# Florida Academy of Sciences

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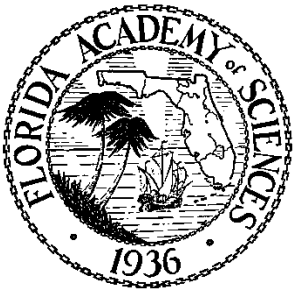
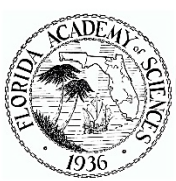



## 89th ANNUAL MEETING

**University of Tampa**
**Tampa, Florida**

**March 20, 2026**

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FLORIDA ACADEMY OF SCIENCES

SCIENTIFIC KNOWLEDGE & RESEARCH | EDUCATION & PUBLIC UNDERSTANDING OF SCIENCE | ETHICAL & SUSTAINABLE APPLICATION OF SCIENCE

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**Physics and Space Sciences:** Dr. Geuorgui Bourov, Embry-Riddle Aeronautical University and Dr. Emadelden Fouad, Florida Polytechnic University
**Science Teaching:** Dr. Tom Arnold and Dr. Matt Tucker, Lake Erie College of Osteopathic Medicine
**Social Sciences:** Dr. Jennifer Wortham, University of Tampa

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## PLENARY ADDRESS

FRIDAY 2:30 p.m.
JENNIFER WORTHAM, FAS PRESIDENT, presiding

2:30 p.m. PLE-01 **From Nature to Space: A Journey Across Science without Boundaries.**

Arvind Agarwal, 2025 Florida Academy of Sciences Medalist. Professor and Chair of Mechanical and Nuclear Engineering, Virginia Commonwealth University.

Science often advances most profoundly at the intersections—where materials meet biology, and where imagination meets engineering. In this talk, I will share my two-decade journey in Florida exploring those intersections across living systems, materials, and extreme environments.

My academic training in materials science began with a fascination for how the same atoms can create entirely different materials simply by rearranging themselves—a curiosity that pushed me beyond metals and ceramics into the realm of nature itself.

One of my favorite examples comes from the Mimosa pudica plant, which folds its leaves in response to touch. We studied how this motion combines structural, electrical, and mechanical signals, and used those principles to build bio-inspired actuators and soft robotic systems using graphene, shape-memory polymers, and 3D printing. That sense of biomimicry continued with the American alligator's tooth, whose natural process of mineralization inspired our work on wear-resistant materials and coatings. Moving from the swamp to the lab, we also explored how heart cells (cardiomyocytes) sense mechanical forces with the aim of developing cardiac patch materials that could one day help repair tissue after heart attacks.

Taking this curiosity beyond Earth, our collaborations with NASA's Materials International Space Station Experiment (MISSE) studied how materials degrade in space and helped design next-generation coatings for astronaut suits to withstand radiation and atomic oxygen. Finally, I will connect these themes to my ongoing defense-related research on extreme-environment materials and coatings, where advanced manufacturing converges to create new protective systems for national security and aerospace applications.

Across these efforts runs a single thread: a belief that the boundaries between life, materials, and technology are not limits—but launchpads for discovery.

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## AOS = ATMOSPHERIC AND OCEANOGRAPHIC SCIENCES

FRIDAY 8:30 a.m. – 9:45 a.m.
DAVID KARLEN, ENVIRONMENTAL PROTECTION COMMISSION OF HILLSBOROUGH COUNTY, presiding

08:30 a.m. AOS-01 **Thirty-year trends in the benthic macroinvertebrate community of Tampa Bay.**

David J. Karlen, Thomas L. Dix, Kevin W. Campbell, Julie Christian, Barbara K. Goetting, Sara E. Markham, Joette Jernigan, Anthony Chacour, Kirsti Martinez. Environmental Protection Commission of Hillsborough County, 3629 Queen Palm Dr. Tampa, FL 33619.

Tampa Bay is the largest open water estuary in Florida and is home to one of the largest ports on the east coast of the United States. The Environmental Protection Commission of Hillsborough County has been collecting sediment samples in Tampa Bay since 1993 to monitor sediment contaminants and long-term changes in the benthic macroinvertebrate community, as a measure of the Bay's ecological health. Over the 30-year period, 1993-2022, a total of 2,011 samples were processed, and approximately 1,600 benthic macroinvertebrate taxa have been identified. Overall median species richness was 38 taxa/sample with a median abundance of 6,575 individuals/$m^2$. The most abundant species were the cephalochordate *Branchiostoma floridae* and the brachiopod *Glottidia pyramidata*, comprising 4.98% and 4.03% of the overall abundance, respectively. Sediment composition and dissolved oxygen were the physical factors that most strongly influenced the benthic community structure. Species richness increased from the upper to lower segments of the Bay, which corresponded to increasing salinity and decreasing silt+clay content. Temporal changes in the benthic community structure correlated with salinity and water quality. Decreases in species richness and changes in species composition were observed in lower salinity years. An overall increasing trend in the benthic species richness was apparent over the 30-year monitoring period which reflects observed changes in Tampa Bay's water quality and seagrass coverage.

**Keywords:** Tampa Bay, long-term monitoring, benthic infauna, benthic communities.

Corresponding author: David Karlen, karlen@epchc.org

08:45 a.m. AOS-02 **Investigating Stainless Steel Attachment Materials for Living Dock Benthic Restoration Mats in the Indian River Lagoon.**
Michelle Krumholz, Kelli Hunsucker, Robert Weaver, Dante Romero. Florida Institute of Technology, 150 W University Blvd, Melbourne, FL 32901.

The Living Docks program uses existing infrastructure to build habitats that promote the growth of filter-feeding organisms. This mitigates water quality issues within the Indian River Lagoon (IRL). Living Dock oyster mats are constructed by attaching dried oyster shells to aquaculture-grade plastic mesh mats with UV-resistant plastic zip ties. Growing concerns regarding the use of plastic have led to the initiative of material alternatives. Previous research found stainless steel to be the most successful non-plastic attachment material. Building off these results, the current study was designed to observe two different stainless-steel attachment materials, 316L 18-gauge wire and 316 steel cable ties, while using plastic zip ties as a control. These materials were placed on smaller Living Dock test mats, 30 shells per mat, and deployed in four locations in the IRL. This presentation will discuss the durability of the stainless-steel attachment based on the material type, environmental conditions, and temporal and spatial variations.

**Keywords:** Indian River lagoon, Stainless-steel, Living Dock, oyster mats

Corresponding author: Michelle Krumholz, mkrumholz2024@my.fit.edu

09:00 a.m. AOS-03 **Multi-Trophic Community Succession on Below Dock Artificial Reefs in the Indian River Lagoon.**
Evelyn Marquez. Indian River State College. 3209 Virginia Ave. Ft. Pierce, FL.

The Indian River Lagoon (IRL) is a 156-mile-long estuary of national significance along the east coast of Florida. Studies have shown that the IRL has suffered a significant decline in biodiversity due primarily to anthropogenic factors. Indeed, IRL restoration is a priority. Here we test how adding artificial reefs under an observation deck changes fouling, invertebrate, and fish communities over time. Thirty-six spartan oyster reefs were deployed within the IRL that abuts the Florida Oceanographic Society (FOS) property. The implementation of this reef system has a twofold goal: habitat restoration and providing information on the rate of succession within newly implemented artificial reef systems. Data collected will analyze the rate of succession from microorganism communities settling on the reefs, to fouling species and marine macrofauna that use these reefs as habitat. Microorganism communities were identified after swabbing randomized modules top, north and south sides. Fouling species were measured a month into the experiment by picking randomized reefs and measuring total species coverage using

GoPro cameras placed facing the reefs were used to identify macrofauna that utilize the reef habitat. Information gathered from this multi-tiered succession study shows how a successful reef system can be used to repopulate and improve diversity in the IRL and elucidate the processes through which artificial reef implementation affects local population dynamics and biodiversity.

**Keywords:** Indian River Lagoon, succession, artificial reef, restoration

Corresponding author: Evelyn Marquez, marquezer@mail.irsc.edu

09:15 a.m. AOS-04 **Hidden in the Shallows: Tracking Juvenile Horseshoe Crabs Across Seasons.**

Jordan Young, Jaylyn Lopez, Nicholas Davis, Lakean McGregor. Bethune Cookman University. 640 Dr Mary Mcleod Bethune Blvd., Daytona Beach, FL.

While spawning populations of Atlantic horseshoe crabs in the Indian River Lagoon have been well documented, juvenile life stages remain largely understudied, creating a critical gap in understanding early survival, habitat use, and recruitment. Juvenile horseshoe crabs represent a vulnerable stage of the species' life cycle and identifying where and when they occur is essential for developing effective conservation strategies in this ecologically important estuary. This study assessed the seasonal distribution, abundance, and size structure of juvenile horseshoe crabs across two sites in the northern lagoon and one site within the Banana River subbasin. Sampling occurred during summer, fall, and winter to evaluate temporal changes in juvenile presence and growth. At each site, a 1.2-meter push net was used to sample ten 8 m by 8 m quadrats, divided evenly between shallow and deep-water habitats. All juveniles were counted and measured using digital calipers, and water quality parameters were recorded at each quadrat. Results revealed strong seasonal and depth-related patterns. Juveniles were largely absent from deeper habitats, with only one deep quadrat containing crabs in summer and none observed in deep water during fall or winter. Although no significant differences were detected among sites in summer, two locations supported approximately three times more juveniles than others, suggesting potential nursery hotspots. Juvenile abundance declined sharply in fall and remained low in winter, with no crabs found at Kelly Park and only three individuals recorded at Parrish Park. Crabs collected later in the year were larger on average, indicating measurable cohort growth over time. By focusing on this understudied life stage, this research provides new insight into juvenile settlement patterns and habitat preferences. These findings can inform management decisions aimed at protecting essential nursery habitats and supporting long-term horseshoe crab conservation efforts.

**Keywords:** horseshoe crabs, Seasonal distribution, Nursery habitat, Indian River Lagoon, Estuarine ecology

Corresponding author: Jordan Young, jordan.young@students.cookman.edu

09:30 a.m. AOS-05 **AI for data rescue applied to a Florida tide gauge.**
Steven D. Meyers[(1)], Aishlin E. Ingraham[(2)], Tyler Hawkins[(3)], Amanda Boczar[(1)], Stefan A. Talke[(4)], and Mark E. Luther[(1)]. [(1)]Univ. of South Florida, 140 7th Ave S., St. Petersburg, Florida 33701, [(2)]Rutgers University, 71 Dudley Road, New Brunswick, NJ 08901, [(3)]Florida State University, 253 Love Building, Tallahassee, FL 32306, [(4)]California Polytechnic University, 1 Grand Ave., San Luis Obispo, CA 93407.

Thousands of years of paper tide gauge records are stored in archives worldwide. Digitization of these records is typically based on time-consuming manual data entry methods. We assessed the AI-driven Qdox system with optical character recognition (OCR) as a tool for rapidly digitizing archival tidal measurements in St. Petersburg, Florida (1924–1926). The records were photographed at the U.S. National Archives. Each image page contained 1 week of data (168 values) with a precision of 0.1ft (0.03m), plus metadata. QDox digitized metadata with an error rate of 1.55 errors per page. Water level data were read with an average error rate of about 1 error per 116 data points (~0.9%), slightly larger than manual digitization error rates (0.1-0.5%). Data errors manifested as discontinuities or spikes, were detected using standard QA/QC methods, and were manually replaced with the correct values from the corresponding image. QDox was also able to overcome issues such as damage to the paper that obscured numbers in the ledger. Image sharpness was found to be an important determinant in the OCR error rate. Those with poorer focus were more likely to have a high error rate, up to 9%, with a mean absolute error around 0.09 m. Tidal amplitudes and non-tidal signals (storm surge) of the computed data were found to be similar to modern values. Preliminary speed tests indicated digitization+QA using Qdox was 5-10x faster than manual methods.

**Keywords:** tide gauge, artificial intelligence, optical character recognition, climate, coastal ocean

Corresponding author: Steven D. Meyers, smeyers@usf.edu

## AOS Posters – 3:45 p.m.-6:30 p.m. Friday

AOS-P01 **Quality control of NOAA tide gauge records along the coastal southeastern United States.**

Dylan D. Benedict, Steven D. Meyers, Gary T. Mitchum. Univ. of South Florida, 140 7th Ave S., St. Petersburg, Florida 33701

High quality data is the basis for consequential sea-level research. Historical and modern sea-level records are subject to time-shift errors and data spikes. Fifty tide gauge records along the southeastern United States coastline, with a minimum of 10 years of data, were selected from the National Oceanographic and Atmospheric Administration (NOAA). Quality control processes based on wavelet-analysis and mean absolute deviation (MAD) methods were applied to linearly detrended and non-tidal hourly data for the identification and handling of time-shift errors and data spikes. Wavelet analysis results were visually inspected to identify data segments containing periodic signals potentially introduced by time-shift errors. These segments were then incrementally shifted ± 3 hours, and shifts that removed periodic signals were accepted as valid adjustments. Signals not removed through shifting were considered potentially forced by natural processes. A spike threshold was set using the MAD seasonal cycle of first differences of the data. Spikes were identified where first differences exceeded the threshold while neighbored by data that fell within the threshold and flagged as NaN. Of the 50 qualifying NOAA tide gauge records, 19 are also included in the Joint Archive for Sea Level Data (JASL) network with additional processing. Results from our quality control treatment were compared to overlapping stations for validation. There were 77 instances across 17 stations where time-shift errors were identified and treated. Rates of data spikes ranged from .9 to 8 spikes per mille data points. Our new quality control treatment reduced extreme value counts and decreased standard deviation values on monthly timescales, adjusting outlier months towards the seasonal cycle.

**Keywords:** tide gauge records, data quality control, spike detection, time-shift errors, coastal flooding

Corresponding author: Dylan D. Benedict, dylanb3@usf.edu

**BIO = BIOLOGICAL SCIENCES**
*(Session A)*

FRIDAY 09:00 a.m. – 11:15 a.m.
KYM ROUSE HOLZWART, SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT AND MELBA HORTON, SOUTHEASTERN UNIVERSITY, presiding

09:00 a.m. BIO-01 **Influence of Environmental Factors on the Growth and Carotenoid Production of *Dunaliella salina*.**
Priscille Moussa Sangara, Leah Church, Anna Church and Melba D. Horton. Southeastern University, 1000 Longfellow Boulevard, Lakeland, Florida, 33801.

*Dunaliella salina* is a halophilic microalga that inhabits hypersaline environments and is known for producing β-carotene, particularly under stress conditions. This study examined the effects of varying salinity (15 and 23 ppt), pH (average range: 7.6-9.2), and light intensities (718, 818, 1069, 1258 and 374 lux) on carotenoid production over six weeks. Cultures grown at higher salinity exhibited osmotic stress and reduced growth, consistent with the adaptation and recovery cycle associated with stress responses. In addition, pH fluctuations were more pronounced at higher salinity and negatively correlated with cell counts, suggesting reduced $CO_2$ uptake and photosynthetic activity that may have altered carbonic acid equilibrium. Light intensity did not significantly affect algal growth, although cultures exposed to natural sunlight showed greater variability than those under artificial light. Carotenoid yields did not differ significantly between salinity treatments ($p > 0.05$). However, infrared spectroscopy of pigment extracts revealed distinct peaks, indicating variability in photosynthetic pigments across salinity levels. Overall, these findings suggest that environmental factors influence the growth dynamics of *D. salina*, although the salinity range tested was insufficient to produce statistically significant differences in carotenoid accumulation.

**Keywords:** *Dunaliella salina*, β-carotene, salinity, microalgal growth, light intensity

Corresponding author: Melba D. Horton, mdhorton@seu.edu

09:15 a.m. BIO-02 **Unusual secondary increment of Cycads on the example of *Cycas revoluta.***
Anna Ponce. Bethune-Cookman University, 640 Dr Mary McLeod Bethune Blvd, Daytona Beach, FL 32114.

Cycadales are the sister group to conifers, and understanding their biology is essential for uncovering the evolutionary development of seed plants. They exhibit atypical stem anatomy, with multiple cambial cylinders, and their xylogenesis remains poorly understood. While most recent anatomical studies of cycads have focused on primary structures such as petioles and xylem elements, or genetic and molecular data, information on vascular cambium is nonexistent. A transverse disc of the basal area of the trunk of a single specimen of *Cycas revoluta* was divided into samples, including vascular tissues. The samples were fixed in ethanol:glycerol (1:1), dehydrated, embedded in paraffin, sectioned transversally, stained (PAS), and mounted in Permount. The sections were analyzed and photographed using a Zeiss microscope and Moticam, documenting events of cambial rearrangement recorded in the layers of secondary xylem. In the specimen examined, three cylinders of vascular tissues were observed, with the largest amount of secondary xylem present in the innermost cylinder. Anticlinal divisions were observed by examination of the layers of secondary xylem, and their frequency slightly exceeded that required for circumferential expansion. In several cases, after an anticlinal division, one of the daughter initials was eliminated, and its associated radial file was terminated. Intrusive growth and elimination events were frequently recorded, including the formation of slanted walls, as previously described in other seed plants. Cambial rearrangement was detected in every cambial cylinder examined, from the innermost to the outermost one. These findings suggest that, despite the anatomical uniqueness of Cycadales, their cambial dynamics share key features with other seed plants. This study provides novel anatomical evidence on cycad biology and expands the understanding of vascular cambium function in seed plants.

**Keywords:** cycad, secondary xylem, xylogenesis, vascular cambium, intrusive growth

Corresponding author: Anna Ponce, poncea@cookman.edu

09:30 a.m. BIO-03 ***Saccularina*** **parasitic trematode in Florida ladyfish.**

Emily Durkin, Carlos Santamaria, L. John Ambrosio, Liza Walker, Kathleen Gillis. University of Tampa, 401 W Kennedy Blvd, Tampa, FL 33606.

This study represents the first record of the parasitic trematode *Saccularina magnacetabula* Louvard et al., 2022 in the Atlantic basin. Using morphological and molecular data, we identified specimens isolated from *Elops saurus* Linnaeus, 1766 in Tampa Bay, Florida as *S. magnacetabula*, a species described from Australian waters. Although previous studies report putative undescribed species of

*Saccularina* along the Atlantic coast of North America, we present the first record of *S. magnacetabula*, expanding the species' known range and host associations.

**Keywords:** Parasite Ladyfish Tampa Bay Trematode

Corresponding author: Emily Durkin, edurkin@ut.edu

09:45 a.m. BIO-04 **Geographic variation in helminth parasites of invasive cane toads (*Rhinella horribilis*) in Florida.**

Connor J. McCowan, Dr. Christina Anaya. Florida Gulf Coast University, Department of Biology, 10501 FGCU Blvd, Fort Myers, Florida 33965.

Non-native species commonly transport parasites from their native range, posing a risk of spillover into native fauna. The cane toad, *Rhinella horribilis*, is a widespread invasive species in Florida's urban ecosystems, yet its parasite communities remain poorly documented. We developed a regional checklist of parasites infecting cane toads from central, southwest, and southeast Florida to examine how the parasite communities differ between the original establishment area and the invasion front. We received frozen cane toads from local contractors and homeowners from each region. The lungs and digestive tract were removed, and their contents examined under a stereomicroscope for parasites. In the respiratory tract, we found the trematode *Haematoloechus* sp., the nematode *Rhabdias pseudosphaerocephala* and a pentastome in the genus *Raillietiella*. *Haematoloechus* sp. was only found in central Florida while the pentastome was only found in southeastern Florida. Prevalence of *R. pseudosphaerocephala* was highest in southeast Florida (67%) and lowest in central Florida (12.5%). In the gastrointestinal tract, we recovered three nematodes (including *Cosmocercoides* and *Oswaldocruzia*), two trematodes, and one cestode. The nematode *Cosmocercoides* sp. was common in all three regions while the cestode species was absent from central Florida. *Cosmocercoides* sp. abundance also varied regionally, ranging from 36.6 nematodes per host in southeast Florida to 25 in central Florida. Additionally, one nematode was found in the body cavity. Cane toads near the invasion front in central Florida exhibited the lowest species diversity, consistent with expectations under rapid host range expansion. Understanding these shifts in diversity is important for predicting spillover risk and invasive species management.

**Keywords:** cane toads, invasive species, parasites

Corresponding author: Connor J. McCowan, cmccowan@fgcu.edu

10:00 a.m. **BREAK**

10:15 a.m. BIO-05 **A comparative morphological assessment of helminth parasites from invasive and native snakes in south Florida.**
Luke Niemann, Dr. Christina Anaya. Florida Gulf Coast University, Department of Biology, 10501 FGCU Blvd S, Fort Myers, Florida 33965.

Burmese pythons (*Python bivittatus*) are an invasive snake species originating in southeast Asia, now established throughout south Florida. In addition to their direct impact on native species, recent studies indicate that a lung parasite from the python's native range are now present in native Florida snake populations. Despite these findings, other native parasites of native snake species remains insufficiently documented, providing only a limited understanding of their parasite biodiversity. The objective of this study was to compare the diversity, prevalence, and intensity of parasites between native snakes and the invasive Burmese python, while creating a species checklist of recovered parasites. Native snakes were collected as roadkill and pythons were donated by hunters. Parasites were identified using morphological methods, with comparisons to previous taxonomical studies. Statistical analyses were completed to characterize the parasitic fauna of native and non-native species. Burmese pythons exhibited lower pentastome prevalence than native species, with an overall prevalence of 7.58%, genera detected included *Porocephalus* (4.55%, mean intensity: 1.33) and *Raillietiella orientalis* (4.55%, mean intensity: 1.00). Pentastomes were detected in 21.2% of native snakes, with *R. orientalis* exhibiting high prevalence in Black racers (*Coluber constrictor*) (66.7%), while significantly lower in Mudsnakes (*Farancia abacura*) (14.3%) and Banded watersnakes (*Nerodia fasciata*) (33.3%). *Porocephalus* was detected in Mudsnakes (28.6%) and Banded watersnakes (16.7%). Burmese pythons were not infected with platyhelminths that are commonly found in native snake species. Establishing baseline metrics for parasitic infection in native and invasive snake populations provides a foundation for monitoring changes in the rate of spillover from invasive into native snakes.

**Keywords:** Burmese pythons, invasive species, parasites

Corresponding author: Luke Niemann, lniemann@fgcu.edu

10:30 a.m. BIO-06 **Identification and Characterization of a β2-Tubulin Promoter Candidate in *Anopheles crucians.***
Providence Pangira, Vishwa Trivedi. Bethune-Cookman University, 640 Dr Mary McLeod Bethune Blvd., Daytona Beach, FL, 32114.

Malaria remains a major global health burden, and emerging or understudied vectors such as *Anopheles crucians* may complicate elimination efforts, especially in regions like the southeastern United States, where malaria is not currently endemic. Traditional control tools are being challenged by insecticide resistance, motivating the development of genetic strategies such as precision-guided Sterile Insect Technique (pgSIT), which depends on tissue-specific promoters and fertility genes to generate sterile males in a tissue-restricted manner. In this context, we investigated the β2-tubulin (β2t) gene in *A. crucians* as a candidate target and promoter for a male germline driver in a pgSIT pipeline, with the primary goal of characterizing the β2t promoter sequence and defining a workflow for its discovery. Publicly available short-read genomic data for *A. crucians* (SRR15646846) were assembled de novo with MaSuRCA and formatted into a BLAST database to enable in silico mining of candidate loci. Orthologous β2t exon 1 sequences from *A. gambiae* and *A. stephensi* were used as queries to identify candidate crucians contigs, prioritizing those with strong sequence identity, conserved exon–intron boundaries, and extensive upstream sequence. The top internal exon 1 hit showed about 76% identity to *A. gambiae* and contained many kilobases of upstream sequence, which were scanned in silico for conserved core promoter features, like TATA-like elements and motifs reported in other mosquitoes. Primer3 was then used to design overlapping primer pairs spanning approximately 5 kb upstream through exon 1. These primer sets will be used for PCR amplification from *A. crucians* genomic DNA, Sanger sequencing of the promoter–exon 1 interval, and construction of reporter plasmids to evaluate testis-specific activity in assay systems. Although functional validation is ongoing, this work identifies a β2t promoter ortholog in *A. crucians*, establishes a bioinformatic-to-experimental pipeline that supports the development of β2t-based, environmentally sustainable genetic control tools for malaria vector management worldwide.

**Keywords:** Vector control, *Anopheles crucians*, pgSIT, β2-tubulin promoter, Genetic biocontrol

Corresponding author: Providence Pangira, providence.pangira@students.cookman.edu

10:45 a.m. BIO-07 **Effects of Simulated Rainfall Intensity on the Foraging Behavior of Leaf-Cutter Ants (*Atta* spp.) in Monteverde, Costa Rica.**
Makiya Johnson. Bethune-Cookman University, 640 Dr Mary McLeod Bethune Blvd. Daytona Beach, FL 32114.

This study examines how simulated rainfall intensity impacts the foraging behavior of leaf-cutter ants (*Atta* spp.) in Monteverde, Costa Rica. Known for their complex agricultural practices, leaf-cutter ants are significantly affected by rainfall, with observations showing reduced activity during heavy rain. To explore this, ant activity was monitored on five trails on the CIEE Monteverde campus before, during, and after simulated rain events, alongside temperature and humidity measurements. It was hypothesized that heavy rainfall inhibits foraging more than light rain due to increased challenges in leaf transport. The findings reveal that while light rain (Pressure 1) had no significant effect, heavy rain (Pressure 2) caused a notable decline in ant abundance during rainfall, followed by a quick recovery afterwards ($F_{2,23}$= 3.61, p = 0.043). Increased numbers of dropped leaf fragments were observed under both rainfall conditions, indicating that rainfall disrupts load transport ($F_{2,59.4}$ = 10.47, p < 0.001). A mixed-effects model suggested that humidity positively influenced ant abundance (β = 2.29 ± 0.66 SE, p = 0.0026), but it is not solely responsible for suppressing foraging activity in the absence of rain cues. These results highlight the sensitivity of leaf-cutter ants to environmental changes and their ability to quickly return to foraging once conditions improve.

**Keywords:** Ecology, Study abroad, foraging behavior, weather, HBCU

Corresponding author: Makiya Johnson, makiya.d.johnson@students.cookman.edu

11:00 a.m. BIO-08 **Local sediment chemistry shapes microbiome assembly in horseshoe crab eggs.**

Nathaniel P. Curtis[(1)], Fabian Leija[(2)], Jose A. Moscoso-Nunez[(1)], Nicholas Santangelo[(2)], and Kent A. Hatch[(1)]. [(1)] Natural Sciences Division, New College of Florida, 5800 Bay Shore Rd, Sarasota, FL 34243, [(2)] Department of Biology, Hofstra University, 900 Fulton Ave, Hempstead, NY 11550.

Horseshoe crabs (*Limulus polyphemus*) deposit developing eggs into intertidal sediments, creating transient microhabitats where host-associated and sediment-derived microbial communities intersect. Although sediment chemistry is expected to influence early development, the microbial ecology of buried eggs remains poorly resolved. Here, 16S rRNA gene sequencing was used to characterize microbiomes of eggs and adjacent sands from beige (oxic) and dark (anoxic) sediments at Zach's Bay, Long Island, NY. Sand samples harbored the highest richness and evenness, whereas eggs contained strongly filtered, low-diversity subsets of the surrounding sediment communities. Eggs deposited in anoxic sands exhibited slightly higher within-sample diversity and greater heterogeneity than eggs from oxic sands, reflecting the recruitment of additional anaerobic specialists. LEfSe and differential abundance analyses revealed that egg microbiomes were

consistently enriched in fermentative and sulfate-reducing lineages, while oxic sands were dominated by nitrifiers and aerobic heterotrophs. Only ~11% of ASVs detected in eggs were exclusive to eggs, and most of these were rare, low-abundance taxa; the remainder overlapped with the surrounding sediment, indicating that eggs assemble their microbiomes primarily from environmental pools. Collectively, these findings demonstrate that egg-associated microbial communities do not represent vertically maintained symbionts but instead arise through strong environmental filtering shaped by local sediment redox conditions. This work establishes baseline ecological patterns for understanding how microbially mediated processes may influence horseshoe crab egg development across heterogeneous spawning habitats.

**Keywords:** microbiome ecology, marine invertebrates, sediment biogeochemistry, host–environment interactions, coastal ecosystems

Corresponding author: Nathaniel P. Curtis, ncurtis@ncf.edu

## BIO = BIOLOGICAL SCIENCES
***(Session B)***

FRIDAY 10:00 a.m. – 12:30 p.m.
KYM ROUSE HOLZWART, SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT AND MELBA HORTON, SOUTHEASTERN UNIVERSITY, presiding

10:00 a.m. BIO-09 **Eastern Oyster recruitment and its relationship with the cumulative salinity extremes in the Caloosahatchee River Estuary.**
Alexander Nickerson, Yonggang Liu, Detong Sun, Melanie Parker, Barbara Welch. University of South Florida. 140 7th Ave S, St. Petersburg, FL 33701.

The eastern oyster, *Crassotrea virginica*, is an important species in the Caloosahatchee River Estuary due to its multi-facted role as a habitat and a filter feeder. In this estuarine system, four distinct populations of oysters have been routinely measured over a period of 20+ years, with the settled oyster populations measured seasonally and spat recruitment rates measured monthly. In situ measurements of salinity were combined with the recruitment data in a biophysical application of the self-organizing map, a neural network artificial intelligence system that extracts recurring patterns from the provided data. This application revealed distinct

seasonal patterns in the oyster populations and distinct patterns for years with reduced oyster recruitment. Wet seasons with distinct, strong periods of low salinity preceded larger recruitment densities, whereas seasons with higher minimum salinities had reduced recruitment. An empirical model can approximately predict seasonal recruitment via knowledge of recent rainfall and Caloosahatchee River flow rates.

**Keywords:** oysters, estuary, salinity, empirical model

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10:15 a.m. BIO-10 **Herbivore Implicated in the Local Disappearance of *Caulerpa* algae in Tampa Bay, FL.**

Michael Middlebrooks, Louis Ambrosio, Susan Bell. University of Tampa. 401 W Kennedy Blvd., Tampa, FL.

In Tampa Bay, Florida there have been many instances where habitat previously occupied by seagrass has been replaced by the green macroalgae *Caulerpa prolifera*. This alga can form a bed similar in structure to seagrass but is often ephemeral and over time may disappear from a local habitat. While conducting a study exploring the invertebrate community living on *C. prolifera* and a neighboring seagrass bed, we discovered a large population of the sacoglossan sea slug *Elysia subornata*, a specialist herbivore which eats *Caulerpa* spp., feeding on the algae. Benthic surveys found the slugs had eaten most of the algae that previously dominated the area and were rapidly consuming what little remained. We also observed many egg masses deposited by the slugs. We returned to the site semiannually for two years after this event and found no evidence of the *C. prolifera* or the slugs returning. This suggests that *E. subornata* may play an important role in the instances of local disappearance of *C. prolifera* from seagrass beds in Tampa Bay.

**Keywords:** Seagrass, Herbivory, *Caulerpa*, Algae, Sacoglossa

Corresponding author: Michael Middlebrooks, mmiddlebrooks@ut.edu

10:30 a.m. BIO-11 **Surveying habitat preferences and population dynamics in Bahamian seahorses across varying depth profiles.**

Georgia Ambrose, Hannah Holland, Lissette OrtizMartin, Salyse Dillihay, Tereza Miksovska, Sebastian Gutierrez, Heather Mason, Emily Rose. New College of Florida, Sarasota, FL; University of Tampa, Tampa, FL; Valdosta State University, Valdosta, GA.

We investigated a population of seahorses in Sweetings Pond, Eleuthera, to assess how sex, reproductive status, and size influence their spatial distribution, habitat preference, and behavioral ecology. Random transects were conducted in July 2017 across a range of depth profiles (1-9 m) with 86.5% of seahorses found in 3.5 m or shallower. Individuals were surveyed using non-invasive methods and photographed for body sizes to be analyzed using ImageJ software. Seahorse abundance was significantly higher in the three northern locations of the pond (n=134) compared to the three southern collection sites (n=21). The holdfast analyses showed seahorses preferred algal substrates, particularly *Laurencia* sp., across all life stages. Females and non-gravid males show a strong preference for *Laurencia* sp.. Gravid males and juveniles show a broader range of habitat preferences, including *Caulerpa* sp. and other benthic species. Body posture of seahorses relative to the benthic surface was documented as a range from fish observed flat on the bottom as 0 to up right in the water column as 1, with the results paralleling the holdfast preferences across reproductive groups. Females and non-gravid males were observed in a more horizontal, thanatosis - like body posture, whereas juveniles and gravid males exhibit high variability in body posturing. These findings indicate that shallow algal habitats are crucial for seahorse settlement and potential predator avoidance, and that reproductive status and ontogeny significantly influence habitat selection. Transects surveyed across varying depths displayed a male-biased population with a 0.55 sex ratio and low percent of gravid males (19.7% of males), similar to previous wet season sampling restricted to the shallows in the pond. Future research and analyses will assess seasonal and diurnal variation, quantify the availability and complexity of anchoring substrates, and examine how habitat disturbance might affect the population.

**Keywords:** Seahorse, Conservation, Habitat Preference

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10:45 a.m. BIO-12 **Photographic Mark-Recapture Study of Unique Lined Seahorse Population in Sweeting's Pond.**

Rose Gaetano, Megan Sims, Emma Robbins, Emily Rose. University of Tampa, Tampa, FL; New College of Florida, Sarasota, FL; Valdosta State University, Valdosta, GA.

Sweeting's Pond, located on Eleuthera Island in the Bahamas, is a unique, isolated marine ecosystem of conservation interest. This pond contains a population of lined seahorses (*Hippocampus erectus*) that differ from typical populations of this species due to their size, morphology, and density. This 20-month study utilized

photographic mark-recapture (PMR) techniques to estimate key population parameters – including population size, survival, growth rates, and movement – and to examine habitat usage, morphometric change, and sex-based differences in movement within the pond. Using a 25 x 25 m grid, seahorses were identified across 12 capture periods (ranging from 6-102 days) using visible implant fluorescent elastomer (VIFE) tags, in concert with natural and distinctive facial patterning. Additionally, recaptured individuals were measured across initial and final captures, providing insight into growth rates over time of this isolated population. Individual growth rates over time (mm/day) significantly decreased with increasing time between recaptures, demonstrating growth patterns in this population. Males exhibited slightly faster growth rates than females, though no significant differences were detected in movement by sex. The estimated superpopulation was 495 individuals, consisting of 227 males (SE = 33) and 268 females (SE = 32) based on a POPAN model including sex as a covariate. A total of 458 unique individuals were identified during the study (182 females, 254 males), indicating differences between the observed and estimated population parameters. Thirty-three (33) males and 22 females were recaptured during this study with males recaptured up to four times, and females only twice. With seahorse populations facing increasing pressures, it is crucial to understand how these animals use the pond to avoid further biodiversity loss. Long-term monitoring can provide valuable insight into their ecology and inform future conservation management strategies and regulations.

**Keywords:** Mark-Recapture, Seahorse, Conservation, Population Monitoring

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11:00 a.m. BIO-13 **Comparative Feeding Kinematics of Two Sympatric Pipefish Species Using High-Speed Video.**

Nicholas Davis, Sarah Krejci. Bethune-Cookman University. 640 Dr. Mary McLeod Bethune Blvd., Daytona Beach, FL 32114-3012.

Seagrass loss in Florida's Indian River Lagoon (IRL) has compressed habitats for seagrass-dependent fishes, potentially intensifying competition among ecologically similar species. Gulf Pipefish (*Syngnathus scovelli*) and Chain Pipefish (*S. louisianae*) co-occur throughout the IRL and rely on overlapping prey resources, providing an opportunity to examine whether differences in feeding mechanics contribute to coexistence under habitat degradation. This study uses high-speed video analysis to compare feeding kinematics of *S. scovelli* and *S. louisianae* during capture of shared amphipod prey. High-speed recordings quantified strike speed, mouth gape, head angle, and feeding bout duration for both species. No

significant differences were detected in any kinematic variables (PERMANOVA, $p = 0.707$), indicating highly similar mechanical feeding performance. These results suggest that differences in prey capture ability or feeding behavior are unlikely to drive resource partitioning between species. To further place the kinematic results in an ecological context, supporting fisheries and diet data were used to characterize patterns of co-occurrence and resource use. Although the two species displayed a spatial overlap to an extent, *S. scovelli* exhibited higher overall feeding activity than *S. louisianae*. When considered alongside the kinematic similarity observed in high-speed video, these findings suggest that differences in feeding mechanics do not drive coexistence in the IRL. Instead, they may reflect broader patterns of habitat use and resource availability. Ongoing seagrass loss may therefore increase competitive pressure, particularly for *S. louisianae*.

**Keywords:** Pipefish, Indian River Lagoon, Feeding Kinematics, High Speed Video, Dietary Overlap

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11:15 a.m. **BREAK**

11:30 a.m. BIO-14 **A regime shift is reflected in the fish community dynamics of the Indian River Lagoon (IRL).**

Arthur Jones, Andrew Pyryt, Jenna Laughinghouse, Mitulkumar Tandel, Maggie Reed, Dr. Edward Phlips, Dr. Toufiq Reza, Dr. Vincent Lovko, Dr. Ralph Turingan. Florida Institute of Technology. 150 W University Blvd., Melbourne, FL 32901.

In 2011, the Indian River Lagoon (IRL) underwent a regime shift because of an intense harmful algae bloom (HAB) that fundamentally changed ecosystem conditions to favor phytoplankton blooms over seagrass, causing massive losses in seagrass coverage. We wanted to determine if this regime shift is reflected in fish community dynamics, including mass mortality events, in the IRL. We conducted a meta-analysis of long-term data sets of IRL phytoplankton biomass, seagrass coverage, fish kills, and population fluctuations of 10 fish species of interest, over 30-year time frame. Statistical analyses found a strong correlational relationship between phytoplankton biomass and fish mortality. This is potentially because HAB events can create hypoxic dead zones and release toxins produced by certain algal species, which lead to fish kills. It also appears that the 2011 regime shift coincides with a decline in abundance for fish species of interest reliant on seagrasses, possibly due to the loss of essential nursery and foraging habitat in seagrass beds. Lastly, the annual geographic distribution of fish kills in the IRL

become more clustered around coastal cities after 2011, perhaps due to sewage pollution from septic tanks providing nutrient input to the IRL that causes blooms. The response of fish to the regime shift underscores the negative impacts of human activity on the IRL and makes clear the importance of proactive environmental management to protect this ecosystem.

**Keywords:** Fish, Phytoplankton, Seagrass, IRL, HAB

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11:45 a.m. BIO-15 **Common Snook (*Centropomus undecimalis*) thermal refuge habitat use and movement patterns in Kings Bay/Crystal River, Florida.**

Kym Rouse Holzwart[(1)], Alexis Trotter[(2)], Kyle Williams[(2)], Gloria Keough[(2)], Phil Stevens[(2)]and Micheal Allen[(3)]. [(1)] Southwest Florida Water Management District, 2379 Broad Street, Brooksville, FL 34604, [(2)] Florida Fish and Wildlife Research Institute, 100 8th Avenue SE, St. Petersburg, FL 33701, [(3)] UF IFAS Nature Coast Biological Station, 552 1st Street, Cedar Key, FL 32625.

As a result of rising temperatures in recent years, Common Snook (*Centropomus undecimalis*), a tropical game fish, have expanded their range northward along the Gulf Coast, establishing year-round populations in Nature Coast springs systems. These springs systems provide necessary winter thermal refuge habitat, which is critical to population sustainability. We monitored Common Snook habitat use and movement in Kings Bay/Crystal River from Fall 2021 through Spring 2025 using acoustic telemetry. Sixty-one Common Snook, which ranged in size from 256 to 1,095 mm, were captured by electrofishing boats in December 2021 (40), December 2022 (10), and December 2023 (11) and tagged with acoustic telemetry tags. Almost 1,800,000 unique detections of Common Snook were recorded, determining seasonal movement, migration timing, and winter behavior. They were more widely distributed before and after cold fronts, and during strong cold fronts, detections within Kings Bay increased, with specific springs (King Spring, Three Sisters/Idiots Delight, and Fountain/City Hall) providing important thermal refuge habitat. Common Snook migrated out to the Gulf for spawning during the summer and later returned, while many smaller fish remained in Kings Bay/Crystal River throughout the year. Some were detected in other Nature Coast river systems, as well as at Cedar Keys spawning sites. The established minimum flows for Kings Bay/Crystal River are currently being re-evaluated, and the results from this project will ensure that critical Common Snook thermal refuge habitat is protected.

**Keywords** Common Snook, thermal refuge, Kings Bay, Crystal River, climate change

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12:00 p.m. BIO-16 **Cold tolerance of tropical freshwater fishes in the aquarium trade.**

Meghan Eaton, Quenton Tuckett, Jeffrey Hill. University of Florida/ Fisheries and Aquatic Sciences/ Tropical Aquaculture Lab. 1408 24th Street SE, Ruskin, FL, 33570.

