Presentation type: Poster (STT - P17)

The Territorial Coral Reef Monitoring Program (TCRMP) was created in 2001 with the intent to evaluate the status of coral reefs in the US Virgin Islands and their long-term response to stress events. Due to the mass bleaching event in 2005, Caribbean reefs experienced catastrophic mortality with losses of up to 50% coral

cover in some locations. This study aimed to examine how reefs in the US Virgin Islands were affected by the bleaching event, the rate at which they have recovered, and to evaluate their resilience. Individual reefs displayed a range of responses to the bleaching event. We are analyzing the underlying causes of the degree of recovery (or lack thereof) across a variety of natural and human factors.

Keywords: resistance, recovery, ecology, water quality, coral bleaching

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Magical Realism and Its Usage in *Land of Love and Drowning* and *Their Eyes Were Watching God*

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Vincent Cooper
Faculty, College of Liberal Arts and Social Sciences
Presentation type: Roundtable discussion (STT – R3)

This research project proposes to look at the literary device of magical realism and how it has influenced fiction in the 20th and 21st centuries. The roundtable discussion will seek to illustrate an understanding of what magical realism is and how a reader can look into a story's plot to find out the true purpose of the magical realism being used. Through the eyes of magical realism, my HUM 498 poster will seek to elucidate the purpose of exploring the magical realism in two distinguished modern novels: *Land of Love and Drowning* by Tiphanie Yanique (a former UVI student and now an award-winning author) and *Their Eyes Were Watching God* Zora Neale Hurston's masterpiece. During the HUM 498 class roundtable session there will be a discussion of how the magical realism informs the reader's understanding of the major female characters' search for true identity, and how they are able to find love.

Keywords: Magical Realism, Identity, Love

Molecular Docking Studies and Derivatization of a Lemongrass Component as Potential COX-2 Inhibitors

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Faculty, College of Science and Mathematics
Presentation type: Poster (STT - P18)

Prostaglandin-endoperoxide synthase 2, also known as COX-2, belongs to a family of enzymes, which catalyze the synthesis of prostaglandins. Prostaglandins are vasodilators that mediate the inflammatory response. Cancer is one of several diseases that are strongly linked to chronic inflammation. Previous findings indicate that the presence of inflammatory agents, such as cytokines, in the tumor microenvironment promotes tumor growth and cell proliferation. The expression of COX-2 is controlled by cytokines, and as a result, is upregulated in certain cancers. Collectively, these observations supported the hypothesis that the inhibition of COX-2 would decrease inflammation and tumor progression. The development and use of selective COX-2 inhibitors, coxibs, has shown that these drugs are effective in suppressing inflammation and cancer growth; however, it was found that coxibs increase an individual's risk of experiencing severe cardiovascular events. This reinforces the need for alternative COX-2 inhibitors. Studies have shown that geraniol, a monoterpene alcohol in lemongrass, has therapeutic effects on cancer and inhibits the COX-2 enzyme, however, high concentrations are required which makes it clinically irrelevant. We predict that increased COX-2 inhibition is achievable through the derivatization of geraniol. So far, there is no information regarding the COX-2 inhibitory activity of geranyl derivatives. Just like the coxibs, it is imperative for these geranyl derivatives to bind to the residues within COX-2 to be potent. We hypothesize that increased binding interactions at the COX-2 active site and binding interactions at Ser 530 and Tyr 385 of murine COX-2 enzymes are related to enhanced COX-2 inhibition. Therefore, computational molecular docking studies were performed to determine the residue-ligand interactions with geraniol and several geranyl derivatives. Based on these findings some derivatives were synthesized, and their structures elucidated using FTIR, MS, ^{1}H-, ^{13}C- and NOESY NMR.

Keywords: Geraniol, COX-2, Inflammation

Exploring the Ocean

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Staff, VI Experimental Program to Stimulate Competitive Research
Presentation type: Demonstration (STT - D2)

The ocean covers approximately 71 percent of the Earth's surface and helps to support life both on land and under water. With all its significance, for many Virgin Islanders, the ocean is mostly not understood represented by the large percentage of the population that lack any swimming ability. As it is often difficult for educators to get students to explore the ocean, the Virgin Islands Marine Advisory Service (VIMAS) and the Virgin Islands Experimental Program to Stimulate Competitive Research (VI-EPSCoR) have developed innovative ways to bring the ocean to classroom. Through this activity, our team will demonstrate the use of virtual reality to immerse participants into the vast underwater world to look through the eyes of a marine scientist.

Keywords: marine science, STEM, education

Youth Ocean Explorers: A Pathway for Virgin Islands Youth into STEM-based Careers

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Staff, VI Experimental Program to Stimulate Competitive Research
Presentation type: Poster (STT - P19)

Youth Ocean Explorers (YOE) is a four-week summer enrichment program that uses the ocean as the lens through which students in grades 7-12 learn about the importance and interconnectedness of our oceans and terrestrial ecosystems. In 2017, the YOE program received programmatic and financial support from the Supporting Emerging Aquatic Scientists (S.E.A.S.) Your Tomorrow Program which is funded through the National Science Foundation (NSF) Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science (INCLUDES) program. With this support, the YOE program has been able to broaden the participation for underrepresented minorities in Science Technology Engineering and Mathematics (STEM) and incorporate innovative teaching strategies aimed at improving students' retention of concepts covered during the program.

