79TH JOINT ANNUAL MEETING OF NIS/BKX

PROGRAM GUIDE

Sustainable STEM: Resilience in a Changing Climate

MARCH 27-30, 2024

AT THE

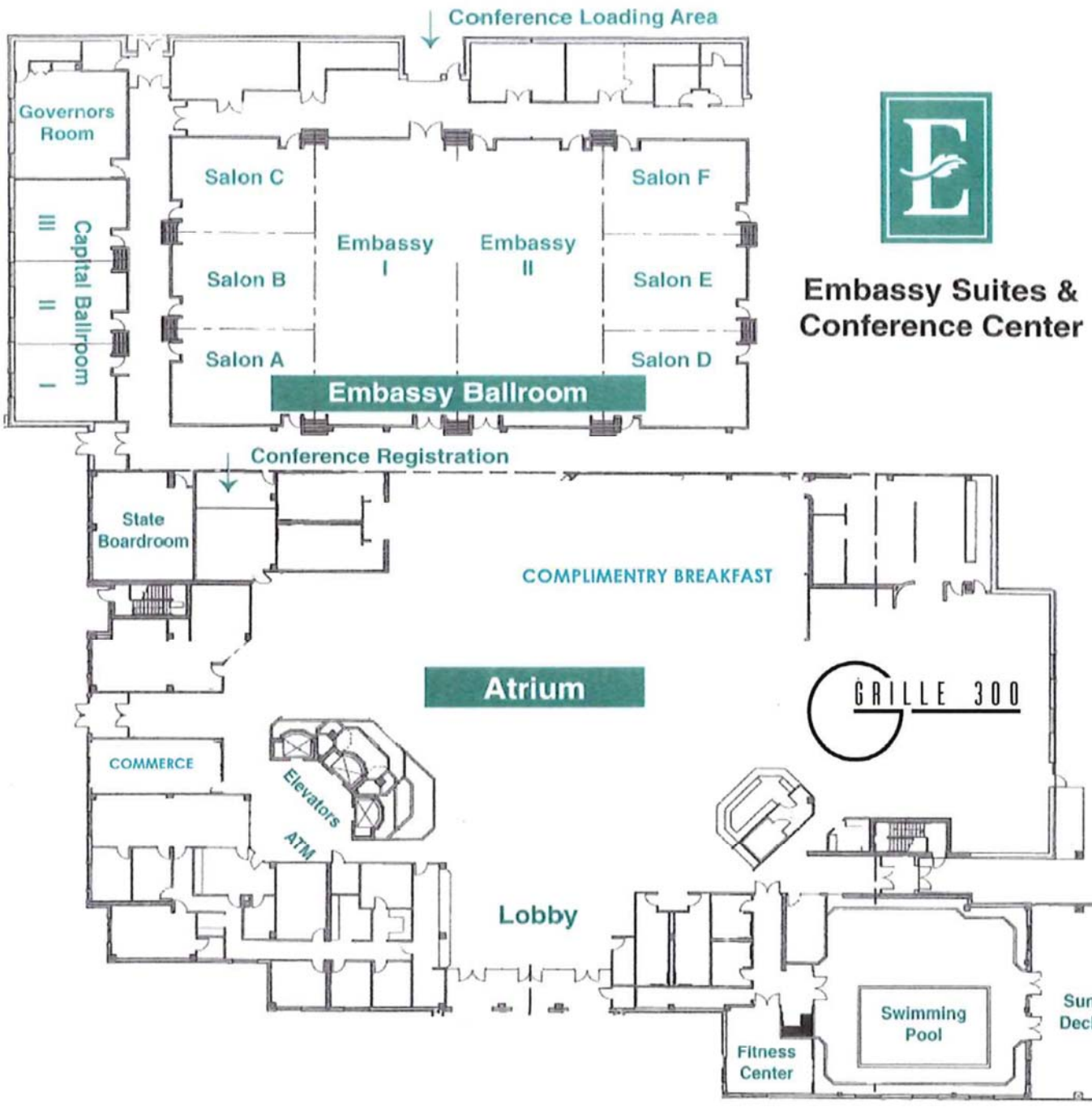
EMBASSY SUITES HOTEL

300 TALLAPOOSA STREET, MONTGOMERY, ALABAMA

HOSTED BY ALABAMA STATE UNIVERSITY

915 SOUTH JACKSON STREET, MONTGOMERY, AL 36104

EMBASSY SUITES BY HILTON
MONTGOMERY HOTEL & CONFERENCE CENTER



Embassy Suites & Conference Center

Meeting at a glance

"Sustainable STEM: Resilience in a Changing Climate"

79th JOINT ANNUAL MEETING of NIS/BKX

March 27-30, 2024

March 27, Wednesday - EMBASSY SUITES HOTEL		
2:00 PM – 8:00 PM	REGISTRATION	In front of Embassy Ballroom
5:30 PM – 6:30 PM	**OPENING PLENARY SESSION** Guest Speaker: **Dr. Thelma Ivery** ***"Recalling the Past, Contemplating the Present, and Creating the Future with BKX and NIS"***	Embassy I & II
6:00 PM – 7:00 PM	MEET AND GREET/ HOTEL COMPLIMENTARY HAPPY HOUR	Atrium
6:45 PM – 7:45 PM	JUDGES MEETING	Commerce
8:00 PM-9:00 PM	EXECUTIVE SESSION (NIS/BKX)	State Boardroom
March 28, Thursday - EMBASSY SUITES HOTEL		
7:00 AM – 8:30 AM	BREAKFAST (COMPLIMENTARY PROVIDED BY HOTEL)	Atrium & Montgomery Grill
8:30 AM – 12:00 PM	GRADUATE ORAL PRESENTATIONS GROUP A (Morning session)	Capital Ballroom
8:30 AM – 12:00 PM	GRADUATE ORAL PRESENTATIONS GROUP B (Morning session)	Salon A & B
UNDERGRADUATE ORAL PRESENTATIONS (Morning session)		
9:00 AM – 12:00 PM	CMPE (Chem; Comp. Sci; Phy; Math; Eng.) PSE (Psy; Soc. Sci., Env. Educ.)	Salon D

12:00 PM – 1:30 PM	**BKX LECTURE AND MEMORIAL LUNCHEON** **LECTURER: Marlin l. Ford, PhD, MPA** Farm Research Superintendent /Research Assistant Professor and Urban Agricultural Specialist at the Southern University Agricultural Research & Extension Center "*Promoting Sustainable Integration in STEN/STEAM Education, Research, and Outreach at Historically Black Colleges and Universities (HBCUs)* "	Embassy I & II
1:45 PM – 5:00 PM	**GRADUATE ORAL PRESENTATIONS** **(Afternoon sessions)**	Capital Ballroom
UNDERGRADUATE ORAL PRESENTATIONS **(Afternoon Sessions)**		
2:00 PM – 5:00 PM	BIO (Biology)	Salon D
5:45	**************JUDGING RESULTS DUE***************	Commerce
6:00 PM - 8:00 PM	**NISBKX DINNER SPEAKER:** **Sherrice Allen, PhD** Inclusive Learning Group Center for The Advancement of Science Leadership and Culture *"Be the Solution: Sustaining STEM by Executing the 3Ps (Prepare/Position/Produce)"*	Embassy I & II
March 29, Friday - EMBASSY SUITES HOTEL		
7:00 AM – 8:30 AM	BREAKFAST (COMPLIMENTARY PROVIDED BY HOTEL)	Atrium & Montgomery Grill
9:00 AM – 11:30 AM	EXHIBITIONS	In front of Embassy Ballroom
9:00 AM – 9:30 AM	POSTER SET UP	Salons D, E & F
9:30 AM – 11:30 PM	UNDERGRADUATE AND GRADUATE POSTER PRESENTATIONS	Salons D, E & F
12:00 PM – 1:30 PM	**NIS MEMORIAL LUNCHEON** **LECTURER: Quenton Bonds, PhD** Lead for NASA GSFC SBIR/STTR Program *"WHAT IS IT????"* Motivational Talk	Embassy I & II

2:00 PM – 5:00 PM	**WORKSHOPS**	
2:00PM-3:00PM	I. **Nyree McDonald, PhD** Associate Dean, Graduate Enrollment Management University of Notre Dame and **Marcus A. Huggans, PhD** Executive Director, Client Relations The National GEM Consortium *"Graduate School is FREE, in fact we pay you!!"*	Salon A
2:00PM-3:00PM	II. **Quenton Bonds, PhD** Lead for NASA GSFC SBIR/STTR Program *NASA Funding Info Session for Researchers*	Salon C
3:00pm-4:00PM	III. **LaTanya Hammonds-Odie, PhD,** Georgia Gwinnett College and **Debra D. Murray, PhD,** Baylor College of Medicine *"Precision Medicine: All of Us Research Program on the Brink of Making it a Reality"*	Salon B
3:00PM-4:00PM	V. **Jianping Yu, PhD** (NREL), **Himadri Pakrasi, Dr.** (WUSTL), Dr. **Harvey Hou, PhD**(ASU) *"Energy Science: Challenges and Opportunities"*	Salon C
4:00PM-5:00 PM	IV. **Olufemi Ajayi, PhD** Director, Industrial Hemp & Specialty Crops Program Alabama State University Department of Biological Sciences *"Mitigating climate change effects via urban gardening"*	Salon A
4:00PM-5:00 PM	IV. Derrick Rowe JD, PhD Patent Attorney at Wilson Sonsini Goodrich & Rosati *"Alternative Career Pathways for PhDs: Patent Law"*	Salon B

5:00 PM - 6:30 PM	DINNER SPEAKER: **Himadri Pakrasi. PhD** George William and Irene Koechig Freiberg Professor Washington University in St. Louis *Climate Challenges: Biology to the Rescue*	Embassy I & II
6:30PM - 7:30PM	**NIS STUDENTS MEETING**	Salon A
6:30PM - 8:00PM	**BKX BUSINESS MEETING**	Salon B
8:00PM – 9:00PM	**NIS BUSINESS MEETING**	Salon C
7:30PM – 8:30PM	**BKX STUDENTS MEETING**	Salon D
7:30 PM - 8:30 PM	**SPECIAL JOINT NIS AND BKX PLANNING SESSION**	State Boardroom
March 30, Saturday - EMBASSY SUITES HOTEL AND EMBASSY I & II		
7:00 AM – 8:30 AM	BREAKFAST (COMPLIMENTARY PROVIDED BY HOTEL)	Atrium & Montgomery Grill
8:30AM – 9:00 AM 9:00 AM – 11:30AM	**GROUP PICTURE** **&** **TOUR OF EQUAL JUSTICE INITIATIVE AND NATIONAL MEMORIAL FOR PEACE AND JUSTICE MUSEUM**	River Front Board busses in front of the hotel
12:15 PM –2:00 PM	**79TH ANNUAL NIS/BKX AWARDS LUNCHEON**	Embassy I & II
Adjourn		

OFFICE OF THE GOVERNOR

KAY IVEY
GOVERNOR

STATE CAPITOL
MONTGOMERY, ALABAMA 36130

(334) 242-7100
FAX: (334) 242-3282

STATE OF ALABAMA

March 27, 2024

Greetings:

I would like to welcome you to 79th Joint Meeting of the National Institute of Science (NIS) and Beta Kappa Chi (BKX) National Scientific Honor Society held on March 27 - 30, 2024 at the Embassy Suites in Montgomery, Alabama.

Hosted by Alabama State University, this special joint meeting will feature presentations from undergraduate and graduate students from many Historically Black Colleges and Universities (HBCUs) majoring in science disciplines who will share their research experiences with a broader audience. The theme for this year's meeting is: "It is Sustainable STEM: Resilience in a Changing Climate."

Upon completion of this year's meeting, many of you will return to your respective campuses and I wish you a safe and pleasant journey. Again, welcome to the 79th Joint Meeting of the National Institute of Science and the Beta Kappa Chi National Scientific Honor Society in Montgomery and best wishes for a memorable event.

Sincerely,

Kay Ivey

Kay Ivey
Governor

KI/pb/aw

Alabama State University

OFFICE OF THE PRESIDENT

P.O. BOX 271, MONTGOMERY, ALABAMA 36101 • (334) 229-4200

Greetings!

It is my pleasure to extend greetings to the National Institute of Science and to the Beta Kappa Chi Scientific Honor Society on the occasion of your 77th Joint Annual Meeting. Alabama State University is honored to host this prestigious meeting.

This year's theme, "Effects of Global Changes on the Environment: A Public Challenge" is most appropriate due to the changes we are observing in our climate. Current climate conditions pose a challenge and require each of us to play a vital role in addressing what could become a monumental problem for future generations.

Your objective of addressing the underrepresentation of minorities in science disciplines is commendable. ASU shares that vision and is committed to global excellence in research. I encourage you to use this event as an opportunity to enrich yourselves and to aspire to greater heights in scientific research.

On behalf of the Board of Trustees, faculty, staff, students and alumni of ASU, I welcome you to our beautiful campus and wish you a successful event!

Sincerely,

Quinton T. Ross, Jr., Ed.D.
President

NATIONAL INSTITUTE OF SCIENCE

Founded 1943

Greetings,

On behalf of the Alabama State University chapters of Beta Kappa Chi and the National Institute of Science, we are delighted that you have chosen to join us for this 79th Annual Meeting of NIS and BKX. I would like to welcome you to our historic institution and city! As the host institution, we hope that you find this meeting both informative and insightful.

Through the collective effort of nine former slaves, the iconic Alabama State University (ASU) was originally founded as Lincoln Normal School for Coloreds. This educational institution was purposefully established for people of color, who otherwise would be denied access to the freedom that accompanies a formal education. Decades later, ASU would serve as a portion of the backdrop for the Civil Rights movement which single-handedly molded this nation into a more perfect union through the combined pursuits of all people, representing a variety of ethnic, racial, religious and educational backgrounds. Similarly, the communal visions of NIS and BKX founders led to the establishment of two organizations that serve scientists of color who had been marginalized by their peers- not because of lack of merit of their work, but instead, due to the color of their skin. NIS and BKX converge annually in the exact same collaborative spirit to allow students, primarily from minority serving institutions, a platform to showcase their scientific talents and endeavors. And in this 79th year, the rich heritages of ASU, NIS and BKX will assemble to celebrate, acknowledge, and explore the accomplishments of future leaders that will not only change the nation but transform the world via STEM achievement. Affectionately known as "*Oh Mother Dear"* to its faculty, students, staff, and alumni, ASU has fostered many in their quest for educational advancement. In this spirit, I would like to extend this nurturing sentiment to all in attendance.

Throughout this conference and beyond, always keep in mind: "Science holds the golden key to the royal palace of knowledge!" WELCOME!

Sincerely

Timetria Bonds, PhD

President, National Institute of Science

NATIONAL INSTITUTE OF SCIENCE

Founded 1943

GREETINGS NIS and BKX Members, Sponsors, Guests, and Future Members!

We are so excited to have you attend our 79th Joint Annual Meeting of the Beta Kappa Chi Scientific Honor Society and National Institute of Science (March 27-30, 2024) in Montgomery, Alabama that has continued to thrive and encourage academic and scholarly activities.

As we focus on the numerous opportunities of networking, competitions, collaborations, and engagement with fellow students from various institutions, may these opportunities promote productivity and advancement.

Welcome to the 79th Joint Annual Meeting in Montgomery Alabama!

Sincerely,

Shervia Taylor

Shervia Taylor, Ph.D.
National Institute of Science Vice-President
National Institute of Science Southcentral Regional Director
Beta Kappa Chi Scientific Honor Society Vice-President Southcentral Region

BETA KAPPA CHI

National Scientific Honor Society

"Science Holds the Golden Key to the Royal Palace of Knowledge"

Greetings,

On behalf of the Betta Kappa Chi Scientific Honor Society (BKX) It's my privilege to welcome your participation in the 79th Joint Annual Meeting of the National Institute of Science (NIS) and Beta Kappa Chi Scientific Honor Society, March 27-30th, 2024 at the Embassy Suites hotel in Montgomery, Alabama. This year's conference is "Sustainable STEM: Resilience in a Changing Climate." This year's conference is appropriate during this time because it addresses the perseverance of the STEM Ecosystem in a changing and dynamic environment in the country and world today.

We are looking forward to a productive and exciting meeting hosted by Alabama State University. The planning committee has come collectively to develop an exciting program that includes oral and poster student presentations, workshops, and outstanding speakers.

Thank you for your dedication to excellence in STEM and for your participation. I look forward to seeing you in Montgomery, Alabama.

Sincerely,

Maureen Scott

Maureen Scott,
National President
Beta Kappa Chi Scientific Honor Society

ALABAMA STATE UNIVERSITY - MAP OF CAMPUS

1: Hornet Stadium
2: H.M. Jr. Football Complex
3: G.H. Lockheart Hall
4: J.W. Beverly Hall
5: G.W. Trenholm Hall
6: Robert C. Hatch Hall
7: C.D. Alexander Apts.
8: J.W. Abercrombie Hall
9: P. Finley Apartments
10: Wilease S. Simpson Hall
11: Bessie Sears Estell Hall
12: Bibb Graves Hall
13: Bessie Wilson Benson Hall
14: Martin Luther King Jr. Hall
15: John Garrick Hardy Center
16: W.B. Patterson Hall
17: E.G. McGehee Hall
18: W.H. Councill Hall
19: H. Councill Trenholm Hall
20: Tullibody Fine Arts Hall
21: Tullibody Music Hall
22: Kilby Hall
23: Office of Alumni Relations
24: Z.S. Early Childhood Center

25: Buskey Health Sci Center
26: L. Watkins Learning Center
27: George N. Card Hall
28: C.J. Dunn Tower
29: Shuttlesworth Dining Hall
30A: Facility 1
30B: Facility 2
31: ASU Acadome
32: Sting Shop
33: ASU Stadium
34: ASU Life Science Building
35: R.D. Abernathy Hall
36: Abernathy Annex
37: ASU Physical Plant
38: Girard Apts.
39: ASU Police Department
40: W.W. Baseball Complex
41: B.W. Softball Complex
42: Underwood Tennis Center
43: McGinty Apts
44: Nat Center for Civil Rights
45: President's Mansion
46: Friendship Mansion

HOST INSTITUTIONS OF MEETINGS
2000-2023

2023
78th Joint Annual Meeting
BKX Centenary Celebration
North Carolina A&T University, Charlotte, Virginia

2022
Online Meeting
77th Joint Annual Meeting
(Platform-*Anymeets*)

2021
None Scheduled
(Covid-19 epidemic)

2020
Cancelled
(COVID-19 epidemic)
Alabama State University,
Montgomery, Alabama

2019
76th Joint Annual Meeting
Fort Valley State University,
Atlanta, Georgia

2018
75th Joint Annual Meeting
University of the District of Columbia. Washington, DC

2017
74th Joint Annual Meeting
Southern University and A&M College. Baton Rouge, Louisiana

2016
73rd Joint Annual Meeting
Hampton University and Norfolk State University.
Hampton, Virginia.

2015
72nd Joint Annual Meeting
Jackson State University.
Jackson, Mississippi.

2014
71st Joint Annual Meeting
Prairie View A&M University.
Houston, Texas

2013
70th Joint Annual Meeting
University of the District of Columbia, Washington, DC

2012
69th Joint Annual Meeting
Tennessee State University and Fisk University Nashville, Tennessee

2011
68th Joint Annual Meeting
Fort Valley State Univ. and Clarke Atlanta Univ. Atlanta, Georgia

2010
67th Joint Annual Meeting
Dillard University and Southern University at New Orleans. New Orleans, Louisiana

2009
66th Joint Annual Meeting
Norfolk State University. Norfolk, Virginia

2008
65th Joint Annual Meeting
Jarvis Christian College. Dallas, Texas

2007
64th Joint Annual Meeting
North Carolina A&T State University. Greensboro, North Carolina

2006
63rd Joint Annual Meeting
Alabama State University and Tuskegee University
Montgomery, Alabama

AWARDS BANQUET SPEAKERS (**2001-2023)**

2023 78th Joint Meeting BKX/NIS.
NA

2022 77th (Online)
NA

2019 76th Joint Meeting BKX/NIS. Jamika Hallman-Cooper, MD. Department of Pediatric Neurology, Emory School of Medicine

2018 75th Joint Meeting BKX/NIS Ronald Mason Jr., J.D., President of University of the District of Columbia

2017 74th Joint Meeting BKX/NIS Isiah M. Warner, Ph.D., Vice President for Strategic Initiatives, Philip W. West Professor of Chemistry, & Boyd Professor of the Louisiana State University System

2016 73rd Joint Meeting NIS/BKX Ruby Broadway, Ph.D., President, NIS Dillard University, New Orleans, Louisiana & **Frederick Mclaughlin, Ed.D., President, BKX.** Fort Valley State University, Fort Valley, Georgia

2015 72nd Joint Meeting BKX/NIS Isiah Warner, Ph.D., Vice Chancellor for Strategic Initiatives, Philip W. West Professor of Chemistry, & Boyd Professor of the Louisiana State University System, Baton Rouge, Louisiana

2014 71st Joint Meeting NIS/BKX Lovell A. Jones, Ph.D., Director, The Dorothy I. Height Center for Health Equity and Evaluation Research (DH-CHEER) The University of Texas MD Anderson Cancer Center (MD Anderson), Houston, Texas

2013 70th Joint Meeting of the BKX/NIS Melvin A. Johnson, Ph.D., Former Treasurer NIS, Member of BKX and Various Alumni of the NIS and BKX

2012 69th Joint Meeting of the NIS/BKX George Hill, Ph.D., Assistant Chancellor of Multicultural Affairs, Special Assistant to Provost & Vice Chancellor for Health Affairs Vanderbilt University, Nashville, Tennessee

2011 68th Joint Meeting BKX/NIS Kenneth Olden, Ph.D., Sc.D., L.L.H.
Acting Dean, School of the Health Professions, Hunter College, New York City, New York

2010 67th Joint Meeting NIS/BKX John Ruffin, Ph.D., Director of the National Institute on Minority Health and Health Disparities, National Institutes of Health, Bethesda, Maryland

2009 66th Joint Meeting BKX/NIS Yvonne T. Maddox, Ph.D., Deputy Director National Institute of Child Health Development, National Institutes of Health Bethesda, Maryland

2008 65th Joint Meeting NIS/BKX Robert L. Satcher, Ph.D., M.D. NASA Astronaut. Lyndon B. Johnson Space Center Houston, Texas

2007 64th Joint Meeting BKX/NIS Erich Jarvis, Ph.D. Associate Professor of Neurobiology Duke University Medical Center Durham, North Carolina

2006 63rd Joint Meeting NIS/BKX Arlie Petters, Ph.D. Professor of Mathematics and Physics Duke University, Durham, North Carolina

2005 62nd Joint Meeting BKX/NIS April Joy Ericsson, Ph.D. Instrument Manager and Aerospace Engineer, NASA Goddard Space Flight Center, Greenbelt, Maryland

2004 61st Joint Meet. NIS/BKX/BSP Mr. Wally "Famous" Amos, Entrepreneur "Famous Amos" Cookies & Uncle Wally's Co. Long Island, New York

2001 58th Joint Meeting BKX/NIS/BSP David Satcher, M.D., Ph.D., Surgeon General and Assistant Secretary of Health of the United States of America

INVITED SPEAKERS

PLENARY SESSION

Wednesday, March 27, 2024 *5:30 PM – 6:30 pm* *Embassy I & II*

GUEST SPEAKER: Thelma Carroll Ivery, PhD

Thelma Carroll was born in Mobile, Alabama and grew up in Daphne, Alabama, which is on the eastern shore of Mobile Bay in Baldwin County. She attended Alabama State College (now Alabama State University). In 1959, when she was a senior there, she was initiated into Beta Kappa Chi Scientific Society. She earned a B.S. in Secondary Education (chemistry and mathematics) and subsequently taught four years of high school and junior high school science and mathematics. She earned a Master of Science in Chemistry from Atlanta University (Thesis: Studies in Conjugated Systems: Addition of Chlorine to 1-(p-Carboethoxyphenyl)-4-phenylbutadiene-1,3), and a Ph.D. in Chemistry from Auburn University (Dissertation: Oxidation of the Sulfhydryl Groups of Thymidylate Synthase from Lactobacillus Casei).