The global aquarium trade and Florida's aquaculture industry depend extensively on freshwater tropical ornamental fishes; however, these sectors also function as pathways for the introduction of non-native species. If introduced, non-native species may cause negative ecological and economic impacts, highlighting the need to identify factors that influence establishment and spread. Thermal tolerance is a major determinant of invasion success, as exposure to low temperatures can restrict survival, establishment, and spread of tropical species, often limiting their invasion success to warm climate regions. Despite its importance, cold tolerance information is lacking for many species, constraining effective risk assessment. To address this data gap, chronic lethal methodology was conducted by decreasing water temperature by 1°C per day for experimental fish while control individuals were maintained at the acclimation temperature (24°C). Three endpoints were identified: cessation of feeding, loss of equilibrium, and chronic lethal minimum (CLmin). Sixty-two non-native freshwater species that are important in Florida aquaculture and the global aquarium trade were tested. Most species have CLmin values between 10°C and 12°C, with many near 11°C. The most cold-tolerant species was the Bloodfin Tetra *Aphyocharax anisitsi*, which ceased feeding at 9.6°C, lost equilibrium at 6.0°C, and had a CLmin of 5.2°C. In contrast, the least cold-tolerant species was the Clown Loach *Chromobotia macracanthus*, which ceased feeding at 15.8°C, lost equilibrium at 14.0°C, and had a CLmin of 13.5°C. The range of cold tolerance is ecologically significant because it indicates species-specific differences in establishment potential and invasion risk. (Funding provided by the Florida Department of Agriculture and Consumer Services).

**Keywords:** Chronic lethal minimum, non-native, ornamental fish

Corresponding author: Meghan Eaton, m.eaton@ufl.edu

12:15 p.m. BIO-17 **Auditory evoked potentials and vocal response timing during signal detection in bottlenose dolphins.**
Taylor Combe. New College of Florida. 5800 Bay Shore Rd, Sarasota, FL 34243.

Dolphins navigating turbid waters rely on echolocation for foraging and navigation. At speeds up to 10 m/s, they have high demands for using auditory information to update motor plans and movement trajectories. Previous attempts to quantify behavioral response times for auditory tasks relied largely on acoustic recordings of dolphins producing a whistle when they detected a target. In the present study we asked 1. If it is possible to observe AEPs in the time window between target sound onset and a whistle response and 2. Is it possible to use the muscle activation from the same electrode to estimate behavioral response time? We recorded EEG from a single electrode, a hydrophone near the dolphin's head, and a hydrophone encased in a silicone suction cup placed on the dolphin's melon. Two male dolphins (*Tursiops truncatus*) performed a behavioral hearing threshold task with a descending staircase, whistling when they heard a 40 kHz tone that we modulated in amplitude. Preliminary results indicate that an AEP similar to passive listening conditions in previous experiments is present, followed by a longer latency, larger amplitude negative deflection that appears to peak around the time that muscles are engaged to produce a vocalization (~200 ms post stimulus onset). These suggest that this could be a useful method for studying cognitive processes in dolphins for both stimulus-locked neural activity as well as response-locked activity that could be used for future studies of dolphin decision making in the moments leading up to a behavioral response.

**Keywords:** Dolphin, AEP, Cognition, Behavior

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## BIO Posters – 3:45 p.m.-6:30 p.m. Friday

BIO-P01 **Secrets in the soil: Revealing Hidden Diversity within Bacteriophages.**
Eduardo Vernier, Leilani Rondon, Ryan Cronin. Saint Leo University Dept Of Natural Sciences, MC2188 33701 County Road 52, Saint Leo FL 33574.

During Fall 2025, bacteriophages were isolated from environmental soil samples through the SEA-PHAGES program at Saint Leo University. Whole-genome sequencing performed at the University of Pittsburgh revealed four novel Arthrobacter bacteriophages, expanding the known diversity of bacteriophages within

this host system. Based on sequence similarity, three of these phages were assigned to established Cluster E subclusters EA1, ED2, and EL, while one phage was identified as a singleton, representing a genome that does not cluster with any previously characterized phages. Currently, the EA1 subcluster contains approximately 138 known members, ED2 contains 18 members, and EL remains sparsely populated with only four known phages. The identification of an additional EL phage therefore provides a rare opportunity to expand representation within this underrepresented subcluster. The discovery of a singleton phage is particularly notable, as singleton genomes often reflect highly divergent evolutionary lineages and underscore the vast, unexplored diversity of environmental bacteriophages. Here, we present a comparative genomic analysis of the three Cluster E bacteriophages in relation to previously identified Cluster E phages, as well as an analysis aimed at assigning putative gene functions to the previously uncharacterized singleton phage genome. This study reports the isolation and genomic identification of four novel Arthrobacter bacteriophages, including a highly unique singleton, and contributes new sequence data to the growing SEA-PHAGES database, highlighting the continued potential for discovery within environmental phage populations.

**Keywords:** bacteriophages, Arthrobacter, SEA-PHAGES

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BIO-P02 **Turning the Phage: Functional Analysis of F1 Bacteriophage Tootsiepop.**

Taliyah Cooper, Madison Gunn, Karissa Sanchez, Cindy Cadichon, Briana Pratt, Michael Tracey. Dept. of Natural Sciences, Saint Leo University. 33701 County Road 52, Saint Leo, FL 33574-6665.

The *Mycobacterium* phage Tootsiepop was isolated and sequenced in 2016 as part of the SEA-PHAGES discovery program, where student researchers isolate novel bacteriophage from environmental soil samples using various microbiological lab techniques. Using next-generation sequencing, the bacteriophage Tootsiepop was found to have a genome containing 57,455 base pairs composing a total of 93 genes. Tootsiepop was subsequently categorized into the F1 subcluster, of which 249 unique bacteriophages belong. Out of Tootsiepop's 93 total genes, only 30 have known and documented functions. To further understand the bacteriophage, a series of experimental steps were taken where the genes from Tootsiepop were amplified via PCR and cloned into the plasmid, pExTra. The cloned plasmid was

then transformed into the bacterial host, *Escherichia coli*, to allow for high-density growth of plasmid DNA and then further transformed via electroporation into the bacterial host, *Mycobacterium smegmatis*. The cytotoxicity assay assessed the toxicological effect of the phage genes' expression on the growth of transformed bacterial cells with the use of an inducer molecule—anhydro-tetracycline. This presentation reviews the results of the identified cytotoxic genes subcloned into the recombinant plasmid, p2Hα, and further tested in a protein-protein interaction assay with an *M. smegmatis* genomic library. The results of the phage gene and *M. smegmatis* genomic library screening provides the basis for further analysis and potential identification of gene functions.

**Keywords:** Interaction assay, Cell toxicity, Plasmid, Bacteriophage, SEA-GENES

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BIO-P03 **Expression and Antimicrobial Assessment of a Phage-Derived Lysozyme from *Agrobacterium tumefaciens* Phage Rivra.**

Samuel Eastmond. Indian River State College. 3209 Virginia Avenue, Fort Pierce, FL 34981.

Reliance on agricultural antibiotics has contributed to increasing antimicrobial resistance, prompting the search for new antimicrobial control strategies. Bacteriophage-derived lysins, which break down bacterial cell walls without the use of whole phages, offer a targeted antimicrobial approach. In this study, a lysozyme from bacteriophage Rivra was isolated and characterized, then expressed using a cell-free system to evaluate its activity against *Escherichia coli*. A growth inhibition assay showed that the lysozyme reduced bacterial growth compared to a control. Engineered versions of the lysozyme with added C-terminal cationic amino acids (A.A.) were developed to enhance binding to Gram-negative bacteria. A turbidity reduction assay comparing the original (0 A.A.), +5 A.A., +10 A.A. variants, along with a control, revealed that the +5 A.A. variant significantly reduced turbidity. While further optimization and validation are required, including in planta and field-based evaluations. These results indicate that bacteriophage-derived lysozyme variants merit continued investigation as alternative antimicrobial agents in agriculture.

**Keywords:** *Agrobacterium tumefacien*, Phage lysins, Antimicrobial activity, Agricultural biocontrol, Cell-free protein expression.

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BIO-P04 **Differences in microbiomes among sea anemones in the Florida Keys.**

Matthew Banta, Samuel A. Bedgood, Jose A. Moscoso, Samantha T. Levell, and Kent A. Hatch. New College of Florida, 5800 Bay Shore Rd, Sarasota, FL 34243.

The wellbeing of all organisms is connected to their associated microbial communities. Invertebrate hosts can have robust mechanisms to control the assembly of microbial communities as they develop, but changes in the environment may overwhelm those controls. In this study we compared the microbiomes of three species of sea anemones, *Actinostella flosculifera*, *Bartholomea annulata*, and *Aiptaisia diaphana*, at the same site in Tavernier Key, FL. We also sampled the microbiomes of upside-down jellyfish inhabiting the same site, and *A. flosculifera* at Summerland Key, FL for further comparisons. Comparisons between anemone species and co-occurring upside-down jellyfish revealed both shared and distinct microbial community members. Overall, patterns in microbiome composition indicated that while host species identity contributes to microbial community differences, environmental context plays a substantial role in shaping microbiome assembly across hosts.

**Keywords:** marine invertebrate microbiomes

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BIO-P05 **Determining the timeframe of microbiome shifts in *Schizoporella* v. through reciprocal transplants.**

Savannah Buckner, Jose Moscoso Nunez. New College of Florida. 5800 Bay Shore Road, Sarasota, FL 34243.

Microbiomes are made up of symbiotic microorganisms residing in a host organism including viruses, bacteria, and fungi. Changes in the environment can result in microbiome variation. Preliminary studies suggest that the microbiomes of translocated *Schizoporella variabilis* colonies resemble those of local conspecifics while maintaining some microbes from their site of origin, suggesting a strong influence of the environment on microbiome composition which can overwhelm host controls on microbiome assembly. This study aims to determine the timeframe of changes in microbiomes of *S. variabilis* using reciprocal translocation and weekly sampling of individual microbiomes. We used reciprocal transplants of *S. variabilis* colonies at SUNY Maritime College in Bronx, NY and Captree State Park in Oak Beach, NY. Settlement plates from each location, including the cross-site transplanted plates containing *S. variabilis* colonies were collected

at the moment of translocation and weekly thereon for seven additional weeks. Five colonies from each site x origin were excised from settlement plate samples from each week. *S. variabilis* were identified using synapomorphies for the species as described by Winston and Hayward (2012). We characterized microbial communities through sequencing of 16S rDNA gene amplicon libraries, and analysis using the DADA2 workflow.

**Keywords:** microbiome, ecology, biological sciences

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BIO-P06 **Characterization of *Caprella penantis* microbiome under seasonal temperature fluctuation.**

Zachary Lee [(1)], Jose A. Moscoso [(2)], Nathaniel P. Curtis [(2)], and Kent A. Hatch [(2)]. [(1)] Roslyn High School, Roslyn, NY 11577; [(2)] New College of Florida, 5800 Bay Shore Rd, Sarasota, FL 34243.

*Caprella penantis* is an important organism responsible for cleaning decaying matter and predating on small invertebrates. Microbiome variation can facilitate host evolution and be the mechanism by which a species can become cosmopolitan, by expanding the breadth of niches hosts can occupy. The microbiomes of *C. penantis* have not been previously characterized. This study examined the microbiomes of *C. penantis* over time to test for the effects of temperature and seasonal variation on skeleton shrimp microbiome composition. The *C. penantis* microbiome was analyzed on three separate days, an early, middle, and late day. There were notably colder water temperatures on the days leading up to the early date compared to the other two dates, and as a result the early date had a significantly different microbial composition. We also observed a greater alpha diversity in microbial communities for the early sampling date. The *C. penantis* microbiome composition was very similar to *Litopenaeus vannamei*, the most commonly used shrimp in microbiome research. The main observable differences between the early and later dates was an increase in the relative abundance of Gammaproteobacteria, a class containing several opportunistic pathogens which can compete with other bacteria in the microbiome, potentially resulting in decreased microbial diversity, altered microbiome composition, and increased host vulnerability to infection and disease. This is the first instance where the *C. penantis* microbiome has been documented.

**Keywords:** seasonal microbiome variation, marine invertebrates

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BIO-P07 **Ecological modeling and species identification of wild nematodes using DNA barcoding.**

Laine M. Boldus, Kelsey A. Fox, Timothy A. Crombie. Department of Biomedical Engineering and Science, Florida Institute of Technology, 150 W. University Blvd., Melbourne, FL 32901.

*Caenorhabditis* nematode species are widely used as model organisms for developmental and molecular genetics. Within the genus, three species are self-fertile (*C. elegans*, *C. briggsae*, and *C. tropicalis*) and are represented by hundreds of diverse wild strains. However, just two *C. briggsae* and no *C. elegans* or *C. tropicalis* specimens have been collected in Florida despite the state's favorable climate. To facilitate large-scale sampling of these species, we developed a wild collection procedure using the Google Sheets mobile app to efficiently record ecological data associated with environmental samples. This tool was tested in Melbourne/Palm Bay, Florida, to survey for the presence of the species. We collected a total of 45 substrate samples from multiple field sites across two winters. From these samples, we isolated a total of 64 nematodes and used DNA ITS2 barcoding to identify 15 novel *C. briggsae* strains that are now cryopreserved. Importantly, we isolated *C. briggsae* nematodes from all four unique collections trips, suggesting *C. briggsae* is pervasive in the region. Additionally, we created an R package (ecolinkR) to analyze and visualize the collection data. The environmental parameters associated with the samples suggest that continued sampling may yet uncover *C. elegans* or *C. tropicalis* in the state of Florida. All newly isolated strains will be whole-genome sequenced and deposited in the *Caenorhabditis* Natural Diversity Resource (CaeNDR). These resources will facilitate future studies of natural genetic variation in *Caenorhabditis* nematodes.

**Keywords:** *Caenorhabditis*, Genetics, Natural variation, Ecology

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BIO-P08 **Using DNA barcoding to identify a scarabaeoid beetle.**

Jadyn Garrett and Ty Giller. South Florida State College, 600 W College Dr, Avon Park, FL 33825.

DNA barcoding is a taxonomic tool used to identify species based on DNA sequences. A beetle specimen (Coleoptera) hypothesized to be *Peltotrupes profundus* (Scarabaeoidea: Geotrupidae), based on morphology, was collected in Highlands County, Florida. Tissue was dissected, and DNA was extracted from the specimen. The mitochondrial cytochrome c oxidase subunit I (COI) gene was amplified using polymerase chain reactions (PCRs), and the resultant amplicons were

sequenced using Sanger sequencing. The bioinformatics platform DNA Subway was used to analyze the sequences and to create consensus sequences (≈ 730 bp in length) from the forward and reverse reads. These consensus sequences were then compared to entries on the BLAST database. Although no BLAST sequences entirely matched our sequences, the closest matches indicated that our hypothesis was not supported. These results led us to perform a more thorough morphological and geographical analysis to identify the specimen. Based on these analyses and the consensus sequences, we identified the specimen as *Strategus antaeus* (Scarabaeoidea: Scarabaeidae), which is commonly known as the Smooth Ox Beetle. These procedures and results demonstrate that DNA barcoding is an important tool for verifying non-expert taxonomic identifications that are based solely on morphological and geographic data.

**Keywords:** DNA Barcoding, Coleoptera, Scarabaeoidea, Highlands County

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BIO-P09 **Discerning if *Triops* Have Personality.**

Gwen Therrien, Lydia Wassink, Samantha Levell. New College of Florida. 5800 Bay Shore Rd, Sarasota, FL 34243.

*Triops*, or tadpole shrimp, are small, freshwater invertebrates. They are the apex predator of their habitat, temporary pools of freshwater. They eat plant matter, worms, mosquito larvae and their own eggs. Their eggs go through anhydrobiosis; meaning they can survive without water for extended periods of time. There have been no previous studies specifically on triops' personality. Thus this raises the question if individuals show to have different personalities from each other. Boldness trials were conducted on 12 specimens that were on a diet of herbivore pellets and carrots. Each set of trials were repeated 1-12 times. The trials consisted of an exploration trial which was an open-field test, a novel object trial, where they were introduced to a new type of object, and an emergence from a shelter trial where it was recorded how long it would take for them to leave a shelter. In this study it was found that individual *Triops* showed different behaviors and personality types.

**Keywords:** *Triops*, Personality

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BIO-P10 **Testing for morphological differences between sympatric phenotypes of *Tozeuma* shrimp in Sarasota, Florida.**
Matthew J. Rossi, Nathaniel P. Curtis, Jose A. Moscoso, Samantha T. Levell, and Kent A. Hatch. Natural Sciences Division, New College of Florida, 5800 Bay Shore Rd, Sarasota, FL 34243.

Cryptic coloration is a common predator avoidance strategy in seagrass-associated organisms and may be linked to differences in morphology, diet, and survival. Arrow shrimp (*Tozeuma carolinense*) exhibit two sympatric color phenotypes (i.e., green and clear) within seagrass beds along the Florida coast. Here, we quantified morphological and color differences between these phenotypes and developed a standardized approach for measuring shrimp size and coloration. Individual shrimp (n = 130) were collected via push net from two seagrass sites in Sarasota Bay, Florida. Each shrimp was measured using microscopy wherein total body length was recorded and coloration was quantified using average dorsal ridge red–green–blue (RGB) values. Overall and within each sampling site, green shrimp were significantly larger than clear shrimp, with green individuals averaging 21% greater total length across all individuals. Multivariate analyses showed clear separation in RGB color space between phenotypes, and classification models correctly identified shrimp color with over 80% accuracy. These consistent differences in size and coloration suggest that phenotype may influence ecological interactions, potentially through differences in visibility to predators within structurally complex seagrass habitats.

**Keywords:** cryptic coloration, seagrass ecosystems, comparative morphology, sympatric phenotypes, marine invertebrate ecology

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BIO-P11 **Ceratal autotomy as a defensive mechanism of the aeolid nudibranch *Dondice jupiteriensis.*** Elizabeth Wilson, Lea Hinsley. University of Tampa. 401 W. Kennedy Blvd. Tampa, FL 33606.

Nudibranch sea slugs are a monophyletic group of non-shelled gastropods, the group of mollusks that includes snails. The loss of a shell has led to the evolution of alternative defensive strategies for these slugs. Autotomy, the self-induced loss of a body part, is a possible physical defense mechanism in nudibranchs. The objective of this study was to evaluate the effectiveness of autotomy as a defense mechanism in nudibranchs against a generalist predator. *Dondice jupiteriensis* is a recently described species of nudibranch found throughout the Caribbean and Gulf of Mexico. Species of the *Dondice* genus can autotomize cerata, small appendages on their dorsal surface, under stressful situations. *Dondice jupiterienesis*

nudibranchs were introduced to the peppermint shrimp *Lysmata* spp. for ten-minute interactions. Most slugs were attacked by the predator, with all slugs autotomizing when attacked. Only a small subset of slugs (N=3) of the 12 trials survived. Most interactions consisted of a single fatal attack, with the shrimp consuming the body of the slug and temporarily discarding cerata. The three slugs that survived had a greater size compared to those that were rapidly consumed, suggesting the size ratio of predator to prey could influence survival. We have found that ceratal autotomy is not an effective defense mechanism in *D. jupiteriensis*; instead, they may rely on crypsis or other mechanisms for protection.

**Keywords:** Autotomy, Nudibranch, Defense Mechanism

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BIO-P12 **The Zero-Sum Loss: Autotomy Does Not Compromise Burrowing Speed in *Microphiopholis gracillima*.**

Wyatt Lear. University of Tampa. 401 W Kennedy Blvd Tampa, FL 33606.

Autotomy is a common defense mechanism seen among various taxa. While different mechanisms are used, the purpose is to sacrifice an appendage in hopes of self-preservation. In many cases, a trade-off occurs whereby autotomy can produce decreased locomotion in arachnids, issues with balance among reptiles, and even hydrodynamic drag among cephalopods. Examining the burrowing speed of *Microphiopholis gracillima*, a common shallow water ophiuroid found in the western Atlantic, has shown that autotomy does not significantly impact burrowing speed, a common escape mechanism used by members of the Class. Specimens with various numbers of arms (having undergone autotomy before collection) were gathered in Tampa Bay, FL, along with water and local sediment. Individuals were then introduced to separate 20 L tanks and behavior was video recorded. Comparison of burrowing speed among specimens with three, four and five arms revealed no significant differences (one-way ANOVA p=0.92). Comparing oral disk diameter, as well as arm length, still resulted in no significant differences. While feeding efficiency might be impacted, this study established that autotomy among *M. gracillima* does not impact the all-important burrowing behavior.

**Keywords:** Autotomy, Ophiuroids, Burrowing Speed, Behavior

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BIO-P13 **CRISPR-Based Dissection of Maternal Mos Function in Early Blastogenesis of *Lytechinus* Sea Urchins.**

Rachel Ramos, Harriet Carr. University of Tampa. 400 West Kennedy Blvd. Tampa FL 33606.

Sea urchins of the genus *Lytechinus* have long served as important models for developmental biology. *Lytechinus variegatus* inhabits seagrass beds in the Gulf of Mexico, while *Lytechinus pictus* occupies subtidal environments in the Pacific Ocean. Recently, *L. pictus* has emerged as a genetically enabled model, supporting efficient gene editing and the generation of the first stable transgenic sea urchin lines. These advances have expanded the use of sea urchins for genetic analyses of early development. In this study, we use both *L. pictus* and *L. variegatus* to investigate the role of the Mitogen-Activated Protein Kinase (MAPK) pathway during early embryogenesis, focusing on the maternal determinant Mos. Preliminary data from our lab indicate that Mos mRNA and protein are present in unfertilized eggs and decreases following fertilization through early blastogenesis. We hypothesize that Mos is required for egg/oocyte arrest and that its reduction permits progression through the first critical embryonic cell divisions. Mos functions as a cell cycle regulator and proto-oncogene, making it a compelling target for studies of both early development and cell cycle–related disease. Although Mos has been primarily studied in vertebrate systems, its role in eggs and embryos is present across taxa. Therefore, characterizing Mos function in sea urchins will provide insight into conserved mechanisms governing blastogenesis and cell cycle control. The research presented here employs CRISPR-mediated gene editing to generate Mos loss-of-function eggs and embryos and present phenotypic analyses demonstrating the effects of Mos disruption on early developmental stages in both *L. pictus* and *L. variegatus*.

**Keywords:** Gene-editing during urchin development

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BIO-P14 **Spatial Ecology of Native and Invasive Fishes in Plant Park Stream, Hillsborough County, Florida.**

Milo Shanefelter, Delaney Halverson, Lori Benson McRae, Mark G. McRae. University of Tampa. 401 W Kennedy Blvd, Tampa, FL 33606.

Plant Park Stream (PPS) is a spring fed tributary of the Lower Hillsborough River (LHR) which flows through the University of Tampa campus. Habitats in PPS include both estuarine and freshwater reaches. In response to increased freshwater

flow into the LHR, the population density of invasive Mayan Cichlids (*Cichlasoma urophthalmus*) in the Lower Hillsborough River (and in PPS) has increased over the last 11 years. This study aims to compare the current community of native and invasive fishes in PPS to historical data collected in 2008 and again in 2015. Sampling consists of bi-weekly minnow trapping at six locations spanning the length of PPS. At each trapping location, fish are identified and sexed (when possible), and physico-chemical measurements are recorded. This will allow us to test the null hypothesis that there have been no changes in the composition and distribution of the fish community in PPS over the last 11 years. Preliminary results indicate that Mayan Cichlids have moved further up PPS since 2015. Frillfin Gobies (*Bathygobius soporator*), Fat Sleepers (*Dormitator maculatus*), and the Marsh Killifish (*Fundulus confluentus*) have not been captured in current sampling efforts despite being present 11 years ago. Spotted Sea Trout (*Cynoscion nebulosus*) and Blackchin Tilapia (*Sarotherodon melanotheron*) are also currently not present in PPS despite being observed 18 years ago. Green Swordtails (*Xiphophorus helleri*; invasive), Eastern Mosquitofish (*Gambusia holbrooki*), and Sheepshead Minnows (*Cyprinodon variegatus*) have experienced a distribution reduction in PPS. Gulf Killifish (*Fundulus grandis*), Rainwater Killifish (*Lucania parva*), and Mayan Cichlids are now more dominant members of the PPS fish community than they were in 2015. Thus far, our null hypothesis appears to be rejected. Our preliminary results document the potential impacts of an aggressive invasive fish on a native fish community in an urban aquatic habitat.

**Keywords:** Aquatic ecology, Ichthyology, Community Ecology, Invasive Species

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BIO-P15 **Examining Water Quality and Fish Diversity Across Human-Impacted Sites in Tampa.**

Jocelyn George, Maryn Pechatsko. University of Tampa, 401 W. Kennedy Blvd. Tampa, FL 33606-1490

Assessing fish populations in Tampa Bay at human-influenced sites is essential for understanding the effects of recreational use and its impact on fish biodiversity. Tampa Bay is a popular destination for ecotourism and is a crucial nursery for important recreational and commercial fisheries. Therefore, it is vital to evaluate how human impact is affecting species in the area. This project involved data collection that consisted of gathering measurements such as standard and total lengths of fish at each site. Fish fauna were sampled using a bag seine at 3 different sites including Davis Island, Cypress Point, and Picnic Island. This data was interpreted to see if there is an effect on fish diversity, abundance, and size. Based

on these parameters, we were able to evaluate the health of each site. So far four sampling events have been conducted between August and December 2025. This is to see if the time of year or fish spawning season has an impact on abundance and what the average size of fish is in the area. Currently, the data consists of over 450 individual measurements of different fish species, the most abundant being the Mojarra and Silverside. To date there have been a total of 13 species identified between the sites. After compiling the results, unexpected trends emerged, such as the site with the worst visibility having the highest diversity of fish. This result highlights the importance of keeping these areas clean and safe for fish populations in Tampa Bay to thrive.

**Keywords:** Ecology, Water Quality, Biodiversity, Fishery, Abundance

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BIO-P16 **Effects of Ecological Factors on Neuromast Morphology and Distribution in *Heterandria formosa*.**

Brielle Spencer, Samantha Levell. New College of Florida. 5800 Bayshore Rd. Sarasota Fl 34243.

Neuromasts are mechanosensory organs that form the lateral line system and allow fish to detect water movement, vibrations, and pressure change. While life-history traits have been well studied in *Heterandria formosa* populations differing in predation risk, habitat hype, and population density, little is known about if their sensory systems vary in parallel with these ecological pressures. This study investigates whether neuromast number and distribution differ between *Heterandria formosa* population from spring and pond habitats with varying ecological conditions. Neuromasts were stained in live *Heterandria formosa* using the fluorescent dye 4-Di-2-ASP then imaged using a fluorescent microscope. Ten males and ten females from 7 different populations were sampled. Neuromasts were counted and measured from fluorescent images using ImageJ. Neuromast counts were across three anatomical regions on the head, supraorbital, infraorbital, and postorbital. Neuomast counts differed significantly among populations and habitats, individuals from low density populations having significantly less neuromasts than those from high density populations. Neuromast counts also varied among anatomical regions with the postorbital region containing the highest amounts. Differences associated with body size and sex were also observed. These findings suggest that sensory morphology in *Heterandria formosa* may vary with ecological factors such as population density and habitat type. This work is a foundation for future studies that could link neuromast variation to behavior and environmental conditions.

**Keywords:** Neuromast, ecological factors, sensory morphology

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BIO-P17 **Aggressive Behavior and Personality in the *Heterandria formosa.***

Nicole Lustic, Christina N. Toms, Samantha Levell. New College of Florida. 5800 Bay Shore Road, Sarasota, FL 34243.

Animal personality is the consistent individual differences in behavior over time and context. Some examples of personality that are measurable in fish are boldness and aggression. This study focused on *Heterandria formosa* (least killifish) from a Trout Pond near Tallahassee, Florida. The Trout Pond *H. formosa* population experiences low density and vegetation with high predation that may impact behavioral strategies, leading us to hypothesize that individual fish would exhibit repeatable high levels of aggression, indicating that aggression functions as a personality trait. Focal fish were exposed to a conspecific fish and a mirror across repeated video recorded trials, and aggressive behaviors were quantified using an ethogram in a five-minute period. By quantifying behaviors such as chases and strikes, we can see whether individuals show consistent differences in aggression levels across contexts and time. This study contributes to our understanding of behavioral consistency and the ecological relevance of personality variation in small freshwater fish.

**Keywords:** Personality, Behavior, Aggression, Fish, Ethogram

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BIO-P18 **Diet analysis of the Gulf Pipefish, *Syngnathus scovelli* in Sarasota Bay.**

Lily Braun, Emily Rose, Samantha Levell. New College of Florida. 5800 Bayshore Road, Sarasota, FL, 34243.

Seagrass beds are critical habitats that support diverse marine life, and food availability within these ecosystems plays a crucial role in the survival and reproductive success of fish species. In Sarasota Bay, several Syngnathids, including three

species of pipefish and two species of seahorses, inhabit these seagrass beds. The Gulf pipefish, *Syngnathus scovelli*, is one of the most common pipefish species. Our monthly census efforts have revealed a female-biased sex ratio in the natural population. *Syngnathus* pipefish primarily feed on small crustaceans, including amphipods, copepods, and mysid shrimp. This study investigated potential sex differences in feeding habits between male and female *S. scovelli*, motivated by observations of females consuming more food than males in captivity. Additionally, there was a difference in prey availability between the wet and dry season in Sarasota Bay, so this study also investigated whether or not that has an impact on the amount and diversity of prey items *S. scovelli* consumed. We collected Gulf pipefish, along with zooplankton and abiotic data monthly, between January 2024 and December 2024 to explore how seasonal variations and prey availability within seagrass beds influence their diet. Based on the data that was collected, there were differences found between the sexes and between the seasons. Specifically, the females consumed more, and there were more prey items in the gut samples during the wet season. This data can be used to further research into the gut content and prey preference studies for *Syngnathus* species and contribute evidence to an overall understanding of the feeding ecology and functional trophic level of this species. Given the role of seahorses and pipefish as flagship species in seagrass beds, this work can provide an assessment of the health of the seagrass ecosystem.

**Keywords:** Diets, Pipefish, Sarasota Bay

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BIO-P19 **Assessing Reproductive Characteristics of Female *Syngnathus louisianae.***

David Kelley, New College of Florida, Sarasota, Florida

Syngnathid fishes, including pipefish and seahorses, are unique members of seagrass ecosystems. The southwest region of Florida has three dominant species of pipefish in the genus *Syngnathus*. Our study attempts to learn more about the life history of *Syngnathus louisianae*, an understudied species. We examined gravid females to characterize egg traits and compared them to those of closely related species, *Syngnathus scovelli* and *Syngnathus floridae*. Specimens of all three species were collected from Sarasota Bay using seine and pushnets in shallow seagrass beds. We dissected and quantified size, number, and lipid content in their eggs. Body size and the presence of mature ovaries can be used to estimate

the length at which *S. louisianae* are when they reach sexual maturity. Assessing the quantity, size, and lipid content of their eggs helps us understand their reproductive investment relative to sister species *S. scovelli* and *S. floridae*.

**Keywords:** Syngnathidae, pipefish, Sarasota Bay

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BIO-P20 **How Low Can They Go: Gulf Pipefish Survival Under Salinity Stress.**

Kellisha Lewis, Nicholas Davis, Lakean McGregor, Kathryn Greiner-Ferris, Michelle Gaither. Bethune-Cookman University. 640 Dr Mary Mcleod Bethune Blvd. Daytona Beach, FL.

Gulf pipefish (*Syngnathus scovelli*) are widely considered euryhaline and have been documented across a broad range of salinity conditions in estuarine habitats. However, salinity in coastal systems can fluctuate abruptly due to freshwater inflows, storms, and seasonal variability. Gulf pipefish have also been documented in habitats with persistently low salinity and freshwater conditions, suggesting broad environmental tolerance; however, it remains unclear whether individuals originating from higher-salinity environments can physiologically adjust to rapid salinity declines and sustain prolonged exposure to low salinity. This study evaluates the short-term survival of *S. scovelli* under controlled low-salinity conditions. Individuals were collected from the Northern Indian River Lagoon during winter conditions (13°C; ~24 ppt) and transported to the laboratory, where they were acclimated over one week to standardized tank conditions at 26°C while maintaining lagoon salinity. Experimental trials were conducted in eight 38 L glass aquaria with two pipefish per tank, consisting of a mixture of females and juveniles to minimize size- and sex-related bias. Four tanks served as controls and remained at lagoon salinity (~24 ppt) throughout the study. In four treatment tanks, salinity was reduced gradually by 5 ppt per day until a target salinity of 5 ppt was reached, after which conditions were maintained for the remainder of the two-week experiment. Water-quality parameters, including temperature, salinity, and dissolved oxygen, were measured daily, while pH, ammonia, nitrite, and nitrate were monitored every other day to ensure consistency across treatments and minimize confounding stressors. Fish were fed twice daily with a mixed live diet of wild-caught plankton and *Artemia*. Survival was recorded daily, and behavioral

indicators of stress were noted during routine observations. By examining tolerance to sustained low-salinity exposure, this study provides insight into the capacity of *S. scovelli* to withstand environmental change and informs predictions of estuarine fish resilience under increasing freshwater influx associated with climate variability.

**Keywords:** Gulf pipefish Salinity tolerance Estuarine resilience Environmental stress Indian River Lagoon

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BIO-P21 **The Decline of Sygnanthid Densities in the Indian River Lagoon.**

Shakira Brown, Lakean McGregor, Nicholas Davis, Lakean McGregor, Jiyahna Price, Dr. Sarah Krejci. Bethune-Cookman University. Daytona Beach, FL.

Seahorses and pipefish (family Syngnathidae) are vital components of coastal marine ecosystems but face numerous anthropogenic threats, including habitat loss, overharvesting, pollution, and climate change. The Indian River Lagoon (IRL) has been significantly impacted by repeated disturbances, such as harmful algal blooms since 2010, which have degraded benthic habitats like seagrass; potentially reducing syngnathid fish populations. This study examined syngnathid fish populations in the Mosquito Lagoon and Northern IRL using data collected in the summer of 2014, and data collected in the summer of 2024 and 2025. Results showed an increase in *Syngnathus scovelli* (Gulf Pipefish) populations over the decade, a shift in *Syngnathus louisianae* (Chain Pipefish) population from the Northern IRL in 2014 to Mosquito Lagoon in 2024, and the absence of the two seahorse species, *Hippocampus erectus* (Lined Seahorse) and *Hippocampus zosterae* (Dwarf Seahorse) in 2024. The 2025 study results showed a dramatic increase of the *Syngnathus louisianae* in the Northern Indian River Lagoon along with an increase in the *Syngnathus scovelli* (Chain Pipefish).

**Keywords:** Seahorse, Benthic, Syngnathid, Density

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BIO-P22 **Tricaine Methanesulfonate (MS-222) Anesthetic Exposure Effects on Apoptosis in Zebrafish Organs.**

Haven Harrington, Dani Hamilton, Anna Whelan, and Sherri A. Emer. Florida Gulf Coast University 10501 FGCU Boulevard South Fort Myers, Florida 33965.

Tricaine methanesulfonate (MS-222) is a standard anesthetic used in aquatic organisms, particularly in zebrafish research laboratories. The rapid onset of sedation and recovery, dose-dependent effects based on concentration and exposure time, and reduced stress on the animal make it a valuable tool for handling aquatic organisms safely and humanely. Zebrafish are gaining popularity as a biomedical research model due to their genetic similarity to humans, short generation time, and transparent embryos, among many other reasons. Sedation of zebrafish with MS-222 is required for a variety of procedures and is the standard anesthetic used in many labs, but data related to the consequences of MS-222 exposure are often limited to behavioral assays. We previously observed in the brains of zebrafish exposed to MS-222 anesthesia for electroretinography (ERG) procedures significantly increased levels of neural apoptosis. Given these results, we analyzed the heart, liver, and skeletal muscle from the same experimental fish, using immunohistochemical labeling of the same apoptotic marker, caspase-3. Preliminary data suggest significant caspase labeling in the liver and heart, with minimal labeling in the skeletal muscle. Further, the effects of MS-222 exposure methods through immersion versus intubation are discussed. These findings can provide insight into the appropriate use of MS-222 and its consequences on the reliability and integrity of tissues that are evaluated following anesthetization.

**Keywords:** heart, muscle, liver, immersion, intubation

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BIO-P23 **Updates to an aquatic life support system for use with microgravity simulation devices.**

Nathan South, Miguel Zyniewicz. Florida Gulf Coast University. 10501FGCU Blvd S, Fort Myers 33965.

Microgravity simulation is a cost-effective way to gather preliminary data and justify the conduct of experiments on spaceflight missions. Although previous studies have identified a variety of physiological changes in vertebrate models maintained aboard the International Space Station (ISS), the ability to accurately replicate these effects using Earth-based simulated microgravity is debated. Not only could the development of a prototype for its use with clinostats serve as a

precedent for more advanced and scalable designs, it could validate zebrafish as the next centralized model for microgravity studies. Here, we are continuing to develop an aquatic life support system for use with a random position machine (RPM) to begin to test the hypothesis that simulated microgravity accurately predicts true microgravity effects on vertebrate physiology. Through Blender modeling, iterative stress testing, and animal metabolic evaluation, we produced a vessel capable of containing adult zebrafish on a RPM for hours to days. Recent iterations include the implementation of gas permeable membranes for dissolved oxygen regulation and onboard sensor platform to monitor water quality. While the gas permeable membranes appeared to help mitigate reductions in dissolved oxygen in the system, the data recorded lacked statistical significance. These recent developments highlight important experimental parameters that need to be addressed, namely fluid dynamics and biological characteristics of the model that ultimately impact the effects of simulated microgravity. Additional experiments and sensor incorporation are underway to improve the system. Importantly, our prototype can help establish credibility of low-budget Earth-based simulated microgravity- and spaceflight-capable designs and provide a foundation for future studies of physiological systems and drug effectiveness under simulated microgravity conditions.

**Keywords:** RPM, zebrafish, Blender, spaceflight

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BIO-P24 **Evaluation of Long-Term Archived Spaceflight Rodent Brain Tissue Integrity.**

Elizabeth Niles, Sage Cohen. Florida Gulf Coast University. 10501 FGCU Boulevard South, Fort Myers, Florida 33965.

Tissues from spaceflight animals that are not allocated to research projects are archived by the NASA Ames Life Sciences Data Archive (ALSDA) for later distribution to investigators studying the effects of microgravity on various physiological systems. Older specimens maintained for 30+ years may not be useful in some types of research, as evidenced by low RNA integrity recently identified in specimens originally processed for storage in 1991. Despite this limitation, some proteins and microanatomical structures may withstand long-term storage, and the potential of these archived tissues for other types of research has not been fully evaluated. This work investigates the integrity of rat (*Rattus norvegicus*) brains collected from the STS-51B SL-3 payload in 1985 and preserved at −80 °C.

Brains from ground-based control groups (preflight basal, vivarium, and simulated ground) and flight conditions were examined. Previously cold-thawed, fixed tissues were sectioned and processed using Nissl staining to assess general morphology and neuroanatomy, caspase-3 immunohistochemistry to evaluate cellular integrity, and DAPI staining to visualize cell nuclei. Imaging with light and fluorescence microscopy focused on structures that function in cognitive flexibility (cingulate cortex, hippocampus). While some tissue degradation was observed in the Nissl preparations, caspase immunolabeling and cell nuclei were visible, suggesting that the tissue may be suitable for morphological analysis. Current efforts are underway to compare the archived brains to mouse brains from the 2024 Rodent Research-28 mission. These results will provide insight into the extent of degradation and signal loss experienced over time.

**Keywords:** Caspase-3, Microgravity, Degradation, Mouse, Rat

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BIO-P25 **A Survey of Parasite Fauna of *Anaxyrus terrestris* (Southern Toad) in Florida.**

Jillian Masiero, Dr. Christina Anaya. Florida Gulf Coast University. 10501 FGCU Blvd, Fort Myers, Florida 33965.

Parasite-host relationships are an important yet understudied component of biodiversity, especially within native amphibian hosts. Within Florida ecosystems, amphibians such as the Southern toad (*Anaxyrus terrestris*) have a key role in the ecosystem. Like most amphibians, we know very little above the parasites they harbor. Knowing what parasites, they have not only provides baseline data but also allows us to know the potential for zoonoses (transmission to humans or domestic animals). Additionally, this data will help with monitoring the impact invasive species have since they are a source of new parasites. The objective of this study was to examine the parasite of digestive and respiratory parasites in Southern toads and to establish baseline data on host-parasite interrelations within this native anuran. Southern toads were collected from locations in central Florida as well as both the east and west coast. Host length and masses were recorded prior to necropsy. The gastrointestinal and respiratory tracts were promptly removed for further examination. Organs were placed in water-filled petri dishes, and gastrointestinal contents were cleaned and examined for parasites. When found, parasites were removed, sorted taxonomically by class, photographed, measured, and

placed in 70% ethanol for preservation and further identification. Six morphologically distinct parasite taxa were extracted from toads, representing species of the phyla Nematoda and Platyhelminthes. Uncommonly, two lung parasites, nematode *Rhabdias* sp. and trematode *Haematoloechus medioplexus*, were found co-infecting a single host. This study represents the second in Florida and the first report of *Haematoloechus* sp. infecting hosts in Florida. Additionally, a nematode, *Cosmocercoides* sp. was in 60% of male hosts versus 33% in female hosts in the colon. These findings contribute to the growing body of research and data regarding parasite diversity and tissue specific relations in Southern toads, providing important baselines for future studies on Floridian amphibian parasite ecology.