Keywords: marine science, STEM, education

Multiple genotypes of *Halophila stipulacea* found around St. Thomas, USVI

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Presentation type: Poster (STT - P20)

From its native location in the Indian Ocean, *Halophila stipulacea*, first invaded the Mediterranean Sea in the mid 1850's and continued to spread westward crossing the North Atlantic to the Caribbean Sea early in the 2000's. The species arrived in St. Thomas in 2013. Due to the lack of observed flowering in the Caribbean, it has been assumed that invasive patches represent the expansion of one clone into a new site. Our objective was to determine if invasive patches were the result of the spread of one clone or multiple introductions from different clones. To do this we collected samples (n=8), along a 64 m transect, from eight different bays. We identified 16 unique multilocus genotypes among the 64 samples.

Keywords: Halophilia stipulacea, invasive seagrass, Caribbean Sea

Cluster Analysis on Hurricane Data

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Presentation type: Poster (STT - P21)

A hurricane is a higher form of a tropical cyclone with sustained winds of 74 miles/hour and pressures below 980 millibars. When a tropical cyclone reaches hurricane status, the low pressure is called the eye. Warm water fuels the hurricane by turning into heat in the abundance of rain that circles around the which is the eye wall. The released heat lowers the barometric pressure in which strengthens the hurricane from the center. The objective of this research is to look for similarities between these storms. We used an unsupervised algorithm clustering called K-means that will hurricanes according to the pressure and wind speed. We expect the hurricanes to be clustered according to the Saffir-Simpson Hurricane Wind scale Category 1-5 and match with the classification of the hurricanes. This data can be used to determine the severity of hurricanes, gauge how the storms have been changing over time, as well as look at the frequency of the intensity of storms. We clustered 84 number hurricanes with the K means method.

Keywords: Hurricanes, Atmospheric Science, K-Means Cluster

Natural Disasters and the Transition to College in the Caribbean

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Presentation type: Poster (STT - P22)

This study will examine what factors predict whether students in the Caribbean successfully transition to college following hurricanes Irma and Maria. Factors to be examined include disruptions in daily life due to the hurricanes, high school GPA, self-esteem, and family support. Participants will be 100 freshmen students at the University of the Virgin Islands, most of whom are female, African American, and between the ages of 18 and 19 years old. It is predicted that greater daily disruptions will have a negative relationship to college adjustment, while high school GPA, self-esteem and family support will be positively related to adjustment. This study may assist universities with retention and graduation rates by indicating how they can help students during their most vulnerable times.

Keywords: natural disasters, transition to college, academic achievement

Marvelous Mud! A dig into how and why we sample sediment in coastal habitats

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Presentation type: Demonstration (STT - D3)

This demonstration will showcase methods used to collect sediment from coastal habitats (mangroves, seagrass meadows, salt ponds and sandy beaches) and will feature interactive exhibits that detail current research involving coastal sediments in the territory. Participants will learn how to collect their own miniature sediment cores before delving into games and demonstrations exploring ongoing projects that use those methods as a basis for their research. Equipment used to sample different coastal habitats and samples themselves, will be available to touch and explore. Key geological concepts, like grain size, will be investigated using a hands-on, interactive activity. Recent research of University of the Virgin Islands Masters of Marine and Environmental Masters students in the Grimes Lab, will be featured.

Keywords: sediments, coastal habitats, geoscience

Dynamically influenced visual authentication system (DIVS)

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Presentation type: Poster (STT - P23)

To keep users' information safe, policies are put in place to make users create passwords that are difficult to hack, but easy to remember. As a result, the "password problem" arises as users will likely create weak or complex passwords that will be handled carelessly. Amethyst Edmond, a student at Norfolk State University, proposed a solution called Dynamically Influenced Visual Authentication System (DIVAS). For this project, we will develop a desktop application using DIVAS as a blueprint. DIVAS is an image-based challenge-response system that removes traditional passwords, while remaining both secure and convenient. The system will present users with four grids containing images, in which 3 of the images has been pre-selected by the user. The user will then respond to the challenge based on the position of the pre-selected images. The response serves as a temporary password as the images will appear in random location each time users login. We then tested the usability among 10 participants and a post-survey was administered. The usability will be determined by the percentage of successful first-time logins.

Keywords: Cybersecurity, Image-based challenge-response system, Passwords

Acknowledgements: This work was funded by the Federal Agency Department of Energy CECOR under grant # DE-NA0002686.

Paradise Lost? Comparing Perceived Risks against Measurable Economic Impacts of Golden Tides in Barbados

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Presentation type: Poster (STT - P24)

Since 2011, many Caribbean islands have been affected by golden tides - large accumulations of floating algae from the genus *Sargassum*. Negative effects have been suggested to accompany these events including die-offs of marine life, blocking of waterways affecting transportation and fishing, health risks related to gases released from seaweed decomposition, and strong drops in tourism as beachgoers cancel or avoid vacations in areas where these algae occur. Because small Caribbean islands tend to rely relatively more on tourism and fishing, the potential economic effects of these natural events can be catastrophic, and some countries have declared states of emergency during golden tide years. Barbados has been discussed in many news articles as one of the islands most impacted by this phenomenon, but no quantitative support has been provided yet. This study uses a bioeconomic approach to understand the effects of *Sargassum* accumulations by correlating oscillations in various key indicators to golden tide presence over several decades. The focus is on fisheries (calculated as total landings for all fished species reported) and tourism (assessed as numbers of tourists arriving yearly and as tourism-weighed GDP). Modeling of fisheries data showed a significant negative correlation between golden tides and fisheries total landings. Results indicated a decrease as large as 20% in fisheries yields related to years when golden tides occurred. In contrast, tourist arrivals by air or sea and tourism-weighed GDP were not measurably affected by golden tides. These findings emphasize the need to evaluate perceived risks against quantifiable actual risks of natural phenomena that could affect sustainability and are poised to intensify due to climate change. The approach used here can inform resource management decisions for other Caribbean islands.

