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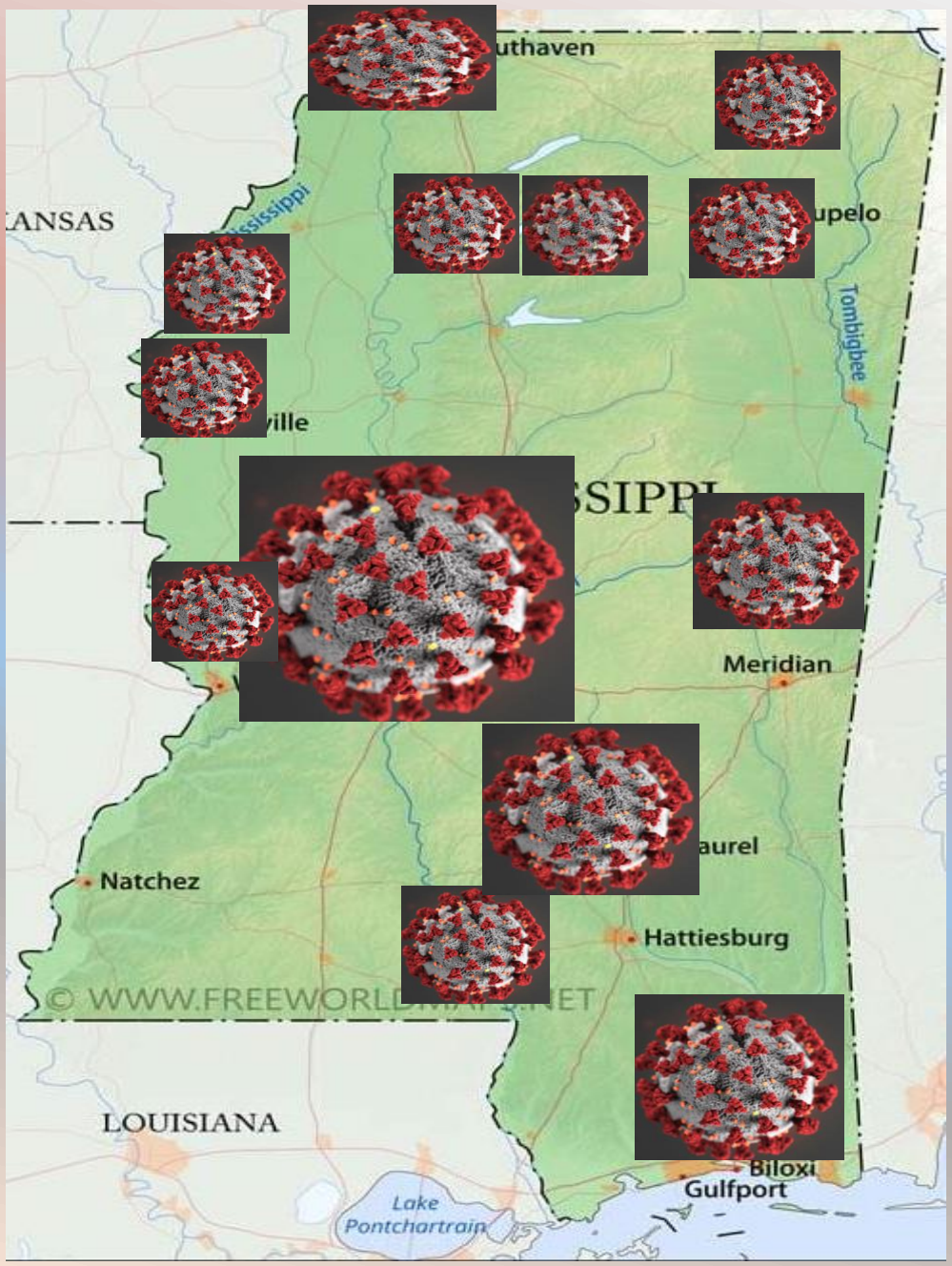

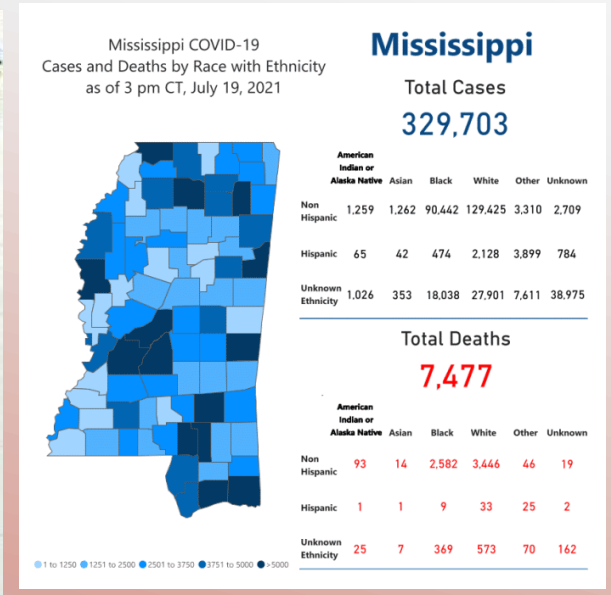

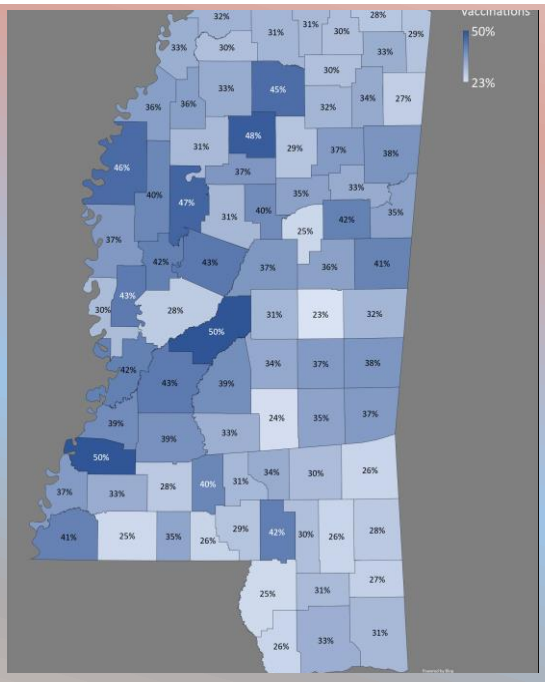

Vaccination percentage by counties

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EIGHTY-FIFTH ANNUAL MEETING

August 5-6, 2021

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Biloxi, MS

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Journal of the Mississippi Academy of Sciences

Volume 66 July 2021 Number 3

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Thursday	Agriculture and Plant Sciences	Cellular, Molecular, Dev. Biol	Chemistry and Chem. Engineering	Ecology and Evolutionary Biology	Geology and Geography	Health Sciences	History and Philosophy of Science	Marine and Atmospheric Sciences	Mathematics and Computer Sci, and Stats	Physics and Engineering	Psychology and Social Science	Science Education	Zoology	LSMAMP
7:00	Registration													
8:00	Oral session D2			Divisional Symposium D5		Oral Session I D11		Co-sponsor Ecology symposium D5	Oral session I 8:15-10:15 D9	Keynote Speaker 8:00- 8:30 Oral Session I 8:40-9:40 D6		Co-sponsor Ecology symposium D5		
9:00		Oral Session D4 8:50-10:20	Oral Session D12 8:50-10:15	Oral Session D5		Oral Session II D11	Oral Session 9:50-12:00 D3		10:30 Break		Oral Session 8:50-11:45 D8		Oral Session 9:00-12:00 D10	
10:00	Break Oral Session D2	Oral Session II D4 10:30-12:00	Oral Session II D12 10:30-12:00	Divisional Business Meeting	Oral Session 9:50-11:00 D7	Virtual Workshop			Oral Session II 10:50-12:00 D9	Oral Session II 10:20-12:00 D6				
11:00														
12:00	General Session						General Session							
1:00	Divisional Posers Poster Hall C	Mississippi INBRE Microbiome Symposium D4	Career Workshop D12 1:00-1:45	Divisional Posters Poster hall C	Keynote Speaker D7	Break	Oral Session 1:00-3:00 D3	Oral Session 12:50-2:45 D8	Workshop 1:00-2:30 D9	D2	Divisional Posters Poster Hall C 1:00-2:30	Oral Session D10	Divisional Poster Poster Hall C 1:30-2:45	Symposium B2-3
2:00			Oral Session III D12		Oral Session II D7	Symposium I Symposium I				Oral Session III 1:20-2:40 D6				
3:00						Disease and Pandemic		2:45-3:00 Business meeting D8						
3:30														
Evening	MAS Awards Ceremony and Dodgen Lecture Room B5=6													
	Reception and MAS All Division Poster Event Poster Hall C													

Friday	Agriculture and Plant Sciences	Cellular, Molecular, Dev. Biol	Chemistry and Chem. Engineering	Ecology and Evolutionary Biology	Geology and Geography	Health Sciences		History and Philosophy of Science	Mathematics and Computer Sci, and Stats	Physics and Engineering	Psychology and Social Science	LSMAMP
7:00	Registration											
8:00	Divisional Workshop And Oral Session 8:00-11:00 D2									Oral Session IV 8:00-9:20 D6		
9:00		Welcome, Business, Awards 8:50-9:20 Oral Session 9:30-11:00 D4	Welcome, Oral Session, Awards 8:50-12:00 D5	Co-Sponsor Agriculture Workshop D2		Oral Sessions D11	Oral Session D8	Oral Session 8:50- 12:30 Business meeting and student awards 12:30 and 12:45 D3	Oral Session 8:20-11:00 D10		Neuroscience Symposium D12	
10:00					Welcome, Business, Awards Oral Session 10:00-12:00 D7					Workshop 9:30-11:00 D6		
11:00	Bus meeting			Field Trip								Advisory Board Meeting D9
12:00	General Session											
1:00-5:00						L.C Dorsey Symposium D9					Neuroscience Symposium D12	LSMAMP Symposium D11
See you next year!! Save the Dates---March 31-April 1, 2022 Location: Biloxi Convention Center												

Mississippi Gulf Coast Convention Center
Biloxi, MS 39531

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If Coming from Jackson, MS –Go South on I-49:

Take the MS-67 S ramp to Biloxi
Continue onto MS-67 S (9.1 miles)
Exit onto MS-605 S (11.7 miles)

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Turn left when you see the Mississippi Gulf Coast and Convention Center

If Coming from Starkville, MS Take US-45, I-59, and US49
Take US 45 (70 miles)
Then take the Exit onto I-20-W/I-59 South Toward Meridian
Continue on I-59 South (Look for signs Laurel/ New Orelans

Take exit 59 for US 98 E towards Lucedale/Mobile

Continue onto US 98 E/US98 BYP E and use the right lane to take the ramp to Gulfport

Merge onto I-49 South

Take the MS-67 S ramp to Biloxi
Continue onto MS-67 S (9.1 miles)
Exit onto MS-605 S (11.7 miles)

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If Coming from the Lorman MS on Highway 61 S:
Take US 61 S to US 98

Merge onto I-55 South/ US-98 E toward McComb

Take exit 29 A Onto I-12 East toward Slidell

Take Exit 38 toward MS 605

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If Coming from Mississippi Valley State University on US-82 W:
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Continue on US 49 South toward Jackson, Hattiesburg, Gulfport

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Take I- 55MS 7 in Grenada County South to Jackson

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The Executive Director's Column

by

Ham Benghuzzi, Ph.D., FBSE, FAIMBE

This year marks our 85th Annual Meeting for the prestigious Mississippi Academy of Sciences (MAS). This was a year of total uncertainity, and in January the looks of having the 85th annual meeting was quite dim. For almost 18 months, the entire world has stood in the grasp of an invisible invader that caused many of us to feel frustrated and helpless as we struggled with sheltering in place. The separation from family and friends was difficult and the loss of friends and family has taken its toll. The efforts of our first responders and health care workers who went above and beyond with limited resources should never be forgotten. We call them superheroes, because they are incredible people doing an astonishing job under unbelievable circumstances. Take a minute to thank the first responders and always provide them with the respect they deserve.

The success of an organization depends upons its people and its sponsors. I am honored to tell you that when our Organization was facing uncertainity, the board of directors, the division chairs, and standing members of various committees worked together to provide the academy with ideas and ways to generate support. In addition, the Mississippi Research Consortium stepped up, and dedicated more financial resources this year to help us through this pandemic.

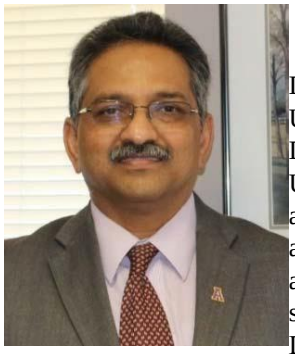
The support for the annual meeting from the Mississippi INBRE allows the opportunity to keep the registration cost for faculty at price that is significantly below the cost of other state academies. We did not know what to expect this year when we opened the call for abstracts since many students have been missing from the campus for over a year. We have had an unusal response this year in terms of faculty presentations. The faculty and staff presentations are at a record high for every division. We are indebted to their support and we are excited to have that level of participation for our student attendees. Also, we will have student attendance and presentations from Mississippi INBRE, My Brother's Keeper and LSMAMP. Last year, right before COVID-19, we were all together at the annual with limited social distancing and no real understanding of how impactful that virus would be for our health. At that time last year, we had a significant number of abstracts (720) attendees (>1200). This year we were anticipating roughly 150 abstracts. We are well over double that number in terms of submission, which has made us do some serious thinking on how to keep everyone safe. The board has worked diligently to keep up with the latest requirements and safety codes for having an in person meeting, as our state begins to reopen. We have implemented a safety committee to work hand in hand with the Department of Health to ensure a safe environment for the attendees. We will be posting around the convention center information what precautions we will need to take. Those guidelines may be different for thosethat fully vaccinated and those that are either partially or non vaccinated. Will keep you update with changes as we get closer to the meeting. I look forward to seeing all of you back in Biloxi!!!

MISSISSIPPI ACADEMY OF SCIENCES AWARD WINNERS 2021

Contribution to Science

Babu P. Patlolla, PhD

Dean and Professor of Biology, Alcorn State University



Dr. Babu Patlolla currently holds the position of Dean of School of Arts and Sciences at Alcorn State University (ASU) since 2013. Prior to that, he was Associate Dean for four years.

Dr. Patlolla has been a faculty member in the Department of Biological Sciences at Alcorn State University for the past twenty-three years. He is currently serving as Professor of Biology. He also acted as the Chairman for the Department of Biological Sciences from 2002 to 2004. In his tenure at Alcorn State University, Dr. Patlolla has secured over three million dollars in external funding and conducted four week summer workshops for K-12 Math and Science teachers from surrounding school districts for eight years. In 2001 with the funding from Mississippi Institutions of Higher Learning, he established a 'Teacher Resource Center' to lend instructional equipment such as laptop, LCD projector, digital camera, camcorder, scanner and research experimental kits to K-12 teachers, faculty and students at Alcorn State University.

Dr. Patlolla served in several committees at ASU including Academic Priorities committee of Presidential Transition Team, Faculty focus group for Strategic Planning, member of faculty senate. He was past chairman for the Institutional Review Board (IRB) and ASU Research Council. Since 2011 he is serving on the Mississippi University Research Authority (MURA) Board and he was part of Mississippi K-12 Science Framework Revision Team. Dr. Patlolla currently serves at ASU as SACSCOC QEP Leadership Team, University Strategic Planning Advisory Committee, University Sesquicentennial Celebration Leadership Committee and 'All for One' faculty and staff campaign 2020 co-chair for fund raising. Dr. Patlolla is a life member of Mississippi Academy of Sciences and current member of American Chemical Society (ACS). He has published and reviewed articles for peer-reviewed journals; he also reviewed Human Anatomy and Physiology, Biostatistics and Zoology textbooks. In 2018, he received Diversity Award of Excellence at Alcorn State University given by the Mississippi Board of Trustees of State Institutions of Higher Learning (IHL).

Dr. Patlolla has a Bachelor of Science in Biology & Chemistry and Master of Science in Genetics from Osmania University, India. He has a Master of Science in Biology and Ph.D. in Environmental Sciences from Jackson State University. Dr. Patlolla is married to Dr. Anita Patlolla and have a son (Shiva) and a daughter (Sapna).

Dudley Peeler Award
Contribution to the Mississippi Academy of Sciences

Zelma Cason, Ph.D.

Professor

Dr. Zelma Cason., of Jackson, Mississippi, is a scientist and educator. She has been involved in teaching and research at the University of Mississippi Medical since 1965. She is a board-certified Specialist in Cytology, and has trained nearly every cytotechnologist in our state has trained under her. In addition, she has been an integral part of pathology resident training in cytology. Dr. Cason, recently retired from the University of Mississippi Medical Center, and in retirement, she is double energized and has stretched her knowledge and desire to teach across the globe to improve the health care of women.

She has traveled to Abuja, Nigeria to teach workshops in PAP screening to laboratory scientist, pathologists, and residents in pathology. She has recently devoted her time to adapt new technology to offer a robust training program that can be implemented via the internet. Her overall goal is to increase the life expectancy of women, and she has said .. **"This work is**

just the beginning, and we know that every long journey begins with a single step".

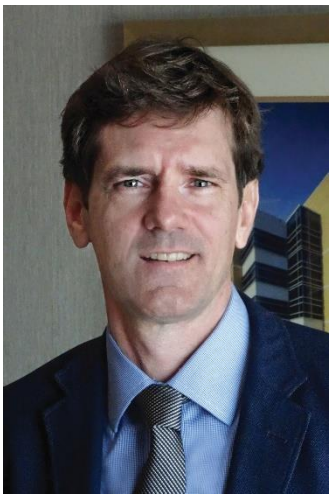
Dr. Cason's research work has appeared in a variety of regional, national, and international journals. She has authored or co-authored >100 peer reviewed scientific papers and presented >200 abstracts at conferences and meetings around the country. The American Society for Cytopathologist recognized her knowledge and teaching with their top award that honors George Papanicolaou, the father of the PAP stain.

Dr. Cason is a life member of MAS, and has been affiliated with the Academy for over 50 years. She has served as chair of the election committee since 2004, and has been a mainstay at registration desk during the annual meeting since 2000. She has served the Academy in a number of capacities including vice-chair and later chair of the Health Sciences division. She was elected to service as a member of the MAS Board of Directors and had the honor of serving as the first female African American President of the Academy.

Presidential Award

Thomas Dobbs, M.D.

State Health Officer, MS State Department of Health



Dr. Thomas Dobbs currently serves as Mississippi's State Health Officer with the Mississippi State Department of Health. Dr. Dobbs is an Infectious Diseases physician with 20 years of experience in public health, with specific expertise in tuberculous (TB) and Human immunodeficiency virus (HIV). He served as a regional health officer in Mississippi from 2008 - 2012 and as State Epidemiologist from 2012 -2016. From 2016 - 2018, Dr. Dobbs worked as a clinician and Chief Medical Officer/ Chief Quality Officer for a local health system. In addition to his role at the Department of Health, Dr. Dobbs is an Associate Professor at the UMMC School of Population Health, teaching courses in Epidemiology and Health Policy. He is internationally known for his work in health disparities associated with TB, HIV, and leprosy.

During the COVID-19 pandemic, his training allowed him to provide, clear directives based upon facts derived from peer-reviewed research. At the beginning of the pandemic, he spent long hours working side by side with nurses, doctors, and local and state officials to ensure that all hospitals were equipped with beds, ventilators, masks, gloves, and pharmacological therapies to combat the virus. He met weekly with the Mississippi State Medical Association Board, and as a part of the Governor's task force, he participated in many briefings and conferences. He became a household name and he gained the trust of many Mississippians. Currently, he continues to be on the front-line during vaccination administration, and in surveying robust populations to prevent the spread of the variants in communities with vaccination hesitancy. He strives to advance the health knowledge and understanding of all Mississippians. Through his actions, it is evident that he cares about our health and safety.

Over the years, Dr. Dobbs has been a strong supporter for MAS and has provides insight on numerous topics of health disparities in the Health Sciences Division. Dr. Dobbs provides our academy with knowledge about the status of health care and health inequities in our state. Teamwork is the strategy towards a healthier Mississippi and it is attainable under the leadership of Dr. Dobbs. (More information on Dr. Dobbs can be seen under the speakers for the Health Sciences Symposium I- Dr. Dobbs will be the lead speaker on Thursday afternoon at 1:00 PM Room- D11)

Mississippi Academy of Sciences
Inaugural Fellows – 2021

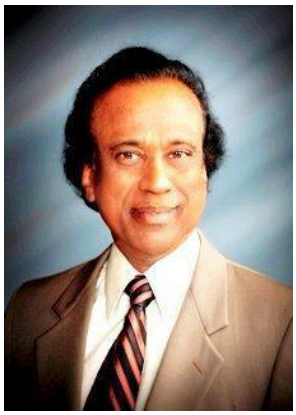
Dr. Hameed Benghuzzi is the Executive Director and division chairs advisor at the Mississippi Academy of Sciences (MAS). He is known nationally and internationally as a pioneer in Ceramic Drug Delivery Systems. He has over 300 PubMed indexed articles and over 700 abstracts detailing various areas of expertise. He has trained more than 40 PhD students and dozens of mater students who are actively involved in leadership roles in academic careers and federal and industrial agencies. He has mentored students at all levels (from high school, undergrad, grad, postdoc and faculty). He has served as a mentor for residents and faculty on more than 10 funded grants. He has been in research leadership roles in many organizations such as President of the Academy of Surgical Research, the President of the Rocky Mountain Bioengineering Society, President of MAS, and organized and chaired several regional, national and international society programs. He has also served on numerous NIH special emphasis panels, including R-25, K01, KO8, T-35, and the P-60 center grants. In addition, he has received multiple awards from various organizations during his career. A few of his awards include: (1) The Presidential Award from the RMBS, (2) Presidential Award from SEM International, (3) the Endocrine's Society Outstanding Investigator Award, (4) MAS Contribution to Science Award, (5) The MAS Dudley Peeler Award, and (6) HEADWAE Award, (7) C. Hall Award, Outstanding Contribution to Biomedical Engineering (32nd SBEC), and (8) ISCM Excellence Award from the International Society for Ceramics in Medicine. He was invited as a keynote/plenary to speak at state, national and international levels, including recent France, Italy, Spain, Greece, China, Poland, Dubai, and Canada. He is a fellow of the American Institute for Medical and Biological Engineering (FAIMBE) and an International Fellow of Biomaterials Science and Engineering (FBSE).

Kenneth Butler is a Professor of Medicine at the University of Mississippi Medical Center and Laboratory Director at the Gertrude C. Ford Memory Impairment and Neurodegenerative Dementia (MIND) Research Center in Jackson, Mississippi. He has a secondary appointment in the School of Population Health in the Department of Population Health Sciences. He has trained 20 doctoral candidates and postgraduates in Clinical Health Sciences, Pharmacy, and Medicine and over 230 students seeking master's degrees in Population Health and Medicine. Dr. Butler has published over 70 peer-reviewed articles in biomedical engineering and epidemiology journals. He has been recognized nationally for distinguished contributions to biomedical science, epidemiology, and population health. An elected fellow of the American Heart Association, he serves on the Council of Epidemiology and Prevention. In 2020, he received the Dudley F. Peeler Award for service to the Academy and the Mississippi College Spirit of MC Faculty Award. Dr. Butler, a MAS Past-President, currently serves Academy as chair of the Awards and Resolutions Committee.

Dr. Cason is a retired professor and program director in the Department of Diagnostic and Clinical health Sciences at the University of Mississippi Medical Center. She was affliated with UMC since 1965 and officially retired June, 2020. During her tenure at the university she served as Chair for the Department of Cytotechnology and trained nearly every cytologist in the state of Mississippi. She has also had significant impact on training pathology residents for over 5 decades (1967-2020). Dr. Cason has contributed significantly to the fields of cytology and biomaterial research and has published more than 80 per reviewed articles. Several of her journal articles have been cited over 100 times. She has worked on several innovative and automated screening tools for cytology such as PAP net, CYTCYT, SurePath, and KeenEye. Now that she has retired she continues to teach cytology to under represented areas of the world via a computer platform. She trains students via a free platform in Africa, Korea, and United Arab Emirates to name just a few locations. Nationally, she has served as a member on the committee on current concepts and technology for the American Society of Society Pathology and was appointed by the director of the U.S. Department of Health and Human Services (HHS) to serve as a member on the recombinant DNA advisory committee in Washington, DC. Dr. Cason has been an active member of the academy since 1970 and served as chair and vice chair of health sciences. She is a board member and a past president of MAS. She has received the teacher of the year award from the academy, and the health disparity award. Dr. Cason has brought students every year from 1994-2019 to present.

Joseph A. Cameron, Ph.D., is an Adjunct Professor in the Department of Biology at Jackson State University, a Board Member of the Rocky Mountain Bioengineering Symposium (RMBS), and a past President of the Mississippi Academy of Sciences (MAS). He has directed or co-directed many biomedical research and training grants from the NIH (NIGMS, NHLBI, NIMHD), NSF, and the U.S. Army, resulting in the mentoring and training of hundreds of students, particularly minority, at the pre-college, bachelor, masters and doctoral levels. Dr. Cameron has also served as Chair and/or member of many NIH grantsmanship review panels, an active member of research societies, e.g., endocrine society, society of experimental biology and medicine, etc. He has received many awards and recognition for his achievements, including the Sigma Xi award for "Meritorious Research," Outstanding Contributions to the MAS, and inclusion in "Personalities of the South" and "Who's Who Among Black Americans." In addition, he has published extensively and presented research findings nationally and internationally.

D. Olga McDaniel, an Emeritus Professor of SOM and General Surgery, at UMMC. During her services at UMMC, she was Principal Investigator and Director of Transplantation Immunogenetics/DNA Diagnostics Laboratory. Her research activities have particularly been devoted to studies involving African-American patients who represent a very significant portion of the population, required kidney or heart transplantation at UMMC. She mentored numerous students through the Base Pair program at UMMC, undergraduate students through the MARK and MBRS Programs, and graduate students through the MSRP, BBDP, MFGN, SURE, and INBRE. She served 2 terms as Faculty Senate Member and Faculty Development Program at UMMC. She was Chair of HSD, 2004-2005, and 2014-2016. 2006-2010, Education Committee leader for ASHI. 2010-2014 Chair of Bylaws Committee. The ASHI holds a critical position in organ sharing and donation programs known as UNOS. 2008-Present, Education Committee for ASHG and Mentorship for K-12 genetics education in Mississippi. She advocated genetics through 23 and Me. She recently advocated the L.C. Dorsey Research Honor Society to join the MAS as a "Sister Division." The L.C. Dorsey society is a regional network of social, health, and citizen scientists upholding excellence in research and education.



Dr. Girish K. Panicker, an authority on C-factor (cover and management) research and an internationally renowned agricultural scientist, is a professor and director of conservation research at Alcorn State University, Mississippi. He holds B.S. (India), M.S. (ASU), and Ph.D.(MSU) in agricultural science. He has been a Certified Professional Agronomist and has worked on three continents, Asia, Africa, and North America. His research center has the world's largest C-factor data bank at an investment of more than $6.5 million. He joined MAS in 1991 and continues as a life member. His advanced organic research techniques increase Vitamin C and antioxidants in fruits. In collaboration with the U.S. Army scientists, he has produced a new organic fertilizer that traps ammonia and prevents groundwater pollution. While serving as a director board member of several organizations, he has been chairman of the division of Agriculture of MAS twice and an advisor to the Indian American International Chamber of Commerce, Washington, D.C. He is the winner of the 2020 Lifetime Organic Achievement Award and has been honored with the Pride of India Award.

Dr. Babu Patlolla currently holds the Dean of the School of Arts and Sciences at Alcorn State University (ASU) since 2013. He has been a faculty member in the Department of Biological Sciences at Alcorn State University for the past twenty-three years and currently serves as Professor of Biology. Since 2011 he is serving on the Mississippi University Research Authority (MURA) Board. Dr. Patlolla is a life member of the Mississippi Academy of Sciences. In 2018 he received the Diversity Award of Excellence at Alcorn State University given by the Mississippi Board of Trustees of State Institutions of Higher Learning (IHL). Dr. Patlolla has a Bachelor of Science in Biology & Chemistry and a Master of Science in Genetics from Osmania University, India. He has a Master of Science in Biology and Ph.D. in Environmental Sciences from Jackson State University.

Dr. K. Raja Reddy is a Research Professor in the Department of Plant and Soil Sciences and a William L. Giles Distinguished Professor at Mississippi State University, Mississippi State, Mississippi. He teaches graduate-level courses and trained over 100 students, postdocs, and visiting scientists, published over 300 papers. He is a fellow of the American Association for the Advancement of Sciences., the American Society of Agronomy, and the Crop Science Society of America. Dr. Reddy received numerous awards, including the ICAC Cotton Researcher of the year award by the International Cotton Advisory Committee, the Beltwide Cotton Physiology Award by the National Cotton Council of America. Dr. Reddy is currently serving as the President of the MAS and received the contribution to the science award from MAS. Dr. Reddy is recognized internationally for distinguished contributions to environmental plant physiology, including climate science, remote sensing, agricultural systems modeling, and applications, and provides service and leadership to many organizations and ranked the World's Top 2% of scientists In Plant Biology and Botany.

Dr. Remata Reddy is an Associate Professor in the Dept. of Chemistry, Physics and Atmospheric Sciences, Jackson State University, and is responsible for teaching various undergraduate and graduate courses and serves as an academic and research advisor for meteorology and environmental science majors. He is involved in the NOAA projects and researching tropical meteorology, climate variability, and climate change using numerical modeling and satellite data analysis and collaborating with NOAA/NASA scientists. Since NCAS's inception, he has been conducting remote sensing workshops at JSU. Dr. Reddy is P.I. for grants received from NSF and NASA for educational and research high school pipeline to meteorology program and conducting remote sensing/climate workshops. Reddy has published numerous papers in reputed journals in the areas of meteorology and climatology. He has participated and presented papers in national and international conferences, professional meetings. Reddy was an advisor for Ph.D. and postdoc students in Environmental/Atmospheric Sciences through NASA funding. Dr. Reddy was a scientist at the Government of India and the Government of Canada. Dr. Reddy currently is Chair for the Division of Marine and Atmospheric Sciences, Mississippi of Academic Sciences. Award.

Dr. Sukumar Saha, Ph.D. from Texas A&M University with 40 years of research experience, is working as a Research Geneticist with USDA/ARS since 1997. He demonstrated outstanding stature with a stellar record as an international authority in cotton genomics and cytogenetics to develop genetic and cytogenetic resources that are being used in the USA and around the world. His peers recognized him for his outstanding contribution with multiple awards, including the 2010 Cotton Geneticist award from the National Cotton Council, the ICAC Cotton Researcher of the Year Award in 2011 from the International Cotton Advisory Committee, the Crop Science Society of America (CSSA) International Service Award (CSSA- ISA) in 2016, CSSA Fellow Award in 2017, Outstanding Senior Scientist Award in 2017 from the Association of Agriculture Scientists of Indian Origin, Outstanding Scientist Award of 2018 from Mississippi Academy of Sciences. He received funding of over two million dollars as the
P.I. from USDA, USAID, NSF, and Cotton Incorporated and published over 115 peer-reviewed journal articles, a patent application, and a co-edited book.

Dr. James Stephens is an instructor of physics at Southwest Mississippi Community College in Summit, MS. From 2004-13 he was a Research Associate Professor in the Department of Physics & Astronomy at The University of Southern Mississippi and a research scientist at the department's Signal Research Center, and a member of the Littoral Acoustic Demonstration Center (LADC). Dr. Stephens was formerly employed as a project geophysicist in the exploration industry and is experienced in the acoustic and seismic data processing. Prior to graduate studies, he gained significant operational experience as an officer in the Navy. He is a past President of MAS and has participated in the Physics & Engineering division in several capacities. Dr. Stephens is a graduate of Rice University (B.A.), The University of Southern Mississippi (M.S.), and Georgia Institute of Technology (Ph.D.).

Dr. Michelle Tucci, Professor of Anesthesiology at the University of Mississippi Medical Center. Dr. Tucci has been involved in a leadership role for various state, national and international organizations. After completing her undergraduate training at Seton Hill University in Pennsylvania, she completed a Master's degree in Biology at the University of Dayton in Ohio. Following her move to Mississippi, she completed her Ph.D. in pharmacology and Toxicology in 2000. Aside from her work supervising and overseeing resident's basic science research in orthopedic surgery for several years, she has also mentored and directed many undergraduate and graduate students from diverse disciplines. Her lab is focused on understanding the role of neuropeptides and their role in bone remodeling. She served/serving on the editorial boards for several journals as well as a member of various NIH special review panels. She has over 200 PubMed indexed articles and over 400 abstracts detailing multiple areas of expertise. She is the Chief Editor of the *Biomed Science Instrumentation* and Chief Editor for the *Journal of the Mississippi Academy of Sciences*. Previously, she has been recognized for her work and service by the Academy of Surgical Research, the Mississippi Academy of Sciences Outstanding Contribution to Science, Peeler Dudley Outstanding Service Award, Presidential Award from RMBS, and Douglas Walker Award and recently were inducted as a fellow in American Institute of the Biomedical and Biological Engineering.

Francis Tuluri is currently working as a Professor in the Department of Industrial Systems & Technology, Jackson State University, Mississippi. He teaches Electronics; microcontrollers, Robotics; Drafting, Technical Seminar, among other courses. His areas of research include data systems and science; Industrial Pollution and Health Impacts; Air Quality modeling and Health impacts; Remote Sensing and GIS analytics; Nuclear Magnetic Resonance, Engineering Physics; Technology, and Engineering. He has published over 60 papers in peer-reviewed journals of national and international reputation. Participated and presented scientific and technical papers in about 15 National and International Symposia/Conference/Meetings. He is also the recipient of the best professor award in the College of Science and Technology, Jackson State University. He was awarded twice the 'Creative Research' award, Jackson State University. He is a recipient of the summer research fellow award at the University of Colorado, Boulder, with Professor Noel Clark, and two summer research fellow awards at Virginia Tech, Virginia, with Professor Louis Madsen. He is a reviewer of Molecular Crystals and Liquid Crystal's journal. He is also serving as a member of Ph.D. thesis reviewer at Nagarjuna University, India

Dr. Md S. Zaman is a Professor Emeritus in the Department of Biological Sciences at Alcorn State University in Lorman, Mississippi, and currently serves as a Professor of Biology at South Texas College in McAllen, Texas. Prior to joining Alcorn State University, he was a Postdoctoral Research Fellow at the Johns Hopkins University, School of Medicine, Division of Pediatric Oncology. His academic training is in the fields of Radiation Biology and Immunology/Oncology. Dr. Zaman's primary teaching areas encompass Anatomy & Physiology, and Histology at undergraduate and graduate levels. His key research areas include ionizing radiation on brain myelination, isolation and purification of hematopoietic stem cells from human bone marrow, differentiation of stem cells under the influence of various growth factors, and phytoremediation of metal contaminated soils. Dr. Zaman's research has produced significant research and review publications, and his current writings primarily focus on a diverse range of environmental issues. Dr. Zaman is committed to his students and believes his success in his career is tied to the success of his students.