Dr. Ivery was employed at Alabama State University for forty-five- and one-half years, where she taught chemistry and chaired the Department of Physical Sciences. She is pleased whenever her former students let her know of their accomplishments, and she is proud to have identified approximately sixty of her former chemistry students who have earned doctorate degrees in various fields. In 2009 she retired after nine and one-half years as Dean of the College of Arts and Sciences.

Dr. Ivery is active in the Montgomery (AL) Alumnae Chapter of Delts Sigma Theta Sorority, for which she served as Chapter Historian from 2011 – 2023. Since 1996, she has been Historian for Southern Province Silhouettes of Kappa Alpha Psi, Inc. She has researched and written several histories for those organizations and for other groups and institutions including the Baldwin County Training School Class of 1955 and Alabama State University. Other works include the history of her father's family, "Tony's Kin"; the history of her mother's family, "Threads of Kinship"; and the history of her husband's family, "Memories We Cherish." She has also written her autobiography, "The Principal's Daughter," and completed her father's life story, "My Life in Education".

She and her husband, John Ivery, whom she met when they were undergraduates, celebrated their sixty- second wedding anniversary in 2023. They are parents of two daughters and one son and have three grandsons.

BKX LECTURE AND LUNCHEON

Thursday, March 28, 2024 12:00 PM – 1:30 PM Embassy I&II

GUEST SPEAKER: Dr. Marlin L. Ford, PhD

Dr. Marlin Ford is a native of Plain Dealing, Louisiana (LA) and a proud member of the Four Winds Cherokee Tribe. He attended Louisiana State University in Baton Rouge, LA and received a B.S. degree in Arts & Sciences. Dr. Ford then attended Southern University and A&M College where he received a M.S. in Education (Administration and Supervision), a M.S. in Urban Forestry, and Ph.D. in Urban Forestry & Natural Resources. Dr. Ford also went on to complete a M.P.A. in Public Administration concentrating in Public Management, State and Local Government, Human Resource Management, and Health Services Administration from Grambling State University. His work with urban and rural land management was instrumental in the development of (5) mile educational nature trail located in the heart of Grambling, Louisiana. Dr. Ford conducted research at the Southern University Agriculture Research & Extension Center as an Assistant Professor of Sustainable Agricultural Systems where he focused on native plant species and the agronomic performance of native grasses and their effect in reducing soil erosion. In addition, Dr. Ford has publications in the form of grants, journals, articles, brochures, fact sheets, and handouts that were used to enhance instruction in the areas of sustainable agriculture, environmental education and AG technology. Dr. Ford is now the Farm Research Superintendent /Research Assistant Professor and Urban Agricultural Specialist at the Southern University Agricultural Research & Extension Center where his extensive background in sustainability education, research and outreach programs in green space design, environmental studies, precision agriculture and urban agricultural practices has benefited the citizens of Louisiana.

NIS LECTURE AND MEMORIAL LUNCHEON

Friday, March 29, 2024 *11:30 AM – 1:00 PM* *Embassy I&II*

GUEST SPEAKER: Quenton Bonds, PhD

Dr. Quenton Bonds is the center lead for NASA GSFC's SBIR/STTR program. He has held several key roles within the program as lead for Entrepreneurial Engagement as well as the lead for SBIR IGNITE (https://sbir.nasa.gov/ignite). He brings both engineering and entrepreneurship skills to bear helping small businesses and NASA get the most out of their partnership.

He has started for- and non-profit businesses and won competitive research awards for technology development across various sectors, including automotive, biomedical, and earth science.

He has supported the Agency on a myriad of projects in various capacities. Before joining NASA's SBIR program, he developed microwave instruments. His research has mainly been focused on the development of remote sensors for biomedical, geoscience and various other space and aircraft applications. (https://www.linkedin.com/in/drquentonbonds) He served as Design Engineer & Instrument Lead to providing Proposal Development and Product Development Lead – type support for projects including SWESARR – Snow Water Equivalent Synthetic Aperture Radar and Radiometer, WISM – the Wideband Instrument for Snow Measurement, HIWRAP – High-Altitude Imaging Wind and Rain Airborne Profiler, and CubeRRT – CubeSat Radiometer Radio Frequency Interference (RFI). These projects have earned numerous distinguished awards at the division, directorate, center, and Agency levels. (https://www.linkedin.com/in/drquentonbonds)

Dr. Bonds received the B.S. degree in Mathematics from Alabama State University in Montgomery, Alabama. After serving two very rewarding years as a high school instructor, he went on to attain the M.S. degree in Electrical Engineering (EE) from the University of South Florida (USF) in Tampa, Florida and continued on at USF to earn the Ph.D. in EE. He is an expert in Sensor design for microwave applications; calibration; microwave radiometer design; RF system design and engineering; antenna design and characterization; SpaceCube/CubeSat technology development; analysis development of mathematical models for electromagnetic propagation through stratified media; development of materials (esp. biomedical) to mimic objects based on their electromagnetic properties.

Dr. Bonds believes in using the gifts God has given him to uplift others and to create technologies that make our world a better place. He regularly volunteers and is passionate about inspiring the next generation, especially those growing up in dire economic circumstances. He is very involved in the IEEE Microwave Theory and Techniques Society (MTTS) and supports the society as a speaker, reviewer & judge, and committee member for technical conferences, workshops, and meetings. He was the IEEE MTTS Young Professionals (YP) Co-Chair for several years, the Chair for IEEE WAMICONN 2020, current Chair of the Startup Pavilion for the IEEE IMS 2024. Dr. Bonds is also a spoken word poet who has performed at venues all over the nation, as well as a member of Washington DC's District Triathlon team.

NATIONAL INSTITUTE OF SCIENCE
&
BETA KAPPA CHI SCIENTIFIC HONOR SOCIETY
DINNER

Thursday, March 28, 2024 *6:00 PM – 8:00 PM* *Embassy I&II*

GUEST SPEAKER: Sherrice Allen, PhD

Dr. Sherrice V. Allen received a Bachelor of Science degree in Medical Technology from East Carolina University, a Master of Science degree in Biology from Fayetteville State University and a Doctor of Philosophy degree in Microbiology from North Carolina State University. She also completed the Seeding Postdoctoral Innovators in Research and Education (SPIRE) Postdoctoral Research and Teaching Fellows program at UNC-Chapel Hill. In addition, Dr. Allen is an alumna of the HERS (Higher Education Resource Services) Leadership Institute (2019) and the HERS Luce Program for Women in STEM Leadership.

Currently, Dr. Allen serves as a Program Officer with the Inclusive Excellence 3 (IE3) initiative at the Howard Hughes Medical Institute. This initiative is focused on building institutional capacity for inclusion of all students in science. Prior to joining HHMI, Dr. Allen held several positions at North Carolina Agricultural and Technical State University where she led institutional initiatives promoting equitable policies and practices to foster a culture of inclusion for all. She served as the director of the NSF ADVANCE Institutional Transformation Project, interim Executive Director of Diversity and Inclusion as well as the Associate Program Director and Lead Applicant for the HHMI Inclusive Excellence (IE3) Learning and Implementation grants, respectively.

An experienced educator and researcher, Dr. Allen held faculty appointments at Fayetteville State University, North Carolina Central University and Campbell University. She also served as an independent educational consultant with SVA1 Consulting, LLC, and as the STEM Partnership Coordinator for the North Carolina Center for Afterschool Programs at the Public School Forum of North Carolina. Dr. Allen's dedication to excellence in teaching, service and research earned her several departmental and college honors and awards.

During her tenure at Fayetteville State University (FSU), Dr. Allen was actively engaged in research, training more than twenty high school, undergraduate and graduate students in her lab. Dr. Allen's research focused on investigating if key enzymes involved in the *de novo* synthesis of folic acid in *Pseudomonas aeruginosa* could serve as targets for novel antimicrobial agents. In addition, she investigated if arylsulfatase enzymes, encoded by ceramide synthesis genes in *Magnaporthe grisea,* played a role in pathogenicity and development. While at FSU, Dr. Allen acquired funding to support STEM enrichment and research programs. She served as the Co-Principal Investigator for the NIH-funded Research Initiative for Scientific Enhancement (FSU-RISE) grant, serving as the Assistant Director and Director of the program. In addition, she was the Principal Investigator of a National Science Foundation Research Initiation Grant. Finally, she served as the Director of the Center for Promoting STEM Education and Research, (CPSER); funded by Title III.

With over 20 years of experience in higher education, Dr. Allen remains committed to engaging in efforts to diversify the STEM workforce at the undergraduate, graduate and faculty levels.

WORKSHOPS

Nyrée McDonald, Ph.D.
nmcdonal@nd.edu *"Graduate School is FREE, in fact we pay you!!"*
574-631-8421

Dr. McDonald is a native of the Bahamas. She completed her Bachelor of Science degree at Tuskegee University in chemical engineering. She went on to work in the oil industry as a well planning engineer for a number of years. Her passion, for education returned and she returned to school and earned a master of science in environmental quality engineering from the University of Alaska, Anchorage in August 2000. She continued her graduate work at the University of Notre Dame earning a doctor of philosophy in 2006. During her time with University of Notre Dame, she was also a recruiter for the Graduate School. After completing her doctoral degree she began her career as a tenure track faculty member of the University of Alaska Anchorage in the civil engineering department, here, her work focused on drinking water treatment for rural communities. After four years on the faculty of the University of Alaska Anchorage, she accepted a position as the Associate Dean for Recruitment and Admissions at the University of Notre Dame. At present, she is the Associate Dean for Graduate Enrollment Management at the University of Notre Dame, overseeing recruitment, admissions and continuing student progress toward degree. Over her career, she has authored numerous papers, presented at conferences, won major fellowships and grants and authored a chapter of a book.

Quenton Bonds, PhD. *NASA Funding Info Session for Researchers*

Dr. Quenton Bonds is the center lead for NASA GSFC's SBIR/STTR program. He has held several key roles within the program as lead for Entrepreneurial Engagement as well as the lead for SBIR IGNITE (https://sbir.nasa.gov/ignite). He brings both engineering and entrepreneurship skills to bear helping small businesses and NASA get the most out of their partnership.

He has started for- and non-profit businesses and won competitive research awards for technology development across various sectors, including automotive, biomedical, and earth science.

Before joining NASA's SBIR program he supported the Microwave Instrument and Technology Branch at Goddard, where Quenton held several engineering, project management, and project lead roles supporting microwave instrument development for CubeSats, aircraft instruments, and more.

He is also a PROUD graduate of 'THE Alabama State University'

Latanya Hammonds-Odie, Ph.D. *"Precision Medicine: All of Us Research Program on the Brink of Making it a Reality"*

Latanya Hammonds-Odie is a Professor at Georgia Gwinnett College (GGC). She held faculty positions at Spelman College and Dillard University before joining the faculty at GGC. She earned her M.S. and Ph.D. degrees at the University of Alabama at Birmingham. She also earned an M.S. in Educational Research from Georgia State University in 2018. While on the faculty at Spelman, she served in several roles including as Associate Director of the Atlanta University Center-wide MARC USTAR Program. Her research over the past 28 years has encompassed cellular physiology, developmental biology, toxicology, and science education.

She has been an active member of the American Society for Cell Biology Maximizing Access in Cell Biology for PEERS (formerly Minorities Affairs Committee). She is part of the leadership team for two professional career development programs for postdoctoral fellows and junior faculty members; the Faculty Research and Education Development (FRED) Program (https://www.ascb.org/career-development/grant-writing-training-fred/) and the Baylor College of Medicine All of Us Evening with Genetics Program (https://www.bcm.edu/allofuseveningswithgenetics). She is also a member of the leadership team aligning the evaluation and reward structure for faculty at GGC to increase the sense of belonging of students (supported by the HHMI Inclusive Excellence 3 Initiative; https://www.hhmi.org/science-education/programs/inclusive-excellence-3).

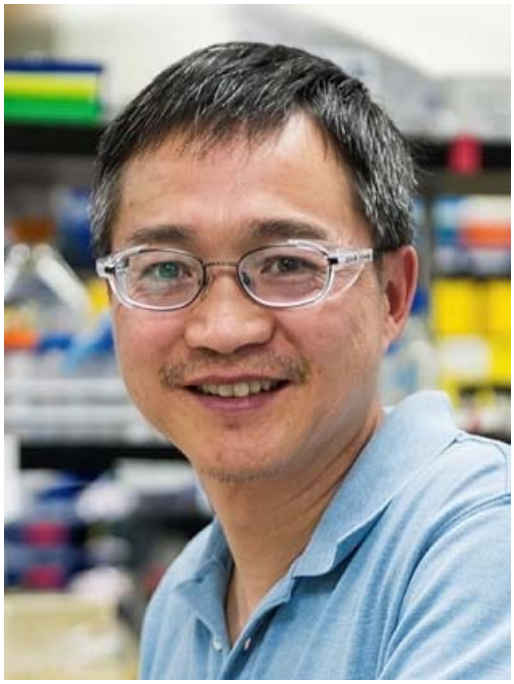
Debra D. Murray, Ph.D. *"Precision Medicine: All of Us Research Program on the Brink of Making it a Reality"*

Dr. Debra D. Murray, a leader in diversity and inclusion, mentoring, and research education, is a 2021 recipient of the Norton Rose Fulbright Faculty Excellence Award in Educational Leadership. As a MPI, she recently was awarded the All of Us Evenings With Genetics Research Program from the NIH All of Us Research Program. Dr. Murray is Director of Education and Research Equity Initiatives in the Human Genome Sequencing Center (HGSC), and an Associate Professor in the Molecular and Human Genetics Department and co-Director of the Office of Community Engagement and Equity at Baylor College of Medicine (BCM). In this role, she focuses on faculty training and increasing awareness about medical genetics' programs. She is a part of the Engagement, Communication, and Education (ECE) Team that provides community engagement research and activities for the Intellectual and Developmental Disabilities Research Center (IDDRC) and is co-PI on a PCORI "Building Capacity in Hispanic Serving Institutions for PCOR/CER focused on Mental Health Impacts of COVID-19".

Olufemi Ajayi, PhD. *Mitigating climate change effects via urban gardening*

Dr. Olufemi Ajayi is the Director of Industrial Hemp and Specialty Crops Program at Alabama State University. His research explores plant-insect interactions with focus on pest management in the face of global climate change, a threat to food security and environmental conservation. His dissertation was on management of urban insect pests of economic importance. In his research, he utilizes techniques in biological control, insect physiology, chemical ecology, and molecular biology. His research is published in peer-reviewed journals, and he serves as a reviewer for peer-reviewed journals in the Entomology discipline. He has received several awards from the Entomological Society of America. He has also received competitive grant funds to support his research.

Jianping Yu, **PhD**. *Energy Science: Challenges and Opportunities.*

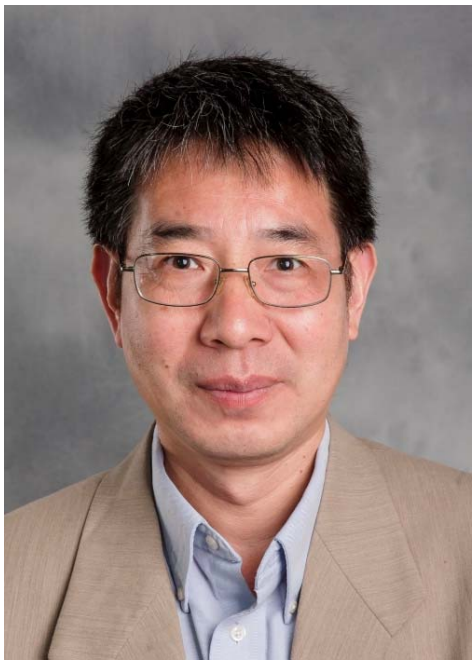


Dr. Jianping Yu is a researcher who leads cyanobacterial metabolism and biotechnology in the Biosciences Center at National Renewable Energy Laboratory (NREL). His current research is focused on energy regulation in photosynthesis and on carbon/nitrogen metabolism. Jianping has more than 30 years of professional experience in photosynthesis, microbial genetics and physiology, systems and synthetic biology, and bioengineering. Yu's PhD dissertation work at Michigan State University focused on genetic and biochemical study of photosynthetic complexes in a model cyanobacterium. At NREL, he developed cyanobacteria for the production of ethylene and nitrogen fertilizer. His current research interests include biofertilizer, biocontainment, bioremediation, and photosynthetic carbon fixation and energy regulation.

Himadri Pakrasi, PhD. *Energy Science: Challenges and Opportunities.*

Dr. Himadri Pakrasi is the George William and Irene Koechig Freiberg Professor at Washington University in St. Louis. He received his M.Sc. degree in Physics from the Presidency College, Kolkata, India and Ph. D. in Biophysics from the University of Missouri. Professor Pakrasi conducts research in the broad areas of photosynthesis, systems biology and synthetic biology. He is deeply engaged in bridging research interests in physical and biological sciences. Himadri Pakrasi's current focus is on bioenergy production in cyanobacteria. His lab studies how cyanobacteria use solar energy to drive the chemistry of life. They work in many disciplines and have projects that focus on determining how the molecular machines that capture solar energy are assembled and maintained, how cyanobacteria respond to environmental changes at the systems level, and how to engineer new strains of cyanobacteria that are capable of channeling solar energy into biochemical production.

Harvey Hou, PhD. *Energy Science: Challenges and Opportunities.*



Dr. Harvey Hou is a Professor of Forensic Science in the Department of Physical and Forensic Sciences at Alabama State University. He completed his Ph.D. in Analytical Chemistry from Peking University and postdoctoral training with David Mauzerall at Rockefeller University. He has focused on photosynthesis research for 30 years and is the founding professor of the forensic science programs at Alabama State University. He published 5 books and authored or co-authored 138 publications in books and peer-reviewed journals, including *Journal of the American Chemical Society, Proceedings of the National Academy of Sciences,* and *Biochemistry*. He is the editor or editorial board member for 18 international journals. He has reviewed manuscripts for 72 international journals, including *Trends in Plant Science*, *Coordination Chemistry Reviews*, and *Photosynthesis Research*. He has evaluated grant proposals for NSF, USDA, DOE, NASA, and European Human Frontier Science Foundation. He has organized or co-organized 27 conferences/symposia since 2004. He is passionate about photosynthesis, forensic chemistry, and education.

Derrick D. Rowe, PARTNER Intellectual Property, Washington, D.C. drowe@wsgr.com

Dr. Derrick Rowe is a partner in the Washington, D.C., office of Wilson Sonsini Goodrich & Rosati, where his practice focuses on patent prosecution and counseling designed to help clients protect their intellectual property rights both domestically and internationally in the life sciences, biotechnology, molecular biology, pharmaceutical, diagnostic, and medical device fields.

Derrick has extensive experience and has developed his practice in view of his experience in private practice as well as an in-house counsel at a large pharmaceutical company where he provided patent, contract, regulatory, and strategic counseling for pharmaceuticals and vaccines (including for multiple marketed products and related strategic partnerships).

Derrick is the author or co-author of eight peer-reviewed scientific articles and several published legal articles. He has also served as speaker/panelist/moderator in multiple life science settings and has guest lectured at a U.S. law school on the topic of Intellectual Property Licensing Law.