Keywords: Golden Tides, *Sargassum* seaweed, Economic Impacts

The Creative Writing Process and Me

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Presentation type: Poster (STT - P25)

This Senior Seminar project is focused on the creative writing process. The researcher plans to investigate what the creative writing process is, what it means, and the approach novice writers should take when beginning their journeys. In order to demonstrate what the creative writing process is I plan to present two of my short stories and to discuss in-depth my creative writing process. It is important I share my work and my process with my audience because it will illustrate how the process works first-hand. I will use the textbook, *Writing Fiction – A Guide to Narrative Craft*, to research and hone my skills as a creative writer, and I will use Carl Jung's, *The Spirit in Man, Art, and Literature*, to investigate the psychology embedded in literature. Our HUM 498 class of five students is proposing to present a poster session, with five separate posters—as well as a roundtable, based on our theme, Reframing the World Through a Humanities Perspective.

Keywords: Alternate Reality, Altered Consciousness, Characterization

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Coral-algal competition and overgrowth dynamics of a rapidly emerging red alga (Ramicrusta sp.) in St. Thomas, US Virgin Islands

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Presentation type: Poster (STT - P26)

Caribbean coral cover has decreased by about 80% in the last three decades, with much of the coral being replaced by macroalgae. A rapidly emerging red alga, *Ramicrusta* sp. (hereinafter *Ramicrusta*), has recently overtaken several coral reefs in the Caribbean. The alga commonly outcompetes other benthic organisms and prevents coral recovery, posing a severe threat to local reefs. In the US Virgin Islands, *Ramicrusta* has already demonstrated widespread harm to corals by overgrowing living tissue, causing bleaching and mortality, and impairing recruitment. This study uses high-resolution 3D modeling to measure *Ramicrusta* growth on corals to determine if certain coral taxa experience faster overgrowth by the alga and to investigate trends in environmental parameters that may influence *Ramicrusta* growth and abundance.

Keywords: corals, algae, photogrammetry

Training Neural Networks for Object Recognition Using Blurred Images

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Department of Brain and Cognitive Sciences, Massachusetts Institute of Technology
Presentation type: Poster (STT - 27)

Deep Neural Networks are sophisticated computational techniques used, for example, in trying to replicate "object recognition" in how human vision works. However, this technique requires a huge amount of data. We hypothesized that when training with few data examples, blurring the input images would cause the network to perform better compared to non-blurred images, because of the removal of unnecessary details. In this study, we trained a convolutional neural network on the blurred images, varying the amounts of blur in order to determine how the validation accuracy changes. Our results suggest that blurring the images doesn't help when learning from few examples; however, we cannot fully disprove the hypothesis because it requires further experimentation with other data sets and models.

Keywords: Neural Networks, Deep Learning, Supervised Machine Learning

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Gamma-Ray Bursts Light Curve Fitting with Swift XRT

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Amy Lien
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Presentation type: Poster (STT - P28)

Gamma-Ray Bursts (GRBs) are extreme explosions occurring when large massive stars ends its life and dies in the most energetic explosion ever seen in the Universe. We present a study focusing on GRB afterglow flares; what are they? Why do they occur? How are they related to the prompt GRB itself? We address these questions by analyzing ~350 X-ray afterglow light curves collected by the Swift X-ray Telescope. The fitting procedure uses the superposition of two mathematical models: the Norris function and broken power-laws. The fit residuals and possible patterns in them may show a characteristic signature similar to what has been observed in GRB prompt gamma-ray emission. This signature may reveal details of the shock physics and provide a better understanding of relativistic shocks.

Keywords: NASA, Gamma-Ray Bursts, Astrophysics

Using Data to Improve the Quality of Early Care and Education in the VI

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Presentation type: Poster (STT - P29)

Research to inform the use of evidence-based practices in social programs throughout the VI is severely lacking. Through a federally-funded partnership including UVI and DHS, research was conducted to assess the evidence base for a quality improvement rating system (QRIS), a strategy used nationally to increase the supply of high-quality early care and education (ECE). QRIS set progressive standards that are used to rate the quality of ECE programs, much like hotels are rated with 1 -5 stars. IRT analyses were conducted on data collected from 72 ECE programs in the VI to determine if the quality standards in the VI QRIS form a psychometrically sound measure of "quality". Results indicated that they do but also suggest areas for improvement. Overall, this study demonstrated the value of using research to inform evidence-based practices in the VI.

Keywords: early care and education, quality, applied research

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Measuring Cell Phone Addiction in College Students

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Students in Quantitative Research Methods (SSC 328)
Undergraduate Students, College of Liberal Arts and Social Sciences
Presentation type: Poster (STT - P30)

Nearly everywhere you look people are using their cellphones even in situations, such as driving or class, where they should not be. Some have characterized the inability of people to get off of their cellphones as an "addiction". There are few validated measures of cell phone addiction for use in American or Caribbean samples in the literature. Therefore, students in a quantitative research methods class at UVI set out to develop their own measure as part of a class project. Based on promising results from the class project, the survey was modified and the current study was designed to examine its reliability and validity. Predictors and outcomes associated with cell phone addiction will also be examined.