2021 Dodgen Lecture

Thursday, August 5, 2021 (3:30 PM)

"Mississippi's Leadership in Agricultural Innovation"

Given by

Kater Hake, Ph.D.
Cotton Incorporated
Vice President of Agricultural and Environmental Research

Research at Cotton Incorporated where he is responsible for the cotton production research program. Kater leads a team of six Research Directors who develop and support innovative problem-solving research with a network of 300 public sector scientists to increase the profitability and sustainability of cotton farming in the U.S. Kater came to Cotton Incorporated from a long career in cotton research and management. Most recently, he was the Vice President of Technology Development at Delta & Pine Land Company. He has also held positions at Texas A&M University, The National Cotton Council, and the University of California. He holds 3 degrees from the University of California at Davis and at Riverside.

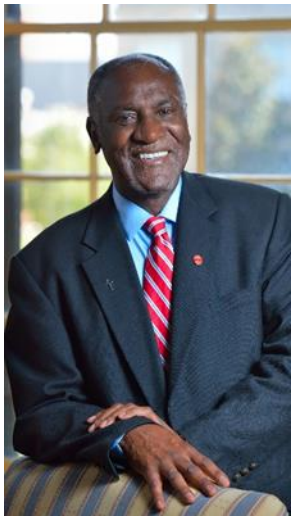
Cotton Incorporated

Plenary Speaker

Louis Stokes Mississippi Alliance for Minority Participation (LSMAMP) Symposium

Symposium Chair(s): Dr. Victor Ogungbe and Dr. Martha Tchounwou, Jackson State University

Thursday, August 5, 2021 Noon-1:00 pm (Room B4-5)



Speaker: Dr. Donald Cole

Theme: **Strategies and Actions for Forming Effective Mentorship Alliances**

Moderator: Mrs. Jacqueline Vinson. University of Mississippi

Dr. Donald Cole was a university administrator and former faculty member at the University of Mississippi (UM). *'Don Cole'* served as Assistant Provost and Assistant to the Chancellor for Multicultural Affairs. Drawing from his personal and professional experience at UM, he played an active role in supporting and inspiring students at the university. Dr. Cole was a stern advocate of minority students, and he devoted tremendous energy to promote, train, and guide minority students during his tenure at UM. He also made a tremendous contribution to the success of the LSAMP program in Mississippi. He served as the co-principal investigator and coordinator of LSMAP at UM. A Jackson, Mississippi native, Dr. Cole received a bachelor's degree from Tougaloo College, M.A degrees from the State University of New York and the University of Michigan, and a Ph.D. in Mathematics from the University of Mississippi. Being a Catalyst for Change at UM for more than 50 years, The Donald Cole Catalyst for Change Scholarship was established in his honor at the University of Mississippi.

1:15-2:00 (Closed Session- RoomB4-5)

LSMAMP Executive Committee Meeting (Program Administrators and Site Coordinators).

Agenda 2023 and beyond

Organizers: **Dr. Ikenga Mississippi Valley State University and Mrs. Sonia Eley Alcorn State University**

General Session

Funding Opportunities with the National Institute of Food and Agriculture

Organized by

Dr. Peter Motavalli (NIFA/USDA) and Dr. Sukumar Saha (ARS/USDA)

Noon-1:00 PM ---Talks

1:00-1:10 PM Break

1:10-2:10 PM Panel Discussion

Dr. Peter Motavalli is the Director of the Division of Community and Education (DOCE) of the Institute of Youth, Family, and Community at the National Institute of Food and Agriculture (NIFA) in USDA. He provides coordination and oversight for the division's research, extension, education and capacity-building programs. These programs are focusing on enhancing the capacity of minority-serving, land-grant, and non land-grant institutions to train the next generation of food, agricultural and natural resource professionals. Dr. Motavalli worked for over 24 years as a Professor of Soil Fertility and Plant Nutrition at the University of Missouri and previously as a Professor of Soil Science at the University of Guam. His Ph.D. in soil science is from Cornell University.

Dr. Ganesh Bora is a National Program Leader at National Institute of Food and Agriculture (NIFA), United States Department of Agriculture (USDA). Ganesh provides leadership at National Robotic Initiative (NRI), Farm of the Future, Artificial Intelligence (AI) Institutes, Data Science for Food and Agricultural Systems (DSFAS), Inter-Disciplinary Engagement in Animal Systems (IDEA), Nanotechnology for Agricultural and Food Systems, and Economic and Social Implications of Food and Agricultural Technologies programs. He is also NIFA representative at Multistate Projects 'Delta Region Farm Management and Agricultural Policy Working Group', 'Automation for Specialty Crop', 'UAS for US Agriculture and Natural Resources' and 'Technology for Animal Production Systems'.

He is an active member of American Society of Agricultural and Biological Engineers and presently serve as the Chair of Executive Committee on Global Engagement. Ganesh also serve as an US expert of agricultural machinery in International Standard Organization (ISO).

Dr. Shelby Servais is a Biological Program Specialist for the National Institute of Food and Agriculture (NIFA). As a Program Specialist, Servais facilitates the scientific peer review process of grant applications submitted to NIFA. Servais' program portfolio covers subjects ranging from plant breeding, plant products, conservation of natural resources, to sustainable agriculture systems. Prior to joining NIFA, Servais was a Science Policy Fellow for the National Academies of Sciences' Gulf Research Program. Servais has a Ph.D. in Biology from Florida International University, and an undergraduate degree in Environmental Science from Mount Saint Mary's University.

Plenary Speaker

Sponsored by Millsaps College and Mississippi INBRE

Friday, August 6, 2021
12:00 P.M. (Room B2-3)

"How Do Leaders Cultivate a Culture of Respect?"

Given by

Dennis Watts, PhD
Assistant to the President
Belhaven University
Jackson, MS

Dennis Watts serves Belhaven University as Assistant to the President having previously served as Associate Provost. Prior to Belhaven, he served in academic administration at the University of Mississippi Medical Center (UMMC) and the Mississippi Institutions of Higher Learning. Early in his career, he was engaged in both bench and human subjects research at UMMC and presented at the annual MAS Meeting. Dr. Watts, a native of Madison, earned the bachelor of arts and doctor of philosophy from the University of Mississippi, the master of divinity from Reformed Theological Seminary, and a post-graduate certificate from the *Institute for Management and Leadership in Education* at Harvard University. He is married to the former Jenny Lindner of Dyersburg, TN (a Millsaps and UMMC graduate) and they have three boys, Jonathan, Samuel, and Benjamin.

85th Annual Mississippi Academy of Sciences Meeting

August 5-6, 2021
MS Coast Coliseum & Convention Center
2350 Beach Blvd. | Biloxi, MS 39531

The MAS, in its commitment to recognize and promote novel student research, would like to announce the following prestigious awards:

1. Millsaps Undergraduate Scholars Symposium

Honoring Excellence in Science in Mississippi
Symposium Chairman: Dr. Tim Ward | Millsaps College, Jackson, MS
Event Coordinator: Dr. Ramon Jackson | MAS Executive Assistant

This symposium, was originally established with support from the Howard Hughes Medical Institute (HHMI), it is intended to expand the scope and depth of opportunities for undergraduate student researchers to meet other student researchers and to provide a dedicated venue to disseminate and present their research activities. Participation in undergraduate research increases self- confidence, independence, and critical thinking skills. Disseminating one's results by participating in conference symposia develops communication and presentation skills. These experiences create and foster a life-long quest for research and discovery. The symposium seeks to promote all levels of science education and is dedicated to increasing the number of people who pursue science-related careers and to broadening access to science for all. Student researchers who have shown outstanding achievement in science and engineering research may be selected by their division chairs to compete for these outstanding symposium awards.

Criteria for Selection of recipients:

1. Each division chair(s) and vice chair(s) of the 13 divisions will select their **top undergraduate student abstracts** to represent their division and present in the MAS sponsored lunch award symposium, "Honoring Excellence in Science in Mississippi," on Friday February 21st from 12:00 pm – 3:00 pm. Student's name must appear as first author in both abstract and poster.
2. After presenting in their division, the nominated students will agree to present their posters in the genral poster session following the Dodgen Lecture. The student should attend the provided lunch abd talk on Friday from 1:00 pm – 3:00 pm. Failure to physically present at their respective division the day prior will disqualify the selected presenters from competing in the symposium. First author must be present to compete and presentation by a co-author will not be accepted.
3. Award prizes will be presented immediately at the end of event as follows:
   1st Place: Certificate plus $250; 2nd Place: Certificate plus $200; 3rd Place: Certificate plus $150; 4th Place: Certificate plus $100; and honorable mention for 5th – 6th winners. Each selected presenter will receive a MAS certificate of achievement.

2. Mississippi INBRE Graduate Scholars Symposium

Honoring Excellence in Science in Mississippi
Symposium Chairman: Dr. Alex Flynt | Program Coordinator, Mississippi INBRE
Event Coordinator: Mrs. Mary Ann McRaney | Events and Public Relations Coordinator
The University of Southern Mississippi, Hattiesburg, MS

Sponsored by Mississippi IDeA Network of Biomedical Research Excellence (INBRE), this symposium is intended to promote and recognize meritorious research conducted by graduate students. Mississippi INBRE is a network of colleges and universities throughout Mississippi with the goal of enhancing biomedical research infrastructure, funding, and training opportunities to better the development of the next generation of researchers in Mississippi. Funded by the National Institutes of Health and housed at The University of Southern Mississippi, the mission of Mississippi INBRE is to reach out to Mississippians in order to improve health throughout the state and to engage talented researchers and students in biomedical research projects that will increase the state's research competitiveness as well as impact the health of citizens of Mississippi.

Criteria for Selection of recipients:

1. Each division chair(s) and vice chair(s) of the 13 divisions will select the top **20% of graduate student abstracts** to represent their division and present their work in the Mississippi INBRE sponsored lunch award symposium, "Honoring Excellence in Science in Mississippi," on Friday, February 22nd at 10:00 am – 1:00 pm. Student's name must appear as first author in both abstract and poster.
2. After presenting in their division, the nominated students will agree to present their posters in the poster symposium on Friday from 10:00 am – 12:00 pm. Lunch will be provided from 12:00pm – 1:00pm. Failure to physically present at their respective division the day prior will disqualify the selected presenters from competing in the symposium. First author must be present to compete and presentation by a co-author will not be accepted.
3. Award prizes will be presented immediately at the end of event as follows:
   1st Place: Certificate plus $250; 2nd Place: Certificate plus $200; 3rd Place: Certificate plus $150; 4th Place: Certificate plus $100; and honorable mention for 5th – 6th winners. Each selected presenter will receive a MAS certificate of achievement.

85th Annual Mississippi Academy of Sciences Meeting

Mississippi INBRE Graduate Scholars Symposium

Honoring Excellence in Research in Mississippi

Symposium Chairman: Dr. Alex Flynt | Program Coordinator -Mississippi INBRE
Event Coordinator: Mary Ann McRaney| Events and Public Relations Coordinator
University of Southern Mississippi, MS

Symposium Program: All posters have to be assembled by **Thursday 8/5/2021 no later than 12:00 PM** and dismantled after **after 3:00 PM on Friday 8/6/2021**. All students **must be present** on both days and lack of adherence with this schedule will result in disqualification from the competition.

Thursday

5:00-7:00 **Judging of students posters will begin immediately after Dodgen Event.**

Friday

12:00-1:00 **Symposium Plenary Speaker and Lunch**
1:00-1:20 **Opening and Introduction Remarks, Dr. Alex Flynt; Symposium Chair**
1:30-1:40 **President's Remarks, K. Raja Reddy; MAS President**
1:40-2:25 **Poster competition (Visit to Posters- if the Judges have not finished)**
2:25-2:55 **Presentation of Awards: Drs. Flynt and Reddy**
2:55-3:00 **Closing Remarks: Dr. D. Flynt: Chair of the Symposium**

(Times subject to change- announcements of any changes to the schedule will be made by the Symposium Chair- following the plenary speaker)

Awardees must be present at the awards event and monitory award will not be honored for no show by the student winners at the awards ceremony

85th Annual Mississippi Academy of Sciences Meeting

Millsaps Undergraduate Scholars Symposium – Honoring Excellence in Science in Mississippi

Symposium Chairman: Tim Ward, PhD
Millsaps College

Symposium Program: All posters have to be assembled by **Thursday 8/5/2021 no later than 12:00 PM** and dismantled after **after 3:00 PM on Friday 8/6/2021**. All students **must be present** on both days and lack of adherence with this schedule will result in disqualification from the competition.

Thursday

5:00-7:00 Judging of students posters will begin immediately after Dodgen Event.

Friday

12:00-1:00 Symposium Plenary Speaker and Lunch
1:00-1:20 Opening and Introduction Remarks, Dr. Tim Ward; Symposium Chair
1:30-1:40 Past President's Remarks, James Stephens; MAS President
1:40-2:25 Poster competition (Visit to Posters- if the Judges have not finished)
2:25-2:55 Presentation of Awards: Drs. Shearer and Stephens
2:55-3:00 Closing Remarks: Dr. Tim Ward: Chair of the Symposium

(Times subject to change- announcements of any changes to the schedule will be made by the Symposium Chair- following the plenary speaker)

Awardees must be present at the awards event and monitory award will not be honored for no show by the student winners at the awards ceremony

Friday, August 6, 2021

11:00 AM-12:00 PM (Room D9)

LSMAMP Advisory Board Meeting

(Presidents/Provosts of Alliance Institutions and Program Administrators)

Moderator: **Dr. Glake Hill**

LSMAMP Symposium

(LSMAMP participants only)

1:00 PM-1:30 PM Speaker: Dr. Isi Ero-Tolliver, Hampton University

The Role of Mentorship on Student Science Career Trajectories

Moderators: **Ms. Kia Davis**, Bridge to the Doctorate, Jackson State University

Dr. Isi Ero-Tolliver is the interim Dean of the School of Science and Associate Professor of Biology at Hampton University. Dr. Ero-Tolliver earned her B.S and M.S in Biology at Jackson State University. She earned her Ph.D. in Interdisciplinary Studies in Biological Sciences and Science Education at Vanderbilt University. Dr.Ero-Tolliver's current research focuses on best practices for exposure, recruitment, and retention of underrepresented minorities into the pipeline and watershed of STEM using model-based reasoning, CURE (Course-based Undergraduate Research Experiences), authentic research experiences, and intentional mentorship. She has mentored high school and undergraduate students at the lab-bench using novel research as an engagement tool. These students have gone on to be successfully admitted to undergraduate and graduate schools, respectively. Being the benefactor of outstanding mentorship, she is interested in how this process helps minority students attain and retain science identities.

1:35 PM- 2:20 PM Speaker: Denise Yates, Co-PI LSAMP NSF International Center of Excellence, University of Illinois, Chicago

LSMAMP International Research Experience Program

Moderators*:* Dr. Martha Tchounwou, Jackson State University

Ms. Denise Yates is the Director of the LSAMP Bridge to the Doctorate and Co-PI of the NSF International Center of Excellence in the Office of Graduate Diversity Programs at the University of Illinois, Chicago (UIC). Ms. Yates is a nationally certified counselor. She holds a Master of Arts Degree in Human Development Counseling from the University of Illinois at Springfield and has achieved excellence in recruiting graduate and professional students for the biomedical science programs at UIC. Ms. Yates provides graduate and professional school preparation as well as academic support programming to graduate students, especially students from groups that are historically underrepresented in STEM, at UIC's College of Medicine.

2:20 PM–2:35 PM **…….Break ……**

2:35-3:05 PM **LSMAMP ALUMNI SPOTLIGHT**

Dr. Tomekia Simeon, Dillard University, New Orleans, LA

PEER-LED TEAM LEARNING AND A BRIEF INTRODUCTION TO RARE EARTH METALS

Moderator: Dr. Theresa D. Gaines, Delta State University

Tomekia Simeon is a passionate Assistant Professor of Chemistry at Dillard University and a K-12 and higher education STEM advocate. Tomekia received her Ph.D. from Jackson State University in Physical Chemistry under the supervision of Prof. Jerzy Leszczynski. Afterward, she joined the groups of Profs. Mark Ratner and George Schatz at Northwestern University as a postdoctoral fellow. Her research involves using computational chemistry and theoretical methods to study the chemical and electronic properties of rare earth metals and ionic polyamide materials.

3:05--3:30 PM

Closing Remarks: Dr. Julius Ikenga, Alcorn State University

3:15-3:20 pm
Group Photograph

DIVISIONAL SYMPOSIA AND WORKSHOPS

Thursday, August 5, 2021

ECOLOGY AND EVOLUTIONARY BIOLOGY SYMPOSIA

8:00-8:45

Room D5

CONSERVATION THROUGH SCIENCE AND EDUCATON

***Organizers*: Dr. AHM Ali Reza and Dr. Nina Baghai-Riding**
Delta State University

Abigail J. Darrah, Ph.D, Biologist for Audubon Delta's Mississippi Coastal Program.

Presentation Title: **'*Ecology and conservation of Mississippi's beach-nesting birds*'**.

Eleven years after the Deepwater Horizon oil spill disaster affecting the coastline of the northern Gulf of Mexico, settlement money is being used to fund habitat restoration and management actions to benefit bird populations that were injured by the spill. Mississippi's beaches are home to some of the largest breeding colonies of Least Terns in the Gulf of Mexico, and this species is a priority for Audubon's stewardship and research efforts. Dr. Darrah will present recent population trends, breeding productivity, and movement patterns of Least Terns in response to management actions and environmental threats.

Dr. Darrah earned her Ph.D. in biology in 2013 from the University of Arkansas. She first became involved in coastal shorebird conservation during her postdoctoral position at SUNY-ESF from 2014-2017, during which she developed a decision-support tool for Atlantic Coast Piping Plover conservation. She joined Audubon in 2017 and leads the research and monitoring efforts of Audubon Delta's Mississippi Coastal Program.

Tom Mohrman, Director of the Mississippi Marine Program of The Nature Conservancy (TNC).

Presentation Title: **'*Conservation Organization's role in implementation species conservation in Mississippi*'**.

There are a wide variety of conservation organizations in Mississippi focusing on different aspects of habitat and species protection. The Nature Conservancy uses a variety of tools to support research and implementation of projects designed to impact species conservation. Looking at examples of reptile and amphibian conservation projects, Mr. Mohrman will describe some strategies and tools used for species level projects. Many of the tools and approaches are designed to be transferable and applicable to a wide variety of opportunities.

Mr. Mohman has 21 years' experience in the conservation of coastal species and habitats. He earned his bachelor's degree in biology from Rowan University of New Jersey, and his master's degree in biology from the University of Southern Mississippi. He joined The Nature Conservancy in 2011 to establish a coastal program for the Mississippi Chapter, which he has been leading for the past ten years. Current program focus is primarily dedicated to oyster restoration and the conservation of diamondback terrapins and Alabama red-bellied turtles.

Joseph M. Lane, Ph.D, Assistant Professor of Geography and Sustainable Development and Assistant Director of the Center for Interdisciplinary Geospatial Information Technologies at Delta State University

Presentation Title: **'*Learner Perspectives on Informal Science and Geography Education in Bangladesh*'.**

Informal Science and Geography Education are resourceful processes that engage learners in strategizing around a specific concern, typically a geographic area, cultural region, biological phenomena or unique population. This presentation examines methods in which individual learners advance their understanding of science and geography during a unique field experience, in South Asia; more specifically, The People's Republic of Bangladesh. Suggestions and potential for future research are explicitly examined, with detailed examples provided.

Dr. Joseph Lane has served as Assistant Professor of Geography and Sustainable Development and as the Assistant Director of the Center for Interdisciplinary Geospatial Information Technologies at Delta State University since 2018. His research interests are centered around teacher and learner perspectives in the context of Informal Science and Geography Education. Dr. Lane teaches at the undergraduate and graduate levels, conducts research and development activities, and assists with the geographic education outreach.

Jennifer Frey, Southern Conservation Resource Biologist for Mississippi Department of Wildlife, Fisheries and Parks.

Presentation Title: **'*Working towards a time series analysis of gopher tortoise habitat in south Mississippi for the past thirty years and conserving the species for the next thirty*'**.

A time series analysis is a map story that illustrates the changes land has gone through for the habitat types resource managers select for. We are currently collecting data and working to fill in existing data gaps to analyze how the survey methods, habitat management, and species protection have been progressing in Mississippi. In her presentation, Ms. Frey will discuss how to find areas for future management and show where management has been successful.

Ms. Frey has worked in conservation and resource management in south Mississippi/Louisiana for the past 15 years through various, state, federal, and private agencies. She ran a herpetological biological inventory for The Department of Marine Resources for five years. She has also worked for NPS, NASA, LDWF, and TNC. She earned her undergraduate degree in Wildlife and Fisheries from Louisiana State University, a masters in Coastal Sciences from The University of Southern Mississippi's Gulf Coast Research Laboratory and a GIT certificate from The University of Southern Mississippi. Her research interests include utilizing GIS to show habitat change over time for species of concern, threatened and endangered species, updating historical heritage records, terrapin conservation, and teaching the next generation of kiddos why herps are amazing.

HEALTH SCIENCES
Room: D11

10:30-11:45 AM

Division Workshop I

Moderator: Dr. Ritesh Tandon, microbiology/Immunology, UMMC

Kristianna Felch
Micobiology/Immunology
University of Mississippi Medical Center

Title: " Virtual ELISA"

Kristianna Felch, will discuss a Bio-Interactive workshop through an Enzyme-Linked Immunosorbent Assay (ELISA).

Kristianna is a candidate for Doctor of Philosophy in the Department of Microbiology and Immunology, University of Mississippi Medical Center.

Originally, she is from Maryland. She received her B.S. in Animal Science in 2017 from Berry College in Rome, GA. Then in 2018, she moved to University of Mississippi Medical Center to pursuit her PhD degree. She settled in Drs. Eva Bengtén and Dr. Melanie Wilson laboratory to study comparative immunity in a channel catfish model.

Her working skills include western blotting, cell culture, flow cytometry, ELISA, PCR, data analysis, bioinformatics, lab animal maintenance, communication, writing in addition to many others. Her Professional affiliations includes: American Society of Microbiology; American Chemical Society; Alpha Zeta Academic Agricultural Fraternity; etc.

The ELISA Virtual Workshop is a fictional example that allows students to become immersed in a life-like laboratory. Recognizing all of the buffers, wash steps, incubation periods and samples, this online web format will give the audience the opportunity to virtually perform their own ELISA. This program works through dilutions, basic science math and also help troubleshoot common mistakes made when performing ELISAs. In this stepwise ELISA demonstration, the participants will be able to understand the principle of ELISAs, and to understand reasons for false-positive and false-negative results. The lab is accompanied by an optional worksheet, and from start to finish looking for autoantibodies in Systemic lupus erythematosus (SLE).

CELLULAR AND MOLECULAR
Mississippi INBRE Microbiome Symposium
1:00 PM -3:00 PM
Room: D4
Mississippi INBRE Microbiome Symposium

Organizer: Dr. Shahid Karim,
The University of Southern Mississippi
(Shahid.Karim@usm.edu)

1:00-1:05: **Welcome remarks**

1:05-1:35 PM:

How shipwrecks shape the microbiomes of the deep-sea (and why it matters)
Dr. Leila Hamdan,
School of Ocean Science and Engineering
The University of Southern Mississippi, Ocean Spring, MS 39564

1:35-1:55 PM:

An insight into the microbiome of the gulf-coast tick (*Amblyomma maculatum*)- PART 2

Abdulsalam Adegoke
School of Biological, Environmental, and Earth Sciences,
The University of Southern Mississippi, Hattiesburg, MS-39406

1:55-2:15 PM:

Exploring the microbiome of neo-tropical ticks hitchhiking on migratory birds en route to the United States of America

Raima Sen
School of Biological, Environmental, and Earth Sciences,
The University of Southern Mississippi, Hattiesburg, MS-39406

2:15-2:30 PM:

Understanding the interplay between the tick microbiome and Alpha-Gal Syndrome

Surendra Sharma
School of Biological, Environmental, and Earth Sciences,
The University of Southern Mississippi, Hattiesburg, MS-39406

2:30-2:55 PM:

Drought stress and root-associated microbiome

Dr. Dmitri Mavrodi
School of Biological, Environmental, and Earth Sciences,
The University of Southern Mississippi, Hattiesburg, MS-39406

2:55-3:00 PM:

Concluding remarks

HEALTH SCIENCES
1:00-PM-3:00 PM
Room: D11

Symposium I

Disease and Pandemics

Moderators: Dr. D.O. McDaniel and Dr. Frank Spradeley

Dr. Thomas Dobbs
State Health Officer
MS State Department of Health

Title: "Updates on COVID-19 Pandemic in Mississippi vs. USA and Beyond"

Dr. Dobbs will discuss COVID-19 Pandemic and the New Variants in Mississippi and Elsewhere. Dr. Dobbs was appointed Mississippi's State Health Officer in 2018.

Dr. Dobbs is a board certified Infectious Diseases and Internal Medicine physician with 20 years of extensive training in public health and epidemiology, with specific expertise in TB and HIV. Dr. Dobbs joined the MSDH as the Deputy State Health Officer after two years working in Laurel as a practicing physician but also as Vice President for Quality and Chief Medical Officer of South Central Regional Medical Center. Prior to this he served four years as a District Health Officer in southern Mississippi and then four years as the State Epidemiologist with MSDH. He also has an appointment at the John D. Bower School of Population Health at UMMC, teaching courses in Epidemiology.

Dr. Dobbs graduated from Emory University and received his MD degree and his MPH degree in Public Health at the University of Alabama at Birmingham. He has been active in public health research and advocacy, working globally through the Gorgas Tuberculosis Initiative in

Russia and Cambodia, and in the U.S. through appointments at UMMC and the University of Florida (as regional clinical consultant with the Southeastern National TB Center).

Thomas Dobbs is internationally known with respect to science and health disparities particularly in the area of Infectious Diseases such as TB and HIV infections. As a public health leader, he has demonstrated advocacy plans for implementation and promoting a better health system particularly for minority population in the state of Mississippi. A Colleague describes: "while Dobbs was a district health officer, a man who had tested positive for tuberculosis went missing. The health department wanted to find the man before he spread the contagious disease. The man was spotted at Walmart. Dobbs went to pick up the man got him something to eat, checked him into a motel and counseled him about his illness".

His research activities have particularly been devoted to studies involving minority patient population who represent a very significant portion of the State's Population with transmittable diseases, such as Tuberculosis, Leprosy, Human Immunodeficiency Virus infection, and, more recently, the coronavirus disease 2019 (COVID-19) outbreak.

Dobbs' Colleagues say: "He always practices what he preaches". He meets weekly with the Mississippi State Medical Association Board and participates in many briefings and conferences. He visits nursing homes and in counties experiencing the COVID-19 pandemic. He worked with hospitals to ensure they are fully operational with beds and ventilators for the patients. Dr. Dobbs continues planning a robust population testing and vaccination in communities with severe outbreaks.

As the state health officer, he has had a major role in all aspects of health care in Mississippi during the pandemic. He has spent long hours working with the governor and others throughout the state to bring health equity to all of the state. He has given countless interviews to update Mississippians on the state's status and efforts against COVID-19 for almost the last year and a half. He has provided clear insight and relied on facts and peer-reviewed medical studies to help guide efforts in the state to protect those at highest risk. This includes advocating for African-Americans, citizens of the delta, and the elderly throughout the state. He focuses on advancing the health knowledge and understanding of all Mississippians. He leads by example and through teamwork, working with nurses, local, and state officials. He has been on the front line of testing and the rollout of the coronavirus vaccine. He refuses to be pulled into the political fray around masks and the vaccine. An important milestone for the state was when there was parity between the percent of African-Americans in the state and the percent of African-Americans that had received the vaccine. This was in large part through the efforts of Dr. Dobbs working for all individuals in the state, different races, ethnicities, and ages, and people with disabilities as well. As for the Mississippi Academy of Sciences, Dr. Dobbs, unconditionally, accepted invitations to speak at the health disparities symposium since 2016. He is an effective communicator particularly promoting excellence in disease awareness and advancement in science and education. His mastery of science and science education has clearly demonstrated that Dr. Thomas Dobbs is an asset in the pursuit of a healthier Mississippi.

1:35-1:55 PM

Dr. John Bates
Microbiology and Immunology
University of Mississippi Medical Center

Title: "COVID Convalescent Plasma: Why Time Matters?"

Dr. Bates will discuss therapeutic values of convalescent plasma with high antibody levels to treat patients. Dr. Bates, currently is Assistant Professor in the department of Microbiology and Immunology at the School of Medicine. In addition, he is Scientific Director of Human Immunology and inflammation Biomarker Core Laboratory. He received his PhD, in Immunology, from University of Alabama at Birmingham, Birmingham, AL. Then he completed two post-doctoral fellowships first in Wake Forest University School of Medicine, Winston-Salem, NC, 2nd in Vanderbilt University School of Medicine, Nashville, TN, both in immunology. However, he gained experience studying immune responses to respiratory viruses and in depth, exposure to the concept and science of reverse vaccinology, i.e. the design of vaccines based on identification of neutralizing epitopes. Dr. Bates sought training for a career as a "Vaccinologist" and he obtained considerable experience studying adjuvant mechanisms and measuring innate and adaptive immune responses to immunization.

In 2015 Dr. Bates joined the faculty at the University of Mississippi Medical Center and started his independent research program. Currently, his laboratory is heavily involved in analyzing SARS-CoV-2-specific antibody responses in humans. He routinely analyzes patient and employee samples for antibodies specific for SARS-CoV-2 spike, RBD, and nucleocapsid protein, as well as antibodies specific for other circulating coronaviruses. In 2020, Dr. Bates was awarded "the UMMC COVID Research Hero". The Award was for his timely efforts in supporting the institution.

Dr. Bates has been member of several scientific societies including, American Society for Microbiology; International Society for Vaccines; American Association of Immunologists. The NIH-study section and Ad hoc Reviewer are among his other professional memberships.

2:05-2:10 Break

2:10-2:30 PM

Dr. John Neiswinger
Biology Department
Belhaven University

Title: "Asymptomatic COVID-19 Screening and Contact Tracing on an Undergraduate Campus"

Dr. Neiswinger will discuss on-site COVID screening and tracing in a college community setting using saliva and a high-throughput qRT-PCR protocol.

Dr. Neiswinger is an Associate Professor of Biology at Belhaven University. He received a BS in Chemistry from Geneva College and a PhD in Pharmacology from the Johns Hopkins School of Medicine where he performed high-throughput studies on kinases and glycosyltransferases. He was an IRTA postdoctoral fellow in the Laboratory of Cardiovascular Science at the NIH for two years before joining Belhaven's faculty in 2016. This past year, he was a member of a faculty team for Belhaven's on-site COVID screening facility, where he developed a high-throughput qRT-PCR screening protocol using saliva samples.

As a postdoctoral fellow he studied aortic tissue lysates from monkeys to identify substrates of the active enzymes within these tissues. Using protein microarrays. He identified tyrosine phosphorylated, SUMOylation, acetylated, and ubiquitylated substrates that are involved in various cellular processes. This was road to establish a connection between age, diet, and cholesterol levels with enzyme activity.

His doctoral work focused on using protein microarrays to identify novel interactions between kinases and their respective substrates and as substrates themselves. Dr. Neiswinger became Lab coordinator for COVID screening center on Belhaven Campus, screening 1,300 faculty, staff, and students every week.

Dr. Neiswinger has been involved through his studies and teaching with several scientific societies, including American Society for Pharmacology and Experimental Therapeutics; The National Institutes of Health; Loyola University Maryland; The Johns Hopkins School of Medicine; The University of Akron during his REU Internship studying elastic properties of virus films. When he is not in lab or teaching, Dr. Neiswinger loves to do woodworking, cook, and play piano.

2:35-2:55 PM

Dr. Ashley Robinson
Microbiology/Immunology
University of Mississippi Medical Center

Title: "The spread of Antibiotic-resistant Bacteria across Continents and People"

Dr. Robinson will discuss the role antibiotic-resistant bacteria plays in transmission of pathogens across the Globe. Dr. Robinson is Professor and Vice Chair in the Department of Microbiology and Immunology, and Associate Director for Microbial Genomics in the Molecular and Genomics Core Facility, at the University of Mississippi Medical Center.

Dr. Robinson's Ph.D. training was at the University of Alabama at Birmingham and focused on the population genetics of *Streptococcus pneumoniae*. His postdoctoral training was at the University of Bath (United Kingdom), where he studied the population biology and epidemiology of *Staphylococcus aureus*, and then at New York Medical College on the population genetics of *Streptococcus pyogenes*. Dr. Robinson's first faculty appointment was in 2005 at New York Medical College.

In 2009 he moved to the University of Mississippi Medical Center. He has been PI on research grants or contracts from the NIH, AHA, and CDC, and he has been sub-award PI on grants from various universities.

Dr. Robinson's research focuses on the genomics, epidemiology, and evolution of antibiotic-resistant bacteria, which has application to outbreak investigations, infectious disease surveillance and prevention, and diagnostics.

He has 73 peer-reviewed publications in scientific journals with >9,100 citations, plus 9 book chapters and reviews. Dr. Robinson was the lead editor of a 2010 book published by Wiley-Blackwell, "Bacterial Population Genetics in Infectious Disease" that synthesized knowledge about the natural history of major bacterial pathogens at the dawn of the next-generation sequencing era. Dr. Robinson is a team teacher in his Department's medical microbiology and advanced microbiology courses, and he is the course director for the UMMC interdisciplinary course on bioinformatics and genomics.

Dr. Robinson has been actively involved with several scientific societies/organizations including American Society of Microbiology; Infectious Disease Society; Bacterial Population Genetics; The NIH-study section and Ad hoc Reviewer, etc. Dr. Robinson received multiple Awards for Excellence in Research at UMMC and elsewhere.

MATHEMATICS, COMPUTER SCIENCE, STATISTICS
WORKSHOP
1:00 PM -2:30 PM
Room: D8

ILLUSTRATING SPECIFIC STATISTICAL TOOLS REQUIRED FOR DESIGNING RESEARCH STUDIES

Jamil Ibrahim
University of Mississippi Medical Center, Jackson, MS

Statistics is useful in almost all fields especially in research studies. Statisticians should be involved from the beginning of these studies. In research practice, the most common requests to statisticians from investigators are sample size calculations or sample size justifications. The techniques of statistical power, sample size estimations and confidence intervals are the most important aspects of a research study. Determining sample size is one of the most important steps in designing a study. In order to have reliable and valid results, it is important to determine the right sample in combination with high quality data collection efforts. Sometimes, researchers have different opinions as to how sample size should be calculated. Statisticians usually choose from many available formulas that can be applied for different types of data and study designs. The aim of this presentation is to clarify this issue and to provide examples on how to calculate sample size. The components of sample size calculations will be discussed and what factors to consider in choosing the sample size. Other concepts related to this issue such as power analysis, confidence intervals, variability, type I error, type II error, and minimum effect size of interest will also be discussed.

