UMES 2025

14TH ANNUAL RESEARCH SYMPOSIUM

135 years Anniversary of the Second Morrill Act

THE SECOND MORRILL ACT
CELEBRATING
135 YEARS OF SERVICE

FROM VISION TO INNOVATION

ADVANCING RESEARCH FOR SOCIETY

9TH GRADUATE EDUCATION WEEK
APRIL 14 - 18, 2025
14TH ANNUAL RESEARCH SYMPOSIUM
APRIL 17, 2025

BOOK OF ABSTRACTS

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BioSketch

Heidi Anderson
UMES President

Heidi M. Anderson, a native of Gary, IN, assumed the presidency of the University of Maryland Eastern Shore on September 1, 2018. She is the 16th leader of the 1890 land-grant institution in Princess Anne that opened its doors on Sept. 13, 1886 as the Delaware Conference Academy initially under the auspices of the Methodist Episcopal Church.

A three-time graduate of Purdue University in her native Indiana, Dr. Anderson came to UMES with nearly two decades of higher education leadership experience. "What I personally value about access, quality and opportunity – the tools that close the achievement gap – are at the core of my leadership," she said.

She was previously chief academic policymaker at Texas A&M University-Kingsville from 2015 to 2017, where she managed a $35 million budget and directed 22 academic departments, 10 centers and institutes. She oversaw creation of new degrees in computer science, engineering and clinical mental health counseling.

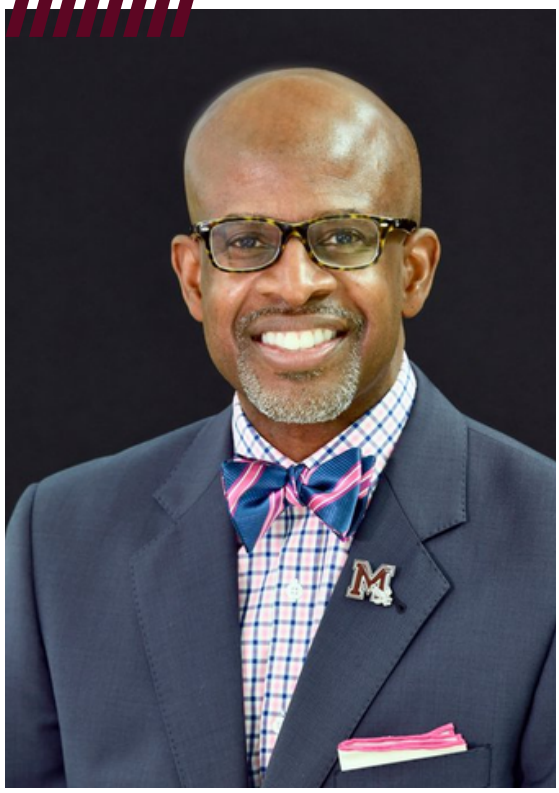
Prior to working in Texas, Dr. Anderson was chief academic policymaker at the University of the Sciences in Philadelphia from 2013 to 2015. Between 2006 and 2013, she held a variety of positions at the University of Kentucky, including professor in the Department of Pharmacy Practice and Science, assistant dean for educational innovation, associate provost for faculty affairs and vice president/associate provost for institutional effectiveness.

Her classroom experience includes work as professor and chair of Auburn University's Pharmacy Care System Department and serving an assistant professor in the University of Tennessee's College of Pharmacy.

She has served as president and vice president of the Accreditation Council for Pharmacy Education.

Dr. Anderson earned her Ph.D. in pharmacy administration, a Master's in education and a Bachelor of Science degree in pharmacy from Purdue, also a land-grant university.

BioSketch



Rondall Allen, PharmD

Provost & Vice President for Academic Affairs

Dr. Rondall E. Allen joined UMES on July 1, 2015 as Dean of the School of Pharmacy and Health Professions. Prior to coming to UMES, he served as the Associate Dean for Academic Quality at South University School of Pharmacy.

He also served in several administrative roles during his tenure at Xavier University of Louisiana College of Pharmacy to include Director of Experiential Education, Assistant Dean for Program Assessment and Associate Dean for Student Affairs. Currently, he serves as the Provost and Vice President for Academic Affairs.

Dr. Allen has over 33 years of experience in the profession of pharmacy and has spent the last 20 years in academia. He has practiced in a variety of settings to include community pharmacy, acute care, ambulatory care, and the pharmaceutical industry.

As a clinician, he developed and implemented two outpatient anticoagulation clinics in which he managed patients with deep vein thrombosis, pulmonary emboli, atrial fibrillation and other clotting disorders.

Dr. Allen was recently appointed to another four-year term by the Governor to serve on the Board of Trustees for the Maryland Health Benefit Exchange (MHBE). The MHBE is responsible for overseeing the Affordable Care Act for the state of Maryland. He also serves on the Board of Directors for TidalHealth and the Board of Directors for the Maryland Technology Development Corporation. He is a trained site-team evaluator for the Accreditation Council of Pharmacy Education and has served as a consultant for several Schools/Colleges of Pharmacy.

Dr. Allen earned his Bachelor of Science degree in Pharmacy from the Florida Agricultural and Mechanical University College of Pharmacy and Pharmaceutical Sciences and his Doctor of Pharmacy from the Xavier University of Louisiana College of Pharmacy. He completed a post-graduate Pharmacy Practice residency at Baptist Memorial Hospital in Memphis, TN and is a Fellow of the American Association of Colleges of Pharmacy. He also completed Harvard's Graduate School of Education Institute for Management in Leadership Education program.

Welcome Message

LaKeisha Harris, PhD
Dean,
School of Graduate Studies

Dear Esteemed Scholars, Guests,
and Researchers,

On behalf of the School of Graduate Studies, it is with great pleasure and excitement that I extend a warm welcome to each one of you to the 9th Annual Graduate Education Week and the 14th Annual UMES Research Symposium!

Our theme for this year is, "From Vision to Innovation: Advancing Research for Society". We invite you to reflect on how your research is making a difference. This year's theme challenges us to turn dreams into action—not just for personal success, but for the betterment of society. Let's showcase the power of research to inspire, innovate, and drive meaningful change.

This year we are especially excited to collaborate with the School of Agricultural and Natural Sciences in celebrating the 135th anniversary of the Second Morrill Act of 1890-a pivotal piece of legislation that laid the foundation for the 1890 land-grant institutions and expanded access to higher education, research, and public service for underrepresented communities.

We extend our deepest gratitude to all the participants, presenters, speakers, sponsors, and organizers who have contributed their time, talents, and passion to making this event a success. Your presence enriches the conversation and strengthens the spirit of collaboration and discovery.

Enjoy the research symposium, take a tour of our spacious campus, and feel free to explore the town the Princess Anne.

We look forward to a great day of learning, networking, and celebration!

Warm regards,

LaKeisha L. Harris

LaKeisha L. Harris, Ph.D.

Keynote Speaker

Douglas Steele, Ph.D.
Vice President, Food, Agriculture, & Natural Resources (FANR)

The Association of Public and Land-grant Universities (APLU®)

The Association of Public and Land-grant Universities (APLU) is a membership organization that fosters a community of university leaders collectively working to advance the mission of public research universities. Dr. Douglas Steele was appointed as Vice President for the Office of Food, Agriculture & Natural Resources on January 2, 2019. He strongly believes in the power of the Land-Grant University to provide access and affordability to higher education, increase the profitability of agricultural enterprises and transform families, youth and communities. His prior positions and appointments include Director of the Texas A&M AgriLife Extension Service (2012-2018) and Vice President for External Relations and Director of Extension for Montana State University (2004-2012).

Dr. Steele previously held Extension and faculty positions at Colorado State University, where he was assistant director and State 4-H Program leader, and at Purdue University, where he served as an Extension specialist and assistant professor in the Department of Curriculum and Instruction.

On the national level, Dr. Steele has served as chair of the Extension Committee on Organization and Policy (ECOP), the ECOP Budget and Legislative Committee, national BAA Policy Board of Directors, and the National 4-H Congress Board of Directors. He's also served as Trustee for National 4-H Council, officer of the eXtension Foundation Executive Committee, and Co-chair of the ECOP Marketing and Communications Task Force.

Dr. Steele has received several awards of distinction including the Visionary Leadership Award, Montana State University Extension; the F. A. Anderson Distinguished Service Award, Colorado State University; Texans Caring for Texans honoree; and the National Friend of Family and Consumer Sciences and the Superior Service Award for Excellence, United States Department of Agriculture. Throughout his career he has received over 10 million dollars in funding to support curriculum development, rural development work and engagement activities.

Dr. Steele has a Bachelor of Science degree in Animal Science/Agri Business from Panhandle State University, Goodwell, OK; a Master of Agriculture degree in agronomy from West Texas State University, Canyon, TX; and a Doctor of Philosophy degree in Educational Human Resource Development from Texas A&M University, College Station, Texas. He currently resides in Bowie, MD with his wife, Lori, and has four grown children and four grandchildren.

135th Anniversary of the Second Morill Act of 1890

Moses Kairo, PhD

Dean, School of Agricultural and Natural Sciences
Interim Vice President for Research

2025 is a momentous year as it marks the 135th anniversary of the Second Morill Act of 1890. This act was pivotal for the establishment of the nineteen 1890 Land Grant Institutions, including the University of Maryland Eastern Shore (UMES). The Act was signed into law by President Benjamin Harrison on August 30, 1890. However, throughout this year, we are celebrating this land mark legislation in order to uplift and heighten the knowledge and legacy of these fine institutions.

This act was a sequel to the first Morrill Act, passed in 1862 which aimed to provide affordable higher education by granting federal land to states for the creation of agricultural and mechanical colleges. The goal was to promote the practical education of the nation's working class, particularly in fields such as farming, engineering, and the mechanical arts. However, the implementation of the act largely benefitted white populations, as it was deeply entwined with the racial segregation that existed at the time. Southern states, which had large Black populations, which had large Black populations, did not create institutions that were accessible to African Americans.

The Second Morrill Act of 1890 directly addressed this challenge and it holds a crucial place in American educational history, as it significantly expanded access to higher education, particularly for African Americans in the Southern United States. The Act required that states with segregated schools to establish separate land-grant colleges for Black students and provided federal funding to support these institutions.

The significance of the Second Morrill Act extends far beyond the immediate creation of educational institutions. By investing in Black education, the act contributed to the long-term intellectual and professional development of African American communities. Today, graduates of these universities play key roles in fields such as agriculture, engineering, education, and business.

UMES is a proud 1890 university which is open to people from all backgrounds who seek the unique educational experience we offer within a dynamic and vibrant campus atmosphere.

As an 1890 university UMES is not just focused on education and workforce development, but it is also a powerhouse of innovation, research and community engagement. The university contributes contribute significantly to research in agriculture, health, science, and technology. UMES plays a key role as an economic engine, providing jobs, supporting businesses, and contributing to local development.

Happy 135th Anniversary!


1890 LAND-GRANT UNIVERSITIES
135 Years of Service
1890 2025
THE SECOND MORRILL ACT
135th
ANNIVERSARY
SECOND MORRILL ACT!

Call for Abstracts

UNIVERSITY OF MARYLAND EASTERN SHORE

SOAR ABOVE & BEYOND

DIVISION *of* ACADEMIC AFFAIRS
School of Graduate Studies and Research

Call for Abstracts
University of Maryland Eastern Shore
Ninth Annual Graduate Education Week
Fourteenth Annual Regional Research Symposium
Student Services Center
Thursday, April 17, 2025
8:00 a.m.- 4:00 p.m.

The School of Graduate Studies at the University of Maryland Eastern Shore is pleased to announce its ninth annual Graduate Education Week and 14th Annual Regional Research Symposium to be held on Thursday, April 17, 2025. The theme of this year's symposium is:

From Vision to Innovation: Advancing Research for Society

This year's research symposium dares you not just to dream, but to turn your dreams into reality. This call challenges us to reflect on our dreams and our goals. Have we put forth the effort and accomplished them? Are we in the process of doing so? Or have we lost sight of our vision altogether and need to realign with our mission?

It's one thing to have dreams for ourselves, but another to have dreams for the advancement of society. While personal ambition fuels innovation, the true power of research lies in its ability to drive meaningful change for society. Turning dreams into reality requires more than just ideas—it demands action. Achieving great things is also never a solitary endeavor. Collaboration and support play a vital role in bringing innovation to life. This year, we ask: *In what ways have you used research to realize your dreams for the benefit of society?*

We invite researchers from all disciplines to share and celebrate their work at the research symposium. Whether you are pushing the boundaries of science, advancing social change, or pioneering new technologies, we encourage you to showcase how your research is making an impact.

Register and submit your abstract by March 10, 2025: wwwcp.umes.edu/symposium2025
Need assistance? Contact:
Dr. Wele Elangwe | welangwe@umes.edu
Ms. Amelia Potter | agpotter@umes.edu
Dr. Kelsie Endicott | kjendicott@umes.edu
Want to support the symposium as a judge, moderator or volunteer? Sign up by March 10, 2025:
https://forms.gle/cWYtAzMusetosX54A

Respectfully,

LaKeisha L. Harris

LaKeisha L. Harris, Ph.D.

Engineering and Aviation Science Complex, Suite 3046 Princess Anne, MD 21853 Tel: (410) 651-6507 Fax: (410) 651-7571

Graduate School Team

Organizing Department

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DR. WELE ELANGWE

Director of Student Services
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Ed.D. Education Leadership
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Graduate Assistant/ WebMaster

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MS. ISABELLE PUWO

Senior
Computer Science
Student Intern

MR. PRESTON GROSS

Graduate Admissions Coordinator
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MR. TYREE SUKRAM

Sophomore
Aviation Science
Student Intern

MS. CHINENYE OLUOBA

Master's Student
M.S. Rehabilitation Counseling
Graduate Assistant - Social Media

MR. BERYL MALOMO

Master's Student
M.S. Applied Computer Science
Graduate Assistant - Photography

Sponsors, Vendors & UMES Participating Schools & Departments

Sponsors

- Division of Academic Affairs
- School of Agricultural and Natural Sciences
- School of Graduate Studies
- Office of the President
- Office of Title III
- Office of Research
- UMES Interdisciplinary Research Center

Vendors

- Thompson Hospitality, UMES
- Crestline, Inc.
- FEDEX Printing, Salisbury, MD
- Crown Trophies, Delmar, DE
- Jackie's Flowers & More, Inc., Salisbury MD
- Quill Office Supplies
- Bold Beautiful Event Designs, LLC

UMES Participating Schools & Departments

University of Maryland Eastern Shore, Princess, Anne, MD 21853

1. School of Agriculture and Natural Sciences
    a. Department of Agriculture, Food and Resource Sciences
    b. Department of Natural Sciences
2. School of Business and Technology
    a. Department of Computer Science and Engineering Technology
    b. Department of Engineering and Aviation Sciences
3. School of Education, Social Sciences and the Arts
    a. Department of English and Modern Languages
    b. Department of Social Sciences
4. School of Pharmacy and Health Professions
    a. Department of Physician Assistant
    b. Department of Pharmaceutical Sciences
    c. Department of Physical Therapy
    d. Department of Rehabilitation Services

Federal Agencies

- National Oceanic and Atmospheric Administration (NOAA)
    NOAA Chesapeake Bay Office, Oxford, MD, 21654
    National Marine Fisheries Service, Office of Habitat Conservation, NOAA, Silver Spring, MD 20910
    Educational Partnership Program (EPP) with Minority Serving Institutions, Silver Spring, MD 20910
- United States Department of Agriculture (USDA)
    USDA-Agricultural Research Service (ARS)-Hydrology and Remote Sensing Laboratory.
    USDA-ARS U.S. National Poultry Research Center, Athens, GA 30607

Affiliate USA & International Institutions

USA Universities

- Albany State University, Albany, Georgia 31705
- Brigham Young University, Utah
  College of Life Sciences
- Children's Hospital of Philadelphia, Philadelphia, PA, 19104
  Center for Applied Genomics,
- Greenebaum Comprehensive Cancer Center, Baltimore, MD 21201
  Hormone Related Cancers Program
- Maryland Department of Agriculture, Mosquito Control Office, Salisbury, MD 21803
- North Carolina State University, Raleigh, NC, 27695
- Salisbury University, Salisbury, MD 21801
  Department of Biological Sciences
- Southern Poultry Research Group, Athens, GA 30607
- Stony Brook University, Southampton, NY 11968
- Temple University, Philadelphia, PA, 19122
  Department of CST Biology
- University of California, Los Angeles, CA
  Division of Oral and Systemic Health Sciences, School of Dentistry, 90024University of Maryland
- University of Maryland Center for Environmental Science Horn Point Lab, Cambridge, MD, 21613
  Vice President for Science Application,
- University of Maryland Center for Environmental Science Integration and Application Network, Annapolis, MD, 21403
- University of Maryland Extension, Queenstown, MD 21658
  Wye Research & Education Center .
- UMES Extension
- University of Michigan, Ann Arbor Mi 48109
  Cooperative Institute for Great Lakes Research
- University of Pennsylvania Perelman School of Medicine, Philadelphia, PA 19104
  Department of Pediatrics
- University of Pittsburgh, Pittsburgh, PA 15213, USA
  Neurobiology

International Universities

- University of Tehran, Karaj, Iran
  Department of Forestry and Forest Ecnomics, Faculty of Natural Resources
  Department of Arid and Mountainous Regions Reclamation, Faculty of Natural Resources
- University of Birjand, Birjand, Iran
  Department of Water Engineering, Faculty of Agriculture,
- University of Khartoum, 11115, Sudan
  Khartoum Teaching Dental Hospital
  Faculty of Dentistry
  Faculty of Veterinary Medicine
- Osaka University,565-0871 Japan
  Graduate School of Dentistry
- Shahid Beheshti University of Medical Sciences, Tehran, Iran, 19395-4763
  Cellular and Molecular Endocrine Research Center, Research Institute for Endocrine Molecular Biology, Research Institute for Endocrine Sciences,
- Tehran University of Medical Sciences, Tehran, Iran, 1417613151
  School of Medicine

Research Symposium Planning Committee

Dr. LaKeisha Harris
Convener

Ms. Angela Young
Planner-in-Chief

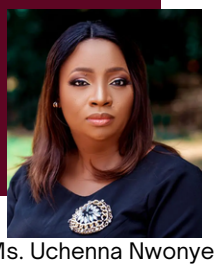
Mr. Chibunkem Asuzu
Webmaster

Ms. Amelia Potter
Program Co-Chair

Dr. Wele Elangwe
Program Chair

Dr. Kelsie Endicott
Editor
Book of Abstracts

Dr. Patrice Jackson-Ayotunde
Chair of Judges



Ms. Uchenna Nwonye
Co-Chair of Judges
Chair of Moderators

Dr. Eric May
Logistics

Ms. Corrie Cotton
Logistics

Mr. Preston Gross
Logistics

Ms. Chinenye Oluoba
Social Media

Dr. Lila Karki
Logistics

Ms. Isabelle Puwo
Registration

Ms. Tahirah Johnson
Registration

Dr. Wayne Omagamre
Logistics

Ms. Priscilla Kini
Registration

Mr. Albert Ofosu
TallyMaster

Mr. Joshua Akinola
TallyMaster

Mr. Ian Kalama
Logistics

Dr. Jesu Raj Pandya
Logistics

Mr. Mouhamed Kaba
Logistics

Dr. Tigist Tolosa
Logistics

Ms. Kayla Waters
Logistics

Mr. Tyree Sukram
Logistics

Symposium Day Agenda

8:00am - 1:30pm	**Registration** SSC Lobby (Hallway between SSC Theatre and Ballroom)
8:00am - 1:30pm	**Judges and Moderators Check-in** (SSC Central Entrance)
8:00am	**Continental Breakfast** (SSC Multipurpose Room)
8:15 am - 8:30am	**Greetings (SSC Multi-purpose Room)** **Dr. LaKeisha Harris** Dean, School of Graduate Studies
8:30am - 9:45am	**Three Minute Thesis (3MT®) Competition** (SSC Multipurpose Room) • Welcome and Introduction, *Dr. Wele Elangwe* • Competition rules and Judging Criteria ◦ Doctoral Category ◦ Master's Category ◦ Undergraduate Category • People's Choice
9:45 am - 12:30pm	**Oral Presentations** (SSC Room 2144, 2146, 2147, 2149)
12:30pm - 1:30pm	**LUNCH** **Keynote Address:** "*Honoring Our Past, Creating Our Future.*" **Speaker:** **Dr. Douglas Steele** V.P. Food, Agriculture, & Natural Resources (FANR) The Association of Public & Land-grant Universities (SSC Ballroom)
1:30pm - 3:00pm	**Poster Presentations** SSC Ballroom
3:00 pm - 4:00pm	**Concurrent Sessions** • Recruitment & Networking Hour • Institutional Animal Care & Use Committee (IACUC) - SSC 2147 Animal use Protocol Training - **Ms. Amelia Potter**
4:00 pm - 4:30 pm THE END	**Awards Ceremony** (SSC Multipurpose Room) Thank you and See you Next Year 2026!

3MT® THREE MINUTE THESIS Competition

FOUNDED BY THE UNIVERSITY OF QUEENSLAND

Competition Rules

1. The presentation must be no longer than 3 minutes in length, or the competitor will be disqualified.
2. The presentation is considered to have begun when the student starts the presentation through movement or speech.
3. Presentations should include a single, static slide (no transitions, movement, or animation in the slide). You don't need to have a slide. Slides are not compulsory.
4. No script or cue cards may be used during the presentation; students must recite their presentation by memory.
5. No additional props are permitted (i.e. costumes, musical instruments, lab equipment).
6. Presentations must be spoken-word (i.e. no poem, rap, song). Note that passages from songs, poems, etc. are acceptable if the presentation requires quoting from such sources, but it is recommended that you limit your use of such quotations.
7. No additional electronic media (sound or video files) are permitted within the presentation.

Judging Criteria

Each competitor's presentation will be assessed according to the criteria listed below. Please note that each criterion is equally weighted.

1. Comprehension:
Did the presentation help the audience understand the research?
2. Engagement
Did the oration make the audience want to know more?
3. Communication
Was the thesis topic and its significance communicated in language appropriate to a non-specialist audience?

Award Categories

Doctoral Category
1st Place: $400
2nd Place: $200

Master's Category
1st Place: $300
2nd Place: $150

Undergraduate Category
1st Place: $200
2nd Place: $100

People' Choice Award: $100

3MT® THREE MINUTE THESIS Competition

FOUNDED BY THE UNIVERSITY OF QUEENSLAND

Judges & TimeKeeper

Judges

Ms. Chalarra Sessoms
Clinical Social Worker, Somerset County Schools

Ms. Elissa Gordon
UMES Center for International Education

Mr. Tywoine Gary
UMES Maintenance Department

Timekeeper

Mr. Seth Roberts
UMES Center for Access and Academic Success (CAAS)

Doctoral Participants

Jennifer Chi
Food and Agricultural Sciences (FASC)

Priscilla Kini
Toxicology

John Ithiru
Food and Agricultural Sciences (FASC)

Priscilla Okyere
Pharmaceutical Sciences

Kimberly Okpah
Food and Agricultural Sciences (FASC)

Chibunkem Asuzu
Applied Computing and Engineering

Freweyni Abrha
Food and Agricultural Sciences (FASC)

Master's Participants

Ian Kalama
Food and Agricultural Sciences (FASC)

Chinenye Oluoba
Rehabilitation Counseling

Shuvonkar Bonik
Food and Agricultural Sciences (FASC)

Tamunoene Bamson
Electrical and Mechatronics Engineering

Undergraduate Participants

Wyatt McWilliams
Aviation Science

Kayla Collins
Biology

Owen Mielnik
Aviation Science

Salim Laakira
Aviation Science

Competition Schedule

Venue: SSC Multipurpose Room

8:30am - 8:35am	**Introduction of Judges, Competition Rules and Judging Criteria.** ***Dr. Wele Elangwe*****,** Director of Graduate Student Services
	Doctoral Category
8:35am - 8:39am	**Jennifer Chi,** Food and Agricultural Sciences (FASC**)** *Smarter Bananas: Using Machine Learning to Predict Fruit Quality*
8:39am - 8:43am	**Priscilla Kini, Toxicology** *Two Systems, One Goal: Exploring Healthcare in Denmark vs. the U.S.*
8:43am - 8:47am	**John Ithiru,** Food and Agricultural Sciences (FASC) *Overcoming Heat Stress- Unlock Quinoa Productivity in the USA*
8:47am - 8:51am	**Priscilla Okyere,** Pharmaceutical Sciences *A Race Against Time: From AGING To REGENERATION*
8:51am - 8:55am	**Kimberly Okpah,** Food and Agricultural Sciences *The Efficacy of Entomopathogens Against Insect Pests*
8:55am - 8:59am	**Chibunkem Asuzu,** Applied Computing and Engineering *When AI Reads Faces: Understanding Facial Emotions in Real Time*
8:59am - 9:03am	**Freweyni Abrha**, Food and Agricultural Sciences (FASC) *ABBERANT GENES: How they drive drug resistance in blood cancer*
	Master's Category
9:06am - 9:10am	**Ian Kalama,** Food and Agricultural Sciences (FASC) *Environmental Equity in Urban Forestry: A Maryland Case Study*
9:10am - 9:14am	**Chinenye Oluoba**, Rehabilitation Counselling *Use of Telecounseling Before-During_After COVID-19 Pandemic among women with physical disabilities: A Narrative Literature Review*
9:14am - 9:18am	**Shuvonkar Bonik,** Food and Agricultural Sciences (FASC) *Interaction of Endophytic Microorganisms in Hydroponic Systems*
9:18am - 9:22am	**Tamunoene Bamson,** Electrical and Mechatronics Engineering *Where Did My Signal Go? Understanding Signal Loss Indoors at 5.85 GHz*
	Undergraduate Category
9:24am - 9:28am	**Wyatt McWilliams,** Aviation Science *Does Airfield Size Influence the Rate of Incidents/Accidents?*
9:28am - 9:32am	**Kayla Collins,** Biology *From Garbage to Groundbreaking: A New PFAS Filter is Born*
9:32am - 9:36am	**Owen Mielnik,** Aviation Science *Sleepless Skies : Addressing Fatigue for Safer Aviation*
9:36am - 9:40am	**Salim Laakira,** Aviation Science *FAA Vs EASA Flight training standards*
9:40am	Questions/Voting of People's Choice Award
9:42am	Word from Judge's Representative
9:45am	Egress to Oral Presentation Sessions
4:00pm - 4:30pm	Announcement of Winners

List of Presenters - ORAL PRESENTATIONS

Faculty Presenters Room: SSC Theatre Time: 9:45am - 12:30pm

9:45am OF1	Advancing Sustainable Smart Farming Solutions at the University of Maryland Eastern Shore. **Dr. Jesu Raj Pandya**
10:00am OF2	Grapevine Genome Editing for Improving Powdery Mildew Resistance. **Dr. Papaiah Sardaru**
10:15am OF3	Knowledge, Attitudes, and Perceptions of Opioid Use and Misuse Among Faculty, Staff, and Students in Academia. **Dr. Khaled Muhsen Hasan**
10:30am OF4	PFAS Contamination in Irrigation Ponds: The Role of Runoff from Biosolid-Amended Soils and Effects on Soybean Quality. **Dr. Wayne Omagamre**
10:45am OF5	Precision Agriculture with Eyes on the Fields and Technology in Action. **Dr. Alfadhl Yahya Alkhaled**
11:00am OF6	Pre-Service Professionals' Knowledge of Culturally Responsive Positive Behavior Support (PBS). **Dr. Bryan Gere**
11:15am OF7	Stem Recruitment and Retention Strategies for Minority and Female Students. **Dr. Joseph O Arumala**
11:30am OF8	Temporal and Spatial Population Dynamics of Corn Earworm (*Helicoverpa zea*) in Hemp Fields in Delmarva Peninsula. **Dr. Tigist Tolosa**
11:45am OF9	The Effect of Gum Arabic on Iatrogenic Endodontic Perforation Performed on Wister Albino Rat Dental Pulp (Case Report). **Dr. Nuha Abdel-Rahman Elmubarak**
12:00pm OF10	Working Toward Developing the Non-chemical Methods of Insect Pest Management. **Dr. Simon Zebelo**

Doctoral Presenters Room: SSC 2149 Time: 9:45am - 12:30pm

9:45am OD1	Aberrant PI3Kδ Splice Variant as a Driver for Idelalisib Resistance and PI3K/AKT/mTOR activation in Blood Cancers. **Ms. Alyssa Lucero**
10:00am OD2	An Exploration of Factors Influencing the Work-Life Balance of Higher Education Teachers in The Mid-Atlantic Region: A Spiritual Perspective. **Ms. Jocelyn Martin**
10:15am OD3	Building Climate Resilience: Lessons from Copenhagen and the Challenge of Emerging Contaminants. **Mr. Benjamin O. Komolafe**
10:30am OD4	Comparative Analysis of Healthcare Systems in Denmark and the United States: Challenges and Areas for Improvement. **Ms. Priscilla Kini**
10:45am OD5	Co-Expression of Chaperones to Enhance Soluble Production Putative Pyridoxal-5'-Phosphate (PLP)-dependent Enzyme in Escherichia coli BL21. **Mr. Matthew Kusche**
11:00am OD6	Deciphering The Role of Adipose-Derived Stem Cell Exosomes in Aging-Associated Inflammation. **Ms. Priscilla Okyere**
11:15am OD7	Delivery of siRNA for Bone Tissue Engineering through Exosome Mimetic Hybrid Nanoparticles. **Ms. Meghna S. Rao**
11:30am OD8	Elucidating Diazaquinomycin Biosynthetic Pathway in Micromonospora M42. **Ms. Amna Farzeen Baig**
11:45am OD9	Enhancing Beet Cultivation in an Indoor FarmBot System: The Role of Seaweed Biostimulants and AI-Driven Environmental Monitoring. **Mr. Nabin Khadka**
12:00pm OD10	Exploring the Role of PGE2 EP4 Receptor in Ovarian Cancer Progression. **Ms. Mercy Amofa**

List of Presenters - ORAL PRESENTATIONS

Doctoral Presenters Room: SSC 2147 Time: 9:45am - 12:30pm

9:45am OD11	Generation of Exosome Mimetics with Endogenous Osteogenic Factors for Bone Regeneration. **Dr. Iram Elamin**
10:00am OD12	Impact and Effects of Edible Coating on Post Harvest Quality of Two Selected Day-Neutral Strawberries. **Mr. Erasmus Aduteye**
10:15am OD13	Impact of Corn Earworm Damage on Transcriptional Levels of Cannabinoid Synthesis Genes in Hemp Plant. **Ms. Freweyni Michael Abrha**
10:30am OD14	Investigating the Prevalence and Antimicrobial Resistance Profile of Salmonella in Commercial Pet Foods in Delmarva. **Mr. Richard Yaw Otwey**
10:45am OD15	In-Vitro Characterization of β-Carboline Biosynthetic Gene, KslB. **Ms. Mary A. Twumasi**
11:00am OD16	Machine Learning for Banana Quality Prediction: Model Evaluation and Data Literacy. **Ms. Jennifer Chi**
11:15am OD17	Osteoimmunomodulatory Effects of Modified Mesenchymal Stem Cell-Derived Exosomes. **Ms. Angela Hatton**
11:30am OD18	The Role of Hybrid Schedules in Mitigating COVID-19's Impact on Educators' Well-Being and Pedagogical Reform: A Mixed-Methods Study Exploring Benefits for Mental Health and Work-Life Balance. **Mr. Stephen Gerard Brown Jr.**
11:45am OD19	Transcriptional Regulation of Heat Stress Responses and Their Impact on Growth, Development, and Agronomic Performance in Quinoa. **Mr. John Mwangi Ithiru**