Keywords: Cell phone addiction, instrument construction, psychometrics

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Bioinformatic Analysis of the Tropical Necrobiome: The Microbial Dynamics of Death in the Antilles

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Presentation type: Poster (STT - P31)

Post-Mortem Interval (PMI) in any given environment is instrumental in the "time since death" spaciotemporal determination of suspect death investigations. The dynamics of the rapid onset decomposition is crucial in determining PMI in the poorly studied tropical environments. This study is part of ongoing work that aims to elucidate the multifactorial tropical decomposition dynamics for accurate PMI from fresh to fossilized tissue. Sequential skin sampling and metagenomic sequencing through the complete phases of active decomposing were assayed to elucidate microbial succession order and temporal environments effects on the decomposition rate. Additionally, the necrobiome is correlated with the distinct decomposition stages, prokaryote species abundance and diversity changes chronologically. Although the contributing factors have not been completely delineated it is clearly related to ambient environmental conditions, initial prokaryotic load, arthropod succession and associated symbiotic microflora. The strength of a correlative approach is in elucidating these factors, and also to provide multiple and independent assessment techniques, that allow for an increased precision in the forensic determination of the post-Mortem interval.

Keywords: Tropical Necrobiome, Dynamics of Death, Bioinformatics Analysis

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Improving the UVI Campus Experience with Technology

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Presentation type: Poster (STT - P32)

A winning team at the UVI HackFest in 2018 proposed the development of a smartphone application ("Campus Connection") that would address issues impacting the UVI student campus experience. Five students enrolled in the MKT 426 Marketing Research, Fall Semester, 2018 class, defined research objectives and a marketing research proposal, and implemented a marketing research project for the Campus Connection. The students developed a survey instrument in collaboration with Dr. Asha DeGannes, ECC. They completed a pilot study, making modifications to the survey instrument. The students then interviewed 100 UVI students, seeking their input on their experiences with the UVI cafeteria, shuttle and security services, BucsWifi, and school spirit. Campus Connection will use the results in product development.

Keywords: Smartphone Application, Campus Experience, Marketing Research

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Physician Scientists - An Illustrious Career that Combines Research and Medicine

Barbara Kazmierczak
Director of MD-PhD Program, *Yale University*

Torhera Durand
Undergraduate Student, College of Science and Mathematics
Presentation type: Roundtable discussion (STT - R1)

Dr. Barbara Kazmierczak is a physician-scientist at Yale School of Medicine whose laboratory studies how bacterial pathogens cause disease. She is a professor of Medicine (Infectious Diseases) and Microbial Pathogenesis and also directs the MD-PhD Program at Yale. This round table will provide information for students to learn about careers in medicine, biomedical research and the path to become a Physician Scientist. We encourage students to join the discussion and ask questions about the process to apply to medical school, how to get training in biomedical research, and getting advice on how to gain acceptance to an MD-PhD program. Torhera Durand is an undergraduate student at UVI who participated in a summer research experience at Yale and will share insights on her academic career and passion for biomedical research.

Keywords: physician scientist, medicine, research

Marine debris in the USVI: discover the issue and discuss solutions

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Presentation type: Demonstration (STT - D4)

Marine debris is a global issue, felt locally in the U.S. Virgin Islands. Most marine debris is plastic and comes from land-based sources. Both macro- (> 5 mm) and microplastics (< 5 mm) negatively impact marine life, through entanglement, ingestion, or the spread of disease. This demonstration provides hands-on activities that explore how UVI researchers collect and document marine debris impacts in the territory, highlighting the research of current and former UVI Masters of Marine and Environmental Science students, including microscope views of microplastics found in our local environment and games that explore the most common types of marine debris found along our beaches and mangrove shorelines. Participants will leave understanding what they can do to prevent marine debris locally.

Keywords: marine debris, microplastics

Stimulation of Inflammasomes in Isolated Human B-Cells

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Presentation type: Poster (STT – P33)

There are two lines of immune defense: the innate and adaptive immunity. Innate immunity uses Pathogen Recognition Receptors (PRRs) to recognize Pathogen Associated Molecular Patterns (PAMPs) such as the Nod-like receptor protein-3 (NLRP3) and functions in defense and homeostatic regulation. At onset of infection, primary signaling from a PAMP results in the stimulation of the NLRP3 inflammasome. A secondary signal from a Danger Associate Molecular Pattern (DAMP) then allows the pathogen to be recognized. Caspase-1, a product of this process, is an inflammasome associated protein that enzymatically processes cytokines, mediators of inflammation. In adaptive immunity, B-cells create antibodies that will bind to foreign molecules and signal to disposal infected cells and pathogens. The goal of this study was to determine if human B-cells have an inflammasome and, if it does, would it function similarly to the NLRP3 inflammasome. We hypothesized that if we stimulate human B-cells with known PAMP lipopolysaccharide (LPS), and then perform a secondary stimulation with several DAMPs we may be able to achieve the same response in B-cells as seen in the NLRP3 inflammasome in macrophages. We observed that when stimulated with LPS+ATP and LPS+NIG pro-caspase-1 bands at 48kD were visible. When samples were stimulated with LPS+SAL and LPS+CITRO pro-caspase-1 bands at 48kd and an intermediate band at 37kd were visible. Additionally, in cells stimulated with LPS+SAL and LPS+CITRO we observed a 30kD band. We have not seen any caspase-1 bands at 20kd. While the results show that stimulation and activation are occurring, we do not know to what extent.

Keywords: NLRP3 Inflammasomes, B-cells, caspase-1

Combatting Cyber Threats Against the Aviation Industry

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Presentation type: Poster (STT - P34)

As of recently, the Aviation Industry took another step forward in the technological world. With technology rapidly advancing, we have gone from an era where flight was thought to be impossible, to one where in-flight internet access is now a possibility. This amenity offers a new level of convenience to many airline passengers. However, as planes are being equipped with in-flight Wi-Fi, the risks of cyberattacks on the Aviation Industry increases. In other words, it may be possible for someone to penetrate the airplane's network and gain access to its avionics system from within the cabin or remotely. This project serves the

purpose of recognizing and defending against a variety of cyber threats related to the modern aircrafts.