DIVISIONAL SYMPOSIA AND WORKSHOPS
Friday, August 6, 2021

AGRICULTURE
SYMPOSIA
8:30 AM -10:30 AM
Room: D2

DEVELOPING IN-CULTURE METHODS USING COLOR CHANGE FOR DETECTION OF TOXINS FROM PATHOGENIC FUNGI

Organized by

Hamed K. Abbas, Vivek H. Khambhati, Sahib Alam, Michael Sulyok, Nacer Bellaloui, and W. Thomas Shier

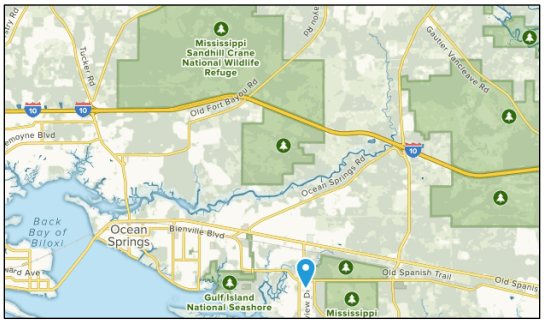
ECOLOGY AND EVOLUTIONARY BIOLOGY
Field Trip
10:30-1:00
Please sign up at the registration desk (limited space)

FIELD TRIP TO THE SANDHILL CRANE NATIONAL WILDLIFE REFUGE

***Organizers*: Dr. AHM Ali Reza** and **Dr. Nina Baghai-Riding**, Delta State University
In collaboration with: **Angela Dedrickson**, Wildlife Biologist, Mississippi Sandhill Crane National Wildlife Refuge, US Fish and Wildlife Service

Mississippi Sandhill Crane National Wildlife Refuge

The Mississippi Sandhill Crane National Wildlife Refuge is located in Jackson County in extreme southeast Mississippi, less than 10 miles from the Gulf Coast. It is part of the Gulf Coast Refuge Complex which includes Grand Bay and Bon Secour National Wildlife Refuges located on the coasts of Mississippi and Alabama. The refuge is managed and run by the US Fish and Wildlife Service. The crane population, at that time only 30-35 birds, is currently at approximately 110 birds. Through captive rearing and reintroduction to the area as well as wild birds nesting in the savannas, the crane population continues to grow.



The Mississippi Sandhill Crane National Wildlife Refuge was established in 1975 to protect and preserve the Mississippi sandhill crane and its critical wet pine savanna habitat. The refuge consists of approximately 19,300 acres in three main units that include savanna, coastal prairie, cypress swamp strands, pine flatwoods, and brackish marsh. The refuge is the only home of this endangered non-migratory subspecies of sandhill crane and provides valuable habitat for the endangered dusky gopher frog and several declining grassland birds like the Henslow's sparrow, yellow rail, sedge wren, and numerous species of unique and rare plants.

The Field Trip

The field trip to the Sandhill Crane National Wildlife Refuge will involve a drive and walk through wet pine savannah, a mixed hardwood seepage area, and a tour of the refuge visitor center at the refuge headquarters.

- A sign up sheet to participate in the field trip will be provided on Thursday morning.
- We will have early lunch at the site. Please bring your own packet lunch with you. There is no restaurant or food place at the refuge.
- Free transportation will be provided by the organizers.
- We recommend all participants to have comfortable walking shoes and a bottle of drinking water.

HEALTH SCIENCES
Symposium II
10:00-11:30AM
Room D11
Theme: "Precision Medicine"

10:00-10:20 AM

Edward Florez, Eng, M.SC., PhD,
University of Mississippi Medical Center

Title: "Precision Medicine through radiomics"

Dr. Florez will discuss CT-based radiomic features predict metastatic renal cell carcinoma response to therapy. Dr. Florez, is currently a Postdoctoral Research Fellow at the Department of Radiology – University of Mississippi Medical Center, Jackson, Mississippi. Dr. Florez has an engineering degree from the Pontifical Catholic University of Peru, a specialization in Project Management from the Peruvian University of Applied Sciences, Peru, and a M.Sc. degree and a Ph.D. degree (Biomedical Engineering) from the University of Sao Paulo, Brazil. He serves as the Co-Vice Chair for the Mississippi Academy of Science, Health Science Division for the period 2020 – 2022.

Dr. Florez has authored/co-authored over 125 peer-review publications and abstracts. His research is focused on the characterization of lesions through different medical image modalities (MRE, MRI, CT, PET, PET/CT, fMRI, and so on) using radiomics and several artificial intelligence approaches. Indeed, he developed some medical tools as segmentation algorithms, filters, algorithms to quantify the metabolism, among others.

He has received numerous awards in recognition of his research, including the 2021 Trainee Research Award and Clinical Science Young Investigator Award from The Southern Society for Clinical Investigation and The Southern Society for Pediatric Research, respectively. Dr. Florez has mentored many students in different categories, including high school students, undergraduate and graduate students and radiologist residents. He has presented his research at numerous regional, national, and international conferences.

10:25-10:45 AM

Candace M. Howard-Claudio, MD, PhD.
University of Mississippi Medical Center

Title: "Precision Medicine through gene therapy?"

Dr. Howard will discuss tumor suppressor genes, cancer cell-cycles and image guided gene therapy. She is an Associate Professor in Radiology, Cardiac and Body Imaging Divisions, at the University of Mississippi Medical Center (UMMC). In addition, she is Vice-Chair and Director of Radiology Research, a member of the Cancer Institute Research Advisory Committee, and Medical Executive Committee, among other departmental and institutional committees in the School of Medicine at UMMC.

Dr. Howard completed her M.D. and Ph.D. in molecular genetics at Thomas Jefferson University (TJU) in 2000 where she was awarded the William J. Bodine, Jr. Research Award, for an outstanding contribution to cancer research. Dr. Howard completed her residency in diagnostic radiology at Thomas Jefferson University Hospital in 2005 where her research efforts continued to be recognized by the prestigious RSNA Roentgen Resident/Fellow Research Award, along with industry sponsored educational/research grants that allowed her to initiate her studies in image guided gene therapy that has been awarded a patent. At the end of her residency Dr. Howard was the first female to win the prestigious ISMRM/GE Healthcare MRI Resident Reporter Program, General Electric Healthcare Grant Award that allowed her to complete a tailored Body and MSK MRI fellowship at TJU with additional training in cardiac imaging at John's Hopkins University & UCSF.

She is Certified in Breast Imaging with Tomosynthesis, Diagnostic Radiology, Cardiac & Peripheral Vascular MRI, Neuroradiology, CT Colonoscopy, etc. Dr. Howard has published over 50 peer-reviewed manuscripts, book chapters, and editorials in leading journals for the field of diagnostic radiology, cell cycle, cancer biology, and gene therapy.

Dr. Howard provides leadership and has overall responsibility for the diagnostic services of the Medical Center as well as the teaching and research program.

10:50-11:10 AM

Pier Paolo Claudio, MD, PhD.

University of Mississippi Medical Center

Title: "Precision Medicine through stem cells"

Dr. Pier Paolo Claudio will discuss Cancer Stem Cell Chemotherapeutics and chemo-predictive assays for targeting cancer stem cells. He is Professor in the Department of BioMolecular Sciences, University of Mississippi, Jackson, MS and Research Professor at the National Center for Natural Products Research, University of Mississippi, Oxford, MS. In addition, he holds appointments as Adjunct Professor at the Departments of Radiation Oncology and Maxillofacial Surgery at the University of Mississippi Medical Center. Currently, he is the director of the STEM cell Core facility at UMMC. He holds numerous scientific appointments at USA and elsewhere including Instituto Superiore di Sanita', Rome, Italy (National Health Institute, Rome, Italy), Member Peer Review Committee Stem Cells Study Section.

Dr. Claudio received his MD, in Medicine and Surgery, and his PhD, in Maxillofacial Sciences, from University of Naples Federico II, Italy. He completed his postdoctoral fellowship at Thomas Jefferson University, Philadelphia, PA. His research is focused on regenerative cell therapy, cancer stem cells, drug discovery for cancer, and image-guided viral gene therapy. He has been awarded numerous international patents for multiple diagnostic, therapeutic, and theranostic methods. His research has been supported by several industry sponsored, university- and NIH-funded grants.

For complete list of Dr. Claudio's bibliography and published work go to:

https://www.ncbi.nlm.nih.gov/sites/myncbi/pier%20paolo.claudio.1/bibliography/47457978/public/?sort=date&direction=ascending

HEALTH SCIENCES
Symposium III
Room D9
The L.C. Dorsey Research Honor Society

1:30-4:00 PM

Dr. Lula C. Dorsey, (Dec. 17, 1938 – Aug. 21, 2013)

Dr. Dorsey was born in Tribbett, a small town in the Mississippi Delta. She was Civil rights and social justice activist.

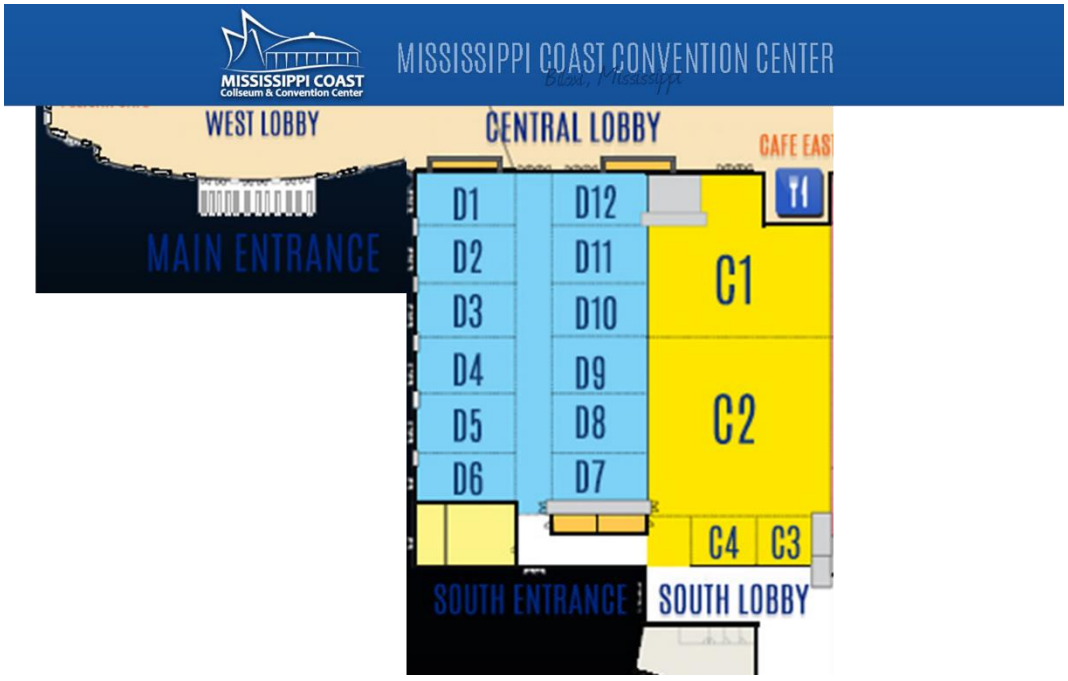
The society is named after her. She was known for her commitment to improving the health and well-being of Mississippi's disadvantaged and disenfranchised populations. Being raised in the turbulent civil rights era, she dropped out of school in the 11th grade to keep her family safe, and with the help of Fannie Lou Hamer, she became an advocate for black delta residents and community involvement.

She returned to school when she was 31 years old and obtained her GED, a doctorate degree in social work from Howard University, a master's degree in social work from State University of New York, and a Certificate in Health Systems Management from John Hopkins University. She was one of the first Mississippians to obtain a master's degree in her field.

The L.C. Dorsey Research Honor Society is a regional, multidisciplinary network of social, behavioral, health, and citizen scientists created to recognize excellence in research contributing to the effort to improve health among vulnerable populations.

The society have contributed to the production of exceptional minority health disparities and education research. This honor society is comprised of graduate students, faculty and citizen scientist, who honor the life and legacy of Dr. L.C. Dorsey through a pursuit of research excellent, a focus on marginalized population and a willingness to invest in the next generation.

Mississippi Coast Coliseum and Convention Center Floor Plan



NOTES

Key to Abbreviations

O = Oral Presentation
P = Poster Presentation
1st number is Division

1	**Agriculture and Plant Science**
2	**Cellular, Molecular, and Developmental Biology**
3	**Chemistry and Chemical Engineering**
4	**Ecology and Evolutionary Biology**
5	**Geology and Geography**
6	**Health Sciences**
7	**History and Philosophy of Science**
8	**Marine and Atmospheric Sciences**
9	**Mathematics, Computer Science, and Statistics**
10	**Physics and Engineering**
11	**Psychology and Social Sciences**
12	**Science Education**
13	**Zoology and Entomology**

2nd number is Abstract Number within oral presentations or poster session
Eg., O3.04 = oral presentation (O) number 4 in the division of Chemistry and Chemical Engineering (3)

AGRICULTURE AND PLANT SCIENCES

Chair: Yan Meng

Alcorn State University

Vice-Chair: Kaur Gurpreet

Mississippi State University

Thursday, August 5, 2021

MORNING

Room D2

8:00 Opening remarks

O1.01

8:15 CONSEQUENCES OF ELEVATED CARBON DIOXIDE ON SOIL INORGANIC CARBON, CATION DEPLETION, AND ACIDIFICATION: A CASE STUDY WITH MISSISSIPPIAN SOILS

Jannatul Ferdush, Varun Paul, Jac Varco, Andrew Dygert, Keri Jones

Mississippi State University, Mississippi State, MS, USA

The elevated atmospheric CO_2 concentration rapidly affects soil inorganic carbon (SIC) flux, with acidification being a major concern for soil and crop sustainability. Impacts of such elevated CO_2 on SIC at different depths were investigated through column-leachate experiments using six different soil series of Mississippi. Six different soil samples representing acidic, neutral, and alkaline were selected and tested with varying CO_2 treatments (100%, 10%, 1%, and control). A significant cation release was observed after 30 days in all soil CO_2 enrichment experiments. The availability of essential exchangeable cations (Ca, Mg, Na, K) were higher initially than days 30 in the leachate solution, while trace elements like Mn, Al, and Fe increased with time under soil CO_2 enrichment. The cation exchange capacity (CEC) increased with time under soil acidification, while pH and SIC declined in all soils, especially in alkaline soils at 100% CO_2. The CO_2 enrichment has a minimal role in SIC content at neutral and acidic soils over the short term. The diminishing concentration of exchangeable cations in soil leachates suggests a deficiency of minerals at long-term acidification but nutrient availability in the short term. Additionally, the high soil CEC and low SIC content offer significant SIC leaching at shorter-term and potential future SIC sink at deposition site. This study will be beneficial to understand the effects of elevated atmospheric CO_2 on soil pH, particularly how these could affect acidification, CEC, and SIC in a changing environment, and provide suggestions for sustainable land management practices in stressed conditions.

O1.02

8:30 PHYTOREMEDIATION OF URANIUM SPECIES IN SOIL BY USING *Nerium oleander*

Naira Ibrahim, Fenxiang Han; Ahmet Celik

Jackson State University, Jackson, MS, USA

Uranium is a radionuclide with a long-term radio decay half time. The mining and processing of U are causing a large area polluted with U source. Therefore, the remediation technologies of U is essential to clean up U contaminated soils. Phytoremediation and Electrokinetic (EK) Coupled with Phytoremediation are one of these technologies by using some plants with the capability to accumulate radionuclides inside their parts. Our work is to evaluate a) Effects of *Nerium oleander* plants in remediating different forms of U in soil; b) Determination of Uranium forms either in soil or in the parts of plants (Leaves, stem, roots). c) To compare efficiency of U removal by Phytoremediation alone or EK coupled with phytoremediation. Soil sample was taken from US Army Yuma Proven Ground. Soil was supplied with base NPK fertilizer. Four different U species (UO_2, UO_3, Uranyl Acetate and Shoepit) were spiked in the soil with two concentration (100 and 1000 ppm. Each pot contained 1 kg of the prepared soil. Moreover, the seedling plants will be transferred into the pots. Plants grow for two months and two graphite electrodes will use for electrokinetic treatments. In addition, an XPS spectroscopy images will be taken in soil, leaves, stems and roots. Total Pseudo and fractionation U will be determined in soil. U subcellular distribution and chemical form in plants will be studied as well. As it was observed, that *Nerium oleander* is able to accumulate heavy metals as (Pb, Cd and Zn) from soils. We expected that *Nerium oleander* might have a capability to clean up U contaminated soil through Phytoremediation Coupled with phytoremediation.

O1.03

8:45 AGROBACTERIUM-MEDIATED TRANSFORMATION OF SWEET POTATO FOR IMPROVED RESISTANCE TO VIRUSES

Tymesha Nabors and Yan Meng

Department of Agriculture, Alcorn State University, Lorman, MS, USA

The sweet potato (*Ipomoea batatas* L.), a member of Convolvulaceae family, is the seventh most significant food crop in the world. As one of the top three vegetable crops grown in Mississippi, one major limitation to sweet potato production is the cumulative effect of virus infection leading to cultivar decline and yield losses. Two of the main viruses that cause devastating diseases and yield reductions in Mississippi are the *Sweet potato leaf curl virus* (SPLCV) and the *Sweet potato virus C* (SPVC). In this study, a novel biotechnological approach has been utilized to address the viral disease problem. The SPLCV and SPVC dual genetic segment was introduced into a binary vector for expression to induce gene silencing in transgenic sweet potato. Expression of transgenes has been achieved by using *Agrobacterium*-mediated transformation. Plants induced from transformed leaf and petiole cells showed positive signs of transgene expression by PCR. In this research, we target on the optimization of plant transformation and regeneration protocols for the production of value-added sweet potato lines by using popular production lines. The protocols for investigation on transgenic plants' resistance to SPLCV and SPVC have been developed and the testing results will be discussed. With improved tolerance to virus infection, the potential of sweet potato as a food security crop will increase.

O1.04

9:00 EFFECTS OF PROHEXADIONE CALCIUM APPLICATION TIMING ON PEANUT (*Arachis Hypogaea L.*) GROWTH AND YIELD IN MISSISSIPPI

Anna Gaudin, Connor Ferguson, Brendan Zurweller

Mississippi State University, Mississippi State, MS, USA

Excessive vegetative growth in peanut (*Arachis hypogaea* L.) can lead to decreased reproductive growth and harvest efficiency. Peanut vegetative growth is often managed with the plant growth regulator, prohexadione calcium. Although application of prohexadione calcium is recommended at 50% and 100% canopy closure, research on the optimal application timing has been minimal. The objective of this research was to evaluate the effect of prohexadione calcium application timing based on percent canopy closure. Experiments occurred at three different on-farm sites across Mississippi. Treatments included applications at 50% and 100% (canopy closure), before 50% and after 100%, 2 applications in 1 week at 100%, before 50% and before 100%, and 3 applications in a week at 100%. A non-treated control was included in all experiments. On all sites, prohexadione calcium applications were made at the manufacture recommendation of 140 g ai ha^{-1}. Treatment responses were evaluated based on peanut yield, pod loss, and harvest indices including pod weight, pod count, and dry plant weight. Peanut yield across field sites was evaluated as a percent untreated control. Average yields by treatment ranged from 6535 to 7000 kg ha^{-1}. On average, control treatments had a lower yield than treatments containing prohexadione calcium. Two applications in 1 week at 100% had the most significant effect on yield with an average of 8.9% increase in yield when compared to control treatments. The lowest performing treatments were the before 50% and after 100% and the 3 applications in 1 week at 100% with an average of 1.4% and 0.9% increase in yield when compared to control treatments. Application timing had little effect on pod count and pod loss. The use of prohexadione calcium in the growing season at optimized timings increased peanut yield and decreased vegetative growth, improving harvest

efficiency and reduced harvest losses.

O1.05

9:15 MELLEIN PRODUCTION BY *Macrophomina phaseolina* ISOLATES AND ITS PHYTOTOXICITY IN SOYBEAN

Vivek H. Khambhati[1], Hamed K. Abbas[2], Michael Sulyok[3], Maria Tomaso-Peterson[1], Jian Chen[2], Perng-Kuang Chang[2], Alemu Mengistu[2], W. Thomas Shier[4]

[1]Mississippi State University, Mississippi State, MS, USA, [2]USDA-ARS, Stoneville, MS, USA, [3] University of Natural Resources and Life Sciences, Vienna (BOKU), Austria, [3]University of Minnesota, Minneapolis, MS, USA

The fungus *Macrophomina phaseolina* (*Mp*) infects >500 species including some economically important crops by a process using a toxin to produce necrotic areas on the root surface through which hyphae penetrate. *Mp* is known to produce potent phytotoxins, (-)-botryodiplodin and phaseolinone, as well as other secondary metabolites. Recently Khambhati et al. identified 12 unreported secondary metabolites produced by *Mp* cultures isolated from soybean, including mellein, a bioactive compound produced by numerous fungi, insects, and marine organisms. The aim of this study was to determine the frequency *Mp* cultures produce mellein, and to evaluate the phytotoxic effects on soybean seedlings. In a collection of 89 *Mp* cell-free culture filtrates analyzed by LC-MS/MS, 28.1% produced mellein (1.66–74.9 µg/L). The same culture filtrates were tested for root toxicity in soybean seedlings in hydroponic culture at 1:1 and 3:1 growth medium:filtrate ratios. Phytotoxicity was observed in all cultures (at 1:1 ratio: chlorosis, 61%; necrosis, 82%; wilting, 9%; death, 26%; at 3:1 ratio: chlorosis, 73%; necrosis, 78%; wilting, 7%; death, 16%). Mellein in hydroponic culture medium caused only symptoms of wilting and stunted growth in soybean seedlings with increasing severity from 40–100 µg/mL. This suggests that mellein alone does not account for the potent phytotoxic effects of *Mp* culture filtrates, and further investigation is required to determine its role in *Mp* pathogenesis.

O1.06

9:30 DOSE RESPONSE STUDY OF COTTON CHROMOSOME SUBSTITUTION LINES TO 2,4-D

Josiane Argenta[1], Willian Matte[1], Sukumar Saha[2]

[1]Department of Biochemistry, Molecular Biology, Entomology, and Plant Pathology, Mississippi State University, Mississippi State, MS, USA and [2]USDA-ARS, Crop Science Research Lab, Genetics and Sustainable Agriculture Research Unit, Mississippi State, MS, USA

The development of 2,4-D resistant crop cultivars will potentially have a significant influence on weed management. However, the off-site movement of this chemical to adjacent non-target crops and other plants is a concern in many areas worldwide, especially where sensitive crops are grown. To overcome this problem, the introduction of herbicide-tolerant cotton chromosomal substitution lines (CS lines) into the cropping systems can give the farmers the option to plant a cultivar tolerant to possible 2,4-D drifts that could damage the crop and reduce cotton yield. Thus, the objective of this research was to identify the tolerance level of cotton chromosomal substitution lines to 2,4-D through a dose-response study conducted in the greenhouse. The experiment was laid in a completely randomized design with six different cotton chromosomal substitution lines/varieties. Five different rates of 2,4-D (0, 5, 25, 50, and 75% of the recommended dose of 1,120 g a.i. ha-1) were applied using an automated spray chamber equipped with TP8002VS Even flat spray nozzle, calibrated to provide 20 gallons acre-1 at 40 psi, when plants were at 2-3 leaf stage. Plant injury was visually recorded at 28 days after treatment (DAT) on a scale ranging from 0 to 100, where 0% means no herbicide injury and 100% plant death. The results showed that at the lowest rate of 2,4-D (5% of the recommended dose), the CS-B04 line presented significantly lower injury when than other CS lines and susceptible cultivar UA48 ($P < 0.05$). No difference was observed among the CS lines when the herbicide rate was equal to or greater than 25%. This study indicates that the CS-B04 line is potentially tolerant to the drift rate of 2,4-D, and it can be used as a genetic resource in developing cotton that is tolerant to 2,4-D drift.

O1.07

9:45 USING COTTON SUBSTITUTION LINES TO SUPPRESS WEED GROWTH

Worlanyo Segbefia[1], Mary Gracen Fuller[1], Te-Ming Tseng[1], Sukumar Saha[2]

[1]Department of Biochemistry, Molecular Biology, Entomology, and Plant Pathology, Mississippi State University, Mississippi State, MS, USA and [2]USDA-ARS, Crop Science Research Lab, Genetics and Sustainable Agriculture Research Unit, Mississippi State, MS, USA

Weed interference is a major threat to cotton production. In Mississippi, Palmer amaranth (*Amaranthus palmeri*) is the most common and troublesome cottonweed. There is the need to supplement chemical weed control strategies, using a biological means. Allelopathy, an ancient and a promising biological weed control mechanism, uses secondary metabolites from plants, algae, fungi and bacteria to inhibit the growth and development of plants nearby. Allelopathic chemicals have been used to defend crop plants against, diseases, insects and nematodes. This research seeks to identify chromosome substitution lines with weed-suppressive traits or characteristics. The experiment was carried out at MSU greenhouse using a stair step structure. This project uses backcrossed chromosome substitution (CS) lines developed with a homologous pair of chromosome or chromosome arm of *G. barbadense* (CS-B), *G.tomentosum* (CS-T),and *G.mustellinum* (CS-M), substituted for homologous pair of *G. hirsutum* (TM-1) chromosome or chromosome arm, to screen for weed-suppressive ability. There were two replications using Randomized Complete Block method, with eight CS lines. Four CS lines inhibited the growth of Palmer amaranth by reducing its height and root length by 60 and 40%, respectively. Height reduction was highest for BNTN 16-15 and lowest for Enlist. Chlorophyll reduction was highest for BNTN 16-15, with a mean value of 65, and lowest for Enlist, with a mean value of 2. This study will be helpful in improving the genetic diversity of upland cotton the development of bio-herbicides.

10:00 Break

O1.08

10:15 ADAPTATION OF JOHNSON GRASS MOSAIC VIRUS INFECTION CDNA CLONE FOR AGROINFILTRATION INOCULATION

Myshawn Smith, Yan Meng, Victor Njiti, Chunquan Zhang

Department of Agriculture, Alcorn State University, Lorman, MS, USA

Johnson grass mosaic virus (JGMV) is a plant pathogenic virus in the genus *potyvirus* of the family *Potyviridae*. JGMV is an obligate parasite and cannot survive outside of either its host or vector. This virus occurs in every country in the world where corn is grown with the main exception of Australia. JGMV has many strains that are isolated from different hosts. Here we identified a Johnson grass isolate from Lorman, Mississippi, USA. Throughout the timeframe of this research, a series of biotechnology methods were applied to molecularly characterize this JGMV isolate from Mississippi.

Leaf sap was prepared from the infected johnsongrass and inoculated onto sweetcorn. Three weeks post inoculation, symptomatic leaves of sweet corn was harvested and grounded in liquid nitrogen for total RNA extraction. Reverse transcription was done using Oligo(dT) as reverse transcription primer. Series of pairs of primers were used to amplify the cDNA products. The PCR products were sequenced and used to synthesize primers for full length genomic cDNA cloning into SMV-NVEC vector previously published. Upon biolistic inoculation, a combination of three constructs JGMV-F606, F607 and F608, together can produce mosaic symptoms on sweet corn and the infection was confirmed by RT-PCR. All three clones were fully sequenced for modification into binary vector pCambia-0380 for agro-infiltration based infection. Currently, it is being done for agro-infection screening of the new binary clones. These JGMV high infectivity clones can then be developed as plant virus-based transient gene expression and silencing platform for corn functional genomics.

O1.09

10:30 GROWING AGARICUS SUBRUFESCENS (ALMOND MUSHROOM) ON COMPOST COMBINED WITH HARDWOOD WOOD CHIPS

Derryin Stampley, Frank Mrema, Franklin Chukwuma, Leonard Kibet

Alcorn State University, Lorman, MS, USA

Agaricus subrufescens is an edible mushroom with medicinal properties such as anti-cancer, anti-microbial, immunomodulatory properties rich in bioactive compounds, especially glucans. Despite the health benefits, *A. subrufescens* is seldom cultivated or consumed by many Mississippians. The purpose of this study was to evaluate indoor cultivation of *A. subrefescens* grown on the compost combined with hardwood wood chips (COWO2:1) substrates (2:1 by wt.); amended with two supplements; wheat bran and rice bran (8%). Two types of casing layers (A and B) as substrate skin for *A. subrufescens*) tested. Casing A was Memphis Silt Loam Soil (Sand = 21; Clay 24%; and Silt 55%). Casing B was peat moss buffered by 0.8% hydrated lime. The data was collected on mycelial growth on Malt extract agar (MEA) at different temperatures (16 ℃, 22 ℃, and 28 ℃). The results showed that mycelial growth at 28 ℃ on day 16 was 46% higher than at 22 ℃, suggesting that *A. subrufescens* flourished well at a higher temperature. While COWO2:1, substrate spawn amended with wheat bran colonized the wood chips well, the rice bran amended spawn did not grow well. COWO2:1 substrate amended with rice bran showed poor performance. Casing layer B performed well by producing healthy fruiting bodies, while all pinnings in casing A aborted, and no fruiting body. This study suggests that COWO2:1 spawn amended with wheat bran and peat moss casing as the best substrate for growing *A.subrufescens* mushrooms. More studies will be conducted indoors and outdoors this summer.

O1.10

10:45 EVALUATING SPRING BURNDOWN PROGRAMS TO MAXIMIZE ITALIAN RYEGRASS (LOLIUM PERENNE SSP. MULTIFLORUM) CONTROL IN MISSISSIPPI CORN

John Hughes

Mississippi State University, Mississippi State, MS, USA

Italian ryegrass (*Lolium perenne* L. ssp. *multiflorum* (Lam.)) is a major weed problem for Mississippi corn growers, often resulting in reduced yields. Previous research over three years showed that application of a preemergence herbicide in the fall followed by a postemergence herbicide in the early spring resulted in maximum ryegrass control and corn yield. Recent fall seasons had above average rainfall, preventing fall preemergence herbicide applications. Finding spring burndown programs for Italian ryegrass would give growers increased flexibility to control this problematic weed species in corn regardless of the weather prior to planting. The two main objectives for this study were to identify an effective spring burndown program to control Italian ryegrass prior to corn planting, and to assess burndown program costs and benefits through a return on investment (ROI) analysis. Field studies were conducted at two locations in Mississippi from 2019-2020 at the R.R. Foil Plant Science Research Center in Starkville and the Coastal Plain Experiment Station in Newton. Experimental plots were drill-seeded with Italian ryegrass at 112 kg ha^{-1} in the fall of 2019. In the spring, herbicide treatments were applied 28 days prior to corn planting, a timing found to prevent yield loss of corn from previous studies. Treatments included a nontreated control, a weed-free control, the standard fall preemergence application and fourteen other spring burndown programs arranged in a randomized complete block design with four replications. The standard fall preemergence treatment was *S*-metolachlor plus metribuzin (Boundary 6.5 EC) at 2.28 kg ai ha^{-1} followed by an application of paraquat (Gramoxone SL 2.0) at 1,121 g ai ha^{-1} in the spring. Results showed that the fall preemergence followed by a spring application of paraquat provided 99% ryegrass control, a grower ROI of $313.88, and the highest yield at 10,927 kg ha^{-1}. The highest performing program contained clethodim (Select Max) at 136 g ai ha^{-1}, paraquat at 1,121.4 g ai ha^{-1}, dimethenamid-P (Outlook) at 1,103.9 g ai ha^{-1}, and COC at $277.70 resulting in 96.5% ryegrass control, and a yield of 10,801 kg ha^{-1}. Five burndown treatments showed statistically similar yields compared to the fall preemergence application. The study is underway for 2021, with the addition of a third site, the Black Belt Experiment Station in Brooksville, MS. Plots at all three sites were drilled with 112 kg ha^{-1} Italian ryegrass in the fall of 2020, and spring burndown programs will be applied compared to the fall preemergence program in February 2021. Burndown treatments were fine-tuned based on data from 2020, to further improve viability of spring burndown programs to allow growers maximum flexibility for controlling this yield reducing weed, while optimizing grower return on investment. Increasing the number of sites and optimizing herbicide programs is essential to reducing the effect this competitive weed has on corn growth and yield.

O1.11

11:00 ROOTING RESPONSE OF MOUNTAIN AZALEA USING AUXIN BASAL QUICK DIP ON NEW GROWTH

Jenny B. Ryals, Patricia R. Knight, Christine E. H. Coker, Gary R. Bachman, Jim M. DelPrince, Patricia R. Drackett, Scott Langlois, David Brand, Anthony T. Bowden

Mississippi State University, Mississippi State, MS, USA

Mountain azalea (Rhododendron canescens) is a deciduous azalea native to the southeastern United States as well as areas in Maryland and Pennsylvania. To provide growers with relevant cutting propagation recommendations, the objective of this research was to determine rooting response of new growth, single node cuttings to an auxin basal quick dip. Auxin source was Hortus IBA Water Soluble Salts™ (Hortus IBA) at 0, 50, 250, or 400 ppm IBA. Auxin was applied using the basal quick dip method. Results indicate that single node, Mountain azalea cuttings will root with or without the use of an auxin basal quick dip.

O1.12

11:15 DEVELOPING FUNCTIONAL RELATIONSHIPS BETWEEN BRASSICA SPECIES GROWTH RESPONSES TO ULTRAVIOLET-B RADIATION

Charles Hunt Walne[1], K. Raja Reddy[1], Akanksha Sehgal[1], T. Casey Barickman[1], Wei Gao[2]

[1]Department of Plant and Soil Sciences, Mississippi State University, Mississippi State, MS, USA and [2]USDA UV-B Monitoring and Research Program, Natural Resource Ecology Laboratory, Department of Ecosystem Science and Sustainability, Colorado State University, Fort Collins, CO, USA

Current and projected ultraviolet-B radiation levels impact the yield and quality of horticultural production and crops grown between 40°N and 40°S are already experiencing varying UV-B doses between 2-11 kJ m^{-2} per day depending on location and season. To date, quantitative relationships between Brassica species growth and development as a function of UV-B radiation are not available under natural solar radiation conditions. An experiment was conducted with two Brassica species: B. oleracea L. var. Acephala Winterbor F1 (Hybrid Kale) and B. juncea var. Green wave OG (Mustard Greens). Plants were grown under optimal temperature, nutrient, and soil moisture conditions. Four levels of UV-B radiation (0, 5, 10, and 15 kJ m^{-2} d^{-1}) were imposed from 12-40 days after sowing (DAS). Root and shoot growth, including harvestable fresh biomass, were measured at harvest (40 DAS) along with multiple physiological parameters. Mustard showed higher growth values across all treatment levels, but the normalized response to UV-B radiation was similar for both species. Marketable fresh weight was 592 g $plant^{-1}$ for mustard and 246 g $plant^{-1}$ for kale under the 0 kJ m^{-2} d^{-1} treatment and decreased at a rate of 6% per 1 kJ m^{-2} d^{-1} increase in UV-B radiation. Our results suggest that both current and predicted future UV-B radiation levels adversely affect Brassica species growth and, ultimately, marketable yield. The functional algorithms derived from this study could develop crop simulation models and decision support for implementing management strategies.

Thursday, August 5, 2021

AFTERNOON

DIVISIONAL POSTER SESSION

1:00-3:00

Posters will be judged in the division and will also be presented in the General Poster Session

P1.01

EFFECTS OF HARVEST AIDS ON SEED COMPOSITION AND SEED DAMAGE IN SOYBEAN GROWN IN MISSISSIPPI

Nacer Bellaloui[1], James R Smith[1], Jeffery D Ray[1], Daniel K Fisher[1], Alemu Mengistu[2]
USDA-ARS, Stoneville, MS, USA and USDA-ARS, Jackson, TN, USA

Paraquat is a common harvest aid used in the Midsouth USA to defoliate green tissues to achieve uniformly dry plants at harvest to improve harvest efficiency, increase yield, reduce elevator discounts and increase net returns. However, its application can cause significant crop damage if applied too early such as at the R5 or early R6 growth stages. Although several studies have been conducted on the effects of harvest aid application on yield, there is very limited information available on the effects of harvest aid on seed composition, mineral nutrition, and seed damage in soybean. Therefore, the objective of the current research was to investigate the effects of application timing of harvest aids on soybean seed protein, oil, fatty acids, and seed damage. A field experiment was conducted in 2019 and 2020 in Stoneville, MS, USA. Paraquat (Gramoxone SL 2.0), as harvest-aid, was applied at the label rate (15 gallons/acre or 1 qt/acre) at R6, R6.5, R7 growth stages. A 1% of Fire Zone Methylated Seed Oil (MSO) was used for paraquat application. No paraquat was applied for the control. Two recent maturity IV commercial soybean cultivars were used (P46A57BX and P48A60X). The results showed that application of paraquat at R6 decreased yield and seed oil in 2019 and 2020. However, seed protein increased as oil and protein are inversely related. Also, the one-year results showed that the application of paraquat at R6 growth stage resulted in lower seed germination and higher seed damage. This research will provide producers with useful information on the effects of harvest-aid application management (time of application) and its impact on seed composition, seed damage, and potential dockage at the elevator. This information is critical to decisions made by producers in order to maintain yield and seed quality to avoid losses in profit margins.