Wednesday, March 27, 2024 5:30 PM-6:30 PM Embassy I & II

OPENING PLENARY SESSION

Greetings:	**Dr. Timetria Bonds**, *NIS President*
Administrative Greetings:	**Dr. Carl Pettis**, Provost and Vice President of Academic Affairs, Alabama State University
Occasion:	Ms. Maureen Scott, BKX President
Roll Call:	Prof. Deadra Mackie, Executive Secretary, BKX
Guest Speaker:	Dr. Thelma Ivery, "History of BKX"

Thursday, March 29, 2024 3:00 PM-3:50 PM Salon A

Workshop: "Energy Science: Challenges and Opportunities."

Chairs: Dr. Jianping Yu (The National Renewable Energy Laboratory)
Dr. Himadri Pakrasi (Washington University in St. Louis)
Dr. Harvey Hou (Alabama State University)

3:00-3:40 pm
Session 1: Welcome and Faculty Talks
Chair: Dr. Jianping Yu (The National Renewable Energy Laboratory)

3:00-3:15 pm
"Introducing the National Renewable Energy Laboratory"
Dr. Jianping Yu (The National Renewable Energy Laboratory)

3:15-3:30 pm
"Climate-friendly bioproduction of fertilizers"
Dr. Himadri Pakrasi (Washington University in St. Louis)

3:30-3:35 pm
"Training ASU students in STEM research"
Dr. Vida Dennis (Alabama State University)

3:35-3:40 pm
"Biodiversity and Application of Alabama Cyanobacteria"
Dr. Harvey Hou (Alabama State University)

3:45-3:46 pm
Session 2: One-Minute Student Talks
Chair: Dr. Himadri Pakrasi

"Experience in Energy Science Research using Cyanobacteria"
1. **Ibrahim Alamin** (Ph.D. student, Alabama State University)
2. **Khadijah Taite** (Undergraduate, Alabama State University)
3. **Victory Obele** (Undergraduate, Alabama State University)
4. **Lydia Daviesbalogun** (Undergraduate, Alabama State University)
5. **Eryn Griffin** (Undergraduate, Alabama State University)
6. **Arielle Lee** (Undergraduate, Alabama State University)

3:46-3:50 pm
Session 3: Conclusions
Chair: Dr. Harvey Hou (Alabama State University)

79TH ANNUAL NIS/BKX AWARDS LUNCHEON

Scientific Award Ceremony

Recognition of Advisors and Sponsors

Swearing in of New Officers

Announcement of next year's host and venue

Graduate Oral Presentations

CAPITOL BALLROOM – MORNING SESSION GROUP A

CODE	*TIME*	**ABSTRACT TITLE-PRESENTER-INSTITUTION**
		GROUP A
GSO6	8:30 – 8:55	**Investigating the Expression of PIWI in Resistant and Susceptible Strains of Biomphalaria glabrata Post S. mansoniInfection Using a Series of Cell and Molecular Biological Techniques.** Odain Stewart. *University Of The District Of Columbia*
GSO7	8:55 – 9:20	**Feline Coronavirus Influences the Biogenesis and Composition of Extracellular Vesicles Derived from CRFK Cells** Sandani Wijerathne. *Alabama State University*
GSO8	9:20 – 9:45	**A Study of the Postmortem Soil Microbial Communities Associated With Rat Decomposition** Tyria High. *Alabama State University*
GSO9	9:45 – 10:10	**Biologically Relevant Conditions Significantly Upregulate Virulence Target Expression in *Pseudomonas aeruginosa* strain PA14** Amber Grace. *Alabama State University*
GSO10	10:10 – 10:35	**Canine Coronavirus Infection Alters the Cell Derived-Extracellular Vesicles Biogenesis and Pharmacological-Mediated Cellular Activity** Rachana Pandit. *Alabama State University*
GSO11	10:35 – 11:00	**Admixing chlamydial MOMP with dmLT adjuvant enhances TLR-2 expression and Th1 immune responses in murine macrophages.** Clemence Nguiakam Sipowe. *Alabama State University*
GSO12	11:25 – 11:50	**Cationic Lipo-Oligopeptides (CLOPs) display in-vitro antiviral activity against Herpes Simplex Virus Type 1** Othreniel Forte. *Alabama State University*

SALONS A&B – MORNING SESSION GROUP B

FCO1	8:30 – 8:55	**Cross-Curricular Course-Based Undergraduate Research Experiences (CURES) at Bowie State University** George Ude, *Bowie State University*
GSO13	8:55 – 9:20	**Effect of Getah Virus Infection on Cancer Cells *In-Vitro*** Bernard Efa. *Alabama State University*
GSO14	9:20 – 9:45	**Photosynthesis and application of cyanobacteria: forensic detection of microorganisms** Ibrahim Alamin. *Alabama State University*
GSO15	9:45 – 10:10	**Differential Analysis of Exosomes and Ectosomes from Diverse Adenovirus 48 infected Cells** Chioma Ezeuko. *Alabama State University*
GSO16	10:10 – 10:35	**Exploring the role of rhizosphere microbiome in hemp plant growth and defense against two-spotted spider mites** Ivy Thweatt. *Alabama State University*
GSO18	10:35 – 11:00	**CBD-resistant *Salmonella* Strains Are Susceptible to Epsilon 34 Phage Tailspike protein** Ibrahim Iddrisu. *Alabama State University*
GSO19	11:25 – 11:50	**Impact of pesticides on phyllosphere microbial communities of hemp plants** Abi Awad. *Alabama State University*

CAPITOL BALLROOM – AFTERNOON SESSION

GSO2	1:45 – 2:10	**Nanotube Nexus: Exploring Health Impacts, Signaling Pathways, and Environmental Interactions** Manisha Thakur. Southern University And A&M College
GSO3	2:10 – 2:35	**Diesel Particulate Extract and Cellular Dynamics: Unraveling SUMOylation's Impact on Inflammation and Apoptosis in Alveolar Epithelial Cells** NANDINI BIDARIMATH. *Southern University And A&M College*
GSO4	2:35 – 3:40	**"Environmental Perils: Pentachlorophenol, Tetrachlorohydroquinone, and Their Legacy"** Ranjeeth Reddy Kondati. *Southern University And A&M College*
GSO5	4:00 – 4:25	**Investigating Virtual Reality Adoption in Education: An Elicitation Study of Students' Salient Beliefs** Devender Rapolu. *Southern University And A&M College*
GSO17	4:25 – 4:50	**The Impact of Sorbent Amendments for Mercury Remediation on the Viability of Microorganisms in East Fork Poplar Creek (EFPC) Bank Soils** Jeffrey Ogbudu. *Alabama State University*
GSO20	4:50 – 5:15	**Exploring the Higher Prevalence of Hypertension among African Americans: A Focus on Lifestyle Factors** Joshua Umoru. *Huston-Tillotson University*
GSO1	5:15 – 5:40	**Proteasome Stmphony: Lipid Rafts and Exosomes As Key Players in E-cigarettte-Induced Inflammation** Dhruthi Mutyala, *Southern University And A&M College*

UNDERGRADUATE ORAL PRESENTATIONS

SALON D– MORNING SESSION

CODE	*TIME*	ABSTRACT TITLE-PRESENTER-INSTITUTION
CMPE2	9:00 – 9:25	**Did Prices and Technological Advancements Play Significant Roles In U.S. Supply of Bell Peppers From 1970-2021?** Christian Jacobs. Southern University And A&M College
CMPE3	9:25 – 9:50	**Design and Fabrication of 3D Proximal Tubule Scaffolds for Renal Function and Tissue Engineering** Faith Smith. Alabama State University
CMPE4	9:50 – 10:15	**Access Disparities in Collegiate Athletics - A Comparative Analysis of HBCU and PWI** Morgan McQueen. Southern University A&M College
CMPE5	10:15 – 10:40	**Using Smartphone Technology in Real-Time Field Soil Health Assessment** Chasity Joseph. Southern University And A&M College
PSE1	10:40 – 11:05	**Evaluating Social Determinants of Health Among an Older Adult Population in Kentucky** Ellis Jackson. University Of Kentucky /Kentucky State University
PSE2	11:05 – 11:30	**Sustaining 1890 Land-Grant Programs by Demystifying Stereotypical Perceptions Toward African-Americans, Blacks, or Brown Peoples' Participation in Agriculture and Agricultural-related Industries** Jensine Crowder. Kentucky State University

UNDERGRADUATE ORAL PRESENTATIONS

SALON D – AFTERNOON SESSION

BIO3	2:00 – 2:25	**Perceptions of Health Care Communication and Trust Related to Colorectal Cancer Screening among Black American Adults** Segen Mussie. Kentucky State University
BIO4	2:25 – 2:50	**Infant Mortality Rate: Global Disparities and Possible Underlying Causes** Ariell Dunkley. Kentucky State University
BIO5	2:50 – 4:15	**Postmortem Microbial Communities Associated With Criminal Cadavers** Jacalyn Thomas. Alabama State University
BIO6	4:15 – 4:40	**Suppressor of Cytokine Signaling (SOCS) 1 Regulates IFN-γ Signaling in *Chlamydia muridarum*-Stimulated Mouse Macrophages** Vanella Tadjuidje. Alabama State University
BIO2	4:25 – 4:50	**Eco-Physiological Effects of Copper on Sunflower and Corn** Rayan Demery. Southern University At New Orleans

Graduate Poster Presentations

FCP1

Detoxification Gene Expression Variation in Two-Spotted Spider Mites Feeding on Different Hemp Cultivars

Junhuan Xu. Alabama State University

GSP1

The Effects of Adipokines Leptin and Adiponectin on Cardiovascular HealthJasmine Redmond. Mississippi Valley State University

Jordan Johnson. *Mississippi Valley State University*

GSP2

Antimicrobial resistance in Methicillin-Resistant *Staphylococcus aureus* (MRSA) infections based on geographical region

Jasmine Redmond. *Mississippi Valley State University*

GSP3

Exploring Cultural Nuances in Adolescent Ghanaian and Kenyan Students Using Quantitative Ethnography

Leah-Maria Gaskin. *Southern University A&M College*

GSP4

Seasonal variation and effect of pesticidal compounds on aquatic microbial communities

Nur E Alam. *Alabama State University*

GSP5

Changes in water chemistry and microbial communities at different locations of Alabama River in the summer season

Jannatul Ferdous Jhumur. *Alabama State University*

GSP6

Metagenomics analysis of the microbial diversity and quantitative co-relationship to the pharmaceutical and pesticide compounds in different seasons in Alabama River, Montgomery

Khabir Md Imam Ul. *Alabama State University*

Undergraduate Poster Presentations

PSUG1

Analysis of Translation Initiation in Response to Integrated Stress Response Pathway Activation

Brynne J. Darden. *Hampton University*

PSUG2

Characteristics of Mycobacteriophage AdamB1 and AdamB2

Montaja McMullen-Crockett. *Norfolk State University*

PSUG3

Progression of Bathrachocytrium dendrobatidis life cycle stages affected by the presence of hard keratin

Treshur Williams-Carter. *Fort Valley State University*

PSUG4

***In Vitro* Interaction between Barium Chloride and Pyrimethamine against *Toxoplasma gondii* growth**

Nicholas Haas. *University Of Tennessee at Martin*

PSUG5

Effect of milk on *Escherichia coli* metabolite colibactin production and its impact on breast cancer cells

Jasmine Whitlow. *Alabama State University*

PSUG6

Synthesis and Bio-Compatibility Studies on Cerium Oxide Nanoparticles in Human Epithelial Skin Cells

Kimani Kelly. *Norfolk State University*

PSUG7

Maternal *Staphylococcus aureus* Mastitis Immunomodulatory Treatment Effect on the Stomachs of Nursing Pups

Nadira Muhammad. *Tuskegee University*

PSUG8

Tumor Microenvironment Pressures on Hyaluronic Acid Biosynthesis in Glioblastoma

Audi Hicks. *Kentucky State University*

PSUG9

Investigating Growth Conditions of Marsh Grasses for Production of Lipoxygenase Inhibitors

Nia White. *Norfolk State University*

PSUG10

Surveying Airborne Bacteria in Carver Hall

Bayleigh Oliver. *Kentucky State University*

PSUG11

A Comparative Physiological Analysis of the Effects of Ammonium Nitrate on Amphibian and Fish in the Usage of Chitosan Remediation

KMya Saddler. *Norfolk State University*

PSUG12

The Impact of Creosote on Blue Crab Immune Function

Indigo Peterson. *Norfolk State University*

PSUG13

Kentucky's PFAS Awareness Database

Timaia Sugars. *Kentucky State University*

PSUG14

HPLC and LCMS analysis shows beta-ketoglutarate overflow in cyanobacteria.

Khadijah Taite. *Alabama State University*

PSUG15

Nitrate depletion in the growth medium inhibits pyruvate overflow in cyanobacteria

Arielle Lee. *Alabama State University*

PSUG16

CBD-Resistant Salmonella reverts after Zinc sensitization

Daron Johnson. *Alabama State University*

PSUG17

The Susceptibility of *Xenopus laevis* to selected strains of bacterial infection.

Zeenat Abdulsalam. *Alabama State University*

PSUG18

Proton Ions in the Growth Medium Inhabit Pyruvate Overflow in Cyanobacteria

Lydia Davies. *Alabama State University*

PSUG19

Leveraging Hydrophobic and Hydrogen Bonding Interactions to Synthesize Novel Molecularly Imprinted Polymeric Nanoparticles for PFAS Sensor Development

Sinclair Strong. *Fisk University*

PSUG20

Multi-Domain Molecularly Imprinted Polymeric Nanoparticles via Hydrogen Bonding Interactions for Selective Capture and Release Applications.

Aqeel Dawson. *Fisk University*

PSUG21

Acute Toxicological Effects of Copper on Palaemonetes pugio L.

Charrel Williams. *Southern University at New Orleans*

PSUG22

Synthesis of Biocompatible Aminooxy Polyglycidol Derivatives for Tissue Engineering Applications

Sierra McClain. *Fisk University*

PSUG23

System Analysis of Social Media

Kydale Redmond. *Southern University and A&M College*

PSUG24

Progress on Contouring Tree-Based AMR Grids

Aaron Levy. *Southern University and A&M College*

PSUG25

Calibration and Learning Key Points for Bimanual Manipulation

Yvonne Obukehwo. *Huston-Tillotson University*

PSUG26

In Vitro* Activity of Hemp Extract and its Mechanism of Action Against *Toxoplasma gondii

Victory Obele. *Alabama State University*

PSUG27

Transcranial Magnetic Stimulation and White Matter Integrity in People Who Smoke

Donavyn Mosley. *Kentucky State University*

PSUG28

Scaffolds that Mimic Proximal Tubule's Physical and Biological Characteristics

Kyra Ramirez. *Alabama State University*

ABSTRACTS

BIO2
ECO-PHYSIOLOGICAL EFFECTS OF COPPER ON SUNFLOWER AND CORN

Rayan Demery and Murty Kambhampati. Southern University at New Orleans, New Orleans, LA.

The eco-physiological effects of copper [$CuSO_4(5H_2O)$] at varied concentrations of (2.5, 5, and 10) ppm on *Helianthus annuus* (Sunflower) and *Zea mays* (Corn), in replicates of three at 0, 2.5, 5, and 10 ppm over the course of six weeks were studied in ambient conditions of the greenhouse. The first group of plants (Phase-I) received Cu only, whereas the second group of plants (Phase-II) received Cu and 600mg of MiracleGro fertilizer. This research was focused on testing the hypothesis that, in comparison to phase I plants, phase II plants would experience a detrimental impact from the fertilizer and copper treatments. The seed germination, plant growth, chlorophyll concentrations, chlorosis, stomatal counts, necrosis, and biomass were studied. Additionally, the data were collected on environmental factors like soil temperature in experimental pots and greenhouse temperature to find any correlations between various eco-physiological effects of Cu and fertilizer. Results showed that among the various concentrations of Cu, 10ppm Cu showed the highest growth rate in both fertilized and nonfertilized corn. The highest growth rate for fertilized and nonfertilized sunflower was in the 2.5ppm concentration of Cu. In addition, the nonfertilized plants were affected by the varied concentrations of Cu in the biomass study. It showed that control had the highest biomass, then each concentration showed a decrease (Control > 2.5 ppm > 5 ppm > 10 ppm). The stomata count was also affected by the Cu and the physical factors showing the control had the highest quantity in sunflower, but in corn, the 2.5 ppm had the highest amount. Generally, in both nonfertilized and fertilized corn the chlorophyll analysis at about 15 days was less than the chlorophyll analysis at about 30 days. By contrast, in the sunflower at 10ppm the chlorophyll increased and in the fertilized sunflower an increase occurred in the control and the 5ppm. Overall, the diverse concentrations showed different trends for nonfertilized and fertilized sunflower and corn plants. Based on the data that were collected, the hypothesis was not accepted because the immature fertilized plants during the first two weeks of their growth showed harmful effects of the copper and fertilizer soil solution, but as they matured, they begin tolerating the synergistic effect of Cu and fertilizer and showed signs of improvement.

BIO3
PERCEPTIONS OF HEALTH CARE COMMUNICATION AND TRUST RELATED TO COLORECTAL CANCER SCREENING AMONG BLACK AMERICAN ADULTS

Segen Habtesion Mussie[1], Fidelis Sesenu[2] and Aaron J. Kruse-Diehr[3]. [1]SPARK Program, Kentucky State University, [2]Center for Health Equity Transformation, University of Kentucky, [3]Department of Family and Community Medicine, University of Kentucky

Black Americans in Louisville face higher colorectal cancer (CRC) incidence rates and have an even higher mortality rate compared to their white counterparts. Barriers related to CRC perceptions, trust in health care providers, and providers' communication style were tested by analyzing surveys completed by participants. Survey data were collected from 39 Black American men and women (aged over 45 years) at community health fairs in Louisville. The 70-item survey covered respondents' socio-economic characteristics; CRC perceptions of susceptibility, severity, benefits, and barriers; trust in providers; and patient-provider communication. This survey was used to determine how Black Americans' perceptions about CRC screening beliefs differ based on their experiences in health care settings. Respondents indicated moderate CRC perceptions with mean scores for susceptibility, severity, and barriers ranging from 2.4 to 2.8 (range,1–5). Perceived benefits of CRC screening was high with a mean score of 4.1 (SD = 0.8). Fairly high average scores were also reported for trust in providers (M = 3.8, SD = 0.7) and patient-provider communication (M = 3.7, SD = 0.4). Furthermore, threat perceptions (severity and susceptibility) were positively correlated with perceived barriers and negatively correlated with trust in providers and patient-provider communication. Whereas patient-provider communication was positively correlated with

trust in physician, CRC screening barriers were negatively correlated with screening benefits and patient-provider communication. When screening benefits and patient-provider communication was low, barriers to CRC screening increased. Participants were able to better trust their physicians when patient-provider communication was emphasized.

BIO4
INFANT MORTALITY RATE: GLOBAL DISPARITIES AND POSSIBLE UNDERLYING CAUSES

Ariell Dunkley. *Kentucky State University, Frankfort, KY.*

Infant mortality rate (IMR) is a determiner for a country's overall health, as it can ascertain the healthcare needs of citizens. Therefore, it is important to decipher contributing factors for countries with high rates of mortality. Despite declining trends worldwide, IMR is particularly high in least-developed countries (LDC). While disparities are noted, there is a lack of analysis of social, geographic, and economic impact on neonatal rates. Current efforts from struggling countries to combat high trends continuously fall short. It is imperative to divulge techniques that have provided success for other countries in an attempt to reduce current high trends. By comparing the conditions of two highly developed countries and two lower developed countries, it is possible to establish a more lucrative strategy for attacking high IMR in the future. In the chosen LDCs, Somalia and DR Congo, high infant mortality is attributed to insufficient quantity of healthcare physicians, higher HIV rates, poor education, and the economy. Ongoing political crises further deter rates by leaving the country in a constant state of war. Somalian officials have proclaimed promises to lower rates; however, efforts and resources are not focused on this area. Japan, the leader of low IMR worldwide, diminished its neonatal rates through the promotion of cleanliness, greater access to healthcare, and programs that offered direct intervention. While Ireland used similar methods, programs to combat congested living arrangements that further spread the disease were also implemented. Struggling countries such as DR Congo and Somalia could benefit from active public health interventions to lower neonatal rates. Government programs that promoted vaccinations, sanitation, hygiene, and education for expecting mothers could lead to a significant decline in current trends of IMR. By implementing tactics similar to those of Japan and Ireland, it is possible for these countries, and others like them, to reduce infant mortality trends.

BIO5
POSTMORTEM MICROBIAL COMMUNITIES ASSOCIATED WITH CRIMINAL CADAVERS

Jacalyn Thomas, Tyesha Adams, Gulnaz Javan and Sheree Finley. Alabama State University, Montgomery, AL.

Thanatomicrobiome, or the postmortem microbiome, has been investigated as an informative microbial biomarker of the time of death and location of human death. Postmortem microbial proliferation occurs throughout the body beginning in the gut area, then spreading to proximate organs such as the liver and spleen and continuing to distal organs such as the heart and brain depending on the cause of death; however, in healthy adults, internal organs such as the brain, spleen and reproductive organs are sterile due to the unculturable bacteria. We hypothesized that the most abundant microorganisms detected in the brain of decomposing humans will be more similar to bacteria commonly found in the gut. To test this hypothesis, we sampled the liver and brain of criminal cadavers with homicide and suicide causes of death. Postmortem DNA was extracted, and universal primers (341F/805R) were used to profile cojoined V3-V4 hypervariable regions of 16S rRNA gene to generate amplicon sizes of approximately 465 base pairs. Based on the amplicon sequence variance abundance and the taxonomy annotation, the top 30 bacterial taxa were determined and the Bray-curtis distance and Sankey plots were generated. The most abundant phyla were Firmicutes, Proteobacteria, and Bacteroidota. A Sankey plot demonstrated the change in the relative abundance of bacteria at the phylum level and genus level and found that

Paeniclostridium was the most abundant and Escherichia shigella was the least. The future question for this research is what are the successional changes in the brain and liver over an extended period of time.