Keywords: Cybersecurity, Aircrafts

Determining coral cover and coral species distributions in mesophotic reef habitat in St. Thomas, United States Virgin Islands

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Presentation type: Poster (STT - 35)

The National Coral Reef Monitoring Program (NCRMP) is a federal program that uses divers on SCUBA to monitor coral reefs. Due to federal safety regulations, NCRMP is limited to depths <30m. As a result, 50% of coral reefs in the US Virgin Islands are not assessed by NCRMP. DCRMP (Deep CRMP) is a UVI project that extends NCRMP to mesophotic reefs, which are deeper (30-100m), but share the same coral species as shallow reefs. Many areas assessed by DCRMP have not been explored. For this project, photos taken during DCRMP dives were analyzed for coral cover using image analysis software. Results will indicate the spatial and depth distribution of coral species and will increase our understanding of mesophotic reefs.

Keywords: mesophotic coral reefs, coral, monitoring

Application of the Rasch Measurement Model to the Public's Perception of Hurricane Preparedness in the USVI in 2017

Frank Mills
Faculty, Eastern Caribbean Center
Presentation type: Poster (STT - P36)

Following the brutal impact of hurricanes *IrMaria* on the US Virgin Islands in September 2017, many residents subsequently questioned the preparedness of the Territory by its public sector officials. In order to derive objective measures of the perception of readiness of the VI community, a survey instrument with 11 items was developed with a four-category scale. The instrument was administered to two different focus groups in St Thomas in 2018. In order to enhance the interpretation of the resulting ordinal-level attitudinal data, Classical Test Theory (CTT) method of analysis was eschewed for the application of the more rigorous Rasch model. This model produces linear measures that are *person free*—which means that useful data are produced regardless of the group being measured—and *item free*—meaning that it does not matter which mix of items on the trait is completed. Psychometric measures of reliability and validity that are estimated are more rigorous than those found in CTT. Analysis of the data identifies which services the public perceived to have been adequately prepared, and those for which public sector officials were castigated for their negligence.

Keywords: Hurricane preparedness, Rasch model, items of official negligence

The Blood Traveler: Apicomplexan Blood Parasite of Dusky Damselfish

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Presentation type: Poster (STT - 37)

Mentors: Jennilee Robinson, PhD Assistant Professor of Biology, College of Science and Mathematics, UVI,
Paul Sikkel, PhD, Arkansas State University,
Andrew Campbell, PhD, Brown University

Apicomplexa are intracellular parasitic protozoa infecting a variety of hosts. A few cause severe diseases such as malaria. In the Caribbean, some of the most abundant coral reef fishes are infected by intraerythrocytic apicomplexans. These include dusky damselfish, where intracellular parasites are detectable in thin blood smears. Our primary objectives are to map the prevalence of infection in *Stegastes adustus* in the US Virgin Islands, and test whether PCR could enable rapid diagnosis. Dusky damselfish sampled pre- and post-hurricane at multiple USVI sites were compared. Data collected included fish lengths, weights, population density, and habitat features. *S. adustus* caught by hand net were anesthetized, blood was collected, and after recovery, fish were released. Infection was assessed by microscopy of Giemsa-stained thin blood smears. Overall, the infection pattern resembled a Poisson distribution with some sites having high prevalence, and others none. The average prevalence of infected fish decreased from 49.9±23.6% during 2015-2017 (n=80) to 26.1±29.6% post-hurricanes (n=130). PCR analysis currently does not match traditional microscopy assessment. We plan to conduct IFA and qPCR. These techniques can be used to identify tissues and host infections, and lead towards mapping the lifecycle of these understudied marine Apicomplexa.

Keywords: marine apicomplexa, dusky damselfish, blood parasite

Evaluating the impact of Irmaria with bioacoustics: how bats respond to hurricanes

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Robert Brodman
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Presentation type: Poster (STT - P38)

Bats of the U.S. Virgin Islands were affected by two major hurricanes in 2017 due to severe changes in habitat and food availability. Long-term passive acoustic monitoring of bats was conducted at three sites to examine differences in bat species composition and activity before, immediately after, and one-year after the disturbance event. Bat activity varied by species at both sites ($p < 0.01$) but was not different across time in relation to the storms. Molossus molossus activity showed an increase after the disturbance ($p < 0.05$), showing a strong potential storm response. This response has previously been unmeasured from these species after this type of storm event and could provide insight for conservation management to build resilience towards climate change.

Keywords: bats, hurricane, bioacoustics

Bringing Our Soldiers from the Field: Latency of Emergence and Locomotion Differ between Tests and Over Time for the Soldier Crab *Coenobita clypeatus*

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Presentation type: Poster (STT - P39)

Scientists recognize that the stress of collection and transport of animals for study, and subsequent habituation to lab conditions, could alter the behavior of test individuals compared to field conspecifics. However, behavioral ecologists rarely examine this possibility. This study quantified differences in response of the semiterrestrial soldier crab (hermit crab) Coenobita clypeatus using two tests that assess defensive behaviors in hermit crabs: the emergence test and the drop test. Individual responses were measured in the field and again in the lab at three instances within a week. To assess possible ontogenetic behavioral changes small, medium, and large individuals were tested. Digital video recordings of individuals subjected to each test were analyzed for latency of emergence (time taken to extend all legs from shell after a disturbance) and first locomotion (following emergence). When field measurements were compared to the first lab measurements obtained alone, two-way ANOVAs detected no significant differences in latency or initial locomotion regardless of size class or test used (emergence or drop test). However, the timing of both responses decreased significantly in emergence tests over the course of one week in captivity for all size classes. No effect of time in captivity was observed during drop tests, although trends towards differences in response among size classes were found for both latency ($p=0.062$) and initial locomotion ($p=0.053$). These findings highlight constraints in interpreting behavioral data from laboratory-acclimated animals. Discrepancies in response between field and laboratory-kept Coenobita were test-specific, illustrating higher context dependence in behavioral trends than currently appreciated.