Master's Presenters Room: SSC 2144 Time: 9:45am - 12:30pm

9:45am OM1	6 to 126: Using a Hybrid Model Approach to Forecast The Price of Eggs. **Ms. Victoria Hanzer-Diaz**
10:00am OM2	A Deep Dive into John Deere's Financial Performance Through Ratio Analysis. **Ms. Catherine Ngo**
10:15am OM3	Applying Wiese-Bjornstal's Integrated Model to Explore Intrinsic Motivation in International Student-Athletes During Post-Injury Adaptation. **Ms. Derionah Abner**
10:30am OM4	Assessing the Impact of Climate-Smart Agricultural Practices on Soil Greenhouse Gas Emissions. **Mr. Dipendra Gurung**
10:45am OM5	Determinants of Vegetable Diversification and Household Food Security in Urban Gardening: A Case of Small and Minority Farmers in Maryland. **Mr. Sahil Ojha**
11:00am OM6	**Educational Development: A Comparative Case Study of Denmark and the USA.** Mr. Albert A. Ofosu
11:15am OM7	Enhancing Antioxidant Potentials of Aeroponically Grown Lettuce using a Seaweed-Based Liquid Biostimulant. **Ms. Portia Aba Nkrumah**
11:30am OM8	Environmental Equity in Urban Forestry: A Comparative Study of Tree Canopy and Ecosystem Services in Maryland. **Mr. Ian Kalama**
11:45am OM9	Interaction of the Endophytic Fungus Trichoderma with Corchorus olitorius and Its Impact on Growth Response. **Mr. Shuvonkar Kangsha Bonik**
12:00pm OM10	Path Loss of 5.85 GHz Signal in a Laboratory Environment. **Mr. Tamunoene Bamson and Ms. Tassnim Mohamed**
12:15pm OM11	Prevalence, Serotype Distribution, and Antimicrobial Resistance (AMR) of Salmonella from Conventional Broiler Farm. **Mr. Sandesh Chapagain**

List of Presenters - ORAL PRESENTATIONS

Master's Presenters: SSC Ballroom Time: 9:45am - 10:15am

9:45am OM12 Socio-Demographic Correlates of Participation in Heirs' Property Education. **Ms. Raksha Khadka**

10:00am OM13 The Risk of Cardiovascular Disease Death in Lower Income, Rural Families in Maryland. **Mr. Deonte Campbell-Sims and Mrs. Laura Nadia Hassan.**

Undergraduate Presenters: SSC 2146 Time: 9:45am - 12:30pm

9:45am OU1 Advancing Automation in Agriculture: Enhancements to the UMES Outdoor FarmBot. **Mr. Parker Wilson**

10:00am OU2 Advancing Pilot Training and Operational Efficiency Through Flight Simulation Technologies. **Ms. Britney Elizabeth Wilkin**

10:15am OU3 Applying Wiese-Bjornstal's Integrated Model to Explore Intrinsic Motivation in International Student-Athletes During Post-Injury Adaptation. **Mr. Destiny Emuze**

10:30am OU4 Effects of Climate Change on Turbulence-Related Aviation Accidents in the U.S. **Ms. Elizabeth Thornwall**

10:45am OU5 Evaluating AI Integration in Air Traffic Control: A Compromise between Efficiency, Safety, and Risk. **Ms. Veronica Melissa Caramantin**

11:00am OU6 Exploring Autonomous Robotics In Lunar Environments. **Mr. Lance Ward**

11:15am OU7 How Does the Rehabilitation of Inmates Differ in the U.S. and Denmark? **Ms. Lydia Christianna Teclar**

11:30am OU8 How Extension Educates Smallholder Farmers about Climate Resilient Agriculture. **Mr. Mouhamadou Lamine Diack**

11:45am OU9 Impact of Cognitive Aging in Aviation, Pilot Performance and Safety. **Mr. Paa Kwasi Opoku**

12:00pm OU10 Impact of the Money Smart Club on Saving Money for College Education. **Mr. Mouhamed Kaba**

12:15pm OU11 Preliminary Efforts Towards Utilizing Satellite Imagery for UMES Agricultural Field. **Ms. Jossie Gates**

Undergraduate Presenters: SSC Multipurpose Room Time: 9:45am - 12:30pm

10:00am OU12 Single Pilot Operations and their Impact on Risks and Safety. **Mr. Emmanuel A. Burns**

10:15am OU13 The Advantage of Flight Instructing: Why being a Flight Instructor makes a better Airline Pilot. **Mr. Jacob Fogan**

10:30am OU14 The Impact of Mental Health on Commercial Pilots. **Mr. Gabriel Reason**

10:45am OU15 The Impact of Workload and Fatigue on Decision-Making in Aviation. **Mr. Yaniv Ezra**

11:00am OU16 The Relationship between Aeronautical Decision Making and Law of Primacy. **Mr. Khalid Elhag**

11:15am OU17 Understanding the Experiences of African American College Women Diagnosed with ADHD: An Intersectional Perspective. **Ms. Amanda Exantus**

11:30am OU18 Unleaded and Alternatives Fuels for Aviation. **Mr. Nkosi Thom**

11:45am OU19 Film Reception Theory. **Ms. Aajayjah Lemons**

12:00pm OU20 Does an individual's upbringing affect their proneness to hazardous attitudes in the cockpit? **Mr. Julian Thomas**

List of Presenters - POSTER PRESENTATIONS

Doctoral Presenters Room: SSC Ballroom Time: 1:30pm - 3:00pm

PD 1 A National Survey of Pelvic Health Content in Physical Therapist Assistant Programs. **Ms. Stefanie D. McBeth**

PD 2 Association of Monoallelic Rare Germline Filaggrin 2 (FLG2) Sequence Variants with Skin Inflammation and Infections. **Ms. Fatemeh Vahidnezhad**

PD3 Combating Multidrug Resistance in Ovarian Cancer Therapy Utilizing Nanostructured Niosomal Curcumin. **Mr. Muhanad Elhussein, Mr. Amar Yousif, and Ms. Alicia Rowe**

PD4 Development of a Novel mRNA-based Oncovaccine for Renal Cancer. **Mr. Ashraf Kheir**

PD5 DPT Student Perspectives on Working with Clients with Dementia: An Innovative Pro Bono Outreach Initiative. **Ms. Kristen Eisenreich, Ms. Kathleen Cooper, Ms. Nia' Fisher, Ms. DiAngelin Ross, Ms. Faith Majors-Culp, and Mr. Zachary Stango.**

PD6 Effects of Great Toe Extension Range of Motion and Physical Activity on Gait Metrics in Community-Dwelling Older Adults: A Pilot Study. **Ms. Amanda Irwin, Ms. Anna Lausch, Mr. Jarrett Schneider, Ms. Sierra Smith-DiLeo, and Mr. Justine Suarez**

PD7 Effects of the Combination of Purlane (Portulaca oleraceae), Prebiotics, and Probiotics on Broiler Meat Quality. **Ms. Euyeon Noh**

PD8 Engineering Enhancer-Driven Adeno-Associated Viral Vectors for Cell Type Specific Neural Circuits and Transgenesis. **Mr. Daniel Ogbeh**

PD9 Investigating the Acute Effects of Blood Flow Restriction Training on Vastus Medialis Oblique Thickness, Neuromuscular Activation, and Perceived Exertion. **Mr. Joshua Sproul**

PD10 Shellshocked: Developing a New York Shellfish Sensitivity Index for Estuaries Impacted by Low Oxygen and Warming – A Tool to Enhance Sustainability. **Ms. Alison Novara**

PD11 Targeting mTOR/AR signaling as a novel therapeutic strategy for aggressive prostate cancer. **Ms. Shweta Kharal**

PD12 The Effects of Different Types of Blood Flow Restriction Training on the Vastus Medialis Oblique: A Pilot Study. **Mr. Erik Verhoeven**

PD 13 The Impact of Team 360 on Quality of Life in Athletes, Caregivers, and Volunteers. **Ms. Vanessa Adams**

PD14 Transcriptional Regulation of Heat Stress Responses and Their Impact on Growth, Development, and Agronomic Performance in Quinoa. **Mr. John M. Ithiru**

PD15 Transportation Barriers to Employment for Adults with Developmental Disabilities in Rural Areas: A Basic Review. **Ms. Uchenna Nwonye**

Master's Presenters Room: SSC Ballroom Time: 1:30pm - 3:00pm

PM 1 Broader Implications of Heirs' Property Community Education in Maryland. **Ms. Raksha Khadka**

PM2 Characterizing the Diets of Louisiana Coastal Predatory Fish Using Metabarcoding and Next Generation Sequencing. **Mr. Wyatt Palenchar**

PM3 Community Advocacy Paper: Advocates for Public School Funding. **Ms. Chinenye E. Oluoba**

PM4 Comparison of Treatment for Osteoporosis in Postmenopausal Women. **Mr. Christopher Baptiste, Mr. Christian Brown, and Ms. Briana Henderson**

PM5 Development of Cassava (Manihot esculenta Crantz)-Quinoa (Chenopodium quinoa)- Finger millet (Eleusine coracana) Value-Added Products to Improve Food Security in Underserved Communities. **Ms. Anthonia E. Nwagwu**

PM6 Development of Optimal High-Pressure Extractor and Automatic Distiller Methods for Phytochemical Analysis of Juvenile Ginger (Zingiber officinale). **Ms. Sara Elizabeth Lahoff**

PM7 Effects of Temperature and Population Decline on Mid-Atlantic Eelgrass Carbon Sequestration. **Ms. Katie Tanner**

List of Presenters - POSTER PRESENTATIONS

Master's Presenters Room: SSC Ballroom Time: 1:30pm - 3:00pm

PM8 Engaging Local Communities in Mitigating Greenhouse Gas Emissions through Demonstration Sites. **Ms. Rumita L. Sanwa**

PM9 Evaluation of the Effects of Paxlovid on Hospitalization and Mortality Rates in High-Risk COVID-19 Patients. **Ms. Maya Armstrong, Ms. Naomi A. Beneyam and Ms. Summer Mae Black**

PM10 Exploring Mosquitoes as Bioindicators for PFAS Contamination Across Environmental and Biological Systems. **Ms. Isabella Beasley**

PM11 Exploring New Waters: Annual Movement Patterns and Population Structure of Chesapeake Bay Red Drum. **Mr. Glen E. Collins Jr.**

PM12 Exploring the Impact of Cover Crops and Organic Amendments on Soil Health and Crop Productivity in Sandy Loam Organic Vegetable Crop Systems in the Delmarva Region. **Mr. Keith Bucca**

PM13 Local- and Broad-scale Effects of Oyster Aquaculture on the Distribution of Submerged Aquatic Vegetation. **Mr. Owen Skirtich**

PM14 Medicaid Expansion: Easing Depression in Low-Income Communities. **Mr. Dominique Jones, Ms. Shekina Rousseau, Mrs. Magda Miguel**

PM15 Path Loss of 5.85 GHz Signal in a Laboratory Environment. **Mr. Tamunoene Bamson and Ms. Tassnim Mohamed**

PM16 Pre-Service Professionals' Knowledge of Culturally Responsive Positive Behavior Support (PBS). **Ms. Charity U. Akpovino**

PM17 Prevalence of Breast Cancer Throughout Maryland Counties. **Mrs. Alexis Layton, Ms. Yasmeen Faine, Mr. Christopher Aaron Jones, and Mr. Alexis Layton**

PM18 Return to Fertility After Oral Contraceptive Use: Comparing Short- vs Long-Term Use. **Ms. Mikaela Natale**

PM19 Semaglutide in Heart Failure with Preserved Ejection Fraction: Impact on Outcomes. **Mr. Neil Patel, Ms. Paige Richardson, and Mr. Ryan Schwarz.**

PM20 The Effect of Precise Irrigation on the Phytochemical Composition of Aronia Mitschurinii Fruits Grown in Maryland. **Ms. T'naisha Addison**

PM21 The Effect of Social Media Use on Adolescents' Mental Health. **Ms. Corliss Mitchell, Ms. Ginikachukwu Mgbenka, Ms. Jada Byrd**

PM22 The Risk of Cardiovascular Disease Death in Lower Income, Rural Families in Maryland. **Mr. Deonte Campbell-Sims, Mrs. Laura N Hassan, Ms. Julia Reed**

PM23 Time Series Forecasting of Price of the U.S. Cotton Using Machine Learning Models. **Ms. Rumita L. Sanwa, Ms. Lucy Njoroge, Ms. Raksha Khadka, Mr. Simala Wright, Mr. Jordan Frazier**

PM24 Varenicline, Nicotine Replacement Therapy, and Cognitive Behavioral Therapy Effects in Smoking Cessation. **Ms. Danielle Bailey, Ms. Sylvia Fang, Ms. Aden Farouk, and Ms. Karyn Yates.**

Undergraduate Presenters Room: SSC Ballroom Time: 1:30pm - 3:00pm

PU1 Development of Microbial Compounds Derived from Actinomycetes as Eco-Friendly Solutions for the Management of Grape Diseases. **Ms. Nandini Walia**

PU2 Bubbling Beneath the Waves: Exploring Habitats and Communities of Methane Seeps Along the U.S. Atlantic Margin. **Mr. Daryl J Bullock**

PU3 Development of an AI-Assisted Next-Generation Imaging Flow Cytometry (AIFC) for Blood Cell Classification. **Mr. Briggs J. Pugner**

PU4 Efficacy of Different Traps in the Capture of Aedes Albopictus Mosquitoes on the Eastern Shore of Maryland. **Ms. Lesley Thomas**

PU5 Establishing a Colony of Culex Mosquitoes in a UMES Insectary. **Ms. Nola Mountain**

List of Presenters - POSTER PRESENTATIONS

Undergraduate Presenters Room: SSC Ballroom Time: 1:30pm - 3:00pm

PU6 Exosome-Laden miR-423 Inhibitor Promotes Bone Defect Healing in an OVX Mouse Model. **Ms. Aquila B. Maimo and Mr. Qureyin Wilkinson**

PU7 How Does Hydrodynamic Ice events Impact Sediment Plume in the Southern Basin of Lake Michigan? **Ms. Amari M. Dupree**

PU8 Human-Operated Planetary Surface Exploration Smart Tools for Artemis Lunar Missions. **Mr. Clerkson N. Ngolle and Mr. Gilbert L. Pinkett**

PU9 On-farm Demonstration: Showcasing Climate–Smart Agricultural Practices. **Mr. Kpardeh D. Boayue**

PU10 Screening a Small Organic Compound for Potential Antiseizure Activity in the Zebrafish PTZ Model. **Ms. Hope-Abigail M. Mbanga**

PU11 The Effects of Zinc on NHE3 Expression in Zebrafish Kidneys and on Cell Viability. **Ms. Maggie Nana**

PU12 The Impact of Beauveria bassiana on Squash Bugs Mortality. **Ms. Kayla Waters**

PU13 Waste-Derived Carbon Adsorbents for Optimized PFAS Removal from Water. **Ms. Kayla Collins**

PU14 Water Quality of Dead End Canals. **Ms. Mikaela Blackwood**

(Titles in Alphabetical Order)

Advancing Sustainable Smart Farming Solutions at the University of Maryland Eastern Shore

Jesu Raj Pandya, PhD 1*, Abhijit Nagchaudhuri, PhD2, Michael Cosh, PhD 4, Madhumi Mitra, PhD 3, Caleb Nindo, PhD11 and Naveen Kumar Dixit, PhD. 1.

1Department of Food and Agricultural Sciences, School of Agriculture and Natural Sciences, University of Maryland, Eastern Shore, Princess Anne, MD 21853

2 Department of Engineering and Aviation Sciences, School of Agriculture and Natural Sciences, University of Maryland Eastern Shore, Princess Anne, MD 21853.

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4 USDA-ARS-Hydrology and Remote Sensing Laboratory.

The smart farming research program at the University of Maryland Eastern Shore (UMES) is at the forefront of transforming modern farming through innovative, sustainable, and scalable solutions. By leveraging cutting-edge technologies such as remote sensing, robotics (e.g., FarmBot), and Variable Rate Technologies (VRT), the research aims to optimize agricultural productivity while reducing resource consumption. These technologies are applied across a spectrum of farming systems, from large-scale commercial operations to small-scale indoor and outdoor gardens, showcasing their adaptability and impact. The program emphasizes sustainability by tackling critical environmental issues, including soil degradation, water overuse, and greenhouse gas emissions. Through data-driven strategies and advanced technological integration, the research program is committed to harmonizing agricultural efficiency with environmental stewardship, fostering a resilient and sustainable future for farming. This presentation provides a comprehensive overview of the design, development, and application of these technologies in precision agriculture, illustrating their potential to address the diverse needs of both global and localized farming systems.

Grapevine Genome Editing for Improving Powdery Mildew Resistance

Papaiah Sardaru, PhD*, Rajeswari Purushothaman, PhD, Purushothaman Natarajan, PhD, and Sadanand Dhekney, PhD.

*Department of Agriculture, Food and Resource Sciences, School of Agriculture and Natural Sciences, University of Maryland Eastern Shore, Princess Anne, MD 21853

Grapevine (Vitis vinifera) is one of the most important crops in the world economy and is used in the production of wine and table grapes. However, the cultivation of grapes is usually affected by various pathogens with powdery mildew caused by Erysiphe necator being the most devastating. This fungal disease not only reduces the yield but also lowers the quality of the fruit to the extent that the growers must largely depend on chemical fungicides for its control. The conventional breeding programs to improve disease resistance are also known to be tedious, time-consuming, and usually ineffective owing to the complexity of grapevine genetics. This study aims to exploit the emerging CRISPR-Cas9 gene editing system to specifically disrupt the MLO (Mildew Resistance Locus O) gene and thus enhance grapevine resistance to powdery mildew. We designed dual guide RNAs (gRNAs) to recognize specific sequences in the MLO gene and introduced CRISPR-Cas9 complexes into grapevine callus cultures through Agrobacterium-mediated transformation. PCR and Sanger sequencing were used for molecular screenings to determine the success of the transformation and the frequency and precision of the editing in the recovered transformed embryo lines. The PCR analysis demonstrated that the efficiency of the transformation was high, and a large number of the regenerated grapevine plants had mutations at the targeted MLO locations with nucleotide replacement, indels, and insertions ranging from 1-2850 nucleotides. The edited plants along with the wild type of of grapevine were maintained under greenhouse conditions to determine their level of resistance to powdery mildew through a natural infection process. Greenhouse experiments showed that the edited grapevines had a higher level of resistance to powdery mildew than the unedited control plants, with lower infection rates. This study assessed the resistance of transgenic grapevine plant lines to powdery mildew using the IPGRI disease susceptibility grading system (grades 0-4). Among the 37 transgenic plant lines evaluated, 56% displayed a susceptibility grade of 0, 30% of plants a grade of 1, while 5% and 3% exhibited grades of 2 and 3, respectively, indicating varying levels of susceptibility to the disease. Whereas, of 15 wild type grapevines recorded grades ranged between 3 - 3.5, underlining their serious susceptibility to powdery mildew. These findings indicate that the CRISPR-Cas9 system can be effectively applied to create disease-resistant grapevine plants. In addition, this study expands our knowledge on the function of the MLO gene in the resistance response and supports the gene editing technology in sustainable viticulture. Future work will include evaluating the field performance and other quality parameters of the edited grapevines to establish their usefulness in production.

Knowledge, Attitudes, and Perceptions of Opioid Use and Misuse Among Faculty, Staff, and Students in Academia

Khaled M. Hasan, MD*

Physician Assistant Department, School of Pharmacy and Health Professions, University of Maryland Eastern Shore, Princess Anne, MD 21853

Opioid misuse is a significant public health issue in the United States. Opioids include both illegal drugs like heroin and prescription medications such as hydrocodone and oxycodone. This study evaluates knowledge and perceptions regarding opioid use and misuse among individuals at the University of Maryland Eastern Shore. The survey included faculty, staff, and students who participated voluntarily and anonymously. Differences in knowledge and perceptions were analyzed using the Chi-Square Test and the Kruskal-Wallis Test. A total of 233 individuals participated. Most participants (≥ 90%) understood what an opioid is ($p = 0.46$), and nearly all (≥ 99%) were aware that certain pain medications can lead to addiction ($p = 0.98$). Most participants identified 18–25 years as the most common age for opioid misuse, followed by 26–65 years ($p = 0.69$). About 50% of faculty, staff, and graduate students reported 18–25 years as the most common age range, whereas 70% of undergraduates agreed. Over half of faculty and staff believed healthcare providers, family, and friends share responsibility in addressing opioid misuse, while over 90% of graduates and 70% of undergraduates held this belief, showing significant differences ($p = 0.01$). Familiarity with drugs that may cause misuse varied. Approximately 60–70% of faculty, staff, and graduate students were aware, while 70% of undergraduates were not. Significant differences were observed in recognizing drug overdose as the leading cause of opioid-related death. While 93% of faculty, 70% of staff, and 85% of graduate students identified overdose as the primary cause, only 30% of undergraduates did ($p < 0.0001$). Regarding routes of opioid misuse, 100% of undergraduates identified inhalation as the most common route, whereas only 8% of faculty, 12% of staff, and 8% of graduate students agreed. However, all participants recognized multiple routes of misuse. Nearly all participants (≥ 95%) acknowledged both positive and negative physical and psychological effects of opioid misuse ($p = 0.34$). This study highlights that while many participants understand the risks of opioid misuse, a significant portion requires further education and awareness to address this ongoing public health crisis.

PFAS Contamination in Irrigation Ponds: The Role of Runoff from Biosolid-Amended Soils and Effects on Soybean Quality

Wayne Omagamre, PhD*

Department of Natural Sciences, School of Agriculture and Natural Sciences, University of Maryland Eastern Shore, Princess Anne, MD 21853

As climate change intensifies droughts and alters precipitation patterns, irrigation ponds are becoming increasingly vital for agricultural water supply. However, these water sources are vulnerable to contamination from per- and polyfluoroalkyl substances (PFAS), persistent synthetic chemicals introduced through biosolid applications. Understanding the transport and impact of PFAS in irrigation systems is crucial for sustainable agriculture. This study examined PFAS contamination in an agricultural system with a history of biosolid application, analyzing irrigation pond water, runoff ditches, and farm soil using a modified EPA 1633 method. Twelve PFAS compounds were identified in runoff ditches, with perfluorooctanoic acid (PFOA) and perfluorobutane sulfonate (PFBS) being the most abundant. Short-chain PFAS dominated ditch water, whereas long-chain PFAS were more prevalent in soil. To understand the effects of the quantified PFAS on crop health, productivity, and accumulation in plant tissues, a subsequent controlled growth chamber experiment was conducted. Soybean plants were exposed to a PFAS mixture replicating the irrigation pond profile at four concentrations (25, 250, 2500, and 25000 ppt) over 150 days. PFAS uptake into soybean beans followed a chain-length-dependent mechanism, with short-chain PFAS preferentially translocated. In the 250 ppt group, beans contained PFBA, PFPeA, PFBS, and PFHxA, while the 25000 ppt group additionally contained PFHpA and PFHpS, demonstrating a concentration-dependent accumulation pattern. At the highest exposure concentration, plants produced significantly more pods (8 per plant) and beans (14 per plant) compared to the control (4 pods and beans, $p < 0.01$), while bean biochemical composition showed elevated carbohydrate, protein, and triglyceride levels. Root transcriptomics revealed upregulation of water uptake pathways and aquaporin genes, while biosynthetic pathways were downregulated, potentially reallocating resources toward reproductive development. These findings highlight the risks of PFAS contamination in agricultural systems and its potential to alter crop productivity and food composition. The growth chamber experiment provides direct evidence of how PFAS runoff from biosolid-amended soils can influence plant physiology, biochemical composition, and PFAS accumulation in edible tissues, demonstrating the need for targeted mitigation strategies.

Precision Agriculture with Eyes on the Fields and Technology in Action
Alfadhl Alkhaled, PhD*

Department of Agriculture, Food, and Resource Sciences, School of Agriculture and Natural Sciences, University of Maryland Eastern Shore, Princess Anne, MD 21853

Precision agriculture integrates advanced technologies such as remote sensing, robotics, and artificial intelligence AI-driven data analytics to monitor crop nutrients and predict yield. This study explores the use of hyperspectral remote sensing and machine learning models for precision agriculture, particularly in optimizing nitrogen management and predicting crop yields. Using hyperspectral imaging data from three growing seasons (2018–2020), the Xtreme Gradient Boosting (XGBoost) model predicted nitrogen, and total tuber yield in potato crops. Findings showed that yield gains from nitrogen application could be predicted at different growth stages, though in-season nitrogen status response varied across years (coefficient of determination: R^2 up to 0.822). By leveraging machine learning models and high-resolution spectral data, we can improve decision-making, reduce resource wastage, and promote sustainable yield optimization. This research highlights how hyperspectral imaging and machine learning can improve precision nitrogen management, reducing excess fertilizer use while enhancing productivity. The study align with the symposium's theme by demonstrating the role of innovative technologies in advancing sustainable agriculture.

Pre-Service Professionals' Knowledge of Culturally Responsive Positive Behavior Support (PBS)
Bryan Gere, PhD., CRC.*

Department of Rehabilitation Services, School of Pharmacy and Health Professions, University of Maryland Eastern Shore, Princess Anne, 21853

Positive Behavioral Interventions and Supports (PBIS) is an evidence-based framework designed to improve school-wide behavioral outcomes and promote inclusive learning environments. However, disparities in disciplinary practices disproportionately affect minority students, necessitating a culturally responsive approach to PBIS implementation. This study examines the effectiveness of pre-service training programs in equipping future educators with the knowledge and skills to implement culturally responsive PBIS strategies. Using a mixed-methods approach, 32 pre-service professionals participated in a PBIS training module and completed pre- and post-assessment surveys measuring their familiarity, confidence, and preparedness in applying PBIS principles within diverse educational settings. Quantitative results indicate significant improvements in participants' self-reported knowledge and confidence post-training, while qualitative findings highlight key challenges, including implicit bias, resistance to change, and the need for culturally relevant behavioral assessment tools. The study underscores the importance of integrating cultural competency training into teacher preparation programs and fostering community collaboration to ensure equitable behavioral support systems. Future research should explore long-term impacts of culturally responsive PBIS training on student outcomes and teacher effectiveness.

Stem Recruitment and Retention Strategies for Minority and Female Students
Joseph O. Arumala, PhD1*, Ibibia K. Dabipi, PhD2 and Joseph D. Dodoo, PhD3.

Department of the Built Environment, School of Business and Technology, University of Maryland Eastern Shore, Princess Anne, MD 21853
Department of Engineering & Aviation Sciences, School of Business & Technology, University of Maryland Eastern Shore, Princess Anne, MD 21853
Department of Natural Sciences, School of Agriculture and Natural Sciences, University of Maryland Eastern Shore, Princess Anne, MD 21853

Researchers for some time now, have been looking at methods and strategies of attracting females and minority students into STEM-Related Programs and Careers. Some of the methods include providing opportunities to middle and high school minority students to learn the importance and benefits of STEM Education and Careers, develop understanding of importance of positive attitudes about learning mathematics and science and the opportunities for advanced studies, exposure to a college campus and opportunity to meet faculty members and college students who are involved in academic programs that lead to STEM careers ,and development of computer, professional, and communication skills needed for successful study habits and workplace effectiveness.. This paper will examine several summer enhancement programs conducted for minority students in the local community. The effectiveness of several Activities including field trips, preparation for SAT examinations in Mathematics and English and other hands-on-activities will be highlighted. The paper will look in-depth into a pre-college summer program for high school minority and female students and its effectiveness. The paper will conclude with recommendations for female and underrepresented minority students for success in undergraduate, graduate programs and the workplace. Strategies for coping with Diversity, Equity and Inclusiveness (DEI) will also be examined.

Temporal and Spatial Population Dynamics of Corn Earworm (Helicoverpa zea) in Hemp Fields in Delmarva Peninsula

Tigist Tolosa, PhD*, Shellyann Henry, PhD, and Simon Zebelo, PhD.
Department of Agriculture, Food, and Resource Sciences, School of Agriculture and Natural Sciences, University of Maryland Eastern Shore, MD 21853

Hemp, *Cannabis sativa* L., was legalized recently in the U.S. with <0.3% delta -9-tetrahydrocannabinol content. Following its legalization, hemp cultivation has increased significantly across North America. However, hemp growers have encountered unexpected production challenge and yield loss due to the emergence of the corn earworm (CEW), as a major pest in the Mid-Atlantic and southeastern U.S. Here, we provided three years spatial and temporal population dynamics of CEW and recommended a possible timeline for pest management. The experiment was conducted to monitor corn earworm-hemp interaction for three consecutive years from July to October in two locations in Maryland. The adult CEW populations peaked from late July through early September and declined toward the end of September. However, the larvae population surged significantly from the end of August until harvest, causing substantial damage to hemp flowers in both locations. These findings provide a timeline for effective pest management strategies, highlighting critical periods for intervention to mitigate CEW damage and enhance hemp yield. The study could serve as a guideline for design more time-effective and efficient pest management strategies to tackle CEW and other lepidopteran pests in hemp cultivation.

The Effect of Gum Arabic on Iatrogenic Endodontic Perforation Performed on Wister Albino Rat Dental Pulp (Case Report)

Nuha Elmubarak*[1], Yahia Ibrahim[1], Abbas Gareeballah[1] , Nada Sanhouri[1] , Afaf Abuelgasim2 ,Manahil Ali1 , Motoki Okamoto3 , and Amel Sahnoon4
1 Faculty of Dentistry, University of Khartoum, 1115, Sudan
2 Faculty of Veterinary Medicine, University of Khartoum, 1115, Sudan
3 Graduate School of Dentistry, Osaka University,565-0871 Japan
4 Khartoum Teaching Dental Hospital, 11111, Sudan

About ten percent of unsuccessful endodontic cases are caused by iatrogenic perforations. Selecting the appropriate material is essential for repairing these perforations. Gum Arabic is a promising medicinal plant, and numerous studies have shown its benefits for oral health. This study is a case report demonstrating the effect of Gum Arabic on iatrogenic endodontic perforation in the dental pulp of Wisrer Albino Rat. The left maxillary first molar was disinfected by Chlorahexidine, and a class I cavity with perforation on the mesial side of the pulpal floor was performed using a steel round bur of 0.5 mm in diameter. The perforated pulpal floor was sealed with a liner prepared from Gum Arabic mixed with distilled water, and the cavity was restored with Glass Ionomer cement. The rat was euthanized after four weeks, and the restored tooth was removed, fixed with 10% formalin, and decalcified with 10% formic acid. The tooth was sectioned mesiodistally, processed, and stained with Hematoxyline and Eosin. The histological section revealed the development of a complete calcific barrier, which was lined with an odontoblast layer. This barrier separates the healthy distal portion of the pulp tissue from the abscess and the inflamed region on the mesial side of the pulp. Gum Arabic has demonstrated promising results in the treatment of iatrogenic endodontic perforations; however, further research is necessary to validate its efficacy.