Acknowledgments: This work was supported by the National Institutes of Health grant under Award Number R16-GM149358, and the National Science Foundation grants EES 2011764.

BIO6
SUPPRESSOR OF CYTOKINE SIGNALING (SOCS) 1 REGULATES IFN-Γ SIGNALING IN *CHLAMYDIA MURIDARUM*-STIMULATED MOUSE MACROPHAGES

Vanella Tadjuidje, Rajnish Sahu, Aguy C. Nguiakam Sipowe, Shree R. Singh, Vida A. Dennis*. Center for NanoBiotechnology Research, Department of Biological Sciences, Alabama State University, Montgomery, AL, 36104, USA.

Chlamydia trachomatis (Ct) is an obligate intracellular bacterium and is the most frequently reported bacterial sexually transmitted infection in the United States. Ct infections often induce inflammation, a mechanism that can increase the survival of the bacterium if left untreated. There is limited natural immunity to Ct, and repeated infections further enhance inflammatory responses. Interferon-gamma (IFN-γ) is a cytokine that regulates macrophage activation via the Janus kinase (JAK)/signal transducer and activators of transcription (STAT) pathway, which can lead to the induction of other pro-inflammatory cytokines. Under normal circumstances, IFN-γ signaling is short-lived to recover homeostasis in the organism. Suppressors of cytokine signaling (SOCS) proteins have been implicated as negative regulators for various inflammatory cytokines by inhibiting the JAK/STAT signaling pathway. We have previously shown that *Chlamydia* induces the expression of SOCS 1 and SOCS 3, suggesting that Ct may regulate cytokine signaling to control its inflammation and promote survival in the host. In the current study, we investigated the role of SOCS 1 induced by *Chlamydia* and its major outer membrane protein (MOMP) on IFN-γ signaling required for macrophage activation. We hypothesize that Ct inhibits IFN-γ signaling through STAT1 phosphorylation via SOCS1 expression to minimize macrophage activation and its function. We used murine RAW 264.7 macrophages and stimulated them with IFN-γ, murine live *C. muridarum,* and MOMP. After 24 hours the cells were stimulated with and without added IFN-γ. Our results show that *Chlamydia* induced the pro-inflammatory cytokines (IL-6, TNF-α) in macrophages, which were then further enhanced by adding IFN-γ in comparison to the absence of exogenous IFN-γ. The MOMP-stimulated cells producing IL-6 and TNF-α in the presence of exogenous IFN-γ were not altered drastically. We conclude that *Chlamydia* does inhibit the IFN-γ signaling pathway, thus also inhibiting macrophage activation and its function to promote survival in the host.

CMPE2
DID PRICES AND TECHNOLOGICAL ADVANCEMENTS PLAY SIGNIFICANT ROLES IN U.S. SUPPLY OF BELL PEPPERS FROM 1970-2021?

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Given the wide variety of bell peppers available to U.S. consumers, per capita consumption and market values have risen substantially over the last 50 years. Agricultural products, including fresh bell peppers, are highly perishable which often results in substantial post-harvest shrinkage. Thus, current and future producers must have easy access to new and reliable research on both the demand and supply side of markets so they can make informed production and marketing decisions. Our study takes a small step in that direction. It presents historical descriptions of production, imports, supply, and prices of bell peppers from 1970-2021; determines the roles played by prices and technological advancements in supply; computes and interprets the own-price elasticity of supply for bell peppers. The overall objective is to assist farmers with their economic assessments of the crop’s viability prior to introduction, expansion or

reduction in production levels and or changes in marketing strategies. A linear supply function was hypothesized with prices and technological advancements as the main determinants of supply. Data were compiled from government publications and analyzed using graphing and regression techniques from the *Excel* software. On average, production, imports, and supply rose by 515,910; 240,720, and 756,630 hundredweight annually, respectively, while seasonal average prices rose by $0.64/hundredweight annually. Results from the estimated linear supply function indicated that bell pepper prices and technological advancements significantly ($p<0.00001$) influenced supply and that 90% of the variations in supply were explained by variations in prices and technological advancements. The estimated elasticity of supply coefficient of 1.02 implied that supply was elastic, and that a 10% increase in bell pepper prices would result in a 10.20% increase in the quantity of bell peppers supplied, other variables held constant. The elastic supply also suggested that producers readily adapted to changes in bell pepper prices from 1970-2021.

CMPE3
DESIGN AND FABRICATION OF 3D PROXIMAL TUBULE SCAFFOLDS FOR RENAL FUNCTION AND TISSUE ENGINEERING

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Proximal tubules, constituting a vital segment of the nephron in the renal system, play a pivotal role in the complex process of urine formation and maintenance of systemic homeostasis. Anatomically located in the renal cortex, proximal tubules are characterized by a highly convoluted structure, consisting of cuboidal epithelial cells with numerous microvilli on their luminal surface, facilitating efficient reabsorption of water, ions, and solutes from the glomerular filtrate. This intricate cellular arrangement contributes to the remarkable capacity of proximal tubules to reclaim essential substances, such as glucose, amino acids, and electrolytes, from the urine back into the bloodstream. Dysfunction of these tubules is associated with various renal disorders, emphasizing the clinical significance of understanding their structure and function.

The main objective of this project is to address the critical question: How can we design and fabricate a 3D Proximal Tubule (PT) scaffold that can recapitulate the architecture, composition, and bioactivity of the PT, while also meeting specific functional and manufacturing requirements? This project aims to develop 3D Proximal Tubule Scaffolds that mimic proper architecture, composition, and bioactivity, support renal membrane and vascular formation, and uphold transport functionality.

This objective stems from the limitations of current treatment methods for End Stage Renal Disease (ESRD), such as dialysis and kidney transplantation, which not only fail to address the underlying cause of chronic kidney disease (CKD) but also lead to various health problems and require ongoing, costly medical care and management. The goal is to create a functional PT scaffold that can be used as a therapeutic intervention for renal disorders, contributing to preserving and restoring renal health.

We have used bioprinting of hydrogel polymers to fabricate tubular scaffolds with a convoluted architecture that mimics native proximal tubules. Perfusion studies show that the tubes exhibit transport functionality. The processing-structure-function relationships for these structures will be presented. Additionally, attachment and growth of renal epithelial cells will be discussed.

CMPE4
ACCESS DISPARITIES IN COLLEGIATE ATHLETICS- A COMPARATIVE ANALYSIS OF HBCU AND PWI

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This research focuses on how access to critical resources such as funding, facilities, and coaching staff differs between Historically Black Colleges and Universities (HBCUs) and Predominantly White Institutions (PWIs) and how these disparities impact the athletic performance of student-athletes within higher education. To discern the nuanced experiences of student-athletes, a methodologically sound approach was employed. The research leverages the firsthand insights of student-athletes from both HBCUs and PWIs to provide a qualitative perspective on the challenges and advantages associated with resource allocation. Through a detailed analysis of survey responses, this study uncovered patterns and trends that illuminate the distinct ways in which HBCUs and PWIs allocate resources to their athletic programs. Additionally, this research explores the perceived impact of resource disparities on athletes' training, competition experiences, and overall athletic performance. In conclusion, the findings of this study underscore the profound impact of resource disparities on the athletic landscape of higher education, particularly concerning HBCUs and PWIs.

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CMPE5
USING SMARTPHONE TECHNOLOGY IN REAL-TIME FIELD SOIL HEALTH ASSESSMENT

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This research analyzes the statistical effectiveness of machine-learning algorithms in combination with smartphone technology to characterize soil spectral reflectance. Currently, general field soil health assessments are conducted on an experience-based level that presents issues for reliability. Therefore, this research examines the viability of utilizing smartphone technology to standardize soil health assessment practices. The main factors of soil classification that will be analyzed for variability are aggregate size, soil color, and estimated soil nutrient concentration. Hence, the goal of this research is to evaluate and compare the feasibility of real-time soil classification on mobile phones to improve and inform soil management practices.

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FCO1
CROSS-CURRICULAR COURSE-BASED UNDERGRADUATE RESEARCH EXPERIENCES (CURES) AT BOWIE STATE UNIVERSITY

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Research experience is essential to the education and professional development of undergraduate STEM majors. To provide adequate opportunity for research experiences, the Department of Natural Sciences has embarked upon a Course-based Undergraduate Research Experience (CURE) Program, in which faculty develop projects that engage whole classes of students in addressing a research question or

problem that is of interest to the scientific community. Unique research projects across the departmental curriculum afford multiple opportunities for undergraduates to explore research as a further career pathway and to develop technical skills from the first year through the senior year. Bowie State University CURE courses, by design, complement and build upon one another in order to enhance student learning, skills acquisition, competency development, and provide maximum opportunity for impact, in contrast to traditional models of research scholarship. CURE courses offer research opportunity to whole classes of students in molecular biology, animal ecology, genetic engineering, microbiology, bioinformatics and more.

FCP1
DETOXIFICATION GENE EXPRESSION VARIATION IN TWO-SPOTTED SPIDER MITES FEEDING ON DIFFERENT HEMP CULTIVARS

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Industrial hemp (*Cannabis sativa*) serves multiple purposes, including fiber and cannabidiol (CBD) production. However, hemp cultivation faces a notable threat from the two-spotted spider mite (*Tetranychus urticae*), which inflicts damage through feeding and virus transmission. This study aimed to identify key genes significantly up- or down-regulated in spider mites feeding on fiber and CBD hemp cultivars, focusing particularly on detoxification genes. Our hypothesis posited that *T. urticae* modulates specific pathway genes in response to the chemical compositions of hemp cultivars it feeds on. To elucidate how spider mites regulate detoxification genes when exposed to various hemp cultivars, specimens were collected from two fiber hemp cultivars and three CBD hemp cultivars. RNA extraction, cDNA transcription, high-throughput sequencing, and subsequent data analysis were performed. Results revealed a greater number of significantly upregulated genes in spider mites feeding on CBD hemp cultivars compared to those on fiber hemp cultivars. Notably, pathway genes associated with xenobiotic metabolism, such as cytochrome P450 (P540), glutathione S-transferase (GST), glucuronosyltransferase (UDP), and carboxyl-/esterases (EST), exhibited significant upregulation in spider mites feeding on CBD hemp cultivars. These findings suggest that *T. urticae* strategically regulates these genes in response to the distinct chemical compositions of hemp cultivars. Unique components like CBD may influence spider mite populations, underscoring the intricate relationship between mites and the chemical profiles of different hemp varieties.

GSO1
PROTEASOME SYMPHONY: LIPID RAFTS AND EXOSOMES AS KEY PLAYERS IN E-CIGARETTE-INDUCED INFLAMMATION

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While advertised as a safer alternative than traditional cigarettes, e-cigarettes have been linked to oxidative stress and protein degradation in recent studies. They might trigger harmful processes in the body, paving the way for respiratory diseases. Earlier findings from our laboratory highlighted the essential role of inducible 20S proteasome catalytic subunits in tobacco-flavored e-cigarette vapor condensate (TF-ECVC ± nicotine)-induced inflammation in A549 cells. Further expanding our study, we observed an increase in the transcription and translation of 19S regulatory particle subunits Rpn13 and Rpn10 in TF-ECVC-challenged cells. This suggests enhanced substrate binding and commitment of the gate components for ubiquitin-mediated protein degradation. The co-localization of 20S proteasomes in both lipid rafts and exosomes, which are recognized as hubs for intercellular communication and disease in various study models, opens intriguing possibilities for understanding their roles in health and pathology. Earlier studies demonstrated LPS-mediated selective activation of the proteasome in

membrane rafts by inducing the IKK-p105-MEK(TPL-2)-ERK pathway and its inactivation outside the raft entities. We isolated lipid rafts and exosomes from TF-ECVC-challenged lung epithelial cells (A549) to determine the localization of constitutive/immune/19S subunits, along with the specific biomarkers for each hub, using conventional and hybrid immunoblotting. Our results demonstrate increased accumulation of constitutive (β1, β2, β5); immuno- (MECL1); and 19S proteasome subunit (Rpn13) along with biomarkers Caveolin-1 and Flotillin-1 in the raft fractions of TF-ECVC challenged cells. Studies suggest that lipid rafts may play a role in the biogenesis and release of exosomes. Therefore, as anticipated, our results showed an increased presence of constitutive (β1, β2, β5), immuno-(MECL1), and 19S (Rpn13) subunits in the exosomes as well. Overall, our findings provide critical information about the role of exosomes and lipid rafts in ECVC-induced inflammation. Our future studies focusing on altering lipid raft assembly or inhibiting exosome release will provide useful information about the strategies that can be used to mitigate the harmful or toxic impacts of ECVC.

GSO2
NANOTUBE NEXUS: EXPLORING HEALTH IMPACTS, SIGNALING PATHWAYS, AND ENVIRONMENTAL INTERACTIONS

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Carbon nanotubes (CNTs), particularly single- or multi-walled (SWCNTs/MWCNTs), are widely used in industrial and consumer products, raising concerns about potential human health risks upon inhalation. Their large surface area and affinity for binding to pollutants or biomolecules add complexity, especially when subjected to 'functionalization' with chemical groups, altering their physicochemical properties. While CNTs hold promise for environmental remediation, reports suggest heightened responses to allergens, smoke, or pollutants in their presence. Preliminary studies using alveolar epithelial cells (A549) were conducted to explore the impact of pristine and functionalized MWCNTs on inflammation. Results revealed increased cytokine/chemokine production, NF-κB expression, the receptor for advanced glycation end products (RAGE), danger-associated molecular pattern-HMGB1, and autophagy markers in exposed A549 cells. Furthermore, considering the intricate network of cellular signaling, we investigated the influence of the Hippo signaling pathway during MWCNT exposure. Our findings suggest altered transcription of Hippo signaling pathway components, emphasizing its role in mediating cellular responses following MWCNTs exposure. In understanding how CNTs influence inflammation induced by particulate matter such as perfluorooctanoic acid (PFOA), we conducted *in-silico* studies. The findings demonstrated that pristine MWCNTs enhance the binding affinity between PFOA components and inflammatory proteins. This insight contributes to unraveling the complexities of nanotube exposure, shedding light on health risks and interactions with environmental pollutants. Furthermore, the study highlights the need for comprehensive assessments of the consequences of nanomaterial exposure, emphasizing the intricate interplay between CNTs, the Hippo signaling pathway, and existing environmental stressors. As CNT applications proliferate, ongoing research in this area is essential for informed risk management and the development of safe nanomaterials.

GSO3
DIESEL PARTICULATE EXTRACT AND CELLULAR DYNAMICS: UNRAVELING SUMOYLATION'S IMPACT ON INFLAMMATION AND APOPTOSIS IN ALVEOLAR EPITHELIAL CELLS

Nandini Bidarimath, Ranjeeth Kondatti, Georrein Dupre, Dhruthi Mutyala, Manisha Takur, Sanjay Batra. Southern University and A&M College, Baton Rouge, LA.

Diesel particulate matter (DPM) is a form of anthropogenic air pollution produced during the combustion process of heavy-duty diesel engines in diverse industrial sectors such as agriculture, construction, marine, and mining. Occupational exposure to diesel particulate extract (DPE) has been associated with

inflammation and various lung diseases. Recent research suggests that SUMOylation, a reversible chemical modification process induced by SUMO-1, may play a pivotal role in activating the inflammasome and triggering programmed cell death (apoptosis). However, the specific link between DPE-induced SUMOylation and the activation of the inflammasome and apoptosis remains unclear. To address this knowledge gap, experiments were conducted on human alveolar epithelial cells (A549), which share characteristics with alveolar type II cells. These cells were exposed to DPE to examine the genetic regulation of key proteins involved in these pathways. Significantly, exposure to DPE for 48 h led to increased mRNA levels of SUMO conjugating proteins (SUMO1, SUMO2/3), components of the NLRP3 inflammasome (NLRP3, ASC, CASP1), and pro-apoptotic genes, including initiator caspases (CASP8, CASP9) and executioner caspases (CASP3), in A549 cells. Notably, we observed that SUMO1 knockdown in A549 cells rescued DPE-induced-NLRP3, CASP1, and CASP3 expression, suggesting a potential role for SUMO1 in regulating pyroptosis and apoptosis. Additionally, the release of inflammasome components into the extracellular space from A549 cells exposed to DPE for 48 h was an interesting finding in our study model. Further investigations employing both in vitro and in silico methods are in progress to provide a more comprehensive understanding of these molecular mechanisms.

GSO4
"ENVIRONMENTAL PERILS: PENTACHLOROPHENOL, TETRACHLOROHYDROQUINONE, AND THEIR LEGACY"

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Pentachlorophenol (PCP), a chlorinated aromatic organic compound, has historically served various agricultural purposes, including as a pesticide, fungicide, herbicide, and insecticide, since its introduction in 1936. However, its usage faced prohibition by the United States government in 1984 due to its recognized carcinogenic and toxic properties. However, approximately 36 million utility poles treated with PCP still remain across the country and continuously pose risk of exposure. Exposure to PCP primarily occurs through direct volatilization from treated surfaces, leading to potential inhalation or skin contact. Its persistence in the environment, with a half-life of up to 200 days in water and varying durations in human tissue, contributes to its widespread presence. Recent studies have unveiled PCP's conversion into Tetrachlorohydroquinone (TCHQ), a more potent carcinogenic compound, through oxidative processes. Building on this background and earlier results from our laboratory, which demonstrate PCP induced inflammation in lung and liver epithelial cells, we hypothesized the important role of TCHQ in cell survival pathways. Our preliminary findings demonstrate that TCHQ exposure may lead to significant health risks, particularly as we observed heightened toxicity in TCHQ-exposed lung epithelial cells (A549) compared to PCP challenged cells. Further investigations highlight TCHQ-mediated activation of key cell death pathways including-apoptosis, pyroptosis, and necroptosis. We observed increased expression of ZBP1, a key regulator of PANoptosis. Additionally, TCHQ also induced the expression of proinflammatory mediators like TLR-4, STAT3, CCL2, and IL-6. Our future work is focusing on unraveling the intricate molecular mechanisms underlying TCHQ-induced toxicity, particularly concentrating on PANoptosome regulation in A549 cells. By gaining a thorough understanding of these pathways, we aim to reduce the health risks linked to PCP and TCHQ exposure and facilitate the development of safer alternatives for both humans and agricultural practices.

GSO5

INVESTIGATING VIRTUAL REALITY ADOPTION IN EDUCATION: AN ELICITATION STUDY OF STUDENTS' SALIENT BELIEFS

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Virtual reality (VR) platforms for enhancing student learning outcomes are an area of growing interest. However, adoption rates of VR-based educational tools still need to improve among students. This elicitation study aimed to uncover students' salient behavioral, normative, and control beliefs that shape their intentions toward adopting VR-integrated instructional methods (Ajzen, 2014). An open-ended survey was administered based on student opinions from the engineering and agricultural sciences undergraduate programs at HBCU institutions with varying VR knowledge and experience. Using the belief elicitation approach, the survey aimed to better understand (1) factors that facilitate use based on students' perspectives, (2) social referents who may influence VR adoption decisions, and (3) perceived advantages and disadvantages of VR integration into instruction. The qualitative findings provide theoretical grounding to derive salient belief (Ajzen, 2014) constructs, allowing future research to quantitatively examine factors influencing VR integration intentions and develop targeted interventions to convert intentions into actual adoption behavior. Overall, this study signifies an essential first step in investigating and advancing VR adoption in HBCU institutions through an elicitation approach centered on understanding end-users' beliefs in engineering and agricultural sciences.

GSO6

INVESTIGATING THE EXPRESSION OF PIWI IN RESISTANT AND SUSCEPTIBLE STRAINS OF BIOMPHALARIA GLABRATA POST S. MANSONIINFECTION USING A SERIES OF CELL AND MOLECULAR BIOLOGICAL TECHNIQUES.

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The genome is the blueprint of an organism whose products orchestrate and regulate a myriad of cellular and subcellular processes that govern regulatory functions and, in essence, life. The replication and expression of genes are strictly controlled and monitored extensively in order to preserve the integrity of the genome, as failure to do so amounts to severe ramifications. Mutations within the genome lend to a gene product being absent or altered in such a way that renders them ineffective or essentially nonfunctional. These products, especially those involved in regulatory cascades such as cell growth and division, can become constitutively active, paving the way for cancer manifestation. However, there are mechanisms within the body that help to reduce the chances of such occurrences. One such mechanism is the silencing of transposable elements, which are mobile genetic elements that have the ability to move from one area of the genome to the next and, in so doing, can create mutations, altering the genome and resulting in genetic instability, a hallmark of cancer. This can be achieved through endogenous PIWI activity, which serves as a protector through the silencing of these mobile elements. In this study, through parasite-host interaction, the expression of PIWI is investigated through a series of cell and molecular biological techniques where *B. glabrata* is infected with *S. mansoni*. Several human cancers have been found to be triggered by parasite infection through different processes, such as induced inflammation, where cytokines and chemokines trigger downstream signaling cascades, which have genetic implications. The physical damage that ensues also has an impact on cellular processes. Together, these two processes, inflammation and physical damage, have the ability to induce DNA damage and mutational events in addition to oncogene activation. Through modification of cell growth, survival as well as proliferation through different signaling cascades, tumor development is initiated as well as its progression. Through this study, PIWI expression in the resistant and susceptible snails will provide some

enlightenment as to whether PIWI might have some role in the host defense system, providing protection from further downstream events and posing as a potential candidate to study metastatic cancer.