P1.02

USDA UV-B MONITORING AND RESEARCH PROGRAM

Wei Gao

USDA UV-B Monitoring and Research Program, Natural Resource Ecology Laboratory, Department of Ecosystem Science and Sustainability, Colorado State University, Fort Collins, CO, USA

Solar Ultraviolet (UV) radiation reaching the Earth's surface has significant impacts on the environment including agriculture crops, rangeland grasses, and forests. Reductions in UV-absorbing stratospheric ozone resulting from climate change and the anthropogenic emission of ozone depleting substances raised concerns regarding future levels of surface UV radiation. Responding to this potential threat, the U.S. Department of Agriculture established the UV-B Monitoring and Research Program (UVMRP) in 1992. There are three primary goals in UVMRP: (1) to monitor surface-level solar UV and visible radiation across the U.S.; (2) to investigate the effects of UV and other environmental stressors on economically important crops through experiments; and (3) to provide science-informed decision support toward sustainable U.S. agriculture by developing the coupled Climate-Agroecosystem-UV Interactions and Economic impacts (CAIE) modelling framework. The UVMRP currently consists of 37 climatological monitoring sites, each is equipped with four primary irradiance instruments including: (1) UV MultiFilter Rotating Shadowband Radiometer (UV-MFRSR); (2) visible MFRSR; (3) UVB-1 broadband meter; (4) Photosynthetically Active Radiation (PAR) sensor. The irradiance measurements and the derived products are distributed through the UVMRP website. For effects research, the UVMRP and its collaborators in Mississippi State University conduct experiments using computer-controlled environmental chambers. In addition, UVMRP is collaborating with the University of Maryland to build/improve the component models of the CAIE framework and to couple these components. The core components of CAIE include the climate model (the regional Climate-Weather Research and Forecasting model, CWRF), the crop models (GOSSYM and DSSAT), the biogeochemical model (DayCent), and the economic models.

P1.03

CLASSIFICATION OF FIELD CROPS GROWN UNDER SOIL SALINITY CONDITIONS USING HYPERSPECTRAL REMOTE SENSING ALGORITHMS

Sathishkumar Samiappan, Raju Bheemanahalli, Meilun Zhou, K Raja Reddy
Mississippi State University, Mississippi State, MS, USA

Salinity is one of the abiotic stress factors that negatively affect the growth and development of agriculture crops worldwide. Direct accumulation of salts all major morpho-physiological traits during the juvenile growth stage and disturbs metabolic processes in plants. Thus, the development of novel phenotyping approaches towards crop improvement is urgently needed. Evidence is accumulating on sensor-based phenotyping being essential for detecting salinity impact at the early vegetative stage. In this study, five field crops involving three C_3 (soybean, cotton, and wheat) and two C_4 (*Amaranthus* and sorghum) crops were exposed to five different salinity levels (0, 3, 6, 9, and 12 dS m^{-1}), one week after emergence. Regardless of crop species, plant vigor showed a negative relationship with soil salt concentration. Along with other plant health-related data, leaf reflectance data were collected using a spectroradiometer 30 days after salt stress. We utilized different configurations of supervised learning algorithms to classify the leaf reflectance of five crop species grown under different salinity. The ability of complete visible and near-infrared spectra (400-2500 nm) and partial (400-1000 nm) are studied for maximum likelihood machine learning classification. In this pilot study, salinity-induced changes in leaf hyperspectral reflectance enable the classification of crops tolerant and sensitive to salt stress non-invasively. Integrated stress physiology, leaf reflectance, and deep learning allowed us to classify and identify crop-specific salinity thresholds. Leaf hyperspectral reflectance indices could be effectively utilized for high-throughput phenotyping to characterize breeding populations under different salinity stress conditions.

P1.04

EFFECT OF DROUGHT STRESS ON EARLY CROP ESTABLISHMENT AND ITS RELEVANCE TO STORAGE ROOT DEVELOPMENT IN SWEET POTATO

Purushothaman Ramamoorthy[1], Raju Bheemanahalli[2], David Brand[2], Mark Shankle[3], Sathishkumar Samiappan[1,] and K. Raja Reddy[2]

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[2]Department of Plant and Soil Sciences, 117 Dorman Hall, Box 9555, Mississippi State University, MS, 39762, USA

[3]Pontotoc Ridge-Flatwoods Branch Experiment Station, North Mississippi Research and Extension Center, Mississippi State University, Pontotoc, MS, USA.

Drought stress is considered one of the significant constraints for sweetpotato productivity, and the level of impact is found to be acute when it is grown under rainfed areas. Identification of phenotypes that govern the drought tolerance in sweetpotato is highly desirable to develop elite cultivars in yield. Ten sweetpotato cultivars were grown under both non-stress and drought stress conditions. Various shoot, root morphological, and physiological functional traits were measured at the early stage of the crop growth to assess its association to storage root number (SRN). Significant genotype and treatment interactions were observed for most morpho-physiological, pigments, and sink development parameters. Drought stress decreased the leaf area (32%), root surface area (31%), root length (29%), total dry weight (25%), and SRN (16%) compared to non-stress conditions. Path coefficient analysis revealed that SRN has a positive direct effect with

all the root traits except root surface area and a negative direct impact with all the shoot traits under drought stress. Besides, fluorescence and chlorophyll were positive, and nitrogen balance index and flavonoids were direct adverse effects. Cultivars showed markable variation in SRN. Among them, Covington found the highest, and Bouregaurd (B14) exhibited the lowest SRN. Therefore, the identified tolerant cultivar and its associated drought-responsive traits could assist the breeding program to improve the root yield under drought for the framer's profitability.

P1.05

MORPHO-PHYSIOLOGICAL CHARACTERIZATION OF DIVERSE SOYBEAN GENOTYPES FOR SEEDLING STAGE DROUGHT TOLERANCE

Nisarga Kodadinne Narayana, Chathu Wijewardana, Firas Alsajri, Raju Bheemanahalli, K. Raja Reddy

Mississippi State University, Mississippi State, MS, USA

Drought is considered as one of the main constraints that limit the growth and development of soybean. We examined the root and shoot developmental plasticity of traits among 64 soybean genotypes grown under non-stress (100% field capacity) and drought stress (40% field capacity) conditions during the early seedling establishment. Several physiological (leaf chlorophyll, leaf flavonoid index, and nitrogen balance index), aboveground (plant height, mainstem leaves, whole-plant leaf area, shoot dry weight, and whole plant dry weight), and belowground (root tips, root forks, root crossings, total root length, root volume, root surface area, and root dry weight) parameters were recorded across treatments. Soybean genotypes exhibited significant difference (P<0.001) between the control and drought stress treatments for the growth parameters. Also, significant variability (P<0.001) was observed among the soybean cultivars within the control and drought stress treatments and their response to drought stress. Drought stress-induced highest reduction on leaf area (38%) followed by plant height (21%) and shoot weight (20%). On average, among 64 genotypes, canopy temperature increased by 11%, and the chlorophyll index decreased by 15%. The drought stress had a significant inhibitory effect on all the shoot growth and developmental traits than the non-stressed conditions. A broad genetic variability of most of the measured traits suggests that soybean comprise drought-adaptive traits, which can utilize for crop improvement. The generated phenotypic data and identified early-stage drought-tolerant candidate cultivars, would help develop soybean with enhanced resilience to drought. Also, soybean producers could select the identified drought-tolerant cultivars to minimize the damage under rainfed- and partially-irrigated cropping systems.

P1.06

ULTRAVIOLET-B, ELEVATED CO_2 AND HIGH-TEMPERATURE EFFECTS ON MORPHOLOGICAL AND BIOCHEMICAL ASPECTS OF BRASSICA SPECIES

Akanksha Sehgal, Charles Hunt, T. Casey Barickman, Skyler Brazel, Daryl Chastain, K.Raja Reddy

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Introduction: Changes in climate are increasing the frequency of weather components that detrimentally impact plant performance. In particular, ultraviolet-B (UV-B) radiation, the most harmful form and temperature significantly affect various plant morphological and biochemical features like plant height, plant weight, and chlorophyll content. There is little information on the effect of multiple abiotic stresses on morphological and biochemical aspects for kale and mustard. **Methods:** An experiment was conducted with two *Brassica* species, *B. oleracea* L. var. Acephala Winterbor F1 (Hybrid Kale) and *B. juncea* var. Green wave OG (Mustard Greens) grown under optimal nutrients and soil moisture conditions in Soil-Plant-Atmosphere-Research (SPAR) units. Two levels of UV-B radiation (0 and 10 kJ m^{-2} d^{-1}), two concentrations of CO_2 (420 and 720 ppm), and two different temperature treatments (25/17 ºC and 35/27 ºC) were imposed 12 days after sowing (DAS) and continued for another 30 days. Several morphological and biochemical parameters were measured at the final harvest. **Results & Discussion:** The measured traits declined significantly under individual and multi-stress conditions in both the species except under elevated CO_2 levels, which positively impacted. Marketable fresh weight was 569.2 g $plant^{-1}$ for mustard and 241.3 g $plant^{-1}$ for kale under the control treatment and decreased by 55% and 64%, respectively, under UV-B treatment. However, there was a slight increase in the chlorophyll content under the UV-B treatment alone and combination with high temperature and elevated CO_2. The increased CO_2 concentrations ameliorated the adverse impacts of high temperature and UV-B stresses. **Conclusions:** Understanding the of CO_2 and UV-B radiation on leafy vegetables like kale and mustard can improve existing varieties for increased tolerance while simultaneously improving yield, plant morphology, and biochemistry.

P1.07

INTEGRATED AERIAL AND DESTRUCTIVE METHODS DIFFERENTIATE PLANT HEALTH OF COTTON IN RESPONSE TO COVER CROPPING

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Growing cover crops during the fallow period is thought to provide multiple benefits to soil health and subsequent cash crops grown under rain-fed conditions. A field study was conducted to examine the influence of three cover crops (Elbon Rye, Austrian winter pea, and Dalkon radish) combined with the broiler litter (applied as source nitrogen) on cotton (*Gossypium hirsutum* L.) growth development under no-till cultivation. We measured morphological (leaf number, leaf area, leaf weight, total biomass) and biochemical (chlorophyll, flavonoids, and anthocyanins) parameters at weekly intervals from planting to maturity across treatments. During early-season crop establishment, a substantial difference in cotton seedling density (i.e., number of seedlings per meter distance) and seedling vigor were observed in response to treatments. Cotton seedlings showed significantly higher leaf area and biomass at the early-seedling stage in response to winter pea cover cropping. Aerial imaging using an unmanned aerial vehicle fitted with multispectral sensors was used to capture reflectance, from which vegetation indices were derived at regular intervals during the entire crop growing season. These values were averaged at the plot scale. Spectral indices associated with above-ground biomass, canopy water, nitrogen status, and structure-insensitive pigment index showed substantial variation among the treatments. Potential indices that best differentiate the response of cash crops to different cover cropping treatments will be discussed.

P1.08

THE ROLE OF PLANT ROOT EXUDATES IN THE ADAPTATION OF PSEUDOMONAS SYNXANTHA 2-79 TO THE DRYLAND WHEAT

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Introduction: Drought is a major abiotic stress that affects agriculture on a global scale. Plants evolved multiple mechanisms to adapt to water-stressed conditions, including nurturing distinct communities of microorganisms that facilitate nutrient acquisition, modulate phytohormone levels and produce water-sequestering biofilms. *Pseudomonas synxantha* 2-79 is a beneficial strain isolated from the rhizosphere of dryland wheat grown in arid central Washington State. This organism thrives in dry soils and protects dryland cereals from soilborne fungal pathogens. The molecular mechanisms by

which 2-79 maintains physiological activity and mutualistic interactions with its plant hosts in dry soils remain poorly understood. We hypothesized that the affinity of 2-79 towards dryland wheat is built upon the chemical crosstalk between bacteria and roots of water-stressed plants. Plant roots secrete complex mixtures of organic metabolites, and these exudates help plants select and shape their root microbiota. The release of these compounds is actively controlled in response to environmental stimuli, and the composition of rhizodeposits varies according to plant species and physiological conditions. **Methods:** In this study, root exudates were collected from water-replete and water-stressed wheat cv. Tara and profiled by GC and LC coupled mass spectrometry. To characterize the effect of dryland wheat exometabolites on rhizobacteria, we compared the growth of osmotically challenged 2-79 under control conditions and in the presence of root exudates. We also cultured the bacteria in a minimal medium supplemented with control and water-stressed Tara exudates and analyzed changes in the 2-79 transcriptome by RNA-seq. **Results and discussion:** The RNA-seq identified 56 and 154 genes that responded, respectively, to control and water-stressed root exudates. Among 2-79 genes upregulated by water-stressed exudates were those encoding enzymes and transporters involved in the catabolism of quaternary ammonium compounds (QACs). The metabolome profiling revealed that, in addition to diverse carbohydrates, organic and amino acids, the roots of water-stressed wheat release elevated amounts of the quaternary ammonium compounds (QACs) choline and glycine betaine. In many microorganisms, the QACs function as effective osmoprotectants. Accordingly, the addition of root exudates and QACs to 2-79 cultures efficiently protected the bacteria from water stress. The 2-79 genome encodes several membrane transporters critical for the rhizosphere competence and allow this organism to take up QACs. These results provide insight into the effects of drought on the rhizosphere microbiome and suggest that plant root exudates play a significant role in the survival of root-associated microorganisms in water-deprived conditions.

P1.09

EARTHWORM (*LUMBRICUS TERRESTRIS*) RESPONSE TO HIGHLY CONCENTRATED U SITES IN CONTAMINATED SOILS

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Several species of small insects and animals have already been studied for their response to radioactive situations and their utilization as biomarkers. However very few resources are available in regard to Earthworms being utilized to decide soil conditions in highly contaminated U sites. The purpose of these assays is to determine the effect of U on Bose earthworm's uptake and bioaccumulation (*Lumbricus Terrestris*), physical structures (size, weight, change in cell structure, mortality rate and digestion) as well as the subcellular forms of U. The study will provide the scientific base for using earthworms as a bio-indicator of U eco toxicity in the ecosystem.

P1.10

BIOCHAR APPLICATION IMPACT ON SOIL PHYSICAL PROPERTIES IN SHARKEY CLAY IN MISSISSPPI DELTA

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Due to variability in the year to year and in-season rainfall distribution, producers heavily rely on Mississippi River Valley Alluvial Aquifer (MRVAA) for irrigation water supply to obtain economic crop yields in the Mississippi Delta. Greater water withdrawal than recharge has resulted in water level decline in the MRVAA, which requires the need for use and adoption of better crop and soil management practices for irrigated and rainfed cropping systems that increase water use productivity and soil water storage. Soil amendments, such as biochar, can help increase soil water holding capacity, carbon sequestration, improve soil fertility and nutrient availability, influence soil microbial diversity, and thus, can improve soil health and crop productivity. A field experiment was conducted in Stoneville, MS to evaluate the effects of biochar on soil physical properties in a rainfed cotton production field. The experimental design was a completely randomized design with four replications. Biochar was applied before planting cotton at rates of 0, 10, 20, and 40 Mg ha-1. Deep core soil samples were taken in fall 2020 from 0-61 cm and divided into depth increments of 0-5, 6-15, 16-30, 30-45, and 46-61 cm for determining soil aggregate stability and bulk density using Eijkelkamp wet sieving apparatus and core method, respectively. Penetration resistance measurements were recorded by the Eijkelkamp penetrometer. Biochar application at 40 Mg ha-1 had the highest aggregate stability, whereas applying biochar at 10 Mg ha-1 resulted in the lowest aggregate stability. Biochar application did not change bulk density and compaction in our study.

P1.11

ALLELOPATHY: AN ALTERNATIVE STRATEGY TO MANAGE PALMER AMARANTH IN SWEETPOTATO

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Weeds, especially Palmer amaranth, cause a reduction in yield and quality of sweet potato. Despite the high value of sweet potato, farmers have limited options for weed management. Weeds compete with the crop for nutrition and serve as alternate hosts for disease-causing organisms and insect pests, which ultimately reduces the yield many folds. Mechanical methods for weed management are laborious and time-consuming. At the same time, most of the chemical herbicides registered for use in sweet potato are ineffective on Palmer amaranth. There is, therefore, a need for a more effective, economical, and sustainable weed management strategy. The present study was conducted in the greenhouse under controlled conditions to uncover the allelopathic effects of different sweet potato varieties on the growth and density of Palmer amaranth. The experiment was performed in a stair-step setup. There were two columns for each sweet potato variety; the treatment column and the control column, and a weed control column per repetition. Each column was a closed individual system to avoid interaction between columns. The height of all the plants in the stair-step was recorded at regular intervals. The allelopathic effect of the donor (sweet potato) plants based on the percent inhibition of the receiver (Palmer amaranth) plant was calculated. Data were analyzed using a general linear model with mean values separated using Fisher's protected least significant difference at or below a 0.05 probability level in JMP pro 14.0 (SAS Institute Inc., Cary, NC) for windows software. Results of the current screening showed a reduction of 38 to 95% in Palmer amaranth height in the presence of different sweet potato varieties at five weeks after transplantation (WAT). Variety Centennial suppressed the growth of Palmer amaranth starting from four weeks, eventually leading to weed mortality. Morado variety suppressed Palmer amaranth germination up to four weeks, and even after the fourth week, Palmer amaranth growth was very slow. Variety Evangeline and Hatteras significantly suppressed the growth of the weed in the fourth and fifth WAT. Identifying allelopathic sweet potato varieties will open up a novel strategy for weed management in sweet potato and other crops. Further identification of genes and biochemicals involved in weed suppression will be helpful in the development of sweet potato varieties with enhanced allelopathic potential. This strategy will also benefit organic sweet potato growers by increasing organic crop production and reducing the various risks associated with chemical herbicides.

P1.12

ASSESSMENT OF BIOAVAILABILITY OF HEAVY METALS IN CENTRAL MISSISSIPPI PLAYGROUND SOIL AND CHILDREN HEALTH

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Children play in urban children playground. Soils may be eaten by children through hand touch. This bioavailability of Heavy metals in playground soil

were assessed in playground soils for children safety in the central Mississippi area. Heavy metals are ubiquitous but can be potentially hazardous. Majority of parks in Mississippi are located in rural areas only few are located in urban areas with a high amount of traffic. Soil contamination levels are determined by location and its exposure level to certain contaminants. Children are a vulnerable population, and it is important to know of any potential hazards when at local playgrounds. Soil was taken from several playgrounds using spatial distribution in the Jackson, MS area and a total of 100 samples were collected from 6 different parks. Pb, As, Cd, Zn, Hg, Cu, Cr, Ni levels were evaluated using ICP-MS using acid digestion. Results show bioavailability of heavy metals in children playground may be controlled by biogeochemical conditions and traffic conditions. This study will provide the data on assessment of children heath as affected by these playgrounds.

P1.13

EFFECTS OF SOIL MOISTURE ON U FORMS AND STABILITY IN A WEAPON TESTING SITE

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Uranium is a naturally occurring radioactive trace element found in rocks, soils, and coals. It acquires accumulation in groundwater and soil as waste contamination from nuclear power plant operations, spent fuel reprocessing, high level wasted disposal, milling, ore mining, processing, and manufacturing which causes serious environmental problems. These issues, if not solved, will impact human health and contribute to environmental hazard. In order to determine uranium's involvement with YUMA soil from the YUMA Proving Grounds in AZ, the soil was spiked with different concentrations (100ppm and 1000ppm). Fractionation of uranium in the soil with different moisture was conducted. The three moisture regimes included saturated, field capacity, and wetting/drying cycle. A sample was taken from each after 1 day, 1 week, 2 weeks, and 1 month. Sequential selective dissolution procedurewas used to simulate the actual situation of summer stormy seasons. The expected outcome will be changes of U solubility and forms in soils as affected by soil moistures in the fields. This study will provide scientific basis for better management of Yuma site.

P1.14

AGRONOMIC OPTIMUM NITROGEN RATE FOR CORN PRODUCTION IN MISSISSIPPI

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Random influence of the environment on nitrogen (N) demand and supply dictates the need for yearly updated N recommendation strategies. Currently, yield goals are used by 34 land grant universities, including Mississippi State University, which does not consider either demand or supply of N. This research aims to distinguish agronomic optimum N rate (AONR) for corn production in Mississippi. A total of 12 N rate treatments were replicated four times over four locations. One treatment was a check not receiving any N fertilizer, and five treatments were N at the V2 growth stage at rates of 45, 90, 134, 179, 224 kg N ha-1. The remaining six treatments were 45 kg N ha-1 at the V2 growth stage and 34, 67, 101, 168, 202 kg N ha-1 at the V6 growth stage. Extrication of AONR on total N applied was completed using Linear (L), Quadratic (Q), Linear-plateau (LP), and Quadratic-plateau (QP) models using "Easynls package" in R statistical software. Analysis of variance was completed using GLIMMIX procedure in SAS statistical software, and differences among treatment means were separated using Fisher's unrestricted Least Significant Difference procedure. With combined data, AONR was found to be 218 kg N ha-1 resulting in a yield of 9.9 Mg ha-1, where QP was best fit with a low coefficient of determination (R2 = 0.23). Starkville was best fitted by the QP model with R2 = 0.9, where yield started plateauing at 252 kg N ha-1 reaching a max. yield of 12.5 Mg ha-1. Stoneville was best fitted by the Q model with R2 = 0.39, the max. yield was 11.7 Mg ha-1 at 131 kg N ha-1, where yield started decreasing beyond this point. Brookville was best explained by the LP model with R2 = 0.79, at 9.8 Mg ha-1 with an AONR of 97 kg N ha-1. The differences in models indicates that there can be markedly different N requirements depending on the location. This data suggests that locations should be individually analyzed for N recommendation as failure to adhere to this would lead to over or under application of N.

P1.15

SOLUBILITY AND EXTRACTABILITY OF URANIUM IN US ARMY SHOOTING SOIL

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Yuma Proving Ground (YPG) is one of the largest military bases in the world. It is a subsidiary command of the Army test. Depleted Uranium (DU) is used to make weapon penetrators. The presence of DU in YPG soil varies among fields and ditches. DU can be extracted from the contaminated soil using water, Humic Acid (0ppm, 0.5ppm, 5ppm, 20ppm, and 100ppm) , acidic water with pH levels (2, 4, 6, 8, 10), and salt solutions containing various anions (NaCl, $NaNO_3$, Na_2CO_3, $NaSO_4$, NaH_2PO_4, Na Acetate) and EDTA (sodium). Twenty original samples were taken from YPG sites. The results from the Humic experiment show humic solution increased U solubility and extractability with increasing in humic concentration and u extraction increased with increasing water acidity. The results on the effects of anions in salt on U solubility will be presented as well. This study provide a scientific base for evaluation of U solubility in the US Army weapon sites as well as possible battle fields as affected by biogeochemical conditions.

P1.16

COVER CROPS RESPONSE TO SOIL RESIDUAL HERBICIDES LABELED FOR COTTON

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Cover crops provides many agronomic and environmental benefits and thus, improves soil and water quality and increase crop productivity. Benefits provided by cover crops depend upon type of cover crop species used, their biomass production, planting and termination timing, soil, and climatic conditions. Residual herbicides commonly used in row crops can affect germination and emergence of cover crops species and reduce their biomass production. Therefore, a greenhouse study was conducted at Mississippi State University's Delta Research and Extension Center to evaluate sensitivity of five cover crop species (hairy vetch, radish, turnip, cereal rye, and clover) to soil residual herbicides labeled for use in cotton. The experiment was arranged in a randomized complete block design with five replications. Herbicides included in this study were: Fluridone, Fluometuron, Diuron, S-metolachlor, and Pyrithiobac sodium. An untreated control was also included in the study. Pots (10.16 cm diameter) were filled with very fine sandy loam soil and sprayed 246 days before the cover crops were seeded. Plant emergence was evaluated 10 days after planting (DAP), while stand count, plant height, and fresh biomass produced were recorded 37 DAP. All herbicides significantly reduced cover crop emergence and stand count by 28% and 85%, respectively, compared to the untreated control. Averaged over cover crop species, plant height and fresh weight were also significantly reduced from 79% and 89%, respectively, compared to the untreated control. Radish had 0.82 to 1.28 g more fresh weight than all other cover crop species. Cover crop seeding rate should be adjusted if planted after cotton to compensate for low germination due to the soil residual herbicides.

P1.17

EVALUATION OF COTTON CHROMOSOME SUBSTITUTION LINES FOR THEIR WEED SUPPRESSIVE POTENTIAL UNDER FIELD CONDITIONS

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Allelopathic interactions have been observed to reduce interspecific competition in agricultural settings. The chemicals involved in allelopathy can be released in a variety of ways and are affected by environmental conditions. Greenhouse tests and lab tests are limited in their capacity to mimic realistic environmental conditions and interactions; for this reason, field studies are necessary to test the effectiveness of weed-suppressing chemicals. Five chromosome substitution (CS) cotton lines previously screened for weed suppressing abilities were selected for this field trial. The CS lines were sowed in 20-foot rows, respectively, with three problematic weed species: redroot pigweed (*Amaranthus retroflexus*), morninglories (*Ipomoea spp*.), and common lambsquarters (*Chenopodium album*). Weed density and cotton height were measured 7, 14, and 21 days after the establishment (DAE) of weed species. On the 21st day, biomass samples of individual weed species were collected from the field. Twenty-five bolls were harvested from each plot to calculate lint yield percentage and for HVI fiber analysis. At 7 DAE, CS lines CS-50 and CS-49 reduced redroot pigweed density 306.67% and 300%, respectively, while CS-49 (2000%), CS-50 (1766.67%), and TM1 (1900%) reduced Johnsongrass density. At 21 DAE, CS-49and CS-23 reduced Johnsongrass and morningglory density, respectively. Differences in cotton height were observed at 14 DAE, with a 14.67% discrepancy between the tallest CS line (CS-34) and the shortest (CS-26). Fiber analysis indicated no differences among CS lines and UA48, disregarding upper half mean (UHM) measurements, in which UA48 was different from all other fiber analyzed. Allelopathy is a complex phenomenon that requires extended research to be harnessed and applied as an alternative weed.

P1.18

SURVIVAL AND REGROWTH RATE OF *Listeria monocytogenes* ScottA SEROTYPE 4B IN LOW CONCENTRATIONS OF QAC

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Quaternary ammonium compounds (QACs) are the most commonly used disinfectants, as they are effective against a wide range of bacteria, fungi, and viruses. Despite the cleaning and sanitization practices, diverse *Listeria monocytogenes* isolates from several outbreaks are traced to the processing environment and equipment, implying the persistence of strains during food processing. In the food processing environments, even though sanitizers and disinfectants are routinely used at 50-100 times greater than that of their minimum bactericidal concentration (MBC) to kill foodborne bacterial pathogens, planktonic cells or biofilms present in the crevices may be exposed to lower or sublethal concentrations of biocides. Since very low levels of QAC are found in the rinse waters (1 to 15 µg/ml) and if such rinse water stagnates it may allow the proliferation of QAC tolerant subpopulation of *L. monocytogenes* cells over non-tolerant cells. In the present study, we determined the survival and regrowth rate of L. monocytogenes ScottA serotype 4b by creating a concentration gradient of QAC in microwells that mimic the high to low concentrations of QAC that may be discharged into the downstream. Such subpopulations of L. monocytogenes are often unrecognized by the conventional testing methods.

P1.19

ASSESSING THE GENETIC DIVERSITY OF WEEDY RICE MINI-GERMPLASM USING SNPs

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As one of the most important staple food crops globally, rice (Oryza sativa L.) feedsmore than half of the global population. Rice currently provides approximately 50% of the dailycaloric intake for millions living in poverty and is a model plant organism that evolved fromtropical and subtropical areas. With a modest genome size of about 400 million base pairs thathave been completely sequenced using a map-based approach, rice has been intensely studiedthrough functional genomic approaches. These approaches include numerous genome-wideassociation studies, quantitative trait loci studies, and simple sequence repeat studies toaccess genetic diversity and uncover candidate genes for increased tolerance to abiotic stresses.While many studies have used rice to discover candidate genes, there are limitations due to theloss of beneficial traits during rice domestication. To overcome this limitation, research studieshave turned to utilizing weedy species for new trait discovery. Given its increased stresstolerance, weedy rice (WR) may serve as a resource for unique stress tolerance traits. Whilestudies have identified significant genetic similarities between rice and WR, this study aims toevaluate the genetic diversity of a weedy rice mini-germplasm collected from Arkansas andSouth Carolina and rice cultivars after exposure to cold (18°C), heat (38°C), and completesubmergence using single nucleotide polymorphisms (SNPs) identified by next generation sequencing. A total of 199,441 SNPs were uncovered, and when subjected to Structure Harvester, three to four distinct clusters were found in all stress treatments separating tolerant WR accessions, sensitive WR accessions, and cultivated rice.

P1.20

IRRIGATION SCHEDULING THRESHOLDS AND COVER CROP INFLUENCES ON CORN PRODUCTION IN THE MISSISSIPPI DELTA

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The main source of irrigation water in the Mississippi Delta is the Mississippi River Valley Alluvial Aquifer (MRVAA). Increases in irrigated crop acreage and frequent droughts throughout the growing season have resulted in water level decline in the MRVAA. The objective of this research was to determine the effectiveness of sensor thresholds for irrigation scheduling in combination with winter cover crops on corn production, water productivity, and soil physical properties. The field experiment was initiated in fall 2019 at the National Center for Alluvial Aquifer Research in Leland, MS. The four cover crop treatments were: cereal rye (*Secale cereale* L.), hairy vetch (*Vicia villosa* L.), a wheat (*Triticum aestivum* L.)-radish (*Raphanus sativus* L.)-turnip (*Brassica rapa* L.) mix, and a no cover crop control. The three irrigation treatments used for irrigation scheduling were: a season-long “wet” threshold (-40 kPa), a season-long “dry” threshold (-90 kPa), and a non-irrigated control. Watermark Soil Moisture Sensors were used for monitoring soil water potential to schedule irrigation events. In 2020, corn yield was 1.1-2.9 Mg ha^{-1} higher in no cover crop treatments compared to all other cover crop treatments. Water productivity was 1.6-12.9 kg ha^{-1} mm^{-1} higher in -90 kPa no cover crop treatments compared to all other treatments, but was not significantly different from non-irrigated no cover crop, -40 kPa no cover crop, and non-irrigated cereal rye treatments. Cover crops in 2019 did not affect soil physical properties. Results from the 2020-2021 growing season will be presented at the conference.

P1.21

TILLAGE AND FERTILIZER PLACEMENT EFFECTS ON IRRIGATED AND DRYLAND CORN IN THE MISSISSIPPI DELTA

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Soil nutrient loss due to runoff can be a major problem in regions with heavy winter precipitation like the Mississippi Delta. Extensive conventional tillage operations for bed preparation needed to facilitate proper drainage results in a loss of organic matter which elevates surface sealing and sub-soil compaction. Strip tillage systems provide an alternate form of tillage where only 25% of the land is tilled and an added tillage shank helps break compacted subsoil layers. The objective of this study was to evaluate the effects of tillage systems with P and K fertilizer placement on soil properties in irrigated and dryland corn. Treatments included two irrigation systems (dryland and irrigated), three tillage systems (conventional tillage, conventional tillage with subsoiling, and strip tillage) and three fertilizer placements (surface broadcast after tillage, surface broadcast and incorporated with tillage/deep banded with strip tillage, and non-treated control). Data collection included penetration resistance, soil bulk density,

and Mehlich-3 soil available P and K. Strip-till (2.07 MPa) reduced compaction compared to subsoiling (2.35 MPa) and conventional tillage (2.47 MPa). Soil available P was significantly higher in strip-till deep banded treatments at 15-30 cm depth (29.38 mg^{-1} kg^{-1}) when compared to other treatments and depths, except for the conventional till incorporated broadcast (25.88 mg^{-1} kg^{-1}), subsoiling incorporated broadcast (23.38 mg^{-1} kg^{-1}), and the strip-till deep banded treatments (21.88 mg^{-1} kg^{-1}) at 0-15 cm depth. Soil available K was highest in strip-till, broadcast after tillage treatments at 0-15 cm (185.38 mg^{-1} kg^{-1}) than all other treatments.

P1.22

URANIUM THROUGH THE ECOSYSTEM IN ARID SOILS

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Being an emerging pollutant, U has the ability to affect public and environmental health. While U contamination may occur near mining, enrichment facilities, or as agriculture contaminates, it is also likely in war-stricken areas or military training grounds that utilized depleted uranium penetrators. In this study, soils from three locations at Yuma Proving Ground in Arizona were analyzed to observe U concentration and to determine what correlations occur with the soil physicochemical properties to best direct management practices.

The sample area is an alkaline soil, high in carbonate and Fe oxides, dominated by a sandy-loam texture. The oxidized uranium at the site is found to be in the schoepite family. High concentrations of U were determined to be limited to specific points while a lower concentration such as 368, 384, and 305 mg/kg U were observed in the field, ditch, and DU garden, respectively. These lower concentrations are presumed to be at a capacity with uranyl in a state of equilibrium, being a contaminated background concentration.

Transport of U from sources were limited: from an oxidized penetrator 92.8% remained in the top 5 cm of soil and reducing in concentration to equilibrium in less than 20 cm from the source. In locations prone to high amounts of water runoff such as a ditch, U concentration reduced to near equilibrium levels after 20 m. Samples of U were shown by Pearson's coefficient to be correlated to Mn oxides, Fe oxides, and carbonate, but due to interactions with one another or hydraulic situations the correlations differed based on sampling location. Mn oxide and carbonate demonstrated more correlation with U in areas that are less inundated by water, otherwise Fe oxide becomes a major recipient of U.

Buried penetrators, previously fired and unfired, exhibited similar upward migration demonstrating similar concentrations at each soil layer leading to the surface. This upward percolation is the result of capillary action that occurs during alternating wetting and drying conditions where the scale of U transported is affected by areas with higher electric conductivity more than the rate. Transport of U from soil to vegetation to herbivores was also observed. Transport of U between trophic levels can be limited by reduced translocation and accumulation to the edible portions in plants.

P1.23

RUELLIA SIMPLEX (MEXICAN PETUNIA), A PROMISING PLANT FOR SOIL AND WATER REMEDIATION

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Ruellia simplex (Mexican Petunia) was first introduced to United States in 1940s and became a popular landscape plant because of its continuous flowering and low growth requirements: high survival in desert and in alkaline condition. After several decades, Mexican Petunia has escaped cultivation and become an invasive plant. Based on its fast growth in a variety of soil types, here, we proposed a possibility that using this plant to remedy heavy metal pollution and alkaline radioactive waste. In the study, we used the cutting method to grow many Mexican Petunia in both Hoagland solutions and tap water at different concentration of U, Cd, and Se. After 2-3 weeks, plants samples were collected U, Cd. and Se concentrations in roots, shoots, leaves and flowers were tested with ICP-OES and XRF. Our results showed that Mexican petunia could survive well in both Hoagland solution and tap water. The plant could withstand more than 5 mg/L U in hydroponic solutions. Also, high amount of U was tested in roots, however exceedingly small amount of U in flowers and leaves was tested. Hence, our preliminary data proved that it is possible to use Mexican petunia to uptake heavy metals in wastewater and polluted soil.