Working Toward Developing the Non-chemical Methods of Insect Pest Management

Simon Zebelo, PhD1,2, Tigist Tolosa, PhD2, Zachary William, PhD2, Jocelyn Simmons Elliot, PhD2, Kimberly Okpha2, and Kayla Waters1,2
1Department of Natural Sciences, School of Agriculture and Natural Sciences, University of Maryland Eastern Shore, Princess Anne, MD 21853.
2Department of Agriculture Food and Resource Sciences, School of Agriculture and Natural Sciences, University of Maryland Eastern Shore, Princess Anne, MD 21853.

Consumer demand for organic products continues to rise in the US and globally as people become more conscious about their health, the quality of the food they eat, and the environment in which it is grown. Organic food sales in the US have shown double-digit growth during most years since the 1990s. Currently, organic sales account for nearly 6% of the total food market in the US. Most sales comprise fresh produce such as fruits, nuts, and vegetables, accounting for 43% of total organic sales. A key reason for this limited production of organic fruits and vegetables is a lack of research and information dissemination on integrated pest management (IPM) tactics conducive to organic production systems. Dr. Zebelo's lab researches and develops the non-chemical insect pest management method. Non-chemical techniques include but are not limited to, using microbes that enhance plant health and growth, entomopathogens that cause disease to insect pests, and trap crops that attract and arrest pests. These techniques reduce the use of chemical pesticides and their associated impact on human beings and the environment and give organic crop growers an option to control pests.

Oral Abstracts - Doctoral

(Titles in Alphabetical Order)

Aberrant PI3Kδ Splice Variant as a Driver for Idelalisib Resistance and PI3K/AKT/mTOR activation in Blood Cancers

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The PI3K pathway is frequently upregulated in cancers, with PI3Kδ isoform playing a significant role in hematologic malignancies such as lymphoma and leukemia. Previous research has illustrated aberrant RNA splicing of *PIK3CD* as an oncogenic driver for tumor progression and drug resistance, particularly in prostate cancer and other solid tumors. Here, we investigate whether the PI3Kδ-S splice isoform contributes to the hyperactivation of PI3K/AKT/mTOR signaling, promoting cancer aggressiveness and resistance to Idelalisib, a PI3Kδ-specific inhibitor, in lymphoma and leukemia. We analyzed the expression profiles of *PIK3CD-S/PIK3CD-L and PI3Kδ-S/PI3Kδ-L* in lymphoma and leukemia cell lines (Jeko-1, Ramos, SU-DHL-5, and Hs 505.T) using RT-PCR and immunofluorescence assays, respectively. PI3Kδ expression was further evaluated in patient samples using RNAScope analysis. Second, western blot analysis was performed to assess the activation of PI3K/AKT/mTOR pathway in the presence or absence of Idelalisib. Finally, functional assays, including MTT and apoptosis assays, were conducted to determine the drug efficacy in relation to *PIK3CD-S/PIK3CD-L* expression levels in the leukemia and lymphoma cells. Our results showed that Idelalisib effectively inhibited PI3K/AKT/mTOR signaling and induced apoptosis in cell lines with a low *PIK3CD-S/PIK3CD-L* ratio (including SU-DHL-5, Jeko-1 and Ramos). However, cell lines with a high *PIK3CD-S/PIK3CD-L* ratio (e.g., Hs 505.T) exhibited reduced sensitivity to Idelalisib. To further investigate resistance mechanisms, we developed Idelalisib-resistant cell lines and confirmed their resistance using an apoptosis assay. RT-PCR further revealed that the resistant cell lines exhibited an increased *PIK3CD-S/PIK3CD-L* ratio, supporting the role of PI3Kδ-S in drug resistance. These findings suggest that PI3Kδ-S is a more oncogenic splice variant (compared to the full-length PI3Kδ-L) that drives the hyperactivation of PI3K/AKT/mTOR and contributes to the Idelalisib resistance. Taken together, PI3Kδ-S may serve as a prognostic biomarker and a potential therapeutic target for aggressive hematologic malignancies.

An Exploration of Factors Influencing the Work-Life Balance of Higher Education Teachers in The Mid-Atlantic Region: A Spiritual Perspective

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Maslow (1969) acknowledges that the essence of human motivation surpasses our natural understanding of life, residing in a level of spiritual experience (self-transcendence). At this level human beings yearn for a connection with "something" far greater than themselves. Consequently, leadership scholars have agreed upon common approaches to inspiring self and others in a manner that transcends the ego. However, the theories are often pitted against one another in a race to obtain validity and reliability. Nevertheless, ethical, spiritual, transformational, authentic, and servant leadership theories have been used to explain motivation to achieve shared goals at organizational and personal levels (Rahaman & Stoutem, 2019; Aftab et al., 2022; Vedula & Agrawal, 2023). Each of the theories mentioned above respectfully engages the human soul to fulfill missions driven by spiritual principles and values of altruism, service, and humility (Khan et al., 2016). Such principles and values motivate individuals in how they conduct themselves at work, choose a career path, and cope with stress in their professional and personal lives (Park, 2012; Bark & Nayak, 2024). Hence, through a qualitative study on the "Work-life Balance of Higher Education Teachers", I sought to use a spiritual perspective to answer the questions: How do higher education teachers navigate boundaries between work and personal lives and what factors contribute to their work-life balance overall? As this research is in progress, I cannot conclude whether the spiritual perspective applies to each participant's life. However, after engaging in the first five interviews, I can conclude that there is great promise in shedding light on the need to engage the soul of every individual we encounter in the workplace. Viewing the leadership process through a lens of transcendence and connection may very well prove to yield the fruit of justice, equity, compassion, and service not just for the benefit of a single organization, but for the benefit of our entire society. Perhaps the conclusion of this study will yield justification for nurturing the inner life of professionals through workplace practices which transcend profit.

Building Climate Resilience: Lessons from Copenhagen and the Challenge of Emerging Contaminants

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Copenhagen, Denmark, is a global leader in urban climate resilience, offering a model for integrating climate adaptation and mitigation. As part of a three-week faculty-led study abroad program in June 2024, We explored Copenhagen's innovative strategies through academic and cultural immersion. This qualitative study highlights key lessons from Copenhagen's flood management, green infrastructure, renewable energy, and waste-to-energy innovations. Copenhagen's Cloudburst Management Plan integrates green infrastructure and stormwater solutions to prevent flooding, potentially avoiding €1 billion in damages from cloudburst events annually. Public spaces like Enghaveparken blend recreation with flood mitigation. The city's renewable energy transition is evident in its reliance on wind power for electricity and an extensive district heating system powered through recycled energy. Strong governance, broad political consensus, and active citizen participation have also helped to sustain long-term climate policies and sustainability programs, including an extensive cycling infrastructure. Beyond infrastructure, climate change exacerbates the mobilization of contaminants of emerging concern (CECs), including Per- and polyfluoroalkyl substances (PFAS), in aquatic systems. Increased flooding and rising sea levels contribute to greater pollutant runoff, altered degradation rates, and heightened exposure risks for ecosystems and human health. Copenhagen's climate strategies not only mitigate climate risks but also reduce water pollution, demonstrating the intersection between climate resilience and pollution control. These lessons offer actionable strategies for global coastal cities to adopt. By integrating climate adaptation with pollution management, these cities can build a future where communities and ecosystems thrive despite environmental challenges.

Comparative Analysis of Healthcare Systems in Denmark and the United States: Challenges and Areas for Improvement

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Healthcare systems constitute the cornerstone for providing medical services, safeguarding public health, and meeting population health requirements. This study compares the healthcare systems in Denmark and the United States, focusing on their organizational structures, financing mechanisms, accessibility, and overall efficiency. Denmark operates under a universal, tax-funded healthcare model prioritizing preventive care, equitable access, and decentralized service delivery. However, challenges such as an aging population, workforce shortages, and prolonged wait times present barriers to optimal care delivery. The United States employs a mixed public-private model, featuring government programs like Medicare and Medicaid alongside private insurance. Despite the benefits of advanced medical technology and innovation, the U.S. healthcare system is marked by significant disparities in access, high costs, and inconsistent practices. Denmark's healthcare system prioritizes preventive care, equitable access, and decentralized service delivery, while the U.S. employs a mixed public-private model, featuring government programs like Medicare and Medicaid alongside private insurance. Healthcare systems are essential for delivering medical services, ensuring public health, and addressing population health needs. The study highlights the need for a more comprehensive approach to healthcare systems to ensure optimal care delivery and public health.

Co-Expression of Chaperones to Enhance Soluble Production Putative Pyridoxal-5'-Phosphate (PLP)-dependent Enzyme in Escherichia coli BL21

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Heterologous production of enzymes in E. coli is a convenient approach to interrogate the catalytic activity of the enzymes when a system to produce enzymes in the native host is not available. The proper folding of proteins is critical for the catalytic activity of enzymes. Given the heterogeneity and difference in cellular environments among organisms, such expressions in E. coli often lead to the expression of genes in the form of insoluble proteins, also called inclusion bodies. Organisms belonging to the phylum Actinobacteria are known to produce the majority of bioactive metabolites. Expressions of secondary metabolite biosynthetic genes in E. coli often end up with the exclusive production of inclusion

bodies. Chaperones are well known for their ability to enhance proper folding and solubilization of expressed gene products. While a variety of chaperones are commercially available, little is known concerning which chaperone system would enhance the optimal production of actinobacterial proteins in E. coli. In this work, we herein report a comparison of five different chaperones (pG-KJE8, pGro7, pKJE7, pG-Tf2, and pTf16) concerning their effect on protein solubility and expression using a putative PLP-dependent decarboxylase gene from Micromonospora M42 strain. This gene is exclusively expressed in E. coli in the form of inclusion bodies. The results garnered from this project may be extended for the successful production of other actinobacterial proteins in E. coli.

Deciphering The Role of Adipose-Derived Stem Cell Exosomes in Aging-Associated Inflammation

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Aging is a global health concern characterized by chronic low-grade inflammation, immunosenescence, and tissue dysfunction. Fat tissues play a pivotal role in the aging process, as their distribution, function, and cellular composition change over time, contributing to metabolic dysfunction, inflammation, and the onset of age-related diseases, such as osteoporosis, diabetes, cardiovascular diseases, and neurodegenerative diseases. Exosomes secreted by cells, which contain bioactive components such as proteins, microRNAs, and mRNAs, have emerged as key modulators of inflammation and immune responses. However, the molecular alterations in exosomes derived from adipose-derived stem cells (ASCs) during aging and their contributions to inflammatory signaling remain poorly understood, limiting the development of effective therapeutic strategies for aging-related diseases. This study investigates the role of exosomes derived from aged ASCs in inflammation and tissue degradation. Exosomes were isolated from young and aged ASCs harvested from C57BL/6J mice using ultracentrifugation, followed by their size and bioactive content characterization. The inflammatory response of young and aged exosomes was compared using real-time PCR assays, and their effects on collagen degradation were assessed at both the gene and protein levels. Results revealed that exosomes were successfully isolated from young and aged ASCs, with an average diameter of approximately 100 nm. Aged exosomes induced higher expression of inflammatory genes, including TNF-α and IL-1β, in RAW 264.7 cells compared to young exosomes. Additionally, aged exosomes promoted increased collagen degradation. In conclusion, our findings demonstrate that aged ASC-derived exosomes play a critical role in mediating inflammation and tissue degeneration, providing a foundation for subsequent investigation into the underlying mechanisms and the potential development of engineered exosomes for anti-aging therapies.

Delivery of siRNA for Bone Tissue Engineering through Exosome Mimetic Hybrid Nanoparticles

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The reconstruction of large bone defects remains a significant clinical challenge, necessitating innovative and effective solutions for tissue engineering. Donor site availability and complications limit traditional therapeutic approaches like auto and allografts. While RNA interference therapy holds promise, it faces challenges in efficiently delivering siRNA molecules to the target site. Despite lipid-based nanoparticles being employed as carriers for siRNA, concerns regarding their delivery efficiency persist. Extracellular vesicles (EVs) derived from mesenchymal stem cells (MSCs) have garnered attention as potential carriers for the delivery of siRNA, but their low efficiency has been found to hinder exogenous cargo loading. This study aims to develop exosome mimetics (EM)-liposome hybrid nanoparticles (HNs) encapsulating noggin siRNA, a BMP antagonist (crucial for bone formation) and assess their potential in bone tissue engineering in combination with bioscaffolds. A biomimetic approach was employed to create semi-synthetic HNs. Production of EMs from human MSCs was achieved through an extrusion technique. Subsequently, EMs were combined with noggin siRNA and liposomes through a lipid-film hydration process and extrusion to create HNs. HNs were characterized for their physiochemical properties and evaluated for gene-silencing efficacy, toxicity, and osteogenic impacts in vitro. Additionally, the HNs were incorporated into an apatite-coated PLGA scaffold to form HN-scaffold complex and assessed for osteogenic potential in vitro. Our data revealed successful fabrication of HNs capable of functionally delivering noggin siRNA while maintaining essential characteristics of EM. The hybrid didn't exhibit a dose-dependent decrease in cell viability, indicating enhanced biocompatibility and upregulation of osteogenic markers including early ALP and later mineralization when tested with hMSCs. Importantly, increased osteogenesis was observed within the HN-scaffold complex in vitro. Our findings demonstrate that the HN-scaffold complex exerts a significant osteogenic induction, indicating its potential for applications in tissue engineering. Further research aims to evaluate its efficacy in an in vivo mouse critical-sized calvarial defect model. We anticipate that our work will provide a promising alternative for addressing large bone defects in the context of bone tissue engineering.

Elucidating Diazaquinomycin Biosynthetic Pathway in *Micromonospora* M42

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Genomics-guided new natural products discovery is proven to be a powerful tool for the identification of bioactive molecules. To elucidate the genomic basis for the production of manzamines in Micromonospora M42, a member of the actinomycete, we conducted whole genome sequencing of this organism. Although our efforts to identify manzamine A biosynthetic gene cluster were proven futile, bioinformatic analysis revealed over a dozen biosynthetic gene clusters, including one potentially involved in the production of diazoquinomycin (DAQ) class of natural product. Diazaquinomycin (DAQ) is a distinctive diaza-anthraquinone natural product known for its potent bioactivities, including antimicrobial and anticancer properties. In vivo studies in other organisms have indicated that DAQ core is produced through attachment of 2,6-diaminohydroquinone with two diketone intermediates. However, a little is known regarding the biosynthesis of both components. This study focuses on elucidating the biosynthetic steps involved in the production of 2,6-diaminohydroquinone in Micromonospora M42. Analysis of DAQ biosynthetic locus resulted in the identification of 29 open reading frames (orfs), of which 9 orfs are proposed to be involved in production of 2,6-diaminohydroquinone. We here in report cloning and heterologous production of biosynthetic enzymes and functional analysis of four key enzymes. By using molecular biology tools and in vitro reconstitution of the biosynthetic pathway, we plan to unravel the specific enzymatic steps involved in DAQ biosynthesis. This research will provide crucial insights into the biogenesis of this unique compound and will also pave the way for the engineered production of DAQ analogs with enhanced therapeutic properties.

Enhancing Beet Cultivation in an Indoor FarmBot System: The Role of Seaweed Biostimulants and AI-Driven Environmental Monitoring

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Advancements in Controlled Environment Agriculture (CEA) integrate robotics, artificial intelligence (AI), and automation to optimize crop production, transforming how crops are monitored and managed. This study investigates the application of an indoor FarmBot system for cultivating beets (Beta vulgaris) in potting soil, assessing the effects of seaweed-derived biostimulants on plant growth and development. Beneficial compounds in seaweed-derived biostimulants, such as polysaccharides, amino acids, and plant hormones, can enhance root development, increase biomass accumulation, and improve stress resistance. In this study, two concentrations of biostimulants were applied as foliar sprays. These treatments were compared to untreated control groups to evaluate their effectiveness in promoting plant growth and their influence on biomass accumulation and root development. Microsoft FarmBeats, an AI-driven agricultural data platform, was integrated into the indoor growth system to enhance environmental monitoring. IoT-enabled sensors recorded real-time soil moisture, temperature, and humidity data, facilitating data-driven decision-making. By collecting and analyzing environmental data, FarmBeats helps automate irrigation, predict plant needs, and improve resource efficiency. Preliminary results indicate stable environmental conditions across treatments, with mean temperature, moisture, and humidity values of 21.75°C, 0.62, and 20.41%, respectively. An Analysis of Variance (ANOVA) was conducted to determine whether there were significant differences in environmental conditions among treatments. The results showed minimal statistical variance, indicating that all treatment groups experienced similar environmental conditions, ensuring fair comparisons of plant responses. Future work will incorporate machine learning models to analyze plant responses to biostimulant treatments, optimize growth conditions, and improve overall crop resilience.

Exploring the Role of PGE2 EP4 Receptor in Ovarian Cancer Progression

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Prostaglandin E2 (PGE2) is a bioactive lipid mediator in the tumor microenvironment that plays significant roles in initiating inflammation, immune suppression, and tumor growth. It targets four G-protein-coupled receptors (EP1-4), with the EP4 receptor being particularly significant due to its ability to activate adenylate cyclase, PI3K, and other pathways associated with

tumor growth, survival, and metastasis. Although EP4 overexpression is well reported in several cancers like breast, colorectal, uterine leiomyosarcoma, and endometrial cancer, its role in ovarian cancer has been less explored. Ovarian cancer (OC) is the most lethal gynecologic malignancy in the United States with high mortality due to its asymptomatic progression and late-stage diagnosis. This cancer has distinct molecular subtypes, each characterized by particular gene expression and protein profiles that affect tumor behavior and response to therapy. Our findings show that EP4 is highly overexpressed in several OC subtypes, including high-grade serous, low-grade serous, and clear-cell OC cell lines, compared to normal ovarian surface epithelial cells. We have shown functional studies that demonstrate that pharmacologic ablation of EP4 results in profound inhibition of cell proliferation/migration and invasion of OC cells, both critical metastatic processes. Moreover, EP4 blockade enhances the anticancer efficacy of taxane- and platinum-based chemotherapy, pointing to its role in chemoresistance. Our mechanistic research also indicates that EP4 blockade alters apoptotic pathways and inhibits cell cycle progression, leading to increased cancer cell death and impaired viability of the tumor. With the aggressive nature of OC and the limited therapeutic options for advanced or recurrent disease, targeting EP4 presents a potential therapeutic strategy. Our findings support further preclinical and clinical investigations examining EP4 inhibition as a strategy to improve therapeutic efficacy and overcome chemoresistance in OC. Understanding the particular molecular mechanisms by which EP4 stimulates ovarian tumor growth may lead to novel therapeutic approaches to enhance patient survival.

Generation of Exosome Mimetics with Endogenous Osteogenic Factors for Bone Regeneration

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Osteoporosis is responsible for nearly two million fractures annually and results in tremendous psychological and financial burdens. Bone regeneration in osteoporosis is hindered due to dysregulated differentiation of mesenchymal stem cells (MSCs), favoring adipocytes over osteoblasts. Modulating MSC lineage commitment offers a potential therapeutic strategy for addressing bone loss. We previously identified Tribbles Homolog 3 (Trb3) as a critical molecular switch governing MSC lineage fate. Our research has demonstrated that small compounds targeting Trb3 can enhance the formation of osteoblasts and promote the healing of mandibular and skull fractures. These findings highlight the critical role of Trb3 in balancing adipogenesis and osteogenesis. Our previous studies demonstrated that the generation of exosome mimetics (EMs) enriched with therapeutic factors by an extrusion approach can significantly enhance bone regeneration. Therefore, we aim to modify EMs to have higher endogenous Trb3 (EM-Trb3) levels to enhance bone density. In vitro experiments have shown that EM-Trb3 can promote osteogenesis, as indicated by increased alkaline phosphatase activity, an early biomarker for osteogenesis, and elevation of critical osteogenic genes by real-time PCR. EM-Trb3 also suppresses adipogenesis by decreasing essential genes responsible for adipogenesis, such as PPARγ. The EM-Trb3/scaffold complex demonstrates high cell viability, effective bone-cell formation, and reduced adipogenesis in both 2D and 3D environments. For precise bone tissue targeting in vivo, a metabolic engineering technique added modified azide groups to human MSCs. Subsequently, a bone-targeting molecule, alendronate, was attached to EM-Trb3 using click chemistry to direct the EM-Trb3 to bone tissue while decreasing accumulation in other tissues. These findings could be the cornerstone for testing EM-Trb3 in enhancing bone density in osteoporotic mouse models.

Impact and Effects of Edible Coating on Post-Harvest Quality of Two Selected Day-Neutral Strawberries

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Strawberries (*Fragaria x ananassa*) are one of the most widely cultivated fruit crops, valued for their high nutritional content and economic significance. It is a highly perishable fruit with a short post-harvest shelf life, often leading to significant quality loss during storage. Edible coatings have emerged as a promising method to enhance the post-harvest quality of fruits by acting as a protective barrier that reduces moisture loss, maintains firmness, and inhibits microbial growth. This study investigated the effectiveness of edible coatings on the post-harvest quality of two selected day-neutral strawberries (Monterrey and Seascape). Strawberries were coated with edible fish gelatin film and stored at 4°C for 15 days. Physiochemical (weight loss, firmness, pH, and brix) and microbiological (yeast and mold counts) quality parameters were measured. Our findings demonstrated that edible coatings positively affected the preservation of strawberry quality over the 15-day storage period. At day 15, weight loss was found to be 9.82% and 16.16% lower in Seascape and Monterrey-coated strawberries and 18.37% and 21.92% lower in Seascape and Monterrey uncoated strawberries, respectively. The pH levels in both coated and uncoated strawberries showed a similar increasing trend over time. There was no significant difference in the decrease in brix levels over time in both coated and uncoated strawberries. Coated strawberries inhibited yeast and mold growth at 4°C for 15 days, while the highest yeast and mold counts at the end of storage were 5.3 log CFU/g in uncoated Monterrey and 1.36 log CFU/g in coated Seascape strawberries, respectively. Our findings demonstrate the potential of edible films as a practical and sustainable solution to preserve strawberry quality and extend marketability.

(Titles in Alphabetical Order)

Impact of Corn Earworm Damage on Transcriptional Levels of Cannabinoid Synthesis Genes in Hemp Plant

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Following the 2018 farm bill, hemp, *Cannabis sativa* L., with delta-9 tetrahydrocannabinol (D9THC) levels below 0.3% by dry weight basis, is regarded as an agricultural commodity. Hemp production has substantially increased due to its diverse applications and therapeutic potential. Concurrent with this growth, there has been a rise in insect attacks on hemp crops, causing significant concern for growers. Insect herbivores, such as Corn Earworm (CEW) *Helicoverpa zea* (Boddi), emerged as one of the key insect pests of cannabidiol (CBD) hemp. A recent report from our lab showed that CEW damage increased the D9THC level above the legally acceptable limit. However, the feeding impact of CEW on the gene responsible for cannabinoid synthesis in hemp is not well studied. Therefore, this study investigated the impact of CEW infestation on CBD and D9THC levels and on the expression of *CBDAS* and *THCAS* genes, responsible for CBD and THC production, in the Boax hemp variety, respectively. The experiment was conducted under laboratory conditions. Boax hemp variety was grown under controlled environmental conditions in a growth chamber. At the flowering stage, the plant was exposed to CEW larval feeding. After 24 hours of infestation, samples were collected and analyzed using gas chromatography–mass spectrometry (GCMS) and real-time PCR techniques. Our results indicate that insect herbivory significantly increased both cannabinoid levels and the expression of cannabinoid synthesis genes in the herbivory-damaged plants compared to the control. Studying the impact of CEW on cannabinoid synthesis genes in hemp could lead to advanced CEW management techniques. Furthermore, this research will help better understand how hemp and CEW interact and open the door to developing improved hemp varieties.

Investigating the Prevalence and Antimicrobial Resistance Profile of *Salmonella* in Commercial Pet Foods in Delmarva

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Foodborne salmonellosis is one of the major health risks often caused by *Salmonella* originating mainly from contaminated foods and the environment. Pet foods are one of the newly emerged sources of foodborne salmonellosis in humans. Rising trends in pet humanization with premium diets, and raw pet foods heighten the risk of pathogen transmission, such as *Salmonella*, to pets and owners. The aim of this study was to assess the prevalence and antimicrobial resistance profile of *Salmonella* in commercial pet foods. A total of 140 pet food samples (18 dry, 49 raw, 37 semi-moist and 36 treats) were collected from various retail outlets across the Delmarva region. Samples were pre-enriched in buffered peptone water, further selectively enriched in Rappaport Vassiliadis broth, and isolated on XLD agar plates. Isolates were confirmed using PCR targeting the *invA* gene. Positive isolates were screened for antimicrobial resistance using the disk diffusion method with 16 clinically relevant antibiotics. Zones of inhibition were measured for all three replications and data analysis was done using R-Studio software, Chi square Fishers' exact was performed with *p-value* set at 0.05. Out of the 140 samples collected in this study, 7.9% (n=11) samples tested positive for *Salmonella*. The prevalence of *Salmonella* was significantly higher in the raw samples with 64% (7), and then 18% (n=2) each for treat and dry pet foods. All the isolates were multi-drug resistant with 5 (45%) of them being extensively drug resistant. This notable prevalence of multidrug resistant *Salmonella* reveals the potential risk of zoonosis, thus highlighting the need for increased awareness of the quality and safety of pet food (raw or non-raw) handling and feeding to our pets.

***In-Vitro* Characterization of β-Carboline Biosynthetic Gene, KslB**

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β-carbolines alkaloids exhibit promising biological activities such as antimicrobial, anti-parkinsonism, and anticancer. Most bioactive β-carbolines are produced by plants, and the biosynthetic pathways involve the Pictet-Spengler reaction. Pictet-Spenglerases (PSs) that convert L-tryptophan substrate into a β-carboline core have been well studied in plants, but quite scarce in bacteria. Thus far, only three Pictet-Spenglerases (McbB, NscbB, StnK2) from microbes are known to catalyze the formation of such products: 1-acetyl-3-carboxy-β-carboline, 1-acetyl-β-carboline. However, their inherent substrate specificities have been a major hurdle for the production of structurally diverse β-carbolines. *Kitasatospora setae*(an actinomycete) produces Kitasetaline, a β-carboline metabolite. In vivo studies suggest three genes (*KslABC*) involved in the production of kitasetalic acid through an intermediate JBIR-133, which comprises a β-carboline unit decorated with two carboxylic acid functional groups. We here report the cloning of kslA and kslB, heterologous production and purification of corresponding proteins, and their functional characterization. Through enzyme assays, we unambiguously established the functions of KslA and KslB. We demonstrated that KslB catalyzes the Pictet-Spengler reaction utilizing L-tryptophan and alpha-keto-glutaric acid to generate kitasetalic acid. KslA serves as dehydrogenase and catalyzes a follow-up reaction by converting kitasetalic acid into JBIR-133. Kinetics study established *K*M and Kcat values for KslB to be 334.9 ± 97.6 *μ*M and 0.3312 ± 0.04 sec-1, respectively. Relative activity assays showed broad substrate specificity of KslB, making this enzyme a promising candidate for the enzymatic production of structurally diverse β-carboline compounds. To our surprise, KslB prefers D-tryptophan over L-tryptophan as the primary substrate. To explore the application of KslB in β-carboline production, we conducted bioconversion assays using *E. coli* cells that express the *kslB* gene. The bioconversion results showed a rapid utilization of L-tryptophan until 50 minutes, and the concentration of substrate could be elevated up to 5 μM showing a remarkable catalytic potential of the system.

Machine Learning for Banana Quality Prediction: Model Evaluation and Data Literacy

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Maintaining food quality is a critical challenge in agriculture, particularly for perishable crops like bananas, which ripen rapidly and are sensitive to storage and handling conditions. Traditional quality assessments often rely on manual inspection, which is time-consuming and inconsistent. Machine learning (ML) offers scalable, automated approaches to assess banana quality in real time, helping to reduce post-harvest losses, strengthen supply chain operations, and maintain quality standards that reinforce consumer confidence. This research explores ML applications for banana quality assessment, focusing on key quality indicators. These include size, weight, sweetness, softness, ripeness, acidity, and harvest timing, which are critical to determining market readiness and shelf life. Data literacy — the ability to recognize dataset structures, biases, and limitations — is emphasized as a foundation for developing reliable models suited to real-world agricultural contexts. An open-source Kaggle dataset was used, with data literacy guiding each stage of model development from preprocessing to evaluation. A variety of ML models were evaluated, including Linear Discriminant Analysis (LDA), Classification and Regression Trees (CART), k-Nearest Neighbors (KNN) Regression, Naïve Bayes Regression, Neural Networks, Decision Trees, Random Forests, and Support Vector Regression (SVR). Model performance was measured using evaluation metrics, including accuracy, precision, recall, F1 Score, and MCC, to determine the best fit. Results show that, among the models tested, Neural Network (NNET) Regression outperformed others with an accuracy of approximately 98.05% ± 0.05. NNET effectively captured non-linear relationships within the data. By integrating machine learning with open-source data and embedding data literacy throughout the process, this research advances solutions for food quality prediction. These provide a foundation for advancing automated assessment methods in agriculture and other industries.

Osteoimmunomodulatory Effects of Modified Mesenchymal Stem Cell-Derived Exosomes

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Bone fractures are among the most common injuries treated by orthopedic surgeons. Despite extensive research, the exact molecular and cellular mechanisms behind bone remodeling are still not fully understood, primarily due to their complex and variable nature across different locations and times. Effective bone healing requires precise coordination between immune cells and resident bone marrow mesenchymal stem cells (MSCs) at the injury site. While an acute inflammatory response triggered by bone injury can facilitate healing, chronic inflammation, marked by excessive macrophage infiltration and the release of pro-inflammatory cytokines, is associated with impaired healing and osteolysis. The lack of a clear mechanistic understanding of immune regulation has impeded the development of effective treatments for severe bone injuries. Additionally, exosomes derived from MSCs play a crucial role in regulating bone immunity and promoting healing. Our objective is to investigate the osteoimmunomodulatory effects of modified exosomes produced by MSCs in inflammatory environments, with the goal of advancing stem cell-based therapies and improving bone healing outcomes. We discovered that mouse MSCs treated with a cytokine combination showed enhanced osteogenesis and anti-inflammatory effects, as confirmed by various molecular analyses. Furthermore, the modified exosomes from cytokine-treated MSCs exhibited increased expression of endogenous anti-inflammatory cytokines, as demonstrated by an ELISA assay, and produced significant osteoimmunomodulatory effects (pro-osteogenic and anti-inflammatory), as shown by increased osteogenic and reduced inflammatory markers in real-time PCR and flow cytometry assays. Our findings provide a solid foundation for further exploration of modified MSC-derived exosomes in inflammatory regulation and bone repair in a mouse bone defect model. The completion of these studies could also pave the way for the development of a novel exosome-based immunomodulatory approach to enhance bone healing.