Keywords: Invertebrate, Behavior, Hermit Crabs

Phenolic Content and Antioxidant Capacity in Virgin Islands Plants

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Presentation type: Poster (STT – P40)

Antioxidants are compounds that counteract the formation of free radicals. When exposed to environmental stressors over time, cells begin to break down, which can lead to oxidative stress. Eating foods high in antioxidants can prevent diseases resulting from oxidative stress, and replenish our bodily cell functions. In this study, we selected five Virgin Islands plants namely, *Cymbopogon citrates*, *Moringa oleifera*, *Mentha spicata*, *Laurus nobilis*, and *Thymus vulgaris*. Our main objective was to determine if there is a correlation between Hydrophilic Antioxidant Activity and Total Phenolic Content. The ABTS/H_2O_2/HRP decoloration method was used to determine HAA, and Folin-Ciocalteu's method was used to assess TPC. According to results, *Thymus vulgaris* and *Cymbopogon citrates* had the highest and lowest mean HAA and TPC, respectively. A one-way ANOVA showed no significant difference between HAA and TPC ($p = 0.164$). Pearson correlation analysis showed strong evidence of positive correlation between HAA and TPC ($r = 0.935$). Lastly, linear regression analysis showed a linear relationship between HAA and TPC ($R^2 = 0.874$). From this study, we found that there was a correlation between HAA and TPC for the selected Virgin Islands plants. For future work, we would like to study correlation in other local herbs and fruits.

Keywords: Antioxidant, Phenols, Plants

The Sounds that Bats Make—and what it tells us about our natural world

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Presentation type: Demonstration (STT - D5)

Bats are important components of healthy ecosystems and their use of an area can identify important resources such as water, tree canopy cover, insect diversity, and other key habitat features. However, bats are "silent" to us; their vocalizations are in a sound frequency that is not audible to humans. The ability to detect and decipher their sounds is made possible by placing automated recorders in field locations and using sound analysis software to translate vocalizations to an audible frequency. These recordings can reveal species assemblages, activity patterns, and can even offer clues on social behavior. We will demonstrate the ability to listen in on the songs of bats and discuss implications for conservation of species and habitats.

Keywords: Bioacoustics, Ecosystem Monitoring

Virtual Reality in Journalism

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Presentation type: Demonstration/Experiential Activity (STT – D6)

The Communication Lab at UVI has been conducting experiments with the use of virtual reality technology as a means of delivering news stories. The lab acquired computers suitable for use with the Oculus Rift virtual reality system and already has a number of virtual-reality glasses, and Google cardboard virtual reality systems. Working with the New York Times, CNN news feeds that are presented in virtual reality, students have been exploring how to create stories using virtual reality technology and its implications for the news and journalism. At *UVI Research Day* 2019, the Communication Lab will showcase several virtual reality systems in operation with a variety of current news stories in VR.

Keywords: Virtual Reality, Communication, Journalism, News

Using passive acoustic monitoring to model and classify *Eleutherodactylus coqui* with The Automated Remote Biodiversity Monitoring Network (ARBIMON)

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Presentation type: Poster (STT - P41)

Frogs play an important ecological role in the United States Virgin Islands (USVI). Monitoring these species often requires intensive field work and long-time commitments to collect adequate amounts of data for analysis. Recently the use of passive acoustic monitoring (PAM) and modeling and classification software programs make collecting and processing large data sets an easier task. This research used The Automated Remote Biodiversity Monitoring Network (ARBIMON) to model and classify the common song of *Eleutherodactylus coqui*. Results showed that ARBIMON was effective in the use of classification and identification for this species, although its accuracy and precision varied with different recording metrics. This demonstrates that PAM and analysis algorithms are valuable and should be utilized more often in future ecological research.

Keywords: passive acoustic monitoring, modeling and classification programs, *Eleutherodactylus coqui*

U.S Virgin Islands Marine Debris Analytical Comparison

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Presentation type: Poster (STT - P42)

Marine Debris is an issue that garnered much attention in the US Virgin Islands. This study was chosen, to educate the others and to show the importance of minimizing marine debris even after natural disasters. Marine Debris that has found its way into the marine environment (beaches, waters, mangrove areas or underwater reefs and seagrass beds). According the University of the Virgin Islands website, about 80% of the debris found on our beaches and in our waters is blown, washed or dumped from land-based sources. On land sources include people holding events on the beach, poorly-maintained garbage trucks and dumping grounds and litterbugs. This affects marine organisms, animals and people that can become entangled in or injured by marine debris. In an effort to reduce the amount of marine debris in our waters, VIMAS coordinates local Coast weeks, International Coastal Clean-up activities for The Ocean Conservancy. We obtained the data from Coast Week Clean Up USVI and analyzed the data from 1986-2008 and analyzed the amount of marine debris accumulated during those years. Our hypothesis was proven, because different types of marine debris, increased where other types of debris decreased. We also noticed patterns of marine debris fluctuate after a natural disaster such as a hurricane. Doing this study makes us more aware of the problem of marine debris in our oceans and of a need to increase cleaning of the island.