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P1.24

THE ANTI-CANCER EFFECTS OF KAEMPFEROL ON GROWTH AND FUNCTIONS OF OVARIAN CANCER CELL LINES

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Introduction: Difficulty in early diagnosis makes Ovarian cancer (OVCA) the most lethal gynecological cancer. OVCA remains undetected in early stages, until it has spread to the belly or pelvis. OVCA patients often develop drug resistance and almost 70% of the patients have a risk of tumor recurrence as well. Therefore, identification and validation of newer therapeutics are critical for the treatment of OVCA. For years plants have been a prominent source of natural products in drug discovery and in anti-cancer therapeutics. Kaempferol, also known as kaempferol-3 or kaempferide (Kaemp) is a natural flavanol, found in a plethora of plants, fruits, and plant-based foods including kale, watercress, tea, spinach, and broccoli, grapes, strawberries, tomatoes, and apples. Kaemp has polyphenolic antioxidant properties which promotes its anti-cancer effects. **Methods:** The purpose of our experimentation is to observe the differential cellular activity (growth analysis, metabolic activity, autophagy) in the presence of Kaemp. We used Hey A8 and Hey MDR, two isogenic ovarian cancer cell lines, to study the effects of Kaemp in ovarian cancer. Additionally, we utilized mouse embryonic fibroblast (MEF) cells as a non-cancerous normal cell line. **Results:** Our preliminary study shows inhibition of cellular growth upon Kaemp treatment and it also stunts the clonogenic growth of cancer cells. However, Kaemp treatment promoted the growth of non-cancerous MEF cells that indicates the selective nature of its toxicity. Kaemp has also shown to be impacting the cellular metabolism. Cancer cells are equipped with altered metabolic activities including enhanced glucose uptake and lipogenesis. Kaemp treatment reduces glucose uptake and lipid droplet biogenesis along with enhanced acidification of the cells as demonstrated by increased lysotracker red fluorescence**. Conclusion:** Overall, our data indicates anti-cancer activities of Kaemp in the OVCA cell lines which could be implicated by targeting various pathways simultaneously, therefore making it a probable instrument for the prevention of ovarian cancer in women.

P1.25

HERBICIDE TOLERANCE IN UPLAND COTTON: INSIGHTS FROM [14C]2,4-D TRANSLOCATION AND RNA SEQUENCING

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Upland cotton, Gossypium hirsutum L., is a natural source of fiber and a major row crop in the US. However, it is extremely sensitive to broadleaf herbicide, 2,4-dichlorophenoxyacetic acid (2,4-D), used to control weeds and reduce effects on yield. The evolution of herbicide resistance in weeds and the limited variety of characterized herbicide resistance genes available for plant improvement necessitate the identification and development of novel sources of herbicide tolerance in cotton germplasm. Here we report a study of the cotton chromosome substitution line, CS-B15sh, developed in the genetic background of G. hirsutum L. Texas Marker 1 (TM-1) with introgression on the short arm of chromosome 15 from G. barbadense L., and its interaction with 2,4-D herbicide. Cotton seedlings were screened for injury after 2,4-D application at 1x (1.12 kg ae ha-1) in the greenhouse. Uptake and translocation of 14C-labeled 2,4-D was measured in CS-B15sh and TM-1 plants to determine whether altered movement of 2,4-D is involved in the tolerance mechanism while RNA sequencing was done to determine differential expression of genes in 2,4-D treated and non-treated leaf tissues in CS-B15sh and TM-1. Greenhouse screening revealed that CS-B15sh plants averaged 41% lower injury compared to TM-1 at 21 days after application. After 24 hours of [14C]2,4-D treatment, CS-B15sh plants showed restricted movement of [14C]2,4-D within the treated leaf. RNA sequencing revealed differential expression of genes between CS-B15sh and TM-1 in several components of the 2,4-D/auxin response pathway, including ubiquitin E3 ligase, PB1|AUX/IAA, ARF transcription factors, and F box proteins of the SCFTIR1/AFB complex. Progress on understanding the genetics and molecular mechanism of tolerance to 2,4-D in CS-B15sh plants is discussed.

P1.26

IMPACT OF SALT STRESS ON THE GROWTH AND DEVELOPMENT OF C3 AND C4 CROP SPECIES

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The deleterious effect of salt stress on agriculture yields is expected to increase due to climate change-induced variations in irrigation practices. Minimizing salt stress-induced damages by improving the ability of field crops to sustain growth and productivity is much-needed research. Here, we hypothesized that physiological and biomass-related parameters of C_3 crops (cotton, soybean, and wheat) and C_4 crops (sorghum and *Amaranthus*) might have differential levels of adaptability to salt stress. An experiment was carried at five different salinity levels (0, 3, 6, 9, and 12 dS m^{-1}) using a sunlit growth chamber facility during the early-vegetative stage. A range of physiological and biomass-related traits was recorded 34 days after sowing across treatments. A decreasing trend in leaf area and biomass with increasing salt concentrations was observed in all species. The adverse effects (% decrease compared to 0 dS m^{-1}) of 12 dS m^{-1} on chlorophyll content were most significant for soybean (30%), followed by sorghum (8.2%). At 12 dS m^{-1}, cotton recorded a marginal reduction in the root weight (22%) than soybean (83%). Among species, higher leaf area (*Amaranthus*) and biomass (sorghum) were observed at 0 dS m^{-1}, whereas at 12 dS m^{-1}, they decreased by 54% and 87%, respectively. Our results demonstrated the existence of differential tolerance of C_3 and C_4 species to salt stress. As we tested different species with the same range of salt concentrations, the identified damaging threshold for each species can explore used to phenotype diverse genetic resources within the species. Also, the functional shoot and root growth responses to salt stress among crop species could be used to improve models for field applications.

P1.27

WATER QUALITY ASSESSMENT OF MULTISPECIES COVER CROPS IN CORN PRODUCTION SYSTEM IN MISSISSIPPI DELTA

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Winter fallow agricultural fields in the Mississippi delta region exposed to excessive precipitation are most susceptible to nutrient losses from residual fertilizer through runoff and leaching. Impaired water from the tilled fields ends up seeping into the water bodies, thereby, increasing the oxygen demand and impacting aquatic life. Cover crops can bind the nutrients vulnerable to runoff and leaching and release the nutrients to the succeeding cash crop after their timely termination. A field study was conducted at National Center for Alluvial Aquifer Research, Leland, MS to assess the impact of cover crops [cereal rye (*Secale cereale* L.*)*; hairy vetch (*Vicia villosa* Roth); wheat (*Triticum aestivum* L.)-radish (*Raphanus sativus* L.)-turnip (*Brassica rapa* subsp. Rapa L.) mix) and no-cover crop control] and irrigation treatments (dryland and irrigated) on sub-surface water quality on a very fine sandy loam soil. The experimental design was a randomized complete block with four replications. Suction cup lysimeters were installed at 30 and 46 cm soil depths for collecting soil solution samples. Soil solution samples were analyzed for pH, electrical conductivity and anion concentrations (NO_2-N, NO_3-N, Cl^-, PO_4-P, and SO_4-S) using ion chromatography. Cover crops reduced NO_3-N concentration as compared to no-cover crop control by 75 to 99% at 46 cm soil depth under irrigated conditions. Under dryland conditions, cover crops resulted in 79 to 88% lower soil solution NO_2-N concentration than the no-cover crop control at 46 cm soil depth. No differences were obtained due to irrigation and cover crop treatments for soil solution PO_4-P and SO_4-S concentrations.

P1.28

USING GRAFTING TECHNIQUE TO DETECT THE VIRAL RESISTANCE OF TRANSGENIC SWEET POTATO PLANTS

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As one of the top three vegetable crops grown in Mississippi, one major limitation to sweet potato (*Ipomoea batatas* (L.) Lam) production is the cumulative effect of virus infection leading to cultivar decline and yield losses. Due to the difficulty of traditional breeding for virus resistance in sweet potato, genetic engineering has been developed as an alternative tool to target on this agricultural issue since the mid-nineties. In this study, by using *Agrobacterium*- mediated transformation approach, 10 transgenic plants which harboring *Sweet potato leaf curl virus* (SPLCV) and the *Sweet potato virus C* (SPVC) genetic segments in the genome of sweet potato line PI318846 were generated. For investigation on transgenic plants' resistance to SPLCV and SPVC, a grafting-based protocol has been well developed. Transgenic sweet potato plants were used as scion to graft onto SPLCV or SPCV infected sweet potato rootstock, or SPLCV or SPCV infected sweet potato plants were used as scion to graft onto transgenic plants rootstock individually. Morning glory (*Ipomoea*. *setosa* Ker. Gawl) were used as indicating plants for viral symptom development and non-transgenic plants were used as negative controls. All the grafted plants were kept in a dew chamber which was developed to provide high humidity. The grafting successful rate was over 80%. The samples were then collected after 4 weeks of grafting for viral detection by using PCR, and the results will be further discussed.

P1.29

USING IMAGE ANALYSIS TO MEASURE ROOT LENGTH OF CORN AND VETCH SEEDLINGS

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Root length is an important plant property that determines absorption of necessary water and nutrients. Strong root systems are vital to plant health because the root system developed in the seedling stage allows for maximum nutrient absorption, leading to a strong plant that produces optimal yield. Root length is defined as the distance between the root tip and the root's point of emergence from the seed. Root length measurement is a time-consuming process; however, computer vision and imaging analysis software can streamline this process while also being user-friendly. The objective is to study the efficacy of automating root length measurement

using image analysis software. Two species, corn (*Zea mays L.*) and hairy vetch (*Vicia villosa*) were chosen for this experiment due to their morphologically differing root systems. Seeds were sown in a loamy agricultural soil formed from Mississippi River alluvium in 8" pots. Thirty seedlings were removed (intact) for measurements on each of three dates, 4, 7, and 14 days after planting. The same procedure was followed for the vetch on days 7 and 14 after planting. The soil was removed by washing the entire seedling, then the seedling was imaged. Fresh weight was determined on the seedling, next, fresh and dry weights determined on the root system. The images were loaded, and analysis was completed using Ecognition software. Root length measurements derived from the imaging software correlated to the measurements taken by hand. This indicates that root length measurements can be automated, independent of plant species or root system.

P1.30

SURVIVAL AND REGROWTH RATE OF *Listeria monocytogenes* ScottA SEROTYPE 4B IN LOW TO HIGH CONCENTRATIONS OF QAC

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Mississippi State University, Department of Food Science, Nutrition and Health Promotion, Mississippi State, MS 39763

Biocides, such as disinfectants and sanitizers, are routinely tested for toxicity but not for sublethal effects on foodborne pathogens. Some biocides are known to induce an adaptive resistant phenotype. Since there are well developed stress mechanisms in Salmonella, it can induce adaptation to harsh environmental conditions. In this project, we are isolating stable biocide tolerant subpopulations of Salmonella by exposing cells to a gradient of low to high concentrations of quaternary ammonium compound (QAC) at 5 to 80 ppm. We are determining the survival, persistence, and regrowth of Salmonella Typhimurium (smooth morphotype) ATCC 14028 strain when cells are exposed to low to high concentration gradient of QAC in water. Our results show that Salmonella cells that are not killed at low QAC concentrations in water (10 ppm) have extended lag phase and able to grow back within 24 h. By using a pool of predominant isolates of high-risk Salmonella serotypes, this project will lead to understanding the role of sublethal concentrations of commercial disinfectant QAC in the induction of tolerant subpopulation of Salmonella that may persist in the food processing environment.s.

P1.31

DOES ELEVATED CARBON DIOXIDE CONCENTRATION AFFECT THE GROWTH AND DEVELOPMENT OF C3 AND C4 CROP SPECIES DIFFERENTLY?

Lauryn Polito, David Brand, Akanksha Sehgal, Charles Hunt Walne, Raju Bheemanahalli, and K. Raja Reddy
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Crops' response to elevated carbon dioxide e[CO_2] is of great interest as atmospheric carbon dioxide [CO_2] is projected to rise through the foreseeable future. We hypothesize that C_4 plants, with inherent built-in CO_2 enrichment mechanisms, will perform less under [eCO2] than C_3 plants. An experiment was conducted with two C_4 crops (Sorghum and Amaranthus) and three C_3 crops (cotton, soybean, and wheat) grown under optimal temperature (30/22 °C, day/night), nutrient, and soil moisture conditions at six levels of [CO_2], 320 to 820 at 100 ppm increments using sunlit growth chamber facility during vegetative growth and development. Shoot and root growth were measured at harvest, 34 days after sowing. The number of leaves produced on the mainstem was not responsive to e[CO_2] in all species studied. Leaf area showed quadratic trends and increased under [CO_2] up to 620 ppm and declined slightly at higher [CO_2] for all C_3 crops. For the two C_4 crops studied, leaf area response to e[CO_2] was modest but linear. Similar trends were observed for plant height, above-ground weight, and total plant dry weights among the species in their response to e[CO_2]. However, root weight responses to e[CO_2] were minimal in all crops studied. Even though partitioning to roots declined linearly with e[CO_2] in all species, changes in root versus shoot partitioning were more significant in wheat, followed by sorghum, Amaranthus, soybean, and cotton across [CO_2] levels. Therefore, projected [CO_2] levels have implications for C_3 and C_4 crops. Further studies are needed under limiting environmental stresses such as low and high temperatures, drought, and nutrient stresses. Phenotyping diverse genetic resources (within the species) and mapping genetic loci with greater partitioning potential to roots could help design crops for future environmental conditions.

P1.32

AN INVESTIGATION OF BACTERIA FROM ONION SHOOT

Jennifer Laifa and Jordan Johnson

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Plants can harbor bacteria which can provide protection and growth of the plant. Endophytes are microorganisms that live in living plant cells. The present study hypothesized that endophytes would be present in the onion shoot. In the present study, the seeds of the onion were purchased and grown for six weeks. After six weeks, the plants were harvested, measured, and weighed. The roots were separated from the shoots. The shoots were cleaned to remove debris. The shoots were then surfaced sterilized using sterile water and 70% ethanol. The shoots were mixed in sodium chloride solution using a mortar and pestle. The tryptic soy agar plates were used to grow bacteria. After 24 hours of incubation, the morphology of the colonies was observed. Simple staining procedures using methylene blue and Gram strain reactions were conducted. The colonies were also grown on mannitol salt agar. The result indicated that the colonies were round, smooth, elevated, cocci, and Gram-positive bacteria cells. The cells were catalase-positive and could ferment mannitol. The strains of bacteria were found to be from the genus *Staphylococcus*. In conclusion, *Staphylococcus* is one of the bacteria found in onion plants.

P1.33

ECONOMIC FEASIBILITY OF PRECISION AGRICULTURE TECHNOLOGY ADOPTION FOR SMALL FARMERS

Cristina Griffith
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Field variability has always been a problem for consistent and efficient farming. Spatial variables collected by observation and sensors can be used to identify and analyze changes in an area. Crop nutrients can be managed with soil sampling, moisture measurements, and fertilizer or spray applications in management zones to improve yields with optimal use of varying input levels. Precision agriculture technologies have faced slow adoption; the fastest growing accepted equipment are tractor guidance systems by growers and variable rate technology by supply retainers. Large farms have been early adopters because they can absorb fixed costs across more acres than smaller farms. Inequality in adoption of technologies in agriculture results from a minimum farm size capable of absorbing large investments in technologies.

The primary objective of this study is to identify and analyze precision agriculture technologies being used in crop production to assess the profitability and effectiveness of adoption. The specific objectives are to evaluate potential technologies for use by small-scale farmers and develop an adoption plan for representative farms. By interviewing Mississippi farmers, it was noted that they are beginning to realize the economic and environmental benefits of adopting precision agriculture practices. Their willingness to adopt and their plans for future technology adoption were recorded.

Partial budget analysis reveals relevant, unique farm solutions to integrate further precision agriculture technologies. Technology values build as previous technologies are adopted. Divisions by cost and ease of implementation created a low, medium, and high level of precision agriculture technology. Example partial budgets were made as a tool for farmers to analyze the economic profit of single-technology or bundled-technology adoption to their operation.

The concepts behind precision agriculture are not new, and most farmers already have a basis of knowledge from their farming experience to identify possible management zones. The goal of precision agriculture research and

Extension outreach is to share tools and resources with farmers, enabling them to make the best, informed decision for their operation considering personal goals, perceptions, and values.

P1.34

IDENTIFICATION OF ALLELOCOMPOUNDS IN ROOT EXUDATES OF COTTON CHROMOSOME SUBSTITUTION LINES ASSOCIATED WITH SUPPRESSION OF PALMER AMARANTH

Alyssa Miller, Mary Gracen Fuller, Ziming Yue, Te Ming Tseng
Mississippi State University, Mississippi State, MS, USA

Palmer amaranth (*Amaranthus palmeri*) is a problematic weed species, especially for cotton (*Gossypium hirsutum*). With the advent of chemical control, Palmer amaranth populations have developed resistance to commonly used herbicides. It is imperative to develop alternative weed control methods to slow the evolution of herbicide-resistant weed populations. Eleven chromosome substitution (CS) cotton lines (CS-49, CS-38, C-34, CS-39, CS-27, CS-13, CS-50, CS-26, CS-25, CS-43, and CS-46) previously screened for weed-suppressing abilities were utilized in this study. The cotton lines were tested using the established stair-step structure methodology, and the experiment was replicated three times. Height (cm) and chlorophyll concentration (CCI) were measured for each plant in the system. Statistical analysis indicated a difference in Palmer amaranth height reduction and chlorophyll concentration among the CS lines tested for 7, 14, and 21 DAE. The 14th DAE was determined to maintain the largest range in Palmer amaranth height reduction among CS lines. A 77% difference in height reduction was observed between the top-performing CS lines (CS-43, CS-34, CS-26, and CS-50). Mean susceptibility was calculated based on significant differences, where CS-34 was determined to induce the most susceptibility in Palmer amaranth with a value of 68%. Hierarchical clustering was guided by K-clustering techniques, and a principal component analysis was conducted where the most competitive CS lines were determined to be: CS-23, CS-26, CS-50, CS-34, CS-43, CS-46, CS-39, and CS-25. The development of allelopathic cotton varieties would be especially valuable for farmers battling herbicide-resistant weed species or looking to prevent the accelerated evolution of herbicide-resistant populations. Allelopathy, however, is a complex phenomenon that requires further study to be properly exploited in agricultural settings.

P1.35

EFFECTS OF TEMPERATURE AND SALINITY ON THE SEED GERMINATION OF COTTON CHROMOSOME SUBSTITUTION LINES

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Cotton seed germination is affected by many factors, primarily salinity and temperature during the germination stages. This study evaluates these factors and how they affect seeds of the cotton chromosome substitution (CS) lines during their germination stages. The temperatures tested were 15°C (cold), 30°C (optimum), and 38°C (high). These seeds were also exposed to different salinity conditions in combination with temperature treatments. The salinity values were 4 and 8ds/m. Seed germination capacity was then recorded at 4, 8, and 12 days after treatment (DAT). Each cotton CS line used had three seeds in each dish and for each temperature and salinity. In total, there were 135 Petri dishes and 25 seeds used for replications for each cotton CS line. Findings from this study show how different environmental situations affect the germination of cotton CS lines and help show what precautions can be taken to successfully germinate their seeds and grow them.

P1.36

ROOTING RESPONSE OF MOUNTAIN AZALEA USING AUXIN BASAL QUICK DIP ON NEW GROWTH

Jenny B. Ryals, Patricia R. Knight, Christine E. H. Coker, Gary R. Bachman, Jim M. DelPrince, Patricia R. Drackett, Scott Langlois, David Brand, Anthony T. Bowden

Mississippi State University, Mississippi State, MS, USA

P1.37

CONSTRUCTION AND TESTING OF AN ELECTRONIC AVIAN DETERRENT DEVICE (E.A.D.D.) FOR CATFISH FARMS IMPACTED BY FLOODING

Kaldrian Moore[1], Desiree Mills[1], Romans Grant[1], Zachary Dixon[2], Santanu Banerjee[1], Meherun Laiju[1], and Scoty Hearst[2]

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Natural disasters such as wildfires, earthquakes, flooding, and extreme weather are on the rise worldwide. Flooding has become a major problem for Mississippians in the past few years, especially for the Mississippi catfish farmer. Mississippi is the nation's largest catfish producer, producing 60% of the catfish on the market today. The Mississippi Delta was hit hard with around 200,000 acres impacted by flooding in June of 2019. Farmland and catfish farms were underwater destroying vital crop production of corn, soybean, and cotton as well as catfish operations. Although the flood waters have receded, new problems have emerged making recovery from the flooding disaster more difficult for catfish farmers. A new aquatic habitat produced by flooding attracted more avian pests to the Mississippi Delta region, that now have made Mississippi catfish farms a regular food stop along their yearly migration. This increase in avian pest activity has left catfish farmers and their crops vulnerable causing a huge financial burden to farmers and the catfish industry as a whole. As a result catfish farmers have had to increase the use of butane cannons, bangers, poppers, and other deterrents to maintain fish production. To help reduce this burden, we have built an electronic avian deterrent device (E.A.D.D.), that would be a more long-term and sustainable solution to the avian pest problems harming catfish farmers recovering from the recent flooding disaster. Here, we detail the construction and field testing of our E.A.D.D. prototype at a catfish farm in the Mississippi Delta. We created over 21 unique bird deterrent sounds and tested their efficiency in deterring wading birds such as Egrets and Herons away from catfish ponds. We used the most efficient deterrents in our E.AD.D. and examined changes in bird activity at the catfish farm site over a 26 day survey period. Overall, we found that the use of our E.A.D.D. significantly reduced the number of avian pests inhabiting the catfish farm, and was more effective than the current deterrent methods. The E.A.D.D. significantly reduced the number of avian pests from over 900 birds down to less than 200 birds. This data validates further study into the unique spectral properties of the sounds that deterred birds most efficiently. With further research and development, we suggest that our prototype E.A.D.D. could ideally be use to create a non-lethal bird deterrent useful for reducing catfish predication from wading birds on catfish farms and ultimately improve crop yields for catfish farmers impacted by flood related avian pests

3:30 **Dodgen Lecture and Awards Ceremony (B5-6)**

General Poster Session (Immediately Following Dodgen Lecture C-Poster Hall)

Friday, August 6, 2021

MORNING

Room D2

8:00-9:10 Division Workshop

DEVELOPING IN-CULTURE METHODS USING COLOR CHANGE FOR DETECTION OF TOXINS FROM PATHOGENIC FUNGI.

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[e] Crop Genetics Research Unit, Agricultural Research Service, U.S. Department of Agriculture, Stoneville, Mississippi, USA

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Row crop foods in field and storage are commonly infested with fungi, and certain fungi produce mycotoxins that can adversely affect human, livestock, and plant health. In-culture methods were developed using color formation for two different toxins, aflatoxin from *Aspergillus flavus*, which causes Aspergillus ear rot in corn, and botryodiplodin from *Macrophomina phaseolina*, which causes charcoal rot disease in >500 commercially important plants including soybean, corn, and strawberry. For aflatoxin detection, a sensitive, efficient, and inexpensive empirical detection method in *Aspergillus* isolates was refined using chemical analysis of the yellow pigment produced by aflatoxigenic isolates to be pH indicators and biosynthetic intermediates on the pathway to aflatoxin. These yellow pigments turn into a more-readily detected plum-red color on exposure to ammonium hydroxide vapor. This aflatoxigenicity test was found to correlate with the presence of aflatoxins in cultures of more than 97% of aflatoxin-producing isolates. For botryodiplodin detection, *M. phaseolina* isolates were cultured on Czapek-Dox medium supplemented with glycine. Cultures that secreted botryodiplodin produced a pink to red pigment in the agar medium. For both toxigenic fungi, these simple and inexpensive techniques were accurate in identifying toxin-producing fungi. These in-culture detection methods are very useful for world-wide for detection of these potent toxins and will be useful in laboratories that cannot afford expensive analytical equipment such HPLC and LC-MS/MS to analyze samples.

O1.13

9:15 CHARACTERIZATION OF SICKLEPOD EXTRACT AS A DEER REPELLENT AND ANTIFEEDANT FOR SOYBEAN LOOPER *Chrysodeixis includens* (Walker) (Lepidoptera: Noctuidae)

Ziming Yue

Mississippi State University, Mississippi State, MS, USA

Insects and deer (*Odocoileus virginianus*) are two main pests of soybean (*Glycine max* L.) production in the US. The annual deer damage on row crops was estimated around $4.5 billion while the annual soybean insect losses were estimated around $3.9 billion in the US. Sicklepod (*Senna obtusifolia* L.), one of the top ten trouble weeds in agriculture in the southeast of the US, was used to prepare an extract that had both deer repelling and insect antifeedant effects. New formulations of sicklepod extracts were made using methanol extract instead of water extract to test their deer repelling and insect antifeeding effects on soybean looper *Chrysodeixis includens* (Walker) (Lepidoptera: Noctuidae), one of the top three most economically damaging insects in soybean production in the midsouth. For deer repelling effects, the new formulation, for the first time, matched and exceeded Liquid Fence, the best commercial deer repellent on the market. For soybean looper antifeedant effects, the new formulations were evaluated through soybean looper biomass gain after feeding with soybean leaves treated with different extracts for five days. The looper biomass gain for the new extract was less than half of the previous extract. HPLC analyses of the total anthraquinone derivative concentration (active ingredients of the extracts) increased from 160 ppm in the last formulation to 500 ppm in the new formulation. The results showed that the new formulation is a more potent deer repellent and stronger antifeedant for soybean looper than the previous formulation with anthraquinone derivatives as the active ingredients.

O1.14

9:30 APPLICATION OF PLANT AND ANIMAL WASTES ON MUSCADINE (VITIS ROTUNDIFOLIA) VINEYARD AND ITS LONG-TERM EFFECT ON YIELD AND SOIL HEALTH

Girish K. Panicker[1], Leonard Kibet[1], Willie Mims[1], Frank Matta[2], Juan Silva[2]

[1]Alcorn State University, MS, USA and [2]Mississippi State University, MS, USA

Consumers demand for organic produce continues to climb unexpected heights due to severe health related problems. Muscadine grapes (*Vitis rotundifolia* var. Summit), was grown on Memphis Silt Loam soil (Typic Hapludalph, silty, mixed, thermic). Three treatments of organic manures (cow-C; poultry-P; cow+poultry-CP) with gypsum and pine mulch were applied in a CRD. Control received inorganic fertilizers and traditional cultural practices. Leaf area index (LAI), percent canopy cover, stem diameter, and yield were higher in organic plants. There was no significant difference in diameter, length, and degree brix of the fruit. Soil compaction was always higher in control with lower soil moisture content and the compaction was lower in organic treatments due to higher level of organic matter content. Concentrations of nitrate-N and P were higher in the surface soil treated with organic manures, but there was no trend in N or P enrichment in lower layers of the soil. Comprehensive assessment of soil health done by Cornell Soil Health Lab, after seventeen years of study, showed the following great outcome: physical aggregate stability 19.0 25, biological organic matter 4.0 85, biological ACE soil protein index 6.8 43, biological soil respiration 0.8 75, biological active carbon 747 90 and chemical soil pH 7.1 100 with overall quality score of 72 (Excellent). The results suggest that the controlled application of animal and forest wastes in basins of fruit trees can be an agronomically and environmentally sound practice to increase yield, and keep the soil and humans healthy.

O1.15

9:45 PHYTOREMEDIAITON OF URANIUM IN CONTAMINATED SOILS

Frank (Fengxiang) Han

Jackson State University, Jackson, MS, USA

Phytoremediation has been emerged as an environmentally friendly cost-effective green technology to remediate heavy metal polluted soils. The objectives of this study were to examine the feasibility of phytoremediation in cleaning up DU polluted soils with various U sources. The mobility and bioavailability of DU and redistribution were influenced by U sources, U speciation and plants species. UO_2, UO_3 and $UO_2(NO_3)_2$ were used as U sources. We found that DU was accumulated in roots and less transported into shoots. U uptake in both plants were significantly higher from the UO_3 and uranyl polluted soils than from UO_2 polluted soils since the UO_3 and $UO_2(NO_3)_2$ polluted soils had higher exchangeable, weak acid extractable and liable U than the UO_2 polluted soils. After a growing season, the exchangeable U, weak-acid soluble U and liable U in soils decreased and the redistribution of U fractions was affected by U sources/speciation. Overall U removal efficiency after one growing season reached 3.5% in the UO_3 polluted soil with Indian mustard, followed by uranyl (1.6% with both Indian Mustard and Sunflowers) and lest efficiency from the UO_2 polluted soils. The coupled electrokinetic phytoremediation has been proved to be effective to remove heavy metals from contaminated soil. Under the electric field the

soil pH became acidic in the anode and basic in the cathode, resulting mobilization of U into more soluble and potential bioavailable forms such as soluble, exchangeable, and carbonate binding fractions after electrokinetic processes. Electrokinetic treatment enhanced plant uptake of U, depending upon the soil U sources. The present study suggests phytoremediation coupled with electrokinetic treatment may be a potential candidate for remediation of DU polluted soils.

O1.16

10:00 REGULATOR OF CHLOROPLAST BIOGENESIS AND HEMERA COLLABORATE TO PROMOTE ARABIDOPSIS THERMOMORPHOGENESIS BY STABILIZING PIF4 IN THE DAYTIME

Yongjian Qiu
University of Mississippi, University, MS, USA

A warm climate has great impacts on many aspects of plant growth and development. Non-stressful ambient temperature is sensed by phytochrome B (PHYB) at night in a short-day (SD) regime but during daytime in a long-day (LD) photoperiod. PHYB signals primarily through the temperature-responsive transcriptional regulator Phytochrome-Interacting Factor 4 (PIF4) and requires the transcriptional activation activity of the co-activator HEMERA (HMR) in daytime thermosensing. To identify new components in the PHYB-mediated daytime thermoresponsive pathway, we carried out a genetic suppressor screen in Arabidopsis using thermo-induced hypocotyl elongation as a readout. Taking advantage of hmr-22, a missense allele of HMR that carries a loss-of-function D516N mutation in HMR's transcriptional activation domain and fails to induce thermoresponsive genes and PIF4 accumulation, we isolate more than thirty suppressors of hmr-22 that completely rescue its short-hypocotyl defect at a warm temperature (27°C). Here we report one hmr-22 suppressor named rcb-101, a missense allele of REGULATOR OF CHLOROPLAST BIOGENESIS (RCB). The suppressor rcb-101 completely rescues the defects of hmr-22 in thermal response but it has little effect on the wild-type allele or the null allele of HMR, suggesting an allele-specific suppression of hmr-22 by rcb-101. Interestingly, like in hmr mutants, thermo-induced expression of PIF4 target genes and PIF4 accumulation are also abolished in the null allele of RCB, suggesting that RCB plays a similar function as HMR in thermosensory response. We further demonstrate that RCB physically interacts with HMR both in vitro and in vivo. Surprisingly, the missense mutation in hmr-22 doesn't affect the HMR-RCB interaction, suggesting one or more unknown factors are involved in regulating HMR's thermomorphogenetic function. In summary, our findings reveal a new layer of PHYB-mediated daytime thermosensing mechanism, in which RCB and HMR work cooperatively to promote PIF4 accumulation and PIF4-dependent induction of thermoresponsive genes. This research also lays the groundwork for current studies on other hmr-22 suppressors, some of which are key factors in stabilizing the thermoregulator PIF4.

O1.17

10:15 IMPACT OF SOIL AMENDMENTS FOR CROP PRODUCTION ON SOIL HEALTH AND WATER QUALITY

Leonard C. Kibet, Lee Jones, Jacqueline Mccomb, Girish Panicker, Samuel Mwangi, Frank Mrema
Alcorn State University, Lorman, MS, USA

There is a global concern about the overall decline in soil health and water quality. The decline in soil and water quality has increased the cost of agricultural production. Hence, the objectives of this experiment are 1) to assess the effect of poultry litter, compost manure, and urea fertilizer on soil health under an alley cropping system; 2). to assess the impact of poultry litter, compost manure, and urea fertilizer on crop yields under an alley cropping system. The study area is in Alcorn State University, Lorman, MS, and the soil are classified as Memphis silt loam. The experiment plots measured 10 x15ft with alleys of 10 ft. in length. Four treatments were used (compost manure, poultry litter, urea, control) in a randomized complete blocks design. The treatments were applied at the surface and incorporated into the soil at 130 lbs. N/acre. Sweet Corn (Zea Mays) seeds were planted in research plots at a spacing of 1.5 ft. between plants and 3 ft. between the rows. Preliminary results showed no significant differences in soil health properties in the first season. However, crop yields were significantly higher under the urea treatment than the poultry litter treatment, but no significant differences were observed in later growing seasons regarding cabbage yield, corn biomass, and soil health parameters and nutrients that include: N, P, K, pH, aggregate stability, organic matter percentage, and cation exchange capacity. The experiment is ongoing and complete data will be presented at the meeting.

O1.18

10:30 IMPACT OF HEAT STRESS ON REPRODUCTIVE SUCCESS AND GRAIN YIELD IN CEREALS

Raju Bheemanahalli

Mississippi State University, Mississippi State, MS, USA

Extreme heat stress events during the reproductive stage are becoming a serious threat to grain production, resulting in a significant loss in genetic gains achieved over the past decades. Even in current environmental conditions, heat stress coinciding with reproductive stages has resulted in substantial economic losses in field crops grown in different geographical locations. Heat stress induces significant damages to male and female reproductive organ viability during flowering, thus causes a linear decline in fertility. Grain crops have adapted to a harsh environment with different mechanisms to reduce these damages by employing heat escape (time-of-day anthesis), transpiration cooling (avoidance), or true tolerance (reproductive success) mechanisms. The introduction of heat escape trait in rice has been successfully altered to induce early morning flowering and minimized heat stress-induced increase in spikelet sterility during flowering. Unlike rice, investigating flowering patterns in sorghum and wheat displayed a highly conserved peak flower opening time during cooler hours cooler. We explored the genetic variability in tolerance to heat stress at flowering (pollen germination, pollen tube growth, and ovaries and seed number) in sorghum. In addition, our attempts to develop robust anther-based biomarkers as a fast-diagnostic tool to select heat-tolerant genotypes in breeding programs under a warming climate will be discussed, taking wheat as a case study. Breeding targets to induce greater heat stress resilience at flowering and grain filling will be highlighted.

11:00 Divisional Awards Ceremony

11:30 Divisional Business Meeting

Friday, August 6, 2021

AFTERNOON

12:00-1:00	Plenary Speaker
1:00-3:00	Mississippi INBRE/ Millsaps Symposia

CELLULAR, MOLECULAR, DEVELOPMENTAL BIOLOGY

Chair: Donna M. Gordon

Mississippi State University

Chair: James A. Stewart, Jr.

University of Mississippi

Thursday, August 5, 2021

MORNING

Room D4

Oral Presentation Session I

Moderators: Drs. Donna M. Gordon and James A. Stewart, Jr.