GSO7
FELINE CORONAVIRUS INFLUENCES THE BIOGENESIS AND COMPOSITION OF EXTRACELLULAR VESICLES DERIVED FROM CRFK CELLS

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Coronavirus (CoV) has become a public health crisis that causes numerous illnesses in humans and certain animals. Studies have identified the small, lipid-bound structures called extracellular vesicles (EVs) as the mechanism through which viruses can enter host cells, spread, and evade the host's immune defenses.We proposed that the coronavirus could alter EV production and content, as well as influence EV biogenesis and composition in host cells. In the current research, Crandell-Rees feline kidney (CRFK) cells were infected with feline coronavirus (FCoV) in an exosome-free media at a multiplicity of infection (MOI) of 2500 infectious units (IFU) at 48h and 72h time points. Cell viability was analyzed and found to be significantly decreased due to FCoV infection. NanoSight particle tracking analysis (NTA) confirmed that EV sizes averaged between 100 and 200 nm at both incubation time points. Expression of specific protein markers such as TMPRSS2, ACE2, Alix, TSG101, CDs, TLRs, TNF-α, and others were altered in infection-derived EVs when compared to control-derived EVs after FCoV infection. Our findings suggested that feline coronavirus infection could alter the EV production and composition in host cells, which affects the infection progression and disease evolution. One purpose of studying EVs in various animal coronaviruses that are in close contact with humans is to provide significant information about disease development, transmission, and adaptation. Hence, this study suggests that EVs could provide diagnostic and therapeutic applications in animal CoVs, and such understanding could provide information to prevent future coronavirus outbreaks.

GSO8
A STUDY OF THE POSTMORTEM SOIL MICROBIAL COMMUNITIES ASSOCIATED WITH RAT DECOMPOSITION

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Vertebrate decomposition starts immediately after death and an efflux of cellular components to the surrounding environment also begins as tissues breakdown due to autolysis. The goal of many vertebrate decomposition studies is to generate reliable means to determine the bacterial community successional patterns. Using cadaver soil from human surrogates, such as rats, research has demonstrated a correlation between microbial diversity and postmortem interval estimates. We hypothesized that the microbial diversity of cadaver soil collected under decaying vertebrates will reveal an increased diversity compared to control soil samples. To test this hypothesis, soil microbial communities were characterized using the 16S rRNA gene from cadaver soil samples associated with the head and rear paws of a decomposing albino rat at various stages of decomposition. Cadaver soil samples were obtained from a cordoned off area at Alabama State University (32.3630°N, 86.2940°W). Two control samples were also collected approximately five meters from the cadaver soil site. DNA was extracted and universal primers (341F/805R) designed to target the cojoined V3 and V4 hypervariable regions of 16S rRNA gene were used to generate an amplicon of approximately 465 bp in size. Bray-Curtis distance was used to visualize the differences in bacterial populations. The results demonstrated that Actinobacteriota was the most

abundant bacterial phylum across all samples. Further, there was an increase in the Firmicutes in the rat cadaver soil samples (head and rear paws) compared to the control. Future directions include using a larger study population as well as using house rats (*Rattus rattus*) to compare with albino rats. This work was supported by the National Science Foundation (EES 2011764) and the US Department of Education MSEIP (P120A220003).

GSO9
BIOLOGICALLY RELEVANT CONDITIONS SIGNIFICANTLY UPREGULATE VIRULENCE TARGET EXPRESSION IN *PSEUDOMONAS AERUGINOSA* STRAIN PA14

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Pseudomonas aeruginosa is a ubiquitous, gram-negative bacterium that is capable of establishing opportunistic, critical, and potentially fatal infections in immunocompromised individuals. *P. aeruginosa* can cause highly antimicrobial resistant infections, with increased mortality risks, such as burn infections, Possible Ventilator-Associated Pneumonia (PVAP), and chronic infections in cystic fibrosis patients [1]. The recent prevalence of multidrug resistant (MDR) and extensively drug resistant (XDR) strains have made novel drug discovery for *P. aeruginosa* a necessity [2]. Non-traditional antimicrobials like anti-virulent therapeutics can disable the bacterium without directly killing it [3]. Such an approach can restore efficacy to traditional antibiotics or enable successful immune clearing of infections. Although the traditional antimicrobial susceptibility testing (AST) methods, which use Cation-Adjusted Mueller-Hinton Broth (CAMHB), have been effective in screening antibiotics over past decades, a diversion to anti-virulence therapeutic discovery may require a new screening strategy. For *P. aeruginosa*, some virulence factors are not well-expressed under standard AST conditions and could require more biologically relevant conditions [4]. In this study, we hypothesized that biologically relevant media would increase virulence gene expression not seen under standard AST testing conditions. We cultured *P. aeruginosa* strain PA14 in three different media: nutrient broth (NB) as a maintenance media control, CAMHB as AST media, and Dulbecco's Modified Eagle's Medium (DMEM) with Fetal Bovine Serum (FBS) as a biologically relevant media. We then extracted, sequenced, and analyzed *P. aeruginosa* PA14 RNA to identify any changes in virulence expression under AST and host mimicking conditions. Results revealed significant differences in the *P. aeruginosa* PA14 transcriptomes under different growing conditions. The expression of virulence genes involved in Type IV Pili (TfP) initiation (*PilY1, PilW, PilX, FimU*), iron acquisition, secretion and release (*FpvA, OpmQ, HasAp, HasD, HasE, HasF, HasR*), and translocation of Type III Secretion System (T3SS) effectors (*PopD, PopB, PcrV*) were uniquely expressed under biologically relevant conditions when compared to AST conditions. Additionally, these uniquely expressed genes were exposed to PA14's environment, which may indicate that PA14 more closely aligns DMEM-FBS with an actual infection environment than it does with CAMHB. These findings suggest that virulence-targeting therapeutics may be more successfully evaluated under biologically relevant conditions than under standard AST conditions.

GSO10
CANINE CORONAVIRUS INFECTION ALTERS THE CELL DERIVED-EXTRACELLULAR VESICLES BIOGENESIS AND PHARMACOLOGICAL-MEDIATED CELLULAR ACTIVITY

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Coronavirus has persistently become a global health concern causing various diseases in a broad range of animal hosts including humans. However, the study of virus-mediated host responses has been limited. Herein, we proposed using naturally secreted extracellular vesicles (EVs), specifically exosomes, to study host-pathogen responses after coronavirus infection as EVs are extensively involved in intercellular communications and immunomodulation. Here, Crandell-Rees feline kidney (CRFK) and Madin-Darby canine kidney (MDCK) cells were infected with canine coronavirus (CCoV) in an exosome free media at 0.0008 and 0.05 multiplicity of infection (MOI) for 48 and 72 hours (h). The cell viability was significantly decreased over time and transmission electron microscopy (TEM) showed the presence of small EVs (sEVs) after coronavirus infection. Nano-sight tracking analysis (NTA) revealed that EV sizes averaged between 100 and 200 nm. EV particle size and concentration were higher in the CCoV-infected MDCK-derived EVs; however, particle size was reduced in CCoV-infected CRFK-derived EVs at 48 hours compared to control-derived EVs. Total DNA and protein levels were elevated in infection-derived EVs from CRFK and MDCK after CCoV infection. The expression levels of EV biomarkers such as ACE-2, annexin-V, flotillin-1, TLR-7, LAMP, TNF-α, caspase-1, caspase-8, and others were altered in EVs after infection. In addition, the antiviral potential of ketoconazole and climbazole were tested and the cell death after co-treatment of these agents (ketoconazole (5 μM) or climbazole (5 μM and 10 μM) with CCoV was limited relative to CCoV alone. Thus, our findings suggest that coronavirus infection alters exosome biogenesis and pharmacological-mediated cellular activity in the host. Further research with different animal coronavirus, host or pharmacological agents will provide detailed understanding of host exosomal biology and antiviral activity which could be extended to study the interspecies jump to animal coronaviruses to cause infections in humans.

GSO11
ADMIXING CHLAMYDIAL MOMP WITH DMLT ADJUVANT ENHANCES TLR-2 EXPRESSION AND TH1 IMMUNE RESPONSES IN MURINE MACROPHAGES.

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Chlamydia trachomatis (Ct), an obligate aerobe gram-negative bacterium, is the leading cause of bacterial sexually transmitted diseases worldwide. Ct infections are mostly asymptomatic and can lead to severe reproductive issues, such as ectopic pregnancy and sterility, making it a serious public health concern. Due to the asymptomatic nature of Ct, efficient antibiotic treatment is unsuccessful in preventing infections; hence, frequent re-infections occur. Therefore, there is an urgent need for an efficient vaccine to drive long-lasting immunity against Ct. However, the complexity of the pathogen lifestyle and the lack of long-lasting adaptive immunity represent significant challenges in vaccine development. The major outer membrane protein (MOMP) of Ct has shown to be a promising vaccine candidate. Nevertheless, it is unable to elicit the same level of response as the whole organism. Current research uses adjuvants to counteract this issue. This study tested two E. coli-derived adjuvants, including a double mutant labile toxin (dmLT) and the labile toxin subunit A1 (LTA1). We aimed to identify the most potentiating adjuvant for MOMP and hypothesized that the admixture of the dmLT adjuvant with the chlamydial MOMP would enhance the induced innate immune response. As such, J774A.1 murine macrophages were stimulated for 24 hours with different concentrations of adjuvants and MOMP. The cell-free supernatants were collected for cytokines-specific ELISAs and RNA for TaqMan qPCR. Our results showed that macrophages stimulated with the dmLT adjuvanted-MOMP induced and enhanced MOMP-specific IL-6 and IL-12p40 (Th1 cytokines) in a dose-dependent fashion, compared to the bare MOMP and the LTA1 adjuvanted MOMP. We also observed an improved TLR-2 and CD80 gene expression in macrophages stimulated with the dmLT adjuvanted-MOMP. We conclude that adjuvanting the chlamydial MOMP with dmLT bolstered the MOMP-induced immune responses in murine macrophages. The dmLT adjuvanted-

MOMP enhanced the production of IL-12p40 cytokine, essential to fostering a Th1 adaptive response for protective immunity. Also, it enhanced the expression of cell surface receptors (TLR2), which are required for pathogen recognition and entry. Overall, dmLT may be an attractive adjuvant to include in the development of chlamydial vaccines.

GSO12
CATIONIC LIPO-OLIGOPEPTIDES (CLOPS) DISPLAY IN-VITRO ANTIVIRAL ACTIVITY AGAINST HERPES SIMPLEX VIRUS TYPE 1

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Herpes simplex virus type 1 (HSV-1) is an enveloped, double-stranded DNA virus that is associated with sporadic lifelong recurrences resulting from latent infections. The virus infects mucous cells and establishes latent infections in neurons, leading to undesirable health outcomes, which include mucocutaneous ulcerative disease, keratitis, encephalitis, and genital herpes. Therapeutic antiviral agents can prevent viral replication and extreme sequelae of recurrent outbreaks caused by HSV-1. However, these drugs are limited by toxicity, undesirable side effects, and the development of antimicrobial resistance and latent infections. Thus, there is an urgent public health need to explore promising compounds with low toxicity and therapeutic effects against HSV-1. Antimicrobial peptides (AMPs) are of interest since they have demonstrated a wide range of antiviral efficacy against enveloped viruses. Cationic lipo-oligopeptides (CLOPs) are proprietary AMPs that hold promising prospects mainly due to their non-toxic nature and low-risk rational designs. The aim of the study was to determine the antiviral activity of CLOPs against HSV-1. We hypothesized that CLOPs will inhibit the replication of HSV-1 either by disrupting its membrane envelope or by induction of endogenous mediators. Safe concentrations of CLOPs in mammalian cells were determined using the MTT colorimetric assay. Different concentrations (0.48 to 500 µg /mL) of peptides were added to human keratinocytes (HaCaT) and Vero cells for 24, 48, and 72 hours to evaluate their dose-dependent cytotoxicity. Except at the highest concentrations (250 and 500 µg/mL), CLOPs were non-toxic and induced cellular proliferation. To further investigate the antiviral capacity of CLOPs against HSV-1, we selected a range of non-toxic concentrations (12.5 to 100 µg/mL) and screened them using TaqMan qRT-PCR and the plaque assay. Acyclovir, a key drug used for HSV-1 clinical treatment, was used as a positive control. Our results showed that CLOPs TP359 and P1108 significantly reduced ($P < 0.01$) HSV-1 viral load in HaCaT cells at levels comparable to that of acyclovir. Moreover, CLOPs TP359 and P1108 were anti-inflammatory by significantly $P < 0.001$) reducing IL-6 production in HaCaT cells exposed to HSV-1. Notably, CLOPs induced IL-6 at 50 and 100 µg/mL in the absence of HSV-1, coinciding with the reduced viral load at similar concentrations. These results show the potential of CLOPs as antivirals against HSV-1. Ongoing studies include understanding the mechanisms by which CLOPs inhibit HSV-1.

GSO13
EFFECT OF GETAH VIRUS INFECTION ON CANCER CELLS *IN VITRO*

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While chemotherapy, surgery, and radiation continue to lead the area of applied cancer treatments, deaths are reported due to the aggressiveness of cancer. While traditional chemotherapy, surgery, and radiation have been effective, these therapies have some degree of toxicity and complications. Therefore, there is a need to explore other effective treatment methods with lower to no toxicity. Oncolytic viral (OV) therapy has become an area of active research for cancer due to its specificity, selectivity, safety, and tolerability. Emerging evidence reveals effective treatment of different forms of cancer, such as melanoma and glioblastoma, with OVs. Though many viruses have been studied for OV research, the data on the Getah virus, an alphavirus, remains scanty. Getah virus, an oncolytic virus sourced from mosquitoes, is gaining the interest of researchers because of the special role mosquitoes play in the transmission of many diseases, including malaria, which kills millions of people every year. We have hypothesized that an understanding of the effect of Getah virus infection on different cancer cells will close the gap in knowledge on Getah virus oncolytic virus activity and contribute to the refinement and development of proper Getah virus oncolytic therapy. Herein, A-72 cells, a fibroblast cell line that was isolated from an 8-year-old female golden retriever with a tumor, was infected with Getah virus at a multiplicity of infection (MOI) of 0.01, 0.12, and 0.5 infectious units (IFU) per cell for up to 72 hours (h) for the 0.01 IFU, up to 48h for the 0.12 IFU, and 24 h, 48h, and 72h for the 0.5 IFU. At MOIs 0.01 IFU and 0.12 IFU, there were morphological changes, but the decrease in cell viability was not significant at 72h for the 0.01 IFU and 48h for the 0.12 IFU[qm1] [BB2]. However, at the MOI 0.5 IFU, the decrease in cell viability was significant at three separate time points in three different experiments. This decrease was seen at 24h, 48h, and 72h as compared to the controls, and the decrease in cell viability was not time-dependent in each of these experiments. At the highest MOI, the morphological changes were profound, with cell blebbing observed via an infection assay. Summarily, our findings suggest that the Getah virus causes natural infection of A-72 cells at the MOI 0.5 IFU. This study affirms that A-72 cells are susceptible to Getah virus *in vitro.* Since this study is preliminary, our future goal will be to perform various assays to gain more information on the effects of Getah virus infection on cancer cell lines and to also replicate the experiments in an *in vivo* and *ex vivo* models.

GSO14
PHOTOSYNTHESIS AND APPLICATION OF CYANOBACTERIA: FORENSIC DETECTION OF MICROORGANISMS

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Photosynthesis is a fundamental process that allows plants, algae, and photosynthetic bacteria to convert light energy into chemical energy, fueling the growth and maintenance of life on Earth. Cyanobacteria are blue-green gram-negative bacteria and unique among bacteria for their ability to photosynthesize similarly to plants. They are effectively used to deal with numerous tasks in various fields of biotechnology, such as agricultural (including aquaculture), industrial (food and dairy products), environmental (pollution control), biofuel (bioenergy), pharmaceutical biotechnology (such as antimicrobial, anti-inflammatory, immunosuppressant, anticoagulant and antitumor), and forensic science (cyanobacteria and their byproducts may serve as biological tracers). This study explores the identification of cyanobacteria overflow metabolites and the novel application of cyanobacteria in the forensic detection of microorganisms. Our hypothesis is that the unique spectroscopic profiles of microorganisms may be used to detect microorganisms in forensic science and enrich the basic knowledge of metabolites in microbiology. Firstly, we monitored the forensic drug norcocaine over one month in a car using gas chromatography-mass spectrometry (GCMS), Fourier transform infrared spectroscopy (FTIR), and chemometrics. The data showed that the time-associated profiles of norcocaine can be used in the time interval estimation. Next, we investigated the effect of cyanobacteria overflow metabolites in environments using high-performance liquid chromatography (HPLC) and liquid chromatography-mass spectrometry (LCMS). We collected over 1000 mass spectra of metabolite samples of the cyanobacteria, which are used as cyanobacteria overflow profiles to detect metabolites. We analyzed these data using chemometrics and machine learning techniques. These data contain cyanobacteria-specific

photosynthetic signatures, including unique compositions (overflow metabolites) as bioindicators in forensic applications. This work may extend the understanding of metabolism mechanisms in microbiology and offers a sensitive and efficient way for detecting and analyzing microorganisms in forensic samples. The findings of this study could have significant implications for microbiology and crime scene analysis, particularly in tracing biological materials in environmental and aquatic systems.
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GSO15
DIFFERENTIAL ANALYSIS OF EXOSOMES AND ECTOSOMES FROM DIVERSE ADENOVIRUS 48 INFECTED CELLS

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Adenovirus 48 (Ad48) is a rare adenovirus serotype belonging to subgroup D. Using this virus as a vector in gene therapy is an approach to circumventing preexisting immunity that challenges the use of adenoviral vectors in therapeutic approach. However, the complexities of its interactions with host cells, especially regarding the extracellular vesicles released after administration, still need to be better understood. These extracellular vesicles are vital in cell-to-cell communication and are pivotal in determining the effectiveness and safety of treatments using viral vectors. We hypothesized that exosomes and ectosomes derived from Ad48 infected cells exhibit distinctive signaling profiles and these vesicles affect neighboring cells. Different cell lines were infected in exosome-depleted media with Ad48 using 300 viral particles (vp), 750vp, and 1500vp across different time points. Exosomes and ectosomes were extracted, nanoparticle tracking analysis and proteomics were performed to assess and compare the different signal profiles produced by these vesicles. Through detailed analysis of the exosomes and ectosomes released post Ad48 administration across multiple cell lines, we seek to deepen our understanding of adenovirus-cell interactions and the subsequent alterations in the cellular environment to enhance gene delivery.

GSO16
EXPLORING THE ROLE OF RHIZOSPHERE MICROBIOME IN HEMP PLANT GROWTH AND DEFENSE AGAINST TWO-SPOTTED SPIDER MITES

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Hemp *Cannabis sativa* L. is an ancient crop valued for its medicinal and high-quality fiber properties. As interest in its industrial potential grows, there is a need for a deeper understanding of the ecology of hemp, especially regarding beneficial bacteria and defense against insect herbivores. Despite the critical role microorganisms play in plant growth and pest defense, their specific impact on hemp production under pest pressure remains largely unknown. Integrated Pest Management (IPM) is a pivotal approach that prioritizes effective control methods while minimizing reliance on chemical insecticides. Biological control in IPM emphasizes the use of predatory arthropods and parasitoids for biological control. However, new evidence shows that soil and plant microbiomes significantly enhance plant defenses against insect herbivores. Variety selection is crucial in IPM strategies, as certain varieties possess traits like organic compounds or physical characteristics that deter pests. At the same time, microorganisms present in soil and plant microbiomes across various varieties can also strengthen their defense

mechanisms against insect herbivores. We hypothesized that the composition of the hemp rhizosphere microbiome impacts hemp growth and defense against the leaf-feeding two-spotted spider mites. Therefore, this study aims to investigate the rhizosphere of two different varieties of hemp to identify potential microorganisms that may contribute to defense against the two-spotted spider mite (*Tetranychus urticae* Koch), which is a significant pest of hemp in greenhouse production. At the flowering stage, measurements of plant and root dimensions were recorded for twelve plants, each of which was a hemp cultivar, Cirtus, and BaOx. Additionally, damage from two-spotted spider mites was assessed using a scale from 0 to 5. Rhizosphere soil and root samples were also collected for microbial DNA extraction. The bacterial16S ribosomal RNA (rRNA) gene will be amplified to profile microbial communities. We anticipate that the differences between microbial communities and plant performance will unveil the significance of rhizosphere microbiome in plant growth and defense under pest attack.

GSO17
THE IMPACT OF SORBENT AMENDMENTS FOR MERCURY REMEDIATION ON THE VIABILITY OF MICROORGANISMS IN EAST FORK POPLAR CREEK (EFPC) BANK SOILS

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Mercury (Hg) remediation across contaminated environments in the United States is an ongoing project. As part of a cleanup strategy for East Fork Poplar Creek (EFPC), located in Oak Ridge, TN, deployment of sorbents is considered. Engineered sorbents, Organoclay PM-199, and MRM are fine-grained clay minerals designed for various remediation applications. However, the effect of the sorbents on soil microorganisms is not well understood. In this study, we investigated the impact of sorbents, Organoclay PM-199 and MRM on *Serratia marcescens*, and *Burkholderia thailandensis*, gram-negative organisms isolated from the Hg contaminated EFPC bank soil.

Cultures of *S. marcescens* were amended with 5% and 25% PM-199 and MRM respectively for 9 days. The samples were harvested, and bacteria cell viability was determined using a BacLight staining kit. Growth of sorbent-amended bacterium was inhibited in contrast with unamended controls. Biochemical assays were utilized in analyzing bacterial biofilm formation and biofilm components. Results show that biofilm formation by sorbent-treated *S. marcescens* was decreased. Similarly, *B. thailandensis* cultures were treated with 5% and 25% PM-199 and MRM respectively for 9 days. *B. thailandensis* amended with low concentrations of MRM showed enhanced growth. Biofilm formed by sorbent-amended bacterium displayed differences in morphology. This study suggests that the use of organoclay PM-199 and MRM at a higher concentration may hinder the growth of specific soil microorganisms.