**Keywords:** Parasites, Southern toad, *Rhabdias* sp., *Haematoloechus* sp., *Cosmocercoides* sp.

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BIO-P26 **Distribution of *Agama picticauda* and the Prevalence of *Salmonella enterica* in an Isolated Urban Population.**

Elizabeth Ryan, Palina Hurchanka, Hillsborough College, 4001 Tampa Bay Blvd, Tampa, FL 33614.

*Agama picticauda* are African lizards in the family Agamidae that were introduced to southern Florida in 1976 and are now considered an invasive species. Commonly known as Peter's Rock Agama, we observed an isolated urban population in the Drew Park neighborhood of Hillsborough County, FL. Based on periodic field observations since August 2021, this population has expanded outward from the original point of identification, now occupying approximately 22,000 square meters. Within this area, we documented haremic polygamy with territorial males in a patchy urban habitat. The rapid increase in this agama population may influence community associations with symbiotic organisms. Because the site is located near areas of high human activity, we investigated the presence of opportunistic pathogens. *Salmonella*, which has zoonotic potential, is widely studied in animals capable of transmitting bacteria to humans. Agamas were temporarily collected using cricket-baited traps, and cloacal swabs were obtained. Of forty-one sampled lizards, 7% (95% CI: 0–15.3%) were genetically identified as carrying *Salmonella enterica* subsp. *enterica* using a novel PCR assay targeting the gyrA gene. Additional presumptive positives were detected on selective media based on sulfur reduction and lactose fermentation, though several isolates that

initially appeared consistent with *Salmonella* were PCR-negative. Our results indicate that the prevalence of *Salmonella* on external surfaces in this population is significantly lower than values reported in previous studies. Furthermore, the uniform genotype detected among positive samples supports the hypothesis that the bacteria are transmitted vertically through generations rather than acquired from environmental sources. Expanding sampling to include environmental substrates (fecal matter, eggs) could help confirm whether the environment contributes to pathogen cycling.

**Keywords:** *Salmonella*, invasive species, agama, symbiosis

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BIO-P27 **Morphological and Ecological Evolution of the Invasive Nile Monitor (*Veranus niloticus*) in Florida.**

Janessa Maynard, Todd Campbell. University of Tampa, 401 W. Kennedy Blvd. Tampa, FL.

The invasion of the Nile monitor (*Varanus niloticus*) into Florida provides an opportunity to examine the morphological response of an important predator to a new environment. This study quantifies cranial morphological differences between the wild African population and the invasive Florida population of *Varanus niloticus* in an effort to understand the effects of differential selection pressures on cranial morphology. Three-dimensional landmark data were collected from the skulls of invasive and wild Nile monitors and comparatively analyzed using geometric morphometric techniques. Regions of morphological divergence and conservatism of invasive Nile monitor crania were identified and quantified. Invasive animals exhibit significant lateral compression of the rostrum, narrowing of the skull, reduced muscular volume, and other differences. The basis for the dysmorphology in invasive animals may be attributable to multiple evolutionary and non-evolutionary factors (e.g., ontogenetic, nutritional, biomechanical), all owing to the local ecology of Florida. The combination of morphological and ecological analyses of this invasive species presents a unique opportunity to examine a species undergoing rapid evolutionary change in a novel environment.

**Keywords:** Cranial Morphology, Geometric Morphometrics, Evolution

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BIO-P28 **Adaptive strategies of the halotolerant alga, *Dunaliella salina*.**

L. Church, P. M. Sangara, A. Church, and M. D. Horton. Southeastern University, College of Natural & Health Sciences, 1000 Longfellow Blvd., Lakeland, FL 33801.

*Dunaliella salina* is a halotolerant alga well known for its ability to survive in environments with fluctuating salinity. In this study, we explored how differences in salinity influence growth, pigment present, oxygen production, and cellular organization. Cultures were maintained for six weeks at low (15 ppt) and high (23 ppt) salinity, with weekly measurements of growth, dissolved oxygen, and cell structure. Pigments were analyzed in the final week, and statistical comparisons included two-sample t-tests and correlation analyses. Overall, growth and dissolved oxygen did not differ significantly between treatments, although a moderate positive correlation between the two was observed at low salinity. The number of individuals with visible red pigment were statistically different between the treatments but colonies and spores were not significantly different. The pigments present remained consistent in both treatments. These findings indicate that *D. salina* can maintain growth under moderate salinity stress through osmotic regulation, which supports its photosynthetic activity. The greater number of pigmented cells at higher salinity likely reflects carotenoid accumulation as a protective strategy against light-induced stress. Meanwhile, the ability to shift between cell types including colonies and spores supports survival and reproduction in fluctuating salinity levels. Equipment and resources were provided by Southeastern University.

**Keywords:** *Dunaliella salina*, halotolerance, salinity stress, adaptive strategies

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**CMB = Conservation and Management Biology**

FRIDAY 09:00 a.m. – 11:45 a.m.

I. JACK STOUT, UNIVERSITY OF CENTRAL FLORIDA, **presiding**

09:00 a.m. CMB-01 **Differential expression of an oxaspiro lactone in potential crossing pairs of the endangered plant *Ziziphus celata*.**

Kayleigh Cooper, Angel Rivera III, Katiana Reyes and Kate Calvin. South Florida State College, 600 W. College Dr., Avon Park, FL, 33825.

*Pseudoziziphus celata* (Florida Ziziphus) is a shrub native to the Lake Wales Ridge in Highlands and Polk Counties. This native ridge habitat is being lost to development and fragmentation, and Florida Ziziphus is listed as endangered at both state and federal levels. It is bushy with small leaves and very thorny branches. Leaves drop in winter and the plant flowers prolifically in early Spring. They bloom all over the branches, including on the thorns. This plant faces a significant reproductive barrier because it can only cross with other genotypes that also have a compatible mating type. Habitat fragmentation has greatly separated Ziziphus populations and made it difficult for compatible plants to cross. Seeds are rarely seen in wild sites and little is known about how the plant survives. With the goal of providing information for habitat restoration processes, we have collaborated with Bok Tower Gardens (Lake Wales, FL) and Archbold Biological Station (Venus, FL). Samples located in both conservation areas and native sites having different genotypes and putatively compatible mating types were selected for this study. Metabolic profiles were obtained using gas chromatography-mass spectrometry (GC-MS). Quantitative results are still being evaluated. Statistically significant results for the oxaspiro lactone compound 7,9-Di-tert-butyl-1-oxaspiro(4,5)deca-6,9-diene-2,8-dione (79DTBO) are presented here.

**Keywords:** Endangered plant, mating type, metabolic profile, GC-MS

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09:15 a.m. CMB-02 **Identification of endophytic fungi and differential expression of secondary metabolites.**

Aiden Swain, Adrian Mendoza, Cohen Jefferies and Kate Calvin. South Florida State College, 600 W. College Dr., Avon Park, FL, 33825.

Florida is considered to be a global biodiversity hotspot with many rare and endemic species. These species are not found anywhere else in the world and many are on the brink of extinction due to loss of habitat. *Deeringothamnus rugelii*, commonly known as Rugel's pawpaw, is a critically imperiled and federally endangered flowering plant known to exist only in Volusia County, Florida. Fungal endophytes are known endosymbionts that have been shown to confer fitness benefits to their plant hosts. Using microbial isolation techniques and DNA barcoding, the research identified fungal endophytes *Paraconiothyrium* sp., *Alternaria alternata*, *Colletotrichum*, *Cladosporium*, and *Pseudopithomyces* in the Rugel's pawpaw leaves. Next, after growing endophyte cultures in liquid media, secondary metabolites from these fungi were isolated by liquid-liquid extraction and identified using gas chromatography-mass spectrometry. Similar experiments were extended to the endangered plant *Pseudoziziphus celata*, which is native to the Lake Wales Ridge in Highlands and Polk Counties. While endophyte identification in *Pseudoziziphus celata* is pending, results thus far indicate that secondary metabolites found in plant tissues could potentially be distinguished from metabolites originating from the endophytes found within these tissues. Results on differential expression of compounds in *Pseudoziziphus celata* leaves and endophytes are presented here.

**Keywords:** Endangered plant, endophytic fungi, secondary metabolites, GC-MS

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09:30 a.m. CMB-03 **The Functional Role of Dung Beetles in Sub-tropical grasslands and Tropical forests.**

Roisin Stanbrook-Buyer. Bethune-Cookman University. 640 Dr. Mary McLeod Bethune Blvd. Daytona Beach, FL 32114-3099.

Dung beetles (Scarabaeinae) occupy a pivotal niche, yet their significance in ecosystem functioning often remains unappreciated. As our climate continues to rapidly change and more complex human-environment interactions emerge, it has

become even more important to understand how important, but vulnerable insect groups shape the processes that maintain the structure and function of ecosystems. I will explore how dung beetles drive essential functions including dung removal, nutrient cycling, and seed dispersal in both subtropical grasslands and tropical forests. Having established their ecological roles, I will then discuss how these functions can be quantified economically to demonstrate their value to stakeholders such as ranchers, land managers, and policymakers in US agroecosystems.

**Keywords:** Dung beetles, Agroecosystems, Ecosystem Services

Corresponding author: Roisin Stanbrook-Buyer, stanbrookr@cookman.edu

09:45 a.m. CMB-04 **What's on our shores? A study of marine debris and cigarette litter concentrations in Daytona Beach Florida.** Noelle-Marie Steele, Lisa Glover, Parisa Ebrahimbabaie, Kelly M. San Antonio, Hyun J. Cho. Bethune-Cookman University. 640 Dr. Mary Mcleod Bethune Blvd, Daytona Beach, Florida, 32114.

Marine debris, defined by the National Oceanic & Atmospheric Administration, is any persistent, artificial, or processed solid material discarded into the marine and coastal environment. This growing global issue poses significant threats to marine life, coastal ecosystems, and human health. The present study aimed to assess the amount and types of marine debris, with an emphasis on cigarette butts, at two public beaches in Daytona Beach, Florida, a highly urbanized and heavily visited tourist location. Field surveys were conducted from April through July 2025 at the oceanfront beaches of Sunsplash Park and Main Street Pier using transect-based NOAA Marine Debris Monitoring and Assessment Project (MDMAP) protocols to collect, weigh, and categorize debris. The data were analyzed to compare sites and evaluate the impact of public holidays and tourism activity. Results indicated that cigarette butts were the most abundant form of litter, followed by plastics and food-related packaging. Sunsplash Park consistently exhibited higher debris loads, with notable spikes after weekends and holidays. For example, following the Independence Day weekend (July 7), the debris weight at Sunsplash Park reached 169.3 g, more than twice that recorded at Main Street Pier (78.9 g). Cigarette butts, although small in size, contain toxic compounds such as nicotine, arsenic, and lead, which leach into the environment and persist due to resistance to biodegradation. Their prevalence highlights the urgent need for targeted mitigation strategies. Preventive measures, such as installing cigarette receptacles, smoke-free zones, and launching community awareness programs, are recommended. This work emphasizes the importance of local monitoring and county

partnerships to strengthen and give importance to and contribute to a vast marine debris reduction effort.

**Keywords:** Marine debris, Cigarette litter, Daytona Beach, Florida

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10:00 a.m. CMB-05 **Hidden Plastic Pollution in a Protected Paradise at Watamu Marine National Park, Kenya.**

Trinity Resnover, Michelle Feenstra, Robert Sluka. Bethune Cookman University. 640 Dr Mary Mcleod Bethune Blvd., Daytona Beach, FL.

Since the rapid expansion of plastic production in the mid-20th century, microplastics (<5 mm) have become a pervasive threat to marine ecosystems worldwide. Despite increasing global concern, data remain limited from developing regions and protected coastal systems. Within Kenya, and specifically Watamu Marine National Park (WMNP), no prior studies have quantified microplastic pollution. This study characterizes the abundance and composition of microplastics along sandy shorelines of WMNP using standardized field and laboratory methods. Five 100-m transects were established during five sampling periods between October 2021 and May 2022. Along each transect, five randomly selected 0.25-m² quadrats were sampled to a depth of 5 cm. Sediments were sieved through 1- and 5-mm mesh using filtered seawater and processed via saline flotation (35 g/L). Recovered microplastics were classified, counted, and measured with vernier calipers. Microplastic abundance across sites and sampling periods will be analyzed using a Generalized Linear Mixed Model (GLMM) in SPSS v28, while assemblage differences will be assessed using PERMANOVA in Primer v7. The statistical analysis provided by this study will enhance the first baseline assessments of microplastic contamination within WMNP. These findings will establish a critical reference point for long-term monitoring efforts and support Kenya's broader commitments to marine conservation.

**Keywords:** Microplastic pollution, Sandy shoreline, Marine protected areas, Watamu Marine National Park, Baseline monitoring and conservation

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10:15 a.m. **BREAK**

10:30 a.m. CMB-06 **Will "spinning fish events" in south Florida push endangered smalltooth sawfish to extinction?**

Tonya Wiley, Adam Brame. Havenworth Coastal Conservation, 10616 Giddens Place, Palmetto, FL 34221

The smalltooth sawfish (*Pristis pectinata*) is one of the most imperiled marine fishes in the United States, having experienced drastic declines in both abundance and range. Once relatively common from Texas to North Carolina, sawfish were gone from most of their former range by the late 20th century due to fisheries bycatch mortality and habitat loss. Now regularly found only in south Florida, the U.S. population was listed as Endangered under the Endangered Species Act (ESA) in 2003. After 20 years of ESA protections the population appeared to be stable and possibly increasing at localized scales with recurrence in some areas of its former range. A new threat emerged in late 2023 when over 80 invertebrate and fish species began exhibiting erratic spinning behaviors in the Florida Keys. Smalltooth sawfish are among the species that have been observed spinning, and while other species have not been dying in large numbers, sawfish mortalities have been documented at unprecedented levels. Since December 2023 there have been almost 300 reports of sawfish behaving abnormally and 65 confirmed mortalities of large juvenile and adults. The underlying cause likely involves complex interactions between microalgae toxins and fish neurophysiology. The sawfish deaths are extremely troubling given the already depleted population size and growing uncertainty about their ability to reproduce and keep the population viable. These winter "spinning fish events" represent a significant threat that could further imperil an already fragile population if it were to occur regularly and if mitigation measures are not possible.

**Keywords:** Pristidae, unusual mortality event, harmful algal blooms, dinoflagellate, *Gambierdiscus*

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10:45 a.m. CMB-07 **Feralization's Role in Shaping Modern Biodiversity.**

Krystal Renta, Quenton Tuckett, Jeff Hill University of Florida/Institute of Food and Agricultural Sciences Tropical Aquaculture Laboratory, 1408 24th St. SE. Ruskin, FL 33570.

Through the process of domestication, humans have shaped the biology of organisms for various purposes including food security, transportation, and companionship. Global biomass is increasingly dominated by domesticated organisms and encompasses various taxa ranging from plants, terrestrial vertebrates, and fishes. The field of domestication has been intensely studied with scholars developing a unified perspective on the process and outcomes. However, the process of feralization, where domesticated organisms are reintroduced back into the wild, has no unified perspective. During a time of profound human influence, understanding the fates of domesticated organisms can lead to greater prediction of introduction outcomes. A unified framework is vital for understanding and measuring feralization. We define feralization as an evolutionary process that domesticated species undergo, whether inadvertently and advertently, that results in increased fitness along a gradient of human influence. This definition establishes a clear threshold of when an organism becomes feralized, which is important for informing domestication-feralization research. This perspective also unites pathways of introduction, such as invasion and restoration. As human activities have reshaped most of the planet, understanding feralization offers insight into its impact on contemporary biodiversity.

**Keywords:** Aquaculture, Feralization, Ecology, Domestication, Evolution

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11:00 a.m. CMB-08 **Population viability analysis and habitat modeling to inform management of a nonnative amphibian in Florida.**

T. Myles Domohowski, Jeff Hill, Quenton Tuckett. University of Florida/Fisheries and Aquatic Sciences/Tropical Aquaculture Laboratory. 1408 24th Street SE, Ruskin, FL, 33570.

Hillsborough County, Florida has the world's only nonnative population of the Tropical Clawed Frog *Xenopus tropicalis*. Since 2021, control efforts have targeted this population of frogs, which inhabits permanent and ephemeral stormwater ponds in a suburbanized area. Through rigorous experimentation, the native Eastern Mosquitofish *Gambusia holbrooki* has proven effective native biological control of *X. tropicalis* tadpoles. Mosquitofish stocking and frog trapping have significantly reduced breeding success and density of frogs. Despite this, the possibility of eradication is unknown, possibly requiring longer time frames or more intense control strategies than acceptable to managers. Because eradication of

nonnatives can be costly and is more effective early in the invasion, evaluating control strategies is crucial for informing management. My research simulates the costs and likelihood of extirpating this metapopulation under varying control efforts. Control efforts to be assessed are: 1) frog trapping and removal, 2) biological control to interrupt breeding, and 3) breeding pond deepening to create permanent hydroperiod for fish. To determine these costs and likelihoods, I simulated different scenarios using a population viability analysis (PVA) model. Parameters for the PVA originate from published literature and our studies in the system (e.g., mark-recapture population estimates). This research was funded by the Florida Fish and Wildlife Conservation Commission (FWC).

**Keywords:** amphibian, nonnative, biocontrol, population viability

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11:15 a.m. CMB-09 **Risk Screening of the Ball Python *Python regius*.**
Katie M. Everett [(1)], Quenton M. Tuckett [(1)], Scott Hardin [(2)], and Jeffrey E. Hill [(1)]. [(1)] Tropical Aquaculture Laboratory, Program in Fisheries and Aquatic Sciences, School of Forest, Fisheries and Geomatics Science, University of Florida, Ruskin, FL 33570; [(2)] Florida Fish and Wildlife Conservation Commission (Retired), Tallahassee, FL 32399.

When assessing risk of potentially invasive species, we often look at relatives of species that have already invaded in the region, or those that could have high propagule pressure in the environment. The Ball Python *Python regius* is a congener of the highly invasive Burmese Python *Python bivittatus*, is one of the most popular snake species in trade globally and is frequently released or escape from captivity in Florida. However, despite this, there are no documented populations of the Ball Python outside of its native range. Our objectives were: 1) to compile a biological profile of the Ball Python, 2) complete a climate match for the state of Florida using the program CLIMATCH, and 3) conduct a risk screening for Florida using the Terrestrial Animal Species Invasiveness Screening Kit (TAS-ISK) to identify hazards associated with this species. Screenings were completed by two or more assessors for both the wild-type Ball Python and the brightly colored designer morphs, which may pose differential risks of establishment in the state. Our climate match indicated a medium match to Florida, while the average TAS-ISK scores placed it in the medium risk range (non-invasive) for the wild-type Ball Python and low-medium risk (non-invasive) for the designer morphs. Not only do these results indicate a low probability of invasiveness for the Ball Python but also highlight how intraspecific variation can modify invasion risk.

**Keywords:** TAS-ISK, python, non-native species, risk assessment, invasion

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11:30 a.m. CMB-10 **Evaluating species success and conservation outcomes in *Trichechus inunguis* and *T. manatus*.**

Ava Ewert, Naomi Miller, Karlamarie Santana and Dr. Melba D. Horton. Southeastern University at 1000 Longfellow Blvd. Lakeland, FL 33801.

Manatee conservation is critical due to the vital ecological roles these species play in maintaining aquatic ecosystem balance. This perspective research compares conservation strategies and challenges faced by two manatee species: the Amazonian manatee (*Trichechus inunguis*) and the West Indian manatee (*T. manatus*). Previous studies reveal that Amazonian manatees are primarily threatened by natural predators, poaching, and hunting, whereas West Indian manatees face predominantly anthropogenic pressures such as boat collisions, habitat degradation, and water pollution. Findings also indicate that conservation of Amazonian manatees largely depends on the efforts of local communities inhabiting their riverine habitats, while West Indian manatee protection relies more heavily on federal and governmental programs. Based on these distinctions, this study proposes species-specific conservation recommendations. For West Indian manatees, strengthening local initiatives through the establishment of clearly marked protection zones, improved boating regulations, and education programs for local fishers is essential. Conversely, conservation strategies for Amazonian manatees should focus on expanding Marine Protected Areas (MPAs) equipped with patrol surveillance, designating no-wake zones along key stretches of the Amazon River, and enforcing stricter penalties against illegal hunting. By aligning conservation efforts with each species' unique ecological and sociopolitical context, this study highlights the importance of integrated, context-sensitive management to ensure the long-term survival of manatee populations.

**Keywords** Manatee, *Trichechus inunguis*, *Trichechus manatus*, Anthropogenic pressure, Species-specific conservation

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**CMB Posters – 3:45 p.m.-6:30 p.m. Friday**

CMB-P01 **Projecting Climate-Driven Range Shifts of the Dung Beetle *Canthon viridis* under three Emissions Scenarios.**

Marque Snow, Roisin Stanbrook-Buyer. Bethune-Cookman University. 640 Dr. Mary McLeod Bethune Blvd. Daytona Beach, FL 32114-3099.

*Canthon viridis* is a small dung beetle widely distributed in eastern North America, making it a useful focal species for evaluating how climate change may reorganize insect communities and associated ecosystem functions. Climate-driven shifts in dung beetle distributions could alter nutrient cycling and secondary seed dispersal, yet species-specific projections remain limited. We developed species distribution models (SDMs) for *Canthon viridis* using occurrence records from Florida and the broader eastern North American range, combined with bioclimatic and land-cover predictors. Models were calibrated with an ensemble approach and evaluated using spatially blocked cross-validation to reduce overfitting to regional sampling hotspots. We projected habitat suitability under three mid-century climate scenarios representing low, moderate, and high greenhouse gas emission pathways. Across scenarios, core suitability in peninsular Florida contracted and shifted northward, with range loss increasing with emissions, while suitability expanded toward higher latitudes elsewhere in the range. Predicted fragmentation of suitable habitat was greatest under the most extreme scenario, suggesting reduced connectivity among populations and potential disruption of local dung-beetle assemblages. These results indicate that even a currently widespread species like *Canthon viridis* may undergo substantial distributional reorganization under future climates.

**Keywords:** Species Distribution Modeling, Range Shifts, Dung beetles

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CMB-P02 **Midnight Pass: Monitoring the recovery of seagrass meadows.**

Caralise Maloy, Jose Moscoso, Emily Lancaster, Samantha Levell, Samuel Bedgood. New College of Florida, Sarasota, FL.

Estuarine habitats are vulnerable to change caused by natural and human events. Midnight Pass historically connected the Gulf of Mexico to Little Sarasota Bay, Sarasota. The pass was closed in 1984 due to human intervention and coastal development. It was recently reopened after 40 years by hurricanes Helene and Milton; this shifted the area from low flow to high flow with a direct tidal connection to the Gulf of Mexico. The previous seagrass habitat was smothered by sand from adjacent barrier keys. We have monitored the recovery of seagrass at four semi-permanent transects monthly at Midnight Pass since its reopening in October of 2024. Two of these transects are near the pass and experience high tidal flow, while the other two are farther from the pass and experience lower flow. Each month we collect data on seagrass presence and growth, water chemistry, eDNA samples, sediment samples, and fish and invertebrate seine surveys. Fish population dynamics, seagrass percent cover and water quality data has been monitored and analyzed. This study is ongoing and will continue to provide data that can be referenced as seagrass beds and ecological communities change and recover at Midnight Pass.

**Keywords:** Seagrass, Marine Ecology, Conservation, Botany, Fish Population

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CMB-P03 **Effects of Short-Term Storage Conditions on *Ruppia maritima* Seed Viability and Germination for Large-Scale Restoration.**

Khanyisile Tshabalala, Hyun J. Cho, Anna B. Ponce, Kelly M. San Antonio. Bethune-Cookman University, 640 Dr. Mary McLeod Bethune Blvd. Daytona Beach, FL.

*Ruppia maritima* (widgeongrass) is a resilient seagrass due to its tolerance to varying salinity levels and its abundant seed production. Effective seed-based propagation methods are essential to expand restoration efforts in dynamic coastal systems such as the Indian River Lagoon. This project examines how short-term storage conditions influence seed viability and germination success, focusing on optimizing protocols for future large-scale restoration applications. Mature seeds were collected from established *Ruppia* beds and assessed for viability and germination to establish a control baseline. Five replicates of 20 seeds each were used

for this control group, tested under standardized low-salinity conditions. The remaining seeds were divided into three storage treatments: dry storage, freezing, and acid scarification to mimic physical processes to induce and break dormancy. Each storage treatment was subjected to the three durations: one month, three months, and six months. Viability was assessed using tetrazolium chloride staining to detect live embryos. Germination was evaluated over 21 days following each storage duration under low-salinity conditions known to promote sprouting in *R. maritima*. Data collection is ongoing, and results will inform which storage methods are most effective for maintaining seed quality over time and also for fast germination when induced. This study provides insight into the practical challenges of seed storage for *R. maritima* and its implications for restoration success. Understanding how storage type and timing influence seed performance allows for the refinement of protocols that support efficient, scalable propagation strategies. The findings are particularly relevant for restoration projects requiring flexible scheduling or long-term seed banking. We are concurrently developing and implementing a drone-based deployment of seeds and seedlings into remote locations and have limited access, such as impounded marshes.

**Keywords:** Seagrass, Restoration, Germination, Viability, Seeds

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CMB-P04 **Toxic Tides Coast to Coast: Ecological Perspectives on *Karenia brevis* and *Alexandrium catenella* Blooms.**

Mary Sabin, Abigail Jones, Natalie Park. Southeastern University, 1000 Longfellow Blvd, Lakeland, FL 33801.

Each year, coastal regions of the United States experience large algal blooms, commonly known as “Red Tide,” particularly along the eastern and Gulf coasts. These events are primarily caused by the dinoflagellates *Karenia brevis* and *Alexandrium catenella*, single-celled organisms with two flagella that facilitate movement. While naturally occurring for centuries, these harmful algal blooms (HABs) have intensified in frequency and duration, posing increasing threats to marine ecosystems, fisheries, and Florida’s tourism-driven economy. This perspective study examines existing policies related to public communication, prevention, and management of HABs, with a focus on the dissemination of information regarding their health and environmental impacts. The analysis involved

a review of active state legislation and scientific literature addressing HAB effects and policy responses. Findings reveal minimal active regulatory measures, limited public awareness of HAB risks, and substantial economic losses linked to tourism decline during severe bloom events. To mitigate these impacts, this study recommends strengthening state-level legislation to include clear regulatory standards and accountability measures for HAB management, increasing public education campaigns prior to peak bloom seasons, and installing more informative signage along affected shorelines. Enhancing policy-driven awareness and prevention strategies can reduce public exposure, protect coastal livelihoods, and foster a more resilient response framework to toxic algal blooms caused by *K. brevis* and *A. catenella*.

**Keywords:** Red Tide, *Karenia brevis*, *Alexandrium catenella*, Harmful Algal Blooms, Policy-driven awareness

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CMB-P05 **Rethinking Overfishing: Impacts on Marine Life and Emerging Solution.**

Luliana Rivera, Chase Wollam, Liza Rashid, Katherine Short, Melba Horton. Southeastern University, 1000 Longfellow Blvd., Lakeland, FL 33801

Overfishing remains a major global threat to marine ecosystems, endangering biodiversity, disrupting food webs, and undermining the livelihoods of communities dependent on fisheries. This perspective research examines the ecological, economic, and social dimensions of overfishing while identifying emerging strategies for sustainable marine resource management. The study analyzes global patterns of fish stock depletion, with a focus on key regions such as Europe, North America, and the Pacific Islands, to identify the principal drivers of overexploitation, namely market demand, inadequate governance, illegal and unreported fishing, and technological advances in harvesting. Through comparative case analysis and literature synthesis, this research evaluates the effectiveness of interventions including Marine Protected Areas (MPAs), Priority Focal Areas (PFAs), ecosystem-based management, catch limits, and advanced monitoring technologies. Recommendations emphasize the creation of a comprehensive framework integrating international cooperation, policy innovation, and public awareness to mitigate overfishing and enhance ocean sustainability. Furthermore, the integration of ecological, economic, and social dimensions, supported by tools such as satellite tracking and digital catch reporting, is proposed to inform long-term, evidence-based

solutions that safeguard marine biodiversity while ensuring global food security. Ultimately, this research underscores the urgent need to reform current fishing practices and adopt proactive, globally coordinated measures to restore the health and resilience of marine ecosystems.

**Keywords:** Overfishing, Policy innovation, Ecosystem-based management, Satellite tracking, Ecological sustainability

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CMB-P06 **Harvest Intensity and Ecological Implications of Horseshoe Crab Exploitation in Costal Systems.**

Hannah Matyi, Kaeden Beach, Esdras Rodriguez Jr. Southeastern University, 1000 Longfellow Blvd., Lakeland, FL 33801

The Atlantic horseshoe crab (*Limulus polyphemus*) plays a crucial ecological and biomedical role, yet intensive harvesting for bait and biomedical applications has led to significant population declines along the Atlantic coast. This perspective study examines how harvest intensity influences coastal ecosystem dynamics and the reproductive sustainability of L. polyphemus. Using Delaware Bay data from 2003 to 2020, trends in spawning activity, egg density, and shorebird foraging, particularly that of the migratory Red Knot, were analyzed. Results revealed a sharp reduction in spawning adults and egg availability during periods of heightened harvest pressure. Diminished egg populations directly affected shorebird refueling success, threatening the survival of species dependent on this resource. Comparative analysis of states with stricter biomedical collection regulations indicated signs of recovery in local crab populations and stabilization of associated trophic interactions. These findings highlight the ecological consequences of overharvesting and underscore the urgent need for sustainable management strategies. Replacing the use of live horseshoe crabs in biomedical testing with synthetic alternatives and enforcing stricter harvest limits are recommended. Such measures will promote ecological recovery, ensure the preservation of interdependent species, and contribute to the long-term resilience of coastal ecosystems.

**Keywords:** Horseshoe Crab, Shorebird, Overharvesting, Reproductive Sustainability, Sustainable Management.

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CMB-P07 **Insights from the field: angler survey results from Volusia County, Florida.**

Farai Mhende, Jada Brown, Endi Carter, Keanna Forbes, Aris O'neal, Jalen Thompson, Shawna Brooks, Tyrese Taylor, Yungkul Kim. Bethune-Cookman University, Daytona Beach, FL.

Bioaccumulation of contaminants in the Indian River Lagoon (IRL) poses significant risks to the health of the estuary and potentially to humans and animals. To understand the degree to which pollutants are bioaccumulating in the IRL, the Ocean Research & Conservation Association (ORCA) launched the One Health Fish Monitoring Project. This project focuses on analyzing a range of contaminants in the aquatic food web, with particular focus on fish species commonly consumed. The contaminant data collected in the Project is combined with data obtained from angler surveys to estimate the exposure to humans who consume fish caught in the IRL. As part of ORCA's Project, we have been collecting angler surveys at several fishing spots along the Halifax River and Indian River in Volusia County, Florida. Data from this study are currently analyzed to document the demographics and fishing practices of the anglers, to examine the angler preferences and behaviors, and to understand the angler perspectives. Findings from this study will be presented.

**Keywords:** angler surveys, bioaccumulation, environmental contaminants, fish consumption, One Health approach

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CMB-P08 **Artificial Reef Implementation: Ecological Impacts and Future Perspectives.**

Bryce Hiatt, Soffiah Shook, Faith Young. Southeastern University, 1000 Longfellow, Blvd, Lakeland, FL 33801.

To counter the global decline of coral reef ecosystems, artificial reefs (ARs) have been developed to enhance fisheries, provide substrate for coral attachment, and create habitats for diverse marine species. Because marine environments vary widely in ecological composition and resource demands, effective AR design must be tailored to local conditions. However, some structures such as bridge pilings or discarded culverts are often designated as "artificial reefs" without consideration of site-specific ecological objectives, leading to inconsistent outcomes.

This perspective study offers a balanced evaluation of the ecological implications and best practices for AR implementation. Divergent views persist regarding the effectiveness of ARs: some studies suggest that ARs increase local biomass and biodiversity, while others caution that they may concentrate fish populations, increasing vulnerability to overexploitation. Identifying key environmental and socioeconomic factors that influence AR performance is therefore essential in determining their suitability for a given site. Despite extensive research, knowledge gaps remain concerning long-term ecological impacts and sustainability. This study recommends that AR establishment carefully consider local spawning cycles, proximity to marine protected areas, and the presence of natural reef systems. A standardized, evidence-based framework for AR planning and monitoring is necessary to ensure that these structures fulfill their ecological intent without compromising natural ecosystem balance.

**Keywords:** Artificial Reef, Coral Reef, Marine biodiversity, Marine protected areas, Ecosystem balance

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CMB-P09 **Habitat Preference of Invasive Lionfish (*Pterois* spp.) In The Gulf of Mexico.**

River S Barnett and Samantha Levell. New College of Florida, 5800 Bay Shore Rd, Sarasota, FL 34243.

Lionfish (*Pterois* spp.) are an invasive species in the Gulf of Mexico that originated from the Indo-Pacific. They have no natural predators within this area and are known to prey on anything they can fit into their mouths, as well as having a high fecundity rate. This project investigated the habitat preferences of the invasive lionfish (*Pterois volitans* and *P. miles*) in the Gulf of Mexico, focusing on depth distribution and substrate preference. Specifically looking at quantifying depth-related patterns in lionfish abundance across shallow (40 m) zones, assessing the influence of habitat structure, including artificial and natural habitats, on lionfish distribution, and identifying locations where lionfish densities are highest and removal efforts would be most impactful based on these qualities. Having looked at data collected from FWC between 2010 and 2023, *Pterois* spp. were found to have an average depth of approximately 52 meters and prefer substrates with more complexity, such as high-relief rock and artificial structures. This is most likely due to a lack of predators, as well as having more ambush

points. In order to manage lionfish populations in the future, there should be a focus on more complex structures in the mesophotic zone in order to deplete their populations and improve local species growth.

**Keywords:** lionfish invasion, habitat preference, substrate complexity, invasive species management.

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CMB-P10 **Linking shark conservation to the future of ocean health.**

K. J. Brown, A. C. Jones, A. R. Kight and M.D. Horton. Southeastern University, Department of College of Natural and Health Sciences, 1000 Longfellow Boulevard, Lakeland, FL 33801.

As apex predators, sharks play a critical role in maintaining the stability and diversity of marine ecosystems. However, their populations are rapidly declining worldwide due to overfishing, bycatch, habitat destruction, and inadequate management. This study examines the ecological consequences of shark population decline and the resulting trophic degradation that occurs when apex predators disappear. Data indicate that over one-third of shark, ray, and chimaera species are nearing extinction, while more than 75% of those inhabiting tropical and subtropical coastal regions face significant threats. Global shark populations have decreased by over 70% between 1970 and 2018, primarily due to intensive fishing in high seas and the shark fin trade. The proliferation of mesopredators, such as rays and smaller sharks, following the loss of apex species, has disrupted ecosystem balance, reduced biodiversity, and altered benthic community dynamics. The findings underscore the urgent need for coordinated shark conservation efforts. This study proposes the expansion of Marine Protected Areas (MPAs) and Important Shark and Ray Areas (ISRAs), the promotion of sustainable fishing practices, global reduction of seafood consumption, and enhanced public awareness through targeted conservation campaigns. Implementing these strategies collectively can mitigate overfishing, restore trophic balance, and support the recovery of shark populations. Ultimately, sustained international collaboration and information sharing are vital to ensure the long-term stability of marine ecosystems and the survival of threatened shark species.

**Keywords:** Shark, Overfishing, Finning, Apex predator, Marine conservation

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CMB-P11 **Comparative Mortality of Blacktip Sharks Captured by Longline and Drumline Gear in Southern Florida.**
Gillian Tonn, Jasmin Graham, Dr. Samantha Levell. New College of Florida. 5800 Bay Shore Rd. Sarasota, FL.

Shark fishing techniques, whether recreational, commercial, or scientific, are essential in researching a wide variety of shark species. Longlining and drumlining are two common methods of surveying sharks. However, it is important to assess mortality rates between the two methods and across species. Data were examined from multiple sources of drumlined blacktips and longlinged blacktips throughout Southern Florida. Preliminary analysis indicates that longlined blacktips have a higher mortality rate than drumlined blacktips. Other factors, including lactate, sex, and maturity, were also noted and analyzed, implying that stress metrics are greater in longlined blacktips than drumlined blacktips. Further research should be done to determine which fishing gear and protocols the elasmobranch research community could implement to reduce mortality rates, whether at-vessel or upon release.

**Keywords:** Southern Florida, *Carcharhinus limbatus*, longline fishing, drumline fishing, mortality

Corresponding author: Gillian Tonn, g.tonn28@ncf.edu

CMB-P12 **Preliminary Assessment of Microplastic at Surface and Nesting Depth on Volusia County Sea Turtle Nesting Beaches.**
Shaunace Bowen, Trinity Resnover, Widline Souverain. Bethune-Cookman University. 640 Dr Mary Mcleod Bethune Blvd., Daytona Beach, FL.

Microplastics are pervasive in marine environments worldwide and raise concerns for coastal ecosystems, including potential impacts on sea turtle nesting habitats. Microplastics may influence nest temperature, sediment characteristics, and the potential exposure of incubating embryos to contaminants; however, their presence at nesting depth across beaches with varying sea turtle nesting densities in Florida remains poorly understood. This study aims to characterize microplastic presence at the surface and approximate nest depth across high- and low-density sea turtle nesting beaches in Volusia County, Florida. Sampling is being conducted outside of nesting season to avoid disturbance to active nests. To date, sand samples have been collected from two beaches, with five quadrats established at the dune edge per site. Surface samples (upper 5 cm) and subsurface samples (70 cm

depth, approximating typical nest depth) have been obtained and are undergoing laboratory processing. Microplastics are extracted using a supersaturated saline solution, vacuum filtered through 47 μm filter paper, and quantified and classified by size and color using stereomicroscopy. Additional sampling from the remaining study beaches is planned. This ongoing work will contribute baseline data on microplastic distribution across nesting habitats and depths, informing future investigations into potential interactions between microplastics and sea turtle reproductive environments in Volusia County.

**Keywords:** Sea turtles nesting beaches Microplastics Volusia County pollution

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CMB-P13 **Patterns of Use for an Urban Wildlife Underpass in Manatee County, Florida.**

Marissa Cook, Samantha Summerlin, Grace Nguyen, Isabella Wohnhas. State College of Florida, Manatee-Sarasota. 8000 S Tamiami Trail, Venice, FL 34293.

Human population growth, resulting in new development and transportation expansion into undeveloped habitats, has resulted in increased wildlife mortality along Florida roadways. Some government entities are implementing a mitigation strategy: wildlife underpasses. Manatee County in west central Florida recently turned a new roadway into an opportunity to better protect urban wildlife, constructing four (4) underpasses designed specifically for wildlife. To help determine their effectiveness, multiple motion-activated cameras were installed by Manatee County Natural Resources to quantify underpass use by local wildlife. Working with digital image files, we have been documenting wildlife detections from January 2024 to December 2025. During that time, the cameras have detected more than 1,800 crossing events, and over 1,300 of these have been catalogued for species diversity and temporal activity. Twelve (12) species have been detected, including mammalian, reptilian, and avian taxa. The majority of species detections were raccoons (*Procyon lotor*) and opossums (*Didelphis virginiana*). Crossing events were concentrated around dawn (approx. 5 a.m. to 6 a.m.). Initial results suggest that there is a pattern: highest usage times appear to overlap with

periods of increased human roadway activity. Further analysis is ongoing to evaluate additional emerging patterns. These findings may inform future transportation planning for wildlife conservation in Manatee County, Florida.

**Keywords:** Road Ecology, Wildlife Underpass, Temporal Activity

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CMB-P14 **AI assisted analysis of camera trap data can inform the potential for human-elephant conflict: northern Ghana.**

Julia Carpenter, Mason Meers, Payton Phillips. University of Tampa. 401 W. Kennedy Blvd., Tampa, FL 33606.

Human-elephant conflict has become a major issue across sub-Saharan Africa, with intense mitigation efforts designed to keep elephants away from croplands and human habitation. Comparatively little attention, however, has been directed at potential causal factors beyond human population growth and the growth of cropland agriculture. We examined the possibility that grazing patterns of nomadic domestic cattle and goat herders influences resource availability for elephants in northern Ghana through a camera trap study in a biological corridor connecting Ghana and Burkina Faso. Analysis of elephant (*Loxodonta africana*), cattle (*Bos taurus*), and goat (*Capra hircus*) migration patterns were used to characterize seasonal grazing in the survey area, which may affect resource availability for elephants and consequently predict human-elephant conflict. AI image identification via the Agouti platform was used to aid in analyzing a year-long dataset of more than 100,000 photos. Agouti's image identification tools were augmented by subsequent human verification, allowing effective monitoring of elephant and domestic grazing animals along the Red Volta River in northern Ghana. More than 2,000 cattle sightings and more than 300 elephant sightings suggest that cattle usage of the corridor peaks in early dry season, while elephant occupation increased later in the dry seasons. Domestic grazers may reduce the quality and quantity of fodder available to migratory elephant herds and thereby increase the probability of elephant impacts on cultivated cropland.