Keywords: marine debris, beach

Using CRISPR-mediated Mutagenesis to Analyze Protein Phosphatase 2A Regulatory Subunit Functions in *Arabidopsis thaliana*

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Presentation type: Poster (STT - P43)

In plants, protein phosphatase 2A modulates ethylene biosynthesis. Ethylene, controlled by *B13*, *B16* and *B17* genes of the B72 family, regulates leaf senescence. We used CRISPR-mediated mutagenesis to induce mutations in *B16* and *B17*, a functionally redundant gene pair, to determine if they regulate ethylene synthesis. We used a dark-induced leaf senescence assay to investigate their effect on ethylene-dependent phenotypes. Leaves from $b16b17^{C425cfs}$ plants yellowed faster than wild-type controls, suggesting accelerated senescence. To quantify this effect, we assayed chlorophyll content in senescing leaves. However, the expected decline was not observed. To isolate *b16 b17* deletion alleles with stronger loss-of-function effects than the previously isolated $b16b17^{C425cfs}$ mutant, we successfully generated new CRISPR constructs and introduced them to *Arabidopsis* via *Agrobacterium*-mediated transformation.

Keywords: Arabidopsis thaliana, plant growth and development, CRISPR

Characterizing the Habitats of *Halophila stipulacea* and the Effects of Hurricanes Irma and Maria

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Alice Stanford
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Presentation type: Poster (STT - P44)

Halophila stipulacea is a native seagrass found in the Red Sea and along the east African coast. In 2012, it was first sited in US Virgin Islands. Since its invasion, *Halophila stipulacea* has been rapidly spreading and outcompeting the native seagrasses. Thus far, sixteen genotypes were found, suggesting multiple invasions since there is no known evidence of sexual reproduction. We hypothesized that there was a difference in the water quality at the sample sites. ArcMap was used for mapping salinity, temperature, and soil type at the sample sites. Additionally, a map of Brewer's Bay, one of our sample sites, was created showing pre-hurricane and post-hurricane effects on the seagrass beds.

Keywords: Halophila stipulacea, Mapping

Trends in a 28-year historical, citizen science-collected, territorial marine debris dataset in the US Virgin Islands

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Presentation type: Poster (STT - 45)

Marine debris is a growing environmental issue. In this study, we analyzed a 28-year, citizen-science collected, USVI marine debris data set (1988-2016; 94 beaches). The data included location, cleanup-date, number of participants, total marine debris collected (#of items and total kg), shoreline length, and debris items grouped into debris-producing activities (e.g., dumping activities). A Scheirer-Ray-Hare test was used to determine differences in debris density (#of items/m^2); there were significant differences between each island ($p < 0.001$). The composition of debris by island also differed. St. Croix had more foam pieces (n= 182,115), St. Thomas had more caps/lids (n= 4,585) and St. John had more cigarette butts (n= 1,645). These results provide key insights that inform territorial marine debris prevention efforts.

Keywords: Marine debris, Citizen science, Beach

Exploring the Changing Realities of Virgin Islands Culture through Poetry

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Presentation type: Poster (STT - P46)

This project explores the changing realities of Virgin Islands culture through the use of poetry. The research questions specifically address historical traditions that have shaped Virgin Islands culture and the role of poetry in documenting the past, present and even future possibilities. Using Kamau Brathwaite's Theory of Creolization, this qualitative study examines the lived experiences of poets from the US and British Virgin Islands through informal interviews and document analysis. The main challenge encountered initially was finding a suitable theory. The findings revealed that poetry does play a significant role in preserving Virgin Islands culture. As an aspiring poet, I find that I now understand that poems about culture can help to shape the history of our people.

Keywords: culture, poetry

Hurricane generated wave thresholds for damage to coral reefs in the US Virgin Islands

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Presentation type: Poster (STT - P47)

Hurricane-generated waves can be extremely damaging to coral reefs, but threshold values of benthic orbital velocities that induce coral reef damage are not well established. We used a unique dataset of 32 coral reef monitoring sites across shallow (5 m) to mesophotic (41 m) depths in the US Virgin Islands and modeled benthic orbital velocities over two major Hurricanes in 2017. Damage to corals was assessed in situ at 32 monitoring sites. There was a significant relationship between benthic orbital velocity and fragment prevalence (linear regression, $p = 0.0007$, $r^2 = 0.44$) and our results suggest a preliminary orbital velocity threshold of 2 m/s. There were also differences in response due to site species composition, slope, and aspect.

Keywords: Hurricane damage, coral reef ecology, impact assessment

Futures in STEM

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Presentation type: Demonstration (STT – D7)

In the USVI, students within public and private school systems receive little exposure to the various STEM (Science, Technology, Engineering, Mathematics) disciplines and fields that can be pursued locally. As a result, a majority of students within the territory graduate never having recognized STEM as a viable career path. Through the use of hands-on, educational and interactive displays, the VI-EPSCoR team aims to expose student groups to some of the STEM careers that can be pursued at institutions such as the University of the Virgin Islands. This demonstration will focus on the various marine and environmental science research initiatives being done at UVI as examples of careers that incorporate different aspects of STEM.

Keywords: STEM, Education, Careers

Assaying for the Microbial Diversity of the coastal waters of the USVI; a feasibility study for the efficacy and viability of large-scale metagenomics project

Colleen Toussaint
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Presentation type: Poster (STT - P48)

Building upon preliminary marine microbiome diversity studies of Fall 2018, the investigation aims to improve assay techniques of microbial diversity analysis of the groundwater watersheds and the coastal waters of St Thomas as part of a novel approach to determining biological water quality & monitoring in the US Virgin Islands. A key factor is the improved high throughput sampling, differentiation and metagenomic sequencing technique. Initial assays were conducted for quantifiable validity of the improved technique through highly sensitive quantitative and detection techniques, compared to other small volume techniques for optimum high throughput output for metagenomics from small assay (sample) quantities. Methodology concentrates on sterility (low background) and optimal recovery from DNA extraction techniques, determined by target specific limit of detection using RT-PCR. Results demonstrate the applicability of this technique specifically with single site beach samplings, with 47% led to excellent quantities of DNA for metagenomic sequencing, and a further 33% corresponding to border line acceptable quantities. Further trials are currently underway to improve these results are discussed.