O2.01

9:00 ONTOGENIC CHARACTERIZATION OF AMBLYOMMA MACULATUM BACTERIAL COMMUNITIES

Abdulsalam Adegoke[1] and Shahid Karim[1,2]School of Biological, Environmental, and Earth Sciences, The University of Southern Mississippi, Hattiesburg, MS, USA and [2]Center for Molecular and Cellular Biosciences, The University of Southern Mississippi, Hattiesburg, MS, USA

The Gulf Coast tick, *Amblyomma maculatum is* the competent vector of *Rickettsia parkeri*, a spotted fever group rickettsiae, and an emerging human pathogen of public health significance. The taxonomic composition of the bacterial communities within this tick species throughout the different life stages and how they affect vector competence remains a black box. In this current study, we aimed to utilize high throughput sequencing of the bacterial 16S ribosomal RNA to characterize both the unique and commonly observed bacterial assemblages present in all developmental stages including the eggs; unfed and blood-fed larvae, unfed and blood-fed nymphs; unfed adult male and female, unfed and blood-fed salivary glands, midgut and ovarian tissues in *Rickettsia parkeri* infected and uninfected *A. maculatum* ticks. We aimed to understand if the bacterial communities remain fairly constant across different life stages of the Gulf Coast tick. In addition, the impact of the SFGR *Rickettsia parkeri* on bacterial community assemblages across different tick tissues will also be investigated. The bacterial communities were analyzed and quality checks were carried out using the Qiime2 bioinformatics pipeline and raw data were visualized using R language. Taxonomic classification of the different operational taxonomic units (OTUs) across different features was assessed using alpha and beta diversity metrics. Overall comparison between the bacterial richness and evenness showed reduced bacterial composition in *R. parkeri* infected groups compared to uninfected groups. The results of the community profile and bacterial abundances will be presented.

O2.02

9:20 OXIDATION OF HEMOGLOBIN BY *STREPTOCOCCUS PNEUMONIAE*-PRODUCED HYDROGEN PEROXIDE CAUSES THE RELEASE OF REDUCED HEME (FE^{3+}) AND ITS DEGRADATION

Anna Scasny[1], Erin McDevitt[1], Faidad Khan[1], Courtney D. Thompson[1], Zehava Eichenbaum[2], Larry S. McDaniel[1], Jorge E. Vidal[1]

[1]Department of Microbiology and Immunology, University of Mississippi Medical Center, Jackson, MS, USA and [2]Georgia State University, Atlanta, GA, USA

Streptococcus pneumoniae (Spn) produces a greenish halo on blood agar plates referred to as alpha-hemolysis. The alpha-hemolysis halo resembles oxidative reactions of hemoglobin (Hb) that generates variants with different visible spectra (i.e., color). Hb contains iron, bound to a prosthetic heme group in each of the two alpha and two beta chains. The oxygenated form of Hb produces a characteristic absorbance spectra, including a heme-bound hemoglobin peak (i.e., Soret peak) and two oxy-Hb peaks. Spn produces high amounts of highly oxidant hydrogen peroxide thereby we investigated if cultures of Spn oxidize Hb. TIGR4, D39, R6, and EF3030 and isogenic derivative Δ*ply* mutants produced similar alpha-hemolytic halos on blood agar plates, while cultures of hydrogen peroxide knockout Δ*spxB*Δ*lctO* mutants lacked this characteristic halo. Spectroscopic studies demonstrated that TIGR4 released hemoglobin from erythrocytes within 1 h of incubation and caused the oxidation of oxy- Hb to met-Hb. TIGR4Δ*spxB*Δ*lctO* released Hb but did not oxidize oxy-Hb. With an extended incubation time, however, the heme- hemoglobin Soret peak was lost in wt cultures but not in those of Δ*spxB*Δ*lctO*. Experiments conducted with human Hb or oxy- hemoglobin purified from sheep erythrocytes confirmed the loss of the Soret peak when incubated with wt strains but not with Δ*spxB*Δ*lctO* mutants. An in-gel heme staining assay demonstrated that heme was degraded by incubation with wt strains but not in those infected with Δ*spxB*Δ*lctO* mutants. We demonstrated that oxy-Hb is oxidized to met-Hb by *S. pneumoniae*-produced hydrogen peroxide causing the release of the reduced heme (Fe^{3+}) and its degradation.

O2.03

9:40 IDENTIFICATION OF A SOLO ACYLHOMOSERINE LACTONE SYNTHASE FROM THE MYXOBACTERIUM *ARCHANGIUM GEPHYRA* (DSM 2261)

Hanan Albataineh, Maya Duke, Sandeep Misra, Joshua S. Sharp, D. Cole Stevens

University of Mississippi, University, MS, USA

INTRODUCTION: Acylhomoserine lactone (AHL) quorum signaling systems are abundant throughout Proteobacteria enabling the bacteria to monitor their environment and alter their gene expression in response to fluctuations in cell-population density. AHLs are diffusible, self-produced extracellular chemical signals that bind to LuxR-type receptors, which induce the expression of LuxI- type AHL synthases. Thus, they are considered autoinducers. Myxobacteria are a unique group of Proteobacteria that are best known for their well-coordinated social behavior, ability to predate other microbes, and production of a plethora of pharmacologically active specialized metabolites. No evidence of AHLs production by myxobacteria has been reported, but data suggests that myxobacteria respond to exogenous AHLs produced from their potential prey. Of all the myxobacterial biosynthetic gene clusters deposited in the antiSMASH database, only one putative AHL synthase encoding gene, *agpI*, was observed in the genome of the myxobacterium *Archangium gephyra* (DSM 2261). Unlike typical AHL signalling systems, there is no apparent LuxR receptor within the genome *A. gephyra*. **PURPOSE:** Identification of the first AHL synthase from myxobacteria and determination whether AgpI is an uncommon example of an orphaned AHL synthase. **METHODS:** Bioinformatic analysis of the AHL synthase AgpI using antiSMASH, blastp, MEGA7, and EFI-EST was performed. HMMSEARCH tool was utilized for AHL binding site search. Functional assessment of *agpI* was performed by heterologous expression of the myxobacterial AHL synthase AgpI in *Escherichia coli* BL21. LC-MS/MS and molecular networking was used to analyze the extracts of *A. gephyra*, the heterologous host *E. coli* BL21. **RESULTS AND DISCUSSION:** The bioinformatic analysis shows that AgpI is highly homologous to other bacterial functional AHL synthases with no cognate AHL receptor encoded in the genome of A. gephyra. Upon analyzing the extracts of *A. gephyra*, no detectable AHL metabolites are observed in A. gephyra extracts. However, heterologous expression in *E. coli* produced detectable quantities of 3 AHL signals including 2 known AHLs, C8-AHL and C9-AHL. The results suggest that AgpI of *A. gephyra* is a functional, orphaned AHL synthase. While the regulatory mechanism and the utility to the predatory myxobacterium remain unknown, the result provides a unique perspective and supports the continued investigation of small molecule interactions that contribute to microbial community structures.

O2.04

10:00 MSAABCR REGULATION OF ANTIBIOTIC TOLERANCE DEPENDENT ON ENERGY METABOLISM IN *STAPHYLOCOCCUS AUREUS*

Shanti Pandey, Gyan S. Sahukhal, Mohamed O. Elasri

The University of Southern Mississippi, Hattiesburg, MS, USA

Staphylococcus aureus is a prominent human pathogen that causes systemic diseases including osteomyelitis, infective endocarditis, bacteremia and pneumonia. Characteristically, these infections are often chronic in nature and difficult to treat. Such recalcitrance of staphylococcal diseases is largely caused due to the presence of antibiotic tolerant persister cells. A bacterial subpopulation, persister cells, exhibit transient non-growing state accompanied with transient yet extreme antibiotic tolerance. Despite, tremendous clinical significance, the mechanisms underlying formation of persister cells is largely unknown. So far, reduced metabolism accompanied with the depletion of ATP has been associated with persister generation in *S. aureus*. Therefore, to correlate the energy state with persister generation, first, we measured the influence of *msaABCR* operon in metabolic activities in the late exponential growth phase when the TCA cycle is activated in S. aureus. The results showed higher TCA cycle activities along with higher ATP and NADH content in the *msaABCR* mutant as compared to the wild-type USA300 LAC. Then, we measured the persister frequency in the late exponential growth phase and found that *msaABCR* mutant formed significantly less persister cells against major antibiotic classes. Considering that all the stationary phase *S. aureus* cells are extremely tolerant to almost all traditional antibiotics, inability of the *msaABCR* mutant to form persisters in the stationary phase specifically against aminoglycosides stress led us to hypothesize a different regulatory mechanism of persister generation in *S. aureus*. In the stationary phase, we observed higher membrane potential in the *msaABCR* mutant as compared to the USA300 LAC. Since, uptake of aminoglycosides requires membrane potential, these results suggested increased membrane potential in the *msaABCR* mutant led to the decreased antibiotic tolerance against aminoglycosides stress. Furthermore, we also observed direct regulation of TCA cycle and electron transport chain (ETC) by *msaABCR* via binding to catabolite control protein (*ccpE*) and nicotinamide adenine dinucleotide dehydrogenase (*ndh2*) gene respectively. Further, we plan to examine modulation of metabolism by *msaABCR* operon during infection.

10:20 - 10:30 BREAK

Oral Presentation Session II

Moderators: Drs. Donna M. Gordon and James A. Stewart, Jr.

O2.05

10:30 TARGETING OF *CANDIDA ALBICANS* BIOFILM BY THE ANTIFUNGAL OCCIDIOFUNGIN

Rabina Kumpakha and Donna Gordon

Mississippi State University, Mississippi State, MS, USA

Candida albicans is a predominant human fungal pathogen capable of forming biofilms on biotic and abiotic surfaces. Biofilm-related infections are often associated with medical devices including implants, intravascular catheters, dentures, and artificial prostheses. As cells in a biofilm are highly resistant to antifungal treatments, biofilms are considered a leading cause of persistent human infections. Various virulence factors, including the yeast-to-hyphae morphological switch, contribute to biofilm formation. Prior studies in our lab have shown that the antifungal compound, occidiofungin, effectively inhibits filament formation in *C. albicans*. In this study, we aim to extend these findings to determine whether occidiofungin has antibiofilm activity. Data from antibiofilm susceptibility assays found that occidiofungin effectively eradicates biofilms on both plastic and silicon surfaces. The metabolic activity of cells in intact biofilm following occidiofungin treatment of early-stage and mature biofilms were quantified using an XTT assay. The results indicate that occidiofungin can eradicate cells from both early and mature biofilms, however a four-fold higher dose of occidiofungin was required for the mature biofilm. These findings are likely linked to differences in the cell number between these two treatment regimes. Further confirmation that occidiofungin could target cells in a biofilm was determined by quantification of viable cells using CFU assays. The viable colony count data were found to correlate with the XTT assay data. Together these results indicate that occidiofungin could be a promising candidate for treatment of *C. albicans* biofilm associated infections although additional studies are required to examine biofilms formed by other non-albican *Candida* species.

O2.06

10:50 DEFICIENCY OF GLYCOSYLATION IN MOUSE TROPHOBLAST STEM CELLS REDUCES ZIKA VIRUS INFECTIVITY

Biswas Neupane, Mona Fendereski, Yan-Lin Guo, Fengwei Bai The

University of Southern Mississippi, Hattiesburg, MS, USA

Trophoblast stem cells (TSCs), derived from trophectoderm layer of the blastocyst, are the precursors of the placenta cells. Zika virus (ZIKV) is a mosquito-transmitted flavivirus that can infect the placenta and cause congenital Zika syndrome in newborn babies. To investigate if mouse TSCs are permissive to ZIKV infection, we inoculated TSCs with ZIKV that were prepared in Vero cells ($ZIKV_{vero}$). We found that TSCs supported ZIKV replication, albeit at a level compared to Vero cells. Interestingly, we also found that ZIKV generated in TSCs ($ZIKV_{TSC}$) exhibited a slower replication rate and less cytopathic effect than $ZIKV_{vero}$ when they infected Vero cells. Consistent with this, $ZIKV_{TSC}$ produced lower levels of viremia and death in type I interferon receptor-deficient (*Ifnra1*$^{-/-}$) mice compared to $ZIKV_{vero}$, indicating that ZIKV grown in the TSCs has reduced infectivity. $ZIKV_{TSC}$ can regain its infectivity when it grew in Vero cells for one passage. We further demonstrated that $ZIKV_{TSC}$ has impaired ability to bind to glycosaminoglycan (GAG) receptors on the surface of the host cells and the expression of glycosylation related genes is affected during ZIKV infection in TSCs when compared to that in mouse embryonic fibroblasts (MEFs). Collectively, these results suggest that mouse TSCs are deficient in the glycosylation that is essential for ZIKV infectivity.

O2.07

11:10 ENDOGENOUS CFTR EXPRESSION IN HUMAN EPITHELIAL CELL LINES

Zithlaly Amezquita, Justin Labonte, Ghanshyam D. Heda

Mississippi University for Women, Columbus, MS, USA

Introduction: CFTR is a plasma membrane protein that function as a chloride ion channel on surface of many epithelial cells. Mutation in this protein affects its function targeting many organs causing cystic fibrosis (CF). CF is a genetic disease that is most common among Caucasians of northern European origin. Detection of CFTR at the endogenous levels is cumbersome. The primary goal of this project therefore is to detect the expression of CFTR protein in non- transfected epithelial cell lines using an improved western blotting method [Heda et al, BioTechniques, 68(6), 319-325, 2020]. **Methods**: Human pancreatic epithelial cells lines expressing endogenous wild-type CFTR (Capan-1) and DF808-CFTR (CFPAC) were treated with 5mM sodium butyrate for 60h to upregulate the CFTR expression. A transfected lung epithelial cell line expressing exogenous wild-type CFTR (CFBE-wt) and its parental cell line (CFBE41o-) were included as a positive and negative controls, respectively. CFTR protein levels were determined by an improved western blotting and immunoprecipitation methods. Real-time quantitative RT-PCR (qRT-PCR) was used to determine the CFTR mRNA transcript levels. **Results:** Endogenous CFTR protein expression levels now for the first time can be readily detected with the help of an improved western blotting method. CFTR mRNA expression levels as

detected by qRT-PCR complimented the protein expression levels. **Conclusions:** Detection of endogenous CFTR protein expression levels that normally required cumbersome immunoprecipitation requiring large amounts of CFTR antibody now can be detected conveniently by an improved western blotting method. This detection method may be useful in CF diagnosis using patient specimen.

O2.08

11:30 DECIPHERING THE FUNCTIONAL ROLE OF GALECTIN IN TICK PHYSIOLOGY

Surendra Raj Sharma[1], Sumar Beauti[1], and Shahid Karim[1,2]

[1]School of Biological, Environmental, and Earth Sciences, University of Southern Mississippi, Hattiesburg, MS, USA, and [2]Center for Molecular and Cellular Biosciences, School of Biological, Environmental, and Earth Sciences, University of Southern Mississippi, Hattiesburg, MS, USA

Ticks are hematophagous species known to vector various viral, bacteria, protozoal pathogens and cause Alpha-Gal syndrome. Galectins are a family of conserved β-galactose-binding proteins and bind sugars such as N-acetylgalactosamine present in N-linked and O-linked glycolipids or glycolipids. Very little is known about their functions in tick biology. This study aims to characterize the functional role of galectin in galactose-α-1,3-galactose (α-gal) synthesis, transport, hematophagy, reproductive fitness, and microbial homeostasis. Motif scan and Clustal Omega analysis show that tick galectin possesses two conserved carbohydrate recognition domains and shares homology with other tick galectins. Time and tissue-dependent expression data show that galectin is ubiquitously expressed in tick salivary glands, midgut during prolonged blood- feeding. Still, surprisingly, the transcript levels in the ovary significantly up-regulated (20-60-fold) during the slow and fast blood-feeding phase. Silencing of galectin gene expression via RNA interference (RNAi) significantly down-regulated the vital galactose-metabolism genes namely, Alpha galactosidase, ß1,4 Galactosyl transferase, Galactokinase, Oligosyl transferase respectively in tick salivary glands. However, downregulation of these genes did not cause a significant reduction in α-gal; an antigen presented by tick saliva; essential to cause Alpha gal syndrome. Intriguingly, Galectin- silenced ticks showed impaired oviposition and increased microbial load in tick salivary gland and midgut tissue, indicating its potential role in tick immunity and microbial homeostasis. Together, these data provide valuable insight into tick physiology and provide information that helps elucidate the role of galectin in tick ovarian development and microbial maintenance. Keywords: *Amblyomma americanum*, salivary glands, midgut, ovary, Galectin, α-gal, alpha-gal syndrome, microbial homeostasis

12:00 - 1:00 GENERAL SESSIONS

Thursday, August 5, 2021

AFTERNOON

Room D4

MS-INBRE Microbiome Symposium

Organizer:

Dr. Shahid Karim (Shahid.Karim@usm.edu),

Center for Molecular and Cellular Biosciences

School of Biological, Environmental, and Earth Sciences,

The University of Southern Mississippi, Hattiesburg, MS-39406

1:00-1:05:

Welcome remarks

1:05-1:35 PM (Keynote talk)

How shipwrecks shape the microbiomes of the deep-sea (and why it matters)

Dr. Leila Hamdan,
School of Ocean Science and Engineering
The University of Southern Mississippi, Ocean Spring, MS 39564

1:35-1:55 PM:

An insight into the microbiome of the gulf-coast tick (*Amblyomma maculatum*)- PART 2

Abdulsalam Adegoke
School of Biological, Environmental, and Earth Sciences,
The University of Southern Mississippi, Hattiesburg, MS-39406

1:55-2:15 PM:

Exploring the microbiome of neo-tropical ticks hitchhiking on migratory birds en route to the United States of America

Raima Sen
School of Biological, Environmental, and Earth Sciences,
The University of Southern Mississippi, Hattiesburg, MS-39406

2:15-2:30 PM:

Understanding the interplay between the tick microbiome and Alpha-Gal Syndrome

Surendra Sharma
School of Biological, Environmental, and Earth Sciences,
The University of Southern Mississippi, Hattiesburg, MS-39406

2:30-2:55 PM

Drought stress and root-associated microbiome

Dr. Dmitri Mavrodi
School of Biological, Environmental, and Earth Sciences,
The University of Southern Mississippi, Hattiesburg, MS-39406

2:55-3:00 PM: Concluding remarks

Thursday, August 5, 2021

EVENING

3:30 Dodgen Lecture and Awards Ceremony (B5-6)

General Poster Session

(Immediately Following Dodgen Lecture C-Poster Hall)

P2.01

ASSESSMENT OF EVOLUTIONARY RELATIONSHIPS FOR PRIORITIZATION OF MYXOBACTERIA FOR NATURAL PRODUCT DISCOVERY

Hanan Albataineh, Andrew Ahrearne, D. Cole Stevens University of Mississippi, University, MS, USA

INTRODUCTION: *Myxobacteria* are a unique group of Gram- negative bacteria that are best known for their large genomes, production of diverse and novel secondary metabolites with potential clinical applications, and well-coordinated social behaviors. Their multicellular development and gliding motility enable the cooperative predation on other microorganisms, while starvation conditions induce the cooperative formation of fruiting bodies. Discoveries of novel myxobacteria have started to unveil the potentially vast phylogenetic diversity within the family *Myxococcaceae* and brought about an updated approach to myxobacterial classification. While traditional approaches focused on

morphology, 16S gene sequences, and biochemistry, modern methods including comparative genomics have provided a more thorough assessment of myxobacterial taxonomy. **PURPOSE**: To utilize long-read genome sequencing to generate high-quality draft genomes for different myxobacteria (2 myxobacteria previously classified *Archangium primigenium* and *Chondrococcus macrosporus* as well as 4 environmental myxobacteria newly isolated for this study) to investigate their taxonomic rank and biosynthetic potential. **METHODS:** *A. primigenium* and *C. macrosporus* were procured from the American Type Culture Collection (ATCC) as strain numbers ATCC 29037 and ATCC 29039, respectively. The other four myxobacteria strains were isolated from different soil samples using *Escherichia coli* baited WAT agar plate method. Genomic DNA was isolated and sent for genome sequencing. Average nucleotide identity (ANI) and digital DNA-DNA hybridization (dDDH) scores were calculated. Genome BLAST Distance Phylogeny (GBDP) minimum evolution tree was constructed. These three metrics were applied to analyze and compare the genomes. We assess the biosynthetic potential of each sequenced myxobacterium using BiG-SCAPE platform. **RESULTS AND DISCUSSION:** ANI and dDDH scores from comparative genomics suggest previously classified *A. primigenium* to instead be a novel member of the genus *Melittangium*, previously classified *C. macrosporus* to be a novel member of the genus *Corallococcus*. The four isolated myxobacteria include a novel *Corallococcus* species, two novel *Myxococcus* species, and a strain of *Corallococcus exiguus*. BiG-SCAPE results suggest genus-level conservation of biosynthetic pathways which support our preliminary taxonomic assignments. Altogether, we suggest that long-read genome sequencing benefits the classification of myxobacteria and improves the determination of biosynthetic potential for prioritization of natural product discovery.

P2.02

MEGA ELEMENTS ARE HIGHLY MOBILIZED IN THE NASOPHARYNX VIA TRANSFORMATION AND CONFER THE RECIPIENT S. PNEUMONIAE AN ADDITIONAL SURVIVAL ADVANTAGE

Babek Alibayov[1], Xueqing Wu[2], Ana G. Jop Vidal[1], Yih-Ling Tzeng[3], David Stephens[3], Jorge E. Vidal[1]

[1]Department of Microbiology and Immunology, University of Mississippi Medical Center, Jackson, MS, USA, [2] Department of Infectious Disease, Sir Run Run Shaw Hospital, College of Medicine, Zhejiang University, Hangzhou, China, and [3]Department of Medicine, Emory University School of Medicine, Atlanta, GA, USA

Background. *Streptococcus pneumoniae* (Spn) acquires genes for antibiotic resistance while residing in the nasopharynx. Macrolide-resistant Spn strains carry an efflux pump which genes are encoded in a ~5.4/5.5 kb locus *mef*(E)/*mel*, known as Mega. There are different insertion classes depending on the location of Mega in the chromosome. In this study we utilized an *ex vivo* human nasopharyngeal colonization model to study molecular events, including the recombination frequency (rF), leading to the acquisition of Mega elements. **Methods and Results.** TIGR4-isogenic derivatives carrying different Mega insertion classes (i.e., $TIGR4^{MEGA\text{-}1.I}$) were each incubated along with a recipient $D39^{Str\text{-}Tmp}$. $TIGR4^{\Omega ermB}$ with a chromosomal insertion of *ermB* was utilized as a control ($rF=7.295x10^{-5}$). The rF generated by each $TIGR4^{MEGA}$ strain was similar compared to $TIGR4^{\Omega ermB}$ ($rF=7.55x10^{-5}$, p=0.4666). Acquisition of Mega by D39 was due to transformation since DNaseI (15 U/ml) inhibited $D39^{Str\text{-}Tmp/MEGA}$ transformants. We also investigated the acquisition of Mega by a non-vaccine recipient $S34^{Tn916}$ (ST4640) from a NEC donor NT^{MEGA} (class 2.IVc). Recombinants $S34^{Tn916/MEGA}$ were obtained at a $rF=6.2x10^{-5}$ and the lineage and insertion site confirmed by Quellung, serotype-specific qPCR reactions, and whole genome sequencing (WGS). Mega can also be carried in transposons; as such we investigated the mobilization of Mega from strain $GA16833^{Tn2009\text{-}MEGA}$ into two different vaccine-strain recipients ($D39^{Str\text{-}Tmp}$ or $EF3030^{Str\text{-}Tmp}$). Spn recipients acquired Mega at a $rF=6.39x10^{-5}$. Regardless the chromosomal insertion site, the recombinants acquired an unrecognized delayed autolysis phenotype. **Conclusion.** Mega elements are highly mobilized in the nasopharynx, via transformation. Besides resistance to macrolides, Mega confers an additional fitness advantage. **Acknowledgements:** This study was in part supported by grants from the National Institutes of Health (NIH; 1R21AI144571- 01, and 1R21AI151571-01A1). BA was supported by a Fulbright scholarship awarded by the US Department of State.

P2.03

THE GENETIC STABILITY OF Z7, A LIVE-ATTENUATED ZIKA VIRUS VACCINE CANDIDATE

Claire Blackwell[1], Farzana Nazneen[1], Faqing Huang[2], Fengwei Bai[1],

[1]Department of Cell and Molecular Biology, The University of Southern Mississippi, Hattiesburg, MS, USA and [2] Department of Chemistry and Biochemistry, The University of Southern Mississippi, Hattiesburg, MS, USA

Zika virus (ZIKV) can cause severe illness in humans, particularly in infants infected prenatally; despite this, there is no approved vaccine currently available. The ZIKV RNA genome consists of a 5' untranslated region (UTR) region, 3 structural genes, 7 non-structural genes, and a 3' UTR region. Recently, several live-attenuated ZIKV vaccine candidates have been developed by deleting portions of 3' UTR region in ZIKV's genome. In this study, we used a novel approach to generate a live-attenuated ZIKV, Z7, by inserting a 50-nt RNA sequence into the 5'UTR region. Z7 was found to protect *Ifnar1*$^{-/-}$ mice from secondary ZIKV infection; however, the long-term stability of Z7 was not measured. We propagated Z7 in Vero cells for several generations to monitor the viral growth kinetics. After each passage, the viral RNA levels were measured with a qRT-PCR method and normalized to cellular *ß-actin*. Additionally, the PFU equivalence of generation (G) 4 to G10 was determined using qRT-

P2.04

THE EFFECTS OF DCLK1 ISOFORM 2 UPON THE MIGRATION AND INVASION CAPABILITIES OF COLORECTAL CANCER CELLS

Valeria Brown and Lianna Li
Tougaloo College, Touagaloo, MS, USA

Double Cortin-like Kinase 1 (DCLK1) is a cancer stem cell (CSC) marker that is over-expressed in CSCs and epithelial-mesenchymal transition (EMT) cells of many cancers. Due to its expression in the chemoresistant, tumorigenic subpopulation in cancer tissue, DCLK1 plays critical roles in indefinite cell proliferation, tumorigenesis, tumor metastasis, and recurrence of cancer. Further evidence has shown that the deregulation or inhibition of DCLK1 directly causes a decrease in cancer succession and reduces the possibility of relapse. DCLK1 has five isoforms and association of each isoform with human colorectal cancer (hCRC) is unclear. For the current project, we aim to reveal correlation of the DCLK1 isoform 2 (DCLK1-S) with invasion and migration capability of hCRC cells. In order to achieve our goal, we established the isogenic DCLK1-S over- expression cells using the HCT116 cell line, performed the scratching assay, and used ImageJ software to determine the wound healing speed of DCLK1-S over-expression cells and HCT116 cells. Our preliminary results demonstrated that DCLK1-S was not associated with increased migration and invasion capability of hCRC cells. Compared to the HCT116 cells, the wound healing speed of DCLK1- S over-expression cells significantly decreased ($P<0.05$). Therefore, the DCLK1-S might not enhance migration and invasion capabilities of hCRC cells. In the future, we will further confirm our findings and will determine whether DCLK1-S affect stemness of hCRC CSCs and EMTs from other aspects.

P2.05

EXPRESSION OF DROSOPHILA MATRIX METALLOPROTEINASES IN CULTURED CELL LINES ALTERS NEURAL AND GLIAL CELL MORPHOLOGY

Benjamin Draughn[1], Natraj Krishnan[2], Scoty Hearst[1]

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Matrix metalloproteinases (MMPs) are zinc- and calcium- dependent endopeptidases that play pivotal roles in many biological processes including response to injury and various neurological/ neurodegenerative disorders. While extracellular MMPs degrade the extracellular matrix (ECM) and regulate cell surface receptor signaling, the intracellular functions of MMPs or their roles in CNS disorders is unclear. Around 23 different MMPs are found in the human genome with overlapping function, making analysis of the intracellular role of human MMPs a daunting task. However, the fruit fly Drosophila melanogaster genome encodes only two MMPs: dMMP1 and dMMP2. To better understand the intracellular role of MMPs in the CNS, we expressed Green Fluorescent Protein (GFP)- tagged dMMPs in SH-SY5Y neuroblastoma cells and C6 glioblastoma cell lines. dMMP1 localizes to both the cytoplasm and the nucleus whereas dMMP2 had predominantly cytoplasmic localization in both neural and glial cell lines. Cytoplasmic localization demonstrated co-localization of dMMPs with cytoskeleton proteins which suggests a possible role of dMMPs in cell morphology. This was further supported by transient dMMP expression experiments that showed that dMMPs significantly altered both neural and glial cell morphology. Also, inhibition of endogenous MMPs significantly impacted both neural and glial cell morphology as well. Taken together, our results strongly support the intracellular role that dMMPs can play in apoptosis, cytoskeleton remodeling, and cell differentiation. Our studies further reinforce the use of Drosophila MMPs to dissect out the precise mechanisms whereby they exert their intracellular roles in CNS disorders.

P2.06

COMPARATIVE GENOME ANALYSIS OF FUNGAL ANTAGONISTS MARINOMONAS OSTREISTAGNI 398 AND M. SPARTINAE 468

Jessie Lynda Fields, Olga Mavrodi, Karl Indest, Dmitri Mavrodi

University of Southern Mississippi, Hattiesburg, MS, USA

Introduction: Coastal marshes are highly productive ecosystems dominated by smooth cordgrass (*Spartina alterniflora*) and black needlerush (*Juncus roemerianus*). Under certain conditions, these grasses in the Gulf Coast marshes undergo a rapid and progressive decline known as Saltwater Marsh Dieback. Studies of dieback events in Louisiana and New England suggested the involvement of plant pathogenic fungi of the genus *Fusarium*. Earlier, we characterized microbiomes of *S. alterniflora* and *J. roemerianus* from Deer Island, MS, and identified bacteria that suppressed *Fusarium*. Among isolates capable of antagonizing phytopathogenic fungi were *Marinomonas ostreistagni* 398 and *M. spartinae* 468. The genus *Marinomonas* encompasses a group of moderately halophilic, aerobic, heterotrophic, Gram-negative bacteria that live in ocean water, marine sediments, corals, oysters, fish, algae, and marine plants (3). Despite the progress in understanding the diversity of these organisms, our ability to explain ecological, metabolic, and biochemical traits of marinomonads at the genomic sequence level remains limited. **Methods:** In this study, we sequenced the genomes of strains 398 and 468 using Illumina MiSeq, assembled them with Unicycler (4), and annotated with RASTtk (5). Additional analyses and annotations were performed in Geneious Prime 2020.2 (Biomatters, New Zealand). The core genome and pangenome were computed with OrthoVenn 2 (6). Secondary metabolite clusters were characterized using the ARTS 2.0 pipeline (7), whereas genomic islands were identified with IslandViewer 4 (8) and PHASTER (9). **Results:** The analysis revealed that *Marinomonas* genomes form three distinct clades supported by the synteny and relatedness of orthologous genes. The heterogeneity was reflected in the core genome representing only 59-62% of the genome of any individual strain. We identified genes for the synthesis of polyketides, compatible solutes, siderophores, and other secondary metabolites. Clade- and strain-specific genomic regions contained mobile genetic elements, including prophages. These results provide new insights into the genomic diversity of *Marinomonas* by characterizing genes for the adaptation to hypersaline environments and pathways involved in the interaction with plants and the production of antimicrobial compounds.

P2.07

THE DIVERSITY AND EVOLUTION OF PHENAZINE BIOSYNTHESIS PATHWAYS IN ENTEROBACTERIALES

Christian Leise and Dmitri Mavrodi

The University of Southern Mississippi, Hattiesburg, MS, USA

Introduction: *Enterobacterales* is an order of Gram-negative bacteria that encompasses plant and animal pathogens and species of industrial importance (1). Some of these bacteria produce redox-active secondary metabolites called phenazines (Phz). Studies in other groups of microorganisms revealed that phenazines are broadly inhibitory to bacteria, fungi, and parasites (2). Pyocyanin, a phenazine synthesized by the opportunistic pathogen *Pseudomonas aeruginosa*, is a virulence determinant in chronic and acute lung disease (3). *Enterobacterales* are known to produce phenazines, but detailed information on their diversity, biosynthesis, and biological functions is missing. **Methods:** In this work, we screened the NCBI GenBank for genome sequences of phenazine-producing (Phz+) *Enterobacterales*. In addition to these public resources, genomes of Phz+ strains *Pectobacterium carotovorum* cc303 and *P. betavasculorum* Ecb168 were sequenced and used in bioinformatics analyses. The genomes of strains cc303 and Ecb168 were sequenced using Illumina MiSeq, assembled with Unicycler (4), and annotated with RASTtk (5). Scaffolds containing phenazine clusters were extracted and analyzed for the arrangement of the core, modifying, and auxiliary genes. The presence of site-specific recombinases and transposases was identified with IslandViewer 4 (6) and PHASTER (7). The evolution of *phz* pathways was analyzed by comparing phylogenies of the core phenazine biosynthesis and housekeeping genes in Geneious Prime 2020.2 (Biomatters, New Zealand). Phenazine gene clusters and flanking genomic regions were aligned using Multiple Alignment using Fast Fourier Transform (MAFFT)
7.309 (8) and phylogenetic trees were inferred with Geneious Tree Builder using the neighbor-joining (NJ) algorithm. **Results:** The results of our study revealed an unexpected and widespread presence of phenazine genes in Enterobacterales. We identified several distinct types of phenazine clusters in genomes of *Escherichia coli*, *Shigella*, *Klebsiella*, *Enterobacter*, *Pantoeae*, *Brenneria*, *Serratia*, *Xenorhabdus*, *Photorhabdus*, and *Providencia*. In many Phz+ strains, *phz* genes formed parts of genomic islands or were associated with plasmids suggesting the spread via horizontal gene transfer and contribution to the competition for the ecological niche between closely related taxa.

P2.08

MICROBIAL CONTAMINATION AND ANTIMICROBIAL RESISTANCE PATTERNS IN THE MISSISSIPPI GULF COAST

Maitreyee Mukherjee, Emma Aitken, Robyn Cuthbert, Kristi Gay, Karah LeBuda, Katonia McKinney

The University of Southern Mississippi, Hattiesburg, MS, USA

Background: Microbial contamination and spread of antimicrobial resistance and multidrug resistance in various environments, particularly in water sources, is a global emerging public health concern. The Mississippi Gulf Coast is a very important resource for recreation, public use, travel, and economic purposes. Therefore, it is important to monitor, understand and mitigate the occurrence and distribution of pathogens and

drug resistance here as collecting such data will help improve the state's environmental and public health control measures and is an important resource for keeping our coast clean and sustainable. **Methods:** In this study, we collected and analyzed surface ocean water samples from ten sites across the Mississippi Gulf Coast over a period of 7 months for the following specific aims: 1) Enumerate and isolate pathogenic bacteria using EPA methods 1603 (*E. coli*) and 1600 (*Enterococcus*), 2) Identify the patterns of drug-resistance with Kirby-Bauer disc diffusion method. **Results and Brief Discussion:** Data collected over seven months suggest the prevalence of concerning levels of indicator bacteria (*E. coli* and *Enterococcus*) in coastal waters within all sites sampled across the Mississippi Gulf Coast. The *E. coli* numbers ranged between 86 – 810 cfu/100 ml, most falling well beyond the water quality standards set by EPA for recreational waters (126 *E. coli* cfu/100 ml). The *Enterococcus* values ranged between 4-1000 cfu/100 mL, many falling beyond the EPA's recommended values as well (104 *Enterococcus* cfu/100 mL). We also detected high levels of Erythromycin resistance within the isolated *E. coli* from these samples – 85%- as well as high resistance to the antibiotics Ampicillin, Cephalothin and Amoxicillin. *Enterococcus* isolates showed high resistance to Ciprofloxacin- 58%- as well as high amounts of resistance to the antibiotics Erythromycin, Cephalothin, and Sulfamethoxazole. Moreover, many of the *E. coli* and *Enterococcus* isolates showed high numbers of multidrug resistance (resistant to ≥2, ≥3, ≥4, ≥5, or even 6 antimicrobial agents) on most sites across all sampling events. **Future Directions:** Continue sampling and analyses through 2021 to gather data over seasonal variations and Quantitative PCR analysis of antibiotic resistance genes across all samples.