**Keywords:** West Africa, Human-elephant conflict, Wildlife corridors, Livestock grazing, Spatial ecology

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## CMS = COMPUTER/MATHEMATICAL SCIENCES

FRIDAY 09:00 a.m. – 09:45 a.m.
DR. JUAN CALDERON, Bethune-Cookman University, presiding

CMS-01 **Evaluating Domain-Specific and General-Purpose Foundation Models for Anatomical Localization.**
Michael Johnson, Xavier Merino. Florida Institute of Technology. 150 W. University Blvd. Melbourne, FL 32901.

Medical-specific foundation models such as CT-CLIP are designed for pathology detection tasks. This study evaluates their performance on an adjacent task: anatomical localization in CT scans. CT-CLIP (CLIP fine-tuned on CT-RATE) is compared with general-purpose vision models, CLIP via OpenCLIP (pre-trained on LAION-400M) and ViT (pre-trained on ImageNet-21k). Four experiments were conducted: (1) unsupervised clustering to assess whether CT slices group by anatomical region, (2) supervised classification of five anatomical regions (head, thorax, abdomen, pelvis, feet), (3) linear classifier testing to evaluate embedding separability, and (4) binary classification of lung versus non-lung anatomy. CLIP and ViT performed comparably or better than CT-CLIP on experiments (1) and (2). Linear evaluation on (3) showed near-linear separability of embeddings (99.4% accuracy). All models exceeded 99% accuracy on (4) lung detection, with CLIP showing slightly greater robustness under reduced training data. These findings challenge the common assumption that medical-domain fine tuning inherently confers advantages on adjacent non-diagnostic tasks. Although CT-CLIP is fine-tuned on paired CT volumes and radiology reports that reference anatomical structure, this domain specificity did not translate into superior performance on anatomical localization. Instead, models pre-trained at larger scale on diverse visual data produced embeddings that were equally or more effective for spatial recognition tasks. This suggests that anatomical localization depends primarily on global spatial structure rather than disease-specific semantics, and that scale and diversity of pre-training data may be more important than domain alignment in this setting. These results help delineate when medical-specific foundation models are likely to provide value and when general-purpose vision models may suffice for clinical workflows.

**Keywords:** medical imaging, computed tomography (CT), anatomical localization, image classification, model generalization

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CMS-02 **When Agents Can't See: Effective Emergent Communication for Multi-Agent Pursuit.**

Uchenna Njoku. Bethune-Cookman University. 640 Dr Mary McLeod Bethune Blvd. Daytona Beach, FL.

Cooperative multi-agent pursuit is an intuitive testbed for coordination under partial observability: several predator agents must surround and capture an evasive prey while each agent sees only a limited local window. In these settings, independent deep Q-learning can yield redundant chasing and missed containment, motivating explicit information exchange. This study investigates whether teams can learn a compact communication protocol without manually engineered signals. In a simulated grid-world pursuit domain, agents are trained using centralized training with decentralized execution (CTDE): agents access joint state information during learning, but each acts from its own observation plus received messages at test time. We evaluate three conditions: (1) physical observation without communication, (2) an unrestricted continuous message vector (high bandwidth), and (3) a bandwidth-limited discrete channel with a 2-bit vocabulary (four symbols). To enable learning with discrete symbols rather than continuous numbers, we use a mathematical estimator (Gumbel-Softmax) that allows neural networks to send clear, categorical messages while still learning from experience. Coordination is quantified by capture success, time to capture, and prey escape rate across low-visibility and noisy-observation settings, averaged over multiple map layouts. To interpret emergent structure, we relate symbol usage to agent–prey geometry (relative distance and bearing), inferred roles (chaser versus blocker), and train probing classifiers to predict tactical intent—approach, flank, or block—from emitted symbols. Results demonstrate that communicative agents develop structured, context-dependent signaling strategies that yield complementary path planning and improved containment. Notably, the 2-bit protocol matches continuous messaging while using far less bandwidth, indicating that efficiency pressure can produce interpretable, task-relevant communication. These findings provide a proof-of-concept for emergent coordination in bandwidth-limited environments.

**Keywords:** multi-agent reinforcement learning, deep q-learning, emergent communication, partial observability, discrete communication

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CMS-03 **Aerial-Ground Robotic Collaboration for Victim Detection and Assistance in Disaster Zones.**

Colaliya Rollyford. Bethune-Cookman University. 640 Dr Mary Mcleod Bethune Blvd, Daytona Beach, FL, 32114.

This project presents a heterogeneous swarm robotic system designed to support search and rescue operations in disaster environments. The swarm is composed of aerial and ground robots that work collaboratively to accelerate victim detection and assistance while minimizing human risk. Aerial robots are responsible for exploring the affected area, identifying victims, mapping hazards, and gathering critical environmental data. Once potential victims are located, the aerial agents transmit this information to nearby ground robots and help guide them through the environment, ensuring efficient navigation despite obstacles or structural damage. Ground robots are equipped to deliver essential resources such as medicine, food, and communication devices. When possible, they assist in transporting victims to safer areas. The coordination between aerial and ground agents is decentralized, enabling dynamic formation of subgroups that adapt to changing mission needs. Each robot contributes its local observations to the swarm, allowing for consensus on victim location and prioritization of rescue actions. All experiments are conducted in a simulated disaster environment using CoppeliaSim, allowing the team to evaluate communication, task allocation, and multi-agent coordination strategies. The proposed system aims to demonstrate the advantages of heterogeneous robotic collaboration for increasing efficiency, scalability, and safety in complex and time-critical search and rescue missions.

**Keywords:** Heterogeneous swarm robotics, Search and rescue operations, Multi-agent coordination, Simulated disaster environment

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## CMS Posters – 3:45 p.m.-6:30 p.m. Friday

CMS-P01 **Flood Mapping With Satellite Data Using UNET Network.**
Keanna Forbes. Bethune-Cookman University. 640 Doctor Mary McLeod Bethune Boulevard, Daytona Beach, FL.

Using synthetic aperture radar (SAR) to map floodwater in urban settings remains challenging due to the intricacy of backscattering mechanisms in populated areas. Flooding-affected open areas have little backscatter because calm water surfaces reflect specularly. Floodwater in populated regions causes double-bounce effects, the intricacy of which is determined by how the floodwater is arranged in relation to the nearby building facades. The investigation of interferometric SAR coherence has therefore been demonstrated to decrease the under-detection of floods in metropolitan areas. Furthermore, deep convolutional neural networks are well recognized for their tremendous potential in developing SAR-based flood mapping. Consequently, we provide an urban-aware U-Net model that maps the extent of flooding in urban areas using dual-polarization Sentinel-1 multitemporal intensity and coherence data.

**Keywords:** Urban Flood Mapping, Synthetic Aperture Radar (SAR), Interferometric Coherence, Deep Learning, Sentinel-1

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CMS-P02 **Real-Time Beach Monitoring Using AI and Computer Vision for Environmental and Safety Applications.**
Kisha Mulenga. Bethune-Cookman University. 640 Dr Mary McLeod Bethune Blvd. Daytona Beach, FL.

Coastal regions in Florida, particularly Volusia County, continue to face increasing exposure to rapid waterline changes driven by tropical systems and evolving climate patterns. These sudden shifts can disrupt coastal infrastructure, threaten public safety, and demand improved real-time monitoring tools that support early situational awareness. To address this need, we propose an automated system that analyzes live visual data from publicly accessible beach cameras to track shoreline behavior continuously. The framework captures real-time images from internet-connected cameras installed along Volusia County's coastline and processes them through a custom Deep Learning model built on a Multilayer Perceptron (MLP)

architecture adapted for semantic segmentation. The network categorizes each pixel into five key coastal components: sky, ocean, wet sand, dry sand, and beachside structures. This pixel-level interpretation is followed by a geometric correction stage that estimates perspective and spatial depth, enabling accurate measurement of the shoreline's position relative to each camera viewpoint. This approach allows continuous online estimation of shoreline movement and rapid identification of unusual patterns that may signal rising water levels or abrupt environmental changes. The model is trained using data from multiple beach locations to ensure robustness under varying lighting and weather conditions. Ultimately, the project aims to advance toward a scalable, autonomous coastal monitoring system capable of issuing real-time warnings and supporting long-term shoreline observation. Future extensions will incorporate predictive modeling for sea-level dynamics to enhance coastal management strategies and strengthen the region's resilience to environmental hazards.

**Keywords:** Coastal Monitoring , Shoreline Extraction, Semantic Segmentation, Deep Learning, Real-time Image Processing

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## ENG = ENGINEERING SCIENCES

FRIDAY 09:00 a.m. - 11:45 a.m.
SESHA SRINIVASAN, AND MUHAMMAD ULLAH, FLORIDA POLYTECHNIC UNIVERSITY**,** presiding

09:00 a.m. ENG-01 **Analytical Solution to the Unsimplified Incompressible Navier-Stokes Equations with Arbitrary Cauchy Data.**
Alan Longfellow. Florida Polytechnic University, Lakeland, FL.

A novel analytical solution to the incompressible Navier-Stokes equations for arbitrary flow geometries and Cauchy data is introduced to establish a mathematical theory of turbulence through a direct attack on the Millennium Problem from first principles. All nine advective terms are left fully nonlinear. The velocity field is first separated into rotational and irrotational parts in a Helmholtz decomposition.

The irrotational velocity is found by assembling standard vector calculus identities in potential flow while Leray projections are used to carefully handle irrotational and rotational velocity Cauchy data. The rotational velocity derivation is begun by taking the curl of the momentum equations twice, effectively replacing pressure with a Poisson integral of Cauchy data and the forcing terms with incompressibility preventing vorticity entanglement. The resultant pseudo-depressurized momentum equations are addressed by a heavily generalized integral transformation similar to the Cole-Hopf transformation, which captures all nine nonlinear terms in a coupled yet solvable triquadratic algebraic system in the velocity components whose coefficients satisfy heat equations. When said system is solved for the rotational velocity in terms of quartic polynomial roots, the root cause of turbulence is identified as multiplicity collapse of quartic root pairs. Cauchy data is reconciled between the heat equations and velocity components using the method of characteristics. The irrotational and rotational velocities are substituted into the Helmholtz decomposition and its Leray projections, finally resulting in velocity closure. Pressure is recovered when the velocity field is substituted into the standard pressure-Poisson equation. Existence, uniqueness, differentiability class, and kinetic boundedness are analyzed in the Millennium Problem context. Practical implementation is expected to shift CFD paradigms since HPC jobs requiring days would require mere minutes.

**Keywords:** fluid mechanics

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09:15 a.m. ENG-02 **Reconfigurable Hardware Architectures for Noise Filtering Algorithms.**

Venkata Phani Bhargav Kode. Florida Institute of Technology. 150 W University Blvd, Melbourne, FL 32901.

This thesis investigates noise cancellation techniques for speech signals using three well-known algorithms: Least Mean Squares (LMS), Normalized Least Mean Squares (NLMS), and Recursive Least Squares (RLS). Their performance is evaluated through MATLAB simulations in which clean speech is mixed with controlled noise levels to provide a consistent test environment. The study compares the algorithms in terms of convergence behavior, computational complexity, and improvements in signal-to-noise ratio (SNR). The results show that LMS of-

fers a simple structure but converges slowly, NLMS improves stability by normalizing the step size, and RLS delivers the strongest noise reduction and fastest convergence, though at a significantly higher computational cost. In addition to simulations, this work implements a complete noise-cancellation system on the Xilinx Zynq-7020 FPGA. All three filters are designed in Vitis HLS using fixed-point arithmetic, exported as synthesizable IP cores, and integrated into a unified architecture in Vivado. To enhance flexibility and reduce the hardware usage, Dynamic Function eXchange (DFX) is employed so that LMS, NLMS, or RLS can be loaded into a reconfigurable partition without halting or reprogramming the entire device. While the static multi-filter design fits comfortably within the device, the DFX approach further lowers LUT and DSP usage and improves timing due to reduced routing congestion. Power measurements also indicate reduced dynamic consumption, since only the active filter remains in the fabric. Overall, this work demonstrates a practical and resource-efficient FPGA platform for adaptive noise cancellation, with clear potential for real-time audio testing, ARM-driven partial reconfiguration, and extensions to more advanced filtering methods.

**Keywords:** Noise Cancellation Filters, Field Programmable Gate Array, Engineering

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09:30 a.m. ENG-03 **Green Sorption Media for PFAS Removal in Wastewater Matrixes.**

Jinxiang Cheng. University of Central Florida, 4000 Central Florida Blvd, Orlando, FL 32816

Per- and polyfluoroalkyl substances (PFAS) are persistent contaminants frequently detected in wastewater effluent and are challenging to remove due to their chemical stability and wide range of structures. This study evaluated two green sorption media, BAIPGEM (bagasse biochar, perlite, ZVI, clay, sand) and ZEBIPGEM (zeolite, bagasse biochar, perlite, ZVI, clay, sand), for multi-PFAS adsorption and assessed the performance of the selected media under fixed-bed conditions representative of practical filtration treatment. Batch kinetic tests were conducted for seven PFAS species (PFOS, PFOA, PFNA, PFHxS, GenX, PFBS, and PFBA) to compare adsorption behavior and estimate equilibrium uptake. Adsorption was compound-dependent across both media, reflecting PFAS structural

effects. Overall, ZEBIPGEM exhibited stronger uptake for several PFAS species of both long-chain PFAS (PFOA, PFOS, and PFHxS) and short-chain PFAS species (PFBS and PFBA), while BAIPGEM showed higher adsorption capacity for PFNA and GenX only. Kinetic analysis indicated that adsorption dynamics were better described by a pseudo-second-order framework than pseudo-first-order behavior, suggesting that site reactivity and multi-parameter interactions contributed to PFAS uptake rather than simple physical partitioning alone. To translate batch findings to continuous treatment, a triplicate downflow fixed-bed column study was performed. Breakthrough profiles demonstrated a consistent retention hierarchy, with PFOS showing the highest-level removal (80%-100%) and earlier breakthrough for the more mobile PFAS (PFBA and PFBS). Column breakthrough data were further interpreted using commonly applied adsorption models, where a fractal-like Thomas formulation provided improved agreement relative to conventional forms, especially for species exhibiting stronger non-ideal transport and competitive effects. These results demonstrate that green sorption media can achieve selective PFAS attenuation in wastewater matrices and provide modeling insights that can support the design and optimization of scalable PFAS adsorption systems.

**Keywords:** PFAS, adsorption, sorption media, fixed-bed column, breakthrough modeling, wastewater treatment

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09:45 a.m. ENG-04 **Investigation on Thermal Behavior and Kinetics of Loblolly Pine Biomass and Kaolin Clay Co-Pyrolysis.**

Russell Smith, Toufiq Reza. Florida Institute of Technology. 150 W University Blvd., Melbourne, Florida 32901.

This study investigates the thermal behavior and kinetic mechanisms governing the co-pyrolysis of loblolly pine (LP) and kaolin clay (KC), with emphasis on how mineral loading and heating rate affect biomass-mineral conversion. Thermogravimetric experiments were conducted under nitrogen atmosphere at 5, 10, and 20 ˚C min-1 for LP100, KC100, and three blends LP75KC25, LP50KC50, and LP25KC75, resolving devolatilization, Phase II, 130 °C to 400 °C, and both char-mineral transformation, Phase III, 400 °C to 900 °C. Increasing KC content systematically shifted mass-loss events to higher temperatures, suppressed peak weight-loss rates, and increased residual solids, reflecting thermal stabilization

and overlap between biomass charring and kaolinite dehydroxylation. Coats-Redfern analysis showed that in Phase II, LP100 and LP75KC25 were best described by diffusion-limited models, whereas higher KC fraction in LP50KC and LP25KC75 led to reaction-order mechanisms, indicating a growing influence of the mineral phase on devolatilization pathways of biomass. In Phase III, KC100 followed chemically controlled kinetics associated with aluminosilicate restructuring, while co-feeding LP reduced apparent energy barriers and promoted more diffusion-limited char conversion in biomass-rich blends. While clay-rich blends progressively reverted to mineral dominated, reaction-order behavior. Heat rate further modulated these trends by shifting DTG peaks and inducing mechanism switching at an intermediate blend ratio of LP50KC50. Overall, the results demonstrate that adjusting LP to KC ratio and thermal ramp provides a practical means to tailor decomposition pathways and kinetic regimes in biomass and mineral co-pyrolysis systems.

**Keywords:** Coats-Redfern, Co-pyrolysis, Kaolin Clay, Kinetics, Lignocellulosic Biomass

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10:00 a.m. ENG-05 **From Food Waste to Fuel: A Techno-Economic Study of Direct and Two-Stage Hydrothermal Liquefaction.**

Nafiz Ahmed. Florida Institute of Technology. 150 W University Blvd. Melbourne, FL.

More than 1.05 billion tonnes of food waste (FW) are generated globally every year, handling which is a major environmental concern. To remediate the problem, researchers have been looking into ways to convert this food waste into value added products. Due to high moisture content in the FW, hydrothermal liquefaction has emerged as one of the most viable solutions. In this process the FW macromolecules are broken down in high temperature (275-350 °C) and high pressure (10-25 MPa) to smaller molecules in presence of water and a crude oil like organic phase called biocrude is produced along with a solid phase, an aqueous phase and a gas phase. This biocrude can be further upgraded into sustainable aviation fuel (SAF), marine fuel, and other renewable products. However, construction of a large-scale unit for HTL capable of handling the harsh process conditions greatly hampers the process economics. A two-stage process with a low temperature (<200 °C) pre-treatment stage may therefore help the process economics by

reducing the scale of HTL reactor. So, in this study a biocrude synthesis plant was designed to convert 100 tonne/day wet FW into biocrude by direct HTL (case I) and two-stage HTL (case II) to compare the process economics. Using the process designed for both cases, total capital investment (TCI), manufacturing cost, and breakeven selling price of biocrude was calculated. Moreover, return on investment (ROI) was calculated to assess the preliminary economic feasibility of the two cases. Finally, a sensitivity analysis was performed on both cases to identify the most influential parameters on breakeven selling price of biocrude. The results provide insight into the economic feasibility of two stage HTL relative to conventional direct HTL and highlight key cost drivers for future optimization and scale up.

**Keywords:** Sequential HTL, Techno-Economic Assessment, Biocrude, Breakeven Selling Price, Return on Investment

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10:15 a.m. **BREAK**

10:30 a.m. ENG-06 **The Effect of Reaction Temperature on Biofuel Production from Food Waste by Two-Stage Hydrothermal Liquefaction Process.**

Victoria Fotia, Nafiz Ahmed. Florida Institute of Technology. 150 W University Blvd, Melbourne, FL, 3290.

Every year, roughly 1.3 billion tons of food is wasted globally. Most often the waste is sent to a landfill if not composted. Both methods of disposal produce NH3 and CH4 which can cause adverse effects to the environment. Food waste is a rich carbon material that can be turned into a value-added product to help mitigate waste and serve the environment. Typically, thermochemical conversion is used to create a desired product. However, food waste's high moisture content is not ideal for common processes such as pyrolysis and gasification. Alternatively, hydrothermal liquefaction (HTL) utilizes moisture from food waste as well as added moisture for necessary solid to liquid ratios to create a crude like oil. This crude oil made from the biomass is called biocrude. HTL, while moisture friendly, does come with its own limitations. A large volume reactor would be needed to

contain the intense heat and pressure associated with HTL. The cost of such reactors limits the availability for researchers and industry alike to conduct such work. Instead, utilization of two-stage HTL could accommodate the limitations of single-stage HTL. The first stage would be conducted at milder temperatures and would reduce the sample volume, allowing the second stage to be conducted in a much smaller reactor. With two-stage HTL being the focus of the study, first stage HTL was conducted at 140-200°C and second stage HTL, the main stage of HTL, was conducted at 275-300°C. The biocrude was analyzed to determine the quality using CHNS elemental analysis, boiling point distribution analysis, FTIR, and GC-MS. While the yield of two-stage HTL was not much greater than that of single-stage HTL, the quality of the oil was significantly better. Based on the resulting biocrude, two-stage HTL is a viable alternative to single-stage HTL, overcoming limitations and increasing the product's quality.

**Keywords:** Sequential HTL, Bio-oil, Low-temperature hydrothermal pretreatment, HTL reaction mechanism, Boiling point distribution.

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10:45 a.m. ENG-07 **Elucidating the impact of aqueous phase recycling on recovery and physicochemical properties of biocrude.**
Md Mostafizur Rahman, Jasmine Gordon, Toufiq Reza*. Department of Chemistry and Chemical Engineering and Sciences, Florida Institute of Technology, Melbourne, FL 32901, USA.

Organosolv lignin (OL) is a highly promising feedstock for biocrude production via hydrothermal liquefaction (HTL) due to its carbon dense, sulfur and ash free structure. However, the HTL of OL generates a substantial volume of aqueous phase containing toxic phenolic compounds which poses a significant challenge for process sustainability. Recycling the aqueous phase has emerged as a viable strategy to mitigate wastewater generation while potentially enhancing biocrude yield and quality. This study systematically investigates the effect of aqueous phase recycling on biocrude yield and physicochemical properties during the HTL of organosolv lignin. Recycling 80% of the WSO resulted in a maximum 12 wt% increase in biocrude yield at 290 °C compared to the non-recycled case. Furthermore, successive recycling at this ratio led to a continued increase in biocrude yield, accompanied by a corresponding decrease in solid char formation. This trend suggests that aqueous phase recycling effectively suppresses lignin repolymerization reactions, likely through the capping effect of WSO compounds and

enhanced stabilization of lignin-derived fragments in the biocrude phase. Although aqueous phase recycling led to a slight reduction in the higher heating value (HHV) of the biocrude, a substantial decrease in both density and viscosity was observed. These changes indicate an improvement in biocrude fluidity and handling characteristics, indicating the overall effectiveness of aqueous phase recycling as a process intensification strategy for lignin HTL.

Keywords: Biofuel, biocrude, hydrothermal liquefaction

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11:00 a.m. ENG-08 **Fate and Mobility of Inorganic Constituents in Sargassum-Derived Hydrochar and Biochar: A Kinetic Leaching Assessment.**
David Coutu, Robert Cheatham, Toufiq Reza. Florida Institute of Technology, 150 W University Blvd 250640 Melbourne FL 32901.

With the ever-increasing volumes of sargassum washing up on beaches across the Gulf Coast and Caribbean, the economic backbone of these coastal communities has been stretched to the verge of collapse. The toxic release of compounds such as ammonia and hydrogen sulfide from decaying sargassum has severely compromised vital industries, including tourism and fishing. This made the search for sargassum mitigation technologies paramount. Given sargassum's renewable feedstock qualities and its high moisture content, hydrothermal carbonization (HTC) and pyrolysis have been widely regarded as promising means to remediate the seemingly never-ending tides of sargassum. Both processes produce value-added substances: hydrochar and biochar. These substances are often used in agricultural applications. Still, due to sargassum’s high inorganic content, concern arose about possible soil contamination by elements such as arsenic and other heavy metals. Therefore, in this study, sargassum was first converted into hydrochar and biochar via HTC and pyrolysis. The inorganic composition was then measured using Inductively Coupled Plasma (ICP). The leaching kinetics were then studied over 24 hours under ideal composting conditions. The inorganic content of the solution was then studied at regular time intervals using ICP. The kinetic data was then applied to 5 different kinetic models, including liquid film diffusion control (LFDC), chemical reaction control (CRC), and the Jander Equation (JE). From these models, the driving mechanism was determined, and the leaching capabilities of each technology were studied. It was found that while HTC and pyrolysis both reduced the initial heavy metal content, over 24 hours,

the hydrochar leached significantly more heavy metals back into the solution than pyrolysis, highlighting the stability of biochar. In addition, using the kinetic models, it was observed that leaching occurred in a two-step process: diffusion for the initial 4 hours, followed by slow chemical reactions as the hydrochar and biochar matrices slowly degraded.

**Keywords:** Biochar, Hydrochar, Sargassum, Leaching, Kinetics

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11:15 a.m. ENG-09 **Phytotoxicity Reduction of Dairy Manure Hydrochar Through Solvent Washing.**

Alvaro Quinones, Bilash Devnath. Florida Institute of Technology. 150 W. University Blvd. Melbourne, FL 32901.

Hydrochar is a carbon-rich product created from the conversion of biomass using hydrothermal carbonization (HTC). This process effectively maintains the nutrient concentration of the initial biomass, making hydrochar an organic alternative for soil amendment. However, previous studies have shown that raw hydrochar contains high levels of phytotoxic compounds, hindering its use during plant germination. The purpose of this study is to evaluate the reduction of phytotoxicity of hydrochar by washing it with different solvents. In this study, hydrochar was produced from dairy manure, a nutrient-rich waste biomass, at three different temperatures (180, 220, 260 °C). Three solvents (water, 0.2 N nitric acid, and ethyl acetate) were used to wash hydrochars prior to their use in a seed germination study. Non-washed hydrochar was studied as well to establish a control group reference for the baseline phytotoxicity of hydrochar, which is compared to solvent-washed hydrochar. Seed germination metrics were measured by the number of seeds germinated and root length over the course of 2 days, which were analyzed using the grow index (GI) to determine the impact of the three solvents in reducing the phytotoxicity of hydrochar. Solvent treatment substantially reduced phytotoxicity compared to untreated hydrochar. Temperature-dependent variations in phytotoxicity were observed, suggesting that HTC conditions influence the composition of phytotoxic compounds. The results of this study provided insight into hydrochar phytotoxicity and solvent treatment to enhance its effectiveness as a soil amendment for plant cultivation.

**Keywords:** Dairy Manure, Hydrochar, Soil Amendment, Seed Germination, Phytotoxicity

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11:30 a.m. ENG-10 **Baseline Phytotoxicity and Dose-Dependent Biochar Amelioration of Martian and Lunar Regolith Simulants.**

Savannah Madairy, Bilash Devnath. Florida Institute of Technology, 150 W University Blvd, Melbourne, FL 32901

Future interplanetary agriculture will require a clear understanding of how Martian and Lunar regolith's affect plant growth. Previous studies have shown that plants exhibit poor growth in these soils however, the underlying causes remain unclear. This study investigates the phytotoxicity of varying Martian and Lunar regolith's and evaluates whether biochar amendments can improve seed germination. Three Martian regolith simulants (Mars Mojave, Mars Global, and JSC Mars) and one Lunar regolith simulant (LHS-1) were examined in a controlled germination study. Biochar was applied at four amendment levels (0%, 1%, 3%, and 5% by weight) to establish baseline phytotoxicity (a control group) and assess dose-dependent ameliorative effects. Seed germination and early growth metrics were measured in terms of the number of seeds germinated as well as the root length over the course of 7 days and analyzed statistically to determine the impact of regolith type and biochar concentration on plant performance. The findings of this study provided critical insight into regolith-specific phytotoxicity and establish biochar amendment strategies to enhance plant cultivation in simulated extraterrestrial soils.

**Keywords:** Interplanetary, Biochar, Regolith, Phytotoxicity, Extraterrestrial

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## ENG Posters – 3:45 p.m.-6:30 p.m. Friday

ENG-P01 **Assessment of Microcystin-LR Prevalence and Water Quality Covariation Across a Freshwater–Estuarine System.**

Sunday Sam Egon, Arianna Jimenez, Eric Milbrandt Dingbao Wang, Woo H. Lee. University of Central Florida. 12800 Pegasus Drive, Orlando, FL 32816-2450.

Microcystin-LR (MC-LR) poses water quality concerns in interconnected aquatic systems where hydrodynamic and biological processes interact. This study examined the occurrence and drivers of MC-LR across a linked lake–river–estuary gradient, sampling 13 locations from Lake Okeechobee through the Caloosahatchee canal, river, and estuarine reaches for seven events spanning April to Dec 2025. Field measurements included specific conductance, nitrate, temperature, dissolved oxygen, chlorophyll a, and phycocyanin, while laboratory analyses quantified MC-LR and nutrient concentrations (ammonium, nitrite, ortho-phosphate, and total phosphate). Correlation analysis and principal component analysis (PCA) were used to evaluate relationships between MC-LR and environmental variables. MC-LR was widespread, with a mean concentration of 0.588 µg/L and a maximum of 2.34 µg/L, which showed strong positive correlations with chlorophyll ($r = 0.799$) and phycocyanin ($r = 0.722$), indicating a close association between toxin concentrations and cyanobacterial biomass. Moderate positive relationships were also observed between MC-LR and ammonium ($r = 0.529$), suggesting a linkage between reduced nitrogen forms and toxin occurrence. Temperature exhibited a weak positive correlation with MC-LR ($r = 0.274$), while discharge ($r = -0.47$) and rainfall ($r = -0.48$), indicating that increased flow and precipitation are associated with lower MC-LR concentrations, likely due to dilution or flushing effects. Principal component (PC1) was used in capturing the dominant co-variation among MC-LR (loading = 0.477), chlorophyll (0.455), phycocyanin (0.406), ammonium (0.365), and nitrate (0.351), reflecting a biological gradient associated with cyanobacterial biomass and toxin presence. Temperature and dissolved oxygen loaded positively on PC1, but to a lesser extent. The second principal component (PC2) was primarily influenced by specific conductance (−0.557) and total phosphate (0.432), representing variability associated with ionic and phosphorus conditions that did not strongly align with MC-LR distribution. These results show that MC-LR dynamics across the freshwater–estuarine system are strongly linked to biological indicators of cyanobacterial presence, with hydrologic conditions playing a secondary but moderating role.

**Keywords:** Microcystin-LR (MC-LR), Cyanobacterial harmful algal blooms (CyanoHABs), Hydrodynamics, Chlorophyll and phycocyanin, Principal component analysis (PCA)

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ENG-P02 **Modeling high glucose induced cellular stress using DLP-bioprinted vascular tissue constructs in a perfused bioreactor.**

Sampada Koirala[(1)], Martin Tomov[(2)] and Kunal Mitra[(1)]. [(1)]Department of Biomedical Engineering, Florida Institute of Technology, Melbourne, FL 32901; [(2)]Cytoink Solutions, Inc, Decatur, GA 30030.

High glucose metabolic stress significantly impacts cellular functions, leading to oxidative stress, impaired mitochondrial activity, and the progressive degradation of cytoskeletal and ECM integrity. In this study, we developed and applied a DLP-bioprinted vascular tissue model integrated with a perfused bioreactor to investigate cellular responses to high glucose-induced metabolic stress. Using a CELLINK LumenX DLP bioprinter, we fabricated serpentine vascular constructs in which human dermal fibroblasts were encapsulated within the hydrogel matrix, while the channels were seeded with HUVECs to establish a functional co-culture. Constructs were subjected to acute (24 h) and chronic (48 h and 72 h) high glucose (25 mM) media and then allowed to recover under normoglycemic conditions. MitoTracker Red CM-H2XRos and Hoechst 33342 staining in conjunction with image analysis were used to assess mitochondrial ROS and nuclear integrity. Results showed that high glucose metabolic stress increased significantly after 48 h of exposure. However, there was a subsequent decrease at 72 h reflecting cellular adaptation and possible recovery mechanisms. This study defines fibroblast resilience levels under glycemic stress and demonstrates the efficacy of 3D bioprinted vascular tissue constructs for modeling wound healing. The platform provides a physiologically relevant system to screen therapeutic candidates for diabetic microenvironments.

**Keywords:** Bioprinting, hyperglycemia, fibroblasts, vascularization, bioreactor

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ENG-P03 **Developing Unreacted Core Shrinking Model for Mass Transfer and Reaction Kinetics.**

Nafiz Ahmed. Florida Institute of Technology. 150 W University Blvd. Melbourne, FL.

Hydrothermal carbonization (HTC) is one of the most suitable processes for valorization of waste biomass through the production of biofuels, fertilizers, and other useful chemicals and materials. In this process, biomass macromolecules, in

presence of water and at moderate temperatures (180-270 °C) and pressures (1-10 MPa), are broken down into smaller intermediates which further react to yield a solid phase and an organic rich aqueous phase. Mathematical modeling of mass transfer and reaction kinetics of this process, which can enhance the understanding and optimization of the process, has been limited due to the harsh reaction conditions which limits acquisition of real time data from the reactor required for most detailed models. Therefore, in this study, a simple unreacted core shrinking model is used for modeling mass transfer and reaction kinetics of the HTC process. The model assumes that as HTC reaction progresses, a porous product layer is formed around the reactive biomass surface and the dissolution of organic compounds from the solid biomass hinders the transfer of water to the biomass surface and thereby slows the process down. Leveraging literature data of solid mass yield, several important lumped parameters containing – Thiele modulus, reaction rate constant, diffusion coefficient, stoichiometric coefficient, etc. were estimated. These parameters were then employed to assess the controlling mechanisms across different particle geometries and HTC operating conditions. The analysis reveals distinct regimes in which HTC is reaction limited or diffusion limited, providing valuable insights for reactor design, process optimization, and feedstock selection.

**Keywords:** Hydrothermal Carbonization, Mass Transfer Modelling, Shrinking-Core Model, Kinetic Parameter Estimation, Thiele Modulus

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ENG-P04 **Recovery of Near-Critical and Critical Materials from Unconventional Resources: Review on Composition and Recovery.**

Russell Smith, Laura Guidugli, Mohammadreza Shokouhimehr, Toufiq Reza. Florida Institute of Technology. 150 W University Blvd., Melbourne, Florida 32901

The United States generates enormous quantities of unconventional secondary resources that collectively contain substantial in-place inventories of near-critical and critical materials, yet in literature remains fragmented across feedstocks, inconsistent in reporting, and often qualitative, limiting cross-stream comparisons and actionable prioritization. This review addresses that gap by constructing a harmonized, quantitative dataset spanning three dominant U.S. unconventional resource classes, electronic waste (E-waste), phosphogypsum (PG), and coal

wastes (C-waste), and coupling representative bulk elemental compositions with annual national mass generation to produce a compositional atlas of near-critical (Al, Cu, Si, and U) and critical materials (Co, Dy, Ga, Ir, Li, Mg, Nd, Ni, Pr, Pt, and Tb) expressed as annual in-place inventories (tons yr-1) on a logarithmic basis. State-level geographic maps further reveal strong regional clustering driven by industrial infrastructure and policy, while highlighting key data gaps, especially in state-resolved E-waste mass flows. To move beyond resource quantification toward decision-relevant screening, we introduce the Critical Material Recoverability Index (CMRI), a transparent rubric that compresses five dimensions: grade (G), impurity burden (I), technology readiness (T), production cost (C), and environmental risk (E), into a single 5-25 score to benchmark disparate feedstock-flowsheet combinations on a common scale. Finally, we synthesize the current recoverability technology landscape as an evolving, feed-agnostic stack and emphasizing how selectivity, reagent or energy integration, co-product valorization, and co-location with existing infrastructure govern scalability and sustainability. Together, the atlas and CMRI framework provide a quantitative roadmap for prioritizing unconventional resources, identifying dominant bottlenecks, and targeting R&D and deployment pathways that strengthen domestic critical material supply chains.

**Keywords:** Critical materials recovery, Unconventional resources, Rare earth elements, Sustainability

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ENG-P05 **Influence of extraction solvents on biocrude derived from hydrothermal liquefaction of lignosulfonate.**

Md. Mostafizur Rahman, Jasmine Gordon. Florida Institute of Technology. 150 W University Blvd. Melbourne, FL.

Lignosulfonate (LS), a byproduct of the sulfite pulping process, represents a promising feedstock for biocrude production via hydrothermal liquefaction (HTL) due to its carbon-rich structure and large-scale industrial availability. However, biocrude extraction efficiency and product quality are strongly governed by the choice of extraction solvent. Although several studies have examined the influence of extraction solvents on HTL derived biocrude, none have focused on feedstocks that are structurally comparable to LS, which is expected to exhibit distinct

depolymerization, solubilization, and extraction behavior. Furthermore, the combined effects of solvent polarity and HTL temperature on extraction performance have not been systematically investigated, despite the critical role of temperature in controlling lignin depolymerization pathways and the molecular composition of the resulting biocrude. Accordingly, this study comprehensively evaluates the effect of four extraction solvents with varying polarity: toluene (Tol), dichloromethane (DCM), ethyl acetate (EtAc), and methyl ethyl ketone (MEK), across an HTL temperature range of 270–310 °C. The results show a consistent increase in biocrude yield with increasing solvent polarity at each HTL temperature. MEK achieved the highest biocrude yield of 32.1 ± 1.9% at 290 °C, whereas DCM and Tol exhibited their lowest yield of 6.8±0.6 and 2.8±0.5% at this temperature, highlighting a strong interaction between HTL temperature and solvent selectivity. MEK-extracted biocrude also exhibited the highest carbon content, while DCM-extracted biocrude showed the highest energy content, attributed to its preferential extraction of hydrogen-rich aliphatic compounds. Thermogravimetric analysis (TGA) revealed a higher fraction of heavy residue in MEK and EtAc extracted biocrude, explaining their higher extraction yields. In addition, the elevated aromaticity index of MEK and EtAc extracted biocrude indicate a greater abundance of aromatic compounds, consistent with GCMS analysis, whereas DCM and Tol preferentially extracted aliphatic-rich fractions. Overall, these findings provide mechanistic insights into solvent–temperature–biocrude interactions and offer guidance for solvent selection to optimize lignin-based HTL process design.

**Keywords:** Hydrothermal liquefaction, biocrude, waste lignin, waste to energy

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ENG-P06 **Technoeconomic Assessment of *Sargassum* Derived Hydrochar and Biochar.**

Eva Shealy, Robert Cheatham. Florida Institute of Technology. 150 W. University Blvd. Melbourne, FL 32901.

Massive volumes of *Sargassum* continue to wash up on shores throughout Florida, the Gulf of America, and the Caribbean, creating persistent challenges for coastal communities. Accumulations of decomposing *Sargassum* release harmful gases that threaten public health, marine ecosystems, and coastal tourism. These severe impacts have motivated the development of treatment strategies that mitigate

health and environmental risks while recovering value from this pervasive biomass. This work evaluates the economic potential of collecting *Sargassum* for conversion into hydrochar and biochar through hydrothermal carbonization (HTC) and pyrolysis respectively. Techno-economic analysis (TEA) was performed for an HTC process operating at 180, 220, and 260 °C with a 30-minute residence time, followed by thermal activation at 600 °C under inert conditions. The same was performed for biochar production via pyrolysis at 400, 600, and 800 °C with a 30-minute residence time. Process designs included all major equipment, including pumps, mixers, heat exchangers, reactors, filters, dryers, storage tanks, and particulate control units. Economic performance was evaluated over a 12-year plant lifetime, and sensitivity analyses were conducted to assess the effects of feedstock cost, product selling price, processing capacity, and *Sargassum* moisture content. All modeled cases achieved profitability within three years of operation. For HTC, return on investment (ROI) decreased with increasing reaction temperature, yielding values of 191%, 165%, and 140% at 180, 220, and 260°C, respectively. Biochar production via pyrolysis demonstrated higher overall profitability, with ROIs of 354%, 352%, and 338% at 400, 600, and 800 °C, also showing declining profitability with rising temperature. Sensitivity analysis revealed that feedstock acquisition cost was the dominant variable in the profitability for the HTC systems while moisture content was the most influential for pyrolysis systems. These results suggest that thermochemical valorization of *Sargassum* is a viable strategy for managing red tide while generating valuable carbon materials.

**Keywords:** Thermochemical conversion; Process design; Biomass valorization

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ENG-P07 **Agentic LLM for Driver Supervision and Safety Aware in Vehicle Assistance.**

Bongiwe Mkwananzi, Aldridge Kalenga, Buchizya Mwase, Rohan Poudel, Daniel Williams, Caroline Deck, Patrick Currier. Bethune-Cookman University. 640 Dr Mary McLeod Bethune Blvd, Daytona Beach.

We are developing a research prototype of a safety aware, privacy preserving in vehicle AI assistant where a locally deployed LLM (Ollama) acts as an agentic

orchestrator for shared autonomy, driver state supervision, and personalized interaction. The LLM is bootstrapped with system level behavioral constraints and performs structured tool calling over a modular stack that is partially implemented and under evaluation, including driver identification and cabin personalization, affect and vigilance inference, driving style assessment, and semi-autonomous fallback control. Driver authentication uses multimodal biometrics (face recognition and fingerprint) to retrieve on device profiles for mirrors, seat, climate, and media settings, while leveraging calendar context and mobility priors for intent support and proactive trip planning. A Driver Monitoring System estimates distraction, drowsiness, and affective state from facial cues, and a driving evaluator computes safety indicators such as lane keeping error, weaving, speed compliance, and headway or TTC violations. The LLM fuses these signals into a hierarchical risk management dialogue with graduated interventions. Under elevated risk, it can trigger a CNN based controller to perform minimal risk maneuvers, while logging events for auditability.

**Keywords:** In-vehicle agentic LLM, Driver monitoring system (DMS), Multimodal biometrics authentication, Safety-aware shared autonomy, Privacy-preserving on-device AI

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ENG-P08 **Decentralized Bio-Inspired Task Allocation for Search and Rescue UGV Swarms.**

Providence Pangira, Juan Calderon. Bethune-Cookmn University. 640 Dr Mary McLeod Bethune, Daytona Beach, FL, 32114.