The Role of Hybrid Schedules in Mitigating COVID-19's Impact on Educators' Well-Being and Pedagogical Reform: A Mixed-Methods Study Exploring Benefits for Mental Health and Work-Life Balance.

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This study revisits the COVID-19 pandemic with a spotlight focus on educators in the Hampton Roads area in Virginia. The Hampton Roads area consist of the following cities: Norfolk, Virginia Beach, Chesapeake, Portsmouth, Newport News, Hampton, and Suffolk. Using the timeline to outline the series of events that lead to the closure and reopening of school buildings, and the introduction to a new normal. Post pandemic, what did we learn and what instructional practices should continue to be implemented in our school districts? This is mixed methods research to highlight the benefits of a hybrid schedule implementing synchronous and asynchronous instructional practices to benefit educators' well-being. Participants for this study are educators

employed within a school district in the Hampton Roads area school district full-time, pre, during, and post COVID-19. This study gathers educators' perspective on hybrid scheduling implementing synchronous and asynchronous instructional practices and the benefits to their well-being. An explanatory mixed methods design allows for a more complete analysis to answer the following research questions:
1. How have educators adapted to the new educational and social well-being realities?
2. What policies or procedures have been implemented by the districts to address the well-being of educators?
3. How does hybrid schedules implementing synchronous and asynchronous instructional practices benefit teachers' well-being?
Data collection methods include a demographic survey, Teacher Subjective Well-Being Questionnaire (TWSQ) and a 10-12 participant focus group.

Transcriptional Regulation of Heat Stress Responses and Their Impact on Growth, Development, and Agronomic Performance in *Chenopodium Quinoa*

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Expanding Chenopodium quinoa (quinoa) cultivation to non-native regions is of increasing interest due to its nutritional benefits, resilience to diverse climates, and adaptability to marginal soils. However, its susceptibility to temperatures above 32°C poses a significant challenge, particularly in North America, affecting flower and seed development. Heat stress triggers transcriptional changes regulated by transcription factors, making them promising targets for genetic improvement. This study evaluated heat stress-induced gene expression and its association with agronomic traits in nine quinoa genotypes, identifying heat-adapted lines for the Delmarva region. The genotypes were assessed across two planting periods in the field (RCBD) and greenhouse (CRD) using an international quinoa phenotyping methodology. A two-way ANOVA analyzed the effects of Genotype, Season, and Environment on yield with a Tukey HSD test for pairwise comparisons. Pearson correlation analysis examined relationships between yield, height, total primaries, and panicles, while interaction analysis evaluated yield responses to heat stress. An RNA gene expression analysis study using Illumina Next Gen sequencing compared the control group with the heat-stressed treatment identifying 3,340 upregulated and 2,752 downregulated genes under heat stress in leaf and flower tissues. Upregulated genes include the heat shock proteins, jasmonate-induced protein, and transcription factor bHLH, which are significant in the plant's heat tolerance mechanisms. PHD finger MALE STERILITY 1, agamous-like MADS-box, and Aspartic Protease proteins were downregulated genes significant in flower and seed development. There was a significant difference in yield across the nine genotypes between the planting seasons and the two sets of the environment. These findings support the introduction of heat-tolerant quinoa genotypes to mitigate climate-related yield losses. Understanding transcriptional and agronomic responses to heat stress will aid in developing climate-resilient quinoa varieties for expanded cultivation.

6 to 126: Using a Hybrid Model Approach to Forecast The Price of Eggs

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The objective of this study is to forecast the average price of eggs in the United States using time series data from 1980 to 2024 with all the possible hybrid combinations of six models: ARIMA; Theta method (THETAM); Error trend seasonality (ETS); Time series neural network; Trigonometric, Box-Cox, ARIMA, Trend, and Seasonal; and Seasonal and trend decomposition using loess with multiple seasonal periods (STLM). The difference between equal and cross validated error weights in the models was also compared. This resulted in a total of 126 models being made. They were compared and evaluated with the standard criteria of RMSE and MAPE. Overall models with a neutral network component outperformed the rest. The NNAR (13,1,7) model with cross validated weights had the lowest error measure with an RMSE of 0.0673 and the NNAR (13,1,7) model with equal weights was second with a score of 0.0673. When evaluated using MAPE, the NNAR (13, 1, 7) with cross-validated weights had the lowest score, 3.71, and NNAR (13,1,7) equal weights had the second lowest, 3.72. The THETAM and ARIMA models were outperformed by the benchmark model. This shows that in this case the neural network model was better able to handle the instability in the data, which demonstrates neural network's ability to better find hidden patterns in data.

A Deep Dive into John Deere's Financial Performance Through Ratio Analysis

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The John Deere Company is recognized as a premier global manufacturer of agricultural equipment. Founded in 1837 with the invention of the self-scouring plow, the company has established a strong identity characterized by its distinctive green and yellow branding. John Deere is celebrated for his unwavering commitment to quality and innovation, playing a crucial role in the advancement of agricultural practices through technological integration. This study offers a thorough analysis of John Deere's financial performance from 2009 to 2024, employing comprehensive ratio analysis techniques. It evaluates key financial ratios related to liquidity, profitability, solvency, and efficiency, delivering an in-depth assessment of the company's operational effectiveness, financial stability, and growth potential. Utilizing extensive data from Deere's annual reports and public disclosures, the analysis provides valuable insights into the company's strategies for navigating complex market conditions and maintaining its competitive advantage in the agricultural machinery sector. The findings underscore Deere's proficiency in liquidity management, profitability preservation, solvency assurance, and efficiency optimization - even amidst market volatility. This detailed analysis serves as a vital resource for investors, financial analysts, and business students, offering a profound understanding of the financial dynamics within the agricultural machinery industry. It not only elucidates Deere's current financial position but also outlines a strategic roadmap for future success in a competitive and environmentally conscious market.

Applying Wiese-Bjornstal's Integrated Model to Explore Intrinsic Motivation in International Student-Athletes During Post-Injury Adaptation

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Injury can be a defining moment in an athlete's career, influencing their psychological, emotional, and motivational responses. This study applies Wiese-Bjornstal's Integrated Model of Response to Sport Injury (1998) to explore how intrinsic motivation shapes the post-injury adaptation process among HBCU international student-athletes. Using a qualitative research approach, this study investigates cognitive, emotional, and behavioral responses to injury and rehabilitation, with a specific focus on how personal, environmental, and sociocultural factors influence motivation during recovery. Findings will contribute to counselor education by enhancing practitioners' ability to support student-athletes in navigating injury-related challenges, fostering resilience, and maintaining motivation.

Assessing the Impact of Climate-Smart Agricultural Practices on Soil Greenhouse Gas Emissions

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While agriculture is highly susceptible to climate change, agricultural croplands are one of the chief contributors to major greenhouse gas (GHG) emissions, including carbon dioxide (CO2), methane (CH4), and nitrous oxide (N2O). Together, these emissions account for approximately 12% of total GHG emissions and primarily result from soil management practices (e.g., tillage, cultivation, fertilization, irrigation, and drainage), rice cultivation, residue burning, enteric fermentation, and livestock manure management. Climate-smart agricultural (CSA) practices offer a promising approach to mitigating climate change by enhancing soil organic carbon and reducing GHG emissions. However, there is limited information about GHG flux patterns

in agricultural systems and how these fluxes vary with the implementation of climate-smart agricultural practices. This study measured the impact of climate-smart alley cropping (fruit trees in the rows and selected vegetables in the alleys) practice on the flux rate and concentration of the major GHGs. UMES Extension has established five demonstration sites in Somerset, Baltimore, and Montgomery Counties in Maryland. These sites feature an alley cropping system with fruit trees (fig, persimmon, pawpaw, peach, apple) planted in rows, and vegetables (pumpkin, tomato, eggplant, bell pepper, sweet potatoes, cantaloup, watermelon) and herbs (stinging nettle) grown in alleys. Of the major GHGs, CO2 and CH4 fluxes were measured using an LI-7810 gas analyzer connected to a portable smart chamber (LI-8200-01S), and N2O flux was measured using an LI-7820 gas analyzer integrated into the same soil gas flux system. The demonstration sites will continue to serve as hands-on training grounds to educate producers, landowners, professionals, and students. Additionally, the flux data collected from these sites will reveal the changes in GHG emissions because of the interventions. The findings will support informed decisions in adopting climate-smart agricultural practices to promote sustainability and mitigate the impacts of climate change on agriculture. Furthermore, these practices have the potential to increase household food security and strengthen the local food chain.

Determinants of Vegetable Diversification and Household Food Security in Urban Gardening: A Case of Small and Minority Farmers in Maryland

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Vegetable diversification is a crucial strategy for enhancing food security, improving income, and promoting sustainable agricultural practices, particularly among small and minority farmers engaged in urban gardening. It can also help farming households manage the risks associated with weather variabilities, pests, and disease while allowing farmers to adapt to changing market demand and price fluctuations. This study investigated factors influencing vegetable diversification in urban gardens and their role in household food security. A semi-structured survey of 74 urban gardeners from the greater Baltimore area, Maryland, was conducted, and an Ordinary Least Square (OLS) regression technique was employed to determine the factors influencing the extent of vegetable diversification. The OLS result showed that the farmers involved solely in community gardening significantly lowered vegetable diversification ($\beta = -6.09$, $p<0.001$) compared to those engaged in home gardening. Moreover, a small but significant negative relationship existed between family size and vegetable diversification ($\beta = -0.86$, $p<0.05$). The negative association between community gardening and vegetable diversification implies that home gardeners may be more motivated to diversify their gardens to fulfill fresh vegetable demand. Likewise, the inverse relationship between family size and diversification indicated that households with larger family labor tend to allocate labor toward off-farm income-generating activities rather than intensive urban gardening. These findings highlighted the influence of socio-economic, household, and institutional factors in promoting vegetable diversification in urban gardening. Given its role in enhancing household food security, urban gardening initiatives should focus on providing targeted technical assistance, building capacity, and outreach efforts to promote vegetable diversification among small and minority farmers.

Educational Development: A Comparative Case Study of Denmark and the USA

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Education serves as a fundamental pillar for national development, yet disparities in access and affordability continue to shape socioeconomic outcomes across different countries. This comparative case study examines the educational frameworks of Denmark and the United States, focusing on the policies that contribute to student success and long-term workforce preparedness. As part of this research, we visited Denmark to gain firsthand insights into the country's education system, including interviews with educators, as well as on-site observations of academic institutions. Denmark's free and integrated approach fosters greater educational attainment, reduces student debt burdens, and improves workforce development. Unlike the U.S., where higher education is often inaccessible due to financial constraints, Denmark provides tuition-free education up to the master's level and offers stipends to students, allowing them to focus on their academic and professional growth without economic hardship. This study also explores the broader social implications of these contrasting systems. Denmark's model has been linked to lower crime rates, reduced income inequality, and greater social mobility, whereas the high cost of education in the U.S. disproportionately affects lower-income students, perpetuating economic divides. Additionally, we looked at the redistributive tax system in Denmark which ensures equitable funding for education across different regions, providing uniform opportunities for all students, regardless of their socioeconomic background. By analyzing these policy differences, this research argues that certain elements of Denmark's educational framework could be strategically adapted and implemented in the U.S. to improve college affordability, workforce readiness, and long-term economic stability. The findings suggest that adopting a more accessible and structured education model can enhance national productivity and social cohesion, ultimately benefiting both individuals and society as a whole.

Enhancing Antioxidant Potentials of Aeroponically Grown Lettuce using a Seaweed-Based Liquid Biostimulant

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The application of biostimulants in controlled-environment agriculture has garnered increasing attention due to their potential to improve crop nutritional quality. This study evaluates the effects of a seaweed-based biostimulant on the antioxidant properties of aeroponically grown lettuce (Lactuca sativa) using a Tower Garden system. The Tower Garden, a vertical, aeroponic growing system, optimizes space and water efficiency by delivering nutrient-rich water directly to plant roots in a soilless environment. Lettuce plants (n = 20) were cultivated under identical conditions, with 15 plants treated with the biostimulant and 5 serving as controls. Antioxidant activity was assessed through total phenolic content (TPC), total flavonoid content (TFC), DPPH radical scavenging capacity, and oxygen radical absorbance capacity (ORAC). Lettuce treated with the seaweed biostimulant foliar spray thrice a week exhibited significantly higher TPC (2.47 ± 0.05 mg GAE/g DW) and ORAC (7.00 ± 0.45 µmol TE/g DW) compared to the control (2.18 ± 0.02 mg GAE/g DW and 5.79 ± 0.26 µmol TE/g DW, respectively) ($p < 0.05$). Additionally, DPPH radical scavenging activity improved in treated samples (1.16 ± 0.05 mg TE/g DW) relative to the control (1.02 ± 0.01 mg TE/g DW), while TFC showed a moderate increase. These findings suggest that seaweed-based biostimulant application enhances the antioxidant capacity of lettuce, underscoring its potential for improving nutritional quality in soilless, vertical farming systems.

Environmental Equity in Urban Forestry: A Comparative Study of Tree Canopy Cover, Ecosystem Services and Community Characteristics in Maryland's Designated Urban Areas

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Urban forests provide crucial ecosystem services (ES) that improve environmental quality and public health. However, these benefits are often unequally distributed, disproportionately benefiting affluent communities. This study examines environmental equity in urban forestry by analyzing disparities in tree canopy cover (TCC) and ES across Maryland's 34 designated urban areas (DUAs). The objectives of this study were to explore the distribution of Maryland's urban forest cover, observe spatial trends in forest-based ecosystem services, and the relationship between TCC and socioeconomic variables to identify differences between underserved and affluent communities. Environmental inequities in urban forestry were investigated across 34 DUAs for the state of Maryland, examining TCC and related ES in relation to socioeconomic variables. Using Geographic Information System (GIS) spatial analysis, demographic data, and the i-Tree Landscape tool, the study mapped and quantified TCC and ES at the census block group (CBG) level for each DUA. Ecosystem services assessed included carbon sequestration, air quality improvement, and stormwater retention. Community classifications as affluent or underserved were based on the Community Resilience Estimates and Social Vulnerability metrics from the U.S. Census. A MANOVA or a nonparametric alternative was applied to determine significant differences in TCC and ES distribution, while Tukey's post-hoc analysis identified the sources of these disparities. Correlation analysis further explored relationships between demographic factors, TCC, and ES distribution patterns. We hypothesized that underserved areas would show significantly lower TCC and reduced access to ES compared to affluent communities. Preliminary findings suggest that affluent communities benefit from higher TCC, leading to enhanced ES such as greater carbon storage, improved air pollution removal, and reduced stormwater runoff. Conversely, underserved areas with lower canopy cover experience diminished environmental benefits, exacerbating socio-environmental vulnerabilities. The correlation between income levels and ES distribution is anticipated to be statistically significant, underscoring systemic inequalities in urban forestry. The expected results are measurable disparities in TCC and ES distribution, highlighting environmental inequities in Maryland's urban communities. The findings will inform policies promoting environmental equity in urban forestry, ensuring equitable access to the benefits of ES. The integration of TCC, ES, and public health data can help address socio-environmental impacts, while partnerships with local governments and nonprofits can support urban greening efforts which are essential for fostering inclusive and sustainable urban forestry initiatives. Addressing these disparities is imperative for ensuring that all communities benefit equitably from urban forestry resources, thereby enhancing resilience and environmental quality across Maryland's urban landscapes.

Interaction of the Endophytic Fungus Trichoderma with *Corchorus olitorius* and Its Impact on Growth Response

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The genus Trichoderma is widely used in agriculture as a biological agent and biofertilizer, enhancing crop yield and quality. One of the key characteristics of Trichoderma is its role as an endophytic fungus, meaning it attaches directly to plant roots. This relationship promotes plant growth and enhances the plant's ability to tolerate abiotic stress. This study aimed to evaluate the morphological responses of jute plants inoculated with 11 different strains of Trichoderma. The experimental design was a complete randomized design, with twelve treatments: T1: plant growth promoting fungi (PGPF) 1, T2: PGPF 3, T3: PGPF 5, T4: PGPF 7, T5: PGPF 11, T6: PGPF 12, T7: PGPF 14, T8: PGPF 19, T9: PGPF 20, T10: PGPF 29, T11: En-Stins, and T12: control. Each treatment, including the control, consisted of five replicates, with each replicate containing two plants, resulting in a total of 10 plants per treatment. All Trichoderma strains were isolated from soil and were identified morphologically and molecularly. The plants were inoculated by applying Trichoderma strains to the roots at 21 days of age. After 4 weeks of growth, plant height, root length, number of leaves, chlorophyll contents, and plant biomass were analyzed. Trichoderma treatments significantly increased plant height (17.0%), root length (15.7%), total fresh weight (36.4%), total dry weight (42.63%), and number of leaves (9.18%). Visual quality traits, including appearance and firmness, remained unchanged between treatments. Notably, the strains PGPF 20 and PGPF 29 demonstrated the best overall performance, excelling in all evaluated parameters. The findings indicate that Trichoderma strains significantly promote vegetative growth, likely by enhancing nutrient uptake and improving overall plant health. The ability to improve jute plant growth without compromising quality positions Trichoderma as a promising biocontrol agent and biofertilizer, offering an eco-friendly solution to increase productivity in jute cultivation while supporting sustainable farming practices.

Path Loss of 5.85 GHz Signal in a Laboratory Environment

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Wireless channel characterization is significant to understand how radio waves propagate in diverse situations, enabling the design of efficient and reliable mobile communication networks by maximizing network coverage, capacity, and reducing signal degradation. This study investigates the path loss of a 5.85 GHz signal in a typical laboratory setting using two horn antennas with a transmit power of -20 dBm from the signal generator. The laboratory environment consists of complex indoor structures and obstacles, such as walls, furniture, ceilings, and other elements. Measurements were conducted to maximum seven meters link distance, producing a dataset of 168 measurement points. The anechoic chamber provides an ideal free-space environment, where the gain of horn antennas was determined through measurements conducted within it. The experimental data was compared with theoretical predictions from the Friis model. Additionally, this work aims to develop an empirical path loss model that accounts for observed real-world effects, such as diffraction, scattering, and reflection, which are typical in indoor environments. The findings offer valuable insights for indoor wireless communication, RF system design, and electromagnetic compatibility testing. Future research will extend this work by utilizing omnidirectional antennas and exploring models like the log-distance path loss and log-normal shadowing models.

Prevalence, Serotype Distribution, and Antimicrobial Resistance (AMR) of Salmonella from Conventional Broiler Farm

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Non-typhoidal salmonellosis is a major foodborne disease. Poultry is a major source of non-typhoidal Salmonella in humans. Studying and characterizing Salmonella at the pre-harvest stage helps minimize its occurrence during processing and in finished products. This study aimed to assess the prevalence of Salmonella in conventional broiler farms, characterize them, and evaluate antimicrobial (antibiotics and antimicrobial-biocides) resistance. Cloacal swabs, environmental sponges, feed, litter, and water samples were collected from conventional broiler farms in the Delmarva region. The samples were pre-enriched in buffered peptone water, enriched in Rappaport Vassiliadis broth, and isolated in XLT4 agar plates. Isolates were confirmed using PCR targeting the invA gene and serotyped using the Kauffman-White scheme. To determine the minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC), different concentrations of peracetic acid (PAA) were treated against the isolates (4 logs) and incubated for 24h at 37 **°C**. The lowest concentration of PAA without visible turbidity in solution and detectable Salmonella on agar plating was noted and considered to be the MIC and MBC, respectively. Antibiotic sensitivity tests using 15 clinically relevant antibiotics, each of different classes, were performed using the disc diffusion method. The zone of inhibition was measured and evaluated for the resistivity status of bacteria. The AMR-related tests were replicated thrice.

The chi-square test was performed using IBM-SPSS and R-studio software. Cloacal swabs; 10% (n=80), environmental sponges 15.38% (n=65), feed; 24.07% (n=54), litter; 73.01% (n=63), and water; 0% (n=65) were positive. The most common isolates identified were Infantis and Kentucky, with 54.34% and 15.21% (n=46) respectively. The MIC and MBC for 6 isolates tested ranged from 75 to 150 ppm and 125 to 175 ppm. All 6 tested isolates were multi-drug resistant (MDR), resistant to at least 8 antibiotics of different classes. This study highlights MDR Salmonella strains and emerging Infantis serotype in poultry production, emphasizing the need for effective control strategies.

Socio-Demographic Correlates of Participation in Heirs' Property Education

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Heirs' property, a form of land ownership resulting from intestacy, is a major contributor to agricultural land loss in the United States, particularly within African American communities Over the past century, these communities have experienced a 90% decline in agricultural land. Limited awareness about the complexities and legal challenges of heirs' property exacerbates the issue. Educational programs on heirs' property are therefore essential to create awareness and prevent future complications. However, identifying the populations facing heirs' property challenges and those most likely to engage in these programs is crucial for effective outreach. This study examines how socio-demographic characteristics—age, gender, race/ethnicity, education level, and occupation—are related to participation in heirs' property education (HPE) programs and experiences with property-related challenges. The UMES Extension conducted ten workshops across Maryland (Somerset, Baltimore County/City, Prince George's, Montgomery, and Kent County), engaging 160 participants, including farmers, public officials, NGOs, faculty, students, attorneys, entrepreneurs, and community members. Seventy-three attendees filled out post-event surveys. Findings reveal that economically active individuals (ages 18–64) comprised the majority of participants (77%). A significant relationship was observed between higher educational attainment and participation, with individuals holding graduate or professional degrees more likely to engage (Chi-square test, $p<0.01$). Similarly, Black or African American participants demonstrated a significantly higher participation rate (58%) compared to other racial/ethnic groups (38%) (Chi-square test, $p<0.001$). African Americans were likelier to experience a heirs' property situation (significant, Chi-square test, $p<0.01$). Similarly, farmers were likelier to experience heirs' property-related challenges such as land loss, land management, and participation in HPE programs, though this association was not statistically significant. The study reveals the need for outreach and accessible education to bridge knowledge gaps about heirs' property in farming communities. Although farmers experience significant difficulties, further research is required to determine the factors driving their engagement in related educational programs. Future studies will thoroughly examine participant experiences, learning outcomes, land loss, barriers in land improvement practices, and participating government programs.

The Risk of Cardiovascular Disease Death in Lower Income, Rural Families in Maryland

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The disparities behind cardiovascular health and socioeconomic status are a topic that has been well studied on the national level; however, this topic also needs to be examined more on the state and local level, particularly in the state of Maryland. Cardiovascular disease (CVD) is the leading cause of death in the United States, with significant disparities influence by socioeconomic status (SES), geographic location, and access to care. Residents of rural Maryland often face these challenges which are in tandem with lack of heath care resources and fewer specialists. These disparities may lead to higher rates of CVD mortality. This study investigates how income levels and rural living conditions affect CVD mortality compared to suburban and urban populations. While studying peer reviewed articles on the relationship between income, race, gender and CVD outcomes, we found consistencies in the inverse relationship between lower incomes in families that lived in rural areas, and higher risk of cardiovascular disease death. This inverse relationship is also demonstrated while examining county-level data from U.S Census Bureau on income and CVD mortality in Maryland. The peer review articles we examined all contained a P value of <0.001 as well. The purpose of this study is to prove that Rural, low-income populations in Maryland face disproportionately high risk of cardiovascular mortality. Expanding health care access and addressing socioeconomic barriers are essential for improving outcomes.

Oral Abstracts - Undergraduate

(Titles in Alphabetical Order)

Advancing Automation in Agriculture: Enhancements to the UMES Outdoor FarmBot

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The presentation highlights the enhancement efforts for the outdoor FarmBot Genesis XL v1.4, at the University of Maryland Eastern Shore (UMES). Over the past decade, the Smart Farming and Robotics project team has worked with both indoor and outdoor FarmBots a 3-axis Cartesian robots capable of seeding, weeding, irrigating, and capturing time-lapse photography for plant growth on small rectangular raised beds. The UMES outdoor FarmBot operates on a 10 ft. x 20 ft. bed, while the indoor unit manages a 5 ft. x 10 ft. bed. Recent enhancements include calibrating the camera mounted on the outdoor FarmBot's z-axis to ensure accurate plant identification and targeted interventions, particularly for weeding applications using Python. The team conducted extensive trials with various weeding tools, including custom-designed alternatives and commercially available options. Through CAD modeling and iterative testing, the team refined the design to improve efficiency and adaptability. To promote sustainability, the team is developing a rainwater harvesting system and solar panel setup. Rainwater is collected from the tunnel house roof via a gutter system and stored for crop irrigation through the FarmBot's automated watering process.0 Solar panels are also installed to meet the system's power needs. Additionally, a Wyze camera system enables remote monitoring, providing real-time visual feedback for assessing crop health and system performance. The team collaborated with the FarmBot vendor to enable Python programming, enhancing the efficiency of operations such as weeding, soil moisture sensing, irrigation, and time-lapse photography. Future plans include leveraging Python's artificial intelligence and image processing capabilities to extend the system's Smart Farming functionalities. The FarmBot's Python-based code is structured into three principal modules: Irrigation, Weeding, and Disease Detection & Remediation. In the irrigation workflow, real-time soil moisture data triggers targeted watering cycles to conserve resources. For weeding, an OpenCV-based algorithm identifies weeds by flagging objects more than 50 units away from known plant coordinates, with weed locations stored in a local file system to bypass onboard memory constraints. Future disease recognition will utilize specialty services like Plant.ID for early detection and automated or semi-automated treatment. These advancements, combined with plans for AI-driven analysis, position the FarmBot as a sustainable and highly precise farming system.

Advancing Pilot Training and Operational Efficiency Through Flight Simulation Technologies

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Flight simulators and video games have become a hot commodity amongst student pilots and flight schools due to its positive effects. In this study we will discover how the use of flight simulators and video games increase the proficiency and confidence of student pilots. Several studies have shown that flight simulators and video games replicate real world scenarios and can give student pilots as well as experienced pilots experience in adverse conditions, emergency procedures, and maneuvers without the risk of flying. This creates an ideal learning environment that positively transfers to the cockpit. There are many benefits to flying in a simulator or using video games such as the cost effectiveness, flexibility and convenience, and risk-free environment. There have also been studies that students who use flight simulators or video games have received their private pilot's license on an average of 20 hours less than those who don't. Flight simulators and at home video games have started a passion for many and have launched many carriers in aviation fields due to increasing proficiency and confidence in student pilots.

Applying Wiese-Bjornstal's Integrated Model to Explore Intrinsic Motivation in International Student-Athletes During Post-Injury Adaptation

Destiny Emuze*, Derionah Abner, and Xi Zheng, PhD.
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Injury can be a defining moment in an athlete's career, influencing their psychological, emotional, and motivational responses. This study applies Wiese-Bjornstal's Integrated Model of Response to Sport Injury (1998) to explore how intrinsic motivation shapes the post-injury adaptation process among HBCU international student-athletes. Using a qualitative research approach, this study investigates cognitive, emotional, and behavioral responses to injury and rehabilitation, with a specific focus on how personal, environmental, and sociocultural factors influence motivation during recovery. Findings will contribute to counselor education by enhancing practitioners' ability to support student-athletes in navigating injury-related challenges, fostering resilience, and maintaining motivation.

Oral Abstracts - Undergraduate

(Titles in Alphabetical Order)

Effects of Climate Change on Turbulence-Related Aviation Accidents in the U.S.

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Turbulence is the leading cause of accidents involving Part 121 air carriers in the United States. From 2008 to 2022, 36% of U.S. airline accidents resulting in serious injuries involved encounters with turbulence. These accidents most often occurred at cruise altitudes, when aircraft occupants may not have been wearing seat belts. With increasing levels of CO2 and other greenhouse gases leading to shifting global weather patterns, extreme weather events, including turbulence, are predicted to increase. There is growing evidence that both the coverage and severity of turbulence, especially clear air turbulence, are already on the rise. If climate predictions are accurate, this will only get worse in the coming decades. Clear air turbulence is caused by strong vertical wind shear, which is most commonly found near the jet streams in the upper troposphere. As Earth's atmosphere warms, the jet streams are predicted to become stronger and more unstable, leading to more turbulent conditions. An analysis of historical accident trends of Part 121 operations in the United States, along with previous research on the effects of climate change on turbulence and atmospheric conditions, supports this conclusion. Further research is required to fully understand the true impact of climate change on atmospheric turbulence and what effect this could have on the aviation industry.

Evaluating AI Integration in Air Traffic Control: A Compromise between Efficiency, Safety, and Risk

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The integration of Artificial Intelligence (AI) has the potential to improve operational efficiency. Constantly changing technology, however, can be difficult to pinpoint AI's exact dimensional capabilities. By exploring its limitations through strategies such as implementing "worst case scenario" simulations, air traffic control personnel will be able to better navigate the benefits of AI and reduce human error. Human error has and always will be a challenge faced in the aviation industry. While almost impossible to eliminate, many precautions have been put in place to greatly mitigate it. This research examines the hypothesis that if we integrate AI into air traffic control procedures, we will uncover significant benefits that outweigh the potential risks that could compromise flight safety. By analyzing current AI applications, real-world case studies, machine learning simulations, and expert opinions, this research will evaluate the compromise between improvement and emerging risks in aviation safety. The aviation industry has historically advanced through learning from past challenges. While AI may introduce new complexities, its implementation can enhance safety and efficiency, bringing the industry closer to achieving optimal security.

Exploring Autonomous Robotics in Lunar Environments

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Autonomous robotics research at the University of Maryland Eastern Shore (UMES) focuses on developing intelligent robotic systems that integrate perception, navigation, and interaction. Our work is primarily driven by experiential learning, exploring robot autonomy through the optimization of sensor data processing and Robot Operating System (ROS) based navigation frameworks. Our research serves as a foundation for cultivating skills relevant to future lunar exploration. We leverage platforms such as the Agilex Scout Mini for ground-based navigation, the Unitree GO2 EDU quadruped for advanced mobility, and MicroROS-based robots for real-time visual processing tasks. Additionally, efforts to expand robotic functionality have also included the integration of the D1 Servo Arm, a 6-axis robotic arm, onto the GO2 EDU. Beyond research, we engage in student outreach initiatives to introduce robotics and programming concepts to younger students, to foster interest in space exploration and control systems. The results reported are a continuation of previous efforts to establish a framework of knowledge and methods for future autonomous robot trials in the UMES robotics laboratory. Through these efforts, we aim to improve the reliability and efficiency of autonomous robots in dynamic environments while preparing the next generation of engineers through hands-on learning and interdisciplinary projects.