GSO18
CBD-RESISTANT *SALMONELLA* STRAINS ARE SUSCEPTIBLE TO EPSILON 34 PHAGE TAILSPIKE PROTEIN

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The rise of antimicrobial resistance is a global public health crisis that threatens the effective control and prevention of infections. Due to the emergence of pandrug-resistant bacteria, most antibiotics have lost their efficacy. Bacteriophages or their components are known to target bacterial cell walls, cell membranes, and lipopolysaccharides (LPS) and hydrolyze them. Bacteriophages being the natural

predators of pathogenic bacteria, are inevitably categorized as “human friends”, thus fulfilling the adage that “the enemy of my enemy is my friend”. Leveraging on their lethal capabilities against pathogenic bacteria, researchers are searching for more ways to overcome the current antibiotic resistance challenge. We hypothesized that Epsilon 34 phage tailspike protein exhibit broad-spectrum killing potential against *salmonella* strains. The objectives of this study was to assess the ability of epsilon 34 phage tailspike protein to kill CDB-resistant strains of *Salmonella* spp. We expressed and purified epsilon 34 phage tailspike protein (E34 TSP) from the E34 TSP gene, then assessed its killing potential on CBD-resistant strains of *Salmonella* spp. We also assessed the ability of the tailspike protein to cause bacteria membrane disruption, and dehydrogenase depletion. We observed that the combined treatment of CBD-resistant strains of *Salmonella* with CBD and E34 TSP showed poor killing ability whereas the mono-treatment with E34 TSP showed considerably higher killing efficiency. This study demonstrates that the inhibition of the bacteria by E34 TSP was due in part to membrane disruption, and dehydrogenase inactivation by the protein. The results of this work provides an interesting background to highlight the crucial role phage protein such as E34 TSP could play in pathogenic bacterial control.

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GSO19
IMPACT OF PESTICIDES ON PHYLLOSPHERE MICROBIAL COMMUNITIES OF HEMP PLANTS

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Plant-associated microbes play a crucial role in maintaining the health and productivity of their host plants, encompassing various microbial taxa found in the rhizosphere soil, roots, and phyllosphere. Recently, hemp (*Cannabis sativa*) has emerged as a significant crop in the US, with several economic implications. However, like other crops, hemp is susceptible to pest attacks, thus necessitating the use of pesticides. Despite their efficacy in pest control, the use of pesticides raises ecological concerns regarding their impact on non-target organisms, including beneficial plant-associated microbiomes. Our hypothesis posits that disparities in microbial communities between pesticide-treated and control plants will elucidate the effects of pyrethrin on these microbial communities. This study aims to investigate the impact of pyrethrin pesticide on hemp plant performance and its influence on the structure, diversity, and networks of phyllosphere-inhabiting microbial communities. Two hemp cultivars, "FunDip" and "Sunset," will undergo five treatments each, comprising different pre-harvest pyrethrin applications and a control (untreated) treatment. All hemp plants will be harvested simultaneously, and the impacts of pyrethrin on harvested hemp leaves and resident microbial communities will be assessed. Furthermore, microbial DNA extraction will be conducted on samples from pesticide-treated and control plants 48 hours after pesticide application, followed by pesticide residue analyses. Bacterial 16S ribosomal RNA (rRNA) gene sequencing will be employed to analyze microbial communities in these samples. This research endeavor seeks to advance our understanding of the ecological implications associated with the use of pyrethrin in the hemp production. By elucidating the impacts of pyrethrin on plant-associated microbial communities and their ecological interactions, we aim to inform sustainable agricultural practices and mitigate potential ecological risks associated with pesticide use in hemp cultivation.

GSO20
EXPLORING THE HIGHER PREVALENCE OF HYPERTENSION AMONG AFRICAN AMERICANS: A FOCUS ON LIFESTYLE FACTORS

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Hypertension, also known as high blood pressure, is a significant public health concern affecting millions of people worldwide. Although it affects people from all racial and ethnic backgrounds, hypertension disproportionately affects the African American population. The reasons behind this disparity are complex and multifaceted, encompassing genetic, socioeconomic, and lifestyle factors. This research project aims to examine the factors contributing to the higher prevalence of hypertension among African Americans compared to other racial/ethnic groups. By gaining a deeper understanding of the underlying factors driving this health disparity, we hope to inform targeted interventions and policies that can help reduce the burden of hypertension in African American communities. In particular, we will investigate the role of high cholesterol intake, alcohol consumption, and salt (sodium) intake.

GSP1
THE EFFECTS OF ADIPOKINES LEPTIN AND ADIPONECTIN ON CARDIOVASCULAR HEALTH

Jordan Johnson, Charles Bland and Victor Bii. Mississippi Valley State University, Itta Bena, MS.

Cardiovascular disease (CD) is a prevalent global health concern and a leading cause of mortality worldwide. Risk factors such as poor diet, physical inactivity, and excessive alcohol consumption contribute to CD by disrupting hormonal processes involving leptin and adiponectin. Leptin is primarily produced by adipose tissue, influences weight regulation through molecular pathways like JAK-STAT and MAPK, impacting appetite and energy balance. Adiponectin, another hormone secreted by adipose tissue, plays a crucial role in metabolic health, insulin sensitivity, and cardiovascular protection. This study aims to investigate the relationship between adiponectin levels and CD. It is hypothesized that abnormal adiponectin levels correlate with increased CD risk. The study also seeks to identify underlying factors associated with adverse adiponectin levels in cardiac patients. Stroke is a CD subtype which is used due to its association to low adiponectin levels. Data analysis involves examining gene expression patterns, BMI status, disease diagnoses, and blood pressure rates. Machine learning algorithms and tools such as WEKA, R, GeneMANIA and DAVID Functional Annotation Tools were used to measure statistics. Previous research has highlighted common genes between CD subtypes and identified associations between adiponectin levels and lipid metabolism. GeneMANIA analysis identified PCSK9, LDLR, SLC12A3, MYH7, and NOTCH1 as key genes in cardiovascular disease. PCSK9 and LDLR relate to high LDL levels and myocardial infarction risk. SLC12A3 influences renal sodium regulation, potentially treating hypertension. MYH7 triggers TGF-β signaling, causing fibrosis. Genetic associations link ADIPOQ and LEP to these genes, offering therapeutic insights. Physical associations reveal interplay between ADIPOQ, LEP, and key genes.

GSP2
ANTIMICROBIAL RESISTANCE IN METHICILLIN-RESISTANT *STAPHYLOCOCCUS AUREUS* (MRSA) INFECTIONS BASED ON GEOGRAPHICAL REGION

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Antimicrobial resistance (AMR) is a global public health threat, exemplified by Methicillin-resistant *Staphylococcus aureus* (MRSA), which causes severe hospital and community-acquired infections. This research systematically explores MRSA's antimicrobial resistance across diverse geographic regions in the United States. Based on statistical data, regional differences in MRSA resistance profiles were identified to hypothesize the prevalence of MRSA genomes. Visualizations, including various graphs and maps, illustrate regional variations. The findings deepen the understanding of MRSA epidemiology, guiding the development of tailored treatment strategies for improved patient outcomes. Secondary data analysis was used for data collection by analyzing datasets from previous reports provided by the Center for Disease Control (CDC). The study identified regional variations in MRSA resistance profiles across diverse geographic regions in the United States. Due to selected regions within the United States, this limited geographic scope may not capture the full diversity of MRSA

resistance profiles across the country. Future studies could consider incorporating additional factors that influence the occurrence of MRSA, such as the number of preventive programs in place, individual healthcare organization performance, other patient health conditions, and environmental conditions within each location. Comparing MRSA resistance profiles and genomic variations between countries or regions could contribute to a better understanding of global MRSA epidemiology.

GSP3
EXPLORING CULTURAL NUANCES IN ADOLESCENT GHANAIAN AND KENYAN STUDENTS USING QUANTITATIVE ETHNOGRAPHY

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Asset-based learning environments are important in creating nurturing, empowering, and inclusive spaces where all individuals can thrive and reach their full potential. The Asset-Based Learning Environments (ABLE) project was formed to create a virtual, collaborative STEM informal learning program contributing to global awareness, alternative communication, and peer-driven co-learning in adolescents from schools in Kenya, Ghana, Brazil, Canada, Mexico, the USA, and more. Students form global teams to conduct research and create STEM projects and presentations. Researchers and teachers from the participating schools serve as mentors to ABLE's students, offering support and expertise when needed. The research goals of ABLE are to foster inclusivity, analyze personal accounts, and record the growth of each student. This research study is based on the preliminary interviews for incoming ABLE participants in Ghana and Kenya. The structured interviews followed a list of ten questions and were transcribed by two researchers, ensuring the accuracy of participant utterances. Open coding resulted in the development of a codebook of eleven constructs, and each turn-of-talk utterance was labeled 1 or 0, respective to the presence of each code. The resulting data was visualized within the Epistemic Network Analysis (ENA) online tool. These quantitative ethnographic methods were used to capture meaningful cultural nuances in social and STEM identity among participants in Ghana and Kenya prior to their experience in the global STEM community. The preliminary findings suggest strong associations among students' self awareness and their ability to identify limitations and explain how they overcome difficulties. Students also demonstrate a passion for STEM and express clear career aspirations. Degrees of difference between each student's values and academic experiences are evident through visualization within the comparative ENA network map.

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GSP4
SEASONAL VARIATION AND EFFECT OF PESTICIDAL COMPOUNDS ON AQUATIC MICROBIAL COMMUNITIES

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Pesticides, consisting of insecticides, herbicides, and fungicides, are a category of potentially harmful compounds. Although pesticides are primarily intended to target specific pests or groups of pests, they can have unintended consequences for non-target species. Aquatic microorganisms, encompassing algal, bacterial, viral, protozoan, and fungal species, play crucial roles in aquatic ecosystems as primary production, decomposition, and nutrient cycling agents. Aquatic microorganisms can be impacted by pesticides through spills, runoff, and drift. Pesticide exposure can have either a harmful impact on

microbes, causing direct toxicity, or it can be beneficial by serving as a nutrition source to make algal bloom. Seasonal variation is typically observed in the pollution of surface water with pesticides.

This study investigated the presence of pesticides in the water of the Alabama River in downtown Montgomery, Alabama, throughout the year. We conducted multi-residue liquid chromatography-mass spectrometry (LC-MS) analyses to identify and quantify pesticides and/or their metabolites present in the water. In addition, we will employ Next-Generation Sequencing (NGS) technology to amplify the bacterial 16S rRNA genes (namely the V3-V4 regions) and fungal 18S rRNA genes in order to identify and analyze the microbial population within the water samples. We hypothesized that the presence of pesticidal compounds would have an effect on the diverse microbial taxonomic groups. Moreover, these alterations will be translated into modifications in the microbial population, which are determined by the positive or negative interactions that they have with one another.

GSP5
CHANGES IN WATER CHEMISTRY AND MICROBIAL COMMUNITIES AT DIFFERENT LOCATIONS OF ALABAMA RIVER IN THE SUMMER SEASON

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The water ecosystems play an important role in providing water and food to society, in addition to supporting a highly diverse aquatic life. River ecosystems are subjected to several anthropogenic activities particularly during summer times because of increased human activities, such as boating, rafting, and nutrient and agro-chemical inputs. These activities may alter water chemistry and river microbial communities. So we hypothesize that the composition of microbial communities and water chemistry are correlated with each other in the summer season. So our main goal is to investigate the relationship between (i) microbial communities and chemical compounds in the summer season. To perform this research, we have sampled the Alabama River from Montgomery at different locations. Then, we filtered the water samples using the filter machine (AIR CADET, Model: 420-190100FK) equipped with Whattman Nylon membrane filters (0.2µm Diameter). After filtration, we kept this filter paper in the -20^{o}C freezer until DNA extraction. Meanwhile, the filtered water was used for analyzing chemical properties and metabolome. To extract microbial DNA from the filter, we used the Qiagen (DNeasy Power water kit) Kit. We are amplifying the bacterial 16S rRNA genes (V3–V4 regions) using standard primers at the sequencing facility. The amplification and sequencing of 16S rRNA genes will be done at the *University of Minnesota Genomic Center*. We will analyze the sequenced data using the standard ecological pipeline named “Quantitative Insights into Microbial Ecology 2”. Then, we will perform quantitative analysis (LC-MS) to determine chemical compounds (pharmaceutical and pesticide) in the water. Our metabolome analysis has described the presence of several contaminants in the water belonging to pharmaceutical and pesticide compounds. Our data suggest that human activities are negatively impacting river water, and the presence of these compounds will show dramatic associations with the aquatic microbial communities.

GSP6
METAGENOMICS ANALYSIS OF THE MICROBIAL DIVERSITY AND QUANTITATIVE CO-RELATIONSHIP TO THE PHARMACEUTICAL AND PESTICIDE COMPOUNDS IN DIFFERENT SEASONS IN ALABAMA RIVER, MONTGOMERY

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Top-grade water quality is essential for aquatic life and human beings. The microbial communities are the major component of the river ecosystem. Water ecosystems are susceptible to changing climatic factors and human activities. Globally water pollution and water mechanisms are important for the shortage of

pure drinking water. Eco-systematically water chemistry is important also for the whole living organism. In our Research project, we chose the Alabama Riverside for understanding the water-microbiome interrelation and their molecular mechanisms in different seasons. The river is the most important source of understanding the bioecological cycle because microorganisms live in the water at a different level and different sedimentation and play an important role in helping to Mineralization of organic substances. Firstly, we hypothesize that the abundance of microbial taxa (e.g., from phylum to species level) will change with different seasons (spring, summer, fall, winter) in the Alabama River system. Second, we also hypothesized that the seasonal variations in microbiome Communities will be linked with water chemistry. Third, it is also hypothesized that Microbial communities would show interactions with various metabolites across different Sampling points. To perform this Research, we have sampled the Alabama River from Montgomery at the downtown location, where it Experiences the most human pressure, for one year (very comprehensive sampling). We extracted microbial DNA from water filters using the DNeasyPower Water Kit. We are amplifying bacterial 16S rRNA genes (V3–V4 regions) to profile microbial communities. Unless otherwise stated, I have four replicates for each month and a total of 48 samples for metagenomics, metabolomics, and water chemistry Analyses for performing statistical tests. We investigated so many pesticides and pharmaceutical compounds which highly describe how water is contaminated by humans and natural occurrences. We find some pesticides(eg.2,2-Difluoro-1-(1,2,3-thiadiazol-4-yl), insect hormone (eg: Naspm (1-Naphthyl acetyl spermine), pharmaceutical (eg: 2-diazenyl-5-nitrothiazole) plant & animal hormone(eg: Betaine), food additives(eg: Ammeline) organic in organic compounds (eg: Cyanoform, Piperazine) plastic compound (eg: Bis(p-methyl benzylidene)sorbitol) and so many undefined chemical compounds(Using chemspider,pubchem). This relationship among the compounds and their source in different seasons is the main focus of the research. 16s RNA Data will also describe the different microbes and their community and how they affect the different periods in water ecology. Also, describe how the different chemical compounds will depending the microbial abundance and dominating period. Some related compounds are also monitored. This is one of the first comprehensive studies that will significantly advance our understanding of microbial communities and their associations with other important water properties in the context of seasonal variations and human population pressure. Different relationships (microbes to chemical compound, source to compound, season to source, season to their activity, season to dominating microbes /compound) will describe the scientific concept of water ecology and eco-diversity.

PSE1
EVALUATING SOCIAL DETERMINANTS OF HEALTH AMONG AN OLDER ADULT POPULATION IN KENTUCKY

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Social determinants are known to contribute to health and well-being across the lifespan. A study conducted by Ryan (2023) shows that financial strain (73.6%), food insecurity (47.5%), and poor housing quality (39.1%) are a few of the biggest constraints beyond clinical strains faced by those diagnosed with type 2 diabetes (T2D), which illuminates the social determinants impacting diabetes management and overall well-being. Therefore, the proposed study seeks to identify the unmet social needs of older adults diagnosed with T2D in rural Kentucky.

A convenience sample taken from a larger, ongoing study was used to conduct this study. Letters were mailed to study participants who had completed diabetes education as part of the “Social Network Analysis and Social Support Intervention for Rural Dwelling Older Adults with T2DM” (PI: Smalls, 5K01DK116923). Interested participants completed the Social Needs Screening tool endorsed by the American Academy of Family Physicians. After completing and returning the survey via mail, participants received a $25 gift card.

The study sample consisted of 17 participants 55 years or older. The study participants were primarily non-Hispanic White (88%, n=15) and the remaining were African American (12%, n=2). The mean hemoglobin A1c was 6.9%. We found that almost 90% of respondents did not have unmet social needs related to housing and paying utilities. However, over the last 12 months, participants reported not having enough to eat (34.9%) and not consistently having enough money to buy food (13.9%). We also found that approximately 12% of participants indicated concern with their personal safety (e.g., physically attacked, insulted, threats, screaming).

Though this sample size is small, the results of this study indicate that there are unmet social needs among older adults living with T2D in rural Kentucky. The most concerning needs are food security and personal safety. Further assessments of unmet social needs in this population are needed to inform future interventions in this vulnerable population.

PSE2
SUSTAINING 1890 LAND-GRANT PROGRAMS BY DEMYSTIFYING STEREOTYPICAL PERCEPTIONS TOWARD AFRICAN-AMERICANS, BLACKS, OR BROWN PEOPLES'

Jensine Crowder, Kentucky State University, Farnkfort, Ky

Today, diversity in secondary education programs such as Future Farmers of America (FFA) has only begun to reflect the increasing levels of ethnic student diversity in the U.S. In comparison to predominantly white secondary schools, predominantly minority-serving secondary schools have very limited access to funding and resources to create high-impact, active, and authentic agriculture-based curricula for students to excel in organizations such as FFA. These educational barriers exist between underrepresented minority groups such as African-American, Black, and Brown students and impact students being able to participate in agricultural courses at secondary and post-secondary education levels. The main objectives of this research were to (1) assess why underrepresented minority students in secondary and postsecondary have negative perceptions toward agriculture and agricultural-related careers; (2) identify what factors create barriers for underrepresented minority students being able to gain awareness of agricultural education and careers; and (3) identify what implications underrepresented minority students conclude about agriculture in America and if they believe it is an important topic of study. This research utilized a modified STEM perception questionnaire to gather feedback and to establish recommendations to alter negative perceptions towards pursuing agricultural and agricultural-related degrees and careers. Inferences from student responses reveal three key items: (1) African American students have a distorted or negative perception of agriculture due to their knowledge of “farming” in American slavery; (2) respondents identified disparities in secondary education systems that impact their exposure to agricultural knowledge, career awareness and opportunities; and (3) some respondents struggled to see the value chain and proposition in agricultural degrees and agricultural-related careers. This review concludes that implementing agricultural courses in marginalized, predominantly minority-serving secondary schools will enable personal and professional student development, community building, economic uplifting, and preservation of agricultural knowledge and skills among underrepresented and underserved communities. Providing access to quality, high-impact agriculture education in predominantly minority-serving schools can rectify disparity in secondary schools to ensure African-American, Black, or Brown students have the same opportunities to explore, pursue, and thrive in agricultural learning and careers.

PSUG1
ANALYSIS OF TRANSLATION INITIATION IN RESPONSE TO INTEGRATED STRESS RESPONSE PATHWAY ACTIVATION

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Mechanisms that control translation play important roles in tumor progression and metastasis. Emerging evidence has revealed that dysregulated translation also impacts immune evasion in response to cellular

or oncogenic stress. A genome-wide CRISPR-based screening was previously used to identify regulators of the PDL1 immune checkpoint in lung cancer cells, revealing potent induction of PD-L1 upon activation of the integrated stress response (ISR) pathway. Mechanistically, ISR activation resulted in enhanced PD-L1 translation and suppression of anti-tumor immunity. We also found that eukaryotic initiation factor 5B (eIF5B) mediates increased translation of PD-L1 under integrated stress response activation, and eIF5B overexpression is sufficient to induce PD-L1 protein even in the absence of ISR activation. Moreover, we showed that eIF5B expression is elevated in primary lung tumor tissues and correlates with poor prognosis, suggesting that eIF5B is an oncogenic protein that plays a role in ISR-dependent and independent translation. This study aims to determine the extent to which additional eukaryotic initiation factor proteins are induced by ISR activation and whether eIF expression is upregulated in a mouse model of high-grade lung cancer. To address this question, we performed western blot analysis to assess the protein levels of eIF1, eIF1A, eIF3A, eIF6, eIF4A, eIF4G, eIF3H, eIF4E, and eIF5B after exposure to various cellular stresses. In addition, we performed IHC staining for select eIFs to determine if they are differentially expressed in murine lung tumors compared to normal lung tissues. Our western blot analysis indicated that there is heterogeneity of expression of the eIF proteins analyzed both between different cancer cell lines and upon ISR pathway activation. A subset of eIFs (eIF4E, eIF3A, eIF1A, eIF6) was selected for further analysis by fluorescent IHC due to their known oncogenic functions or possible protein expression increases with ISR activation as assessed by western blot. Interestingly, this subset of eIF proteins also showed distinct staining patterns by IHC and distinct accumulation in normal versus tumor tissue. Further analysis is necessary to determine eIF participation in ISR-mediated tumorigenesis.

PSUG2
CHARACTERISTICS OF MYCOBACTERIOPHAGE ADAMB1 AND ADAMB2

Montaja McMullen-Crockett, Nazir Barekzi and Nathan Ndaradzi. Norfolk State University, Norfolk, VA.