We present a decentralized, bio-inspired task allocation framework for homogeneous unmanned ground vehicle (UGV) swarms in disaster response scenarios such as earthquakes, floods, and landslides. The approach is motivated by natural swarms where robust collective behavior emerges from simple local interaction rules and local information sharing through indirect coordination, which helps remove centralized bottlenecks and single points of failure. Each UGV is modeled as an agent whose motion results from a weighted combination of interaction vectors, including obstacle repulsion, neighbor repulsion, attraction toward the swarm centroid, and attraction to a global goal. A Python simulator implements

these forces to study grouping, obstacle avoidance, and sensitivity to tuning parameters. On top of this navigation layer, we define core rescue missions such as area exploration, deployment of communication centers, victim communication, and supply transportation, and we map tasks to robot features and behavior enablers to support decentralized role assignment. Initial demonstrations show dynamic reallocation from exploration to communication relay placement, victim support, and supply retrieval in a multi task rescue workflow. Future work will extend the framework to heterogeneous swarms that combine UAVs and UGVs for complementary sensing and payload capabilities, and it will complete quantitative evaluation and benchmarking against centralized baselines under realistic communication limits and sensing noise.

**Keywords:** Swarm robotics, Unmanned ground vehicles (UGVs), Decentralized control, Task allocation, Bio-inspired algorithms

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## ENV = ENVIRONMENTAL CHEMISTRY AND CHEMICAL SCIENCES

FRIDAY 9:00 a.m.- 11:00 a.m.
JEROME WILLIAMS, ST. LEO UNIVERSITY, presiding

09:00 a.m. ENV-01 **Novel Biomimetic Strategy for Concurrent Enhancement of Stability and Functionality of Merocyanine Photoacids.**
Pavithra Liyanage, Yi Liao. Florida Institute of Technology. 150 W University Blvd Melbourne FL 32901.

Merocynine photoacids (MCHs) are becoming increasingly popular across various applications in fields such as materials science, energy conversion, chemical synthesis, and biomedicine, and they are currently being explored for industrial applications as well. However, the practical utility of these MCHs has become limited due to several factors, including hydrolysis, higher dark acidity, and the average solubility in aqueous solutions. To overcome these limitations, a membrane-mimetic strategy was employed based on the structure of the cell membrane, by incorporating the most widely used MCH into sodium dodecyl sulfate

(SDS) micelles. The spectroscopic analyses, including UV-Vis absorption and NMR data, confirmed that the MCH is located at the micelle-water interface. Precisely, the positively charged indolenium moiety is embedded in the micellar core, while the phenolic moiety remains exposed to the aqueous phase. This arrangement protects the photoacid from hydrolysis while stabilizing its ability to release protons into the surrounding solution. Furthermore, the aqueous half-life of the photoacid increased by a hundred times, extending from days to nearly half a year in 15 mM SDS solution. Moreover, the aqueous solubility of the MCH increased in several orders of magnitude while reducing the dark acidity to a considerable extent. These improvements together enhanced the molecule's functionality as a photo-induced pH switch. Additionally, by modifying the MCH structure with a dodecoxyl substituent and combining it with SDS micelles, the hydrolytic degradation was completely stopped. These results demonstrate that incorporation of MCH into SDS micelles, with targeted molecular design, can enhance the stability and performance of MCHs, advancing their potential applications in aqueous environments.

**Keywords:** Merocyanine, Photoacids, Stability, Sodium Dodecyl Sulfate

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09:15 a.m. ENV-02 **Lunar Oxidative Vitrification Enhancement (LOVE): Towards In Situ Resource Utilization for Space Crop Production.**
Tyler DeScenza, Luke Fountain, Gioia Massa, Rafael Loureiro. Florida Institute of Technology, Melbourne, FL.

The Technological Readiness Level (TRL) of hydroponics for space agriculture applications surpasses that of regolith-based agriculture (RBA) on the Moon. Lunar regolith presents several challenges making it a sub-optimal growth medium for many plants. There are few studies that show regolith as a viable substrate for space crop production as is. However, there is the potential for Lunar regolith to contribute both to crop production and the larger goals of Bioregenerative Life Support Systems (BLSS) even if it does not serve as a direct substrate. One relevant approach is to modify regolith components by binding them via vitrification and sintering techniques to limit chemical leeching. High temperature vitrification and sintering have long been practiced on Earth, as vitrified composites benefit from increased weathering resilience and stability under a wide range of temperature fluctuations. Here we present a viable vitrification process for the fabrication

of Lunar Regolith composite ceramics. Our process is based on the composition of Lunar Highland Simulant 1 (LHS-1) which is similar in properties to classical ceramics with iron oxide glaze. Materials generated by this process were evaluated for their ability to support crop growth in hydroponic systems as an alternative to substrates like Lightweight Expanded Clay Aggregate (LECA). We consider this hybridization of regolith-based agriculture with hydroponics in terms of its improved in situ resource utilization (ISRU) as well as its capacity to support plant growth both alone and as a component of a BLSS.

**Keywords:** TRL, BLSS, LECA, ISRU, Vitrification, Hydroponics

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09:30 a.m. ENV-03 **Co-solvothermal liquefaction of food waste and glycerol for sustainable biocrude oil production.**

Rakesh Bhowmick, Toufiq Reza. Department of Chemistry and Chemical Engineering, Florida Institute of Technology. 150 W. University Blvd. Melbourne, FL 32901.

The conversion of biowaste into biofuels has gained attention due to the dire need for sustainable energy solutions in the US in recent years. Owing to the rising volume of food waste (FW), producing biofuel from FW can address both waste management issues and provide a sustainable fuel alternative. Among numerous thermal conversion techniques, solvothermal liquefaction (STL) is the most promising cutting-edge thermochemical pathway for producing biocrude oil from biowaste, such as FW, potentially reducing dependence on traditional energy sources, such as fossil fuels. Unlike conventional hydrothermal liquefaction, STL employs organic solvents to break multiple chemical bonds in waste feedstocks via hydrolysis, dehydration, decarboxylation, deoxygenation, and repolymerization at high temperatures and pressures. Owing to the abundant supply (a major byproduct of biodiesel production) and capacity to contribute hydrogen, solvent such as glycerol has been used for liquefaction. Therefore, to examine the impact of glycerol content on biocrude yield and quality, this study investigated the co-solvothermal liquefaction (Co-STL) of FW. Thus, glycerol and water were mixed at ratios of 1:0, 3:1, 1:1, 1:3, and 0:1, and the Co-STL temperature was maintained at 280-320 °C for 30 minutes. The GC-MS report revealed that the produced biocrude oil is primarily composed of hydrocarbons, ketones, aldehydes, phenols, esters, alcohols, nitrogen-based compounds, and organic acids. The maximum amount of

biocrude oil was obtained at 320 °C (81.57 ± 1.59 wt.%), with a heating value of 34.15 ± 0.55 MJ/kg, utilizing solely glycerol as the solvent. The findings indicate that STL is a promising and viable technology for converting FW into sustainable biocrude oil, aiding in achieving circular bioeconomy goals.

**Keywords:** Solvothermal liquefaction, biocrude, HHV, glycerol, waste management

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09:45 a.m. ENV-04 **Dual Waste Valorization: Phosphorus Recovery from Dairy Manure and Oyster Shell Waste via HTC and Adsorption.**

Ricardo Irene, Bilash Devnath. Florida Institute of Technology. 150 W University Blvd, Melbourne, FL 32901

Over the past 20 years, the oyster market has grown substantially, with improvements in production and rising demand at the forefront of this growth.1,2 Based on these factors, it can be inferred that having such large growth in consumption of oysters, waste in the form of oyster shells tends to be produced. A proposed use for these oyster shells is sustainable fertilizer production and waste management. Calcined Oyster shells have been found to be capable of absorbing phosphorus and other nutrients, which are needed for plant growth.3 One source of phosphorus that is able to be absorbed by the calcined oyster shell is found in the acid-mediated HTC process liquid of dairy manure. This study demonstrates a novel two-stage process for phosphorus recovery from dairy manure, combining hydrothermal carbonization (HTC) and calcined oyster-shell adsorption. Dairy manure was subjected to HTC treatment at 160°C and pH 2 using either sulfuric or oxalic acid pretreatment, yielding a phosphorus-enriched process liquid and solid hydrochar. Both acid treatments achieved phosphorus solubilization exceeding 95%, with comparative analysis revealing differential efficacy between sulfuric and oxalic acid. The phosphorus-containing process liquid was subsequently treated with calcined oyster shell powder (900°C), where an optimal shell concentration was identified for maximum phosphorus adsorption. Isothermal and kinetic studies were performed to characterize the adsorption mechanism and sorption dynamics. Results demonstrate that calcined oyster shells effectively recover dissolved phosphorus from HTC-processed dairy manure liquids, establishing a circular economy pathway for converting dual waste streams, dairy manure and oyster shells, into a recoverable nutrient product.

**Keywords:** Oyster shell, Dairy Manure, Waste, Hydrothermal Carbonization, Phosphorus Recovery

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10:00 a.m. **BREAK**

10:15 a.m. ENV-05 **Harmful Algal Bloom Remediation via Poly-aluminum Chloride Modified Biochar.**

Eva Shealy, Robert Cheatham. Florida Institute of Technology. 150 W. University Blvd. Melbourne, FL 32901.

Harmful algal blooms (HABs) are increasingly becoming a major concern for coastal communities. They pose a growing threat to coastal ecosystems, public health, and local economies. The species *Karenia brevis* is known for causing widespread environmental and economic damage throughout the Gulf and southern Atlantic coasts. Thus, a solution to remediate HABs from the environment is increasingly necessary. This study investigates an environmentally informed strategy in which biochar produced from loblolly pine (LP) is modified with polyaluminum chloride (PAC) and used as a coagulant to remove HAB cells from seawater. Three different methods were used to produce the modified biochar: pretreatment with dissolved PAC, post-treatment with dissolved PAC, and physical mixing of undissolved biochar and PAC. For the pre-treated samples, raw LP was mixed with PAC in deionized (DI) water at ratios of 1:2, 1:5, and 1:10, then activated at 600 °C for 30 minutes. For post-treated samples, biochar was mixed with PAC in DI water at the same ratios. Mixed samples were produced by physically mixing biochar and PAC at the same previously discussed ratios. A variety of characterization methods were used to analyze the properties of the modified biochars. Surface porosity was quantified using N2 adsorption-desorption analysis, while scanning electron microscopy was used to examine surface morphology. Energy-dispersive X-ray spectroscopy was employed for elemental surface mapping, X-ray powder diffraction for crystallinity analysis, proximate and ultimate analyses for chemical composition, and zeta potential measurements to determine the surface charge and particle size distribution. Each modified biochar was tested to determine efficacy in removing *Karenia* and brevitoxin from seawater at the benchtop scale. Preliminary results indicated that physical mixing was the most practical method, achieving about 67% removal of HAB cells from solution.

**Keywords:** Marine remediation; algal toxin adsorption; coagulation

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10:30 a.m. ENV-06 **Dopamine's Neurotoxin Metabolite: Synthesis of 3,4-Dihydroxyphenylacetaldehyde DOPAL in Parkinson's Disease Pathogenesis**

Joven Jose, Mia Alamo Acosta, Benjamin Kalb. Southeastern University, 1000 Longfellow Blvd. Lakeland, FL

Parkinson's disease (PD) is a progressive neurodegenerative disorder affecting nearly 2% of individuals over the age of 65. The disease is characterized by the degeneration of dopaminergic neurons in the substantia nigra, leading to motor symptoms such as tremors, bradykinesia, rigidity, and postural instability. Although the etiology of PD remains idiopathic, growing evidence suggests that toxic dopamine metabolites play a significant role in neuronal damage. One such metabolite, 3,4-dihydroxyphenylacetaldehyde (DOPAL), has been implicated in dopaminergic neurotoxicity due to its ability to damage nigrostriatal terminals, contributing to dopamine depletion. Existing synthetic routes have obtained DOPAL in four steps, involving three chromatographic purifications, with an overall yield of approximately 4%. This lower yield limits DOPAL availability for further mechanistic and therapeutic studies. To investigate further efficient and high-yielding DOPAL synthesis, another metabolite of dopamine, DOPAC (3,4-Dihydroxyphenylacetic acid), was utilized as the starting compound. This route began through the application of a THP protecting group, an essential step in stabilizing the ester intermediate. Following the THP protection, the compound was then reduced with DIBAL-H (diisobutylaluminum hydride) in anhydrous tetrahydrofuran (THF) at -20°C to yield the corresponding aldehyde. THF was found to coordinate well with DIBAL-H, stabilizing the reagent and improving control over the reduction. The use of THP protection and controlled DIBAL-H reduction improved reaction efficiency and minimized degradation. Infrared (IR) and nuclear magnetic resonance (NMR) spectroscopy analyses confirmed the successful formation and structural integrity of DOPAL. The overall yield of this method is significantly higher than the yield reported in earlier syntheses. This study postulates an efficient synthetic approach to DOPAL using DOPAC as a precursor. Improved availability of DOPAL will facilitate further investigation into its role in

Parkinson's disease pathogenesis and support the development of targeted therapeutic strategies aimed at mitigating dopamine-derived neurotoxicity.

**Keywords:** Parkinson's, Neurotoxin, Dopamine

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10:45 a.m. ENV-07 **Discovery of marine natural products with antibiotic effects from an *Aplysina* sp.**

Jennifer Sharr[(1)], Amy E. Wright, Ph.D.[(2),] and Priscilla Winder, Ph.D.[(2)]. [(1)]Indian River State College, 3209 Virginia Ave, Fort Pierce, FL 34981; [(2)]Harbor Branch Oceanographic Institute 5600 US 1 North, Fort Pierce, FL 34946.

Many bacterial species have become resistant to current antibiotics; therefore, the discovery of new antibiotics is critical to fight bacterial infection. Natural products have been an innovative source for new medicines with over 70% of antibiotics being derived or based on compounds from nature. This project focuses on contributing to the discovery of marine natural products with antibiotic effects. Over a 10-week period, extracts from sponges collected during the 2024 Harbor Branch Oceanographic Institute at Florida Atlantic University research expedition to Puerto Rico were tested for their antibiotic activity against Methicillin Resistant *Staphylococcus aureus* (MRSA). A new species of sponge in the genus *Aplysina* demonstrated significant antibiotic activity and was selected for further bioassay-guided purification. An extract of the sponge was prepared and fractionated using various forms of chromatography until two pure compounds were isolated. These pure compounds demonstrated strong antibiotic effects and were identified using Mass Spectrometry and Nuclear Magnetic Resonance. Database searches revealed these two compounds have been previously discovered and reported to have antibiotic activity. One of the pure structures, Aeroplysinin I, has an MIC of 6.25 µg/mL, demonstrating significant antibiotic activity. Comparably, the control Chloramphenicol demonstrates an MIC of 3.5 µg/mL. Sponges were selected for study as they produce unique defensive compounds as sessile organisms. The remaining sponges collected during the 2024 cruise will undergo further testing by the Harbor Branch Oceanographic Institute Natural Products Chemistry Team to pursue the discovery of novel compounds with antibiotic properties.

**Keywords:** Marine natural products chemistry, Antibiotic resistance, Sponge-derived compounds

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**ENV Posters – 3:45 p.m.- 6:30 p.m. Friday**

ENV-P01 **The investigation of synergistic photocatalytic degradation of methylene blue and ibuprofen using fixed $TiO_2$.**

Saeedeh Babaee, Bo Wang. Department of Chemistry and Chemical Engineering, Florida Institute of Technology, Melbourne, FL, 32901.

Emerging contaminants (ECs), such as pharmaceuticals and personal care products (PPCPs), cannot be effectively removed by conventional wastewater treatment processes. Ibuprofen (IBP) is a commonly used PPCP that enters wastewater through incomplete human metabolism and pharmaceutical effluents. Photocatalysis has been applied to degrade organic pollutants such as IBP, and titanium dioxide ($TiO_2$) has been widely used as a photocatalyst to transform IBP into less toxic compounds. However, most studies have focused on the treatment of single compounds, with few investigating the degradation of IBP in the presence of other coexisting substances. Methylene blue (MB) is a synthetic dye commonly found in wastewater, which can also be degraded through photocatalytic processes. In this study, the synergetic combinational treatment of IBP and MB using $TiO_2$ was investigated. A 3D-printed structure was applied to support the $TiO_2$ materials, which minimizes the need for post-treatment separation and also makes the structure reusable. The removal efficiencies of IBP and MB were measured under simulated solar radiation. Our results indicate that the 3D-printed structures exhibited high stability during water treatment and could be reused multiple times. Although the removal rate of single pollutants was not significantly improved, the removal efficiency of combined pollutants was significantly higher than that of the individual pollutants treated separately. In summary, the study provided a potential new approach for synergistic combinational waste treatment in wastewater systems, which could be an efficient way in future EC removal.

**Keywords:** Photocatalysis, Wastewater treatment, Emerging contaminants, Ibuprofen, Methylene blue

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ENV-P02 **Reaction pathways and kinetics for glycerol-assisted solvothermal liquefaction of food waste.**

Rakesh Bhowmick, Toufiq Reza. Department of Chemistry and Chemical Engineering, Florida Institute of Technology. 150 W. University Blvd. Melbourne, FL 32901.

The sustainable conversion of food waste (FW) into biocrude oil via solvothermal liquefaction (STL) presents a potential pathway for renewable energy production and waste valorization. Besides, due to high availability and the capacity to donate hydrogen, which enhances the hydrolysis of biowaste, glycerol has been used as a liquefaction solvent. To identify reaction pathways and rate-controlling steps for designing an efficient thermochemical process, reaction kinetics were studied. This work aimed to formulate a kinetic model to predict the yields of biocrude, solid, process liquid organics, and gaseous product, and the STL experiments were conducted at various temperatures (280-320°C) and times (15-480 min). A reaction framework was proposed, and the kinetic parameters were computed employing the least-squares approach with a MATLAB optimization algorithm. At 280°C, the lowest biocrude yield (35.04 wt.%) was obtained at 15 min, and the highest (62.27 wt.%) was obtained at 60 min reaction time. The boiling-point distribution revealed that the biocrude contained more lighter fractions as the reaction time increased. The proposed model was compared with experimental data and implemented to predict the optimal process parameters for producing biocrude at maximum capacity.

**Keywords:** Solvothermal liquefaction, biocrude, reaction pathways, kinetic model, waste management

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ENV-P03 **Hydrothermal Pathways for Resource Recovery from Indian River Lagoon Sediment.**

Savannah Madairy, Robert Cheatham. Florida Institute of Technology, 150 W University Blvd, Melbourne, FL 32901

In recent years, sediment accumulation in Florida's Indian River Lagoon, commonly known as "muck," has compromised water quality, threatened aquatic plants and destabilized entire ecosystems. As a result, sediment removal has become a necessity, raising the challenge of how to manage the recovered material. Therefore, in this study, it was desired to study the existing characteristics of the

recovered sediment and then improve those characteristics by creating a hydrochar via hydrothermal carbonization (HTC). Three different HTC temperatures were used: 180, 220, and 260oC. The generated hydrochar was characterized using proximate and ultimate analysis for a detailed chemical composition analysis, scanning electron microscopy for morphology appearance analysis, X-ray powder diffraction for crystallinity analysis, N2 adsorption-desorption for surface porosity quantification, and Fourier transform infrared to observe the hydrochar's functionality. The heavy metal and inorganic characteristics were observed using inductively coupled plasma spectroscopy. Finally, in order to observe the sediments capacity as a soil amendment, a grow-out study was conducted in which microgreens were grown for one month, using a combination of different ratios of commercial biochar and an optimum carbon-to-nitrogen ratio of 25:1. Results showed that biochar-amended sediment effectively repurposed lagoon muck while improving soil quality and supporting microgreen growth.

**Keywords:** Muck, Hydrochar, Biochar, Hydrothermal Carbonization

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ENV-P04 **Molecular analysis of mangrove sediment from the Indian River Lagoon: Microbial composition & biosynthetic gene clusters.**
Joseline Aguilar, Maria Medrano, Kyle Bartow, and Tom D'Elia. Indian River State College 3209 Virginia Avenue, Fort Pierce, FL 34981.

Florida's Indian River Lagoon (IRL) supports extensive black mangroves (*Avicennia germinans*), whose highly stressed sediments harbor uniquely adapted and diverse microbial communities. These conditions often select for microbes with specialized metabolic capabilities, including rich repertoires of biosynthetic gene clusters (BGCs). Genome mining of mangrove sediments can therefore uncover novel secondary metabolites with ecological and biotechnological value. The objective of this study was to investigate microbial community diversity and BGC abundance in black mangrove sediment samples collected across the IRL. Sediments were sampled from sites in Vero Beach and Fort Pierce, Florida, and total soil DNA was extracted and sequenced using the Oxford Nanopore MinION. Bioinformatic analysis showed that microbial profiles varied across sites and years (2024–2025). Overall, Proteobacteria and Actinobacteria were the most abundant phyla, together comprising over 80% of each sample's microbial composition. Alpha diversity values were similar across locations and years, with Shannon indices of 2.08, 1.95, and 2.01 for Vero Beach 2024, Vero Beach 2025, and Fort

Pierce, respectively. Beta diversity analysis did not indicate statistically significant differences among samples. AntiSMASH analysis identified 125 total BGCs, including RiPP-like, NRPS, terpene, and homoserine lactone clusters. Several Pseudomonas-associated clusters showed high-confidence matches to known biosynthetic regions and contained regulatory genes, core biosynthetic genes, and transport-related genes. Motif and binding-site analyses further supported predicted regulatory elements within certain clusters. This preliminary genomic survey highlights key microbial phyla and diverse BGCs within mangrove sediments, underscoring their potential as a source of novel bioactive compounds.

**Keywords:** Indian River Lagoon, Oxford Nanopore sequencing, mangrove sediment microbiome, biosynthetic gene clusters, genome mining

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ENV-P05 **Dissolved oxygen effects of green algal growth and antioxidant capacity of their extracts.**

Kayla M. Simpson, Addison Kight, Makayla Birdsong, Anna Church,and Melba D. Horton. Southeastern University, l 000 Longfellow Boulevard, Lakeland, Florida, 3380l.

Green algae, including colonial and solitary forms, produce oxygen through photosynthesis and synthesize compounds with potential pharmaceutical applications. Recent studies have highlighted bioactive antioxidant compounds in green algal species and their ability to neutralize harmful free radicals, protecting cells from oxidative stress implicated in various diseases. This study investigated the relationship between dissolved oxygen levels and growth of the colonial species *Volvox* and *Eudorina* under different light intensities. Simultaneously, the quantity of bioactive hot-water extract and its antioxidant capacity were compared between a colonial species (*Volvox*) and solitary species (*Euglena*). Cultures were maintained under controlled laboratory conditions at Southeastern University with varying light intensities. Live and dead cells were quantified using automated cell counting over a four-week period, and dissolved oxygen saturation was measured weekly using DO tablets. Results showed a negative correlation between algal growth and dissolved oxygen in both *Volvox* and *Eudorina* cultures under high light intensity, likely due to density-dependent metabolic shifts during growth period that led to oxygen depletion. No significant difference was observed in the

amount of hot-water extract obtained between colonial and solitary species. Furthermore, ferric reducing antioxidant power (FRAP) assays of both species' extracts showed no detectable absorbance or antioxidant activity. These unexpected results likely resulted from methodological limitations identified through literature review. Future work will employ organic solvent extraction methods and higher biomass-equivalent concentrations to more accurately assess antioxidant potential.

**Keywords:** Green algae, Bioactive compounds, Antioxidant potential, Dissolved oxygen, Growth

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ENV-P06 **Phytochemical profiling and antioxidant capacity of sunflower (*Helianthus annuus*) microgreens grown in Martian regolith simulant and Earth soil.**

D. Wiggins, D. Ramos, D. P. Maul and M.C. Pina. College of Health Sciences and Technology, St. Thomas University, 16401 NW 37th Avenue, Miami Gardens, FL 33054.

Microgreens are valued for their exceptional nutritional profiles, particularly their high vitamin C content. As progress toward Mars colonization accelerates, investigating sustainable food production in extraterrestrial environments becomes increasingly critical. Assessing whether plants grown in Martian regolith simulant (MGS-1) retain their beneficial phytochemicals and antioxidant properties is essential for developing bioregenerative life-support systems for future space missions. This study compared the antioxidant capacity and phytochemical profiles of sunflower microgreens cultivated in Ocean Forest potting soil and MGS-1 simulant. Microgreens were grown for one month in both substrates, then dried at 37 °C, ground, and extracted using absolute ethanol and a 50% ethanol/50% water solution. Phytochemical diversity was analyzed via thin-layer chromatography (TLC), antioxidant activity was measured using the 2,2-diphenyl-1-picrylhydrazyl (DPPH) assay, and vitamin C content was quantified through iodine redox titration. TLC revealed similar phytochemical profiles across both soil types, and vitamin C levels were comparable. Notably, the DPPH assay indicated that MGS-1 extracts achieved equivalent % inhibition of free radicals at lower concentrations than Ocean Forest extracts. These findings suggest that soil type does not

significantly influence the diversity of bioactive compounds or antioxidant capacity in sunflower microgreens. Martian regolith simulant can support microgreens with acceptable nutritional quality, positioning it as a promising substrate for space agriculture. (Funding provided by Hispanic Serving Institutions Higher Education Grants Program 2022-77040-37619 from the USDA-NIFA).

**Keywords:** microgreens, antioxidants, phytochemicals, Mars colonization, sunflowers

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ENV-P07 **Phytochemical Screening and Antioxidant Properties of *Dicerandra immaculata* (Savannah Mint), an Endangered Plant of FL.**
Gabriella Espinoza, Lena Bigby, Raynn Daniels. St. Thomas University. 16401 NW 37th Ave, Miami Gardens, FL 33054.

Nature has long been a source of therapeutic remedies, offering a wide range of medicinal plants rich in bioactive compounds. Many of these phytochemicals exhibit antioxidant properties by scavenging free radicals and modulating oxidative stress pathways. Antioxidants play a crucial role in delaying or preventing oxidative damage to cells. In this study, we investigated the antioxidant potential of *Dicerandra immaculata* (Savannah Mint), an endangered plant native to Florida, through thin layer chromatography (TLC) analysis, phytochemical screening, and antioxidant assays, including total phenolic content (TPC), radical scavenging activity DPPH (2,2- diphenyl – 1-picrylhydrazyl), and flavonoids concentration. Plant material was separated into stems and flowers, and extracts were prepared with ethanol alone and a 90:10 ethanol – hexane mixture by maceration. TLC analysis revealed the presence of compounds based on polarity. The DPPH assay measured free radical scavenging activity, using ascorbic acid as a reference standard. TPC was quantified against a gallic acid standard curve, and flavonoid concentration was calculated with quercetin calibration line. Each extract was tested in triplicate for antioxidant analysis. These findings provide insight into the antioxidant potential of *Dicerandra immaculata* (Savannah Mint) and lay the groundwork for future research. The study underscores the phytochemical significance of this species for medicinal plant studies. (Funding provided by U.S. Department of Education STEMPACT P031C210035, Miami Dade College Honors College grant, and Hispanic Serving Institutions Higher Education Grants Program 2022-77040-37619 from the USDA-NIFA).

**Keywords:** Phytochemicals, antioxidants, endangered plants, chromatography, maceration.

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ENV-P08 **Phytochemical screening, Evaluation of Total Phenolic Content, and Antioxidant Activity of *Kalanchoe delagoensis* Leaf Extracts.**

Raynn Daniel, Relina T. Sthapit. College of Health Sciences and Technology. St. Thomas University, 16401 NW 37 Avenue, Miami Gardens Florida, 33054.

Natural products (NPs) have been intricately refined through evolution to generate bioactive compounds with remarkable potency and unique biological effects, resulting in unparalleled structural complexity and diversity. These plant-based phytochemicals produced by plants for their protection exhibit antioxidant activity by scavenging harmful free radicals and help protect from oxidative stress and chronic diseases. In this study, antioxidant activity of *Kalanchoe delagoensis*, a succulent herbaceous plant belonging to the Crassulaceae family and originally from Madagascar, was investigated through thin layer chromatography (TLC) analysis, phytochemical screening, antioxidant properties using different assays such as total phenolic content (TPC) and radical as scavenging activity DPPH (2,2- diphenyl – 1-picrylhydrazyl). Leaves were separated from the plant, and the extract is prepared using methanol alone by maceration method. Antioxidant activity of extracts is expressed as percentage DPPH radical inhibition and IC50 values using ascorbic acids as a standard. TPC analysis of the extract measures total phenolic content which is expressed as gallic acid equivalents using spectrophotometric method. For antioxidant activity, each extract was tested by triplicate. The significant linear correlation between the value of total phenolic content and antioxidant activity indicated the antioxidant potential of *Kalanchoe delagoensis* and provided the opportunity for further studies. The study also highlights its phytochemical significance for future medicinal plant studies. (Funding provided by U.S. Department of Education STEMPACT P031C210035).

**Keywords:** *Kalanchoe delagoensis*, antioxidant, free radicals, phytochemicals

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ENV-P09 **Predicting the Effects of Fatty Acids on the Binding of Chlorpromazine to Human Serum Albumin.**

Terence Oscar-Okpala, Seenith Sivasundaram, Vishwa Trivedi, Brandon Vernier. Bethune-Cookman University, 640 Dr Mary McLeod Bethune Blvd. Daytona Beach, FL.

Human Serum Albumin (HSA) plays a major role in the transport of endogenous ligands and therapeutic drugs in the blood. While the binding of fatty acids to Human Serum Albumin has been extensively studied, its effect on less popular drugs, such as chlorpromazine (CPZ), is less well understood. This project combines computational modeling and graphing to characterize the effects fatty acids have on CPZ-HSA interactions. Molecular docking simulations were performed with Auto Dock Vina to determine different binding poses and energies of CPZ and fatty acids (C12-C18) using different residues within HSA as the central coordinates. Initial analysis of the docking scores suggested that fatty acids and CPZ exhibit similar binding affinities, supporting competitive interaction rather than direct ligand displacement. To complement the single-ligand docking process, mathematical modeling is used to approximate and highlight potential residue-ligand coupling within HSA. Residue-level interaction graphs will be constructed from the docking ensembles, and an electrostatic model will be used to predict how fatty acid binding could perturb CPZ interaction strengths across the protein network. This will help us identify residues most susceptible to direct electrostatic interference in a possible two-ligand system. By reducing the complex protein-ligand system to interpretable network and graph representations, this approach will offer a cost-friendly approximation of competitive and allosteric effects. To validate the behavior of the HSA-CPZ complex with fatty acids with greater accuracy, molecular dynamics simulations will be performed using CHARMM36 and NAMD. These simulations will determine time-resolved contact probabilities and energetic fluctuations within the same binding regions and will also allow us to simulate in real time the interactions between the two ligands in HSA. Comparison between model predictions and molecular dynamics data will be used to improve our graph model, providing a scalable framework for screening drug-protein interactions in an ideal biochemical environment.

**Keywords:** Molecular Docking, Human Serum Albumin, Molecular Dynamics, Mathematical Modeling, Protein-Ligand Interactions

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ENV-P10 **Chemical Pathways of Endocrine-Disrupting Chemical (EDC) Contamination in Infant Formula.**

Renee Reardon. University of South Florida. 140 7th Ave S, St. Petersburg, FL 33701.

Endocrine-disrupting chemicals (EDCs) are increasingly recognized as contaminants of concern in infant nutrition due to their widespread presence in food contact materials and the heightened vulnerability of infants to hormonal perturbation (9,12). This review synthesizes current evidence on the occurrence, sources, and health implications of EDCs in commercial infant formula, with a particular focus on migration from packaging materials such as metal cans, polymer linings, and multilayer plastics. Research across global markets indicates that bisphenols (including BPA, BPS, and emerging analogues), phthalates, and other plasticizers remain detectable in both liquid and powdered formula products despite regulatory restrictions (13). Analytical studies demonstrate that manufacturing steps—from raw ingredient handling to thermal processing and final packaging—contribute variably to contamination, with packaging identified as a primary source due to chemical migration under heat and storage conditions. Health literature highlights that even low-dose exposures during early life may disrupt neurodevelopment, immune function, metabolic pathways, and reproductive system programming. In addition to summarizing toxicological data, this review evaluates methodological differences in detection techniques, including advances in chromatographic separation and mass spectrometry that improve identification of bisphenol isomers and related compounds (5). Current regulatory frameworks in the U.S., EU, and other regions are compared, revealing inconsistencies in allowable limits, risk assessment approaches, and oversight of substitute chemicals. Overall, findings indicate a persistent need for stronger regulation, standardized analytical methods, and increased transparency in manufacturing practices. Protecting infant health will require coordinated efforts across research, industry, and policy domains to reduce EDC presence in formula products and ensure safer packaging alternatives.

**Keywords:** Infant, formula, EDCs, packaging, migration, bisphenols, phthalates, neurodevelopment, regulation, toxicity.

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ENV-P11 **Evaluation of Lead Content in City Water.**

Tosin Akinmolayan. Ave Maria University. 5050 Ave Maria Blvd Ave Maria, FL 34142.

Testing for impurities in water is essential to maintaining human health. Water testing can identify inorganic and organic compounds: heavy metals such as lead and mercury, soil, and microorganisms such as bacteria, viruses, and fungi, respectively. Purifying water from those contaminants is important for drinking water and for recreational water. The most severe health risk is posed by lead in water affecting 22 million people globally every year. Detrimental effects include behavioral/learning problems to as severe as seizures, coma, and even death. In the US, lead contaminates water by leaching out from lead containing pipes. The purpose of our study was to measure the lead content of drinking water and pool water in three cities: Ave Maria, Immokalee, and Naples. The water samples were evaluated using four water testing kits, namely Culligan Water Lab Test kit, Varify Premium Testing kit, Umlecoa 16 in 1 Water test kit and the SJ Wave 16 in 1 water test kit. They did not detect any lead in the sampled waters. These results suggest that the lead levels are below the detection levels of these tests, which is 0.015 mg/L or 0.015 ppm. The lead levels were less than 0.015 mg/L which are considered safe levels according to the US Environmental Protection Agency (EPA). The Food and Drug Administration (FDA) has a stricter requirement for drinking water, that is having less than 0.005 ppm of lead in the water. Further testing will be continued by concentrating the samples to evaluate them whether they also comply with FDA regulations.

**Keywords:** lead, drinking water, pool water

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ENV-P12 **Photoredox-Catalyzed TEMPO DIsproportionation toward Alcohol Oxidation.**

Caroline Evans. University of Tampa. 401 W. Kennedy Blvd., Tampa, FL 33606.

The stable nitroxyl radical TEMPO (2,2,6,6-tetramethylpiperidinyloxyl) undergoes disproportionation to generate the oxoammonium salt, an oxidant with broad

applications in organic synthesis. Conventional methods for TEMPO disproportionation typically require strong, caustic acids, limiting their compatibility with acid-sensitive substrates and raising sustainability concerns. In this work, we harness visible light energy into chemical energy via photoredox catalysis to promote disproportionation under mild and sustainable conditions. Fluorescence spectroscopy and Stern–Volmer quenching analyses were employed to investigate catalyst–substrate interactions and elucidate mechanistic pathways. Notably, the process proceeds efficiently in the presence of a mild acid too weak to initiate this process in the dark. This novel strategy enables substrate oxidation with high efficiency while maintaining compatibility with acid-sensitive materials. These findings not only provide mechanistic insight into the photophysical kinetics of TEMPO in photoredox catalysis but also highlight new opportunities for expanding the utility of oxoammonium salts in sustainable oxidation chemistry.

**Keywords:** Organic Photoredox Catalysis Green Chemistry

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## GEO = GEOSCIENCES

FRIDAY 11:30 a.m. - 12:15 p.m.
AL KARLIN, DEWBERRY AND BRUCE NOCITA, S&ME, INC., presiding

11:30 a.m. GEO-01 **The Need for High-Density Lidar Topography for Hydrography Mapping.**
Alvan Karlin. Dewberry, 1000 N. Ashley Drive, Tampa, FL

With over 1000 people per day migrating into the area, anthropomorphic change has affected the water routing in Southwestern Central Florida. The population influx since 2018, the last time that these county's topography was mapped, has resulted in topographic change to over 40% of the watersheds in this region. In 2024/2025, agencies in Hillsborough, Pinellas, and Manatee Counties in cooperation the U.S. Geological Survey and Dewberry, under the Data Collaboration Program, collected high-density, high precision lidar (light detection and ranging)

data to map the updates in topography in these counties. Analysis shows the importance of high-density lidar data for accurate channel detection and watershed modeling

**Keywords:** High Density Lidar, Channel Detection

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11:45 a.m. GEO-02 **Analyzing Future Extreme Hydrological Conditions in the Upper Amazon Basin. Case Study: Ucayali River.**
Juan Guerrero-Gallego, Nicolas Velasquez Giron, Steven Lazarus. Florida Institute of Technology. 150 W. University Blvd. Melbourne, FL.

Extreme wet and dry events strongly affect human and ecological systems, making it crucial to predict changes in their spatiotemporal patterns under a changing climate. In this sense, the Upper Amazon Basin (UAB) is critical to biodiversity and water security across several regions of Latin America, yet it is highly susceptible to climate variability and hydrological extremes. We analyzed precipitation patterns in the Ucayali River Basin (URB), one of the UAB's main tributaries. We assessed the current and mid-century (2050) hydrological variability in the URB using precipitation anomalies and the Standardized Precipitation Index (SPI), including basin-wide averages and spatial distributions. The analysis is based on observations and on bias-corrected high-resolution CMIP6 projections (10-model ensembles), under three scenarios (SSP1-2.6, SSP3-7.0, and SSP5-8.5). By 2050, under SSP1-2.6 (the low-emissions scenario), the frequency of dry conditions (negative precipitation anomalies relative to the climatological mean) could rise from around 20% of months in the 2020s and 2030s to nearly 30% by 2050, with the largest precipitation deficits occurring most often in August and September. Under SSP3-7.0 and SSP5-8.5, these effects are more pronounced spatially, with similar overall trends and a stronger dominance of dry conditions. To better characterize the extreme hydrological events, we used SPI to analyze interannual (SPI-12) and seasonal (SPI-6) patterns. Overall, our results suggest that dry and wet conditions are projected to intensify, even in low-emissions conditions, with wet conditions likely increasing in magnitude and dry conditions increasing in frequency. These results provide useful insights into the effects of extreme conditions across temporal scales, supporting water resource management and climate adaptation strategies in the URB and the broader UAB.

**Keywords:** Extreme Hydrological Events, Upper Amazon Basin, Precipitation Variability, CMIP6 Climate Projections, Water Resource Management

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12:00 p.m. GEO-03 **Integrating CDL High-Confidence Samples with Sentinel-2 for Crop Classification in the Navajo Nation.**

Varatharajaperumal Thangavel(1), Sudhagar Nagarajan(1), Madasamy Arockiasamy(1), Pias Kumar Biswas (2), George Sklivanitis(1). (1)Florida Atlantic University, 777 Glades Rd, Boca Raton, FL 33431, (2)Navajo Technical University, Lowerpoint Road, State Hwy 371 Crownpoint, NM 87313.

Reliable crop classification is critical for agricultural planning and food security assessment, especially in arid and resource-constrained regions where water scarcity and environmental variability strongly affect farming practices. Traditional field-based crop surveys are often limited in coverage, making satellite-based approaches essential for large-area crop monitoring. In the United States, detailed crop information is publicly available through the USDA Crop Data Layer (CDL). This study focuses on crop classification in the Navajo Nation using High Confidence Pixels (HCP) from the CDL for 2017 and 2022, which aligns with Census of Agriculture statistics. Sentinel-2 surface reflectance data were used to derive spectral indices, including the Normalized Difference Vegetation Index (NDVI), Enhanced Vegetation Index (EVI), Green Chlorophyll Vegetation Index (GCVI), and Land Surface Water Index (LSWI), computed within Google Earth Engine (GEE). Training samples were extracted from CDL HCP layers with ≥95% confidence and split into 80% for training and 20% for validation. The Random Forest classification achieved overall accuracies of 86.70% in 2017 and 83.71% in 2022 using the HCP-based training strategy. This improved crop-mapping framework provides more reliable crop distribution information, which can support seasonal planning, more efficient resource use (such as irrigation and inputs), and long-term agricultural decision-making in water-limited environments. Future work will include independent validation data, additional machine-learning models, and multi-year satellite analysis to improve consistency in agricultural monitoring for the Navajo Nation.

**Keywords:** Crop Mapping; Sentinel 2 data; Crop Data Layer; High Confidence Pixel; Random Forest Model

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**MED = MEDICAL SCIENCES**
*(Session A)*

FRIDAY 9:00 a.m. - 11:00 a.m.
MELISSA BORGEN, FLORIDA INSTITUTE OF TECHNOLOGY, presiding

09:00 a.m. MED-01 **Zero Valent Iron is a useful tool for the removal of coccidian oocysts from water.**
Madison K. Eshleman, Cory A. Petter, Matthew S. Tucker. Lake Erie College of Osteopathic Medicine 5000 Lakewood Ranch Blvd Bradenton, FL. 34211.