How Does the Rehabilitation of Inmates Differ in the U.S. and Denmark?

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After taking a recent study abroad trip to Copenhagen, Denmark, I decided to take a deeper look at the rehabilitative approach to how they treat inmates in their prisons and outside of prison I'm comparison to the U.S. Through literature analysis I found that the rehabilitation of inmates in the United States and Denmark differs significantly in philosophy, approach, and outcomes. The U.S. prison system emphasizes punitive measures, often prioritizing incarceration over

rehabilitation. Programs aimed at inmate reform, such as education and vocational training, exist but are underfunded and inconsistently implemented. In contrast, Denmark follows a humanistic and holistic model that treats incarceration as an opportunity for reintegration into society. Danish prisons emphasize open environments, skill-building, and mental health support, fostering lower recidivism rates. This oral presentation will compare the two systems, highlighting how Denmark's rehabilitative approach can lead to better post-incarceration outcomes compared to the U.S.'s punitive model.

How Extension Educates Smallholder Farmers about Climate Resilient Agriculture

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Small and minority farmers in Maryland often face significant vulnerabilities due to extreme climatic conditions, primarily because of their reliance on natural resources, such as water, soil, and pasture. Consequently, they face crop loss, emerging pests and diseases, water scarcity, and soil degradation, as well as nd market price fluctuations that threaten their agricultural productivity and sustenance farming. Despite the well-documented socio-economic and environmental benefits of climate-smart agriculture (CSA), adoption rates remain low. Key barriers include limited access to information, insufficient technical support, uncertainties in carbon markets, lack of financial incentives, and inadequate awareness of CSA benefits. To address these challenges, the University of Maryland Eastern Shore (UMES) Extension launched an awareness and capacity-building initiative in the summer of 2024 to promote CSA adoption among small and minority farmers in the summer of 2024. A farmer in Mardela Springs, Wicomico County, was recruited to pilot an on-farm CSA demonstration site. Soil samples were collected and analyzed before the plantatingon and after harvesting the seasonal vegetables. Additionally, greenhouse gases (carbon, methane, and nitrous oxide) were measured in spring 2025 to evaluate carbon sequestration improvements and methane and nitrous oxide emissions. Sustainable agricultural practices such as minimum tillage, biodegradable weed suppression fabrics, natural mulch, and fertile topsoil were applied to enhance soil health, optimize water use, and reduce reliance on chemical fertilizers. Alley cropping practice was adopted on two acres, integrating 51 persimmon and 52 fig trees with specialty vegetable crops, including bell pepper, tomato, sweet potato, cantaloupe, eggplant, and watermelon. It is hypothesized that the integration of fruit trees and vegetable crops will yields both long-term carbon sequestration benefits and immediate economic returns as in the form of operational cash flow through from vegetable sales. The CSA approach significantly improved soil health, optimized water utilization, and reduced dependence on chemical inputs. Additionally, the demonstration farm provided an experiential learning platform, showcasing the feasibility and benefits of CSA adoption for small and minority farmers. The successful implementation of this CSA model in Wicomico County underscores its potential as a sustainable strategy for enhancing climate resilience among small and minority farmers and creating learning opportunities for students. By addressing key adoption barriers and demonstrating tangible benefits, this initiative lays the foundation for broader replication across Maryland. Moving forward, UMES Extension aims to expand this initiative into other counties, furthering education, applied research, and outreach efforts to strengthen the sustainability and resilience of small-scale farming operations.

Impact of Cognitive Aging in Aviation, Pilot Performance and Safety

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As pilots age, they accumulate expertise and experience which improves their ability to manage complex flight operations. However, along with experience and expertise, there is a decline in reaction time, decision-making, and situational awareness. This raises concerns about pilot performance and aviation safety. Cognitive aging plays a major role in aviation accidents and/or incidents. This affects the pilots performance alongside decreased working memory and multitasking skills. This research utilizes a combination of observational studies and secondary data analyses from cognitive performance assessments. In addition, safety reviews on the role that cognitive aging plays in aviation incidents/accidents will be evaluated. Data from these studies was collected from pilots who were involved in various tests that highlighted the effect of cognitive aging. The pilots went through a series of tests to determine the impact cognitive aging has on pilot decision-making and their operational efficiency. The overall data indicates that while cognitive aging can negatively affect pilot performance, consistent training, procedural memory, and regulatory oversight help mitigate these effects. This allows experienced pilots to maintain a high level of operational efficiency and flight safety.

Impact of the Money Smart Club on Saving Money for College Education

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Financial literacy is knowledge and understanding that enable sound financial decision-making and effective management of personal finances. As such, improved financial literacy contributes to improved financial well-being. Personal finance knowledge among African Americans tends to be lower than that of whites. The financial situation of African Americans lags that of the U.S. population as a whole and of whites in particular While 66% of African Americans report that they are doing at least OK financially, the comparable figure among whites is 78%. The median household income among African Americans

was $35,400, and for whites was $61,200 in 2016. African American household net worth was $17,600, and analogous figures for white households were $171,000 in 2016. Given the facts, UMES Extension initiated the Money Smart Club (M$C) on campus to strengthen the knowledge, skill, and capability of collegiate youths to effectively manage financial resources and make informed decisions. Evidently, collegiate youths often face challenges in managing their finances, frequently leading to poor spending habits and a lack of saving for important goals such as funding their college education. This paper examined the impact of the M$C on strengthening the knowledge and skill in saving habits of students. The club organized several activities to create awareness as a snowball effect, including a student competition on Saving Money for College Education. Over 50 undergraduate and graduate students participated and 15 of them presented innovative strategies for saving to support their college education. Additionally, Money $mart Booths were organized in campus-wide events, such as the SANS First Look Fair, the UMES First Look event, and Student Day, to expand its reach and engage with a broader audience on campus. These events allowed the club to collaborate with university leaders, faculty, staff students to further promote financial literacy and education. Results indicated that willingness to participate in M$C activities grew to over 131 individuals (undergraduates, graduates, faculty, and parents), reflecting a growing interest in financial literacy activities on campus. The student competition and extension events fostered creativity among students in finding ways to save for their education, while the club's ongoing efforts contributed to raising awareness about the importance of budgeting and financial planning. The club's networking with financial institutions, such as M&T Bank seemed to be a collaborating partner to promote financial literacy on campus and in the community.

Preliminary Efforts Towards Utilizing Satellite Imagery for UMES Agricultural Field

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The "Smart Farming" program at the University of Maryland Eastern Shore (UMES) is dedicated to advancing agricultural productivity and sustainability by optimizing the use of agricultural resources through cutting-edge remote sensing technologies. The study utilizes drone and satellite imagery to monitor crop health and improve decision-making for precision agriculture. Drone imagery, captured using a MicaSense Altum multispectral camera, is used to extract the Normalized Difference Vegetation Index (NDVI), a key indicator of crop health. Additionally, the research team is exploring satellite imagery from platforms such as Landsat and Sentinel 2 to conduct comprehensive agricultural analysis. The Sentinel 2 satellite, in particular, provides spectral data over thirteen bands in the visible (RGB), near infrared, and shortwave infrared ranges (Band 1 - Coastal aerosol, Band 2 - Blue, Band 3 - Green, Band 4 - Red, Band 5 - Vegetation Red Edge 1, Band 6 - Vegetation Red Edge 2, Band 7 - Vegetation Red Edge 3, Band 8 - Near InfraRed, Band 8A - Vegetation Red Edge, Band 9 - Water vapour, Band 10 - SWIR Cirrus, Band 11 - SWIR1, Band 12 - SWIR2). The data was successfully processed in ArcGIS to obtain critical vegetation and moisture indices. NDVI is calculated using Band 4 (Red) and Band 8 (NIR), and the Normalized Difference Moisture Index (NDMI), which assesses water stress and moisture levels in crops, is derived from Band 8 (NIR) and Band 11 (SWIR1). This presentation outlines preliminary efforts involving the utilization of satellite imagery for a selected UMES agricultural field, highlighting the integration of drone and satellite data to enhance crop management, reduce resource waste, and promote sustainable farming practices. This multidisciplinary approach underscores UMES's commitment to leveraging technology for the advancement of agriculture and environmental stewardship.

Single Pilot Operations and their Impact on Risks and Safety

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In normal commercial aviation, standard operations mandate the presence of at least two pilots in the cockpit to ensure a high level of situational awareness, enhance overall flight safety, and effectively distribute workload and task management responsibilities. The presence of multiple pilots allows for continuous monitoring of flight systems, cross-checking of decisions, and immediate intervention in the event of an emergency, reducing the likelihood of human error. However, due to an ongoing global pilot shortage, there has been an increasing interest in exploring the feasibility of transitioning to Single Pilot Operations (SPO). This is a potential solution to mitigate staffing challenges and operational costs. However, research suggests that a transition to SPO would result in negative consequences. This could include an increase in pilot fatigue, overreliance of automation, and loss of redundancy among other safety concerns. This research will analyze the risks and benefits of both SPO and traditional multiple crewed operations by evaluating case studies, human factors, and existing research on the topic. All of which would impact overall safety for the pilot, their crew, and the passengers onboard.

(Titles in Alphabetical Order)

The Advantage of Flight Instructing: Why Being a Flight Instructor Makes a Better Airline Pilot

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A Certified flight instructor (CFI) is a license to learn. A young pilot is able to get many ratings and certificates, but none are as impactful and high stakes as an initial flight instructor. A CFI is a doorway to a new world for student pilots to explore; and while the world of aviation is intriguing and inspiring, it is an unforgiving environment. That environment does not change for an aviator at the airline level. An airline pilot must possess the ability to operate at peak performance, which means strong aviation knowledge, communication, judgment, and confidence. Throughout their career, An instructor will learn patience, teaching methods, aeronautical decision making skills, and how to manage student emotions and anxieties. All are qualities and traits that translate to becoming a better pilot at the airlines. These qualities are hard for a pilot that isn't an instructor to build and replicate effectively. This paper will give details on why flight instructors go on to make good airline pilots based on, emotionally, physically and situational experience. It will utilize articles and ideas from multiple sources, as well as personal experiences to demonstrate the difference in performance between previous CFIs compared to other aviators.

The Impact of Mental Health on Commercial Pilots

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The mental health of commercial pilots is just as important as their physical wellbeing when they conduct operations. However, the mental health of these pilots is often overlooked and not treated as equally as their physical health. Commercial pilots face incredible challenges such as higher stress levels, anxiety, burnout, and other external pressures compared to other professions. In this study we will examine the common mental health struggles of commercial pilots such as stress, anxiety, depression, and burnout to name a few. We will also address how airlines have aimed to solve these issues to provide a safe travel experience for the crews and passengers alike. By analyzing the existing information of airline practices and general mental health improvement tactics, we will gain a more comprehensive understanding of how mental health issues are taken care of in the aviation industry. This study will raise awareness for pilot mental health and potentially contribute to more inclusive safety procedures in commercial aviation. This research also suggests, while airlines do implement and support programs to combat these issues, the current measures can be improved further.

The Impact of Workload and Fatigue on Decision-Making in Aviation

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Aviation safety relies on the cognitive performance of flight crews and air traffic controllers. The industry's demanding work environment creates conditions that make fatigue inevitable, which in turn impairs decision-making. Research from the Federal Aviation Administration (FAA), National Transportation Safety Board (NTSB), International Civil Aviation Organization (ICAO), and National Aeronautics and Space Administration (NASA) identifies fatigue as a key contributing factor in many aviation accidents. Fatigue diminishes cognitive function by slowing reaction times, reducing situational awareness, and increasing the likelihood of errors. Despite existing regulations, fatigue-related mistakes continue to occur, highlighting the need for further investigation. This study examines how increased workload and fatigue affect the accuracy and speed of decision-making in aviation. This research evaluates the hypothesis that excessive workload and fatigue degrade cognitive function. This degradation leads to a higher risk of operational errors. A systematic review synthesizes peer-reviewed research, accident reports, and industry studies, focusing on fatigue-related cognitive impairments. Key areas of analysis include aviation incidents where fatigue was identified as a factor, the effectiveness of fatigue risk management systems (FRMS), and the role of pharmacological interventions such as modafinil and dextroamphetamine in mitigating fatigue's effects. Findings indicate that fatigue significantly impacts decision-making, especially in high-pressure situations. Research shows that fatigued pilots experience slower reaction times, impaired judgment, and reduced adaptability during critical flight operations. While controlled rest and FRMS provide mitigation strategies, they are not consistently implemented across the industry. Pharmacological interventions offer short-term benefits but come with concerns about dependency and cognitive side effects. This research highlights the need for more vigorous regulatory enforcement, improved scheduling practices, and the adoption of real-time fatigue detection technologies to enhance aviation safety.

The Relationship between Aeronautical Decision Making and Law of Primacy

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The first lesson is always the one that students remember the most in training. The law of primacy as defined by the FAA is the first thing learned is best remembered. It can have a big influence on their long-term aeronautical decision making skills. The instructor-student connection encompasses more than just instructional techniques; it also includes perceptions and insights

that the student gains during training. Risk taking flight instructors can obstruct real learning and compromise safety regulations and sound decision-making abilities. One of the main issues in aviation today is that instructors are failing to properly teach the right knowledge and procedures to students the first time. This causes students to revert back to the first thing they've learned which was incorrect. The consequences of this process on student development and safety considerations are examined in this research paper. Using knowledge from classroom education, aviation training, and other studies, this research investigates the role of the law of primacy in the evolution of aeronautical decision making. The hypothesis suggests that the law of primacy is influential in the development of ADM. Gaining insight into the methods used to teach these decision making skill will allow us to produce and develop better learning environments that supports the students' ability to make aeronautical decisions and safety standards

Understanding the Experiences of African American College Women Diagnosed with ADHD: An Intersectional Perspective

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African American women diagnosed with Attention-Deficit/Hyperactivity Disorder (ADHD) face unique challenges shaped by the intersection of race, gender, and disability. This study employs Intersectionality Theory as a framework to examine how these overlapping identities influence their academic experiences, self-perception, and access to institutional support. Using a mixed-methods approach, the research integrates qualitative interviews and a quantitative survey to explore academic struggles, coping mechanisms, and the role of cultural perceptions in ADHD diagnosis and treatment. Findings will highlight systemic barriers such as disparities in ADHD recognition within the African American community, the stigma associated with disclosure, and challenges in securing academic accommodations. By amplifying the voices of African American college women with ADHD, this study seeks to inform higher education institutions on strategies to create more inclusive learning environments that address the unique needs of marginalized students.

Unleaded and Alternatives Fuels for Aviation

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Leaded fuel has been banned in America for many years and in Europe for much longer. The reason being the hazardous effects of lead on the human body and the environment. Advancements in modern engine technology and metallurgy have been proven in the motorcar that unleaded, alternative and hybrid combustion engines can work well and meet the energy and reliability required for use. This study intends to show the viability of unleaded and alternative fuels for aviation in a manner in which there is no performance or reliability loss. There are already contemporary flying examples of aircraft engines using unleaded fuel. The research presented here will investigate these experiments as well other research conducted for these fuel types in aviation. The benefits of switching from leaded gas include cleaner emissions and the reduction of prices for aviation grade fuels. In addition unleaded fuels have the ability to completely make obsolete, leaded fuel for day to day life.

Film Audience Reception Theory: Black Audiences and Black Films

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Film Reception theory provides insight into the dynamic relationship between cinema and society, influencing fields such as film criticism, media studies, and cultural analysis. According to film theorist Stuart Hall, film audience reception theory suggests that viewers interpret films based on their backgrounds, experiences and perspectives instead of passively using the filmmakers' intended meaning. Film reception theory examines how individual experiences, social contexts and ideological frameworks shape cinematic interpretation. Hall highlights that meaning is actively constructed, explaining why audiences react differently to films based on factors like ideology, class and culture. As one of the most impactful forms of mass communication, film has the power to shape our understanding of the world due to its continually increasing global reach. Audiences are becoming increasingly aware of the power of film to create meaning and affect social, political, and cultural realities. This study aims to use Film Reception Theory to explore black audience reception of films made by, for, or about black people. My hypothesis suggests that black audience members connect to black films because of the films' connection to black culture represented in the soundtrack, characters, and visuals. As a result, Black audience members are able to go beyond the entertainment value of these films and actively engage with the deeper meanings conveyed. To test the hypothesis, data will be collected at film screenings of films made by, for, or about black people held at University of Maryland Eastern Shore's Student Services Center the 2025 Black Cinema series and during screenings in the university's DMST 440 African American Cinema course. Data will be collected at these sites using a 9-question survey and through videotaped interviews from randomly selected audience members after the screenings. The significance of this research is to gain more insight about black audience reception to black films and how black audiences engage with meaning in the films. This approach highlights that film isn't just a passive experience but an interactive process influenced by factors such as media, personal experiences and beliefs. Reception theory helps explain why some films spark controversy, how audiences connect with different genres. By focusing on how people engage with films, this theory provides valuable insights into cinema's impact on society and culture.

A National Survey of Pelvic Health Content in Physical Therapist Assistant Programs

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The purpose was to explore content topics, curricular location, content delivery, and teaching methods employed for pelvic health content in physical therapist assistant (PTA) programs nationally. A demographic survey was sent via email to 353 PTA program directors through Survey Monkey. A one-month response period was allotted. The survey instrument underwent a preliminary Delphi panel content validity analysis by regional experts. Analyses included descriptive statistics and were analyzed with SPSS Version 29. Seventy-seven programs responded (21.8% response rate) and represented across US. Pelvic health content was primarily covered through lectures or modules within a designated course (75.32%). Major content areas presented included pregnancy (97.33%), urinary incontinence (94.67%), and urinary urgency (85.33%). Less covered were dyspareunia (34.67%) and anal urgency (25.33%). Instructional delivery was through lecture (100%) and lab activities (48%) presented by full-time faculty (29.9%), guest lecturers (32.5%), or both (35.1%). Most programs described their curricular coverage of pelvic health content as satisfactory or above (77.9%), with clinical education opportunities available in the pelvic health (71.4%).

The descriptive study described major curricular perspectives of pelvic health curricular content in PTA programs nationally. Trends included lectures or modules compartmentalized within a specific course presented by a blend of both program faculty and guest lecturers. Most program faculty noted coverage of pelvic health content as satisfactory or above, moreover, clinical education opportunities were in place to extend didactic curricular coverage to the clinical setting. This benchmark exploratory study serves as a catalyst for pelvic health curricular review, revision, and enhancement in PTA programs nationally. Survey findings elucidate current curricular modes of delivery and trends in topic presentation.

Association of Monoallelic Rare Germline Filaggrin 2 (FLG2) Sequence Variants with Skin Inflammation and Infections

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Filaggrin 2 (FLG2) is a crucial gene involved in skin barrier function, and its biallelic mutations have been linked to Peeling Skin Syndrome 6 (OMIM 616284). However, the full spectrum of clinical manifestations associated with monoallelic rare germline FLG2 sequence variants remains unclear. Understanding these associations is essential for identifying potential disease risks and developing targeted interventions. In this study, we conducted a Phenome-Wide Association Study (PheWAS) to explore the clinical associations of FLG2 rare variants. We analyzed phenotypic and genotypic data from 63 patients carrying FLG2 rare variants and 630 controls without these variants. The study leveraged Electronic Health Record (EHR) data and massive genomic data from the Children's Hospital of Philadelphia (CHOP) to identify potential genotype-phenotype correlations. The EHR dataset contained diagnostic information coded with ICD-9 and ICD-10. Genotypic data, including FLG2 rare sequence variants (CADD ≥ 7.307, MAF ≤ 0.00472), were obtained from CHOP's in-house genetic repository, which includes genomic data from a multiethnic pediatric cohort of 16,713 participants. Among the cohort, 55.6% were female and 44.4% were male. In-silico analysis of genotypic data classified 25.39%, 11.11%, and 63.49% of the identified rare variants as likely pathogenic, variants of uncertain significance (VUS), and benign or likely benign, respectively. Frameshift and stop-gain mutations accounted for 17.53% of the variants, while nonsynonymous mutations were the most prevalent (81.44%). ICD codes and phenotypes were mapped to clinically meaningful groups, with a minimum of five patients per group. We performed logistic regression with Firth correction to mitigate small-sample bias. Covariates including race, age, and gender were incorporated to reduce confounding effects. A category-specific Bonferroni correction was applied to adjust for multiple hypothesis testing. Our results revealed significant associations between FLG2 rare sequence variants and two PheWAS clinical categories: Skin Infections and Inflammatory Conditions (OR = 2.67; 95% CI: 1.22–5.42; P <.015) and Skin Infections (OR =1.93; 95% CI:1.10–3.39; P<.022). These findings suggest a potential link between FLG2 rare variants and skin-related conditions, warranting further investigation in larger and more diverse populations to confirm these associations.

Combating Multidrug Resistance in Ovarian Cancer Therapy Utilizing Nanostructured Niosomal Curcumin

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Ovarian cancer remains one of the most lethal gynecological malignancies, often complicated by the emergence of multidrug resistance (MDR). A promising strategy to overcome MDR is using curcumin, which has demonstrated the ability to modulate several molecular pathways e.g., P-glycoprotein (P-gp), NF-κB, PI3K/Akt involved in drug resistance. However, curcumin's

clinical application has been limited due to its poor bioavailability and rapid metabolism. This study aims to enhance curcumin's therapeutic potential by encapsulating it in niosomal nanocarriers to improve its stability and bioavailability. The niosomes will be evaluated for their potential to overcome MDR when used in combination with chemotherapeutics such as paclitaxel and carboplatin. Niosomes were prepared using the thin-film hydration method with varying ratios of Span 60, Tween 60, and Tween 80. Five formulations were selected from preliminary results based on their physicochemical properties: [F1] Span 60 (50%) + Tween 60 (50%), [F2] Span 60 (75%) + Tween 60 (25%), [F3] Span 60 (25%) + Tween 60 (75%), [F4] Span 60 (100%), and [F5] Tween 60 (100%). A 3:1:1 molar ratio of surfactant:cholesterol:drug was utilized. Curcumin, cholesterol and surfactants solutions were combined in a round-bottom flask. Chloroform (10 mL) was added to the flask and thoroughly mixed. The solvent was removed using a rotary evaporator, forming a thin film. The film was hydrated with distilled water (10 mL). The niosome suspension was vortexed for 3 minutes, then ultrasonicated with three 30-second pulses. The suspension was centrifuged, and the supernatant was analyzed for particle size, polydispersity index (PDI), and zeta potential. The suspensions were freeze-dried for further use. Among the five formulations tested, formulation F3, SPAN 60 (25%) + TWEEN 60 (75%) demonstrated the most favorable physicochemical characteristics, with a particle size of 120.14 ± 3.96 nm, a PDI of 0.448 ± 0.068, and a zeta potential of -33.38 ± 5.65 mV. An optimized niosomal formulation of curcumin has been developed. The formulation has the potential to enhance the bioavailability and efficacy of curcumin, offering a novel approach for overcoming chemoresistance in ovarian cancer. Additionally, it has the potential to simultaneously deliver curcumin with other chemotherapeutic drugs, such as paclitaxel and carboplatin which will be tested in ongoing studies.

Development of a Novel mRNA-Based Onco-Vaccine for Renal Cancer

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Renal cancer ranks among the top ten cancers in the U.S., with 81,610 new cases and 14,390 deaths projected for 2024. Clear cell renal cell carcinoma (ccRCC) is the most prevalent subtype, comprising 70-80% of cases. The VEGF signaling pathway, particularly via VEGFR-2, plays a pivotal role in ccRCC progression and angiogenesis. Despite the clinical use of tyrosine kinase inhibitors (TKIs) targeting this pathway, therapeutic resistance frequently arises, primarily due to increased pathway activity rather than genetic alterations. Recent advancements in cancer immunotherapy include the use of lipid nanoparticles (LNPs) to carry mRNA antigens that stimulate immune responses against cancer cells expressing these targets. Functionalizing LNPs enhances delivery to antigen-presenting cells (APCs), enabling internalization of mRNA encoding VEGFR-2 antigens and activation of cytotoxic T lymphocytes (CTLs) and memory T-cells, essential for eliminating VEGFR-2-expressing cancer cells. High-affinity VEGFR-2 epitopes for MHC class I and II binding were predicted using bioinformatics tools, including IEDB and NetMHCpan. Overlapping epitopes capable of engaging both CTLs and helper T cells were identified. In parallel, a robust manual protocol was developed for LNP formulation using ethanol injection to encapsulate GFP mRNA. The lipid composition included SM-102, DSPC, cholesterol, and DSPE-PEG-Mannose. The lipids were injected into a citrate buffer containing GFP mRNA under controlled stirring conditions. Purification was performed via dialysis and centrifugal filtration to remove unencapsulated mRNA and ethanol. LNPs were characterized using dynamic light scattering (DLS) to determine particle size, polydispersity index, and zeta potential. Encapsulation efficiency was assessed using the QuantiT RiboGreen RNA Assay. GFP mRNA-loaded LNPs were transfected into DC2.4 dendritic cells, and transfection efficiency was evaluated via fluorescence microscopy. Bioinformatics analysis identified high-affinity VEGFR-2 epitopes, including overlapping sequences (e.g., FIIEGAQEK and YLGYPPPEI), with strong potential for cross-presentation. The optimized LNP formulation demonstrated high encapsulation efficiency and robust dendritic cell transfection, leading to efficient antigen expression. These findings indicate that the integration of an optimized mRNA delivery system with immunogenic VEGFR-2 epitopes can potentiate robust CTL and helper T-cell responses. This study integrates a cost-effective LNP formulation protocol with immunoinformatics to develop a novel mRNA-based immunotherapy targeting VEGFR-2 in ccRCC. The findings highlight the potential of this approach for patients resistant to current therapies. Future in vitro and in vivo studies will focus on optimizing mRNA sequences encoding prioritized epitopes and validating their efficacy in relevant kidney cancer models.

DPT Student Perspectives on Working with Clients with Dementia:
An Innovative Pro Bono Outreach Initiative

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Caregiving for older adults with dementia continues to be a challenge worldwide. While entry-level physical therapist and physical therapist assistant programs present didactic content related to dementia, few have embedded ICF participation initiatives for clients with dementia in pro bono specialty settings. The purpose of this phenomenological qualitative study was to illustrate students' perspectives on working with clients with dementia in an innovative rural day activity program at an area agency on aging. We hypothesized that major themes would encompass codes that reflected reminiscence and block practice training among four major approach domains: rapport, motor learning, communication, and the environment. Participants included the middle tier of three cycles of entry-level DPT students (total n=18) integrated into a rural pro bono community program for clients with dementia. Eighteen entry-level DPT students participated in a three-year pro bono outreach initiative to a specialty day activity program. Students initiated multimodal wellness programing, monitored vitals, introduced exercise and walking activities, educated caregivers, and instituted a ballroom dance program. A semi-structured focus group was held with the second student tier to garner perspectives on working with clients with dementia in four major areas: rapport, motor learning, communication, and the environment. Transcripts were coded by two independent reviewers for triangulated open and axial codes; member checks and an audit trail were finalized. Analyses included code percent agreement and Kappa reliability computation. Major axial codes which emerged

included, listening and reminiscence (rapport), blocked practice and dancing (motor learning), cognitive flexibility with a friendly approach, (communication), and maintaining a comfortable surrounding (environment). Kappa reliability for nominal codes was .92. Students' perspectives on working with older clients with dementia yielded insight into optimizing an ICF outreach approach that underscores listening, flexibility, reminiscence, and positivity in a block-structured, comfortable setting. Major thematic codes can serve as a basis for educational programs to structure innovative curricular student outreach activities for persons with dementia both locally and globally.

Effects of Great Toe Extension Range of Motion and Physical Activity on Gait Metrics in Community-Dwelling Older Adults: A Pilot Study

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Sufficient extension at the first metatarsophalangeal joint, often referred to as the great toe, is necessary for normal gait mechanics. Loss of mobility at this joint is commonly seen in older adults. The influence of hip, knee and ankle range of motion on gait velocity in older adults has been investigated extensively in the literature. However, there are limited studies that have researched the effects of great toe range of motion on gait, strength, balance, and mobility. The primary aim of this study was to examine the relationship of great toe extension and physical activity on gait velocity, physical performance measures, and self-reported falls efficacy in community-dwelling older adults. A convenience sample from four local senior centers on the Eastern Shore of Maryland was used for this study. Participants performed a structured circuit of gait analysis at both self-selected and fast gait velocity, 30 Chair Stand Test (30CST), great toe extension goniometric measurements, grip strength, and self reported measures including the Physical Activity Scale for the Elderly (PASE) and the Falls Efficacy Scale-International (FES-I). Statistical analyses included descriptive statistics, Pearson's correlations, and non-parametric tests. Significance was established at p $p<0.05$. Results: A total of 47 individuals, mean age of 73.57 ± 7.56 years old and 74.5% being female participated in the study. Average great toe extension was found to be moderately correlated to both self selected ($r=0.42$, $p<0.001$) and fast ($r=0.43$, $p<0.001$) gait velocities. Physical activity, as measured by the PASE, was significantly associated with gait velocity at self selected ($r=0.64$, $p<0.001$) and fast ($r=0.70$, $p<0.001$) speeds, 30CST performance ($r=0.58$, $p<0.001$), average great toe extension range of motion ($r=0.34$, $p<0.05$), and falls efficacy ($r=-0.56$, $p<0.001$). Self-reported physical activity also exhibited a very significant moderate inverse relationship with fall history ($r=-0.41$, $p<0.001$) and fear of falling ($r=-0.48$, $p<0.001$). The FESI and PASE were both weakly correlated with average great toe extension, $r=-0.32$ and $r=0.34$ ($p<0.05$), respectively. Findings of this study indicate larger ranges of great toe extension are correlated with self-selected and fast gait velocities. Our study also demonstrates the relationship of physical activity participation on range of motion, strength, fall history and balance confidence. Additionally, increased great toe range of motion is associated with higher levels of physical activity and falls efficacy

Effects of the Combination of Purlane (Portulaca oleraceae), Prebiotics, and Probiotics on Broiler Meat Quality

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The use of antibiotic growth promoters (AGPs) in animal production is a major cause of antibiotic resistance. Alternatives like prebiotics and probiotic have gained attention for their potential to improve gut health and immune response. Purslane (Portulaca oleraceae), a leafy green rich in omega-3 fatty acids and antioxidants, has been proposed as a promising dietary supplement for poultry. This study aimed to determine the effects of purslane with prebiotics, and probiotics, individually and in combination, on broiler breast meat quality. A total of 350 one-day-old broiler chicks were randomly allocated to 35 pens, with 7 pens per treatment and 5 birds (both male and female) per pen. The birds were provided with 5 dietary treatments for 40 days: 1) Negative Control (NC), a corn/soybean basal diet, 2) T1, NC diet with 2.5% purslane, 3) T2, T1 with prebiotics, 4) T3, T1 with probiotics, and 5) T4, T1 with both prebiotics and probiotics. On day 41, 2 males and 2 females from each pen were slaughtered, and their breast meat was harvested after 24 hours postmortem. Meat quality parameters, including pH, color, protein solubility, functional properties (drip loss, water holding capacity, marinade uptake, and cooking yield), textural properties, lipid oxidation, and fatty acids profiles in breast meat were determined. No significant differences were found in most quality parameters between breast meat from NC-fed and treatment-fed broilers, except for marinade uptake, lipid oxidation, and fatty acid profiles. Marinade uptake was significantly higher in the meat from NC, T1, and T2-fed broilers compared to T3 and T4-fed birds ($P<0.05$). Lipid oxidation was significantly lower in the cooked meat from treatment-fed broilers ($P<0.05$), likely due to the antioxidants in purslane. The polyunsaturated fatty acid content in meat from T4-fed broilers was significantly higher than that of NC-fed birds ($P<0.05$), indicating that prebiotics and probiotics may enhance the absorption of omega-3 fatty acids from purslane. There were no significant differences in color, lipid oxidation, fatty acid profiles, and texture between male and female broilers. However, functional properties and shear force and energy of meat from female broilers were significantly higher than those from male ($P<0.05$), probably due to higher pH and protein solubility. These results suggested that the combined dietary supplementation of purslane, prebioitcs, and probiotics can improve oxidative stability and fatty acid profile of broiler breast meat, along with potentially benefiting broiler health and productivity.