P2.09

EFFECTS OF CURCUMIN ON OVARIAN CANCER METABOLISM

Praise Ola[1], Sofia Ievleva[1], Bolutyfe Oderinde[1], Bidisha Sengupta[2], Brenita Jenkins[1], Kalaedra Self[1]

[1]Alcorn State University, Lorman, MS, USA, and [2]Stephen F. Austin State University, Nacogdoches, TX, USA

Ovarian Cancer (OVCA) is the most fatal gynecological cancer in the U.S. due to lack of early diagnosis and disease recurrence. Application of natural products is proven to be an effective approach to treat drug-resistant cancers. Curcumin is a naturally occurring polyphenol found in the rhizome of turmeric (Curcuma Longa). Studies have shown that curcumin has anticancer effects against tumor cells with minimal toxicity. It has preventive and therapeutic effects on breast, ovarian, liver, colorectal, and other types of cancer. At the molecular level, curcumin is stabilizing the unusual G4 quadruplex structure. Our goal is to examine the effects of curcumin on the metabolic pathways in ovarian cancer cell lines. Altered metabolism is known to be a hallmark of cancer progression. We show that curcumin treatment inhibits the growth of HeyA8 cells (OVCA cell lines) in a dose dependent manner with distinct change in the cellular morphology. Additionally, we performed colony formation assays in HeyA8 cells in the presence of curcumin to test the clonogenicity. In combination with curcumin, sensitivity of carboplatin (chemotherapy for OVCA) is increased in HeyA8 cells. Interestingly, curcumin treatment did not affect the growth of non- cancerous mouse embryonic fibroblast (MEF) cells which indicates the selective nature of cellular toxicity. Furthermore, we observed that curcumin treatment reduced lipid droplet formation along with autophagic upregulation in a ROS (reactive oxygen species) dependent manner. Together, the data suggest that curcumin's effect on the metabolic pathways could be a promising approach to develop combination therapy of OVCA.

P2.10

TARGETING OF SCUBE3 IMPROVES DOXORUBICIN TREATMENT IN TNBC

Benjamin Onyeagucha
Mississippi University for Women, Columbus, MS, USA

Triple-negative breast cancer is the most aggressive subtype of breast cancers. Characterized by its lack of expression of hormone receptors, TNBC is commonly diagnosed in younger women below 50 years of age. Patients diagnosed with TNBC often have worse treatment outcomes. This is due to the lack of clear molecular targets associated with the disease. Chemotherapy remains the main choice of treatment for TNBC. However, chemotherapy faces significant obstructions like toxicity, adverse side effects, resistance, and death. We have identified Signal peptide-CUB-EGF-like domain-contain protein 3 (SCUBE3), through a genome-wide loss of function study, as a molecular target that can improve TNBC treatment in combination with doxorubicin, a chemotherapeutic agent. The suppression of SCUBE3 expression sensitized TNBC cell lines to doxorubicin, compared to control. In our pre-clinical mouse study, SCUBE3 knockdown significantly improved doxorubicin treatment, compared to controls. SCUBE3 overexpression conferred TNBC growth and metastatic advantages. Also, we demonstrated that SCUBE3 is a crucial regulator of DNA damage repair genes, as ectopic or knockdown of SCUBE3 significantly altered the expression of BRCA1, BRCA2, RAD51, and EXO1, and Foxm1, compared to control. Lastly, our result showed that SCUBE3 regulates EGFR activation, which is commonly overexpressed in more than 50% of TNBC cells. We identified EGFR binding to SCUBE3 using immunoprecipitation. Ectopic SCUBE3 expression elevated EGFR phosphorylation. Similarly, knockdown of EGFR reduced the levels of EGFR phosphorylation in TNBC cells. These findings clearly describe SCUBE3 as an important target for TNBC and suggest that modulators of SCUBE3 expression could offer an effective strategy for treating TNBC patients.

P2.11

ACTIVATION OF THE *STREPTOCOCCUS PNEUMONIAE* EFFLUX PUMP, MEGA, INTERFERES WITH HYDROXYL-MEDIATED KILLING OF STAPHYLOCOCCUS AUREUS

Ana Vidal, Babek Alibayov, Jorge Vidal

Department of Microbiology and Immunology, University of Mississippi Medical Center, Jackson, MS, USA

Introduction. *Streptococcus pneumoniae* (Spn) produces an inducible efflux pump for resistance to macrolides. It is carried in a ~5.4/5.5 kb locus encoding the *mef*(E)/*mel* genes, (i.e., Mega element). Mega can be inserted in different locations in the chromosome. Mega class 2.IVc deleted the locus *piaABCD* encoding a putative iron transporter. We demonstrated that HO· produced by Spn TIGR4 through the Fenton reaction (H_2O_2+Fe^{+2}®OH^- +HO·+Fe^{+3}) kills *S. aureus* (Sau). We investigated whether the Mega-deletion of *piaABCD* interferes with Sau killing by reducing the pool of intracellular iron. **Methods and Results.** We prepared TIGR4$^{Mega2.IVc}$ (D*piaABCD*) and TIGR4$^{Mega1.IVb}$ (intact *piaABCD* locus). TIGR4 wt and a H_2O_2 knockout TIGR4D*spxB*D*lctO* killed or did not kill Sau, respectively. Unexpectedly, both TIGR4MEGA strains were attenuated for Sau killing. An additional D39D*piaABCD* mutant killed Sau as D39 wt suggesting it was Mega and no the lack of Pia that interfere with Sau killing. We assessed a series of Spn strains carrying Mega inserted in different locations. Regardless of its chromosomal insertion, all Mega-carrying strains had a defect for killing Sau, in comparison with Mega-negative Spn strains ($1.14x10^6$ vs $1.46x10^5$ cfu/ml, p=0.0367). We then compared Sau killing in selected Mega-carrying strains under erythromycin-induced and non- induced conditions. Remarkably, killing of Sau was completely inhibited under the erythromycin-induced condition ($1.84x10^6$ vs $1.50x10^3$ cfu/ml, p=0.0319). Population dynamics studies confirmed that whether erythromycin-induced, or non-induced, Mega-carrying strains growth similar at the time killing of Sau occurred. **Conclusion.** We demonstrated that activation of Mega interferes with the molecular mechanism leading to killing of Sau. **Acknowledgements**: This study was in part supported by grants from the National Institutes of Health (NIH; 1R21AI144571-01, and 1R21AI151571-01A1). BA was supported by a Fulbright scholarship awarded by the US Department of State.

Friday, August 6, 2021
MORNING
Room D4

8:50 Welcome

9:00 Cellular, Molecular, Developmental Biology Division Awards

9:15 Cellular, Molecular, Developmental Biology Division Meeting

Oral Presentation Session III

Moderators: Drs. Donna M. Gordon and James A. Stewart, Jr.

O2.09

9:30 IDENTIFICATION OF CANDIDATE GENES INVOLVED IN ZEBRAFISH DORSOVENTRAL PATTERNING AND MORPHOGENESIS

Mohamed Hegazy, Eleni Fanouraki, Yvette Langdon

Millsaps College, Jackson, MS, USA

Early embryonic processes such as dorsoventral patterning, microtubule dynamics, and morphogenetic movements are essential for proper zebrafish development. Previously, we identified Cathepsin B as a maternal factor that is important for dorsoventral patterning and morphogenesis. To identify the molecular pathways used by Cathepsin B to regulate dorsoventral patterning and morphogenesis, proteomic analysis was performed. The analysis revealed differential gene expression between wild type and Cathepsin B deficient zebrafish. Candidate genes were identified and classified according to their roles in dorsoventral patterning (Hdac3, PPP4C) and morphogenesis (GAPDH, Aldha2, PPP4C). The project described was supported by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under Grant #P20GM103476.

O2.10

9:50 DE NOVO SILENCING OF Ac/Ds TRANSPOSONS IN MAIZE

Dafang Wang[1], Jianbo Zhang[2], Tao Zuo[2], Meixia Zhao[3], Damon Lisch[4], Thomas Peterson[2]

[1]Delta, State University, Cleveland, MS, USA, [2]Iowa State University, Ames, IA, USA, [3]University of Miami, Miami, FL, USA, and [4]Perdue University, West Lafayette, IN, USA

Transposable elements (TEs) are ubiquitous mobile genetic elements in all eukaryotes that are generally considered to be "parasitic" DNA sequences because they can replicate themselves and insert into new locations within genomes, which can cause deleterious mutations. All branches of life have evolved strategies to repress TE activity. In the aspect of TE silencing, plants have many similarities to those in animals. Therefore, discoveries in plants can advance our understanding of TE silencing in animal systems, which is directly related to human health. Here we characterized two independent cases of spontaneous silencing of the active maize Ac/Ds transposon system. This silencing is initiated by alternative transposition, a type of aberrant transposition event that engages the termini of two nearby separate TEs. Alternative transposition during DNA replication can generate Composite Insertions that contain inverted duplications of the transposon sequences. We show that the inverted duplications of two Composite Insertions are transcribed to produce double-stranded RNAs that trigger the production of two distinct classes of small interfering RNAs: a 24-nt class complementary to the TE terminal inverted repeats and noncoding subterminal regions, and a 21- to 22- nt class corresponding to the TE transcribed regions. Our preliminary data show that the small RNAs trigger hypermethylation on cytosine sites. Plants containing these small interfering RNA-generating Composite Insertions exhibit decreased levels of Ac transcript and heritable repression of Ac/Ds transposition. Further, we demonstrate that Composite Insertions can heritably silence otherwise active elements in trans. This study documents the first case of transposon silencing induced by alternative transposition and may represent a general initiating mechanism for silencing of DNA transposons. This work was supported by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103476.

O2.11

10:10 SIGNALING PATHWAYS MODIFIED BY DOUBLE CORTIN LIKE KINASE 1 TO INCREASE CHEMORESISTANCE OF HUMAN COLORECTAL CANCER CELLS

Lianna Li

Tougaloo College, Touagaloo, MS, USA

Double cortin like kinase 1 (DCLK1) is a microtubule-associated protein kinase and has five isoforms. It is a specific cancer stem cell (CSC) marker and is up-regulated in multiple cancers. DCLK1 plays critical roles in the enhancement of chemoresitance in multiple human cancers, such as the lung cancer, kidney cancer, colorectal cancer (CRC), etc. Our lab demonstrated that DCLK1 isoform 1 (DCLK1-L) increased chemoresistance of CRC by inhibiting the apoptosis pathway transcriptionally and translationally. However, whether DCLK1-L modulates other critical pathways to increase chemoresitance of CRC cells and whether DCLK1-L and DCLK1 isoform 2 (DCLK1-S) modulate the same pathways to enhance the chemoresistance is unclear. To find this out, we applied the RNA Sequencing technology to reveal the transcriptome profile changes in the isogenic DCLK1 over-expressing CRC cells with 5-Fu treatment. The deferentially expressed genes were used for the pathway analysis using the Ingenuity Pathway Analysis software. Our results revealed that multiple canonical pathways were significantly changed due to DCLK1 over-expression after 5-FU treatment. Besides the apoptosis pathway, the senescence pathway and the P53 Signaling, which are contributing to promote cell survival, are significantly inhibited. The sirtuin signaling pathway, which is essential for the delay of cellular senescence and extension of the organismal lifespan, and the unfolded protein response, which is an adaptive reactions that reduces unfolded protein load to maintain cell viability and function, are significantly activated. DCLK1-L and DCLK1-S modulate some common pathways, but each of them modify unique pathways as well. In summary, DCLK1 can modulate multiple pathways to promote cancer cell survival after chemotherapy, thus increasing chemoresistance of cancer cells. So, DCLK1 and the molecules in the multiple signaling pathways involved can be developed into effective therapeutic strategies for the cancer treatment.

O2.12

10:30 AN *IN-VITRO* STUDY ON EFFECTS OF ASTAXANTHIN ON OVARIAN CANCER GROWTH AND METABOLISM

Brenita Jenkins[1], Ananda Nanjundaswamy[2], Debarshi Roy[1]

[1]Department of Biological Sciences, Alcorn State University, Lorman, MS, USA, and [2]Department of Agriculture, Alcorn State University, Lorman, MS, USA

Introduction: Ovarian Cancer (OVCA) is the fifth leading cause of death in comparison to other female reproductive organ diseases. Risk factors such as age, obesity, heredity, and female reproductive care after menopause are used to determine the prognosis of OVCA. Astaxanthin (AXT), a xanthophyll carotenoid, has been examined in many studies due to its anti-oxidative activity and anticancer roles *in vitro* and *in vivo*. Previous studies have shown that the antioxidant properties of AXT lead to anti-inflammatory and oxidative stress reduction, which result in reduction of cancer incidence by inhibiting tumor cell proliferation. These findings make AXT a potential candidate for future OVCA treatment options due to its anti- cancerous properties. Studying autophagy mechanisms that alter metabolic pathways could prove to be

a critical regulator of cancer progression. Although many findings have supported AXT as an anticancer treatment, studies on the effects of AXT in ovarian cancer cell models, via autophagy, are very few. Here, we examine the effects of AXT *in-vitro* using isogenic chemosensitive and chemoresistant OVCA cell lines, Hey A8 and Hey A8 MDR. **Methods:** The OVCA cell lines, Hey A8 and Hey A8 MDR were treated with AXT to study the effects on cell proliferation, cell migration, drug-resistance, lipid droplet formation and autophagy induction. **Results:** Wound healing assays were performed after AXT treatment which showed decrease in cell migration. Using Lipid Green dye, we observed a three-fold reduction in lipid content after AXT treatment. Lipid droplets consisting of neutral lipids are considered as a hallmark of lipid metabolism and cancer. Using CytoID dye, we observed increased induction of autophagy after cells were treated with AXT (18-fold). **Conclusion:** Taken together, the data suggest that lipid metabolism is being balanced by autophagy after AXT treatment. This data shows promise of AXT being a candidate drug intervention for chemotherapeutic treatment of ovarian cancer, pending further research initiatives.

O2.13

10:50 DRUG COMBINATION AND REPURPOSING OF METFORMIN FOR OVARIAN CANCER THERAPY

Debarshi Roy[1], Brenita Jenkins[1], Viji Shridhar[2]

[1]Alcorn State University, Lorman, MS, USA and [2]Mayo Clinic, Rochester, MN, USA

Ovarian cancer (OVCA) Is the most lethal gynecologic malignancy in the world, which usually develops in post-menopausal women. OVCA has poor survival rate due to late diagnosis and absence of early screening strategy. It is critical to develop novel strategies to treat and prevent the progression of OVCA. Repurposing drugs for cancer treatment is a novel approach to advance therapeutic strategies and prevent disease progression. Metformin (Met) is part of a class of drugs called biguanides which increases body's response to insulin. Met is the recommended drug of choice for the treatment of type II diabetes. Variety of anti-cancerous activities of metformin against several cancer types have been reported. However, the details about its mechanisms have not been fully understood. The goal of this research is to explore the impact of Met on the chemosensitivity status and on the metabolic pathways in OVCA. Our preliminary data shows Met dose-dependently inhibits cell proliferation and clonogenic growth of drug-sensitive and drug-resistant OVCA cells HeyA8 and HeyA8MDR, respectively. Met treatment affects the metabolic pathways of cancer cells by inhibition of lipid droplet biogenesis and triggering autophagy. We further performed lipidomics analysis to investigate the impact of metformin on the lipid metabolites in HeyA8MDR cells. We found that Met treatment enhanced chemosensitivity in the OVCA cells when combined with carboplatin (the first line of chemotherapeutic agent). Overall, our preliminary data indicate novel mechanisms of anti-cancerous activities of Met treatment in OVCA.

O2.14

11:10 DETERMINING THE FUNCTION OF TSAI IN THE DIMORPHIC PATHOGENIC FUNGUS HISTOPLASMA CAPSULATUM

Davida Crossley

Mississippi University for Women, Columbus, MS, USA

TSA1, a thiol-specific antioxidant, is a gene that is shown to be involved in fungal survival due to oxidative stress in fungi such as *Saccharomyces cerevisiae* and *Candida albican*. In *S. cerevisiae*, it is also involved in chaperone activity and resistance to heat shock exposure. In this study, we aim to identify the function of *TSA1*, in the pathogenic dimorphic fungus, *Histoplasma capsulatum* (*Hc*) which is the causative agent for the respiratory infection histoplasmosis. Previous experiments have confirmed that the gene is involved in resistance to oxidative stress. Our recent findings suggests that *TSA1* is not involved in heat shock response resistance in *Hc*. Therefore, now our ongoing study involves a proteomic approach to identify which pathways are effected by *TSA1*, by comparing mass spectrometry results from a *TSA1*-RNAi and wildtype strain. We are currently waiting for the results. The pathways that are found to be effected by a knock-down of *TSA1* expression, will be further investigated and confirmed.

Friday, August 6, 2021

AFTERNOON

12:00-1:00 Plenary Speaker

1:00-3:00 Mississippi INBRE/ Millsaps Symposia

CHEMISTRY AND CHEMICAL ENGINEERING

Chair: Yongfeng Zhao

Jackson State University

Co-Chair- M. Saiful Islam

Jackson State University

Vice-Chair: Samuel S. R. Dasary

Thursday, August 5, 2021

MORNING

Room D12

8:50 Welcome

O3.01

9:00 BIOGEOCHEMISTRY OF DEPLETED URANIUM IN US ARMY RANGES

Frank (Fengxiang) X. Han

Jackson State University, Jackson, MS, USA

Anthropogenic activities, such as ore mining and processing, nuclear power industry and weapon testing have generated depleted U (DU) contamination to soils and waters. Exposure is likely to have impact on humans or the ecosystem where military operations have used DU. Yuma Proving Ground in Arizona, USA has been using depleted uranium ballistics for 36 years. At a contaminated site in the Proving Grounds, soil samples were collected from flat, open field and lower elevated trenches that typically collect summer runoff. Spatial distribution and fractionation of uranium in the fields were analyzed with total acid digestion and selective sequential dissolution with eight operationally defined solid-phase fractions. Results show that the trench area in the testing site had higher accumulation of total U compared to the open field soil. Among the eight solid phase components in the open field samples, U demonstrated stronger affinities for the amorphous iron-oxide bound, followed by the carbonate bound, and the residual fractions. While U in the trench area had a stronger binding to the easily reducible oxide bound fraction, followed by the carbonate bound and amorphous iron-oxide bound fractions. In addition, U was found significantly in field plants on sites, including in ants and wide animal feces. This study indicates a significant spatial variation of U distribution in the shooting range site and U was widely distributed in the local eco systems.

O3.02

9:15 AN ENANTIOMERIC EXCESS DETERMINATION USING 1H-NMR OF ISOTOPE LABELED SUBSTRATES

Thomas Owens and Douglas Masterson

The University of Southern Mississippi, Hattiesburg, MS, USA

A 1H-NMR assay for direct analysis and enantiomeric excess determination from enzyme catalysis is presented. Our method makes use

of an isotope labeled probe that yields pseudo enantiomers, when hydrolyzed with PLE hydrolases, where the optical purity can be quantified by the absence of a signal through ratio-metric measurements. The method developed exploits the use of modified 1H-NMR parameters allowing for rapid analysis and eliminates the necessity of chiral solvating agents, derivatization, or diastereomeric mixture formation. The assay can be completed on microscale, allowing for coinciding enzyme screening for rapid determination of optical purity from various hydrolases of PLE. The verified enantioselectivity can further be used to determine the appropriate enzyme for synthesis of novel sulfur and selenium containing amino acids from the respective prochiral malonate derivatives as intermediates. The methods may be found applicable and easily modifiable to other substrates and enzymes demonstrating the ease and versatility of our method.

O3.03

9:30 TRANSPORT OF URANIUM IN WEAPON TESTED SOILS

Joseph Kazery

Jackson State University, Jackson, MS, USA

Being an emerging pollutant, U has the ability to affect public and environmental health. While U contamination may occur near mining and enrichment facilities, it is also likely in war-stricken areas or military training grounds that utilized depleted uranium penetrators. In this study, soils from three locations at Yuma Proving Ground in Arizona were analyzed to observe U concentration and to determine what correlations occur with the soil physicochemical properties. The sample area is an alkaline soil, high in carbonate and Fe oxides, dominated by a sandy-loam texture. The oxidized uranium at the site is found to be in the schoepite family. High concentrations of U were determined to be limited to an area while a lower concentration such as 368, 384, and 305 mg/kg U were observed in the field, ditch, and DU garden, respectively. These lower concentrations are presumed to be at a capacity with uranyl in a state of equilibrium, or a contaminated background concentration. Transport of U from sources were limited: from an oxidized penetrator 92.8% remained in the top 5 cm of soil and reducing in concentration to equilibrium in less than 20 cm from the source. In locations prone to high amounts of water runoff such as a ditch, U concentration reduced to near equilibrium levels after 20 m. Samples of U were shown by Pearson's coefficient to be correlated to Mn oxides, Fe oxides, and carbonate, but due to interactions with one another or hydraulic situations the correlations differed based on sampling location. Mn oxide and carbonate demonstrated more correlation with U in areas that are less inundated by water, otherwise Fe oxide becomes a major recipient of U. Buried penetrators, previously fired and unfired, exhibited similar upward migration demonstrating similar concentrations at each soil layer leading to the surface. This upward percolation is the result of capillary action that occurs during alternating wetting and drying conditions where the scale of U transported is affected by areas with higher electric conductivity more than the rate. Transport of U from soil to vegetation to herbivores was observed. Transport of U between trophic levels can be limited by reduced translocation and accumulation to the edible portions in plants. Animal artifacts such as ant beds, rabbit and burro scat were used to determine exposure and dietary uptake. Accumulation in ants were 215 mg/kg U while rabbit accumulation was determined from previous studies, and from exposure and accumulation, bioconcentration factors were determined.

O3.04

9:45 INVESTIGATING THE CONTRIBUTION OF MODIFIED P-ENRICHED BIOCHAR ON ACID SOIL'S pH BUFFERING CAPACITY

Beatrice Arwenyo[1], Jac J. Varco[2], Andrew Dygert[2], Sydney Brown[1], Todd Mlsna[1]

[1]Department of Chemistry, Mississippi State University, Mississippi State, MS, USA, and [2]Department of Plant and Soil Science, Mississippi State University, Mississippi State, MS, USA

Biochar can directly hold nutrients in the soil due to the negative charges that exist on its surface. Besides improving cation exchange capacity, the negatives charges on biochar can buffer acid soil by protonation and deprotonation mechanisms. Moreover, biochar can ameliorate soil acidity by releasing minerals such as K, Ca, and Mg. This study compared the pH buffering capacity of acid soil amended with P enriched modified Douglas fir biochar and untreated Douglas fir biochar. The P enriched biochar (CCPP, CAPP and MSPP), were prepared by treating Douglas fir biochar with [calcium chloride ($CaCl_2$) + potassium phosphate monobasic (KH_2PO_4)], [Calcium carbonate ($CaCO_3$) + diammonium phosphate {$(NH_4)_2HPO_4$}], and [magnesium sulphate ($MgSO_4$), + potassium hydroxide (KOH) + potassium phosphate monobasic (KH_2PO_4)] solutions, respectively. Various amounts of biochar ranging from 0%, 10%, 30%, and 50% (w/w) were added to the acid soil and incubated for 30 days at room temperature with moisture content kept at 80% field capacity. The soil-biochar mixture was titrated with 0.1 M HCl acid solution, and the resultant pH was determined. The amount of H^+ added to biochar- soil mixtures was plotted against pH, and the pH buffering capacity of biochar-soil mixtures was obtained from the slope of regression fit of the graph. Results showed that soil pH buffering ability significantly improved with biochar modification. The influence of biochar modification on acid soil pH buffering ability was largely dependent on the biochar alkalinity and ash contents.

O3.05

10:00 CHARACTERIZATION OF EDIBLE PACKAGING FILMS BASED ON BIODEGRADABLE SEMI-SOLUBLE COFFEE CHAFF PLASTICIZED WITH GLYCEROL AND STARCH

Jamie Warrick, Soma Mukherjee, Darryl Holliday

University of Holy Cross, New Orleans, LA, USA

Introduction: Coffee chaff is an industrial bio-waste of the coffee industry. This unique bio-waste cannot be utilized in many other utilizable products like compost in gardening soil as it clogs the water pipelines. The major components of coffee chaff are 77.9 % insoluble lingo-cellulose (cellulose, hemicellulose, and lignin). This bio-waste and underutilized co-product needs to be upcycled. **Methods:** Dry coffee chaffs (200 gms) were soaked in distilled water (100 ml) for overnight to soften the lingo-cellulosic components of the chaff. Semi-soluble coffee chaff slurry was prepared in an alkaline solution of phosphate buffer (pH range 10.9-11.5). Semi-soluble coffee chaff-based edible films (CCF) plasticized with 1% glycerol and 0.5-1.5% starch was prepared and dried in a dehydrator for 2 hours. Thickness, moisture content, water-solubility, water vapor permeability of the CCF were measured. **Results and Discussion:** The thickness of the CCF not varied significantly ($p<0.05$) and the spread ability was uniform for all the samples. Increased moisture content (17%) was found in films with a higher amount of starch content. Solubility of the film in water was comparatively high for all the films with or without starch but less solubility (42.8%) was observed in the film with no starch content. Water vapor permeability was significantly high in films with starch. Lightness (L*), redness/greenness (a*), and yellowness/blueness (b*) was significantly high ($p<0.05$) in the films with 0 % and 0.5% CCF. **Conclusion:** The CCF without any starch showed the best results and have the potentiality to be used as promising packaging and an alternative polysaccharide material for the production of edible films.

10:15 Break

O3.06

10:30 SPECTROSCOPY OF 1,8-NAPHTHALIMIDE AND N-SUBSTITUTED PYRIDINES

Wolfgang Kramer[1], Courtney B. Mullins[1], Melinda K. Solomon[1], Ian R. Gould[2]

Millsaps College, Jackson, MS, USA and Arizona State University, Tempe, AZ, USA

N-alkoxy substituted heteroaromatic compounds based on pyridine,

quinoline, isoquinoline and phenanthridine allow the photochemical generation of transient species that can be used to damage biomolecules and induce controlled cell death. The transient species, heteroaromatic radical cations and a methoxy radical are produced with a quantum yield of about 0.55 as determined by trapping experiments. Laser flash photolysis was used to analyze the photophysical properties of the bifunctional compounds. Interestingly, the 1,8-naphthalimide radical cation was formed and confirmed. The N-methoxy substituted heterocycles produce a radical cation and a methoxy radical, each of which can initiate DNA cleavage. By comparison with restriction endonuclease, cleaving assays indicates that both transient species might be involved in the cleaving process. DNA double strand cleavage is desired for efficient cleavage. The bifunctional compounds presented in this project have the ability to induce DNA damage by two different mechanisms, thus showing potential for double strand cleavage.

This work was supported by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103476.

O3.07

10:45 DESIGN AND SYNTHESIS OF SPIRO-ISOXAZOLINE-LACTAMS

Prasanta Das, Gulrukh Shaheen, Cord Carter, Ashton T. Hamme II
Jackson State University, Jackson, MS, USA

The spiro-isoxazoline structural motif is widely found in several cytotoxic marine natural products. The spiro-linkage is either between isoxazoline and carbocycle in 11-deoxyfistularin-3 (cytotoxic against the MCF-7 breast cancer cell line, LD_{50} = 17 µg/L) or between isoxazoline and oxepine in the psammaplysin family of natural products. Due to the interesting molecular architecture and biological activities, the total synthesis of the natural product and the spiro-isoxazoline analogues have been of great interest for investigating anti-cancer activities. Continuing our interest in the total synthesis of natural products, we were also able to synthesize a series of spiro-ethers and spiro-lactones, and a few of the synthesized compounds showed moderate anti-cancer activity. Regardless of spiro-ethers and spiro-lactones, spiro-isoxazoline-lactam has recently been our focus of interest to develop a series of analogues for biological studies. Synthesis of the cyclic amine from an activated olefin amine *via* halo-amino-cyclization has been well documented for the synthesis of pyrrolidine and piperidine as an essential unit for drug molecules for biomedical studies. Like amines, lactams are also similar competent in many natural and synthetic drug molecules. However, very little study has been done for the synthesis of spiro- cyclic-amide *via* halo-cyclization strategy. Spiro-cyclic compounds have attracted lots of interest due to their molecular complexity coupled with their interesting biological properties. As cyclic lactams are also prevalent in many natural products, developing a new strategy in this context is highly warranted to synthesize spiro- isoxazoline-lactams for investigating the potential leads for anti- cancer activity. Herein, we have described the synthesis of desired ring system in three steps following our previously developed synthetic protocols for isoxazoline-based spiro-lactones and spiro-ethers. The precursor amide was synthesized either before or after the 1,3-dipolar cycloaddition reaction. The alkynoic acids or amide served as dipolarophiles, while various 1,3-dipoles were generated in situ to afford the corresponding isoxazoline derivatives. Having optimized a suitable bromo lactamization strategy, several spriroisoxazolines were synthesized depending on either various substitution or ring sizes. A library of synthetic compounds has been submitted for future biological investigation.

Acknowledgement: The project was supported by grants from the National Institute of General Medicinal Sciences (NIH/NIGMS) (2SC3GM094081-08) and partially supported by the National Science Foundation (HBCU-EiR) (1900127). The Analytical and NMR CORE Facilities were supported by NIH/NIMHD (G12MD007581).

O3.08

11:00 Ru(II)-CATALYZED ENANTIOSELECTIVE AND DESYMMETRIZE C-H ACTIVATION

D. M. Nirosh Udayanga and Xin Cui
Mississippi State University, Mississippi State, MS, USA

Enantioselective desymmetrization is a powerful method for constructing complex structures from simple prochiral molecules. The Rh, Mo, and Pd catalysts were used to generate multiple stereogenic centers with a high enantiomeric excess(ee). These synthesis routes are important for developing more attractive natural products and medicinal agents. Moreover, developing a more efficient pathway to synthesis desymmetrize scaffolds are challenging. Indole-based scaffolds can be found in a large number of drug molecules and natural products. Therefore, efficient and selective reactions allowing the construction of fused cyclic systems could be useful methods. We report herein the desymmetrize C–H activation of tricyclic indole derivatives with two chiral centers using transient directing groups by incorporating ruthenium as a catalyst. Currently, we have achieved up to 95% ee and further explorations of enantioselective C–H functionalization are going on in our laboratory.

O3.09

11:15 DEVELOPING A NEW DESIGN STRATEGY TO SYNTHESIZE XANTHENE BASED NIR I DYES

Ishanka Rajapaksha and Colleen Scott
Department of Chemistry, Mississippi state University, Mississippi State, MS, USA

Fluorescent dyes are widely applied for detect different analytes in biological and environmental systems, due to cost effectiveness, high sensitivity, and considerably high spatiotemporal resolution. The xanthene-based dyes, fluorescein, and rhodamine have unique structural and photophysical properties that allow them to act as biosensors. However, their absorption and emission wavelengths are within the window of the background fluorescence of biological samples, which results a low resolution. Thus, the development of NIR emission dyes/fluorophores has been a major advancement to the field of biological sensing and imaging, as their longer absorption and emission wavelength allow for low background cellular autofluorescence and minimum cell damages. In this study, we have designed xanthene based NIR I dyes, using a simple and short synthetic route. Our probes are based on modifying the electron- deficient xanthene core with an electron-rich pyrrole or indole molecule through the C2 position of the donor molecule instead of the nitrogen atom. This leads to extend the conjugation and results a bathochromic shift in both absorption and emission. Furthermore, to investigate the efficacy of the dyes, we prepared a colorimetric silyl ethyl ester derivative of the xanthene dye and determine it turn-off response to fluoride ions. In this presentation, we will discuss the synthesis of these novel xanthene dyes and investigate their photophysical properties. Overall, we believe this model will be a better approach to prepare improve sensory probes to detect different analytes in environmental and biological systems.

O3.10

11:30 EXPLOITING THE REACTIVITY AND CATALYTIC ACTIVITY TOWARDS THE BENZYLSILYL PHOSPHINES FUNCTIONALIZED RHODIUM COMPLEXES

Niroshani S. Abeynayake and Virginia Montiel-Palma
Mississippi State University, Mississippi State, MS, USA

The family of four coordinated 14-electron complexes ([X-Rh(k^3(*P*,*Si*,*Si*)PhP(o-$C_6H_4CH_2Si^iPr_2)_2$], where X = Cl (**Rh-1**), Br (**Rh- 2**), I (**Rh-3**), OTf (**Rh-4**), Cl·$GaCl_3$ (**Rh-5**) and mixed valance complexes of Rhodium were accessed from the reaction of PhP(*o*- $C_6H_4CH_2Si^iPr_2H)_2$ and $[RhCl(COD)]_2$ as evidenced by X-ray and NMR studies. Moreover, octahedral rhodium {$(Ph_2P$-o-CH_2- $C_6H_4)_3E$}MClH (M = **Rh-6**: E = Si; M = **Rh-7**: E = Ge) complexes bearing EP_3-type tetradentate ligands were synthesized via E-H bond activation. The new complexes were accessed from the reaction between ligands {$(Ph_2P$-o-CH_2-$C_6H_4)_3EH$ with Rh(I) precursor. The solid-state structures of **Rh-6**, and **Rh-7** were confirmed by X-ray crystallography. The catalytic activity of the synthesized rhodium complexes was investigated in the hydrosilylation of alkenes in

the presence of triethylsilane (Et_3SiH). The most prominent results were obtained from the employment of **Rh-1** complex as a catalyst for tandem isomerization/hydrosilylation of the terminal and internal hexenes at low catalyst loading.

O3.11

11:45 INVESTIGATION OF ACID CATALYZED PICTET-SPENGLER CYCLIZATION WITH SULFONAMIDES

Kaitlyn Birkhoff

The University of Southern Mississippi, Hattiesburg, MS, USA

The piperidine scaffold is very prevalent in many FDA-approved drugs, making it an important pharmacophore and essential in the field of drug discovery. Piperidines are the building blocks for over 70 different types of commercial drugs, such as Ritalin and Evista. By discovering new methods to access this scaffold, economic and chemical challenges such as high cost and diastereoselectivity can be eliminated. The overarching goal of this project is to develop a robust catalytic, asymmetric synthesis of piperidine rings from feedstock petrochemicals. In an initial study of the N-sulfonyl iminium ion Pictet-Spengler cyclization with N-para-toluenesulfonyl and N-tert- butanesulfonyl homoveratrylamine and 3-phenylpropanal, a screen of metal triflates was examined. The hypothesis is that transition metal triflates are sufficiently Lewis acidic to activate relatively inert sulfonamide nitrogen atoms to condense with the aldehyde to trigger the intramolecular cyclization forming piperidines. Initial results indicated that scandium (III), stannous (II), and copper (II) triflates gave the fastest conversion to the N-sulfonyl piperidine, while triflates such as lanthanum (III), sodium (I), and magnesium (II) gave little to no conversion under the allotted time. However, the triflates that proved successful with the N-para-toluenesulfonyl did not produce the same conversion when screened against the N-tert- butanesulfonyl. Based upon accepted knowledge of the mechanism we propose that the cyclization proceed through an N- sulfonyliminium ion intermediate. Additional studies have focused on the use of chiral ligands, such as BINOL scaffolds and PyBOX ligands to induce asymmetry in the cyclization event. When screened against N-para-toluenesulfonyl homoveratrylamine with the successful metal triflates (scandium (III) and copper (II)) under various solvents, preliminary results showed no conversion towards the piperidine product. Future studies will focus on examining the kinetics of chiral ligand mechanisms and increasing the reactivity of iminium ions.