Keywords: metageonomics, water sheds, diversity, St. Thomas

Intersection of Gender Role Conflict and Double-Consciousness Among African-Caribbean Men

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Presentation type: Poster (STT - P49)

The present study addresses the psychological impact that occurs among African-Caribbean men as a result of the engagement in double-consciousness. This study serves to add to the literature on African-Caribbean men and masculinity, and provides empirical evidence of the hypothesized mental conflict that exists among African-Caribbean men, particularly as it relates to double-consciousness and gender role conflict. Mental conflict was measured as a function of psychological distress, surfacing in high levels of depression, anxiety, and somatization, made evident through the measurement of the Brief Symptom Inventory- 18 (BSI-18). It was hypothesized that African-Caribbean men will experience strain associated with conflicting gender role expectations, made evident through scores on the Gender Role Conflict Scale (GRCS). Additionally, it was hypothesized that African-Caribbean men engaged in the practice of double-consciousness, made evident through scores on the General Ethnicity Questionnaire (GEC). More specifically, it was expected that those who fail to integrate and only identify with one's Blackness and those who make drastic changes in one's reality by taking on characteristics of the Eurocentric worldview will have higher levels of psychological distress. Results from this study provide practical use on the double-consciousness theory, and implications for future research specifically for African-Caribbean men.

Keywords: Double-consciousness, African-Caribbean masculinity, multiple identities

Probabilistic Model of Sea Turtles Locations in Brewer's Bay

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Presentation type: Poster (STT - P50)

This project uses random walks to determine the probable location of sea turtles in Brewers Bay. With this information, marine biologists can better observe and study the sea turtles we

know so little about. The data used in the project is collected using trackers placed on the turtles and is received when they approach the stations. This data includes the detection time, latitude, longitude, and depth of the turtle. The team developed a computer code using random walks to develop a probabilistic model of the locations of the turtles.

Keywords: Mathematical Biology, Computational Science, Ecology

Spatial Analysis of Open Dumping in Smith Bay and Frydendahl, St. Thomas US Virgin Islands

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Vernon Callwood (Mentor/Faculty advisor)
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Presentation type: Poster (STT – P51)

The Virgin Islands Waste Management Authority closed the public garbage bin collection site in Smith Bay and Frydendahl on June 19, 2015. Since its closure, open dumping has become a problem in this residential area. Open dumping is the improper disposal of waste which includes household trash, garbage, tires, demolition/construction waste, appliances, pipes, metals, or any material which will rust, rot, or burn. Open dumping occurs most frequently on the roadside, in pastures, ravines, and in urban and rural communities. The Smith Bay and Frydendahl residential areas are surrounded by water. With illegal dumping taking place so close to beaches, toxic substances can get consumed by the fishes and other marine animals. These toxins are deposited into the animal's fat tissues causing diseases over the long term and affecting their ability to reproduce. Additionally, when humans consume these animals, it can have detrimental effects on their health. Many marine species also depend on the ocean for its ability to create food and oxygen. Since most of the plastic debris in the ocean remains floating for years, it leads to decrease oxygen levels which severely affect the survival of marine species. In fact, pollution can wipe out entire populations of fish and other marine life. Additionally, it creates a financial cost to individuals, communities, and the government. Cleaning up these sites is very costly because it requires resources, time, and money. These sites degrade the value of land and surrounding properties. As a resident of Smith Bay, I am concerned about the increasing number of open dump sites. Thus, I decided to conduct a spatial analysis of the open dump sites in this area.

Keywords: debris, open dumping, dump sites

The Influence of Hair-Esteem on Attitudes towards hair of Black Caribbean Women

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Presentation type: Poster (STT - P52)

Although natural hair is becoming more acceptable in today's media, Black women still have a standard where natural hair is expected to be of the looser curl structure. Very few studies have investigated the effects that social comparison has on hair of Black women. This study will examine how hair-esteem affects prevailing attitudes towards hair amongst Black women. It is expected that hair texture bias will affect Black Caribbean women's perceptions of beauty and self-esteem. Convenience and snowball sampling will select participants for this study consisting of 93 Black female students ranging from ages 18 and older at the University of the Virgin Islands. An anonymous online survey will be conducted via Survey Monkey consisting of three Likert scales covering Hair-Esteem, Hair Survey and Demographics. Through descriptive and correlational analysis, expected findings will reveal that there is a statistically significant negative relationship between attitudes towards black/natural hair and hair self-esteem. Investigations will also explore whether there is a greater inclination for a positive implicit attitude of millennials (born 1981-1996) towards natural hair. These findings will suggest that generation after generation Black women are conditioned to alter the texture of their hair instead of developing a positive relationship with it.

Keywords: natural hair, Black Caribbean women, European standard of beauty

Mapping Drainage Infrastructure in the US Virgin Islands

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Presentation type: Poster (STT - P53)

Properties all over the Virgin Islands regularly experience flooding during heavy rainfall. A lack of understanding of the complex watershed processes and the hydrologic connectivity between structures and natural features, and the absence of an inventory of the drainage infrastructure are a few reasons why this occurs. We propose implementing a geo-referenced inventory of the engineered drainage infrastructure in the Virgin Islands. By collecting, digitizing, and geo-mapping existing infrastructure, we will create a geodatabase. This geodatabase can then be used to model the effectiveness of storm water systems which in turn, can provide recommendations for improvement. The work proposed will create much needed dataset to build a safe and efficient draining system in the Virgin Islands.

Keywords: Drainage, Mapping, Geo-database