Engineering Enhancer-Driven Adeno-Associated Viral Vectors for Cell Type Specific Neural Circuits and Transgenesis

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Understanding neural circuits at the level of specific cell types is highly important in deciphering the complex functions of the brain. Better knowledge of this can provide researchers with better understanding of how these circuits contribute to behavior and function. Discovery of cell type specific enhancers is also challenging. In this study, we aim to use AAV (Adeno-associated Virus) and Machine Learning Assisted Enhancers which we have discovered as a tool in understanding these brain functions. AAVs are small, non-pathogenic, replication defective viruses with a single stranded DNA genome. AAVs also establish long term gene expression which makes them a useful tool for gene therapy. Enhancers for three cell types were identified and they are striosome, cortex layer 5, and layer 3 neurons. These different enhancers were packaged with our AAV vectors creating a versatile library and infected on our HD10 (Human Dorsal Root Ganglia Cells) cells and also injected into wildtype mice and images were captured. Results showed successful labeling of specific cell types in the brain with enhancer-driven AAV. From this we can conclude that one enhancer-driven AAVs can target specific neurons in the cortex, although we are unsure if this is layer 2 or 3 of the cortex. Future plans involve discovery of more enhancers which could provide us with more precise labeling of neurons in specific layers of the cortex.

Investigating the Acute Effects of Blood Flow Restriction Training on Vastus Medialis Oblique Thickness, Neuromuscular Activation, and Perceived Exertion

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Blood flow restriction (BFR) training partially occludes blood flow to muscles during low-intensity exercise. This creates local hypoxia that drives muscle protein synthesis, which can enhance strength and hypertrophy. Non-autoregulated (N-BFR) involves static pressure settings during exercise. However, autoregulated BFR (A-BFR) automatically adjusts the cuff pressure in response to muscle contraction. This project examined the acute effects of exercise with N-BFR, A-BFR, and without BFR (W-BFR) on the rate of perceived exertion (RPE), activation, morphology, oxygen saturation (SO2), and total hemoglobin (THb) of the vastus medialis oblique muscle (VMO). Eighteen healthy individuals, aged 24.6±2.3 years (9 males and 9 females), completed three randomized sessions. Participants performed four sets of bodyweight single-leg wall squats on their dominant leg (40°-45° knee flexion) with 30, 15, 15, and 15 repetitions at 3-sec concentric/eccentric cadence and 30-sec recovery between sets. Participants wore the BFR cuff on the proximal thigh at 60% supine limb occlusion pressure. VMO thickness was measured via ultrasound before and after each session. Wireless electromyography and near-infrared spectroscopy sensors were used to evaluate VMO activation, SO2, and THb during the exercise. RPE was recorded at the end of each set. Two-way repeated measures ANOVAs were used for statistical analysis. All conditions significantly increased VMO thickness ($p<0.05$), with A-BFR (14.1%) and N-BFR (14.9%) inducing significant increases compared to W-BFR (6.5%) ($p<0.05$). Although all conditions significantly reduced SO2 levels ($p<0.05$), BFR-induced hypoxia significantly lowered SO2 levels for A-BFR (39.7%) and N-BFR (34.6%) compared to W-BFR (19.8%) ($p<0.05$). In contrast, THb levels significantly increased for all conditions ($p<0.05$), with A-BFR (2.9%) and N-BFR (2.7%) showing greater elevations compared to W-BFR (1.2%) ($p<0.05$). Furthermore, RPE significantly increased for A-BFR (40.7%), N-BFR (42.0%), and W-BFR (43.7%) in a similar manner ($p<0.05$). However, no significant differences in VMO activation were observed ($p>0.05$). Our findings suggest that BFR creates a local hypoxia, facilitating greater acute hypertrophy and potentially stimulating muscle protein synthesis. These effects occurred without increasing perceived exertion or higher muscle activation, highlighting the BFR's potential for enhancing muscle mass and strength in patients with musculoskeletal disorders.

Shellshocked: Developing a New York Shellfish Sensitivity Index for Estuaries Impacted by Low Oxygen and Warming – A Tool to Enhance Sustainability

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New York (NY) estuaries support a suite of established and emerging economically important shellfish species, but demonstrate different levels of low dissolved oxygen (DO) and high temperature impairment. These stressors, in isolation or in tandem, can have detrimental impacts on species' development, performance, reproduction, and immunity. Four established species—the Eastern oyster (*Crassostrea virginica*), bay scallop (*Argopecten irradians*), hard clam (*Mercenaria mercenaria*) and blue crab (*Callinectes sapidus*)—face varying degrees of risk associated with warming and low DO, but their sensitivities and the impact to suitable habitat is unclear. To address these challenges, we developed a NY Shellfish Sensitivity Index, a database of significant negative effects of each stressor on each species. An extensive peer-reviewed literature review was conducted, collating a total of 549 experimental comparisons of species' tolerance to temperature- and oxygen-stress. Hypoxia accounted for 75% of comparisons, while temperature

only 25%. C. virginica was the most extensively studied species. Emerging fisheries species, including the Jonah crab (Cancer borealis) and the channeled and knobbed whelks (Busycotypus canaliculatus and Busycon carica, respectively), may also be vulnerable, although experimental data on their tolerance thresholds was scarce during our literature review. We will integrate these findings with 1-km resolution satellite-derived temperature data and DO data from 30 high-frequency monitoring sites to map ideal and inhibitory species' locations across the past, present, and future. This approach will support decisions of regional managers, aquaculturists, fishers, and conservationists to enable sustainable shellfisheries under a changing climate and can also be adapted for estuarine systems throughout the Tidewater Region.

Targeting mTOR/AR Signaling as a Novel Therapeutic Strategy for Aggressive Prostate Cancer

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Prostate cancer (PCa) has been recognized as a major global health concern, considerably ranging from low-grade, high-grade, to life-threatening tumors. Notably, African American (AA) men exhibited 1.7-fold higher PCa incidence and 2.3-fold higher PCa mortality rates when compared to the European American (EA) men. Besides the socioeconomic factors, emerging evidence has highlighted that biological risk factors may play critical roles in the AA PCa disparities. Androgen deprivation therapy (ADT) is a well-established regimen underpinning the current prostate cancer treatment. However, a considerable number of the patients ultimately develop castration-resistant prostate cancer (CRPC) disease. To date, the molecular mechanism underlying the CRPC progression remains elucidated, and a novel/effective therapy for CRPC is still urgently needed. Our previous study suggested that the crosstalk between androgen receptor (AR) and mTOR signaling may represent a critical mechanism promoting CRPC progression and AA PCa disparities. This study further explores whether co-targeting mTOR and AR signaling could improve the treatment efficacies for CRPC and AA PCa. Specifically, mTOR inhibitor Rapamycin (Rap) and AR antagonists Enzalutamide (Enz) and Abiraterone (Abi) were employed to assess their effects, as single agent and in combination, on modulation of AR/mTOR signaling in CRPC and AA PCa. The in-vitro functional (MTT) assay results have demonstrated that a combination of Rap and Enz (or Abi) significantly suppresses the cell viabilities, compared to Rap or Enz/Abi as a single agent, against CRPC and AA PCa cells and spheroids. Co-immunoprecipitation assays coupled with western blot analyses further revealed that treatment of Rap, Enz, or Abi disrupts protein-protein interaction between mTOR and AR. Furthermore, the 2D and 3D spheroids of AA PCa and CRPC cell lines under the same treatments were subjected to immunofluorescence (IF) assays and confocal microscope imaging. Consistent with our Co-IP results, the IF assays also showed that the combination of Rap and Enz (or Abi) synergized the inhibition of mTOR/AR interaction and blocked the nuclear translocation of AR/mTOR complex. Taken together, our results suggest that simultaneously targeting AR and mTOR is likely to disrupt the mTOR/AR interaction, subsequently blocking the nuclear translocation of mTOR/AR and suppressing mTOR/AR-mediated gene expression in AA PCa and CRPC. This novel molecular strategy may represent a more effective therapy against aggressive PCa, including AA PCa and CRPC.

The Effects of Different Types of Blood Flow Restriction Training on the Vastus Medialis Oblique: A Pilot Study

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Blood flow restriction training (BFR) is a promising intervention that simulates the effects of heavy load training using lower loads and offers unique opportunities to optimize recovery, preserve muscle mass, and enhance functional outcomes. The vastus medialis oblique (VMO) plays a significant role in knee stabilization and proper patellar tracking, making it essential for optimizing rehabilitation outcomes and effectively enhancing muscle strength in patients/clients with anterior knee pain. This study aimed to compare the effects of autoregulated BFR (A-BFR), non-autoregulated BFR (N-BFR), and No-BFR on VMO activation and thickness as well as the rate of perceived discomfort (RPD). Seven healthy active individuals (aged 24.9±1.5 years, 4 females) participated in this pilot study. Each participant completed 3 randomized exercise sessions (A-BFR, N-BFR, and No-BFR) with 72 hours between sessions. Each session consisted of four sets of bodyweight dominant leg wall squats (40°-45° knee flexion) with 30/15/15/15 repetitions at 3-sec concentric/eccentric cadence and 30-sec recovery between sets. The BFR cuff was placed on top of the thigh at 60% limb occlusion pressure. The A-BFR cuff pressure automatically adjusted during muscle contraction, while the N-BFR cuff remained constant. VMO thickness was measured with ultrasound and a wireless EMG sensor was used to evaluate VMO activation. Participants' RPD was documented after each exercises set (0-10 scale). SPSS was used to run two-way repeated measures ANOVAs and Pearson Correlations. Immediately following the exercise intervention, VMO thickness increased for A-BFR from 27.1±5.7 to 30.9±5.4mm, N-BFR from 27.6±5.6 to 31.3±6.5mm, and No-BFR from 27.2±5.0 to 29.3±5.8mm ($P<0.001$). From the first to the third set, RPD increased from 3.4±1.5 to 5.6±1.9 for the A-BFR group and increased from 2.7±1.7 to 4.4±2.3 for the N-BFR group ($P<0.001$). Additional analyses revealed significant inverse relationships between VMO activation and RPD for the A-BFR intervention ($r\geq-0.708$, $P\leq0.038$). All three BFR interventions led to a significant increase in VMO thickness. Also, higher RPD levels were identified with the A-BFR intervention as well as inverse relationships between RPD and VMO activation. This highlights the importance between pain and muscle activation. Autoregulation BFR was introduced to enhance safety by adjusting cuff pressure with muscle contractions. Based on our findings, clinicians should consider that autoregulation may lead to higher RPD and a reduction in muscle activation during certain exercises. Further research is necessary to better understand the benefits and effectiveness of A-BFR.

The Impact of Team 360 on Quality of Life in Athletes, Caregivers, and Volunteers

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Team 360 is a nonprofit organization, based on the Eastern Shore of Maryland, that provides motivation and support for differently abled individuals so that they can participate in mainstream running and multisport events. The aim of this research project was to assess the effect of participating in Team 360 events on the quality of life of athletes, caregivers, and volunteers involved in the organization. Individuals who were eligible to participate in the study were sent invitation letters, via email or postal mail, which included instructions, links to online surveys, and the principal investigator's contact information. Investigators utilized the online platform, Qualtrics to obtain participant informed consent/assent and collect survey data. Participants completed a Team 360 quality of life survey and the PERMA-15 questionnaire, which is a validated tool that assesses positive emotion, engagement, relationships, meaning, and accomplishment. Both the Team 360 survey and the PERMA-15 questionnaire utilized a Likert scale to measure the quality of life and well-being of the participants. In addition, the Team 360 survey included two open-ended questions, to allow participants to elaborate on their experience with Team 360. Thus far, 24 volunteers (7 males, 17 females) have completed the surveys, with 30% of respondents being between 45 – 54 years of age. 52% of the volunteers that completed the surveys have participated in Team 360 for more than five years. Findings from the Team 360 volunteer survey indicate that 100% agreed (54.5% strongly agreed) to feeling healthier, 100% agreed (59.1% strongly agreed) to being more involved in the community, 100% agreed (54.5% strongly agreed) to having a positive change in mood, and 90.9% agreed (68.2% strongly agreed) to feeling more comfortable spending time with people different than themselves as a result of participating in Team 360. Moreover, 100% of the volunteers indicated that they would recommend Team 360 to a friend. An overarching theme of responses to the open-ended questions was that volunteering for Team 360 was a rewarding experience that has resulted in many long-lasting friendships. Data collection for athletes and caregivers are ongoing, therefore results from those groups will be presented at the conclusion of the study. In conclusion, our findings thus far suggest that participation in Team 360 has a positive impact on quality of life of volunteers involved in the organization.

Transcriptional Regulation of Heat Stress Responses and Their Impact on Growth, Development, and Agronomic Performance in Chenopodium Quinoa

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Expanding Chenopodium quinoa (quinoa) cultivation to non-native regions is of increasing interest due to its nutritional benefits, resilience to diverse climates, and adaptability to marginal soils. However, its susceptibility to temperatures above 32°C poses a significant challenge, particularly in North America, affecting flower and seed development. Heat stress triggers transcriptional changes regulated by transcription factors, making them promising targets for genetic improvement. This study evaluated heat stress-induced gene expression and its association with agronomic traits in nine quinoa genotypes, identifying heat-adapted lines for the Delmarva region. The genotypes were assessed across two planting periods in the field (RCBD) and greenhouse (CRD) using an international quinoa phenotyping methodology. A two-way ANOVA analyzed the effects of Genotype, Season, and Environment on yield with a Tukey HSD test for pairwise comparisons. Pearson correlation analysis examined relationships between yield, height, total primaries, and panicles, while interaction analysis evaluated yield responses to heat stress. An RNA gene expression analysis study using Illumina Next Gen sequencing compared the control group with the heat-stressed treatment identifying 3,340 upregulated and 2,752 downregulated genes under heat stress in leaf and flower tissues. Upregulated genes include the heat shock proteins, jasmonate-induced protein, and transcription factor bHLH, which are significant in the plant's heat tolerance mechanisms. PHD finger MALE STERILITY 1, agamous-like MADS-box, and Aspartic Protease proteins were downregulated genes significant in flower and seed development. There was a significant difference in yield across the nine genotypes between the planting seasons and the two sets of the environment. These findings support the introduction of heat-tolerant quinoa genotypes to mitigate climate-related yield losses. Understanding transcriptional and agronomic responses to heat stress will aid in developing climate-resilient quinoa varieties for expanded cultivation.

Transportation Barriers to Employment for Adults with Developmental Disabilities in Rural Areas: A Basic Review

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Transportation barriers significantly limit employment opportunities for adults with developmental disabilities (DD) in rural areas, exacerbating social and economic isolation. Despite federal mandates such as the Americans with Disabilities Act (ADA), rural transportation remains inadequate due to infrastructural, operational, and funding constraints. This review examines transportation barriers to employment among adults with DD in rural areas, focusing on reliance on public transit, geographic isolation, and the insufficiency of the current transportation system. It also explores federal and state initiatives, including the Rehabilitation Act of 1973 and the ADA, highlighting persistent policy and funding challenges. The study underscores the critical role of rehabilitation counselors in advocating for improved transportation access through client education and stakeholder collaboration. It calls for increased funding, policy reforms, and community-based interventions to enhance mobility and workforce participation for adults with Developmental Disabilities in rural areas. A multifaceted approach involving policymakers, transportation providers, and rehabilitation professionals and adults with Developmental Disabilities is essential to developing equitable, sustainable transportation solutions that promote independence and economic self-sufficiency.

Broader Implications of Heirs' Property Community Education in Maryland

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Heirs' property, a consequence of inheritance without wills or probate, is a primary cause of land loss in the U.S. This issue persists due to limited awareness of its complexities and challenges, such as lack of clear title, fractured ownership, partition sales, and limited financing. UMES Extension has launched Heirs' Property Education initiatives at the community level across Maryland to educate communities about the socio-economic and legal implications of heirs' property and prevent future complications. Starting in March 2024, ten interactive workshops were organized across Maryland (Somerset, Baltimore County/City, Prince George's, Kent, and Montogomery), engaging 160 participants. The workshops focused on educating the participants about the impact of heirs' property, preventive estate planning, and legal resolution strategies, emphasizing family collaboration. The participants include farmers, entrepreneurs, administrators, educators, and students. The resource personnel included scholars experienced in heirs' property education accompanied by legal experts. Most participants were young adults (34.2% aged 18-34), women (50.7%), and Black or African Americans (57.5%). Post-event evaluations revealed participants' knowledge gains: 71% gained an overview of heirs' property, 63% learned preventive measures, and 68% explored resolution strategies. Furthermore, 89% learned to identify heirs' property, and 88% understood its impact. Participants also revealed an increased understanding of estate planning (88%), will creation (86%), and legal structures (82%). Crucially, 88% acknowledged the importance of family collaboration, and 89% felt confident in taking proactive steps. Actionable outcomes included 86% of participants intending to assist their families, 38% planning to create family trees, and 67% expressing willingness to support their communities. These findings underscore the critical need for continued outreach to mitigate the socio-economic consequences of heirs' property and address barriers such as ineligibility to participate in federal programs. The study will delve deeper into participants' connections to heirs' property and its broader implications, refining its education and outreach strategies and initiatives.

Characterizing the Diets of Louisiana Coastal Predatory Fish Using Metabarcoding and Next Generation Sequencing

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My research focuses on characterizing the diets of piscivorous fish collected off the coast of Louisiana through metabarcoding and next generation sequencing. We are specifically focused on the diet of *Cynoscion nebulosus* or Spotted Seatrout. C. nebulosus is an important fish in the Gulf as it highly sought after by both commercial and recreation fishers. Furthermore, less is known about the diet of C. nebulosus in the Gulf compared to those in the Atlantic. Previous studies that examined diets of these fish focused on other populations, prioritized other life history aspects, or used methods with less accurate results. We used metabarcoding to yield more precise results to gain a better understanding of the diet and trophic interactions of coastal predatory fish. Libraries were built for paired-end Illumina HiSeq sequencing using both the 12S rRNA and 18S rRNA genes to target fish and invertebrates in the gut contents. Results from the sequencing of the stomach contents of C. nebulosus suggests that they are opportunistic feeders that do not prefer one prey item over another. Some of the common fish species found were Brevoortia patronus, *Micropogonias undulatus*, and *Anchoa mithilli*, which appeared in similar percentages of fish. Common invertebrate prey items included Barbatia spp., Tucetona spp., Diastylis spp., and Limulus polyphemus. The results show that C. nebulosus is an opportunistic feeder, which aligns with what is known about Atlantic populations of C. nebulosus. This information is important for sustainable management of C. nebulosus and their prey. We will use these methods to characterize diets of other coastal predatory fish, including *Sciaenops ocellatus* and *Micropogonias undulatus*.

Community Advocacy Paper: Advocates for Public School Funding

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This advocacy paper addresses one of the most pressing social justice issues in American education: the persistent inequity in public school funding. For 18 consecutive years, chronic underfunding has created a critical educational crisis, particularly affecting high-poverty and rural districts. Our research demonstrates that despite serving 19% of all students, rural districts receive only 17% of state education funds, with high-poverty districts receiving $1,000 less per student than wealthy districts. The disparity worsens for districts serving predominantly students of color, which receive $1,800 less per student than districts with fewer students of color. These funding inequities directly impact essential educational resources, from teacher retention to curriculum materials, creating cycles of educational disadvantage. We critically examine existing policies, including the Elementary and Secondary Education Act (reauthorized as ESSA) and state funding formulas, identifying significant limitations in addressing these disparities. Our proposal presents targeted reforms, including weighted funding systems that account for geographic and socioeconomic factors, streamlined grant processes, innovative teacher recruitment programs, expanded educational opportunities through technology, and robust accountability measures. Through these integrated approaches, we aim to create a more equitable educational system that fulfills education's promise as "the great equalizer" for all students, regardless of location or socioeconomic status.

Comparison of Treatment for Osteoporosis in Postmenopausal Women

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Osteoporosis is a skeletal condition that is particularly detrimental to postmenopausal women, primarily due to a sharp decrease in estrogen; a hormone that is responsible for regulating bone density through inhibition of osteoclast activity and bone resorption. This study stands to demonstrate the comparative efficacy of bisphosphonates, monoclonal antibodies, and estrogen/hormone replacement therapy in their ability to prevent fracture incidence and improve bone mineral density (BMD). The aim of this study is to examine the effectiveness of bisphosphonates, monoclonal antibodies or estrogen therapy in postmenopausal women suffering from osteoporosis. Research was conducted on multiple online databases that included PubMed, Google Scholar, and JAMA Network. Terminologies used to search for studies included "osteoporosis", "postmenopause", "estrogen therapy", "monoclonal antibodies", "bisphosphonates", "fracture prevention", and "bone density". The inclusion criteria were peer-reviewed studies, studies conducted within 10 years, and systematically reviewed, randomized controlled with a total of five studies included. Bisphosphonates (Alendronate/Zoledronic Acid) were consistently efficacious as first line therapy. Romosozumab followed by Alendronate reduced vertebral fracture incidence by 48% ($p<0.001$) and clinical fractures by 27% ($p<0.001$) compared to use of an Alendronate (Saag et al., 2017). Abaloparatide followed by Alendronate showed an 87% ($p<0.001$), with relative risk reduction in new vertebral fractures in comparison to the placebo and Alendronate groups; demonstrating greater improvement in bone mineral density across multiple sites. (Cosman et al., 2017) Combination therapy demonstrated a significantly higher efficacy than hormone replacement alone for total hip ($p<0.05$), but not for lumbar spine. Alendronate taken alone had greater efficacy than hormone therapy at the intertrochanteric region. Bisphosphonates remain the first-line therapy for osteoporosis in postmenopausal women given their demonstrable efficacy. Newer adjunctive therapies such as SERMs and monoclonal antibodies have not expanded the clinical landscape. Optimal management involves incorporating lifestyle modifications, and adequate nutritional supplement of calcium and Vitamin D, to reduce fracture risk. Further research could delve into side effects of medications and associated comorbidities.

Development of Cassava (*Manihot esculenta* Crantz)-Quinoa (*Chenopodium quinoa*)- Finger millet (*Eleusine coracana*) Value-Added Products to Improve Food Security in Underserved Communities

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Food is essential to providing vital macronutrients and micronutrients that support growth, immunity, and general health. However, food insecurity remains a persistent global challenge, affecting developing and developed nations. Staple crops such as maize, rice, and cassava provide necessary calories but often lack sufficient proteins, vitamins, and minerals, leading to malnutrition and related health complications. This study aims to address food insecurity by developing value-added products from a blend of Cassava - Quinoa -Finger millet, which have been identified as vital food security crops. These agricultural food crops have complementary nutrient and functional profiles, and their combination enhances food availability and nutrient adequacy to a considerable extent. Cassava, extensively cultivated, is rich in carbohydrates and is tolerant to adverse climatic conditions but lacks considerable protein quality and necessary micronutrients. Quinoa, a pseudo-cereal, is rich in high-quality protein, essential amino acids, dietary fiber, and trace minerals providing an ideal nutrient complement to cassava-based foods. In addition, finger millet is gluten-free with significant health benefits, including its role in diabetes management, improvement in gut health, and excellent antioxidant content. The combination of these crops is an effective approach to the mitigation of food insecurity, especially for communities operating under resource-constrained conditions and immigrant communities. The proposed study will focus on developing product formulations through experimental trials that include food processing techniques such as flour blending, and sensory evaluation. The food products produced will undergo nutrient profiling and functional property analysis to assess their suitability as healthy food options. Sensory analysis will assess consumer acceptance, while market evaluation will analyze economic feasibility and commercial viability. Given the high demand for cassava-based foods among the immigrant population in the Delmarva region, this research will also explore strategies to improve product shelf life and distribution efficiency.

Development of Optimal High-Pressure Extractor and Automatic Distiller Methods for Phytochemical Analysis of Juvenile Ginger (Zingiber officinale)

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High-pressure (HP) extractors and automatic steam distillers are two recent innovations in the sample preparation process that are more efficient and less costly. They have recently been introduced into various chemical fields, such as pharmacy, agriculture, and phytochemistry. HP extraction is the successor to traditional solid-liquid extraction, while automatic steam distillation replaces manual steam distillation, which is costly and time-consuming. Due to their novelty, the most effective way to use these instruments has yet to be explored for different plant materials. On the other hand, it is important to develop methods that yield extract concentrations comparable with traditional methods because new research data in these fields need to be compared with observations of previous years made at different locations and under different cultural management conditions that were published earlier using traditional extraction methods. As such, this project analyzed the utilization of these instruments for samples of juvenile ginger (Zingiber officinale), grown for 7-11 weeks when its antioxidant

samples of juvenile ginger (Zingiber officinale), grown for 7-11 weeks when its antioxidant content peaks, to assess what extraction parameters of each instrument produce the ideal yields and concentrations of samples. High-pressure extraction was used to extract polyphenol, flavonoid, and tannin, for which the obtained concentrations of extracts were compared to extracts produced by traditional extraction. Automatic steam distillation was used for essential oil distillation to obtain the highest yields of essential oil. The influence of different extraction parameters, such as the solvent, temperature, pressure, and extraction time, will be presented on the concentrations of phytochemicals in extracted samples.

Effects of Temperature and Population Decline on Mid-Atlantic Eelgrass Carbon Sequestration

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Eelgrass (Zostera marina) is a cold-water seagrass species that provides numerous ecosystem services, including carbon storage. The sediment pool contains the bulk of sequestered carbon in eelgrass meadows, where carbon accumulates under the root and rhizome networks. As sea surface temperatures rise, eelgrass populations experience increased stress and mortality. Thermal stress affects the energy budgets of individual plants, with more energy allocated to leaves and reproductive shoots than to roots and rhizomes under stressful conditions, potentially affecting the sediment carbon pool. Eelgrass' carbon sequestration capacity can vary widely, however, and little is known about the effects of rising temperatures and subsequent eelgrass loss on carbon sequestration in eelgrass meadows. To quantify these impacts, a space-for-time substitution carbon sequestration sampling survey was developed to retrieve sediment cores across a sequence of 'healthy,' 'partially degraded,' and 'degraded' eelgrass beds from three national seashores along a latitudinal (~ temperature) gradient: Cape Hatteras National Seashore (NC), Assateague Island National Seashore (MD), and Fire Island National Seashore (NY). Sites were selected by assessments of annual survey and aerial imagery data. Preliminary temperature data from two eelgrass beds representative of 'healthy' sites at Assateague Island confirmed that summer temperatures now routinely reach 30˚C, the threshold for eelgrass population decline. Between June 19 and August 3, 2024, temperatures exceeded 30˚C on thirteen days, including four consecutive days from July 7-10. Sediment cores will be analyzed for total Corg, 210Pb, 13C, and 15N to provide insights into the ability of mid-Atlantic eelgrass meadows to sequester atmospheric CO2 under increasing thermal stress and to retain sequestered carbon amid population decline.

Engaging Local Communities in Mitigating Greenhouse Gas Emissions through Demonstration Sites

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Community-driven activities are essential for building resilient agriculture. Eco-friendly practices enhance soil health, conserve resources, reduce greenhouse gas (GHG) emissions, and boost carbon sequestration, ensuring sustainable food systems locally. To empower the local community, the UMES Extension supported the Crisfield Community Garden by promoting regenerative alley cropping with the objective of encouraging community members to adopt practices that reduce GHG emissions and enhance carbon sequestration. The Extension partnered with the community by integrating climate-resilient fruit trees with high carbon sequestration potential alongside vegetable crops in the alleys. The project included a diverse selection of fruit tree varieties: apple (Malus domestica) cultivars comprised Red Delicious (n = 6), Honeycrisp (n = 2), and Aztec Fuji (n = 2); peach (Prunus persica) varieties consisted of Crest haven (n = 3), Belle of Georgia (n = 1), and Elberta (n = 1); and fig (Ficus carica) varieties planted were Celestial (n = 2), Brown Turkey (n = 1), and LSU Purple (n = 1). In the alleys, blueberries (n=14) (Vaccinium corymbosum) vegetable crops, eggplants (n=31) (Solanum melongena), tomatoes (n=8) (Solanum lycopersicum), and bell peppers (n=56) (Capsicum annuum) were planted. All crops were planted using minimum tillage to promote soil health and environmental sustainability. Eighteen cubic yards of natural wood mulch and 16 cubic yards of topsoil mulch were applied to suppress weed growth, enhance soil quality, and improve moisture retention. Besides in-person consultations, hands-on training sessions and a field day were organized to create awareness and enhance participants' knowledge. The participants welcomed the field day, which promoted locally grown fresh produce to increase household food security and lower emissions from food transportation while strengthening community bonds and promoting collective climate resilience. Soil analysis was performed before the intervention to measure total soil carbon. LI-COR Gas Analyzer was used to measure the GHG effluxes (CO_2, CH_4, and N_2O). These data will be compared with the new measurements in the fall of 2025 to determine the impact of the intervention on the set objectives. As a direct economic benefit, the garden provided nearly 233 lbs. of vegetables and fruits, generating an estimated $525 to support low-income individuals and seniors, thereby enhancing local food security and community well-being.