*Cyclospora cayetanensis* is a protozoan parasite responsible for thousands of cases of diarrheal illness annually. Infection occurs by ingestion of resilient oocysts in food or water, which persist for months in environmental sources. Research on *Cyclospora* remains limited because parasites cannot be propagated in vitro or in vivo, complicating efforts related to detection, recovery, and methodology. Therefore, previous studies have utilized surrogates (e.g. *Eimeria* spp.) that exhibit phylogenetic, structural, and biochemical relatedness to *C. cayetanensis*. Employing Zero valent iron (ZVI) is a novel approach for oocyst removal and detection due to its ability to bind parasites. In this study, we investigated the ability of ZVI to bind *Eimeria* oocysts by varying both the concentration of ZVI in solution and time of oocyst exposure. Concentrations of ZVI (10-50% w/v) were inoculated with ~220,000 *E. acervulina* oocysts and incubated for 5 minutes with shaking. After sucrose floatation and concentration, oocysts were counted by microscopy to assess recovery and ZVI-coating characteristics. Preliminary results found 20-24% of inoculated oocysts were recovered. Interestingly, 20% ZVI bound the greatest number of oocysts. Oocysts were coated with ZVI particles at each concentration, and 40% ZVI coated the most oocysts (31.1%). However, oocysts exposed to 50% ZVI exhibited the greatest aggregates of ZVI. These findings illuminate the potential use of ZVI as a control tool for *C. cayetanensis*. Future studies will focus on optimizing exposure time and evaluating magnetic separation methods for recovery of ZVI-bound oocysts from water or produce. Together, these preliminary results indicate the use of ZVI can be a cost-effective strategy in the surveillance and prevention of cyclosporiasis.

**Keywords:** *Cyclospora*, Control, ZVI, Waterborne, Detection

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09:15 a.m. MED-02 **Ultrafast-Electrochemical Detection of Cortisol Using Gold Nanoparticle–Modified CFMs via FSCV.**

Ralph Joseph Page, Garrett Matthews. Florida Institute of Technology, 150 W. University Blvd, Melbourne, FL 32901.

Cortisol is a key stress hormone that regulates energy allocation through glucocorticoid and mineralocorticoid receptor activation, influencing cardiovascular function, metabolism, immune response, and neurological activity. While tightly regulated under healthy conditions, cortisol dysregulation is implicated in autoimmune disorders, metabolic disease, cardiovascular dysfunction, neurodegeneration, and psychiatric conditions. These associations highlight the need for rapid, affordable, and real-time cortisol monitoring platforms to support clinical research and point-of-care (POC) diagnostics. Electrochemical sensing offers significant advantages for biomolecule detection, including high temporal resolution, sensitivity, portability, and compatibility with complex biological matrices. In this study, we investigate cortisol detection using carbon fiber microelectrodes (CFMs) modified with gold nanoparticles (AuNPs) and fast-scan cyclic voltammetry (FSCV). Electrochemical parameters were optimized on bare CFMs to resolve distinct cortisol redox signatures with 100 ms temporal resolution in tris buffer, selected to mimic artificial cerebrospinal fluid conditions. Electrode surfaces were subsequently functionalized with hydrophobic AuNPs to increase active surface area and enhance electron-transfer kinetics. Scanning electron microscopy and energy-dispersive X-ray spectroscopy were used to characterize AuNP-modified electrode morphology and elemental composition. Interference studies were conducted to evaluate sensor selectivity in the presence of biologically relevant species, and stability testing assessed signal reproducibility over repeated measurements. Artificial saliva was selected as a representative biological matrix for sensor validation due to its relevance in POC applications. Calibration curves were constructed to determine linear range and limit of detection. These results demonstrate that AuNP-modified CFMs combined with FSCV enable rapid, selective, and robust cortisol detection. This platform shows strong potential for future adaptation to in vivo cortisol monitoring and continuous stress-related biomarker analysis.

**Keywords:** Electrochemistry, FSCV, Gold Nanoparticles, Biosensor, Cortisol

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09:30 a.m. MED-03 **AI-Assisted, Next Generation Electrochemical Sensors for Multi-Analyte Detection**

Navoda Udawaththa, Ashley Daninger, Parth Ganeriwela, Siddhartha Bhattacharyya, Pavithra Pathirathna. Florida Institute of Technology, 150 W. University Blvd, Melbourne, FL 32901.

Understanding the complex interactions between neurotransmitters and neurotoxic metal ions is critical for identifying effective therapeutic strategies to treat neurodegenerative diseases. Our group has pioneered the development of novel multi-analyte electrochemical sensors based on multi-bore carbon fiber microelectrodes (CFMs) capable of simultaneously detecting up to four analytes using fast-scan cyclic voltammetry at ultrafast temporal resolution. In this study, we report targeted surface functionalization of four-bore CFMs to enhance sensitivity and selectivity toward chemically distinct analytes. Individual electrode bores were selectively modified with gold nanoparticles and Nafion coatings to enable the detection of $Cd^{2+}$ and serotonin, respectively, in the presence of mixtures containing other neurotransmitters and toxic metal ions. This selective surface modification strategy minimizes signal interference while preserving the advantages of concurrent multi-analyte measurements. In addition, we demonstrate that single-bore CFMs can detect analytes and predict their concentrations without relying on external calibration curves through the integration of artificial intelligence (AI)-based data analysis. Artificial neural networks and convolutional neural networks were employed to extract concentration information directly from voltammetric data. This AI-assisted approach represents a significant advancement toward next-generation electrochemical sensors, particularly for in vivo applications, as it eliminates the need for repeated external calibration and improves robustness in complex biological environments. Overall, this work highlights the synergistic integration of surface chemistry, multi-bore electrode architectures, and AI-driven analysis to advance real-time, multi-analyte neurochemical sensing.

**Keywords:** Four-bore Carbon Fiber Microelectrodes, Fast Scan Cyclic Voltammetry, Toxic Heavy Metals, Neurochemicals, Machine Learning–Assisted Electrochemical Sensing

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09:45 a.m. MED-04 **Development of a Novel ECM Hydrogel from Food-Grade Material.**

Vinicius M. Silva, Vipuil Kishore. Biomedical Engineering and Sciences, Florida Institute of Technology, Melbourne, FL 32901.

Gelatin methacryloyl (GelMA) is widely used in tissue engineering (TE). However, the toxicity of methacrylate systems is formulation-dependent, and monomer conversion is critical. Therefore, achieving a high degree of substitution (DS) for stability and mechanical strength, while maintaining biocompatibility with minimal amounts of Methacrylic Anhydride (MA), poses a challenge. Additionally, traditional phosphate-buffered saline (PBS) based methacryloylation is unsuitable for some clinical applications, leading to a rapidly degrading hydrogel. A carbonate-bicarbonate buffer solution (CBS) can replace PBS to improve reaction efficiency, reducing the volume of MA needed, and making the synthesis environmentally friendly and biocompatible. However, CBS produces a lightweight GelMA with poor mechanical properties and a low yield after lyophilization. We created a new methacryloylated-ECM (MECM) hydrogel to overcome these limitations and compared its degree of substitution, mechanical properties, morphology, biocompatibility, and stability with those of GelMA. The raw food-grade material is supplied in powder and fiber, with distinct characteristics. Therefore, three variations were methacryloylated at 20% (w/v): powder (MECM-P), fiber (MECM-F), and a 50:50 blend of both (MECM-2). Samples were polymerized with 0.01% LAP photoinitiator and 365 nm UV light at 17 mW/cm2. The TNBS assay showed DS values above 80% for all samples. MECM showed twice the mass conservation in the stability test, and a compressive modulus 10 times higher than GelMA (300 kPa vs. 30 kPa), while the ultimate compressive stress showed greater resistance for MECM-F (556±140 kPa) compared to GelMA (79±22 kPa). The Scanning Electron Microscopy images showed promising morphology, with cells attached to MECM fibers. The superior mechanical profile and stability of MECM suggest that these materials could be used for diverse applications.

**Keywords:** Gelatin, ECM, methacryloylation, biomaterial, hydrogel.

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10:00 a.m. **BREAK**

10:15 a.m. MED-05 **4D Printed Collagen-Nanosilicate Biphasic Scaffold for Bone-Ligament Interface Tissue Engineering.**

Diya Pillai Babu, Ananiah Piango, Yingnan Zhai, Linxia Gu, Akhilesh Gaharwar. Florida Institute of Technology. 150 West University Boulevard, Melbourne, FL 32901-6975.

Injuries to the bone-ligament interface when subjected to trauma or aging often treated with autograft or allograft therapies lead to subpar functional recovery of the defect site due to poor host tissue integration. Interface Tissue Engineering (ITE) employing biphasic scaffolds that provide region specific biophysical and biochemical cues is a promising strategy to guide functional regeneration of the bone-ligament interface. This study explores a 4D-printed magnetically actuated collagen-nanosilicate (nSi) biphasic scaffold, designed to provide osteostimulative cues on one phase via nSi incorporation and collagen anisotropy on the other phase offering ligamentous cues to augment tissue-specific cell differentiation and matrix augmentation. Methacrylated collagen I was combined with xanthan gum, photoinitiator, and paramagnetic particles to formulate a magnetically actuable biopolymer ink which was extrusion printed under a static magnetic field to induce collagen fiber alignment, followed by fibrillogenesis, UV, and genipin crosslinking. One half of the aligned collagen construct was then coated with nSi to generate a biphasic scaffold. SEM and cytospectral analysis confirmed and quantified the collagen fiber alignment in 4D scaffolds compared to randomly oriented control scaffolds. Methylene blue staining, ATR-FTIR, and EDX confirmed nSi localization to one scaffold half, validating biphasicity. AFM showed higher stiffness in the collagen-nSi phase, with genipin crosslinking increasing the stiffness of both phases. Initial data confirms the biphasic nature of the scaffold in terms of composition, topography, and mechanical stiffness. Ongoing research is examining the effects of these regional cues on cell response. Overall, outcomes of this study establish a promising bioengineering approach for bone-ligament ITE.

**Keywords:** 4D Printing, Interface Tissue Engineering, Bone-ligament Interface, Biphasic

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10:30 a.m. MED-06 **The Oral Microbiome as a Cardiovascular Biomarker: Bridging Dentistry and Cardiology.**

Jenale Alfonso, Andy Gomez. South Florida State College. 600 West College Drive Avon Park, FL 33825.

Cardiovascular disease (CVD) is the leading cause of death and disease worldwide. Among other risk factors, the link between oral health and systemic diseases, particularly CVD, has gained increasing attention in recent years. Periodontal disease, a chronic inflammatory condition affecting the gums and surrounding tissues, has been associated with an increased risk of CVD. Periodental pathogens can enter the bloodstream, triggering systemic inflammation that may contribute to cardiovascular complications. This on-going project aims to explore the potential correlation between periodontal health, oral microbiome and cardiovascular risk factors, such as hypertension and CVD. Oral samples are collected from patients visiting Dental Health Clinic at South Florida State College and analyzed using whole genome metagenomic sequencing. Study participants include patients diagnosed with CVD and controls without known cardiovascular or other systemic disease. The study evaluates the relationship between the oral health indicators, microbial profiles, and cardiovascular status. We will discuss the preliminary findings that reveal significant correlations between signatures, periodontal disease, and CVD, highlighting inflammatory pathways linking oral and systemic health. Based on the results, we have identified candidate microbial biomarkers associated with cardiovascular risk and are developing a LAMP-based rapid diagnostic assay for point-of -carte detection. We will discuss the test development strategy and protocol. This translational approach aims to support early risk stratification and personalized preventative care. Overall, this research underscores the potential of the oral microbiome as a noninvasive biomarker for cardiovascular disease and promotes the integration of dental care into cardiovascular risk management strategies. This research has been supported in part by a grant-in-aid of research from the Florida Endowment for the Sciences of the Florida Academy of Sciences, Bill & Lisa Jarrett Endowed Teaching Chair grant by South Florida State College Foundation and Pilot Project Grant by National Science Foundation.

**Keywords:** cardiovascular, dentistry, oral microbiome, rapid test

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10:45 a.m. MED-07 ***In Vitro* Refolding of Vault-like Protein Nanocapsules with a Novel Scaffolding Mechanism.**
Gabriela Breen, Martin Gonzales, Gracemarie Yeh, Tyler Delyon, Clare McNeill, Anika Lenci, Stephen Thong, and Rodney Burton. Department of Chemistry and Physics, Ave Maria University, Ave Maria, FL 34142, USA.

We attempted to refold denatured major vault protein (MVP) monomers into assembled vault-like nanoparticles in vitro using a novel scaffold-coordinated method. DNA or hyaluronic acid-binding tags were bioengineered onto the MVP monomers, allowing MVP to align rotationally and translationally along these linear molecules and limit their degrees of freedom. This was proposed to mimic the polyribosome assembly of vault nanocapsules in vivo. Tagged MVP variants were expressed in E. coli and purified under denaturing conditions. Dynamic light scattering showed the formation of nanoparticles with a hydrodynamic radius of ~26 nm, consistent with the formation of vault-like nanoparticles. This was confirmed by transmission electron microscopy, FRET analysis, and cargo loading of CFP-INT fusion. CFP- and YFP-tagged MVP showed FRET only in the presence of MVP with a DNA-binding tag. This is the first successful instance of bioengineering of homogenous and heterogeneous vault-like nanoparticles, and at a potentially much larger scale than current protocols.

**Keywords:** Vault; biochemistry; protein refolding; TEM; FRET

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## MED = MEDICAL SCIENCES
*(Session B)*

FRIDAY 9:00 a.m. - 11:00 a.m.
MELISSA BORGEN, FLORIDA INSTITUTE OF TECHNOLOGY, presiding

09:00 a.m. MED-08 **Using NAMD to Determine the Stability of Vault Proteins with Protamine Tags.**
Albert Jagels. Ave Maria University. 5050 Ave Maria Blvd. Ave Maria, FL.

In every human cell, there are multiple copies of a large protein complex called a vault. While it is the largest protein expressed, its function remains unknown. One

clue towards future knowledge of its function is its overexpression in cancer cells. Given its size, it likely functions as a delivery vehicle. Research is being conducted into modifying the Vault to be used as an intercellular drug delivery system for therapeutic use. The purpose of our study was to evaluate the role of protamine and DNA in the stabilization of the vault monomer protein (MVP) complex in silico. We used Alphafold3 to generate a 6 MVP complex with protamine tags, followed by the utilization of pymol to make a copy. The copies were aligned in an interface consistent with electron microscopy images. VMD (Visual Molecular Dynamics) was used to solvate the protein in a water box, and then NAMD (Nanoscale Molecular Dynamics) was utilized in order to run the equilibration simulation. The data shows that without the protamine tag and DNA, MVP monomers break away from each other. The presence of protamine tag and DNA enables the protamine's binding to the DNA, which in turn stablises the MVP interfaces. We hypothesize that the protamine-DNA complex can act as an easter egg-like hinge within the structure.

**Keywords:** NAMD, VMD, Alphafold, Vault, Computational

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09:15 a.m. MED-09 **Detecting the range of copy number variation in humans for an undergraduate genetics laboratory assignment using qPCR.**
M.R. Talafuse and S. Cronin. Department of Biology, Ave Maria University, Ave Maria, FL 34142.

While most protein-coding genes in the human genome are present in two copies, other sequences are present in 1 to 1000s of copies. These sequences in multiple copies are known as copy number variations (CNVs). Some CNVs in the human genome contribute to traits and diseases in the human genome and some CNVs may have no influence on phenotypes. We set out to develop an undergraduate laboratory to assess CNVs in students in a genetics course using qPCR. Primers were designed for quantifying relative copy numbers of five sequences: Mitochondrial MT-ATP6, LINE-1, ALU-1, OPN1M, and OPN1LW. The sequences were chosen to represent the broad variation in sequence number present in the human genome. MT-ATP6 is a mitochondrial gene which forms a protein that is a subunit of ATP synthase. LINE-1 sequences are remnant transposons present in half a million copies in the human genome. ALU-1 is another transposon of interest, and it is estimated to be present in over a million copies. OPN1MW and

OPN1LW produce the green cone opsin in the human eye, and it is anticipated the CNV will vary in part on the biological sex of the individual. Primers were designed to the single-copy autosomal gene SCN2A to use as a reference sequence. DNA was extracted from cheek cells and used for qPCR. We report on our data and the suitability of the procedure for classroom use.

**Keywords:** Copy number variation, sequences, qPCR, gene, human genome.

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09:30 a.m. MED-10 **Construction and Expression of RAD52-GFP Fusion Gene in Yeast as a Biosensor of DNA Damage.**

Jonathan Pawl. Ave Maria University. 5050 Ave Maria Blvd. Ave Maria, FL.

Environmental conditions and chemicals that damage DNA induce a DNA damage response in cells. In the yeast *Saccharomyces cerevisiae*, the RAD52 gene[SC2.1] is involved in the repair of double stranded DNA breaks and is activated in response to replication stress and ionizing radiation. The human homolog of RAD52 becomes essential for cancer cells which have defects in the BRCA1 and BRCA2 genes. Consequently, RAD52 is a potential target for cancer treatment. RAD52 is also of interest because of its change in expression in response to DNA damage, which could make it a useful indicator of exposure to mutagens. Accordingly, we set out: 1. to design and construct a C-terminal RAD52-GFP fusion protein, suitable for use in an undergraduate genetics lab looking at DNA repair in *Saccharomyces cerevisiae*. 2. Develop a protocol for gene editing in yeast suitable for use in an undergraduate molecular biology lab. 3. Make a eukaryotic biosensor suitable for detection of DNA damaging agents in environmental samples. We report on the in construction of the RAD52-GFP fusion by Golden Gate assembly, replacement of the native RAD52 by CRISPR-Cas9 in yeast, and expression of RAD52-GFP in response to known mutagens and environmental samples.

**Keywords:** DNA repair, *Saccharomyces cerevisiae*, biosensor, classroom lab

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09:45 a.m. MED-11 **Comparative Kinetic Profiling of HA-Binding Antibodies Across H3 Influenza Strains**

Mohamed Salem. Harvard Medical School, 25 Shattuck Street, Boston, MA 02115.

Influenza A viruses undergo continuous antigenic drift, enabling escape from pre-existing antibody responses and necessitating frequent vaccine updates. Hemagglutinin (HA), the primary target of neutralizing antibodies, evolves rapidly, posing a major challenge for durable vaccine design. To better understand how antibody responses adapt to viral evolution, we investigated the kinetic and binding evolution of an HA-directed antibody lineage across historical and contemporary H3 influenza strains. Using biolayer interferometry, we quantitatively measured binding kinetics between H3 HA antigens spanning 1968 to 2017 and antibodies representing different stages of lineage maturation, including the inferred unmutated common ancestor (UCA) and multiple affinity-matured variants. The UCA exhibited measurable binding only to older H3 strains, with no detectable binding to post-1999 viruses, indicating limited breadth and sensitivity to antigenic drift. In contrast, affinity-matured antibodies demonstrated significantly improved binding strength and expanded cross-strain reactivity, including recognition of modern H3 variants. These findings demonstrate that binding breadth is not an intrinsic property of naïve antibodies but is acquired through affinity maturation, enabling adaptation to ongoing viral evolution. Our results provide kinetic evidence supporting lineage-based approaches to vaccine design that aim to guide antibody maturation toward conserved HA features. Understanding the molecular and functional evolution of antibody lineages may inform strategies for the development of broader and more durable influenza vaccines.

**Keywords:** Antibody affinity maturation, Influenza hemagglutinin, Vaccine design

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10:00 a.m. **BREAK**

10:15 a.m. MED-12 **Analysis of Transcript Driven Metabolic Flux and Metabolic Associations in Human Tumors.**

Kamaleldin Kamaleldin, Isabella E. Vianna, Leif W. Ellisen, Bryce Ordway. University of South Florida, Tampa Florida

Understanding how gene expression drives functional metabolic activity in cancer remains a major challenge. While transcriptomic data is widely used to characterize tumors, gene expression alone does not always reflect actual metabolic behavior. This study investigates the relationship between transcript abundance and predicted metabolic reaction flux across diverse human cancer types to determine when transcription reliably predicts metabolic function and when additional regulatory mechanisms may dominate. We applied the METAFlux framework to publicly available RNA-seq datasets from multiple cancer cohorts, integrating transcriptomic data with genome-scale metabolic models to infer reaction-level fluxes using flux balance analysis. Gene expression profiles were used to compute metabolic reaction activity scores, followed by flux prediction and normalization. Pearson correlation analyses were performed between gene expression and predicted flux values across samples, generating transcriptome-wide gene-reaction correlation matrices. Analyses were conducted across nine cancer datasets, including breast, prostate, kidney, and brain tumors. Correlation patterns varied substantially by tumor type. Prostate and lymphoid cancers exhibited broader and stronger gene-flux coupling, suggesting tighter transcriptional control of metabolism, while glioblastoma and renal cell carcinoma showed weaker or more heterogeneous relationships. Several gene-reaction pairs, including those involving AAMP and AAMDC, demonstrated consistently strong correlations across datasets, indicating potential conserved influences on metabolic regulation. Cross-cancer comparisons highlighted pronounced tissue-specific variability in transcript-flux relationships. These findings demonstrate that transcript-flux coupling is highly context dependent and that gene expression alone does not uniformly predict metabolic activity across cancers. Flux modeling provides complementary functional insight beyond transcriptomics, enabling identification of metabolic regulation patterns that may otherwise be overlooked. This framework lays the groundwork for future multi-omic integration, including metabolomics, to better characterize tumor-specific metabolic vulnerabilities.

**Keywords:** Cancer biology, Cell Biology, Systems Biology, Computational Biology

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10:30 a.m. MED-13 **Pathogenic Gut Bacteria and Their Mechanisms in Colorectal Cancer Progression.**

Harman S. Bharath. South Florida State College. 600 W. College Dr., Avon Park, FL 33825.

Colorectal cancer (CRC) incidence is increasing at concerning rates among younger adults, a population historically considered at low risk. While genetic predisposition and environmental factors are well-established contributors to CRC, increasing evidence suggests that the gut microbiome plays a critical role in CRC development and progression. This meta-analysis examined published studies investigating the relationship between gut microbial composition and colorectal cancer, with a focus on identifying bacterial taxa consistently associated with CRC presence and tumor characteristics. The objectives of this study were to 1) identify bacterial species recurrently enriched in CRC patients compared to healthy controls, and 2) summarize proposed biological mechanisms by which these microbes contribute to colorectal carcinogenesis. Peer-reviewed human studies comparing gut microbiota profiles among healthy individuals, at-risk populations, and CRC patients were analyzed. Across multiple studies, CRC was consistently associated with increased abundance of *Fusobacterium nucleatum*, enterotoxigenic *Bacteroides fragilis*, and colibactin-producing *Escherichia coli*. These taxa were frequently localized to tumor tissue or enriched in stool samples from CRC patients. Reported mechanisms linking these microbes to CRC included induction of DNA damage, chronic inflammation, disruption of epithelial barrier function, altered host cell signaling pathways, and suppression of anti-tumor immune responses. Several studies also reported co-occurrence of these bacterial species, suggesting synergistic interactions that promote a tumor-supportive microenvironment. Overall, the reviewed literature supports a strong association between specific gut microbial signatures and colorectal cancer. These microbial profiles show promise as non-invasive biomarkers for CRC risk stratification, early detection, and disease monitoring. Microbiome-based screening approaches, utilizing stool samples or colonoscopic tissue biopsies, can serve as valuable complements to existing CRC prevention and diagnostic strategies as evidence continues to expand.

**Keywords:** Cancer, Colorectal, Biomarkers, Gut, Inflammation

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10:45 a.m. MED-14 **Evaluating Circulating miR-21 as a Non-Invasive Biomarker for Early Colorectal Cancer Detection: A Meta-Analysis.**

Carmelo Islas-Cardoso. South Florida State College. 600 W College Dr, Avon Park, FL 33825.

Colorectal Cancer is one of the leading causes of cancer-related deaths, and early detection is essential for improving patient survival. However, the traditional screening methods such as colonoscopy and stool-based tests, while effective, are either invasive, expensive, or simply inconsistent for patient adherence. Therefore, there is a growing need for new techniques that are less invasive, cheaper, effective, and more tolerable for the patients. Blood-based biomarkers analyzed through liquid biopsies may offer such a technique. MicroRNAs, the small non-coding RNAs, have emerged as promising candidates due to their stability in the bloodstream and their effective association with underlying tumorigenic pathways and molecular dysregulation. This project analyzes the current research through a meta-analysis. We reviewed recent studies on serum levels of various miRNAs like miR-21, miR-92a, miR-155, and miR-29a in colorectal cancer patients, and miR-21 consistently showed high diagnostic performances, and elevated the opportunity of early detection in the early stages of colorectal cancer. Therefore, miR-21 was chosen as the focus of this meta-analysis to evaluate its ability as a diagnostic and prognostic marker for colorectal cancer. We conducted the meta-analysis of studies selected from PubMed, Google scholar and Web of Science following PRISMA guidelines. All samples were collected using liquid biopsy and miR levels were analyzed through quantitative RT-PCR. Results support the idea that miR-21 could serve as a non-invasive tool for earlier colorectal cancer detection. As testing methods become more consistent and larger datasets are gathered, it will help confirm biomarker validation and enhance the use of liquid biopsies for colorectal cancer in routine medical care.

**Keywords:** Colorectal Cancer, miR-21, Liquid Biopsy

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## MED Posters – 3:45 p.m.-6:30 p.m. Friday

MED-P01 **Methods of Reducing Wrinkles and Folding in Microtomy**
Dhruv Panwar and Daniel Packert. Barry University, 11300 NE 2nd Ave, Miami Shores FL 33161

Histotechnology is the method used by histotechnologists and histotechnicians to prepare human tissues for the pathologist for diagnosis of diseases. Tissue preparation in the histopathology lab requires different methodologies including specimen receipt, fixation, tissue processing, embedding, microtomy, staining, and diagnosis. Errors in any of these procedures can result in a poor specimen that cannot be interpreted by the pathologist. Microtomy is also one of the more difficult procedures in histopathology and it involves cutting a thin section of the specimen, placing that section in a water bath, and adhering it to a slide for analysis. Poor microtomy can result in tissues with excessive folding and wrinkles. This makes diagnosis very difficult. In this study we intend to lower the surface tension of the water using common reagents found in the histopathology lab. The reagents will be added directly to the water bath and the sections will be floated and then placed on slides. The effects on the tissue and amount of wilding and wrinkles will be recorded. Our goal is to decrease folding and wrinkling without affecting the tissue. This could potentially help with diagnosis from the pathologist, while aiding the histotechnologists and technicians in providing reliable and wrinkle-free sections routinely.

**Keywords:** histology, microtomy, hisopathology, pathology

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MED-P02 **COVID-19 Vaccine Choices of Pre-Medical Students: Insights from the Health Belief Model.**
Alexander Kanfer and Kelley Davis. Nova Southeastern Univ. College of Osteopathic Medicine. 3400 Gulf to Bay Blvd, Clearwater, FL 33759.

During pandemics individual physicians remain trusted by the public while trust in pharmaceutical agencies and governments fall. Physicians can educate, allowing people to arrive at their own informed decisions regarding vaccine safety. This study aimed to better understand the ways future physicians form views towards

innovative medical technologies. This study relied on a 15-question survey administered to post-baccalaureate students. Of 61 eligible participants 35 responded. Data was collected on participant demographics, three dimensions of the Health Belief Model, sources of information, COVID-19 vaccine/booster choices, and participant's expectations as future physicians. 94.3% of respondents received the COVID-19 vaccine and 68.6% received booster shots. The most common answers for the primary source contributing to participants' vaccine decision were discussion with parents or other close family member, personal readings and research on vaccine studies, discussion with medical professionals, undergraduate coursework, and being required by their employer. Participants who did not receive any COVID-19 vaccines or booster shots generally perceived the vaccines to have high potential negative effects and had a low concern of experiencing serious COVID-19 infection. Participants who received COVID-19 vaccines generally perceived the vaccines to have low potential negative effects and had a high concern of experiencing serious COVID-19 infection. This study presents trends that groups with increased perceived barriers elected not to receive the COVID-19 vaccines and/or booster shots. The consistent elevation in perceived barriers between these groups, and the contrasting decrease in the group that received COVID-19 vaccines, support a potential direct relationship between perceived barriers and vaccine choices. By understanding how physicians consume information, the scientific community can educate a primary driver of vaccine adoption.

**Keywords:** Vaccines, COVID-19, Vaccine Communication, Health Belief Model

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MED-P03 **Physical Activity as an Immunomodulatory Adjuvant in Psoriasis and Atopic Dermatitis: A Systematic Review.** Maiya Singer, Betsy Barrueta, and Tania Flink. Lake Erie College of Osteopathic Medicine, 5000 Lakewood Ranch Blvd, Bradenton, FL34211.

Psoriasis and atopic dermatitis are two of the most common immune cell-mediated skin conditions characterized by the dysregulation of keratinocytes and increased production of cytokines, contributing to its chronic and cyclic nature. Physical activity is known to be a nonpharmacological prevention strategy for chronic diseases because of its immunoregulatory effects. This systematic review highlights the role of physical activity as an immunomodulator for psoriasis and atopic dermatitis symptoms and disease severity. This study was designed according to the Systematic Reviews and Meta-Analyses (PRISMA) statement. PubMed, Embase, and ScienceDirect were used to search articles. A total of 6016

articles were extracted from databases, of which 177 duplicates were removed. After screening 2259 unique titles/abstracts, 2217 records were excluded for not meeting criteria. 42 full-text articles were assessed, and 34 were excluded with 8 articles selected for analysis. Included studies (published in the years 2010-2024). Studies have shown regular physical activity has decreased Psoriasis Area and Severity Index (PASI) scores across several intervention types including aerobic, yoga, and walking. Patients with psoriasis introduced to routine physical activity demonstrated a decreased prevalence of depression and anxiety, as well as a decrease in BMI and waist circumference. Experimental animal studies showed improved appearance of atopic dermatitis lesions and a decrease in circulating inflammatory cytokines following regular physical activity. Regular physical activity shows promising benefits in reducing inflammatory markers and improving clinical outcomes. Incorporating physical activity into dermatologic care may enhance treatment response and improve patient quality of life. Future studies are needed to define the standardized exercise recommendations for these conditions.

**Keywords:** inflammatory skin conditions, physical activity, disease severity, adjuvant therapy

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MED-P04 **The Effectiveness of Hormone Replacement Therapy in Reducing Coronary Artery Calcification in Postmenopausal Women: A Systematic Review.**

M. Robbins[1] and T. Flink[1]. [1]Lake Erie College of Osteopathic Medicine, Bradenton, FL 34211.

Menopause represents a major physiological transition marked by declining estrogen levels and an elevated risk of cardiovascular disease. Coronary artery calcification (CAC), driven by atherosclerosis, endothelial dysfunction, and arterial stiffening, is a key predictor of cardiovascular morbidity. Hormone replacement therapy (HRT) may reduce these risks by preserving vascular integrity and improving lipid metabolism. This systematic review evaluates the effectiveness of estrogen-containing HRT in reducing CAC among postmenopausal women. Articles published from 1994 to 2024 were collected from PubMed, ScienceDirect, and EBSCO in accordance with PRISMA guidelines. Inclusion criteria consisted of English-language, peer-reviewed human-subject studies, postmenopausal women as the study population, quantitative CAC measurements, comparison of HRT users with non-users or placebo, and clear reporting of HRT formulation and duration. Additional criteria included baseline cardiovascular risk factors, participants free of coronary artery disease at study onset, sufficient statistical outcomes

for assessing CAC progression, and specification of HRT initiation timing. Exclusion criteria included animal studies, book chapters, and studies lacking defined dosing. Across the reviewed literature, combined estrogen-progestin therapy was linked to improved lipid profiles, including lower LDL and modestly increased HDL. Several trials identified transdermal estradiol as the formulation most strongly associated with reduced arterial calcium deposition. Mechanistically, HRT appeared to enhance endothelial function, reduce inflammation, inhibit smooth muscle proliferation, and improve arterial compliance. Overall, evidence suggests that appropriately prescribed HRT may slow CAC progression in postmenopausal women. Further research is needed to clarify metabolic and vascular mechanisms and to determine the age range in which HRT provides the greatest benefit with minimal adverse effects.

**Keywords:** hormone replacement therapy, coronary artery calcification, menopause, lipid metabolism, cardiovascular health

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MED-P05 **Molecular surveillance of vectorborne pathogens in Maryland ticks and white tailed deer.**

Cassidy R. Landis, Madison K. Eshleman, Maiya S. Singer, Cassandra A. Seminoff, Jesu L. Valencia, Cory A. Petter, Gideon H. Schamberger, Lauren O. Reinfeld, and Matthew S. Tucker. Lake Erie College of Osteopathic Medicine 5000 Lakewood Ranch Blvd., Bradenton, FL. 34211.

Maryland is home to multiple species including the blacklegged deer tick (*Ixodes scapularis*) which transmits, *Anaplasma phagocytophilum* and *Babesia* species. White-tailed deer (WTD) play a critical role in the *I. scapularis* life cycle. Increasing incidences of these tick-borne pathogens in humans emphasizes the importance of monitoring transmission. From 2017-2020, ~460 ticks were collected at ten Maryland parks by dragging and from WTD carcasses along with 249 WTD blood samples. DNA extracted from identified ticks and WTD blood were analyzed by a TaqMan qPCR testing algorithm for *I. scapularis* tick actin, *B. burgdorferi* sl fliD (M1b), *A. phagocytophilum* p44 (M1b), *Babesia microti* sa1 (M1b), *B. burgdorferi* 16S rRNA (M3) to determine pathogen prevalence. Additionally, WTD blood was tested by standard PCR to detect the apicomplexans *Theileria*, *Babesia*, and *Plasmodium*. Results from M1b and M3 assays found *I. scapularis* ticks carried suspected *B. burgdorferi* (11.8%) and *A. phagocytophilum* (18.4%) with no suspected *Babesia microti*. The prevalence of *B. burgdorferi* and *A. phagocytophilum* was higher in ticks taken from deer carcasses (35.3%, 54.3%) compared to field collected (1.6%, 2.8%). Testing of 143 WTD blood samples found

67.1% carried *T. cervi* and 30.8% carried the zoonotic pathogen *Babesia odocoilei*. Additional testing of blood samples found 28.6% positive for *Plasmodium odocoilei*, while 56.1% were positive for *A. phagocytophilum*. Understanding transmission dynamics of tickborne pathogens is essential for improving disease surveillance, guiding preventative strategies, and mitigating the impact of emerging infections.

**Keywords:** Vectorborne, Pathogens, Surveillance, Lyme, Zoonotic

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MED-P06 **Using a molecular testing algorithm for surveillance of vector-borne pathogens in ticks from Monroe County, New York.**

Gideon H. Schamberger, Cassidy R. Landis, and Matthew S. Tucker. Lake Erie College of Osteopathic Medicine 5000 Lakewood Ranch Blvd Bradenton, FL. 34211.

*Ixodes scapularis* (black-legged deer ticks) are well established vectors of several clinically relevant human pathogens throughout the northeastern United States, including *Anaplasma phagocytophilum*, *Babesia microti*, and *Borrelia burgdorferi*. These ticks are typically associated with wooded brushy environments in the eastern United States. In this study, 74 ticks were collected from wooded sites in Monroe County, New York State by dragging. All ticks collected were identified by microscopy as *I. scapularis*. DNA was extracted from all stages of ticks and used in a TaqMan qPCR testing algorithm for *I. scapularis* tick actin, *B. burgdorferi* sl flid (M1b), *A. phagocytophilum* p44 (M1b), *Babesia microti* sa1 (M1b), *B. burgdorferi* 16s rRNA (M3), and *A. phagocytophilum* msp4 (M3) to determine pathogen prevalence. All larvae (n=15) and adult ticks (n=1) tested negative. Among nymphs (n=57), *Borrelia burgdorferi* was detected in 21.4%, which corresponded to 16.2 % of all ticks tested. *A. phagocytophilum* DNA was detected in 1.4% of ticks tested. *B. microti* was not detected in any samples. Environmental conditions during the sampling period, including elevated temperatures and increased rainfall, may have influenced tick activity and collection success. Together, these findings warrant further surveillance to better characterize the distribution and prevalence of tickborne pathogens in the region.

**Keywords:** Surveillance, *Borrelia*, Tickborne, Lyme, *Anaplasma*

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MED-P07 **Chronic Losartan Treatment Prevents Multiscale Aortic Stiffness in Middle-Aged Hypertensive Females.**

Swasti Rastogi, Jessica Liaw, Lucila Mathieu, Yingnan Zhai, Linxia Gu. Florida Institute of Technology. 150 W University Blvd. Melbourne, FL.

Background: Middle-aged hypertensive females remain an underrepresented population in hypertension research, despite experiencing a steeper increase in systolic blood pressure beginning in their middle age, which increases cardiovascular risk as the protection mediated by sex hormones starts to decline. This elevated risk associated with hypertension is particularly driven by Extracellular Matrix (ECM) remodeling involving collagen and elastin alterations, and by increased aortic stiffness, an independent predictor of cardiovascular diseases (CVD) and all-cause mortality. While losartan, an angiotensin receptor blocker, is widely used to manage hypertension, it remains unclear whether it prevents augmented aortic stiffness in middle-aged hypertensive females, ranging from vessel hemodynamic changes to nanoscale vascular smooth muscle stiffness. Therefore, the objective of the study was to determine whether chronic losartan treatment modulates hypertension-associated aortic stiffness in the middle-aged hypertensive females. Methodology: Female Spontaneously Hypertensive Rats were administered losartan (10 mg/kg/day in drinking water), beginning at 20 weeks of age for a duration of 16 weeks. At 36 weeks, corresponding to middle age, the aortic stiffness at the macro-level was assessed using in vivo Pulse Wave Velocity (PWV). At the micro-level, ECM alterations were analyzed, including collagen and elastin. The nanoscale biomechanical properties of the medial layer were measured using Atomic Force Microscopy. Results: Middle-aged hypertensive females exhibited augmented PWV and ECM alterations, characterized by increased collagen deposition and elastin fragmentation along with elevated nanoscale medial layer stiffness. Notably, chronic losartan treatment significantly attenuated these alterations across all scales in the aorta of middle-age hypertensive females. Conclusion: These findings demonstrate that losartan mitigates hypertension-associated aortic stiffening across macro-, micro-, and nano-levels in middle-age hypertensive females, highlighting its ability to improve vascular biomechanics beyond blood pressure lowering and underscoring its potential for preserving vascular structure in middle-age hypertensive females.

**Keywords:** hypertension, vascular dysfunction, losartan, aortic stiffness, pulse wave velocity, atomic force microscopy

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MED-P08 **Angiotensin Receptor Blockade Restores Vascular Smooth Muscle Ca2+ homeostasis in Middle-Aged Hypertensive Females.**

Swasti Rastogi, Jessica Liaw. Florida Institute of Technology, 150 W. University Blvd. Melbourne, FL.

Background: Vascular Smooth Muscle (VSMCs) contraction is tightly regulated by cytosolic calcium (Ca2+) levels. Hypertension is associated with abnormal Ca2+ handling, including increased sarcoplasmic reticulum Ca2+ release and enhanced Ca2+ influx through voltage-dependent and independent channels, which together promote vasoconstriction and lead to vascular dysfunction. Importantly, the pathophysiology of hypertension is both sex- and age-dependent, with females experiencing a steeper rise in blood pressure beginning in midlife and more cardiovascular risk. This middle age represents a critical yet understudied time point during which vascular dysfunction driven by Ca2+ mishandling remains poorly understood. Notably, studies show that females respond more robustly to losartan, an angiotensin receptor blocker, with lower systolic levels and reduced cardiovascular events. However, whether losartan corrects dysregulated Ca2+ handling in the aorta of middle-aged hypertensive females remains unknown. Methodology: Female Wistar (normotensive) and spontaneously hypertensive rats (SHR; hypertensive) received losartan (10 mg/kg) in drinking water from 20 weeks of age for 16 weeks. At the end of treatment, animals were 36 weeks old, corresponding to middle age in humans. Thoracic aortas were then harvested for functional assessment using a wire myograph to evaluate contractile responses and Ca2+ mobilization. Intracellular Ca2+ levels were quantified using a Ca2+ assay kit. Results: Aorta from middle-aged hypertensive females exhibited enhanced vasoconstriction, accompanied by augmented phasic (triggered by Ca2+ release from sarcoplasmic reticulum) and tonic contraction (Ca2+ influx through voltage-dependent and independent channels). It also exhibited higher intracellular Ca2+ levels compared with normotensive controls. Importantly, chronic losartan treatment significantly attenuated hypercontractility, restored both phasic- and tonic-mediated Ca2+ mishandling, and reduced intracellular Ca2+ levels. Conclusion: Angiotensin receptor blocker losartan restores Ca2+ mishandling by normalizing both contraction phases mediated by Ca2+ release and reduces intracellular Ca2+ levels, highlighting its role in mitigating vascular dysfunction in middle-aged hypertensive females, a population that remains understudied.