The current study examines and characterizes different sediment samples to isolate bacteriophages of *Mycobacterium smegmatis* mc^2155 to determine any morphological differences to samples collected from the soil. *Mycobacterium smegmatis* is a gram-positive bacterium with a thick mycolic acid and peptidoglycan layer. *Mycobacterium smegmatis* is an ideal host for isolating mycobacteriophage due to its fast growth rate and biosafety level compared to other *Mycobacterium* species. Phages were isolated from the sediment samples taken from the Elizabeth River using a ponar and isolated using the enrichment procedure. This study focuses on identifying the characteristics such as the type, class, morphology, and killing activity of phage isolated from the wet sediment compared to phage isolated from dry soil. The working hypothesis is that if mycobacteriophage were isolated from the sediment of the Elizabeth River, then the phage would display a Siphoviridae morphology, but unique and different when compared to the structure of soil-isolated mycobacteriophage. To purify the mycobacteriophage, protocols such as spot tests, infection assays, serial dilutions, and pick-a-plaque were performed. Successful results led to the completion of protocols to obtain a medium titer lysate of three different phages. Overall, the study was successful in isolating and purifying bacteriophages from the Elizabeth River sediment. However, sample 1 revealed a mixture of three different plaque morphologies, which we named AdamB1, QueenTaja, and ProdiGy, while sample 2 revealed a single type we named AdamB2. The morphology of AdamB1, QueenTaja, and ProdiGy appears to be turbid in appearance, which infers that it is a lysogenic phage. Also, the phage plaques are large (1mm) with jagged edges. Upon purification of sample 1, the concentration of the first medium titer lysate was calculated as 1.2×10^5 pfu/ml. A second medium titer lysate was prepared with a concentration of 4.0×10^5 pfu/ml. Upon analysis of these additional assays, sample 1 displayed different mixed plaque morphologies, indicating that sample 1 was not a pure phage but instead a mixture of 3 different phages. Further isolation of AdamB1, QueenTaja, and ProdiGy is in progress. The second sample yielded a phage named AdamB2, which had a small, circular, and clear plaque morphology with round edges. This description aided in the determination that AdamB2 is a lytic bacteriophage. The concentration of the medium titer lysate was calculated as 1×10^5 pfu/ml. The overall goal of this project is to obtain a high titer lysate of all four phages--AdamB1, QueenTaja, ProdiGy, and

AdamB2--which will be used to image the structure of each phage using Transmission Electron Microscopy and Restriction Fragment Length Polymorphism.

PSUG3
PROGRESSION OF BATHRACHOCYTRIUM DENDROBATIDIS LIFE CYCLE STAGES AFFECTED BY THE PRESENCE OF HARD KERATIN

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Batrachochytrium dendrobatidis (Bd) is an aquatic fungal pathogen that causes the epidermal infection Chytridiomycosis in amphibians. Chytridiomycosis has proven to be lethal, causing the extinction of at least 90 amphibian species. Previous studies show that Bd only infects keratinized epithelial tissues and exhibits different life stages upon infecting its host; the two most distinct stages are zoospore and zoosporangium. This project investigates how the presence of keratin contributes to the progression of the Bd life cycle. This was achieved by growing and isolating Bd spores in vitro and testing them against different nutritional conditions with and without a source of keratin. A dilute salt solution was used as the negative control and H Broth was used as a positive control. Scales from Pogona vitticeps were used as the source of hard keratin. The resulting growth patterns were observed and recorded using light and fluorescent microscopes. It was found that when zoospores were suspended in the dilute salt solution with the keratin source, the zoospores could mature to an “empty” sporangia stage but did not develop far enough to reproduce more spores. This shows that keratin can push growth to a specific stage when Bd is in a nutrition-scarce environment. However, keratin alone does not push Bd to full maturity, meaning there is a nutritional threshold requirement that is currently unknown. Identifying that threshold and isolating more stages of development are crucial for targeting the infection and pushing conservation efforts forward.

PSUG4
***IN VITRO* INTERACTION BETWEEN BARIUM CHLORIDE AND PYRIMETHAMINE AGAINST *TOXOPLASMA GONDII* GROWTH**

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Intracellular opportunistic parasites continue to affect humans and animals globally, with significant socio-economic and public health concerns. Toxoplasma gondii (T. gondii) is one of such widespread protozoan parasites that can infect almost every warm-blooded mammal. It is estimated that over one-third of the world's population is infected. The current treatment for T. gondii infection is through drugs. However, several challenges have been identified, which include resistance and toxicity. Thus, there is an urgent need to discover new inhibitors against this zoonotic parasite. Calcium plays a crucial role in modulating the T. gondii lytic cycle (attachment, invasion, replication, gliding motility, and egress) in host cells. Barium is a group 2 alkaline earth metal found in the same group as calcium. However, little is known about barium inhibition or induction of T. gondii lytic cycle. We hypothesized that metals such as Ba could inhibit the parasite and disrupt its lytic cycle. Here, we discovered that Ba in the form of chloride was found to inhibit tachyzoite growth more than the current drug (pyrimethamine) which is known to be effective against the parasite. The EC50s values for $BaCl_2$ were 0.055, 0.059, and 0.033 µg/mL for 24, 48, and 72 hours of interaction, respectively. In contrast to the standard drug pyrimethamine, we determined

its EC50s values to be 0.12, 0.43, and 0.63 µg/mL. These interesting findings triggered a combination testing of $BaCl_2$ and PY in ratios of 1:1, 1:2, and 2:1 to decipher whether these combinations could inhibit parasites more than the individual compounds tested. To our surprise, the ratios 1:1, 1:2, and 2:1 variety of $BaCl_2$ and PY gave EC50s values of 20 ng/mL, 5.99 ng/mL, and 4.1 ng/mL at 72 hours of interaction, respectively. The 50% cytotoxic concentration of the $BaCl_2$ and its combinations were not cytotoxic at higher concentrations such as 5 µg/mL. Collectively, these results provide insight into the future development of barium-based drugs against T. gondii if confirmed in vivo to be safe and effective.

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PSUG5

EFFECT OF MILK ON *ESCHERICHIA COLI* METABOLITE COLIBACTIN PRODUCTION AND ITS IMPACT ON BREAST CANCER CELLS

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Breast cancer is the leading cause of cancer related deaths among women, with ductal carcinoma as the most common type of breast cancer that originates in the milk ducts. Although genetics plays an important role in the etiology of the disease, it is not clear whether the microbiota surrounding the breast and inside the breast tissue can contribute to its pathology. Studies have shown that the gut microbiome can impact the microbiota of the breast tissue through the gut-breast axis via the entero-mammary pathway. It has been shown that some strains of *E. coli* can produce genotoxin, colibactin in the colon. What is not known is whether such metabolites are produced in the breast tissue in milk ducts leading to the formation of tumors. Our study aims at understanding the metabolites produced by *E. coli* in the presence of milk and to test its genotoxic impact on breast cancer cells. We hypothesize that in the presence of milk, colibactin production by *E.coli* will increase as compared to LB media. Increased DNA nicks in MCF-7 breast ductal carcinoma cells will observed on exposure to colibactin. Our current data examined the growth kinetics of two strains of *E. coli*, Nova blue and BL21 in milk (nonfat dry milk made from pasteurized skim milk) to determine the optimal concentrations of this media for the growth of the bacterial strains. Our preliminary findings showed that milk poorly supported the growth of these strains of *E. coli* in the first 24 h, however, at 48 h these strains demonstrated over 12 times higher growth rate than in 24 h. We plan to perform metabolite analysis to determine the presence and the concentrations of colibactin in *E. coli* cultures growing in milk at 24 h and 48 h. Then, an equivalent concentration of store-purchased pure colibactin will be used to examine the extent of damage on MCF-7 breast cancer cells. Furthermore, DNA nicking assay as well as histone H2AX phosphorylation, a marker for DNA damage will be evaluated.

PSUG6

SYNTHESIS AND BIO-COMPATIBILITY STUDIES ON CERIUM OXIDE NANOPARTICLES IN HUMAN EPITHELIAL SKIN CELLS

Kimani Kelly, Nithin Gunasekeran and Govindarajan Ramesh. Norfolk State University, Norfolk Virginia.

Cerium oxide nanoparticles have been used in various non-biomedical applications over recent years. The purpose of the Biomedical application research was sparked due to cerium oxide's oxidative stress-relieving abilities. There, the enzyme's mimetic catalytic ability to change between Ce^{3+} and Ce^{4+} states makes it feasible for its role, as a free radical suppressor for systemic diseases as well as pathological diseases (conditions). Due to the oxygen vacancies in the lattice structure, it allows for alternating states during redox reactions. This gives cerium the ability to self-regenerate by reversibly switching between two valences. Cerium Oxide nanoparticles were synthesized through hydroxide-mediated synthesis.

Sodium Hydroxide and Cerium (III) nitrate hexahydrate were used as precursors to produce cerium oxide. After confirming results from Biocompatibility testing on Cerium Oxide nanoparticles and epithelial cells, it was determined that they can be used in further research as well as developing antioxidant material for human cells. The main purpose of this research is to further demonstrate the impact of synthesized CeO_2 nanoparticles on skin cells. This research describes the methods of synthesis for CeONPs, the process of cell culture, the understanding of their antioxidant's behavior, and their ROS (reactive oxygen species) abilities. The hypothesis of this study is epithelial cells will survive when being treated with cerium oxide nanoparticles. The synthesis process was carried out using the hydroxide-mediated approach with Sodium Hydroxide and Cerium (III) nitrate hexahydrate as precursors and as a result, yellowish-white nanoparticles were produced. The presence of cerium oxide was confirmed by characterizing the material using Fourier Transform Infrared Spectroscopy. The biocompatibility studies were conducted by using methods such as MTT and Live/Dead assays, which determined that major cell death was not observed in beas-2b cells upon exposure to cerium oxide nanoparticles even with higher concentrations of 100 µg thereby confirming that the cerium oxide nanoparticles are not toxic. After analyzing live epithelial cells, it can be deduced that cerium Oxide nanoparticles are not harmful to human skin cells. This was concluded after conducting an MTT assay and live dead assay. These two tests indicated that synthesized cerium oxide nanoparticles have no toxic effects on human epithelial skin cells and can be used in several biomedical applications such as anti-oxidative, therapeutic, antimicrobial, and anti-inflammatory agents.

PSUG7
MATERNAL *STAPHYLOCOCCUS AUREUS* MASTITIS IMMUNOMODULATORY TREATMENT EFFECT ON THE STOMACHS OF NURSING PUPS

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Mastitis, an inflammation of the breast or udder tissue due to infection, poses a significant threat to livestock animals, leading to a loss of profit, livestock mortality, and reduced milk production. This study investigates the effects of *S. aureus* inoculation-induced Mastitis on the Renin-Angiotensin-Aldosterone System (RAAS) components in gastric smooth muscle of mice pups. CDK1 female mice (dams) were divided into five groups, including negative control, *S. aureus* inoculation, *S. aureus*+IGY, *S. aureus*+IGY+Vitamin D, and *S. aureus*+IGY+Vitamin D+RP185 groups. After weaning the mouse pups, gastric tissue samples were collected to analyze the expression levels of RAAS components using qPCR. The results showed a significant decrease in the expression of angiotensin receptor 1a and 1b (AT1aR; AT1bR) and G-protein coupled MAS1 oncogene receptor (MASR) in gastric smooth muscle of mice pups that ingested milk from dams infected with Mastitis by S. aureus inoculation. However, no significant effect on ACE2 expression was observed. Despite this, mouse pups who consumed milk from infected dams still had stomach contents compared to the negative control. These findings suggest that RAAS components are downregulated in the gastric smooth muscle of mice pups exposed to S. aureus-induced Mastitis, potentially leading to gastroparesis.

PSUG8
TUMOR MICROENVIRONMENT PRESSURES ON HYALURONIC ACID BIOSYNTHESIS IN GLIOBLASTOMA

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Glioblastoma (GBM) is an aggressive form of brain cancer with very little treatments. Exploring the tumor microenvironment allows for better understanding of cancer cell survival and the network of cells.

Hyaluronic acid is an important component of the extracellular matrix. Hypoxic environments are associated with extracellular matrix remodeling and increased metastatic behavior. While exploring the tumor microenvironment, the objective of this research was to examine how hypoxia affects hyaluronic acid synthesis in glioblastoma influencing its metabolism and efficacy of drug therapies by using 3D bioengineered tumor models. Cancer cells were embedded in hydrogels and treated with hyaluronic acid, Erlotinib(a kinase inhibitor), and Glycyrrhizic acid(hyaluronidase inhibitor). The hydrogels were stained and imaged with clear indication of hypoxic effects on HA production. From the results, HA production was significant when tumor microenvironment was stressed with hypoxia. These findings help to explore how HA production is affecting the GBM tumor microenvironment.

PSUG9
INVESTIGATING GROWTH CONDITIONS OF MARSH GRASSES FOR PRODUCTION OF LIPOXYGENASE INHIBITORS

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We propose to investigate whether marsh grasses contain bioactive compounds that could inhibit either human 12-lipoxygenase (h12-LOX), which causes blood clots, or human 15-lipoxygenase-1 (h15-LOX-1), which causes tissue damage after a stroke, or both. In addition, we plan to determine whether the level of production of these natural products in marsh grasses depends on their growth conditions, specifically water levels. We propose to extract the natural products from this set of marsh grasses and test their bioactivity against h12-LOX and h15-LOX-1. If these crude natural product extracts contain LOX active inhibitors, then we will isolate the specific active chemical entity and determine its structure, to identify a novel LOX inhibitor that could be developed into a human therapeutic.

PSUG10
SURVEYING AIRBORNE BACTERIA IN CARVER HALL

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In the context of higher education, it is nearly inevitable for students to contract illnesses from their peers due to close living quarters and communal spaces like cafeterias. As STEM scholars interested in bacteria and disease spread, we experimented with surveying various airborne bacteria in Carver Hall, which houses the math and science courses at Kentucky State University. Our focus was exploring the correlation between human traffic, humidity, and temperature concerning bacterial growth. Data on airborne bacteria in Carver Hall was collected during October and November 2022, a period marked by significant weather changes known to correlate with an increase in illness. During this time, we spent an hour in the hallway with three agar plates, recording the number of people passing by. Subsequently, the plates were incubated for twenty-four hours, and the formed colonies were circled and collected for gram staining. This process continued until mid-November, revealing the presence of gram-negative bacillus, Staphylococcus, Coccobacillus, Diplococcus, and Coccus. Exposure to these bacteria can lead to various illnesses, with pneumonia being the most common. Implementing proper guidelines and preventive measures can be crucial in curbing the spread of disease in Carver Hall. This study contributes valuable insights into understanding the dynamics of bacterial presence in shared academic spaces, paving the way for potential interventions to enhance campus health and safety.

PSUG11
A COMPARATIVE PHYSIOLOGICAL ANALYSIS OF THE EFFECTS OF AMMONIUM NITRATE ON AMPHIBIAN AND FISH IN THE USAGE OF CHITOSAN REMEDIATION

KMya Saddler and Maureen Scott. Norfolk State University, Norfolk, VA.

Agricultural pollution, ammonium nitrate pollutant is a global issue accessing our nation's waterways. Ammonium nitrate is a byproduct of fertilizer used in agricultural farming. It enters waterways through landfill, farming, and industrial sites. Ammonium nitrate pollution is an emerging concern as it forms a devasting aquatic environment and endangers its aquatic organisms. The Environmental Protection Agency regulates that 10mg/L of ammonium nitrate is safe for human consumption and 17mg/L is chronic to aquatic organisms. This study uses Lithobates pipens tadpoles are great biological indicators because of their physiological and morphological structure. They possess gills as tadpoles and semi-permeable skin for cutaneous respiration. The cutaneous respiration allows agricultural pollutants to access their internal body. Carassius auratus, comet goldfish were used, physiologically fish gills are the primary source of respiration and filtration of substances. Research hypothesis is amphibians are more susceptible to agricultural pollutants due to their physiological and morphological structure compared to fish and chitosan water will remediate the aquatic environment to its optimal condition for the aquatic organisms. Aquatic organisms were exposed to 320mg of ammonium nitrate for bioaccumulation for 14 days, Goldfish, Tadpole, Cohabitating, and control tanks. Chitosan water used in the remediation portion contains chitin derived from crustaceans' shells. Parameters were tested daily for ammonia, nitrite, nitrate, dissolved oxygen, and ph. Results demonstrate ammonium nitrate toxicity correlates to lower pH and dissolved oxygen levels, and high ammonia in the aquatic ecosystems. There was 80mL of chitosan water deposited for bioremediation. The aquatic environment improved but the organisms had an adverse effect from the remediation Chitosan resulting 100% morality rate. Results of the histological analysis demonstrated the impact of ammonia nitrate pollutant on the organism's displayed deterioration, necrosis, lysis, and abnormal growth in intestine and liver. Tadpoles were more susceptible to ammonium nitrate pollution because of their physiological and morphological structure. The study demonstrates the physiological impact from ammonium nitrate on the aquatic organisms and correlates the use of chitosan water for remediation by neutralizing ammonium nitrate toxicity but was not favorable for the vitality and health of freshwater organisms.

PSUG12
THE IMPACT OF CREOSOTE ON BLUE CRAB IMMUNE FUNCTION

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In 1983, the Elizabeth River was declared the most polluted river in the Chesapeake Bay watershed area due to industrial discharge, stormwater runoff, and illegal dumping. Since that time, researchers, government agencies, non-profits, and citizens have engaged in efforts to restore the river and improve its water. Through that work, it was determined that the waters and sediments of the Elizabeth River are contaminated with a chemical mixture called creosote that contains cancer-causing polycyclic aromatic hydrocarbons (PAHs). In this project, we studied the impact of creosote on blue crabs because they are a key component of the Chesapeake Bay ecosystem and economically important in Virginia. We hypothesized that creosote will negatively affect blue crab hemocyte phagocytosis, given its known status as an immunosuppressant in other species. Hemocytes were incubated with different concentrations of creosote in the presence of latex beads, which serve as a target for phagocytosis. Phagocytosis was measured by counting the cells containing phagocytosed beads at each concentration tested. Our results show a dose-dependent reduction in the percentage of cells performing phagocytosis. These data demonstrate the potential impact creosote contamination in the Elizabeth River may have on the

ecologically and economically important blue crab (*Callinectes sapidus*). Overall, this study is important for the ongoing restoration efforts in the Elizabeth River.

PSUG13
KENTUCKY'S PFAS AWARENESS DATABASE

Timaia Sugars and Scott Wicker. Kentucky State University, Frankfort, KY.

In 2022, the global market value for Per- and Polyfluoroalkyl Substances (PFAS) was just $28 billion, with estimated profits around $4 billion, and the waste management market value stood at almost $1.8 billion. PFAS are synthetically produced chemicals composed of carbon and fluorine compounds. Due to the strong C-F bonds, PFAS is very durable and resistant to all types of degradation. Not only are these chemicals nondegradable, but they possess unique chemical properties such as being waterproof, heat-resistant and chemical-resistant, almost making them indestructible and earning them the nickname "Forever Chemicals." PFAS is not only found in our water, the atmosphere, and dust, but manufacturers have been using PFAS in consumer products for nearly a century due to their interest in such durability. Due to their durability, over 98% of the American population is exposed to PFAS through drinking water, contaminated food, cookware, indoor dust, and ambient air. Literature reviews and analysis found a lack of foundational knowledge, information, and materials about PFAS persistence in our everyday lives. Results from the literature review findings recommend a need for further research to increase communities' awareness and knowledge of PFAS exposure, especially in Kentucky. The project's purpose is to collect PFAS-related information and materials to build a curated database and data visualization hub at Kentucky State University. The primary focus is PFAS detection and environmental interactions within the Commonwealth of Kentucky. The primary investigator developed an assessment rubric to evaluate the information and materials sources before assigning the information to either occupation, drinking water, contaminated food, cookware, or indoor dust. In addition, geospatial visualization data extraction from peer-reviewed information and materials is leveraged to track confirmed water-related PFAS detections in Kentucky. PFAS was detected in samples of "treated" water from community water treatment plants, not only from urban land use sites, but rural as well. This means that the water we drink is most likely contaminated with PFAS, and the water that our food sources drink or absorb is also contaminated. Raising awareness is important, as citizens' health and our environment are at risk with the consumption of PFAS. Creating an accessible database for our society will create a community and citizen science approach, where individuals will become more informed and engaged with environmental contaminant awareness.

PSUG14
HPLC AND LCMS ANALYSIS SHOWS BETA-KETOGLUTARATE OVERFLOW IN CYANOBACTERIA.

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Cyanobacteria are a phylum of gram-negative bacteria that obtain energy through photosynthesis. During their evolution, cyanobacteria have developed mechanisms to adapt to a broad range of environmental factors. For example, metabolite overflow of alpha-ketoglutarate (AKG) and pyruvate in a glycogen deletion mutant of cyanobacterium Synechocystis sp. PCC 6803 is an alternative energy management mechanism (Cano et al. 2018). In this work, we observed a new overflow end-product, beta-ketoglutarate (BKG), in the growth medium of the wild-type Synechocystis 6803 using high-performance liquid chromatography (HPLC) and liquid chromatography mass spectrometry (LCMS). HPLC analysis with a

BioRad Aminex HPX 87H column showed a cumulative peak at a retention time of 10.4 min in the growth medium of Synechocystis 6803 over the growth period, which was validated with a BKG standard. LCMS analysis utilizing a BEH Amide column indicated an increasing peak at the retention time of 12.2 min with a mass spectrum characteristic of BKG. The HPLC peak at 10.4 min and LCMS peak at 12.2 min may be assigned to BKG. The metabolic pathway of BKG synthesis and degradation in cyanobacteria is unknown. This observation may provide new information on the metabolite overflow mechanisms in cyanobacteria for carbon sink and energy management. This research was supported by funds from the Alabama State University and the US Department of Energy.