Evaluation of the Effects of Paxlovid on Hospitalization and Mortality Rates in High-Risk COVID-19 Patients

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Severe COVID-19 illness continues to pose a significant threat to individuals with risk factors such as cardiovascular disease, respiratory conditions, immunodeficiency, and advanced age. Paxlovid, an antiviral medication composed of nirmatrelvir and ritonavir, was granted emergency use authorization in December 2021 for the treatment of mild-to-moderate COVID-19 in high

-risk patients. This study evaluates the effectiveness of Paxlovid in reducing hospitalizations, progression to severe disease, and mortality rates among individuals with varying levels of risk factors. Data from peer-reviewed articles and studies published between 2019 and 2024 were analyzed to compare outcomes among patients treated with Paxlovid versus those who were not. Results indicate that for patients with significant risk factors, Paxlovid use was associated with statistically significant reductions in hospitalizations ($p < 0.05$) and mortality (hazard ratio [HR]: 0.79, 95% CI: 0.65–0.95, $p = 0.011$). However, its effect was less pronounced among patients with minimal risk factors. Patients receiving Paxlovid also showed a reduced need for intensive care unit (ICU) admission and oxygen therapy compared to those who did not receive the medication. These findings highlight Paxlovid as an effective treatment option for high-risk COVID-19 patients, particularly in populations with elevated vulnerability to severe outcomes. Further research is recommended to explore its impact on unvaccinated populations and its efficacy in preventing long-term complications of COVID-19. Given its potential side effects and drug interactions, Paxlovid should be reserved for those with significant risk factors, and its use should be carefully monitored in clinical settings.

Exploring Mosquitoes as Bioindicators for PFAS Contamination Across Environmental and Biological Systems

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Per- and polyfluoroalkyl substances (PFAS) are persistent environmental contaminants resistant to degradation. Their bioaccumulation in ecosystems and biomagnification in organisms pose significant toxicological and reproductive risks to wildlife. In humans, PFAS exposure is increasingly associated with damage to the liver, kidneys, and reproductive systems. The detection of PFAS in human blood serum raises public health concerns; however, comprehensive monitoring is limited by resource constraints and challenges in reaching underserved populations. This study aims to assess the feasibility of using mosquitoes as biomonitoring tools for PFAS exposure, investigating their potential to reflect environmental and biological contamination. We evaluate whether mosquitoes acquire PFAS through blood feeding and examine the contribution of environmental exposure to their PFAS body burden. To distinguish between these pathways, mosquitoes are reared in PFAS-spiked water to adulthood to determine the extent of PFAS uptake from water. A separate colony, reared in uncontaminated water, is fed blood meals spiked with the same PFAS mixture to assess uptake via blood feeding. Field collections of adult mosquitoes from five sites near sewage treatment plants on Maryland's eastern shore were analyzed for PFAS compounds using liquid chromatography-mass spectrometry (LC-MS) based on EPA Method 1633. Preliminary data revealed total PFAS loads ranging from 12.5 to 78.7 ppb across the sites, identifying 14 unique PFAS compounds. PFOS was the most prevalent, with an average concentration of 17.3 ppb (±2.6). Long-chain PFAS dominated the samples, with three short-chain types also detected. Of these, eight were carboxylates, two were sulfonates, and three were fluorotelomers. Preliminary findings demonstrate that mosquitoes naturally accumulate PFAS, suggesting their potential as biomonitoring tools. By evaluating PFAS uptake through environmental exposure and blood feeding, this study lays the foundation for future investigations into mosquitoes' suitability as bioindicators of contamination in diverse settings.

Exploring New Waters: Annual Movement Patterns and Population Structure of Chesapeake Bay Red Drum

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As ocean temperatures continue to rise, questions about how this global phenomenon affects local species' distribution shifts have been increasingly pressing. Red Drum (Sciaenops ocellatus), a fish species distributed along the Atlantic and Gulf coasts, historically has not been found in great numbers within the Chesapeake Bay. However, in recent years, an increased prevalence of S. ocellatus has been documented in the Chesapeake Bay, sparking speculation about a possible correlation with warming water temperatures. As a popular recreational fishery that may rival that of Striped Bass, it is important to understand Red Drum movement ecology and population structure to effectively manage the growing stock. This study pairs passive acoustic telemetry and genetics approaches to determine the annual movement patterns and basic genetic structure of the Chesapeake Bay Red Drum population. To determine acoustic receiver placement, preliminary water quality data was collected across 17 sites in four distinct regions, and an underwater camera mount captured images of habitat bottom type: oyster reef, sand, or submerged aquatic vegetation. Twenty-two receivers will be placed across sites in one of the four regions assessed—the northern Tangier Sound—which was selected owing to its abundance of oyster reef habitat. Eighty to one hundred individuals will be tagged across the region from May – October 2025 and 2026 to quantify their movement. Additionally, DNA sourced from tissue samples of tagged individuals will be analyzed at two genes, the mitochondrial D-loop and the nuclear 18s rRNA gene, to characterize basic population structure relative to other populations south of the Chesapeake Bay.

Exploring the Impact of Cover Crops Organic Amendments and Best Management Practices on Soil Health and Crop Productivity in Sandy Loam Organic Vegetable Crop Systems on the Delmarva Region

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The comparative benefits of coupling treatments using best management practices (BMP) such as conservational tillage, landscape fabric, cover cropping, organic compost, and organic pelletized poultry litter fertilizer on soil health and fresh produce production in sandy loam soil areas are unclear. Sandy loam soil in coastal regions like the Delmarva Peninsula has soils with

low organic matter and nutrient levels. Vegetable farmers face a challenge in addressing this problem. The question is whether winter cover crops and compost or pellet organic fertilizer can be added to crop rotations to provide sufficient plant-available nitrogen (N) for the growth of seasonal vegetable crops. Farmers and producers need data-driven optimal management strategies to address this issue and other soil health issues to minimize N loss from vegetable systems. (White et al., 2022). A complete randomized experiment launched in the fall of 2023 at the University of Maryland Eastern Shore (UMES) on an NOP-certified organic field comprising four treatments with four replications per treatment:1. Control (no organic amendments or cover crops), 2. Winter rye and hairy vetch cover crop mixture (CCM), no amendments, 3. CCM and organically compliant compost and 4. CCM and organically produced poultry litter pellets. Our objectives are: 1. quantify the effects on organic vegetable production at an NOP-certified field; 2. measure soil health parameters (e.g., pH, E.C., organic matter, soil texture, respiration, active carbon, bulk density, wet aggregate stability, total carbon, total nitrogen, soil organic carbon, soil enzymes, macronutrients, micronutrients, 3. Assess cover crop impacts on nitrogen use crop efficiency and 4. compare various management practices and strategies designed to improve soil health and N levels in sandy soils for improved vegetable crop yields. This project explores some options to assist farmers in improving yields by combining techniques to improve soil health and supply needed N to support vegetables and other crop production systems.

Local- and Broad-Scale Effects of Oyster Aquaculture on the Distribution of Submerged Aquatic Vegetation

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Bivalve aquaculture is one of the most sustainable, low-impact forms of blue food production available and is expanding across the United States. Under this expansion scenario, there is an increasing probability of spatial overlap between oyster aquaculture activities and important benthic habitats such as seagrass. Hence, there is a need to understand the integrated effects of aquaculture activities on oyster farm- to estuary-scale distributions of submerged aquatic vegetation (SAV). We aimed to characterize aquaculture-SAV interactions across multiple spatial scales via a case study of an oyster farm in a tidal mesohaline estuary of Chesapeake Bay, Maryland. In particular, light availability directly under oyster aquaculture gear (farm-scale effects) and the historical distribution of SAV before and after the establishment of the oyster farm (estuary-scale effects) were quantified. To measure light availability, HOBO pendant light loggers were deployed along transects beneath floating oyster bags ('on farm') and in open water ('off farm'). Historical distributions of SAV were analyzed using aerial imagery data from annual flyovers of the Choptank River. Preliminary light-availability results for the month of June indicated higher median percent surface light detected for 'on farm' locations (25.0%) relative to 'off farm' locations (12.9%). Aerial imagery data indicated increased SAV frequency and abundance during the 2000-2023 period (post-establishment of oyster farm) relative to the 1978-1998 period (pre-oyster farm) at the farm location. Estuary-scale frequency distributions of SAV have yet to be assessed. The findings of this case study can be used to inform future aquaculture practices, management, and policy for Maryland.

Medicaid Expansion: Easing Depression in Low-Income Communities

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Depression is a major public health issue that disproportionately affects low-income populations due to barriers in accessing mental healthcare. The Affordable Care Act's Medicaid expansion aimed to mitigate disparities by increasing insurance coverage and affordability. This study evaluates the impact of Medicaid expansion on depression severity among low-income individuals through a review of peer-reviewed research, including longitudinal cohort studies, randomized controlled trials, and regression models comparing pre- and post-expansion outcomes in states with and without expansion. Findings indicate a significant rise in Medicaid-funded mental health admissions and improved access to medications and counseling. Expanded coverage reduced out-of-pocket costs and facilitated early intervention, correlating with reduced depressive symptoms. However, adverse outcomes (e.g., psychiatric hospitalizations) persist, underscoring gaps in care continuity and systemic barriers like provider shortages and stigma. While Medicaid expansion enhances insurance stability, comprehensive care models addressing social determinants and fragmented systems are critical for sustained mental health improvements. Future policies must integrate coverage with infrastructure investments to bridge remaining disparities.

Path Loss of 5.85 GHz Signal in a Laboratory Environment

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Wireless channel characterization is significant to understand how radio waves propagate in diverse situations, enabling the design of efficient and reliable mobile communication networks by maximizing network coverage, capacity, and reducing signal degradation. This study investigates the path loss of a 5.85 GHz signal in a typical laboratory setting using two horn antennas with a transmit power of -20 dBm from the signal generator. The laboratory environment consists of complex indoor structures and obstacles, such as walls, furniture, ceilings, and other elements. Measurements were conducted to maximum seven meters link distance, producing a dataset of 168 measurement points. The anechoic chamber provides an ideal free-space environment, where the gain of horn antennas was determined through measurements conducted within it. The experimental

data was compared with theoretical predictions from the Friis model. Additionally, this work aims to develop an empirical path loss model that accounts for observed real-world effects, such as diffraction, scattering, and reflection, which are typical in indoor environments. The findings offer valuable insights for indoor wireless communication, RF system design, and electromagnetic compatibility testing. Future research will extend this work by utilizing omnidirectional antennas and exploring models like the log-distance path loss and log-normal shadowing models.

Pre-Service Professionals' Knowledge of Culturally Responsive Positive Behavior Support (PBS)

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Positive Behavioral Interventions and Supports (PBIS) is an evidence-based framework designed to improve school-wide behavioral outcomes and promote inclusive learning environments. However, disparities in disciplinary practices disproportionately affect minority students, necessitating a culturally responsive approach to PBIS implementation. This study examines the effectiveness of pre-service training programs in equipping future educators with the knowledge and skills to implement culturally responsive PBIS strategies. Using a mixed-methods approach, 32 pre-service professionals participated in a PBIS training module and completed pre- and post-assessment surveys measuring their familiarity, confidence, and preparedness in applying PBIS principles within diverse educational settings. Quantitative results indicate significant improvements in participants' self-reported knowledge and confidence post-training, while qualitative findings highlight key challenges, including implicit bias, resistance to change, and the need for culturally relevant behavioral assessment tools. The study underscores the importance of integrating cultural competency training into teacher preparation programs and fostering community collaboration to ensure equitable behavioral support systems. Future research should explore long-term impacts of culturally responsive PBIS training on student outcomes and teacher effectiveness.

Prevalence of Breast Cancer Throughout Maryland Counties

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Breast cancer is the uncontrollable growth of cells in breast tissue. This research aims to explore the correlation between breast cancer prevalence and factors such as socioeconomic status, race, ethnicity, and age across Maryland counties. The study investigates the impact of Breast cancer prevalence on diagnosis and prognosis of different ethnic groups in Maryland counties. This investigation includes African Americans, Caucasian, Asian/Pacific Islander, and Hispanic women aged 49-71 with breast cancer in various stages. Data collected was between the years 2007 and 2017 who provided written consent. Patients outside of Maryland counties were not included in the study. Breast cancer prevalence rates vary by race and location. Caucasians have higher prevalence rates overall, with Montgomery County and Baltimore County. Baltimore City has the most annual breast cancer cases for this ethical group. Among Asian/Pacific Islanders, Queen Anne and Worcester Counties have the most prevalence among these ethical groups. African Americans show the most annual breast cancer cases in Talbot and Frederick Counties, with the largest annual breast cancer cases count in Prince George's County. Asian/Pacific Islanders have lower overall annual case counts, peaking in Montgomery County. Based on our research, breast cancer prevalence is generally higher among Caucasians compared to Asian/Pacific Islanders and African Americans across Maryland counties, with the highest prevalence seen in Montgomery and Baltimore Counties for Caucasians, and in Prince George's County for African Americans. Talbot County has particularly high rates for African Americans, suggesting possible localized factors. Moreover, the localized factors that led to increased breast cancer prevalence in the Maryland counties include racial, socioeconomic, and segregation disparities. Additionally, other restrictions and limitations included healthcare access to local resources such as early breast cancer screenings (i.e., mammograms, ultrasounds, MRIs) or sufficient treatment and care (i.e., proper medication access, radiation therapy, chemotherapy, or surgery). These disparities and limitations all contributed to the rising cases and prevalence rates of breast cancer in the Maryland Counties.

Return to Fertility After Oral Contraceptive Use: Comparing Short Term vs Long Term Oral Contraceptive Use

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There is a widespread misconception that oral contraceptives (OCs) cause infertility, with 13.4% of surveyed women believing prolonged OC use leads to infertility. This research highlights the minimal impact of OC use on fertility and aims to educate patients about the safety of OCs regarding conception. The study's primary goal is to evaluate whether the duration of OC use affects the time to conception after discontinuation in women of reproductive age. Population (P): Women of reproductive age. Intervention (I): Oral contraceptive use. Comparison (C): Long-term vs. short-term OC use. Outcome (O): Time to conception post-OC discontinuation. Inclusion criteria included studies on women of reproductive age, duration of OC use, and time to conception. Six studies met these criteria. Statistical analysis (Figure 1) found no significant delay in conception due to OC use ($p < 0.0001$). 87.04% of women conceived within 12 months of stopping OC use (Figure 2). Pregnancy rates were similar across groups, with 75–81% conceiving within 12 months, regardless of the duration of OC use (Figure 3). Prolonged OC use does not delay fertility return. Median time to conception was 3–4 months. Findings confirm that OC use does not negatively impact fertility or time to pregnancy. The reviewed studies demonstrated that OC use, regardless of duration, does not impair fertility.

Most women conceive within a year of discontinuation. These findings dispel myths about infertility caused by OCs and stress the importance of patient education on this topic. OC use does not cause infertility, and most women return to fertility within three months of discontinuation. Providers should actively address misconceptions and educate patients to promote informed decision-making.

Semaglutide in Heart Failure with Preserved Ejection Fraction: Impact on Outcomes

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Heart failure with preserved ejection fraction (HFpEF), characterized by impaired ventricular filling with preserved ejection fraction (LVEF ≥50%), is exacerbated by obesity. This review evaluates semaglutide, a glucagon-like peptide-1 agonist, on cardiovascular outcomes and functional status in obesity-related HFpEF. Five studies (2022–2024), including randomized trials and retrospective analyses, compared semaglutide to placebo using NT-proBNP levels, 6-minute walk test (6MWT) distances, and Kansas City Cardiomyopathy Questionnaire-Clinical Summary Score (KCCQ-CSS). Semaglutide significantly reduced NT-proBNP (P<0.001), increased 6MWT distance (P<0.001), and improved KCCQ-CSS scores (P<0.001), indicating reduced cardiac stress and enhanced function. Limitations include short-term follow-up (≤52 weeks) and underrepresentation of non-Caucasian populations. While benefits correlate with weight loss, direct cardiac mechanisms remain unclear. Future studies should clarify semaglutide's pathophysiology impact and assess long-term efficacy across diverse demographics.

The effect of Precise Irrigation on the Phytochemical Composition of Aronia Mitschurinii Fruits grown in Maryland

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Aronia mitschurinii (black chokeberry) is a highly nutritious superfruit, rich in bioactive compounds like polyphenols, flavonoids, anthocyanins, and tannins, which offer various health benefits, such as anti-inflammatory, cardiovascular, and neuroprotective effects. This makes Aronia berries an ideal candidate for functional food and nutraceutical development. However, the phytochemical quality and yield of aronia are heavily influenced by environmental factors, cultivation practices, and irrigation, which are crucial for maximizing phytochemical production. This study, conducted in partnership with the University of Maryland's Wye Research and Education Center, examines how different processing methods and irrigation strategies affect aronia berry yield and phytochemical content. This project explores the influence of irrigation and the processing and covers juice, pulp and freeze drying. The real time data loggers and soil moisture sensors are utilized to control the irrigation. With climate change and water conservation concerns, efficient irrigation methods are key to sustainable agriculture. Analytical techniques such as UV-Vis spectrophotometry and refractometry were used to measure bioactive compounds and fruit sweetness, while pH analysis assessed juice acidity, critical for product stability. Results show that precision irrigation and effective management practices improve antioxidant levels, fruit quality, and yields. The use of data loggers enabled the optimization of irrigation strategies, correlating water application with plant health and phytochemical production.

The Effect of Social Media Use on Adolescents' Mental Health

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With the growing prevalence of social media in modern society, these platforms have become integral to how many individuals communicate, share experiences, and engage with others. Social media language encompasses a person's social and personal conversations about daily issues and essentially reflects their psychological and physical health in a range of situations. Through linguistic patterns and online interactions, social media platforms provide a unique lens for researchers to investigate mental health concerns including depression, anxiety, stress, and loneliness. This research study aimed to investigate the correlation between social media use and mental health outcomes amongst adolescents, with a focus on different gender groups. Peer-reviewed and critically appraised articles consisting of a cross-sectional study as well as surveys and questionnaires conducted from 2021-2023. Active social media use and longer duration of screen time leads to higher incidences of mental health issues in cis gender adolescents and lower incidences in mental health issues in the TGNB community. TGNB individuals may also experience high levels of minority stress - "the stress of being a minority in a majority social environment fostered through social processes, and constructs that harass and/or discriminate". Social media allows TGNB youth to create a social environment that is inclusive for others who share the same experience. Additional studies revealed that adolescents are more likely to post content related to stress and emotional struggles. Social media has a dual impact on adolescent mental health. While it provides a supportive environment for TGNB youth, it is associated with increased depression in cisgender adolescents. Future research should focus on standardized methodologies to better understand these effects and explore potential positive applications of social media.

The Risk of Cardiovascular Disease Death in Lower Income, Rural Families in Maryland

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The disparities behind cardiovascular health and socioeconomic status are a topic that has been well studied on the national level; however, this topic also needs to be examined more on the state and local level, particularly in the state of Maryland. Cardiovascular disease (CVD) is the leading cause of death in the United States, with significant disparities influence by socioeconomic status (SES), geographic location, and access to care. Residents of rural Maryland often face these challenges which are in tandem with lack of heath care resources and fewer specialists. These disparities may lead to higher rates of CVD mortality. This study investigates how income levels and rural living conditions affect CVD mortality compared to suburban and urban populations. While studying peer reviewed articles on the relationship between income, race, gender and CVD outcomes, we found consistencies in the inverse relationship between lower incomes in families that lived in rural areas, and higher risk of cardiovascular disease death. This inverse relationship is also demonstrated while examining county-level data from U.S Census Bureau on income and CVD mortality in Maryland. The peer review articles we examined all contained a P value of <0.001 as well. The purpose of this study is to prove that Rural, low-income populations in Maryland face disproportionately high risk of cardiovascular mortality. Expanding health care access and addressing socioeconomic barriers are essential for improving outcomes.

Time Series Forecasting of Price of the U.S. Cotton Using Machine Learning Models

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Accurate agricultural commodity price forecasts are crucial for informed decision making. They enable policymakers to stabilize markets and ensure food security, guide producers in optimizing production and risk management, help consumers anticipate prices, manage budgets, and access affordable food. This study focuses on forecasting cotton prices by employing three predictive models – Autoregressive Integrative Moving Average (ARIMA), Exponential Smoothing State-Space (ETS), and Neural Network Time Series (NNETAR) to forecast cotton prices in the US. The analysis utilizes daily cotton price (USD per pound) data (August 22, 1972, ~ February 25, 2025) sourced from the Macrotrends website. A hybrid model (a combination of ARIMA, ETS, and NNETAR) is incorporated, and equal weights are assigned. The individual models (ARIMA, ETS, and NNETAR) were also evaluated and compared against the hybrid models. The performance of these models was then assessed using five performance evaluation metrics, that is, The Mean Error (ME), Root Mean Square Error (RMSE), Mean Absolute Error (MAE), Mean Percentage Error (MPE), and Mean Absolute Percentage Error (MAPE) and the model that had the least amount of error selected as the best performing model. Empirical comparisons indicate that the NNAR (27,14) achieved the lowest RMSE (0.01166204), MAE (0.008100589), and MAPE (1.162845), demonstrating superior overall predictive accuracy. These findings highlight the potential of machine learning models, particularly neural networks, for enhancing price forecasting and supporting informed decision-making in agricultural markets.

Varenicline, Nicotine Replacement Therapy, and Cognitive Behavioral Therapy Effects in Smoking Cessation

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Tobacco and smoking are risk factors for many chronic illnesses, such as chronic obstructive pulmonary disease, hypertension, cardiovascular disease, atherosclerosis, diabetes, cancer, and microbial infections. Varenicline, a partial agonist of nicotinic receptor and antagonist of the α4β2 receptors, can be an effective treatment, however, it is unknown whether it is more effective than nicotine replacement therapy (NRT). Additionally, behavioral strategies such as cognitive behavioral therapy (CBT) have also been found effective in aid of smoking cessation. This study aims to determine the best method of smoking cessation among varenicline with behavioral therapy, and nicotine replacement therapy with behavioral therapy among adult smokers. In a systematic review of peer-reviewed articles from 2013 to 2024, five studies were identified, including randomized controlled trials, community-based interventional studies, and prospective cohort studies. The primary intervention in these studies compared three approaches: varenicline, behavioral therapy, and nicotine replacement therapy, assessing their abstinence rates through self-reports or carbon monoxide verification at weeks 4 to 52. Over 52 weeks, varenicline combined with CBT was associated with higher cessation rates compared to NRT with CBT. Additionally, varenicline was more effective in reducing nicotine cravings before smoking cessation, while NRT was more effective in managing cravings after cessation. While varenicline combined with CBT demonstrates the highest cessation rates, future research should aim to optimize intervention combinations to enhance outcomes across diverse populations. Strategies to improve adherence and reduce side effects will be essential for achieving long-term smoking cessation success.

Development of Microbial Compounds Derived from Actinomycetes as Eco-Friendly Solutions for the Management of Grape Diseases

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Soil microbes play a crucial role in plant health, offering sustainable alternatives to synthetic chemicals for disease management. Among these, Actinomycetes are known for producing bioactive compounds with antimicrobial properties that help combat fungal and plant diseases while reducing the expenses and adverse environmental effects associated with chemical inputs. This study aimed to identify microbial strains with antifungal activity against two major grape diseases, anthracnose and gray mold, which also impact economically important crops such as strawberries, vegetables, and ornamental plants. These fungal pathogens cause significant agricultural losses, necessitating effective and sustainable disease management strategies. A total of 223 bacterial strains were screened, of which 42 exhibited significant inhibitory effects on fungal growth. These strains were further evaluated under laboratory conditions to assess their potential as biological control agents. Our findings highlight the ability of select Actinomycetes strains to serve as eco-friendly alternatives to chemical fungicides, enhancing crop protection while minimizing environmental impact. By leveraging the natural antifungal properties of these microorganisms, farmers may reduce reliance on synthetic fungicides, thereby promoting sustainable farming practices while mitigating negative effects on human health and soil biodiversity. Additionally, the application of Actinomycetes-based biocontrol agents could help improve food security and contribute to climate change mitigation by supporting healthier, more resilient agricultural systems. Future research will focus on characterizing the active compounds responsible for antifungal activity, understanding their mechanisms of action, and optimizing their application for agricultural use. Further studies may also explore their compatibility with existing farming practices and their potential for large-scale implementation. This research contributes to the growing body of knowledge supporting biological control as a viable and environmentally friendly strategy for plant disease management.

Bubbling Beneath the Waves: Exploring Habitats and Communities of Methane Seeps Along the U.S. Atlantic Margin

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Methane seeps are a type of 'cold seep' where methane escapes from cracks in the ocean floor. These habitats are known in all major oceans and primarily occur in deep waters below the photic zone. In the absence of sunlight, methane forms the base of the food chain for chemosynthetic microbes such as bacteria. Over time, these microbes form calcium carbonate, which provides a hard substrate for attachment by other animals like clams and mussels, tubeworms, crustaceans, and deep-sea corals and sponges. These communities are ecologically significant because they provide habitat and may serve as nursing/breeding grounds for many fish, shark, ray, and octopus species. It is therefore important that we better understand where methane seeps occur and the composition of their biological communities. In support of this need, the purpose of this project was to analyze seafloor images taken from several known seep sites along the U.S. Atlantic margin to characterize the visible habitat and invertebrate communities. Seafloor images were collected with a remotely operated vehicle (ROV) aboard NOAA Ship Okeanos Explorer in 2018 and 2019. The habitat visualized in each image was categorized according to its dominant substrate (e.g., muddy sand, muddy sand with carbonate, muddy sand with mussel shells) and invertebrate fauna were identified and annotated using the online image annotation platform BIIGLE 2.0. Habitat and community structure were compared between seep sites to investigate the degree to which they differ along the U.S. Atlantic margin.

Development of an AI-assisted Next-generation Imaging Flow Cytometry (AIFC) for Blood Cell Classification

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Blood cell activation and heterogeneity are key indicators in inflammatory responses and immune disorders. The heterogeneity of blood cells can be detected in the natural variation of their morphology, mechanical properties, and biochemical compositions, etc. This project presents an AI-assisted imaging flow cytometry (AIFC) system for real-time classification of blood cells. Using a pre-trained model, the system automatically detects and categorizes cells from microscopy images. The cell velocity can be simultaneously measured based on pixel displacement through frames and frame rate. This velocity data is inputted into a closed-loop control system, adjusting a custom syringe pump to regulate flow dynamics. The mechanical properties of single cells can be extracted based on their deformation behaviors and constitutive models. By integrating AI-driven classification with adaptive fluidic control, this next-generation AIFC system offers a robust platform for high-throughput, precise, automated single cell analysis with potential applications in the diagnostics of hemolytic diseases, immune diseases, and other diseases.

Efficacy of Different Traps in the Capture of Aedes Albopictus Mosquitoes on the Eastern Shore of Maryland

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With over 3,500 species worldwide, mosquitoes are important insects, as they are the vectors of many serious parasitic and viral diseases, such as malaria, dengue, and yellow fever. Due to this, reliable surveillance is important to identify the potential viruses present in different regions. Unfortunately, the sampling tools used in mosquito surveillance has variable efficacies for different vector species. The present study was conducted to identify the mosquito species present in the Eastern Shore region of Maryland and compare the efficacy of different traps in sampling Aedes albopictus. Eight trap types, namely, BG Trap with BG Lure only, BG Trap with BG Lure and CO2, BG Trap with CO2 only, BG Trap with octanol, Gravid Trap with chicken manure and hay infusion, CDC Light Trap with CO2 only, CDC Light Trap with Light only, and Dark CDC Light Trap with CO2 only were set side by side in four locations in Salisbury (Wicomico County) and Princess Anne (Somerset County), Maryland. This study ran from July 9th to August 16th, with a plan of sampling mosquitoes 4 days each week. However, due to rainfall event, the experiment was replicated for a total of 10 days. In this period a total of 3691 mosquitoes representing 5 genera and 22 species were collected. In decreasing order, the most abundant species in the collection was Ae. albopictus (1997 females), followed by Culex pipiens (1361 females) and then Cx. restuans (80 females). Statistical analysis showed significant variation in numbers of Ae. albopictus captured in different traps ($p<0.001$). It was found that BG Trap with BG lure and CO2 collected the highest number of Aedes albopictus, followed by BG Trap with CO2 only and Gravid Trap with chicken manure and hay infusion. Results are discussed in relation to surveillance and control of mosquito vectors of diseases.

Establishing a Colony of *Culex* Mosquitoes in a UMES Insectary

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Mosquitoes are vectors of infectious human and animal diseases. In order to develop effective strategies for the control of these diseases, it is important to plan control programs for the mosquito vectors. To do this, laboratory colonies of mosquitoes will be important models for studying mosquito biology, mosquito-pathogens interactions and susceptibility to insecticides. In this study, our objective was to establish a viable colony of local Culex mosquitoes in our insectary at UMES. In order to accomplish this objective, larvae of Culex mosquitoes were collected from Culex mosquito gravid traps that were set by our research team on UMES campus. Various instar larvae from hay infusion water were transferred into trays with purified water in the insectary. The mosquito larvae were fed ground cat food and allowed to mature to pupae before being transferred into water bowls and placed in adult cages to emerge as adults. Cages were placed in the incubator and maintained at 16/8 hours light-dark cycle, and 70-80% relative humidity. After emergence from pupae, adult Culex mosquitoes were fed on water and 10% syrup mixture. Five to six days post emergence, mosquitoes were offered chicken or goat blood through a membrane feeding device overnight. At 48 h post blood feeding, gravid females were provided with egg traps made of hay infusion water to facilitate oviposition. We observed egg rafts in the egg traps after 48 hours, and first instar larvae were seen 5 – 6 days after setting the egg traps. We have successfully cultured two generations of Culex mosquitoes in our insectary. We plan to conduct specie-specific identification of the mosquitoes through microscopic examination and genome sequencing analysis. The colony will then be used in biological and behavioral studies, and insecticide susceptibility tests.

Exosome-Laden miR-423 Inhibitor Promotes Bone Defect Healing in an OVX Mouse Model

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Reconstruction of bone defects, especially in the context of chronic conditions like osteoporosis, remains a significant clinical challenge. Traditional graft-based approaches have been widely used for bone reconstruction; however, they are limited by donor availability and the risk of disease transmission. Mesenchymal stem cells (MSCs), known for their self-renewal and multi-differentiation capacities, have been extensively documented in bone repair and regeneration. Despite their potential, direct MSC transplantation is associated with several drawbacks, including immune rejection and the risk of tumor formation. As an alternative, MSC-derived exosomes have emerged as a promising therapeutic modality due to their intrinsic homing ability, stability in circulation, low immunogenicity, and capacity to effectively modulate molecular signaling pathways. Furthermore, the regenerative potential of exosomes can be enhanced by loading them with therapeutic factors. In our recent studies, we observed that exosomes derived from bone marrow MSCs harvested from ovariectomized (OVX) mice—an osteoporosis model—showed increased expression of miR-423 compared to exosomes from Sham mice. Notably, inhibition of miR-423 in OVX-derived exosomes enhanced their osteogenic potential. Based on these findings, we hypothesize that exosome-loaded miR-423 inhibitors could promote bone defect healing in osteoporotic conditions. To test this hypothesis, we developed a novel method for loading miR-423 inhibitors into MSC-derived exosomes. We then evaluated the osteogenic differentiation of these exosome-laden inhibitors in vitro. Furthermore, the exosome-miR-423 inhibitor complex was incorporated into an apatite-coated PLGA scaffold and implanted into calvarial defects in both OVX and Sham mice. MicroCT imaging and histological analyses were performed to assess the efficacy of bone healing.