**Keywords:** Hypertension, Ca2+ mishandling, females, losartan, vascular dysfunction

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MED-P09 **Identification of natural chlorfenapyr resistance alleles using Cas9-induced nonhomologous recombination.**

Briannamarie Wallace, Michaela Foley. Florida Institute of Technology. 150 W. University Blvd, Melbourne, FL 32901.

Human populations can be exposed to harmful environmental toxicants. However, comprehensive assessment of toxicant susceptibility is difficult because of genetic differences among individuals. Genetic differences among Caenorhabditis elegans strains influence susceptibility to the widely-used insecticide chlorfenapyr. We found that the strain ECA36 is highly resistant to chlorfenapyr relative to all other strains tested. To identify the specific genetic variants responsible for resistance, 120 recombinant inbred lines (RILs) were created by crossing ECA36 with a susceptible strain CB4856. After sequencing RIL genomes and quantifying chlorfenapyr responses, linkage mapping was used to identify a region on chromosome V that explains 88% of the variation in chlorfenapyr resistance among the RILs. To validate whether this region, also known as a quantitative trait locus (QTL), is capable of conferring resistance to chlorfenapyr independently, nearly isogenic lines (NILs) were made using genetic crosses. These lines have the resistant ECA36 genotype at the QTL introgressed into the sensitive CB4856 genetic background. High-throughput phenotyping of chlorfenapyr resistance in the NILs indicates that the ECA36 genotype at the QTL confers resistance. However, ECA36 contains many variants in the QTL, and further narrowing is required to detect specific variants that drive resistance. Using standard techniques to narrow the region further would be difficult, because recombination events would be exceptionally rare. Here we use the CRISPR-Cas9 complex to induce targeted nonhomologous recombination within the QTL. This facilitates the creation of sub-NILs that allow us to test smaller loci for their effect on chlorfenapyr resistance. Ultimately, this approach will help us detect the specific allele(s) that drive resistance in ECA36.

**Keywords:** Toxicology, Quantitative Genetics, Caenorhabditis, CRISPR-Cas9

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MED-P10 **TIR-1 MAPK Signaling promotes neurodegeneration in a *C. elegans* model of tauopathy.**

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Aberrant accumulation of tau protein is a common feature of several neurodegenerative diseases such as frontotemporal dementia, Parkinson's disease and Alzheimer's disease. Tau binds and stabilizes microtubules; mutations in the microtubule binding domain, such as the V337M mutation, cause tau to dissociate from microtubules, form aggregates and destabilize microtubules. We use a *C. elegans* model expressing human Tau-V337M that results in motor dysfunction and neuronal degeneration characterized by breaks in the ventral and dorsal nerve cord. TIR-1 has well-established roles in innate immunity and axon degeneration post-injury, but it's unknown if TIR-1 has a role in disease-related degeneration. Here we identify a role for TIR-1/SARM in neurodegenerative disease pathogenesis. TIR-1 is known to function through the ASK1/NSY-1 MAP Kinase pathway to mediate the host innate immune response. We performed genetic analysis of this pathway and show that TIR-1 is functioning upstream of NSY-1. These results characterize TIR-1 MAPK signaling as pro-degenerative in the context of tauopathy, potentially through its canonical innate immune response pathway.

**Keywords:** Neurodegenerative disease, Tauopathy, *C. elegans*, axon degeneration, immune

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MED-P11 **Genetic interactions of UNC-33/CRMP and Tau in microtubule stability and neurite growth.**

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Microtubule stability is critical for axonal development, function, and maintenance. Disruption of microtubule dynamics is a hallmark of tauopathies, a group of neurodegenerative diseases characterized by aggregation of misfolded Tau protein and loss of Tau function. The molecular mechanisms surrounding the progression of tauopathies are not completely understood, limiting the creation of diagnostics and therapeutics. UNC-33, *C. elegans* homolog of collapsin response

mediator protein 2 (CRMP-2), is a key regulator of microtubule dynamics, functioning by anchoring microtubules to the neuronal cortex. CRMP regulates growth cone collapse, stabilizes axonal microtubules, promotes microtubule growth, and functions in establishing microtubule polarity. To investigate the genetic interactions between these microtubule stabilizers, we examined phenotypes in the *C. elegans* mechanosensory neurons. In the anterior lateral mechanosensory neuron, tau and mutants exhibited severe neurite outgrowth defects that were not enhanced in double mutants, indicating that Tau and UNC-33 act within the same genetic pathway to regulate MT stability. In contrast, in the posterior lateral mechanosensory neuron, double mutants displayed enhanced axon overextension compared to either single mutant, placing Tau and UNC-33 in parallel pathways. These findings reveal neuron-specific roles for Tau and UNC-33/CRMP-2 in regulating MT dynamics and suggest that differences in microtubule polarity may underlie their differing genetic interactions.

**Keywords:** neurite outgrowth, neurodegeneration, microtubule stability, *C. elegans*, Tau

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MED-P12 **Electrochemical Characterization of Adrenaline Using FSCV with CFMs: Time-Dependent Peak Emergence.**

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Conventional blood and urine assays for adrenaline (epinephrine) detection are widely used in clinical settings to assess adrenal function, diagnose adrenal tumors, and monitor therapeutic administration. However, these methods are often time- and cost-intensive, require extensive sample preparation, and fail to provide real-time information. Additionally, their accuracy can be influenced by medications, diet, physiological conditions, and disease states that affect catecholamine metabolism, potentially leading to inaccurate or misleading results. Fast-scan cyclic voltammetry (FSCV) performed with carbon fiber microelectrodes (CFMs) offers high temporal resolution on timescales relevant to neurotransmission, enabling rapid and sensitive electrochemical detection without sample preparation. In this study, FSCV was optimized for the detection of adrenaline in tris buffer designed to mimic artificial cerebrospinal fluid using CFMs. A calibration curve

was constructed to evaluate analytical performance parameters, including sensitivity, linear dynamic range, and limit of detection, at an ultrafast temporal resolution of 100 ms. Electrochemical analysis revealed that the primary oxidation peak of adrenaline closely resembles that of dopamine, presenting a challenge for selective detection. However, a distinct secondary oxidation peak emerged in the adrenaline voltammogram as repeated scans progressed, a feature absent in dopamine measurements. This time-dependent peak emergence provides a distinguishing electrochemical signature for adrenaline and enables differentiation between these structurally similar catecholamines. The preliminary results of this study demonstrate the feasibility of using FSCV with CFMs for selective, real-time adrenaline detection and highlight the potential of this approach for future in vivo monitoring applications at ultrafast temporal resolution.

**Keywords:** FSCV, CFM, Electrochemistry, Adrenaline, Neurotransmitters

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MED-P13 **Spectroscopic and Electrochemical Analysis of Surface-Functionalized Double-Bore CFMs for Neurotransmitter Detection.**

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Because the brain's chemical environment is highly complex, involving multiple interacting neurochemicals and toxic species, simultaneous detection of several analytes is essential for achieving a comprehensive understanding of neurochemical signaling dynamics. Multi-bore carbon fiber microelectrodes (CFMs) provide a powerful platform for concurrent multi-analyte detection, offering significant advantages over traditional single-analyte approaches. However, accurate multi-analyte measurements remain challenging due to electrode surface fouling and overlapping voltammetric signals. In this study, we investigated targeted surface functionalization strategies on double-bore CFMs to enhance analyte selectivity and minimize fouling effects. Gold nanoparticle modification was employed to improve the detection of $Cd^{2+}$, a toxic metal ion of neurological relevance, while Nafion coating was used to selectively detect positively charged neurotransmitters such as serotonin (5-HT). Surface-functionalized double-bore CFMs were characterized using scanning electron microscopy to assess surface morphology and energy-dispersive X-ray spectroscopy to confirm elemental composition on each modified bore. Electrochemical performance was evaluated using fast-scan cyclic

voltammetry in mixed solutions containing $Cd^{2+}$ and 5-HT. The results demonstrate that the selectively functionalized double-bore CFMs enable simultaneous detection of both analytes with improved selectivity and reduced signal interference. Importantly, this work highlights the critical role of controlled surface modification on electrodes positioned at nanometer-scale distances to prevent cross-contamination while maintaining high analytical performance. Overall, this study highlights the importance of understanding surface functionalization fundamentals in multi-bore electrode systems and establishes a foundation for future applications in biologically relevant environments and potential in vivo neurochemical monitoring.

**Keywords:** carbon-fiber microelectrodes, fast-scan cyclic voltammetry, neurochemicals, surface functionalization

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MED-P14 **Platelet-Associated Inflammation as a Contributor to Vascular Dysfunction in Cerebral Amyloid Angiopathy**

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Cerebral amyloid angiopathy (CAA) is characterized by amyloid-β deposition within cerebral blood vessel walls and is a major contributor to vascular dysfunction and cognitive decline in Alzheimer's disease. Impairment of microvascular blood flow occurs early in disease progression; however, the cellular mechanisms underlying these vascular abnormalities remain incompletely understood. Emerging evidence suggests that platelet activation may contribute to microvascular obstruction and inflammatory signaling within the neurovascular unit. This study investigates platelet association with cerebral vasculature and amyloid pathology in a murine model of amyloid deposition. Brain tissue sections were analyzed using immunohistochemistry to visualize platelets, vascular markers, and amyloid-β deposits across cortical and hippocampal regions. Qualitative and quantitative assessments were performed to evaluate platelet localization within and around cerebral vessels and their spatial relationship to amyloid pathology. Preliminary findings demonstrate increased platelet presence within cerebral microvessels and enhanced platelet association with amyloid-β–rich regions compared to control tissue. Platelets were frequently observed in proximity to vascular amyloid depos-

its, suggesting potential sites of platelet-mediated vascular interaction. These observations are consistent with a model in which platelet activation and adhesion may contribute to microvascular obstruction and inflammatory signaling in CAA. While this study does not establish causality, it provides evidence supporting the feasibility of platelet-vascular interactions as a contributing factor to CAA-associated microvascular dysfunction. These findings lay the groundwork for future experiments aimed at determining whether targeted platelet modulation can improve cerebral perfusion and mitigate vascular inflammation. Understanding platelet involvement in early vascular pathology may inform the development of novel biomarkers and therapeutic strategies for cerebrovascular contributions to Alzheimer's disease.

**Keywords:** cerebral amyloid angiopathy

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MED-P15 **A Heat Shock Protein Chaperone Cofactor Is Required for Eye and Brain Development in the fruit fly *D. melanogaster* model.**

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Heat shock proteins (HSPs) are molecular chaperones essential for proper protein folding and maintaining protein structure, especially under cellular stress conditions. HSPs' activity depends on specific cofactors that regulate their folding mechanisms. Disruption of these cofactors can lead to abnormal protein function and developmental defects. In this study, the fruit fly *Drosophila melanogaster* was used as a model system to investigate the role of a specific HSP cofactor in eye and brain development. RNA interference (RNAi) of the HSP cofactor resulted in abnormal eye size and absence of a specific brain region, indicating a crucial role for this cofactor in normal eye and neural development. Experiments are underway to determine if overexpression of this cofactor can rescue the observed eye and neurodegenerative disease defects. Overall, these findings suggest that proper regulation of HSP cofactors is essential for normal developmental outcomes.

**Keywords:** Heat Shock Proteins (HSPs), fruit flies, eye phenotype, brain development.

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MED-P16 **Examining Factors Contributing to the Refolding of Vault-like Nanoparticles with the MARY Tag.**

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We examined how factors of the refolding environment of major vault protein (MVP) monomers with scaffold-binding MARY tags would independently contribute to successful vault nanoparticle refolding. Denatured MVP monomers were exposed to refolding buffer conditions. Under normal buffer conditions, organized vault nanoparticle formation is little to none. Using a novel scaffolding system introduced to the MVP monomers, researchers have demonstrated that more organized and distinct vault-like nanoparticles refold. Further research sought to elucidate the behavior of the MARY tag that is pre-eminent in the scaffold refolding protocol. The refolding buffer pH, salt concentration, and DNA scaffold size were investigated for their impact on nanoparticle formation. Critical to controlling DNA scaffold size was the removal of copurified DNA, which was attempted through optimization of purification conditions and nuclease Benzonase. Protein monomers are often not completely isolated from DNA when purified. To control for this, researchers tested which concentrations of nuclease and which conditions would remove the maximum amount of DNA. With purification conditions of protein monomers complete, the introduction of DNA fragment sizes by a controlled protocol is performed, and the effect of the DNA factor on vault refolding is investigated. Vault-like nanoparticles can be analyzed for ideal and homogenous size by a Dynamic Light Scattering system as well as functional assays. The function of the vault complex remains largely unknown, though it is highly prevalent in protein expression in human cells. By optimizing MARY MVP refolding conditions, proper vault-like nanoparticles can be made and their biological effects examined. This research optimizes the engineering of vault nanoparticles, allowing mass biological functional tests as well as translational application to areas such as drug discovery.

**Keywords:** refolding, protein, vault, nanoparticle, eukaryotes

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MED-P17 **Fluoride Based Toothpaste Has Higher Antibacterial Efficiency When Compared to Toothpastes with Other Active Ingredients.**
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Tooth decay, caused by certain bacteria, remains a widespread issue, affecting about 90% of adults since 1999. It leads to pain, sensitivity, and enamel damage, which can impair chewing and overall nutrition. Chewing is essential for breaking down food and mixing it with saliva, which contains amylase. Impaired chewing or missing teeth can result in larger food particles reaching the stomach, leading to bloating and poor nutrient absorption. Additionally, gaps from missing teeth can harbor bacteria that may enter the digestive system, potentially causing chronic inflammation and metabolic disorders. The most common way to prevent this is by brushing teeth using toothpaste. Brushing removes food and plaque from teeth, helping to prevent further acid production from bacteria attacking the enamel. The purpose of our study was to determine the antibacterial efficacy of different toothpaste's active ingredients against *Streptococcus mutans* and *Escherichia coli*. In addition, we determined which active ingredient is the most effective at inhibiting the growth of *S. mutans*. Kirby-Bauer Antimicrobial Susceptibility Test was used. The zones of inhibition were measured and recorded for each tested active ingredient (Sodium fluoride, nano-hydroxyapatite, charcoal, and hydrated silica) against both bacteria. The larger zone indicated stronger antibacterial effects. Our results indicated that only Sodium Fluoride exhibited antibacterial activity against *S. mutans*. Sodium Fluoride was also the most effective agent at inhibiting the growth of both *E.coli*. Individuals with susceptibility to cavities may take advantage of the preventive effects of sodium fluoride in commercially available toothpaste and other dental related products.

**Keywords:** Sodium Fluoride, tooth decay, dental caries, dental hygiene, microbiology

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MED-P18 **Simulation of Lightning-Produced Electric Field Effects on Dental Pulp Cell Activity.**
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We investigate the effects of environmental factors, particularly lightning produced electric fields, capable of influencing excitable biological tissues. Dental

pulp cells are particularly sensitive to external perturbations due to their dense innervation, the presence of voltage-gated ion channels, and their role in nociceptive signaling mediated by Aδ and C fibers. This study examines how lightning-produced electric fields may modulate the membrane potential and excitability of dental pulp cells using a simulation based biophysical framework. Lightning parameters, including peak current and strike distance, were obtained from the National Lightning Detection Network (NLDN) and the Geostationary Lightning Mapper (GLM) and were used to estimate the electric fields and the corresponding induced membrane potentials. These cellular responses were simulated using a Hodgkin-Huxley model to evaluate action potential initiation and firing behavior. Simulated responses were analyzed across a range of peak currents and distances, with emphasis on action potential initiation and firing frequency rather than threshold crossing alone. The simulations indicate that higher peak currents, commonly associated with lightning strikes over water, produce larger induced membrane depolarizations and increased action potential frequency, while increasing distance attenuates these effects. At closer distances, repeated firing was observed, whereas more distant or lower current events resulted in single or subthreshold responses. These results suggest that lightning-produced electric fields can modulate dental pulp cell excitability as a function of strike distance and peak current.

**Keywords:** Lightning, Electric field, Dental pulp cell, Action potential

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MED-P19 **What your oral microbiome says about your health.**

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This project aims to develop a rapid detection method for *Lactobacillus fermentum* and *Bacillus subtilis*, key members of the human oral microbiome with important implications for human health. Both species are naturally present in the oral cavity, and deviations from normal microbial balance (eubiosis) have been associated with dysbiosis and altered health states. To enable highly specific detection, species-specific genetic markers were selected based on essential cellular functions, including the parB gene involved in chromosome segregation in *L. fermentum* and the aroE gene encoding shikimate dehydrogenase in *B. subtilis*, a key enzyme in aromatic amino acid biosynthesis. These conserved targets were used to design primers for a rapid loop-mediated isothermal amplification (LAMP)

based diagnostic assay, allowing sensitive and efficient identification of each bacterium in oral samples. We discuss the development of LAMP assay using microbial community standards DNA followed by oral sample testing. Alterations in *L. fermentum* abundance may reflect microbial imbalance, particularly in individuals with compromised digestive health, and elevated oral levels may be influenced by consumption of fermented foods. In contrast, *B. subtilis* contributes to microbial stability within the oral ecosystem; however, its exceptional resistance to environmental stressors makes it a potential indicator of microbial disruption. Elevated levels may signal the loss of more sensitive commensal species, while markedly reduced levels may suggest broader or more severe dysbiosis within the oral microbiome. Collectively, this work advances the development of point-of-care molecular tools for real-time assessment of oral microbiome health. This research has been supported in part by Bill & Lisa Jarrett Endowed Teaching Chair grant by South Florida State College Foundation and Pilot Project Grant by National Science Foundation.

**Keywords:** Rapid test, LAMP, oral microbiome

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MED-P20 **The evolving demographics of Colorectal cancer.**

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Colorectal cancer (CRC) is one of the leading causes of cancer-related morbidity and mortality worldwide. The incidence pattern of CRC has been evolving across demographic groups. This project analyzed trends in colon and rectal cancer incidence from 2000 to 2022 using data from the Surveillance, Epidemiology, and End Results (SEER) database. Appendix cancers were excluded, and analyses focused on variations in diagnosis rates across age, race, and sex. By comparing incidence patterns across demographic groups, the study aimed to identify shifts in colorectal cancer risk over time. Overall, the data demonstrate a general decline in colorectal cancer diagnoses per 100,000 individuals in the population. However, a notable increase in incidence was observed among adults under the age of 50, while individuals over 75 experienced a significant reduction in diagnosis rates. This rising trend in younger adults contrasts sharply with the overall decline. Racial disparities were also evident, with incidence rates among White individuals generally decreasing, while rates among Black individuals increased over the

same period. Modest differences were observed between sexes, though the overall trend across both groups was a decrease in incidence. These findings indicate a shifting demographic burden of colorectal cancer, with younger adults and certain racial groups experiencing increasing susceptibility. Although overall incidence has declined, recent trends suggest a transition in risk from older to younger populations. This shift underscores the need for enhanced awareness, early screening, and preventive strategies targeting younger individuals to reduce future disease burden

**Keywords:** Colorectal cancer, epidemiology, trends

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MED-P21 **Rapid Point-of-Care Detection of *Salmonella* and *Listeria* Using LAMP: Forensic and Surgical Applications.**

Marleigh Souther, Maci Gaskins. South Florida State College. 600 W College Dr, Avon Park, FL 33825.

Foodborne pathogens such as *Salmonella* and *Listeria* are major contributors to illness, hospitalization, and worldwide mortality. Fast and reliable identification of these bacteria is essential for protecting public health and supporting fields such as forensic science and medical care. This project aims to develop a rapid point-of-care detection method using loop-mediated isothermal amplification (LAMP), a DNA-based technique that amplifies genetic material at a constant temperature. LAMP offers advantages over traditional PCR by reducing equipment needs and significantly shortening detection time. Primers specific to *Salmonella* and *Listeria* were selected using a New England Biolabs primer design tool, each targeting gene regions unique to their respective species. For *Salmonella* identification, its ssaQ gene was chosen for the amplification, which codes for a secretion system apparatus protein that plays a role in its virulence contributing to pathogenicity and ability to cause disease in humans. For *Listeria* identification, hlyA gene which is a virulence determinant that influences the expression of the bacterium's pathogenicity was chosen as the target gene for the amplification. We discuss the development of LAMP assay using microbial community standards DNA followed by food sample testing. The results would support LAMP as a rapid, accessible, and accurate method for identifying foodborne bacteria. This approach has meaningful applications: in forensic science, it can aid investigations involving contaminated food, cause-of-death analysis, or outbreak tracing; in medical and

surgical contexts, early detection of harmful pathogens can improve patient outcomes and reduce infection-related complications. This research has been supported in part by a Bill & Lisa Jarrett Endowed Teaching Chair grant by South Florida State College Foundation and Pilot Project Grant by National Science Foundation.

**Keywords:** Rapid test, LAMP, *Salmonella*, *Listeria*

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MED-P22 **CANCELLED**

MED-P23 **Bioactive properties of *Kalanchoe delagoensis* extracts on invasive breast cancer cells cultured *in vitro*.**

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*Kalanchoe delagoensis* (Mother of Millions) is a succulent plant with ethnomedicinal uses. This study assessed the cytotoxic effects of 0.5 and 1 mg *K. delagoensis* ethanolic leaf extracts on BT-549 invasive human breast cancer cells using a methylthiazol tetrazolium (MTT) assay. An IC50 value, indicating a 50% reduction in cell viability, of 1.4 mg/mL was calculated. Furthermore, a scratch migration assay was performed to monitor cell motility, a factor associated with metastasis. Data from untreated and 0.33mg *K. delagoensis* extract treated cells are compared. Overall, these preliminary results identify *K. delagoensis* leaf extracts as a source of bioactive anticancer compounds which impair breast cancer cell viability in vitro. (Funding provided by U.S. Department of Education STEM-PACTS grant P031C210035 Miami Dade College Honors College, and Hispanic Serving Institutions Higher Education Grants Program 2022-77040-37619 from the USDA-NIFA).

**Keywords:** cancer, natural products

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MED-P24 **Optimizing human genomic DNA extraction and long read Oxford Nanopore MinION sequencing workflows.**

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We aimed to produce high quality DNA for human whole genome sequencing focusing on long reads. IRB approved protocols were followed. DNA was extracted from buccal swabs and Coriell Institute white blood lymphoblastoid lines. Buccal DNA was purified with the Promega Maxwell HT Genomic DNA Kit and Thermo Fisher King Fisher Flex. DNA was extracted from Coriell cells utilizing the Qiagen DNeasy Kit and QiaCube. DNA concentrations were calculated with a Qubit fluorometer. DNA purity was evaluated by 260/280 and 260/230 absorbance ratios measured with a Nanodrop spectrophotometer. An Agilent Tape Station was employed to assess DNA fragment length and integrity. DNA, previously extracted from frozen whole blood, was sheared with a Covaris G-tube and processed following Oxford Nanopore's ligation-based library preparation protocol. Sequencing on a MinION, produced 698,545 reads, an N50 of 14,508 base pairs, and a mean coverage of 1.175×, as expected due to limited sample input. EPI2ME and human variation workflow software were employed to compare low coverage MinION data to high coverage data previously generated from the same sample using industrial workflows. This study showcases the workflow involved in generating whole genome sequencing data from patient-derived DNA using Oxford Nanopore technology and highlights potential strategies for improvement. (Funding by Galatea Bio Faculty Fellow Award, U.S. Dept. of Education STEMPACTS grant P031C210035, and Miami Dade College Honors College).

**Keywords:** genomics, DNA sequencing

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MED-P25 **Novel Peptidomimetics: Harnessing Nature's Designs to Conquer Cancer**

Luke Assaad, Noah Andrescik, Joshua Wyrick, Dylan Huston. Southeastern University, 1000 Longfellow Blvd., Lakeland, FL 33801.

Cancer remains a leading cause of mortality worldwide, underscoring the need for continued development of therapeutics that target core mechanisms of tumor survival. A hallmark of many malignancies is the evasion of apoptosis through overexpression of anti-apoptotic Bcl-2 family proteins, which inhibit the intrinsic mitochondrial death pathway. This work focuses on the design and synthesis of metabolically stable peptidomimetic inhibitors that mimic the pro-apoptotic Bak protein and disrupt Bcl-2–mediated survival signaling. These peptidomimetic scaffolds are engineered to recapitulate key Bak–Bcl-2 binding interactions while conferring resistance to hydrolytic and proteolytic degradation, thereby improving pharmacokinetic properties such as oral bioavailability. Building upon established synthetic protocols for carbamate, carbazate, dithiocarbazate, polyamine, and phosphonic peptidomimetics, this study extends the platform to de novo analogs incorporating a dithiocarbamate backbone, which is anticipated to more closely emulate native Bak functionality. Following synthesis, lead compounds will be evaluated in biological assays and benchmarked against the clinically approved Bcl-2 inhibitor venetoclax (ABT-199), which has demonstrated substantial efficacy in leukemia, to assess their potential as novel apoptosis-inducing anticancer agents.

**Keywords:** Peptidomimetic, cancer, BCL-2, leukemia, Venetoclax

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MED-P26 **Synthetic and Computational Evaluation of Ring-Modified Efavirenz Analogs for Sustainable HIV Therapy.**

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Acquired immunodeficiency syndrome (AIDS) is a disease caused by the human immunodeficiency virus (HIV), which continues to affect individuals worldwide. Effective therapy for the treatment of HIV-1 infection requires a combination of antiviral drugs. Previously, the standard of care for HIV-1 patients was efavirenz (EFV), a non-nucleoside reverse transcriptase inhibitor (NNRTI). EFV binds to an allosteric site on reverse transcriptase, resulting in the inhibition of DNA synthesis. Although EFV has demonstrated efficacy in reducing viral load, the emergence of drug resistance and adverse side effects has motivated the development of structurally modified analogs. While dolutegravir-based regimens are now

widely used, EFV remains clinically relevant in many developing countries. Cyclopropylacetylene (CA) is a key intermediate in the synthesis of EFV; however, CA is prone to ring strain–induced instability. To address this limitation, alternative ring-containing side chains, including cyclohexylacetylene and the compact bicyclo[1.1.0]butane motif, were explored as replacements for the native cyclopropylacetylene group. Cesium bases present themselves as potential alternatives to n-butyllithium, enabling controlled access to these larger and conformationally constrained ring systems with improved chemical stability. These modifications aim to improve synthetic efficiency and cost-effectiveness, which is critical for the development of therapeutics accessible to low-resource communities. Computational docking and structure-based analyses were employed to evaluate the binding interactions of cyclohexylacetylene- and bicyclo[1.1.0]butane–modified EFV analogs within the HIV-1 reverse transcriptase NNRTI binding pocket. Computational results were used to assess binding orientation, key interactions, and predicted inhibitory activity relative to EFV. Together, this combined synthetic and computational approach aims to identify structurally accessible EFV analogs that retain antiviral activity while enhancing chemical stability, improving synthetic feasibility, and supporting the development of more affordable treatment options.

**Keywords:** HIV-1, Efavirenz, Non-nucleoside reverse transcriptase inhibitors, Medicinal chemistry, Ring-closure synthesis

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MED-P27 **Tuning Anesthesia: Advances in Propofol Analogues and Antagonists**

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Propofol is a globally popular intravenous anesthetic used in a wide variety of surgical procedures due to many desirable characteristics with very few drawbacks, including a rapid onset of sedation, low toxicity, quick metabolism, and simple synthesis model. Acting as a GABA modulator, a well-known receptor in the body present in both the central and peripheral nervous systems, propofol extends the duration and frequency in which chloride ion channels in neurons remain open, maintaining a hyperpolarized state and inducing a loss of consciousness as a result. While propofol has a unique set of properties that are in no current need

of being changed for the general public, it is important to explore and discover propofol analogues and antagonists that can provide nuanced outcomes when necessary. The original and modified models of propofol were reviewed as groundwork for this project, noting and emulating instances of efficiency, high yield, and environmentally friendly models when applicable. Experimental propofol analogues include more water-soluble moieties to reduce injection site pain and prevent risk of embolism in vulnerable patients, including structures adding tertiary amines or silicon as carbon substitutes to improve solubility in comparison to the current emulsion. Antagonists are also essential to explore, such as gabazine, to reduce effects or increase brain activity in research cases. While no known specific reversal agent to propofol exists, research agents currently include aminophylline, physostigmine, and alkyl-fluorobenzene derivatives that are to be studied further. Current research revolves around known propofol properties and effects along with synthesis of propofol, propofol analogues, and antagonists to improve or inhibit specific qualities and improve patient induction and post-operative symptoms through modulation of propofol and developing antagonists.

**Keywords:** Propofol, antagonist, water-solubility, synthesis, review

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MED-P28 **Cortisol as a biomarker of stress in Master of Athletic Training students: A longitudinal study.**

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Graduate education in healthcare-related fields is associated with elevated academic and clinical stress, particularly in accelerated professional programs such as Master of Athletic Training (MAT). Objective biomarkers may provide insight into physiological stress patterns that are not fully captured through self-report measures. Cortisol, a hormone released through activation of the hypothalamic-pituitary-adrenal axis, is commonly used as a biological indicator of stress. The purpose of this longitudinal study is to examine changes in salivary cortisol levels across academic terms in first- and second-year MAT students and to explore relationships between physiological and perceived stress. Baseline data were collected during the Fall 2025 semester from first- and second-year MAT students at

Bethune-Cookman University. Salivary cortisol samples were collected at standardized times of day to minimize diurnal variation, and perceived stress was assessed using the Perceived Stress Scale. Follow-up data collection is ongoing during the Spring 2026 semester, with samples obtained at the beginning and end of the term to capture longitudinal changes as academic and clinical demands evolve. Cortisol assays are conducted using standardized enzyme-linked immunosorbent assay techniques. Planned analyses include between-group comparisons, within-subject longitudinal analyses, and correlations between cortisol levels and perceived stress scores. Preliminary baseline observations suggest measurable physiological stress responses during key phases of MAT training. It is anticipated that first-year students will demonstrate higher cortisol levels than second-year students and that cortisol levels will fluctuate across academic terms. Findings from this study aim to enhance understanding of stress trajectories in graduate healthcare education and may inform evidence-based strategies to support student well-being and academic success. Funding provided by the RISE Student Experiences Project.

**Keywords:** cortisol, stress, athletic training students, biomarkers, longitudinal study

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MED-P29 **Evaluating the Antioxidant Effects of Kaempferol on Sodium Dichromate-induced Oxidative Stress in Human Astrocytes.**

Kent Nayga, Samantha Louis, Juan Ferguson. Florida Gulf Coast University, 10501 FGCU Blvd., S., Fort Myers, FL 33965.

Oxidative stress is a key factor in the progressions of cancer and neurodegenerative diseases, where excessive production of reactive oxygen species leads to cell death and damage. Glioblastoma (GBM) is the deadliest form of brain cancer, derived from mutated human astrocytes, with limited treatment options and poor prognosis. Sodium dichromate is an oxidative stress inducer that has been used to investigate apoptosis and the cytotoxic response at the cellular level. Kaempferol, a naturally occurring flavonoid abundant in fruits and vegetables, exhibits well-documented antioxidant and cytoprotective properties. We hypothesized that kaempferol would ameliorate chromate-induced cytotoxicity in human astrocytes through its antioxidant mechanisms. The objective of this study was to evaluate the protective effects of kaempferol against sodium dichromate-induced oxidative

stress in human astrocytes. Prior to cell-based experiments, a DPPH (2,2-diphenyl-1-picrylhydrazyl) assay confirmed kaempferol's antioxidant activity, showing stronger radical scavenging activity relative to butylated hydroxytoluene (BPN), a standard free radical scavenger. Human astrocytes, which serve as critical support cells in the central nervous system and are particularly vulnerable to oxidative damage, were exposed to varying concentrations of sodium dichromate (0.001 mM – 100 mM), kaempferol (7 μM – 100 μM), and their combinations in 96-well plates for 24 h. Cell viability and metabolic activity were assessed using MTT assay. Results demonstrated significant reduction in cell viability following sodium dichromate exposure (p<0.05), confirming oxidative damage. Co-treatment with kaempferol showed concentration-dependent protective effects, with moderate to high doses (25, 50, and 100 μM) significantly enhancing cell survival under oxidative stress conditions. These findings suggest that kaempferol mitigates chromium-induced oxidative stress and highlights its potential as an antioxidant capable of protecting astrocytes from cellular damage involved in glioblastoma and other disorders driven by oxidative stress.

**Keywords:** Oxidative Stress; Human Astrocytes; Kaempferol

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MED-P30 **Identifying Broad-Spectrum Bacteriocin-Producing Strains Isolated from Vegetables**

Landon Ploszay. Indian River State College, 3209 Virginia Ave. Ft. Pierce, FL 34981

The growing resistance of bacteria to conventional antibiotics is a significant global health concern, with yearly deaths directly attributed to antimicrobial resistance (AMR) predicted to reach 1.91 million by 2050. Bacteriocins are antimicrobial peptides produced by bacteria that have proven efficacy in food preservation and are of increasing interest in efforts to combat AMR. Their selectivity and mode of action are associated with an improved safety profile and reduced resistance compared with conventional antibiotics. The objective of this study was to isolate lactic acid bacteria (LAB) from cabbage and turnip and identify strains capable of producing bacteriocins with antibacterial activity. Fifteen isolates that demonstrated growth inhibition against the *Lactobacillus plantarum* tester strain were further screened against *Escherichia coli* (Gram-negative) and *Staphylococ-*

*cus epidermidis* (Gram-positive). Isolates from both vegetables inhibited *S. epidermidis*, while turnip-derived isolates showed broader activity by more effectively inhibiting *E. coli*. PCR amplification of three common bacteriocin genes (nisin, pediocin, and enterocin) produced positive bands in isolates from both cabbage and turnip, supporting the presence of bacteriocin-producing LAB and aligning with their observed antimicrobial activity. These results demonstrate the potential of vegetable-associated LAB as a reservoir of bacteriocin-producing strains with broad-spectrum antimicrobial activity.

**Keywords:** antimicrobial resistance, bacteriocins, microbiology

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## PSS = PHYSICS AND SPACE SCIENCES

FRIDAY 10:00 a.m. - 11:45 a.m.
GEUORGUI BOUROV, EMBRY-RIDDLE AERONAUTICAL UNIVERSITY AND EMADELDEN FOUAD, FLORIDA POLYTECHNIC UNIVERSITY, **presiding**

10:00 a.m. PSS-01 **Investigating the secondary electron emission and similarity in Paschen's law using experimental Paschen curves.**
Seth Gerow, Andrew Murphy. Embry-Riddle Aeronautical University. 1 Aerospace Blvd, Daytona Beach, FL, 32114

A gas can transition from a dielectric (insulator) to an electrical conductor and produce a luminous emission through a process called dielectric breakdown, or gas discharge. If the emission takes the form of a sheath or is between two electrodes, it is called a corona or glow, respectively. The discharge process is driven by an electron avalanche, which sustains the Townsend discharge. Townsend discharges happen at the onset of electrical breakdowns (glow, corona, streamer, and leaders); thus, they play a critical role in the formation of lightning and other transient luminous events. Paschen established that gas breakdowns characterized by so-called Paschen curves obey a similarity law later demonstrated mathematically

by Townsend. V. Engel and Steenbeck provided a useful formula to describe these curves, which predict that the critical voltage to initiate a gas breakdown between two parallel plate electrodes is dependent on the product of the system pressure and the inter-electrode distance, pd. A consequence of this dependence on pd is that variations in either parameter which results in the same product, do not affect the breakdown voltage. These discharges result from the combined effects of the effective Townsend ionization, α_eff, and the secondary electron emission, ɣ. Our work focuses on plasma discharges driven by Townsend avalanches, forming glow and corona. Here, we compare Paschen curves of a well-documented inert gas, Argon, to the dominant component in the atmosphere of Earth and Mars: air and CO2, respectively. We investigate a deviation from theoretical predictions. In particular, we observe that changes in the inter-electrode distances create a uniform shift of the entire curve, violating the expectations of similarity in Paschen's law. We further compare the characteristics of experimental Paschen curves in different gas mixtures to establish the dependence or independence of the secondary electron emission on the gas composition.

**Keywords:** electric discharge, Paschen curves, Townsend breakdown, atmospheric electricity, gas breakdown

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10:15 a.m. PSS-02 **On the True Interstellar Anisotropy of 13 TeV Cosmic Rays.**

Matthew Conde, Noufel Maalal. Florida Institute of Technology. 150 W. University Blvd. Melbourne, FL 32901.

We fit the 13 TeV anisotropy map produced by the IceCube experiment to a non-linear model designed to allow us to extrapolate from it the interstellar anisotropy map and eliminate the latitudinal blindness that plagues most air-shower experiments. This leads us to conclude that Southern Hemisphere maps contain no information about the hot-spot observed in Northern Hemisphere maps, such as the ones produced by the Tibet $AS\gamma$ or the ARGO-YBJ experiments. We also find that the interstellar pitch-angle distribution for southern maps lack the upwards curvature at high pitch-angle cosine, which some have interpreted as evidence of magnetic focusing, that is found in northern maps. The lack of a hot-spot combined with the aforementioned missing upwards curvature lead us to pro-

pose that the hot-spot may be a product of pitch-angle focusing by inhomogeneities in the local interstellar magnetic field. We also observe an abrupt cut-off in the interstellar pitch-angle distribution. From the value of the cut-off, we are able to estimate the angle between the Earth's axis of rotation and the local interstellar magnetic field.

**Keywords:** Cosmic Rays

Corresponding author: Matthew Conde, mconde2022@my.fit.edu

10:30 a.m. PSS-03 **How Low Can You Go: Exploring the Extreme Mass-Ratio of Binary Massive Stars.**

Erin Abraham, Saida Caballero-Nieves. Embry-Riddle Aeronautical University. 1 Aerospace Blvd. Daytona Beach Fl, 32114.

Massive stars burn bright, die young, and play a vital role in the evolution of our Universe. The presence of a companion to a massive star can influence its evolution through mass transfers and interactions from stellar winds. With the discovery of exoplanets and their advanced instrumentation, we can now explore the extreme mass-ratio binary systems that were previously indetectable, consisting of sub-solar, pre-main sequence stellar companions. These systems will help us glean insight into massive star formation processes. Focusing on the active star-forming region M17, we use the Spectro-Polarimetric High Contrast Exoplanet Research (SPHERE) instrument on the Very Large Telescope to analyze seven young massive stars for companions. SPHERE is uniquely capable of probing the lower end of the binary mass-ratio due to its ground-breaking extreme adaptive optics and coronagraphic capabilities which allow us to achieve greater contrast ratios than traditional adaptive optics. Using SPHERE’s simultaneous dual-band imaging and integral field spectrograph, we detected 201 potential companions for all seven target stars and measured the position angle, angular separation, and contrast magnitude for each potential companion with high contrast imaging techniques, including PCA and ADI, and numerical methods, NEGFC and Simplex Nelder-Mead. Of the 201 candidate companions, we determined 10 candidate companions to be statistically likely true companions that have not been previously detected. The candidate companions had contrast ratios ranging from 0.1 to 15.9 mag in the near infrared. Combining our results with the literature, we found a 100% multiplicity fraction within our sample, with five stars in higher-order systems and two in binaries.

**Keywords:** Massive Binary Stars, High-contrast Imaging, Extreme Mass-Ratio, Observational Astronomy

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10:45 a.m. **BREAK**

11:00 a.m. PSS-04 **Two Be or Not Two Be: A New Companion detection for HD 52244 using HST/FGS1.**

Keefe Kamp, Saida Caballero-Nieves, Edmund Nelan, Nancy Evans, Douglas Gies, Noel Richardson. Embry–Riddle Aeronautical University, 1 Aerospace Blvd Daytona Beach, FL 32114.

In fall 2021, Hubble Space Telescope (HST) became momentarily unavailable to support nominal operations, and we used the operational Fine Guidance Sensors (FGSs) to carry out a multiplicity survey of 6 Be stars. Be stars possess a circumstellar decretion disk that is theorized may be caused by binary interactions. The multiplicity of Be stars have long been neglected. It is further supported that short period binaries are often found a triple system. This wider third companion is a perfect candidate to be detected with the FGSs. Here we present a newly detected companion to the Be star, HD 52244, using the FGSs on the HST. We were able to resolve a companion to HD 52244, with a separation of 42.7 ± 1.1 mas and a position angle of 144.2 ± 0.3 with a differential magnitude in the F583W filter of 1.91 ± 0.02 mag. We approximate the companion as a B8 V star with MV=0.11. This gives us a total mass of the system of (M1(7.3 solar masses) + M2(3.38 solar masses) 10.68 solar masses. Assuming a circular orbit, and that the system is face-on, a projected separation of 42.7 mas corresponds to a radius of 74 AU. Using Kepler's 3rd, we estimate this system would have a period of about 110 years. This study serves as a proof of concept of the use of FGS for the study of multiplicity among Be stars and providing results to the newly detected companion of HD 52244.

**Keywords:** Astronomy, Binary stars, Space Telescopes, Interferometry

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11:15 a.m. PSS-05 **Hubble parameter measurement constraints on the redshift of the deceleration-acceleration transition, dynamical dark energy.**
Muhammad Farooq. Embry-Riddle Aeronautical University. 1 Aerospace Blvd, Daytona Beach, FL, 32114.