PSUG15
NITRATE DEPLETION IN THE GROWTH MEDIUM INHIBITS PYRUVATE OVERFLOW IN CYANOBACTERIA

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Cyanobacteria are a phylum of gram-negative bacteria that get their energy from photosynthesis. They are commonly known as blue-green algae. They are the first organisms known to have produced oxygen and are credited with converting Earth's oxygen-poor atmosphere into an oxidizing one. They also produce toxins known as cyanotoxins that can negatively affect the health of animals and humans. Nitrogen (N) is an essential element for bacteria because it is needed to synthesize the cell's components. Under N-starvation, cyanobacteria will have a decrease in growth and an appearance of chlorosis, which will cause the bacteria to appear bleached. We have observed previously that the glycogen synthesis mutant DglgC can secret alpha-ketoglutarate (AKG) and pyruvate as major overflow end-products as an energy regulation mechanism (Cano, et al., 2018). There is no detectable overflow of AKG and pyruvate in the wild-type cyanobacteria. In the current study, membrane-inlet mass spectrometry (MIMS) was used to measure the total inorganic carbon (Ci) fixation capability during the entire 7-day growth period of the cyanobacteria. High-performance liquid chromatography (HPLC) analysis showed that AKG at about 200 uM and pyruvate at about 300 uM of metabolite overflow in the growth medium of cyanobacterium Synechocystis sp. PCC 6803 was observed in high-light conditions. In contrast, under N-starvation and high light conditions, pyruvate overflow is apparently small at about 30 uM. We hypothesize that nitrate depletion may inhibit the overflow of pyruvate in cyanobacteria. A possible working model is proposed in this study. This idea provides specific new information on the metabolite overflow in cyanobacteria as the alternative mechanisms in carbon sink and energy management. This research was supported by funds from the Alabama State University and the US Department of Energy.

PSUG16
CBD-RESISTANT SALMONELLA REVERTS AFTER ZINC SENSITIZATION

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Cannabidiol (CBD) is an anti-psychoactive component of the hemp plant. It is a minute molecule with a molecular weight of 314 Da, consisting mainly of pentyl-substituted bis-phenol aromatic class. CBD is known to demonstrate antibacterial properties. Zinc is also a known antibacterial agent, especially at higher concentrations. We hypothesized that extended exposure of CBD-resistant *Salmonella* Typhimurium (CRS) to toxic concentrations of zinc causes the bacteria to revert to CBD-susceptible strains. This study aimed to understand the role of zinc in the pathogenesis and antibiotic resistance development of *Salmonella* Typhimurium. We conducted several biological and

biochemical assays and demonstrated that CRS is susceptible to higher concentrations of zinc. However, the bacteria developed resistance to zinc after long exposure to zinc, even at lethal concentrations. Thus, it demonstrated that CRS, which developed resistance to zinc, reverted to susceptibility to CBD. Employing real-time QPCR, we analyzed genetic elements of zinc-resistant CRS that were related to antibiotic resistance and cellular zinc transport. We observed that genes related to antibiotic resistance were found to be heavily downregulated, whereas genes related to extracellular zinc export were upregulated. In conclusion, this study indicates that CRS reverts to CBD-susceptibility after long zinc exposure. While the mechanism underlying this reverting phenomenon is currently unknown, we infer that zinc-resistant CRS strains modulated their cellular energetics to focus mainly on intracellular zinc removal and thus repressed the expression of genetic factors that ensured CBD- and antibiotic resistance.

PSUG17
THE SUSCEPTIBILITY OF *XENOPUS LAEVIS* TO SELECTED STRAINS OF BACTERIAL INFECTION.

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The African clawed frog *Xenopus laevis* has been used in various scientific studies as a model organism for research. Its susceptibility to bacterial infections is a vital aspect of understanding the interactions between host and pathogenic bacteria. This amphibian has many genetic similarities to humans and is a unique vertebrate model that allows for *in-vivo* monitoring of embryonic development. Enteric bacteria such as *Salmonella* spp. and *Escherichia coli* are known to cause gastroenteritis in humans and have been reported to infect various hosts, including amphibians. We hypothesize that the *E. coli* strains invade and cause infection in the *X. laevis* quicker than the *Salmonella* strains. The objective of this research is to assess the physiological, phenotypic, and immunological responses of *X. laevis* following infection with *E. coli* or *Salmonella*, with a focus on survival rates, phenotypic analysis of the larvae after infection, immunofluorescent analysis, mobility, and mortality of infected larvae compared to uninfected controls. The fertilized embryos of *X. laevis* were prepared in 0.1x MMR (Marc's Modified Ringer) until stage 24; at this stage, the experimental groups of *X. laevis* were exposed to strains of bacteria; *E. coli* (NovaBlue, BL21) and *Salmonella* (BV7002, BV4012) and their responses were monitored over three weeks. We assessed the most virulent strain of the bacteria employed in this study through attachment and tissue invasion analysis of the bacteria to the host, as well as observation of pathological outcomes. The X. laevis mortality data, in addition to the molecular, genetic, and histological analysis carried out in this study, demonstrated that the Novablue E. coli strains showed the quickest infection and killing of X. laevis. The data obtained from this study will contribute valuable insights into the susceptibility of *X. laevis* to selected strains of bacterial infection, which indirectly will inform researchers of the potential dangers of these bacterial strains to human health as well as enlighten environmentalists of the consequences of high concentration of these pathogens in natural habitats of amphibians such as the African frog.

PSUG18
PROTON IONS IN THE GROWTH MEDIUM INHABIT PYRUVATE OVERFLOW IN CYANOBACTERIA

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Cyanobacteria are photosynthesizing bacteria that can convert solar energy into chemical energy and have a high impact on global energy and climate changes. Some also produce a class of toxins called cyanotoxins, which can induce illness in humans and animals and cause environmental concerns. For example, it is found in a bloom form, which causes the discoloration of the aquatic and terrestrial environments. The objective of this research is to examine the effect of low pH on the growth of cyanobacterium Synechocystis spp. PC 6803 using high performance liquid chromatography (HPLC) and membrane-inlet mass spectra (MIMS). Our hypothesis is that cyanobacterial metabolite overflow may be pH sensitive for growth and photosynthetic energy management. HPLC is a detailed technique used to identify components in a mixture and separate mixtures of related compounds. MIMS is a method that allows the separation and detection of charged molecules in a gas phase depending on their mass to charge ratio. The MIMS data showed that Synechocystis 6803 grew well with similar total inorganic carbon C_i fixation rate at low pH 6.5 to that at pH 7.4. HPLC analysis showed that similar overflow of alph-ketoglutarate (AKG) in about 200 uM in the growth medium at both pH conditions, which is an alternative energy management mechanism in cyanobacteria (Cano e al 2018). In contrast, the overflow of pyruvate at pH 6.5 is substantially low (about 20 uM) than that (about 300 uM) at pH 7.4. This observation implies that proton ions outside the cells may inhibit the overflow of pyruvate in cyanobacteria. We proposed a possible working model of pyruvate overflow via possibly symport mechanism at different pH conditions. This hypothesis provides new specific information on pH dependence on the carbon sink and energy management in cyanobacteria.

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PSUG19
LEVERAGING HYDROPHOBIC AND HYDROGEN BONDING INTERACTIONS TO SYNTHESIZE NOVEL MOLECULARLY IMPRINTED POLYMERIC NANOPARTICLES FOR PFAS SENSOR DEVELOPMENT

Sinclair Strong, Alysa Christian, Antonio Moore, Aqeel Dawson and Dain B. Beezer*. Fisk University, Nashville TN.

Per- and poly-fluoroalkyl substances (PFAS) are highly toxic pollutants that are currently being detected in drinking water, wastewater, fish, and soil. They are persistent and tend to bioaccumulate in plants and animals, leading to numerous adverse health effects. Detection and removal of PFAS from environmental waters is critical to reduce exposure to these compounds. Molecularly imprinted polymers (MIPs) are materials with high selective affinity for a target compound and hence can be used for sample pre-treatment, separation, and sensors. Typically, MIPs with a single recognition site for a specific molecule are prepared, but very little work has been done towards the synthesis of multiple recognition site in MIPs. We present our progress towards developing a smart imprinting system with multiple recognition sites for multiple PFAS compounds. Such a material would have numerous applications in sample pre-treatment, separation, and sensor development. To incorporate multiple binding sites coupled with magnetic and temperature responsiveness, we utilized a modified solvothermal method to create an iron oxide nanoparticle core, which was then successfully surface functionalized with a thin silicon dioxide film to form a core-shell structured magnetic nanoparticle. Various strategies for synthesizing the molecularly imprinted polymer layer at the surface of the nanoparticle are currently being explored and modified for the optimal binding affinity of the template molecules and will be discussed. We will also showcase the incorporation of these innovative PFAS-MIP nanoparticles into a sensor to detect PFAS and environmentally relevant levels.

PSUG20
MULTI-DOMAIN MOLECULARLY IMPRINTED POLYMERIC NANOPARTICLES VIA HYDROGEN BONDING INTERACTIONS FOR SELECTIVE CAPTURE AND RELEASE APPLICATIONS.

Aqeel Dawson, Antonio Moore, Alysa Christian, Sinclair Strong, and Dain B. Beezer*. Fisk University, Nashville TN.

Natural products from medicinal plants, either as pure compounds or as standardized extracts, continue to play a major role in the healthcare system of most countries primarily due to the cost, adverse side effects, and microbial resistance of chemically synthesized drugs. However, the bioactive compounds in many of these plants, as well as their mechanism of action, have not been well-researched to validate their traditional claims. This is primarily due to the considerable investment of time, human resources, and technical equipment required for the identification of bioactive natural products from these plants. A key step in this process is the rapid identification of known compounds so that all efforts can be concentrated on the discovery of new compounds. We present our progress towards the development of innovative multi-domain magnetic and temperature-responsive molecularly imprinted polymeric nanoparticles (MTMIP-NPs) capable of the selective capture and release of known plant natural compounds. To incorporate multiple binding domains coupled with magnetic and temperature responsiveness, we utilized a modified solvothermal method to create an iron oxide nanoparticle core, which was then successfully surface functionalized with a thin silicon dioxide film to form a core-shell structured magnetic nanoparticle. Various strategies for synthesizing the molecularly imprinted polymer layer at the surface of the nanoparticle are currently being explored and modified for the optimal binding affinity of the template molecules and will be discussed. We envision that these MIP-NPs will allow for rapid removal of already known secondary plant metabolites from a crude plant extract, thereby increasing the concentration of unknown natural products to therapeutically relevant levels, which greatly enhances the potential for their discovery.

PSUG21
ACUTE TOXICOLOGICAL EFFECTS OF COPPER ON *PALAEMONETES PUGIO L.*

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Acute toxicity of copper on *Palaemonetes pugio L.* (grass shrimp) at varying concentrations of copper and salinities were investigated. It is hypothesized that the shrimp will show an overall better morphological state and lower rate of mortality at 1.0 ppm Cu and in 10 ppt medium than the other concentrations and salinity media. Saline media at varying ppt salinity levels were aerated for 7 days in aquaria to stabilize the stimulated habitat. The test subjects were placed in aquaria of 1, 5, 10, and 20 ppt overnight before the toxicity tests were initiated. Four test subjects in each bowl of 330 mL salt medium were treated with 0.25, 0.50, 1.0, and 2.0 ppm Cu prepared using $CuSO_4(5H_2O)$ to determine the LD_{50} and morphological deformities in replicates of 3. The control group 0 ppm Cu, contained no added traces of the tested metal. Data collection for mortality rates, abdominal curvature, discoloration, and mobility were taken at 3, 6, 9, 12, 24, 48, 72, and 96 hours. Water quality for dissolved oxygen (8.8- 9.3 ppm), pH (6-7), and temperature (26ºC-33ºC) were measured in aquaria at weekly intervals throughout the studies. At 1 ppt salinity, replicates yielded more LD_{50} values along with a faster rate of mortality at higher Cu concentrations compared to 5, 10, and 20 ppt salinity levels. In contrast at 20 ppt salinity, mortality rates were lower than 1, 5, and 10 ppt with LD_{50} values increasing as ppt levels decrease (Mortality rate: 20 ppt<10 ppt<5 ppt<1 ppt). As the levels of salinity become lower, the more potent Cu became; higher salinity levels decrease the potency of Cu used. At 2.0 ppm Cu, the LD_{50} threshold was reached in all ppt media replicates after 48 hours. In contrast at 0.25 ppm Cu, mortality rates were lower at 96 hours than 0.50, 1.0, and 2.0ppm with LD_{50} values increasing as Cu concentrations increase (Mortality rate of Cu: 0.25 ppm<0.50 ppm< 1.0 ppm< 2.0ppm). As copper concentrations increase, the mortality rate increased. After concluding the study amongst the varying saline media and Cu concentrations, the hypothesis was

not accepted. Future research involves tissue analysis using the Inductively Coupled Plasma (ICP) Spectrometer to find the levels of copper accumulated in the tissues and to further analyze the data statistically to find any correlations between the levels of Cu, salinity, and mortality of subjects.

PSUG22
SYNTHESIS OF BIOCOMPATIBLE AMINOOXY POLYGLYCIDOL DERIVATIVES FOR TISSUE ENGINEERING APPLICATIONS

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The post-polymerization modification of polyglycidol is of great interest for the synthesis of advanced polymeric biomaterials capable of mimicking native extracellular environments. We present the synthesis of novel ratio-controlled amino-oxy functionalized branched polyglycidols. The biocompatibility and chemospecificity of the amino-oxy functional group make it particularly well suited for applications in bioconjugation, drug delivery and tissue engineering. Amino-oxy functionalized branched polyglycidol can serve as a critical building block for the synthesis of innovative biocompatible degradable hydrogels that are injectable. Ratio-controlled amino-oxy functionalized species were obtained by utilizing the Mitsunobu Reaction and carefully controlling the ratio of N-hydroxy phthalimide to the hydroxyl groups attached to the polyether backbone. The success of our synthetic methodology to create biocompatible functionalized polyglycidol was confirmed using cell viability and proliferation assay, which show the functional derivatives possess similar biocompatibility to the unfunctionalized polymer as well as polyethylene glycol (an FDA approved biocompatible polymer). This unique feature will allow for the tailoring of this branched PEG-like structural motif for the synthesis of advanced biomaterials with tailored biochemical and biomechanical properties.

PSUG23
SYSTEM ANALYSIS OF SOCIAL MEDIA

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In the era of digital connectivity, social media platforms have emerged as dynamic channels for individuals to express their opinions, emotions, and sentiments on a myriad of topics. This research delves into the realm of social media sentiment analysis, employing advanced natural language processing techniques to decipher the nuanced and often complex emotions embedded in user-generated content. In this current age of social media, there are many sentiments, speculations, and inquiries about public viewer consumption. The goal of this research was to educate the public on societal topics that may or may not be beneficial or credible. We hope to provide insight into the viewer's knowledge and reaction to specific environmental posts. This research is also aimed at conducting a system analysis of social media to comprehensively understand the intricate workings of these platforms through meticulous examination of user behavior, content dissemination patterns, and platform algorithms. This analysis seeks to unveil the underlying dynamics shaping online interactions. By scrutinizing the interplay between users, content, and platform policies, insights can be gained into the propagation of misinformation, formation of echo chambers, and polarization within online communities. Additionally, such analysis aims to evaluate the impact of social media on individual well-being, mental health, and societal cohesion. Ultimately, this research endeavors to inform the development of strategies and policies to foster healthier and more inclusive online environments, benefiting both users and society at large. Results indicate that while reactions (likes, comments, shares) play a role, the primary driver of content visibility appears to be

the visual appeal rather than the level of audience interaction. Viewers are more inclined to engage with visually stimulating content, suggesting a shift towards a visually-driven consumption pattern.

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PSUG24

PROGRESS ON CONTOURING TREE-BASED AMR GRIDS

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The goal of this research was to improve the values assigned to vertices on a grid. The current cell-to-point algorithm is appropriate for all vertices that are not hanging nodes. Tree-based AMR is a grid that can be refined where greater precision is required and coarsened where it is not. This allows computer resources to be used efficiently by increasing resolution in areas of interest and coarsening resolution in areas of less interest. Extra vertices exist on the edges or faces of the coarser resolution, where the high resolution is adjacent to the low resolution. These colinear or coplanar vertices, belonging to the higher-resolution cells, are called hanging nodes. Scalar values on the grid that are cell-centered must be interpolated onto the grid vertices for isocontour algorithms. Current cell-to-point algorithms in visualization software do not account properly for these hanging nodes. We first calculated node values using ParaView which is a visualization software that allows one to visualize and analyze large data on a supercomputer. ParaView's cell-to-point calculator was used and the output was saved on a grid. We then post-process that grid to identify and alter hanging nodes' scalar values. Finally, we load the "fixed" grid in ParaView, calculate a contour, and qualitatively evaluate the results. We have resolved the hanging node problem in two dimensions. We have shown improvement in three dimensions but are unable to select scalar values for the vertices that would create continuous, crack-free isocontours.

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PSUG25

CALIBRATION AND LEARNING KEY POINTS FOR BIMANUAL MANIPULATION

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Bimanual robotics reveals a wider scope to accomplish a larger set of tasks. However, inherent difficulties are posed by the process of coordinating meaningfully between two hands due to factors like the high dimensionality of bimanual action spaces. A solution is offered, drawing inspiration from human action, where we can see that some tasks require a stabilizing arm that holds an object in place while an acting arm executes the task. Proposing, BimanUal Dexterity from Stabilization (BUDS), uses a learned re-stabilizing classifier to alternate between updating a learned stabilization position to keep the environment unchanged and accomplishing the task with an acting policy learned from demonstrations.

PSUG26
IN VITRO ACTIVITY OF HEMP EXTRACT AND ITS MECHANISM OF ACTION AGAINST _TOXOPLASMA GONDII_

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Toxoplasma gondii is a zoonotic parasite that causes the disease toxoplasmosis. In the United States (US) more than 40 million people may be infected with the parasite. Fewer drugs are available for managing T. gondii infection. However, these drugs are ineffective, and causes toxicity in humans at repeated intake. The Toxoplasma parasite can persist for long periods of time in the bodies of humans (and other animals) and affects individuals who have compromised immune systems and can also affect pregnant women, possibly even for a lifetime. Industrial hemp is the strongest natural fiber in the world. It is a plant grown for its food, fiber, medicinal properties and benefits of which some are boosting heart health, protecting the brain and improving skin conditions. We hypothesize that industrial hemp can be used as a possible treatment of T. gondii parasite infections and little is known about its anti-parasitic properties. The objective of the research is to determine the hemp chemical composition and their mechanism of action against the parasite. Here, we report for the first time its anti-*Toxoplasma gondii* activity *in vitro*. Notably, the mean IC50 value against tachyzoite growth was determined to be 0.13 µg/mL. The extract was not cytotoxic to human foreskin fibroblast (HFF) at 100 µg/mL. Further experiments are ongoing to discover more antiparasitic properties of hemp and its primary role in the treatment of *T.gondii*.

PSUG27
TRANSCRANIAL MAGNETIC STIMULATION AND WHITE MATTER INTEGRITY IN PEOPLE WHO SMOKE

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Transcranial Magnetic Stimulation (TMS) is a noninvasive neuromodulation technique that delivers focused doses of electric current to the brain. TMS is approved by the Food and Drug Administration (FDA) for treating Major Depressive Disorder (MDD) and smoking cessation. Previous studies showed changes in white matter integrity with TMS in patients with a history of cerebrovascular disease. White matter integrity will be measured by fractional anisotropy (FA). We hypothesized that TMS would modulate these measures much more than sham TMS. Participants received diffusion tensor imaging (DTI) scans at baseline and another after one or four TMS sessions. 11 participants received one session and 10 received four sessions. Our sample comprising people who smoke showed lower FA in several white matter tracts. We observed four iTBS sessions (active and sham) caused the highest changes in FA and MD tracts compared to single iTBS sessions. Our findings suggest TMS modulates white matter integrity measures. Our future analyses will examine correlations between white matter integrity and improvement in cigarette craving and white matter integrity. We hope to advocate for more studies examining the effect of various doses of TMS on white matter integrity measures.

PSUG28

SCAFFOLDS THAT MIMIC PROXIMAL TUBULE'S PHYSICAL AND BIOLOGICAL CHARACTERISTICS

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Chronic kidney disease (CKD) is very prevalent, affecting nearly 37.5 million people in the US and over 700 million people globally. The endpoint of CKD is typically renal fibrosis, which is characterized by an increase in extracellular matrix (ECM) deposition. Patients with CKD who reach end-stage renal disease are often placed on either peritoneal dialysis or hemodialysis therapy while waiting for a suitable donor kidney (usually from the United Network for Organ Sharing—or UNOS—list). However, kidney transplantation is limited by the insufficient number of available healthy donor kidneys; patients' life expectancies are often shorter than their wait time on the UNOS list.

While renal injury can occur at several sites, including the renal vascular network, glomerulus, tubulointerstitium, and collecting ducts, the convoluted proximal tubule (PT) is the most frequently damaged site. The PT is responsible for roughly 65–80% of nutrient absorption and transport from the renal filtrate to the blood. Therefore, circulating drugs and their metabolites often accumulate in the PT at high concentrations in both intra- and intercellular space, which can cause damage. PT scaffolds have the potential to regenerate PT tissue, offering therapeutic potential for patients with CKD. The goal of this project is to identify and select the polymer that most closely mimics the proximal tubule’s physical and biological characteristics to be used in cell studies to ultimately produce podocyte (kidney cell) regeneration.

We leverage electrospinning for polymer creation, and the polymers being tested are polycaprolactone (PCL) 8% wt. in $CHCL_3$/MeOH, polylactic acid (PLA) 8% wt. in $CHCL_3$/MeOH, a 60/40 PLA/PCL copolymer dissolved in $CHCL_3$/MeOH, and Estane (polyurethane) 15% wt. in THF. The Estane solution proved to be the closest in physical characteristics to PT tissue, due to its elasticity and rather uniform fibrous nature compared to the tubes constructed from the other polymers. Cell studies are underway, and results will be presented.