Our results demonstrate that exosome-laden miR-423 inhibitors promote osteogenic differentiation in vitro. In vivo, the exosome/scaffold complex implanted into calvarial defects in both OVX and Sham mice. MicroCT imaging and histological analyses were performed to assess the efficacy of bone healing. Our results demonstrate that exosome-laden miR-423 inhibitors promote osteogenic differentiation in vitro. In vivo, the exosome/scaffold complex significantly enhanced bone healing in OVX mice, as shown by microCT and histological analysis. These findings suggest that exosome-loaded miR-423 inhibitor shows translational potential for promoting bone defect healing in osteoporotic conditions.

How does Hydrodynamic Ice events Impact Sediment Plume in the Southern Basin of Lake Michigan?

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Lake Michigan has undergone extensive research throughout the years. Some of this extensive research includes the study of plume events. Studying for these plume events in warmer conditions became the norm; therefore, there is now not much research about sediment plume during the winter. This project aims to understand the impacts of ice on sediment suspension in the southern basin of Lake Michigan. Satellite images were collected, then put into a spreadsheet in order to research plume cases from 2018 to 2024. This spreadsheet was used to pick the most interesting plume cases. After picking the most interesting plume cases from 2018–2020, models were used for further research. One of these models was an ice cover map that was able to determine the percentage of ice cover in southern Lake Michigan. Another model called the FVCOM-CICI-SWAVE was used to calculate bottom stress. This model is a complex model that includes the ice model and wave dampening. This model is able to show total bottom stress, bottom stress due to lake current, and bottom stress due to waves. It is then able to show the effects with or without ice.

Human-Operated Planetary Surface Exploration Smart Tools for Artemis Lunar Missions

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The upcoming NASA Artemis 3 mission, set to explore the Moon's South Pole, is focused on identifying and analyzing water resources. To support this objective, astronauts will require advanced planetary surface exploration tools capable of conducting in-situ analysis of water content within rock samples, as well as measuring fundamental properties like mass and size. With more than five decades since the last human-operated tools were used on the lunar surface, this mission presents an unprecedented opportunity to innovate, leveraging cutting-edge technology to enhance lunar exploration capabilities. The purpose of this project was to develop efficient tools for Artemis astronauts to use to prospect and collect lunar surface rock samples. Efficiency was measured in terms of the time required to collect a rock sample and the body's energy burn to perform the task. Faster times and lower energy consumptions resulted in better efficiency. The project commenced with an extensive definition phase, carefully identifying key tool functionalities that align with the mission's scientific objectives, environmental constraints, and operational heuristics. The design process drew from both historical Apollo-era tools and modern technological advancements such as integrating computer-aided design, Bluetooth wireless communication and smart devices to enhance tool performance and adaptability. Multiple design iterations were assessed through relative comparison and refined through detailed CAD modeling, incorporating human factors to ensure ergonomic efficiency, durability, and ease of use in the challenging lunar environment. The most promising design was built and tested in a lunar yard located in the High Bay of the Engineering and Aviation Sciences Complex. Our testing of different style tools indicated that our tool design was more 4 times more efficient, lightweight, and multifunctional compared to the tools used by the Apollo-era astronauts. Moreover, the integration of automation, sensor-based feedback systems, and modular adaptability ensures our tool design not only meets current mission requirements but also serves as a foundation for future lunar and planetary exploration needs. The tool's Technology Readiness Level (TRL) is currently at 3 and we are taking steps to advance the TRL to 9 in order to create a flight-ready version of the smart toolset.

On-farm Demonstration: Showcasing Climate–Smart Agricultural Practices

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Small and minority farmers are greatly affected by climate change as they heavily rely on natural resources like water, forests, pasture, and land to operate their small-scale farms. This means they are severely impacted by climate change phenomena, including crop loss, the emergence of new pests and diseases, water scarcity, soil erosion, and market price instability. However, despite the long-term socio-economic and environmental benefits of climate-smart agriculture (CSA), adopting such CSA practices is a daunting challenge for small and minority farmers in Maryland. Major barriers to adopting CSA are limited access to information, insufficient technical support, the uncertainty of carbon markets, lack of financial incentives, limited risk-bearing capacity, and inadequate knowledge and awareness of accrued socioeconomic and environmental benefits. The objectives of this project were to create awareness and build the capacity of these small and minority farmers in CSA and to engage them in adaptation and mitigation practices. After building a rapport, UMES Extension recruited a farmer from Mardela Springs, Wicomico County, who showed enormous interest and dedicated over two acres to developing alley cropping of fruit trees and specialty vegetables in the summer of 2024. Altogether, potentia-

lly high carbon sequestering fruit trees (persimmon = 51 and fig = 52) were planted after taking soil samples to compare the impact of CSA intervention on carbon sequestration before the plantation, in between, and after a few years of plantation. In addition, bell pepper, tomato, sweet potato, cantaloupe, eggplant, and watermelon were planted in the alleys as under-canopy crops to generate operational cash flow while the fruit trees were growing. Following the CSA approach, minimum tillage was practiced, degradable fabrics were used to suppress the growth of weeds, and natural mulch and fertile topsoil were used to minimize the use of chemical fertilizer, increase water use efficiency, and maintain soil health. UMES Extension intends to replicate the on-farm demonstration model of CSA in other counties of Maryland for experiential learning, applied research, education, and outreach.

Screening a Small Organic Compound for Potential Antiseizure Activity in the Zebrafish PTZ Model

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Epilepsy is a chronic neurologic disorder that affects over 70 million people worldwide. Despite the availability of over twenty antiseizure drugs for symptomatic treatment of epileptic seizures, about one-third of patients have drug-resistant epilepsy. T-type calcium channels play a critical role in epilepsy making them an important drug target. In this study, the impact of the novel compound RHB62, known for its activity against T-type calcium channels, was evaluated in zebrafish subjected to pentylenetetrazole (PTZ)-induced seizures. Adult zebrafish were weighed and then anesthetized in an ice water bath. Once anesthetized, the fish received a single intraperitoneal injection (i.p.) of 1% DMSO or 50 mg/kg RHB62 dissolved in the 1% DMSO. After a 15-minute recovery period, the fish were exposed to PTZ (170 mg/kg, i.p.). Zebrafish behavior was manually observed and video-tracked using Ethovision software for fifteen minutes. Additionally, brain tissues were dissected and processed for qPCR analysis to examine the expression of early immediate genes commonly associated with epilepsy. This data revealed that the control fish moved at a faster velocity and traveled a longer distance over time compared to fish injected with RHB62. RHB62 reduced the severity of seizure-like behaviors and promoted calmer swimming patterns. These findings suggest that the novel compound RHB62 has antiseizure effects in the PTZ zebrafish model. Further studies are needed to understand how RHB62 works to prevent seizure-like activity and to check if it is safe and effective in drug-resistant epilepsy.

The Effects of Zinc on NHE3 Expression in Zebrafish Kidneys and on Cell Viability

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The sodium-proton exchanger 3 (NHE3), located in the apical membrane of the proximal tubule of the nephron, plays a crucial role in sodium and water reabsorption, contributing to increased blood volume and hypertension. The activity of NHE3 is modulated by insulin receptor signaling, while zinc cations (Zn^{2+}) are essential for insulin synthesis and function as insulin mimetics. Additionally, zinc activates intestinal NHE3 through phospholipase C (PLC) signaling, raising the question of whether similar effects occur in the kidney. This study evaluated the effects of zinc chloride ($ZnCl_2$) on the expression of nhe3 and zinc transporter genes in zebrafish kidneys, as well as its impact on cell viability in a vertebrate cell line. Adult zebrafish were exposed to varying concentrations of $ZnCl_2$ (5, 10, or 20 mg/L) for one week, followed by tissue dissection and gene expression analysis. Results showed a significant increase in nhe3a and nhe3b expression at 5 and 10 mg/L $ZnCl_2$, whereas higher concentrations (20 mg/L) did not alter expression but reduced survival probability, indicating potential toxicity. In a parallel study, an MTS assay assessed $ZnCl_2$ toxicity in a vertebrate cell line. The cells exhibited a biphasic response: non-cytotoxic effects were observed at concentrations up to 10 µM, while higher concentrations caused significant cytotoxicity. PCR analysis confirmed the expression of zinc transporters in zebrafish kidney tissue, with a notable decrease in expression at 5 mg/L $ZnCl_2$. These findings highlight the concentration-dependent effects of $ZnCl_2$ on nhe3 expression and its potential cytotoxic impacts. Further research is needed to investigate the mechanisms linking NHE3 regulation and zinc transport pathways, which may provide insights into their role in sodium and water balance.

The Impact of *Beauveria Bassiana* on Squash Bugs Mortality

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Beauveria bassiana is an entomopathogenic fungus naturally found in soils and causes a disease known as the white muscadine disease in insects. The spores of this fungus invade the cuticle (skin) of insects first, then move to their host insect's inner body. The fungus causes disease that eventually kills the insect. This research aims to evaluate the efficacy of field-collected entomopathogenic fungi against squash bugs. The field-collected fungi are isolated from cadavers of insects and identified based on their colony color, as White and Pink, until further identification uses molecular techniques. Squash bugs were dipped into a fungal suspension and then placed into a petri dish that has a squash leaf. For comparison, control groups were treated with sterilized water, and data on mortality was collected daily. A Dip assay of the squash bugs showed that within three days, there was a 50% mortality rate in the pink and white strains. The study of the squash bug is at its preliminary stage, so dip and spray assay will be conducted in the upcoming season. This fungus shows its potential as a biological control agent in controlling the insect pest population.

Waste-Derived Carbon Adsorbents for Optimized PFAS Removal from Water

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2Department of Agriculture, Food and Resource Science, University of Maryland Eastern Shore, Princess Anne, MD 21853

Per- and polyfluoroalkyl substances (PFAS) are persistent environmental pollutants that pose significant risks to water quality and ecosystem health. Due to their chemical stability and resistance to degradation, conventional treatment methods often struggle to effectively remove them from contaminated water sources. This study evaluates the adsorption efficiency of engineered waste-derived natural carbon materials for PFAS remediation, focusing on optimizing surface modifications to enhance adsorption performance. A series of proprietary carbon-based treatments were developed, incorporating targeted functionalization strategies to improve PFAS affinity and removal efficiency. Surface characterization will assess key parameters such as porosity, surface charge, and functional groups to elucidate adsorption mechanisms. To investigate adsorption kinetics, specificity, and long-term performance, a diverse mixture of PFAS compounds, representing both short- and long-chain structures, will be utilized. Comparative adsorption experiments will evaluate removal efficiencies across different PFAS types, assessing time-scale adsorption dynamics. Preliminary results indicate that the developed material and adsorption protocol achieved over 99% removal efficiency for both short- and long-chain PFAS. One of the proprietary materials exhibited superior performance compared to unmodified controls, highlighting the effectiveness of the engineered carbon-based adsorbents. By integrating advanced carbon material modifications with sustainable waste-derived resource utilization strategies, this research seeks to develop scalable and eco-friendly remediation solutions. The findings will contribute to the advancement of innovative PFAS mitigation technologies, addressing the urgent need for effective and sustainable approaches to water treatment and environmental protection.

Water Quality of Dead End Canals

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1. University of Maryland Eastern Shore Princess Anne
2. Albany State University Georgia

Ocean City, MD concerns have arisen regarding horseshoe crabs in the dead-end canals, which are man-made channels opening into coastal lagoons. These canals can negatively impact water quality due to pollutants from sewage systems and human activities. Temperature and dissolved oxygen levels are two critical factors influencing horseshoe crab health, as high temperatures can cause heat stress and low dissolved oxygen levels hinder oxygen extraction. This study aimed to evaluate the effects of water and sediment conditions in dead-end canals on horseshoe crab survival, with potential implications for marine life and human health. Water and sediment samples were collected from various locations within the canals, and water quality was assessed using a YSI Exo 2, focusing on temperature and dissolved oxygen. Sediment samples were analyzed for contaminants, including metals. Temperature readings ranged from 28.5°C to 35°C, with a noticeable daily fluctuation, while dissolved oxygen levels were extremely low, indicating potential hypoxic stress for horseshoe crabs. While temperature and dissolved oxygen alone may not directly cause mortality, they contribute to cumulative stress, particularly when combined with reproductive stress, potentially leading to horseshoe crab mortality.

JUDGES' SCHEDULE - ORAL AND POSTER SESSIONS

JUDGES' COMMITTEE

Dr. Jackson-Ayotunde and Ms. Uchenna Nwonye

	NAME	SESSION	TIME	LOCATION	TYPE
		ORAL SESSIONS			
1	Dr. Kamil Alzayady	OF1-OF5	9:45 am - 10:45 am	Theater	Faculty
2	Dr. Madan Kharel	OF1-OF5	9:45 am - 10:45 am	Theater	Faculty
3	Dr. Salina Parveen	OF1-OF5	9:45 am - 10:45 am	Theater	Faculty
4	Dr. Rob Richerson	OF6-OF10	11:00 am-12:00 pm	Theater	Faculty
5	Dr. Michael Lane	OF6-OF10	11:00 am-12:00 pm	Theater	Faculty
6	Dr. Joseph Pitula	OF6-OF10	11:00 am-12:00 pm	Theater	Faculty
7	Dr. Abhijit Nagchaudhuri	OD1-OD5	9:45 am - 10:45 am	2149	Doctoral
8	Dr. Theophilus Isimikalu	OD1-OD5	9:45 am - 10:45 am	2149	Doctoral
9	Dr. Matthew Balish	OD1-OD5	9:45 am - 10:45 am	2149	Doctoral
10	Dr. Ibibia Dabipi	OD6-OD10	11:00 am-12:00 pm	2149	Doctoral
11	Dr. Zheng Xi	OD6-OD10	11:00 am-12:00 pm	2149	Doctoral
12	Dr. Williams Mark	OD6-OD10	11:00 am-12:00 pm	2149	Doctoral
13	Dr. Tao Gong	OD11-OD15	9:45 am - 10:45 am	2147	Doctoral
14	Dr. Masoud Moghaddam	OD11-OD15	9:45 am - 10:45 am	2147	Doctoral
15	Dr. Mohammad Ali	OD11-OD15	9:45 am - 10:45 am	2147	Doctoral
16	Dr. Monisha Das	OD16-OD19	11:00 am-11:45 am	2147	Doctoral
17	Dr. Naveen Dixit	OD16-OD19	11:00 am-11:45 am	2147	Doctoral
18	Dr. Etahe Johnson	OD16-OD19	11:00 am-11:45 am	2147	Doctoral
19	Ms. Andrea Taylor	OM1-OM6	9:45 am-11:00 am	2144	Master's
20	Dr. Dannise Ruiz	OM1-OM6	9:45 am-11:00 am	2144	Master's
21	Dr. Emmanuella Twumasi	OM1-OM6	9:45 am-11:00 am	2144	Master's
22	Ms. Esther Dabipi	OM7-OM11	11:15 am-12:15 pm	2144	Master's
23	Dr. Michael Serwornoo	OM7-OM11	11:15 am-12:15 pm	2144	Master's
24	Dr.Purushothaman Natarajan	OM7-OM11	11:15 am-12:15 pm	2144	Master's
25	Dr. Subhasis Mandal	OM12-OM13	9:45 am-10:00am	Ballroom	Master's
26	Dr. Sungjae Hwang	OM12-OM13	9:45 AM-10:00AM	Ballroom	Master's
27	Ms. Atoya Saturria-Feliz Coker	OU1-OU5	9:45 am-10:45 am	2146	Undergraduate
28	Mr. Samuel Kikile	OU1-OU5	9:45 am-10:45 am	2146	Undergraduate
29	Ms. Karen Gitau	OU1-OU5	9:45 am-10:45 am	2146	Undergraduate
30	Dr. Yuhao Qiang	OU6-OU11	11:00am-12:15 pm	2146	Undergraduate
31	Ms. Joy Enahoro	OU6-OU11	11:00am-12:15 pm	2146	Undergraduate
32	Dr. Kathleen Davis-Bierman	OU6-OU11	11:00am-12:15 pm	2146	Undergraduate
33	Dr. Megan Reid-Fitten	OU12-OU15	10:00 am-10:45 am	Multipurpose Room	Undergraduate
34	Dr. Paul G. Suplee	OU12-OU15	10:00 am-10:45 am	Multipurpose Room	Undergraduate
35	Ms. Stella Ayika	OU12-OU15	10:00 am-10:45 am	Multipurpose Room	Undergraduate
36	Ms. Feyisetan Beke	OU16-OU19	11:00 am-11:45 am	Multipurpose Room	Undergraduate
37	Ms. Shweta Kharal	OU16-OU19	11:00 am-11:45 am	Multipurpose Room	Undergraduate
38	Mr. Simala Wright	OU16-OU19	11:00 am-11:45 am	Multipurpose Room	Undergraduate

JUDGES' SCHEDULE - POSTER SESSIONS

JUDGES' COMMITTEE
Dr. Jackson-Ayotunde and Ms. Uchenna Nwonye

	NAME	SESSION	TIME	LOCATION	ALTERNATES
	ORAL SESSIONS				
1	Dr. Nicole Hollywood	PD1-PD5	1:30 pm - 3:00 pm	Ballroom	Mr. Erasmus Aduteye
2	Dr. Aaron Persad	PD1-PD5	1:30 pm - 3:00 pm	Ballroom	Dr. Iram Elamin
3	Dr. E.N. Escobar	PD1-PD5	1:30 pm - 3:00 pm	Ballroom	Ms. Priscilla Kini
4	Dr. Simon Zebelo	PD6-PD10	1:30 pm - 3:00 pm	Ballroom	Ms. Priscilla Okyere
5	Dr. Anitra Brockman	PD6-PD10	1:30 pm - 3:00 pm	Ballroom	Ms. Taiwo Oluyemo
6	Dr. Vagner Benedito	PD6-PD10	1:30 pm - 3:00 pm	Ballroom	Ms. Trishala Mohan
7	Dr. Caleb Nindo	PD11-PD15	1:30 pm - 3:00 pm	Ballroom	Ms. Tracey DiRusso
8	Dr. Chelsea Richardson	PD11-PD15	1:30 pm - 3:00 pm	Ballroom	Dr. George Ojie-Ahamiojie
9	Dr. Min Byungrok	PD11-PD15	1:30 pm - 3:00 pm	Ballroom	Ms. Mercy Amofa
10	Dr. Ananta Adhikari	PM1-PM5	1:30 pm - 3:00 pm	Ballroom	
11	Dr. Charmita Burch	PM1-PM5	1:30 pm - 3:00 pm	Ballroom	
12	Dr. Anuradha Don	PM1-PM5	1:30 pm - 3:00 pm	Ballroom	
13	Dr. Ahmed Elnabawi	PM6-PM10	1:30 pm - 3:00 pm	Ballroom	
14	Dr. Xavier Henry	PM6-PM10	1:30 pm - 3:00 pm	Ballroom	
15	Dr. Bryan Gere	PM6-PM10	1:30 pm - 3:00 pm	Ballroom	
16	Dr. Jiabing Fan	PM11-PM15	1:30 pm - 3:00 pm	Ballroom	
17	Dr. Ali Ishaque	PM11-PM15	1:30 pm - 3:00 pm	Ballroom	
18	Dr. Jennifer Timmons	PM11-PM15	1:30 pm - 3:00 pm	Ballroom	
19	Dr. Jocelyn Reader	PM16-PM20	1:30 pm - 3:00 pm	Ballroom	
20	Dr. Kathryn Barrett-Gaines	PM16-PM20	1:30 pm - 3:00 pm	Ballroom	
21	Dr. Papaiah Sardaru	PM16-PM20	1:30 pm - 3:00 pm	Ballroom	
22	Dr. M.D. Sarker	PM21-24	1:30 pm - 3:00 pm	Ballroom	
23	Dr. Madhumi Mitra	PM21-PM24	1:30 pm - 3:00 pm	Ballroom	
24	Dr. Shannon Paige Clark	PM21-PM24	1:30 pm - 3:00 pm	Ballroom	
25	Ms. Corrie Cotton	PU1-PU5	1:30 pm - 3:00 pm	Ballroom	
26	Dr. Wayne Omagamre	PU1-PU5	1:30 PM - 3:00 PM	Ballroom	
27	Ms. Mary Twumasi	PU1-PU5	1:30 pm - 3:00 pm	Ballroom	
28	Dr. Mobolaji Okulate	PU6-PU10	1:30 pm - 3:00 pm	Ballroom	
29	Dr. Mohammad Hussain	PU6-PU10	1:30 pm - 3:00 pm	Ballroom	
30	Dr. Etahe Johnson	PU6-PU10	1:30 pm - 3:00 pm	Ballroom	
31	Ms. Fawzia A. Abbas	PU11-PU14	1:30 pm - 3:00 pm	Ballroom	
32	Ms. Cy'Anna Scott	PU11-PU14	1:30 pm - 3:00 pm	Ballroom	
33	Dr. Khaled Hasan	PU11-PU14	1:30 pm - 3:00 pm	Ballroom	

MODERATORS' SCHEDULE - POSTER & ORAL SESSIONS

	MODERATOR	SESSION	TIME	LOCATION	Presentation
			ALL SESSIONS		
1	Dr. George Ojie Ahimoje	OF1 - OF10	9:45 am- 12:15 pm	Theater	Oral Faculty
2	Dr. Madhumi Mitra	OD1 - OD11	9:45 am- 12:15 pm	2149	Oral Doctoral
3	Ms. Priscilla Kini	OD12 - OD20	9:45 am- 12:15 pm	2147	Oral Doctoral
4	Ms. Corrie Cotton	OM1 - OM11	9:45 am- 12:15 pm	2144	Oral Masters
5	Ms. Kimberly Okpah	OM12 - OM13	9:45 am- 12:15 pm	Ballroom	Oral Masters
6	Ms. Charity Akpovino	OU1 - OU11	9:45 am- 12:15 pm	2146	Oral Undergraduates
7	Ms. Brian Goodwyn	OU12 - OU19	9:45 am- 12:15 pm	Multipurpose Room	Oral Undergraduates
8	Ms. Priscilla Kini	PD1 - PD15	1:30 pm - 3:00 pm	Ballroom	Poster Doctoral
9	Ms. Taiwo Oluyemo	PM1 - PM 21	1:30 pm - 3:00 pm	Ballroom	Poster Master's
10	Ms. Mohammad Kaba	PU1 - PU 14	1:30 pm - 3:00 pm	Ballroom	Poster Undergraduate
	ALTERNATES				
	Feyisetan Beke				
	Angel Cooper				

Seed Grant Winners

The UMES Interdisciplinary Research Center

Dr. Molly Selba

Project Title: Bridging Anatomy and Community: Perspectives on Cadaveric Dissection at Minority-Serving Institutions

This study addresses the absence of Historically Black Colleges and Universities (HBCU) voices in the gross anatomy cadaver lab experience. We plan to explore and document perspectives on cadaveric dissection at various HBCUs, with an initial focus on the University of Maryland Eastern Shore.

By examining the beliefs, feelings, and cultural factors that influence attitudes toward cadaveric anatomy education, the study aims to contribute to a more inclusive and supportive environment in the anatomical sciences.

Additionally, this multidisciplinary research seeks to inform best practices for cadaver lab operations and community engagement, ultimately enhancing educational experiences for students and fostering positive relationships with the communities served by these institutions.

Dr. Masoud Moghaddam

Project Title: Investigating the Effects of Pain Education on Kinesiophobia and Quality of Life in Individuals with Knee Osteoarthritis

Osteoarthritis (OA) is a major cause of pain and disability in the United States, affecting 32.5 million Americans and costing society $486 billion each year. Knee OA is the most prevalent form and causes pain, stiffness, and mobility limitations, significantly affecting quality of life. A major barrier to effective OA management is kinesiophobia, or fear of movement, which results in physical inactivity, muscle weakness, and accelerated disease progression. Many patients with knee OA mistakenly believe that exercise will worsen their condition, leading to a fear-voidance cycle that further reduces joint function and overall health. While traditional OA treatments often emphasize symptom relief through medication or joint injections, they often neglect the psychological barriers to physical activity.

The UMES Seed Grant makes this study possible by enabling us to investigate innovative approaches to OA management. With this funding, we can develop and implement a structured, five-module pain education program aimed at reducing kinesiophobia and improving physical activity participation and quality of life in individuals with knee OA. Participants will receive targeted education on pain neurophysiology and the benefits of exercise. The study will assess changes in kinesiophobia, functional mobility, and pain literacy using validated questionnaires and physical activity tracking. We aim to empower individuals with knee OA to overcome fear-driven avoidance behaviors and adopt more active lifestyles by improving their understanding of pain.Findings from this study will provide valuable insights into the feasibility and effectiveness of integrating pain education into OA treatment protocols. This novel approach will enhance patient outcomes and reduce the disease burden by addressing OA's physical and psychological aspects. Our overarching goal is to provide a feasible, evidence-based approach to integrating pain education into OA treatment protocols.

Seed Grant Winners

The UMES Interdisciplinary Research Center

Dr. Purushothaman Natarajan

Project Title: Comparative Analysis of Disease Resistance-Related Topologically Associated Domains (TADs) and Gene Expression in Wild and Cultivated Grapevine

Grapevine cultivation faces major challenges due to the reduced genetic diversity of Vitis vinifera, leading to its increased susceptibility to diseases. In contrast, native American Vitis species, including V. aestivalis and V. rotundifolia, demonstrate superior disease resistance, suggesting that differences in chromatin architecture and gene regulation play a key role in pathogen defense.

This study utilizes Hi-C and RNA-Seq technologies to compare the three-dimensional chromatin organization of wild and cultivated grape species, focusing on how Topologically Associated Domains (TADs) influence gene expression in disease resistance pathways. By integrating chromatin structure mapping with differential gene expression analysis, this research aims to uncover genomic mechanisms that could inform future breeding programs for disease-resistant grape varieties. The findings will support sustainable agriculture efforts and contribute valuable insights to crop improvement strategies.

Dr. Charlene Harris

Project Title: Step Up with FCS! Stand Out from the Rest

The Step Up with FCS! Stand Out from the Rest initiative is a collaboration between the Family and Consumer Sciences (FCS) program in the Department of Human Ecology and 4-H Extension at UMES. The program is designed to increase awareness of FCS-related careers among high school students in Somerset County. This four-week curriculum integrates theoretical learning with hands-on experiences in child development, family life education, fashion design, and career preparedness. The goal is to inspire middle and high school students to explore FCS as a college major and career pathway while strengthening the connection between secondary education and postsecondary opportunities at UMES. The study seeks to evaluate the impact of program participation on students' knowledge of FCS majors and careers, assess their interest in pursuing FCS in college, and determine the initiative's effectiveness in strengthening pathways to UMES' MAT FCS program. Additionally, it aims to identify which FCS areas generate the most student interest, informing targeted recruitment strategies and future outreach efforts. By bridging research with real-world applications, this initiative enhances student exposure to FCS careers while reinforcing UMES' partnerships with local schools, creating a stronger pipeline for students pursuing FCS-related fields. Findings from the study will contribute to broader research on career development in secondary education, particularly within underrepresented and rural communities. The project also supports UMES' long-term outreach and recruitment strategies, establishing a sustainable model for FCS career exploration that fosters student success in higher education and workforce development.

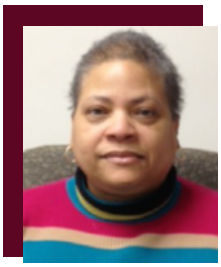
Graduate Programs & Directors

Dr. Asad Azemi
M.S. Applied Computer Science

Dr. Asad Azemi
Ph.D.. Applied Computing and Engineering

Dr. Tyler Love
M.Ed. Career and Technology Education

Dr. Victoria Volkis
M.S. Chemistry

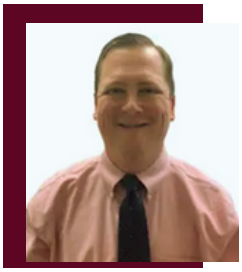


Dr. Cheryl Bowers
M.Ed. Counselor Education

Dr. Robert Brown
M.S. Criminology & Criminal Justice

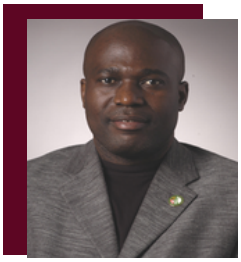
Dr. Derrek Dunn
M.S. Applied Cybersecurity Engineering

Dr. Isaac Marcelin
M.S. Data Science and Analytics Engineering



Dr. Ernest England
Ed.D. Education Leadership

Dr. Yuanwei Jon
M.S. Electrical and Mechatronics Engineering



Dr. Stephan Tubene
M.S. Food and Agricultural Sciences

Dr. Caleb Nindo
Ph.D. Food and Agricultural Sciences

Dr. Bridgett Clinton-Scott
M.S. Human Ecology

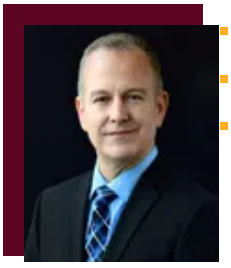
Dr. Grattan C. Baldwin
Master of Arts in Teaching (MAT)

Dr. Stephen Tomasetti
M.S./Ph.D. Marine Estuarine Environmental Science (MEES)

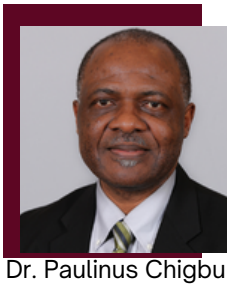
Dr. Tao Gong
Ph.D. Organizational Leadership

Dr. Patrice Jackson-Ayotunde
M.S./Ph.D. Pharmaceutical Sciences

Nicole Wooten, PA-C, MHS
M.M.S. Physician Assistant Studies



Dr. Michael Rabel
Doctor of Physical Therapy (DPT)



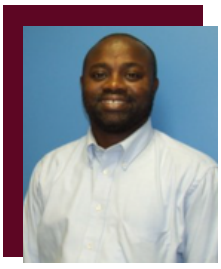
Dr. Paulinus Chigbu
P.S.M. Quantitative Fisheries & Resource Economics

Dr. Bryan Gere
M.S. Rehabilitation Counselling

Dr. Kimberly Poole-Sykes
M.Ed. Special Education

Dr. Kim Poole-Sykes
Special Education (Post-Baccalaureate Certificate)

Dr. Miriam Purnell
Rural Health Disparities (Post-Baccalaureate Certificate)



Dr. Ali Ishaque
M.S. /Ph.D. Toxicology

Notes

Notes

See You Next Year!

Contact Information

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