We use 21 Hubble parameter versus redshift data points from Simon et al., Gazta˜naga et al., Stern et al., and Moresco et al. to place constraints on model parameters of constant and time-evolving dark energy cosmologies. The inclusion of the eight new measurements results inH(z) constraints more restrictive than those derived by Chen & Ratra. These constraints are now almost as restrictive as those that follow from current Type Ia supernova (SNIa) apparent magnitude versus redshift data, which now more carefully account for systematic uncertainties. This is a remarkable result. We emphasize, however, that SNIa data have been studied for a longer time than the H(z) data, possibly resulting in a better estimate of potential systematic errors in the SNIa case. A joint analysis of the H(z), baryon acoustic oscillation peak length scale, and SNIa data favors a spatially flat cosmological model currently dominated by a time-independent cosmological constant but does not exclude slowly evolving dark energy.

**Keywords:** cosmological parameters – cosmology: observations – dark energy

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11:30 a.m. PSS-06 **Photonic crystal-based smart window design for seasonal solar energy management in Beni-Suef City, Egypt.**
Emadelden Fouad, Arafa H. Aly, D. Mohamed, A. F. Amin3. Florida Polytechnic University, Lakeland, FL.

This paper presents a broadband optical short-wave pass (OSWP) multilayer filter optimized for smart-window integration to enhance building energy efficiency in Beni-Suef, Egypt. The structure comprises CaF2, Si3N4, and ZnS dielectric stacks in a dual-laminate configuration designed using the transfer matrix method (TMM). The optimized design achieves high visible transmittance (∼86% at 400–700 nm) while strongly suppressing near-infrared (NIR) radiation across 800–1500 nm. A well-defined photonic band gap (PBG) is confirmed through spectral and phase analyses, showing strong angular sensitivity. With increasing 2 incidence angle, the PBG exhibits an ∼100 nm blue shift, enabling passive seasonal modulation of solar heat: effective NIR blocking for summer cooling and enhanced NIR transmission for winter heating. Compared with conventional low-E

glazing and previously reported photonic crystal filters, the proposed smart-window design offers superior spectral selectivity and climate-responsive performance without electrical power or active control. These results highlight a practical passive solution for reducing energy demand in buildings located in hot-arid regions.

**Keywords:** Smart windows; short-wave pass filter; photonic band gap; multilayer dielectric coatings; near-infrared suppression; passive solar control; energy efficiency

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## PSS Posters – 3:45 p.m.-6:30 p.m. Friday

PSS-P01 **A Deep Learning Framework for Detecting Technosignatures from Theorized Extraterrestrial Kilostructures.**

Colin Harrison, Emilio Lugo, Bridget McDermott. Florida Institute of Technology. 150 W University Blvd, Melbourne FL, 32901.

All observable systems emit a measurable luminosity from their host star which is normalized to a flux value. This can be measured using photometry. When any object passes in front of the star, it blocks out a small portion of light that can be measured over a light curve. Different geometries create different silhouettes over the surface area of the star, and do so differently over time with respect to their orientation. We derive their distinct light curves through the transit method. Nearly all relevant light curves observed and recorded in astrometric databases are of spherical geometry, such as extrasolar planets and their moons. In this work, we address what the light curves of large structures for purposes such as harvesting energy or relocating population surplus would look like. We refer to these transiting bodies as kilostructures. We simulated the theorized kilostructures we deem most plausible for construction by an advanced extraterrestrial intelligence, and used their synthetic light curves to train a fully connected deep convolution neural network that detects and classifies potential alien life, or “technosignatures”, from thousands of real epoch photometries queried from GAIA’s third data release.

**Keywords:** Astrophysics, Astronomy, Data Science, Deep Learning, Artificial Intelligence

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PSS-P02 **Modeling the Secondary Catastrophic Disruption of the Veritas Family.**

Jarrett Dieterle, Skylar Butler, Aiden Kelleher. Embry-Riddle Aeronautical University. 1 Aerospace Blvd, Daytona Beach, FL 32114.

The Veritas asteroid family, located in the outer main belt, is believed to have formed from the catastrophic breakup of a parent body approximately 8.3 million years ago (e.g., Nesvorný et al., 2003). Larger fragments remained in the main belt, while smaller particles evolved inward under radiation forces, forming a toroidal dust structure observable in infrared data as paired bands. Previous studies (e.g., Dermott et al., 2001) have shown that these bands can be linked to their parent families and modeled from their initial disruptions. We propose that the 10° dust bands associated with Veritas may record evidence of a much more recent (~few hundred thousand years ago) secondary disruption. To investigate this, we reprocessed data from the Infrared Astronomical Satellite (IRAS) using Fourier-filtering techniques to isolate fine-structure components of the zodiacal cloud. This filtering enhances faint structural variations, allowing us to determine the longitudinal variation of the bands around the sky. The pattern of this intensity variation is consistent with a recent secondary breakup within the Veritas family. Here we show how the variation of this structure around the sky presents evidence of a possible, recent, secondary disruption within the band. Constraining this spatial variation of the intensity of the bands will help place constraints on the orbital elements of the material producing the secondary structure, as well as the age of the disruption. These parameters serve as inputs to dynamical evolution models aimed at reproducing the observed morphology, offering preliminary evidence that the Veritas family experienced a second, more recent catastrophic event.

**Keywords:** Solar System, Dust, Catastrophic Disruption, Asteroid, Veritas

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PSS-P03 **Designing the ERAU Solar Telescope: Optical Design and STEM Outreach.**

Sarah Hoover, Erin Abraham, Lauren Ashworth, Allyson Woodruff, Margret Stanley, Gwynlyn Hannah, Skylar Butler, Bereket Berhane, Ted von Hippel. Embry-Riddle Aeronautical University. 1 Aerospace Blvd. Daytona Beach, FL, 32114.

The new Embry-Riddle Aeronautical University (ERAU) coelostat is a campus-wide collaboration to design and install a research-grade solar observatory. With first light in Summer 2026, this new solar telescope will expand research in heliophysics, broaden student training opportunities, and increase STEM outreach. The optical design features a multi-element lens and mirror assembly optimized for a 1° field of view. The optical assembly includes a downport centered in the dome that directs the light into the classroom below. Based on the position of the folding mirrors, the optical design is comprised of four light paths: high and low-resolution spectrographs, an imager, and a projection system for public outreach and teaching. High-resolution spectroscopy will be utilized to examine the line profiles of diffuse emissions in the lunar exosphere using a Fabry-Perot interferometer. The low-resolution spectrograph will be fiber-fed and will spectrally observe solar features such as sunspots and coronal mass ejections. The imager will have the capabilities for H-alpha filtering to see solar prominences. The projection system includes a magnified disk image of the Sun and the visible spectrum of the Sun that will be projected into the observation room simultaneously. These efforts will establish a permanent solar research and outreach platform, expanding ERAU's capabilities in heliophysics, spectroscopy, and hands-on optical engineering.

**Keywords:** Solar telescope, Heliophysics, Optical Design, STEM outreach, public engagement

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PSS-P04 **System of Tempest Weather Devices Protecting ERAU Telescopes.**

Allyson Woodruff, Jadia Ewing, Christian Mayer, Joseph Elwell, Alvin Li. Embry-Riddle Aeronautical University. 1 Aerospace Blvd. Daytona Beach, FL 32114.

Ground based telescopes are essential tools for astrophysical research, providing critical data for studying celestial objects. However, these sensitive optical and electronic systems are highly dependent on the weather and environmental conditions. At Embry-Riddle Aeronautical University (ERAU), the 1-meter telescope, six 10-inch reflecting telescopes, and six 8-inch refracting telescopes are particularly vulnerable to Florida's frequent and unpredictable pop-up storms. Currently, a Tempest weather device is installed on the roof of the College of Arts and Sciences (COAS) building at ERAU. It provides real-time weather data to support safe telescope operations. To further protect the telescopes, a system of four additional Tempest devices will be placed roughly two miles from campus in the north, south, east, and west directions. By expanding the radius and quantity of devices, earlier detection of nearby pop-up storms will allow enough time to safely close the 1-meter telescope dome and secure the other roof-top telescopes.

**Keywords:** Telescopes, Weather, Tempest

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PSS-P05 **Stellar Winds, Metallicity, and the Remnant Outcome of Intermediate Mass Stars.**

Gabrielle Lavallee. Embry-Riddle Aeronautical University. 1 Aerospace Blvd. Daytona Beach Fl 32114.

Understanding the effects of metallicity and stellar winds is necessary for improving our knowledge of stellar evolution and constraining stellar remnants. The fate of stars with progenitors around 8M_⊙ are hard to predict from observations alone. In this work, we investigate the evolutionary outcomes of intermediate mass stars by computing stellar evolutionary models with MESA, Modules in Experimental Stellar Astrophysics, from the zero-age main sequence (ZAMS) through the asymptotic giant branch (AGB). We model stars with initial masses between 6.0 and 10.0M_⊙ and a range of metallicities to examine how metallicity-dependent mass loss influences final remnants. By analyzing core growth and mass loss history, we constrain the upper mass limit and lower mass limit of white dwarf and neutron stars respectively thus characterizing the white dwarf-supernovae boundary.

**Keywords:** white dwarf, supernovae, neutron star, metallicity, MESA

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PSS-P06 **Mapping Nebular Gas Structure Through Stellar Population Filtering in the Orion Nebula.**

K. Schenck and C. Hasara. Florida Institute of Technology. 150 W. University Blvd. Melbourne, FL 32901.

The interaction between young stellar populations and surrounding molecular gas governs the morphology and evolution of star-forming regions. In the Orion Nebula (M42), strong radiative feedback, stellar winds, and dynamical motions yield complex structures in nebular gas that are often sought and identified through traditional narrowband imaging and spectroscopy. Here, we repurpose color–magnitude diagrams (CMDs) as diagnostic tools for nebular structure rather than stellar classification. Using a star-removal neural network, we generate star-reduced, calibrated nebular images from Hubble Space Telescope observations MAST archive and map the residual gas emission into CMD space. This CMD-based filtering framework enables a self-consistent isolation of nebular components and reveals coherent morphological features associated with bow shocks, shock fronts, and ionization fronts across the Orion Nebula Cluster. Our results demonstrate that CMDs provide a robust and complementary guide for dissecting gas–star interactions in star-forming nebulae, establishing a novel, data-driven approach to probing nebular structure in crowded stellar environments.

**Keywords:** Nebulae, Color Magnitude Diagrams, Photometry, Neural Network, Nebular Structure

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PSS-P07 **Porkchops and LEMMON-ade: Trajectory and Delta-V Determination for Small Solar System Bodies**

Elizabeth Hayes, Michael Ferrigno, Dominic Heffron. Florida Institute of Technology. 150 W. University Blvd. Melbourne, FL 32901.

The trajectories of comets and asteroids are often extremely irregular and change with time. Additionally, comets and asteroids may contain valuable resources, making them desirable targets for mining. Our team set out to measure and observe a handful of these small solar system bodies to independently recreate their trajectories using our own “Orbit Visualizer”, and construct Mission Design

Curves showing the Delta-V budget for given launch and arrival dates. To determine the Keplerian orbital parameters, we used a Markov Chain Monte Carlo simulation to predict each parameter within 9 degrees of certainty. In conjunction with our "Orbit Visualizer", we graphed the Mission Design Curves for each body, detailing optimal launch and arrival date windows for the minimum Delta-V budget.

**Keywords:** Solar System Bodies, Orbital Mechanics, Observational, Mission Design

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PSS-P08 **Observing Jovian Atmospheric Features Using JunoCam Projections.**

Athena Klos, Persea Halloran. Florida Institute of Technology. 150 W University Blvd., Melbourne, FL 32901.

JunoCam is a visible-light camera mounted on NASA JPL's Juno orbiter; while it was not designed to be used for scientific purposes, it has been useful observing the upper level features of Jupiter's atmosphere. In this project we spherically projected images of Jupiter's north polar region taken across multiple perijoves and used them to identify and track consistent and scientifically interesting vortices and their features. This work further proves the usefulness of JunoCam for the analysis of Jupiter's atmospheric structure and dynamics.

**Keywords:** JunoCam, Jupiter atmosphere, planetary image processing

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PSS-P09 **Modeling of Mitigation Strategy for Carrington Class CMEs.**

Jose Fuentes, Camilla Wright. Florida Institute of Technology. 150 W University Blvd, Melbourne, FL 32901.

One of the current threats society faces is damage from a solar flare coronal mass ejection (CME), with possible economic damage to the US being a significant fraction of the GDP. Using the Carrington event as an example, a modern superflare is modeled to determine the specifications of a shielding device. By simulating a strong magnetic field generated at the Earth-Sun Lagrange point L1, situated

between the Earth and the Sun, the impact from these powerful CMEs could be mitigated. This work examines the mitigation strategy outlined by Lingam and Loeb in detail and finds that a 10nT magnetic field is sufficient to deflect a Carrington class CME.

**Keywords:** CME, plasma, simulation, solar flare

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## SOC = SOCIAL SCIENCES

FRIDAY 11:30 a.m. – 12:15 p.m.

JENNIFER WORTHAM, UNIVERSITY OF TAMPA, presiding

### 11:30 a.m. SOC-01 **Examining the Impact of Police Use of Force Simulations on HBCU Students' Perceptions of Police Legitimacy.**

Diyona Williamson, Taliyah Moore. Bethune-Cookman University. 640 Dr Mary Mcloed Bethune Blvd Daytona Beach,FL 32114.

Police violence and its impact on community trust, perceived police legitimacy, and negative mental health outcomes has been a ubiquitous concern (Chaney & Robertson, 2015; Cooper & Fullilove, 2016; Edwards et al., 2019; Tyler, 2005), with studies frequently highlighting the influence of age, race/ethnicity, and gender on public faith and confidence in police (Decker,1981; Morin & Stephler, 2021). Adverse or intrusive police-public encounters can be particularly deleterious when they involve youth and young adults. Such contacts can create formative experiences which not only impact adult trajectories (Geller & Fagan, 2019; Turney, 2021), but are often shared and reshared with family members, friends, and on social media (Brunson, 2007; McLeroy & Wang, 2024). Young adults, between the ages of 18-34, have been found to display a significantly lower level of trust in police than other age groups (Brucato & Fernandez, 2013). Given this is the age range of the majority of American college students, accessing the impact of police use of force simulations among this group can contribute to our understanding of the dynamics between experiences and perceptions of police legitimacy.

This study utilizes a mixed-methods design to assess college students' perceptions of police legitimacy using the police use of force simulator housed within Bethune-Cookman University's Center for Law and Social Justice (CLSJ). The research design includes both quantitative and qualitative methods using the validated survey instrument, Attitudes Toward Police Legitimacy Scale (APLS) (Reynolds, Estrada-Reynolds, & Nunez, 2018) as well as semi-structured, in-depth focus group interviews. Specifically, the study's research questions are as follows: How does exposure to the police use of force simulator affect college students' perceptions of police legitimacy?; Does the level of force used in the simulation impact perceptions of fairness and trust in police?; and Do individual characteristics (e.g., prior police contact, social media exposure to negative encounters, student major, and gender) moderate the relationship between simulator exposure and perceptions of police legitimacy?

**Keywords:** Police violence, Use of Force Simulator, Police legitimacy, Attitudes Toward Police Legitimacy Scale (APLS)

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11:45 a.m. SOC-02 **Major depressive episode risk factors among men who have sex with men and heterosexual men: evidence from 2023 NSDUH.**
Jasmine A. Vidovich, Kaelei G. Olig, Yan Guo, PhD. Dept. of Health Sciences & Human Performance, The University of Tampa 401 W. Kennedy Blvd., Tampa, FL 33606-1490.

Major depressive episodes (MDE) disproportionately affect sexual minority populations, including men who have sex with men (MSM), yet national comparisons between MSM and heterosexual men are limited. This study examined demographic and behavioral correlates of MDE using national data. We analyzed cross-sectional data from the 2023 National Survey on Drug Use and Health (NSDUH). Multivariable logistic regression estimated adjusted odds ratios (ORs) and 95% confidence intervals (CIs) for past-year MDE among heterosexual men (n = 16,943) and MSM (n = 1,292). Covariates included age, race/ethnicity, education, and substance use disorders. MDE prevalence was 7.3% among heterosexual men and 20.3% among MSM. Older age was inversely associated with MDE. Among heterosexual men, completing high school (vs. less than high school) was associated with higher odds of MDE (OR = 1.23, 95% CI: 1.01–1.51). Compared with

White men, heterosexual Black, Hispanic, and Asian men had lower odds of MDE; similar patterns were observed among Black and Asian MSM. Substance use disorders were strongly associated with MDE. Heterosexual men with drug use disorder (OR = 2.42, 95% CI: 2.06–2.83) or alcohol use disorder (OR = 1.40, 95% CI: 1.17–1.69) had elevated odds of MDE, while MSM with drug use disorder also had increased risk (OR = 1.99, 95% CI: 1.39–2.84). Findings support integrated mental health and substance-use interventions for sexual minority men, with implications for HIV prevention and holistic care.

**Keywords:** men who have sex with men, major depressive episode, sexual orientation, substance use, mental health

Corresponding author: Jasmine A. Vidovich, jasmine.vidovich@spartans.ut.edu

12:00 p.m. SOC-03 **Navigating the Journey into Healthcare: Teamwork Creates Ultimate Success.**

Nicole Patterson[(1)], Keerthika Ravikumar[(1)], AbbyGail Salcido[(1)], Yuri Zagvazdin[(2)] and Cheryl Purvis[(1)]. [(1)]NSU College of Optometry. [(2)]Dr. Kiran C Patel College of Allopathic Medicine (NSU MD).Nova Southeastern University, Health Professions Division, 3200 S. University Drive, Fort Lauderdale, FL 33328.

Everyone has a unique view on life and interactions with others. Recognizing and respecting different personalities and perspectives is a crucial life-long lesson, especially for future Healthcare professionals. Creating positive group dynamics can be the key to career success. Pre-health majors can learn from our experience with future Optometrists. As part of their training, we expect our Optometry students to work together in assigned lab groups throughout their pre-clinical curriculum. During their first semester, the class is divided into four Lab groups. In Fall 2025, to foster near-peer mentoring, students were given a new opportunity for interaction with classmates, as well as upperclassmen. Students from all four years were randomly assigned to social “Societies”. In any group situation, potential personality clashes can often undermine engagement and participation. In our study, we examined various personality types drawn to the field of Optometry. First year students (N=130) took a strengths inventory and positive psychology-based personal preference profile test. We found a substantial percentage identified as Emotional Helpers with Empathy as a dominant strength. Furthermore, we determined this to be true regardless of their lab group or society assignments. A

benefit to our approach was revealing individual strengths and personality types within specific groups. Students gained valuable awareness of their own and their classmates' core individual characteristics. Most importantly, this knowledge empowers students to appreciate each other, their faculty and ultimately their future patients.

**Keywords:** Pre-Health Majors, Optometry, Positive Psychology, Empathy, Emotional Helpers

Corresponding author: Cheryl Purvis, cpurvis@nova.edu

## SOC Posters – 3:45 p.m.-6:30 p.m. Friday

SOC-P01 **Who Is at Risk? National Evidence on Suicide Attempts Among U.S. Adults Using 2023 NSDUH Data.**

Kaelei Olig, Jasmine Vidovich. University of Tampa. 401 W Kennedy Blvd Tampa, FL 33606.

Suicide remains a leading cause of mortality in the United States, yet recent national evidence on population-level risk factors remains limited. Utilizing newly released data, this study examined demographic, socioeconomic, and behavioral factors of past-year suicide attempts among U.S. adults to inform targeted prevention efforts. We conducted a cross-sectional analysis of 43,687 adults participating in the 2023 National Survey on Drug Use and Health (NSDUH), a nationally representative survey of the U.S. civilian, non-institutionalized population. Multivariable logistic regression models estimated adjusted associations between past-year suicide attempts and key factors, including age, sex at birth, race/ethnicity, sexual orientation, county metropolitan status, educational attainment, poverty level, alcohol and/or substance use, and major depressive episode. An estimated 1.0% of U.S. adults reported a suicide attempt in the past year. Major depressive episodes and alcohol or substance use emerged as the strongest and most consistent risk factors. Increasing age was inversely associated with suicide attempts, while sex at birth was not significantly associated with risk. Compared with White adults, Black adults and individuals identifying as other race/ethnicity exhibited higher odds of suicide attempts. Individuals identifying as bisexual or other sexual orientations experienced markedly elevated risk relative to heterosexual adults. Res-

idence in non-metropolitan areas was also associated with increased odds of suicide attempts. Educational attainment demonstrated a protective gradient, whereas higher income was protective only among individuals with incomes exceeding 200% of the federal poverty threshold. These findings reveal disparities in suicide attempt risk across demographic, socioeconomic, and behavioral domains. Results underscore the need for equity-focused, stage-specific suicide prevention strategies that integrate mental health and substance use services, particularly for sexual minority populations, racial/ethnic minorities, and individuals residing in non-metropolitan communities.

**Keywords:** Suicidality, Suicide attempts, Risk factors, Population-level, NSDUH

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SOC-P02 **A Direct Comparison of Dental Care Usage by Hispanic Immigrants in their Home Country and Host Country.**

Tina Wu. South Florida State College. 600 West College Drive, Avon Park, FL 33825.

The topic of dental care usage among immigrants has been widely explored, as numerous studies have typically examined behavioral patterns, accessibility, and/or availability of dental care in the host country. However, this study aimed to compare the usage of dental care among the Hispanic population between their home country and their host country. Specifically, this study focused on 41 participants over the age of 18 who currently reside in the United States and immigrated from a Latin American or Hispanic country. The participants were given surveys adapted from the WHO and NHANES questionnaires to determine the frequency, motivations, and barriers to dental care usage. The data revealed that the reported usage of fluoride toothpaste and dental care services increased after moving to the host country. Additionally, reasons for seeking care demonstrated an upward trend, while barriers to receiving care, such as lack of availability, exhibited a downward trend. By comparing behaviors before and after migration, this study identified barriers that both persisted and naturally disappeared after relocation. Continuations of specific behaviors may indicate potential issues that need to be addressed, while prominent motivators could be used to encourage regular dental care usage. These findings may inform and support clinics, dental

offices, and community programs in implementing more targeted approaches for Hispanic patients, which could lead to improved long-term oral health outcomes.

**Keywords:** Hispanic immigrants; dental care utilization; fluoride toothpaste; pre- and post- migration comparison.

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SOC-P03 **Why do so few high school athletes play in college?**

Stephanie DeFilippo, Abraham Miller. University of Tampa. 401 West Kennedy Blvd. Tampa, FL.

Only a small percentage of high school athletes (8%) continue their sport at a collegiate level. There are many possible reasons for this: the overall numbers of players are smaller in college, increased competition, academics are harder, athletes experience burnout, or injuries pile up. However, there is a gap in the literature investigating why most high school athletes do not continue to play in college. In this study, we aimed to identify the primary reason student athletes do not continue to play sports in college. It was hypothesized that injury was the leading cause of high school athletes not continuing to play in college. Two hundred undergraduate students at The University of Tampa, who participated in high school sports but not in college, were surveyed. Data were analyzed using a Chi Squared Goodness of Fit and Fisher's Exact Test. The most common reason participants reported not playing in college was burnout (40% response), which was significantly more than any other reason given. Unfortunately, if athletes want to play sports at a high level and compete, they need to participate nearly year round in an individual sport. While this improves the athletes' performance and overall competition, it is likely to contribute to the reported burnout found in this study. Burnout in sport was first recognized in the 1980s and the Athlete Burnout Questionnaire (ABQ) was developed in 2001. However, research using the ABQ has primarily been restricted to evaluating adult athletes. This study may indicate organized sports need to reevaluate their training to reduce burnout and monitor youth athletes using the ABQ. Better monitoring and establishing distinct seasons in youth sports may help to reduce burnout in youth athletes. Continuing to play after high school, even if not in college, would positively impact their long-term health.

**Keywords:** athletes, burnout, health

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**TCH = SCIENCE TEACHING**

FRIDAY 11:30 a.m. – 12:15 p.m.
THOMAS ARNOLD AND MATT TUCKER, LAKE ERIE COLLEGE OF OSTEOPATHIC MEDICINE, presiding

11:30 a.m. TCH-01 **Project-Based Learning in AI and Robotics: Teaching Python and Computer Vision through Autonomous Robot Following Tasks.**

Sam Mohammadi, Farahnaz Golrooy Motlagh, Seenith Sivasundaram, Juan Calderon, Xiaohe Wu. Bethune Cookman University, Daytona Beach, FL.

This paper presents a project-based educational initiative implemented through a Robotic Academy for high school students, collaboratively taught by multiple instructors, with the goal of introducing foundational concepts in artificial intelligence (AI), computer vision, Python programming, and mathematical modeling. Students worked in teams to program a mobile robotic platform—referred to as a "robotic puppy"—to autonomously follow its owner using real-time computer vision techniques based on color detection. The program culminated in a competitive robotic race designed to evaluate which algorithms enabled the robot to follow the owner more accurately while moving faster or more smoothly. Using Python and open-source computer vision libraries, students implemented and compared multiple color-tracking strategies, image preprocessing techniques, and control algorithms. Mathematical modeling was incorporated to analyze motion dynamics, speed control, and trajectory stability. Students iteratively modified and optimized their code, observing how different modeling and algorithmic choices affected responsiveness, accuracy, and overall performance. Evaluation criteria included tracking accuracy, reaction time, stability, and speed during race demonstrations. This instructional framework emphasized experiential learning, algorithm comparison, and data-driven decision making, allowing students to directly observe the impact of computational and mathematical choices on robotic behavior. Outcomes showed increased student engagement, improved understanding of AI and computer vision principles, and strengthened problem-solving and programming skills. The collaborative, competition-based environment also fostered

teamwork, creativity, and critical thinking. The results demonstrate that integrating robotics, computer vision, and mathematical modeling into pre-college STEM education provides an effective and engaging pathway for teaching AI concepts. This approach highlights the value of hands-on, instructor-led, interdisciplinary learning experiences in preparing students for future studies and careers in science, engineering, and artificial intelligence.

**Keywords:** Artificial Intelligence, Robotics Education, Computer Vision, Python Programming, Mathematical Modeling, Project-Based Learning, Autonomous Systems, STEM Education, Human–Robot Interaction, Algorithm Optimization

Corresponding author: Farahnaz Golrooy Motlagh, golroof@cookman.edu

11:45 a.m. TCH-02 **Student Perception of How to Succeed in a Pre-Nursing Anatomy and Physiology Course.**

Dr. Marc Behrendt[(1)], Dr. Krisanna Machtmes[(2)], Dr. Jodie Foster[(2)]. [(1)]Webber International University, 1201 North Scenic Highway, Babson Park, FL 33827. [(2)]Ohio University, Athens, OH.

Many university students begin the pre-nursing anatomy and physiology course unprepared for the pace and intensity. In a voluntary writing activity on the last day of the two-semester anatomy and physiology class, students were asked to write a letter to the next year's students to offer advice on how to pass the course, no further direction or guidance of what to write was provided. Data consisted of 283 open letters containing each student's voice, broken down into in vivo codes. Several themes emerged from the codes. Essays recognized the value of study and learning skills, while also voicing negative affective feelings towards the anatomy and physiology course, suggesting that many students were unprepared for this college level course. This study informs anatomy instructors of student preparation and attitude toward an anatomy and physiology course. https://doi.org/10.21692/haps.2020.014

**Keywords:** Anatomy and Physiology, pre-nursing, college readiness, study skills, STEM

Corresponding author: Dr. Marc Behrendt, behrendtme@webber.edu

12:00 p.m. TCH-03 **A Unique Project Development Method for Undergraduate Independent Research.**

Agnes Berki, Jacob Blanchard, Stephen Cronin,Nicholas Curtis, Brett Feger, Alexander Heatherly, Ladislav Sallai, Samuel Shephard, Sandra Tirado, Stephen Wirick. Ave Maria University. 5050 Ave Maria Boulevard, Ave Maria, Florida, 34142.

A unique project development method was used in undergraduate research with great success. Undergraduate students who conduct independent research learn first-hand the steps of scientific inquiry. Gaining an understanding of the scientific method enhances their logical thinking skills and prepares them for graduate school and the workforce, going beyond textbook knowledge. The independent nature of research allows students to develop their own research questions with the guidance of a faculty mentor who offers support and encouragement throughout the process: from project development and execution to the presentation of findings. This experience not only reinforces textbook learning but also fosters deeper scholarly inquiry. The method of project selection and development is crucial to the success of independent undergraduate research. We have developed a unique and proven approach, evidenced by over a hundred successfully completed student projects. This poster will outline the steps of our method. In brief, the student serves as the originator and driver of the research. Because students maintain ownership of their projects, the experience profoundly impacts on their personal growth, particularly in written communication, verbal articulation, and professional confidence. Furthermore, this model more effectively prepares students for success in higher education and integration into the workforce.

**Keywords:** education, undergraduate research, independent research

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## TCH Posters – 3:45 p.m.-6:30 p.m. Friday

TCH-P01 **Construction of an Aquaculture Recirculating System to teach Undergraduate Students Multidisciplinary STEM principles.**
Guillermo Gonzalez, Jabari Young, Anaya Robinson, Adrian Cruz, Olivia Miller, Aaliyah Maze Vidal, Paige Beardsley, Mila Fletcher and Christopher Williams. St Thomas University, Miami, FL.

The St. Thomas University Marine Science Program describes the design, implementation, and pedagogical impact of an urban, multi-species aquaculture recirculating system (ARS) developed as a living laboratory for undergraduate STEM education. The system integrates complementary taxa (finfish, mollusks and aquatic vegetation) with biological filtration and traditional water quality assessment to maximize nutrient recycling and minimize freshwater and waste effluent. A three-stage recirculating system was constructed where undergraduate students performed the construction of pools and elevated foundations, designed flow through recirculation, initiated live animal/vegetation management and performed water chemistry assessment. From an engineering perspective, the three module ARS uses energy-efficient pumps, gravitational exchange, and weekly water monitoring to demonstrate real-world conditions between growth of biomass, nutrient inputs/exchange and system stability. From an ecological perspective, polyculture stocking and trophic partitioning (omnivores, filter feeders and soluble nutrient uptake) increase overall biomass productivity while reducing feed waste and improving nutrient recycling. Pedagogically, the installation was centered around a multidisciplinary curriculum spanning biology, environmental engineering, chemistry, data science, and sustainability studies; learning activities included system design projects, hands-on operation and management, water-quality experiments, life-cycle analyses, and student suggested system renewable energy upgrades. Assessment of student learning used practical hands-on experience and showed gains in quantitative reasoning, system and experimental design, development of sustainable food-production technologies and increased ecological understanding. Instructors observed increased student engagement and interdisciplinary collaboration, and the program expects to facilitate community outreach by producing demonstration data and edible harvests for campus dining. We con-

clude that urban multi-species RAS platforms provide an effective learning technique for STEM education and sustainable aquaculture research, offering scalable models for academic integration and urban food resilience.

**Keywords:** STEM teaching model, aquaculture, recirculation

Corresponding author: Guillermo Gonzalez, guillermogonzalez@stu.edu

TCH-P02 **Microbial Masterpieces: The Symphony of Science and Creativity.**

Carmelo Islas – Cardoso, Reynaldo Villalobos. South Florida State College. 600 W College Dr, Avon Park, FL 33825.

From color theory to the golden ratio, science is commonly integrated into art and has greatly benefited from technological advances. This project is inspired by the emerging field of Bio Art where biotechnology is used to create artwork that integrates biology, engineering, art, and photography and serves as a unique project-based teaching opportunity. Genetically engineered bacteria were used to create art masterpieces in this project. Initially, art principles were used to create a template for the artwork. Students sketched out and created their own designs on a platform called Solidworks, where those designs would then become a 3D printed stamp of the art to help transfer their art onto the Luria broth agar plates which were used as a canvas and genetically modified E. coli strains as paint. Four different strains of E. coli were used, each transformed with plasmid containing genes for either blue, pink, purple, or green fluorescent chromogen. Designs were made by transferring bacterial culture onto the plates using various methods such as paint brush, cell spreader, pipettes or 3D printed stamps. The plates were then incubated for 72 hours in a 37°C incubator, which led to the growth of bacteria and visible colorful bacterial colonies creating artistic designs. Finally, images of the bacterial designs were captured applying photography principles, digitally edited, printed, and mounted for display. Next, this art is used to learn and establish a small business model. This interdisciplinary project serves as a learning opportunity that uniquely integrates art, engineering, photography and molecular and microbiology and entrepreneurship principles, and is a valuable resource for teaching science as seen in real world, cross-integrated with other disciplines.

**Keywords:** BioArt, Inter-disciplinary, Project-based course.

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| *Time* | *GHS 104* | *GHS 105* | *GHS 106* | *GHS 107* | *GHS 109* | *TECH 483* | *TECH 485* | *TECH 486* |
|---|---|---|---|---|---|---|---|---|
| 8:00 | Registration: Jenkins Health and Technology Building Lobby | | | | | | | |
| 8:15 | | | | | | | | |
| 8:30 | | | AOS-01 | | | | | |
| 8:45 | | | AOS-02 | | | | | |
| 9:00 | MED-01 | MED-08 | AOS-03 | BIO-01 | CMB-01 | CMS-01 | ENG-01 | ENV-01 |
| 9:15 | MED-02 | MED-09 | AOS-04 | BIO-02 | CMB-02 | CMS-02 | ENG-02 | ENV-02 |
| 9:30 | MED-03 | MED-10 | AOS-05 | BIO-03 | CMB-03 | CMS-03 | ENG-03 | ENV-03 |
| 9:45 | MED-04 | MED-11 | BREAK | BIO-04 | CMB-04 | BREAK | ENG-04 | ENV-04 |
| 10:00 | BREAK | BREAK | BIO-09 | BREAK | CMB-05 | PSS-01 | ENG-05 | BREAK |
| 10:15 | MED-05 | MED-12 | BIO-10 | BIO-05 | BREAK | PSS-02 | BREAK | ENV-05 |
| 10:30 | MED-06 | MED-13 | BIO-11 | BIO-06 | CMB-06 | PSS-03 | ENG-06 | ENV-06 |
| 10:45 | MED-07 | MED-14 | BIO-12 | BIO-07 | CMB-07 | BREAK | ENG-07 | ENV-07 |
| 11:00 | BREAK | BREAK | BIO-13 | BIO-08 | CMB-08 | PSS-04 | ENG-08 | |
| 11:15 | | | BREAK | BREAK | CMB-09 | PSS-05 | ENG-09 | |
| 11:30 | TCH-01 | GEO-01 | BIO-14 | SOC-01 | CMB-10 | PSS-06 | ENG-10 | |
| 11:45 | TCH-02 | GEO-02 | BIO-15 | SOC-02 | | | | |
| 12:00 | TCH-03 | GEO-03 | BIO-16 | SOC-03 | | | | |
| 12:15 | | | BIO-17 | | | | | |
| 12:30 | **Lunch** | | | | | | | |
| 12:45 | | | | | | | | |
| 13:00 | | | | | | | | |
| 13:15 | | | | | | | | |
| 13:30 | | | | | | | | |
| 13:45 | **FAS Business Meeting** | | | | | | | |
| 14:00 | | | | | | | | |
| 14:15 | **Vaughn Center, Reeves Theater, 2nd floor.** | | | | | | | |
| 14:30 | | | | | | | | |
| 14:45 | **2025 FAS Medalist Address** | | | | | | | |
| 15:00 | **Vaughn Center, Reeves Theater, 2nd floor.** | | | | | | | |
| 15:15 | | | | | | | | |
| 15:30 | **BREAK** | | | | | | | |
| 15:45 | **Poster Session** | | | | | | | |
| 16:00 | **Vaughn Center, 9th floor.** | | | | | | | |
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| 18:30 | | | | | | | | |

# UNIVERSITY OF TAMPA CAMPUS MAP 2025–2026

## ATHLETIC AND RECREATIONAL FACILITIES

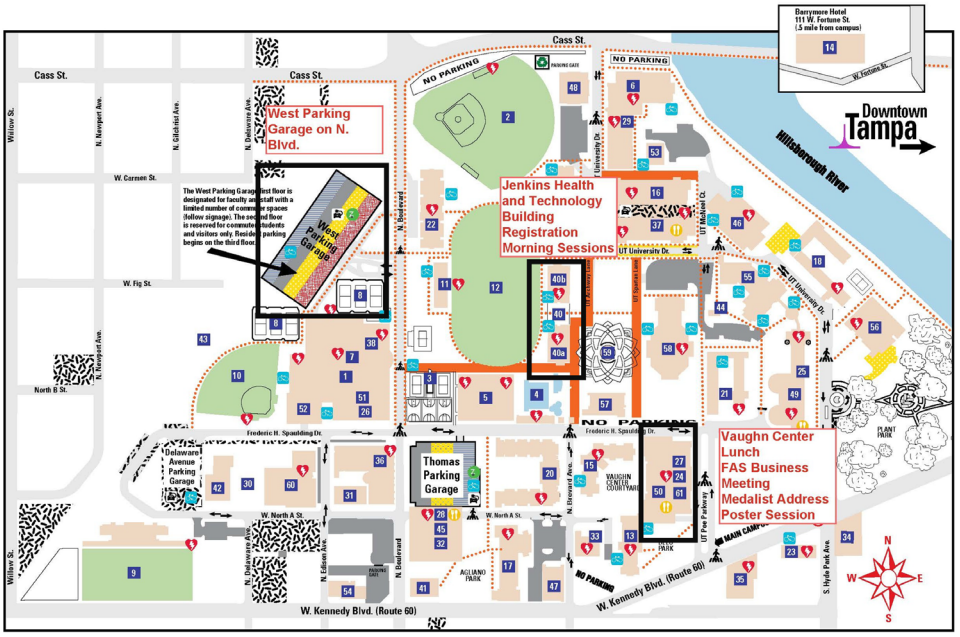
1. Athletic Offices/Classrooms
2. Baseball Field
3. Beach Volleyball Complex
4. Benson Alex Riseman Aquatic Center (POOL)
5. Benson Alex Riseman Fitness and Recreation Center (FIT)
6. Cass Gymnasium (CB)
7. Martinez Athletics Center (MAC)
8. Naimoli and Young Family Tennis Complex (TC)
9. Naimoli Family Athletic and Intramural Complex
10. Naimoli Family Softball Complex
11. Pepin Stadium
12. Track

## RESIDENCE HALLS

13. Austin Hall
14. Barrymore Hotel
15. Brevard Hall
16. Grand Center
17. Jenkins Hall
18. McKay Hall
19. Morsani Hall
20. Palm Apartments
21. Smiley Hall
22. Straz Hall
23. Vaso Hall
24. Vaughn Center

## ACADEMIC AND ADMINISTRATIVE FACILITIES

25. Admissions – 1st Floor
26. Bailey Art Studios (BAS)
    - Fab Lab
27. Bookstore – Barnes & Noble
28. Campus Safety – 1st Floor
29. Cass Building
    - Communication (CCB)
    - Gymnasium (CB)
    - Science (CB)
30. Central Receiving
31. Chiller Plant
32. Daly Innovation and Collaboration Building (ICB)
33. Dickey Health Center
34. Faculty/Staff Offices
35. Falk Theatre (FALK)
36. Forman Center for the Arts (FCA)
    - Charlene A. Gordon Theater
    - Charlene and Mardy Gordon Performance Gallery
    - Saunders Foundation Art Gallery
37. Grand Center (GC)
    - Parking, Floors 2-5
38. Health Sciences and Human Performance Building (HSHP)
39. Henry B. Plant Museum
40. Jenkins Health and Technology Building
    - 40a: Health Building – (GHS)
    - 40b: Technology Building – (TECH)
41. Kennedy Boulevard Building (KBB)
42. Krusen Building
43. Leadership Development Course
44. Little School House
45. Lowth Entrepreneurship Center
46. Macdonald-Kelce Library (LIB)
47. MacKechnie Building (MKE)
48. North Central Energy Plant
49. Plant Hall (PH)
50. Reeves Theater (VAUG RVS)
51. Scarfone/Hartley Gallery
52. Schoonmaker ROTC and Athletics Building (SCHO)
53. Science Annex (SA)
54. Science Research Laboratories
55. Science Wing – Plant Hall (SC)
56. Southard Family Building (SFB)
57. Sykes Chapel and Center for Faith and Values (SCFV)
58. Sykes College of Business (JS)
59. Sykes Plaza and Susan and John Sykes Ars Sonora
60. Thompson Building
61. Vaughn Center (VAUG)




## CAMPUS PARKING KEY

- Faculty/Staff Parking
- Residential Student Parking
- Commuter Student Parking
- Admissions/Visitor Parking
- Museum Parking
- Faculty/Staff/Commuter Parking

This symbol designates automated external defibrillator (AED) unit and bleeding control kit locations.

Disabled parking is available near all campus buildings.

The University of Tampa is a smoke-free campus. This applies to all faculty, staff, students and visitors.

Pedestrian Walkway

Fire Lane

Dining

Electric Vehicle Charging Station

Bicycle Rack

Zipcar Car Sharing Pick Up

THE UNIVERSITY OF TAMPA

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