12:00 General Session

Thursday, August 5, 2021
AFTERNOON
Room D12

1:00 WORKSHOP
Industry Career Workshop

1:45 Break

O3.12

2:00 INHIBITORS OF NON-STRUCTURAL PROTEIN 2 BLOCK THE REPLICATION OF VENEZUELAN EQUINE ENCEPHALITIS VIRUS

Huaisheng Zhang, Moeshia Harmon, Ifedayo Victor Ogungbe
Jackson State University, Jackson, MS, USA

Emerging infectious diseases like those caused by arboviruses such as Venezuelan equine encephalitis virus (VEEV) pose a serious threat to public health systems. Development of medical countermeasures against emerging infectious diseases are of utmost importance. In this work, an acrylate and vinyl sulfone-based chemical series was investigated as promising starting scaffolds against VEEV and as inhibitors of the cysteine protease domain of VEEV's non-structural protein 2 (nsP2). Primary screen and dose response studies were performed to evaluate the potency and cytotoxicity of the compounds. The results provide structural insights into a new class of potent non- peptidic covalent inhibitors of nsP2 cysteine protease. These results may facilitate the evolution of the compounds into selective and broad-spectrum anti-alphaviral drug leads.

O3.13

2:15 ENTRAPMENT OF HONOKIOL IN EXOSOMES ENHANCES ITS ANTITUMOR ACTIVITY

Rajashekhar Kanchanapally

Tougaloo College, Tougaloo MS, USA

Cancer continues to be a leading cause of death worldwide, despite significant advancements in treatment modalities. Chemotherapy is a preferred modality in the treatment of early and advanced stages of cancer. Honokiol is a promising antineoplastic agent with anticancer activity against different kinds of cancers. However, the solubility and poor-bioavailability of Honokiol remain the issues to be solved. Here we propose the use of non-immunogenic natural nanoparticles, Exosomes, for the targeted delivery and enhanced uptake of Honokiol. We have used sonication for the loading of Honokiol in exosomes. Upon confirming the loading of Honokiol in exosomes, the anticancer activity of exosomal-Honokiol was analyzed on various cancer cell lines. Our results indicate that loading of Honokiol in exosomes improved the IC50 of Honokiol against various cancer cells. Further, cellcycle analysis revealed that loading of Honokiol in exosomes also caused the increased-cellcycle arrest. Westernblot analysis revealed the increased expression of apoptosis-related proteins, p21 and Bax, in the exosomal-Honokiol treated group when compared to free Honokiol. It is also observed that intracellular- Honokiol is also greater when the cancer cells were treated with nanoformulation, rather than free Honokiol. Our work demonstrates the first-ever evidence of Honokiol-entrapment in exosomes significantly enhances Honokiol's anticancer activity.

O3.14

2:30 EFFECT OF CATHEPSIN L INHIBITORS ON HEPATOCELLULAR CARCINOMA

Olamide Crown, Felicite K. Noubissi, Ifedayo V. Ogungbe
Jackson State University, Jackson, MS, USA

PURPOSE: The survival rate of African American men suffering from malignant hepatocellular carcinoma (HCC) is significantly lower than the general population, and there are limited options to treat HCC. The biochemical actions, antiproliferative effects, and drug-likeness of a new Cathepsin L (CatL) inhibitor were investigated in this work. The project's long-term goal is to facilitate the development of the inhibitor or its analogs as new anti-hepatocellular carcinoma agents. **METHODS:** The cysteine protease CatL is expressed in high quantities in many malignant cancers, including HCC. CatL has been investigated as a diagnostic marker and as a drug target in cancer cells. The antiproliferative activities of the compound were investigated through dose-dependent cell viability and migration assays using Hep G2 and Hep 3B cell lines, while CatL inhibition was studied using recombinant CatL and endogenous CatL in lysates from Hep G2 cells. Preliminary adsorption, metabolism, solubility, and protein binding assays were also carried out. **RESULTS / EXPECTED RESULTS**: The CatL inhibitor has antiproliferative effects on hepatocarcinoma cells (Hep G2 and Hep 3B) with low micromolar IC_{50} values, and it can inactivate recombinant CatL in a time-dependent manner. Furthermore, adequate bidirectional transport across MDR1-MDCKII monolayers was observed with an efflux ratio that shows the inhibitor is not a substrate for the P-glycoprotein efflux pump (P-gp). **DISCUSSION / CONCLUSION:** These studies showed a relatively high metabolic clearance and plasma protein binding *in vitro*. On-going studies are focused on preliminary xenograft and pharmacokinetics experiments in addition to medicinal chemistry optimization studies. Overall, the CatL inhibitor is a good candidate for evaluation in murine models of HCC.

O3.15

2:45 BOWL-SHAPED LANTHANIDE PILLAR[5]ARENE MACROCYCLIC CAGE FOR ADAMANTYL DERIVATIVE NEW PSYCHOACTIVE SUBSTANCE DRUGS

Rashid Mia and Karl J Wallace

Department of Chemistry and Biochemistry, The University of Southern Mississippi, Hattiesburg, MS, USA

A series of lanthanide based bowl-shaped macrocyclic compounds have been prepared and have shown to bind adamantly derivatives (a functional group found in new psychoactive substances). The four compounds which are prepared in five steps. Five triazole-ortho-pyridyl arm was incorporated via click reaction in pillar[5]arene macrocycle. Due to the C-C single bond rotation through the bridging methylene group, macrocycle undergoes conformational changes, leading to the formation of four major isomers such as 'cone', partially cone ('pacone'), and two 'alternate isomers'. Crystal structure of cone isomer showed all five triazole-ortho-pyridine linkers are at the bottom rim of the macrocycle which explain why only the 'cone' isomer can coordinate to the lanthanide ions. To access forbidden 4f-4f transition, antennas with appropriate lamda$_{em}$ utilized to break the symmetry so that transition can occur. 4,4,4-trifluoro-1- phenyl-1,3-butanedione (lamda$_{ex}$ = 327nm) and 4,4,4-triflluoro-1- napthyl-1,3-butaanedione (lamda$_{ex}$ = 340nm) were used as antenna to sensitize the Tb^{3+} and Eu^{3+} lanthanide complexes, respectively. It was shown that a 1:1 ratio of antenna and Tb/Eu[cone] complex formed, as well as it gives significance rise to the formation of luminescent ternary complexes at 495nm, 550nm, 590nm, and 625nm for Tb[cone] and at 475nm, 510nm, 540nm, 595nm, 615nm, 655nm, 705nm for Eu[cone]. Then 1:1 complex of Tb/Eu[cone] and antenna will be utilized to bind adamantyl derivative new psychoactive substance (NPS) drug due to hydrophobic interaction between electron rich cavity of macrocycle and adamantly moiety via quenching of the luminescence intensity.

Thursday, August 5, 2021

EVENING

3:30 Dodgen Lecture and Awards Ceremony (B5-6)
General Poster Session (Immediately Following Dodgen Lecture C-Poster Hall)

Divisional Posters

P3.01

BLOODSTAIN DETECTION USING HUMAN SERUM ALBUMIN-RESPONSIVE NIR FLUORESCENCE DYE

Jing Qu[1], William Meador[2], Jared Delcamp[2], Yongfeng Zhao[1]

[1]Jackson State University, Jackson, MS, USA and [2]Univeristy of Mississippi, University, MS, USA

Bloodstains detection can provide very useful information for forensic investigators. The ability to detect bloodstain in a non- destructive manner sensitively is highly desired. We report here the use of a SO_3SQ dye to visualize the human serum albumin (HSA) under the near irradiation of infrared light (NIR). In this assay, the specific combination SO_3SQ-HSA has the excitation and emission wavelength of 693 nm and 758 nm, respectively. Both HSA solution and HSA stains can emit fluorescence with high sensitivity under NIR light, while no fluorescence was shown in the ambient light. A sensitive bloodstain detection was demonstrated even after a bloodstain is washed. Even more, fingerprints pattern can be obtained non-destructively on the transfer bloodstains. This method is an advancement in forensic science that could inspire the future development of technology for bloodstain visualization.

P3.02

APTAMER CONJUGATED GOLD NANOSTAR-BASED DISTANCE-DEPENDENT NANOPARTICLE SURFACE ENERGY TRANSFER SPECTROSCOPY FOR ULTRASENSITIVE DETECTION AND INACTIVATION OF CORONA VIRUS

Shamily Patibandla, Paresh Chandra Ray, Avijit Praminik

Jackson State University, Jackson, MS, USA

The ongoing outbreak of the coronavirus infection has killed more than 2 million people. Herein, we demonstrate that Rhodamine 6G (Rh-6G) dye conjugated DNA aptamer-attached gold nanostar (GNS)-based distance-dependent nanoparticle surface energy transfer (NSET) spectroscopy has the capability of rapid diagnosis of specific SARS-CoV-2 spike recombinant antigen or SARS-CoV-2 spike protein pseudotyped baculovirus within 10 min. Because Rh-6G- attached single-stand DNA aptamer wrapped the GNS, 99% dye fluorescence was quenched because of the NSET process. In the presence of spike antigen or virus, the fluorescence signal persists because of the aptamer−spike protein binding. Specifically, the limit of detection for the NSET assay has been determined to be 130 fg/mL for antigen and 8 particles/mL for virus. Finally, we have demonstrated that DNA aptamer-attached GNSs can stop virus infection by blocking the angiotensin-converting enzyme 2 (ACE2) receptor binding capability and destroying the lipid membrane of the virus.

P3.03 See Information P1.12

Thomasina Jenkins and Frank Han

Jackson State University, Jackson, MS, USA

P3.04

CHEMICAL ANALYSIS AND BIOTOXICITY ASSESSMENT OF PLASTIC BIOREMEDIATION USING *Tenebrio molitor* LARVAE

Lillian Sisson, Trent Selby, Scoty Hearst

Department of Chemistry and Biochemistry, Mississippi College, Clinton, MS, USA

Plastic pollution is a worldwide environmental problem impacting ground water, rivers, oceans, soils and landfills. The chemical structure of plastics renders them resistant to many natural degradation processes. Many plastics take anywhere from 20 to 500 years to decompose allowing plastic pollution to accumulate in the environment adversely affecting wildlife, wildlife habitats, and humans. Recent research has found that the larvae of Tenebrio molitor can consume and degrade the common plastic polystyrene. In this study, we examine the bioremediation potential of Tenebrio molitor larvae for other common plastics such as: Polyethylene Terephthalate, High Density and Low Density Polyethylene, Polyvinyl Chloride, Polypropylene, as well as various forms of polystyrene. To prolong the larva stage, insects were treated with s- methoprene, a common insecticide and juvenile hormone analog which acts as a growth regulator. We also explore how diet and gut microbiota impact plastic consumption, physical and chemical biodegradation, and insect toxicity. Tenebrio molitor larvae were feed different types of plastics and their plastic consumption rates and growth rates were determined. Insect tissues and waste products were analyzed for physical and chemical biodegradation of plastics using Fourier-transform infrared spectroscopy alongside other analytical techniques. The importance of gut bacteria for bioremediation and insect health was also assessed. Interestingly, consumption of some plastics were toxic to Tenebrio molitor larvae. Larvae showed a significant preference for polystyrene as compared to other types of plastic. Taken together, the feasibility of plastic bioremediation using Tenebrio molitor larvae seems to be plastic specific. Use of insect in bioremediation is a growing concept with great potential as a green chemistry solution to the worldwide plastic pollution problem. We speculate that plastic bioremediation by other insect species is an area of research worth investigating for future applications.

P3.05 See information P1.15

Richterica T. Ford and Frank X. Han Jackson State University, Jackson, MS, USA

P3.06

RATIONAL DESIGN AND THE SYNTHESIS OF POLYSULFIDE RICH ION-EXCHANGEABLE K2COMOSX CHALCOGELS FOR THE REMOVAL OF REMEDIATION OF HEAVY METALS

Jing Nie, Ahmet Celik, Xianchun Zhu, Alicia Banton, Shaloam Dasari, Qinku Zhang, Pramanik Avijit, Wencai He, Qilin Dai, Shan Yang, Pares Chandra Ray, Fengxiang X. Han, Saiful M. Islam

Jackson State University, Jackson, MS, USA

The remediation of toxic heavy metals from water is tremendously important for the safety of the public health. But, it remains a long standing challenge to develop suitable adsorbents that can sequestrate the metals ions down to ≤ 5 ppb. Chalcogel is one of the merging class of porous amorphous material that has the potential to selectively capture he heavy metals from water. Here, we have rationally designed and developed chalcogel, an emerging class of porous materials, with ion-exchangeable alkali metals, $KCoMoS_x$ that we call KCMS. The gel was synthesized by mixing the solution of $CoCl_2/Co(NO_3)_2$, K_2Sx and ammonium tetrathiomolybdate at ambient conditions. The as synthesized wet gels of K_2CoMoS_x was dried atmospheric pressure and temperature to produce xerogels. The amorphous nature of the xerogels was determined by X-ray powder diffraction (XRD), the composition was obtained by energy dispersive spectroscopy (EDX). Scanning electron microscopy revealed the presence of the nano to microporosities into the physical structure of the xerogels, besides, Raman spectroscopy determined the presence of polysulfide ion into the gels of K_2CoMoS_x. The heavy metal capture experiment results showed that K_2CoMoS_x is highly efficient for the Pb^{2+}, and Ag^+. It exhibits exceedingly high removal rates of over 99.9% for Pb^{2+} and Ag^+ with the K_d values over 10^7 mL/g. The sorption of Pb^{2+} and Ag^+ are extremely rapid, and KCMS can remove Pb^{2+} and Ag^+ from the aqueous solutions well below the safe drinking water limit defined by the US EPA. Thus, K_2CoMoS_x can be used as an outstanding option for water remediation.

P3.07 See information P1.13

Precious Cooper and Fengxiang Han

Jackson State University, Jackson, MS, USA

P3.08

EFFICIENT REMOVAL OF CHROMIUM (VI) BY LAYERED DOUBLE HYDROXIDE — Mo3S13 COMPOSITES

Ahmet Celik[1], Xianchun Zhu[2], Saiful M. Islam[1]

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Heavy metals such as chromium, cadmium, lead, and mercury pose a dire public health issues with deadly consequences. Among them, hexavalent chromium (Cr(VI) is mutagenic type and it can easily accumulate in the human body. This results severe diseases such as arthritis, bronchitis, nerve tissue damage, brain damage and even cancer. Consequently, there is an urgent need to remove Cr (VI) from wastewater before it is released into the environment. Layer double hydroxides (LDHs) are a class of anionic clays that consists of positively charged layers and interlayer anions. This type of clay exhibit a robust intercalation and anion-exchange properties that makes them attractive for the adsorption heavy metals ions from waste water. In this study, we introduce a nanoscale LDH—$[Mo_3S_{13}]$ composite that we synthesized by the chemical exfoliation in formamide and characterized by X-ray powder diffractions, scanning electron microscopy, and IR and Raman spectroscopy. Our experiments revealed that LDH—$[Mo_3S_{13}]$ composite outperforms for the sequestration of Cr^{6+} from water with a removal rate of as high as 99.90% . Such a high removal rate leaves final concentrations down to 8 ppb from a 10 ppm spiked solutions which far below the US EPA defined limit for drinking water standard. Moreover, this material shows outstanding affinity toward the adsorption of Cr^{6+} with a K_d value of > 10^6 mL/g. A concentration dependent capacity test shows that maximum sorption capacity for Cr^{6+} is 225 mg/g. These results suggests that LDH—$[Mo_3S_{13}]$ composite can be a highly effective filter for decontamination of water for hexavalent chromates.

P3.09

CHROMOPHOR CONJUGATION TO ELPS: HYDRODYNAMIC PROPERTY DETERMINATION AND IMPROVED DRUG DELIVERY

Annemarie L. Fetter[1], Wolfgang Kramer[1], Anna N. Thigpen[1], Donya Razinoubakht[2], John J. Correia[2]

[1]Millsaps College, Jackson, MS, USA and [2]University of Mississippi Medical Center, Jackson, MS, USA

ELPs (Elastin-like Polypeptides) are synthetic biopolymers that have unique properties. They are known to undergo liquid-liquid phase separation reversibly above a concentration-dependent transition temperature. Thus they are thermo-responsive and can be equipped with cell-penetrating peptides and loaded with other molecules via cysteine-maleimide crosslinking. Consequently, compounds such as cancer drugs like doxorubicin, can be delivered with ELPs by hyperthermia to target cancer cells. The transition-temperature is influenced by the conjugated drug and this study aims to investigate the effect of various parameters on the thermodynamic functions responsible for the phase separation. The influence of the connective spacer and the chromophore is investigated in this study. For this, various amino acids are converted into their maleimides and *p*- nitroaniline amides. *p*-Nitroaniline absorbs at 365 nm as a free amine, while the amide absorbs at 325 nm. The conjugation to ELP is determined by the ratio of the 280 nm and 325 nm absorptions.

Acknowledgement: This work was supported by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103476.

P3.10

SYNTHESIS OF PYRIDINE-BASED HIV INTEGRASE INHIBITORS

Wolfgang Kramer, Sharon E. Suffern, Gavisha Mugon, Sarah J. Hayek, Jacques J. Kessl[2], Matthew G. Donahue[2], R. Victor Mishoe[1],

Christopher T. Bruni[1]

[1]Millsaps College, Jackson, MS, USA and [2]The University of Southern Mississippi, Hattiesburg, MS, USA

Our collaborator at USM, Jacques Kessl has developed an assay for the determination of the effectiveness of potential HIV integrase inhibitors. HIV integrase is an important enzyme in the life cycle of the AIDS virus, it incorporates the viral DNA into the host cell genome. HIV integrase, reverse transcriptase and protease are three prominent targets in HIV drug development as they are unique to the virus. HIV Integrase inhibitors are mostly based on aromatic heterocycles such as pyridine and quinoline. In this project, we are constructing the pyridine core by reaction of substituted malonic esters with aminocrotonate ester. Variations in 2 positions on the heteroaromatic cycle allows for improving the drug-target interactions. To advance the structure further, the side-chain is developed in a collaborative effort. Finally, the substituents on the pyridine core are introduced via palladium coupling reactions.

Acknowledgement: This work was supported by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103476.

P3.11

SYNTHETIC APPROACHES TO PHOTOACTIVATABLE AROMATIC HETEROCYCLES FOR PHOTOINDUCED CELL DEATH

Wolfgang Kramer, Reagan M. McGuffee, C. Taylor Sledge, Shizhe (CJ) Zhang, Chris N. Hart

Millsaps College, Jackson, MS, USA

N-Methoxy substituted aromatic heterocycles are photoactivatable compounds that produce two transient reactive species upon excitation. The reactive species, a methoxy radical and a heteroaromatic radical cation, have been shown to cleave DNA, which makes them candidates for photoinduced cell death. Applications of photoinduced cell death are found in Photodynamic Cancer Therapy. The efficiency of DNA cleavage is limited by weak ground-state association for the quinoline and isoquinoline derivatives. To increase cleaving efficiency, a DNA-binder (1,8- naphthalimide) has been synthetically attached. To further improve binding and cleaving efficiency, attempts to synthesize novel amino- heterocycles are undertaken. Our approach is to functionalize alkylquinolines or related heterocycles by radical bromination and then modify the products by various Grignard reactions or direct substitution with potassium phthalimide. The isolation of the alkylamine proved to be the most challenging step and it appears that alkaline work-up does not yield the desired product. Consequently, reaction such as the Delepine reaction, which require acidic conditions, are selected.

Acknowledgement: This work was supported by the Mississippi INBRE, funded by an Institutional Development Award (IDeA) from the National Institute of General Medical Sciences of the National Institutes of Health under grant number P20GM103476.

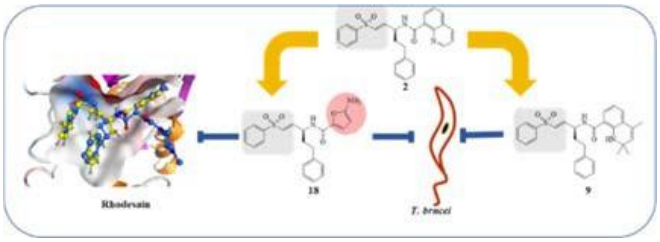
P3.12

VINYL SULFONE-BASED INHIBITORS OF TRYPANOSOMAL CYSTEINE PROTEASE RHODESAIN WITH IMPROVED ANTITRYPANOSOMAL ACTIVITIES

Oluwatomi Ajayi Huaisheng Zhang, Rogers Nyamwihura, Olamide Crown, Ifedayo Victor Ogungbe

Jackson State University, Jackson, MS, USA

The number of reported cases of Human African Trypanosomiasis (HAT), caused by kinetoplastid protozoan parasite Trypanosoma brucei, is declining in sub-Saharan Africa. Historically, such declines are generally followed by periods of higher incidence, and one of the lingering public health challenges of HAT is that its drug development pipeline is historically sparse. As a continuation of our work on new antitrypanosomal agents, we found that partially saturated quinoline-based vinyl sulfone compounds selectively inhibit the growth of T. brucei but displayed relatively weak inhibitory activity towards T. brucei's cysteine protease rhodesain.While two nitroaromatic analogs of the quinoline-based vinyl sulfone compounds displayed potent inhibition of T. brucei and rhodesain. The quinoline derivatives and the nitroaromatic-based compounds were advanced to ADME-based optimization and two of the analogs from the series is currently under pre-clinical efficacy and safety studies.



P3.13

POLYCYCLIC AROMATIC HYDROCARBONS AS BIOSIGNATURES IN THE MARTIAN SUBSURFACE

Timothy Ward, Ardith Bravenec, Thien Pham, Makayla Pfarrer, Christine R. Ward

Millsaps College, Jackson, MS, USA

Evidence for previous life on Mars may be found by looking for biosignatures, which are organic remains that can indicate current or previous biotic activity. Potential biosignatures include polycyclic aromatic hydrocarbons (PAHs) which are important components of the interstellar medium, often abundant in asteroids, and can be indicative of carbon-based life. PAHs have been introduced to the Martian surface via impacts and can provide important information for determining the overall state of organic material on Mars, in addition to organic material that existed on Mars prior to impact introduction. To explore how biosignatures may be preserved on Mars, it is necessary to consider minerals as a potential host environment where biosignatures may be found. Due to the largely inhospitable surface environment of Mars, if biosignatures are to be found, they likely reside in the subsurface within minerals or environments that previously hosted underground hydrothermal systems. Results will inform future searches for life on Mars as well as the interpretation of organic analyses from past missions. To examine the PAHs' preservation potential in Martian conditions, a variety of selected PAHs have undergone various temperature and pressure treatments to simulate Martial subsurface environments. During these temperature and pressure trials, PAH mixtures were embedded in various mineral matrices, including those with oxidizing agents, and then subjected to acidic, saline, and neutral fluid environments, respectively. Following the development of an efficient and sensitive extraction protocol, bulk and trace analysis was performed of the selected PAHs and their degradation products by GC-MS and LC-MS.

P3.14

COLORIMETRIC DETECTION OF OXALATE WITH A DINUCLEAR NI(II) COMPLEX OF A THIOPHENE BASED MACROCYCLE

Arlencia Barnes[1], Md Mhahabubur Rhaman[1], Douglas R. Powell[2], Md. Alamgir Hossain[1]

[1]Department of Chemistry, Physics, and Atmospheric Sciences, Jackson State University, Jackson, MS, USA and [2]Department of Chemistry and Biochemistry, University of Oklahoma, Norman, OK, USA

An oxalate in the human diet is important because it influences the bioavailability of dietary calcium and magnesium. Since there is no enzyme in the human body to degrade oxalate, an increased amount of dietary oxalate significantly decreases calcium and magnesium absorption by the formation of insoluble oxalate salts which finally accumulate in the renal tissue. It may result in a number of pathological conditions including renal failure, pancreatic insufficiency, and the development of kidney stones. Therefore, the quantitative information of oxalate is widely used in identifying several diseases including *hyperoxaluria, vulvodynia,* and kidney stones. Many different methods have been developed for quantitative analysis of oxalate, which are not often convenient for a general purpose. Alternatively, the colorimetric and fluorescence sensing technique becomes an attractive research area because of its low cost, simplicity, and visual detection of an anion without involving expensive instrumentations. In our research, the thiophene based polyamine macrocycle was synthesized by Schif's base reaction between 2,2'-diamino-*N*-methyldiethylamine and 2,5-thiophenedicarboxaldehyde in high dilution condition followed by NaBH4 reduction. The macrocycle was then converted into a dinuclear Ni(II) complex that was studied for the detection of oxalate by an indicator displacement assay (IDA) using commercially available dyes (Eosin Y, Pyrogallol Red, and Pyrocetochol Violet), showing impressive selectivity for oxalate in water.

P3.15

THE REFORMING OF BIOGAS FROM ANAEROBIC DIGESTION OF ORGANIC WASTES FOR SYNGAS PRODUCTION

Fei Yu

Mississippi State University, Mississippi State, MS, USA

The depletion of world fossil fuel resources and an increase of

greenhouse gas emissions shows the necessity for developing and expanding sustainable and renewable energy sources. An attractive energy source is biogas, whereby it is produced through the anaerobic digestion or fermentation of widely available organic matter, such as sewage, energy crops, agricultural wastes, domestic refuse and animal manures. Currently, biogas is mainly applied in heating and producing electricity, which is not effective enough for utilizing biogas energy. One attractive approach is to convert biogas by using catalytic reforming (called as biogas reforming), which has the potential to take full advantage of biogas by converting both CH4 and CO2 (the two principle greenhouse gases) into H2 and CO, or syngas. Syngas can be used as a major feedstock in Fischer-Tropsch synthesis to produce several valuable petrochemicals and fuels. In this research, a Ni-Mg-Al catalyst system was prepared using a refluxed co- precipitation method and was investigated using various Mg molar concentrations with the reforming reaction. The aim of this study was not only to optimize the content of Mg promoter, but also to provide valuable reference data for further applications involving the reformation of raw biogas to syngas. The catalyst characterization was obtained using various techniques including N2 adsorption- desorption, XRD, H2-TPR, CO2-TPD, TEM and TGA in order to investigate the structural properties and basicity of the catalyst, and the type of deposited carbon over different catalysts.

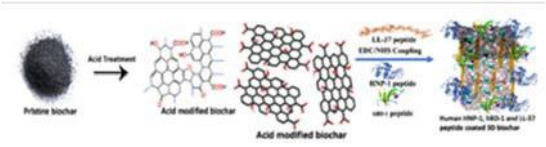
P3.16

DEVELOPMENT OF HUMAN HOST DEFENSE ANTIMICROBIAL PEPTIDE CONJUGATED BIOCHAR NANOCOMPOSITES FOR COMBATING BROAD SPECTRUM SUPERBUGS

Ye Gao

Jackson State University, Jackson, MS, USA

Infectious diseases by multidrug-resistant superbugs, which cannot be cured using commercially available antibiotics, are the biggest threat for our society. Due to the lack of discovery of effective antibiotics in the last two decades, there is an urgent need for the design of new broad-spectrum anti-superbug biomaterials. Herein, we report the development of anti-superbug nanocomposites using human host defense antimicrobial peptide-conjugated biochar. To develop an economically viable technology, biochar, a carbon-rich material from naturally abundant resource, has been used. For combating broad- spectrum superbugs, a nanocomposite has been designed by combining biochar with α-defensin human neutrophil peptide-1 (HNP- 1), human β-defensin-1 (hBD-1), and human cathelicidin LL-37 antimicrobial peptide. The designed three-dimensional (3D) nanocomposites with pore size between 200 and 400 nm have been used as channels for water passage and captured superbugs. The reported data demonstrated that antimicrobial nanocomposite can be used for efficient capture and eradication of Gram-negative carbapenem-resistant Enterobacteriaceae (CRE) Escherichia coli (E. coli) and Klebsiella pneumoniae (KPN) superbugs, as well as Gram- positive methicillin-resistant Staphylococcus aureus (MRSA) and vancomycin-resistant enterococci (VRE) superbugs. Possible mechanisms for broad-spectrum anti-superbug activities using hydrogel have been discussed.



Scheme. Schematic Representation Showing the Synthetic Pathway Used to Develop Human Antimicrobial α-Defensin HNP-1, β- Defensin hBD-1, and Cathelicidin LL-37 Peptide-Attached Biochar Nanocomposites

P3.17

SYNTHESIS OF COPPER DOPED IRON OXIDE NANOPARTICLES FOR POTENTIAL DUAL MODALITY MRI/PET IMAGING

Terriona Cowan, Pohlee Cheah, Yongfeng Zhao

Jackson State University, Jackson, MS, USA

Falling under the ranks of cardiovascular disease, cancer is the second leading cause of massive mortality in the United States. The key to averting mortality rates is to diagnose the malignant disease at an earlier stage. These preventive measures include conventional diagnosis with a significant reliance on molecular imaging. Magnetic resonance imaging, among all imaging modalities, can produce images with extraordinarily high temporal and spatial resolution, especially in soft tissue. However, the sensitivity of MRI is relatively low. Positron emission tomography (PET), another imaging modality used in clinics, allows signaling produced by positron emitting radiotracers to attain an image. PET performs under high sensitivity, up to 10^{-12} mol/L. Although used frequently, PET lacks the ability to gain the information of location due to low resolution. Therefore, the combination of MRI and PET gives synergy of high anatomical spatial resolution of MRI as well as incomparable sensitivity and functional imaging of PET. While significant progress has been made to label iron oxide NPs for PET/MRI dual modality imaging, the current probes are either unstable, polydisperse in size, irregular in shape, or have uncontrollable iron oxide surface chemistry. To address these problems, Cu doped Fe_3O_4 nanoparticles were synthesized via thermal decomposition. Their growth factors were examined under various temperatures, times, and organic solvents to acquire sizes. ICP-MS data was analyzed to compare desired dopings to relative copper recovery. Among copper characterizations, surface modification techniques were explored using poly(acrylic) acid (PAA), poly(ethylene) glycol (PEG), and poly(ethylenimine) (PEI).

P3.18

HIGH MASS ACCURACY DATA FROM A BENCHTOP QUADRUPOLE GC-MS USING POST-ACQUISITION SOFTWARE

Charles B. Smithhart

Delta State University, Cleveland, MS, USA

Conventional benchtop quadrupole GC-MS systems are noted for their affordability, sensitivity and ease of use. Generally, the data acquired from these systems is sufficient to allow good quantitation of known compounds. One limitation of benchtop quadrupole systems has been their relatively poor mass accuracy, and they are often described as having “unit mass resolution”. This lack of mass accuracy leads to ambiguity in the qualitative search/match identification of some compounds.The Delta State University Division of Mathematics and Sciences recently purchased1 an Agilent2 7890B GC with a 5977B Mass Selective Detector. Included with the purchase was a software option provided by Cerno Bioscience3 called MassWorksTM. This post-acquisition software claims to allow users to “obtain up to 100X improvement in mass accuracy on unit resolution systems and up to 99.9% spectral accuracy on both high and unit resolution systems” without the need of standards.This study will test these performance claims using several model compounds and the NIST 2017 MS database. Mass resolution and spectral accuracy results from Agilent's ChemStationTM software, both alone and with MassWorksTM resolution enhancement software, will be presented.Use of this software approach to mass accuracy enhancement may represent a cost-effective way to obtain high mass accuracy data without the need to purchase expensive high-accuracy mass spectrometer hardware. [1]Alumni Donation by Mr. and Mrs. Joe Baker of Miramar Beach, FL [2]Agilent Technologies, Santa Clara, CA [3]Cerno Biosciences, Las Vegas, NV

P3.19 See information P1.09

Olanrewaju Olafuyi

Jackson State University, Jackson, MS, USA

P3.20

POTENTIAL OF USING EARTHWORM AS A BIOINDICATOR FOR SOIL HEALTH AS AFFECTED BY HERBICIDES

Samuel Han[1], Megan Davis[2], Lanre Olafuyi[3], Frank (Fengxiang) Han[3]

[1]Madison High School, Madison, MS, USA, [2]Clinton High School, Clinton, MS, USA, [3]Jackson State University, Jackson, MS, USA

Herbicides have been widely used in the maintaining the agricultural crop land, forest land and laws in the US. In suburban and urban areas, herbicides are applied to lawns, parks, golf courses and other areas. The most ten herbicides used on agricultural land in the U.S. include Glyphosate, atrazine, 2,4-D, and Dicamba etc. Herbicides work in controlling weeds by inhibiting cell division, photosynthesis or amino acid production or by mimicking natural plant growth hormones, causing deformities. Application methods include spraying onto foliage, applying to soils and applying directly to aquatic systems. The objective of this study is to investigate the potential use of earthworm as a bio indicator for soil heath as affected application of herbicides. A widely applied series of herbicides will be used in soils and grassland to examine their effects on earthworm in quantity and health. SEM and TEM will be used to examine the earthworm structure change. The effect on the reproductivity of earthworm will be also studied. This study will provide the scientific evidence on proper application of herbicide in controlling weeds with maintaining a good soil heath.

Friday, August 6, 2021

MORNING

Room D5

8:50 Welcome

O3.16

9:00 AN INDICATOR DISPLACEMENT APPROACH FOR THE DETECTION OF CARBOXYLATE ANIONS WITH DINUCLEAR NI (II) AND CU(II) COMPLEXES OF POLYAMINE-BASED MACROCYCLES

Md Mhahabubur Rhaman[1], Arlencia Barnes[1], Douglas R. Powell[2], Md. Alamgir Hossain[1]

[1]Department of Chemistry, Physics, and Atmospheric Sciences, Jackson State University, Jackson, MS, USA and [2]Department of Chemistry and Biochemistry, University of Oklahoma, Norman, OK, USA

There are various carboxylate anions which play an important role in biology, medicine and food industry. For examples, glutamate is used as a flavor and taste enhancer in food, which can excite cells to death in a process known to as "excitotoxicity". The quantitative information of oxalate in urine is commonly used in diagnosis of several diseases including *hyperoxaluria* and *vulvodynia*. Citrate is another carboxylate anion whose presence in urine is considered to inhibit the crystallization of calcium salt. Its high concentration in urine indicates the growing of kidney stones and urological diseases such as *nephrolithiasis* and *hypocitraturia*. Tartaric acid is often used as an acidulant in beverages and food. However, it is a muscle toxin and the excessive consumption may cause paralysis and death. Therefore, the easy and inexpensive method of quantitative detection of carboxylate anions are important. In our research, several polyamine macrocycles were synthesized by Schif's base reaction between 2,2'-diamino-*N*-methyldiethylamine and various aromatic dicarboxaldehyde in high dilution condition followed by $NaBH_4$ reduction. These macrocycles were converted into dinuclear Ni(II) and Cu(II) complexes, that were studied for the recognition of carboxyl containing anions by indicator displacement assay using Eosin Y, Pyragallol red, and pyrocatechol violet. This presentation will cover the detail of the synthesis and binding studies. of the dinuclear metal complexes.

Acknowledgements: The project was funded by LSMAMP Bridge to the Doctorate (National Science Foundation Grant-HRD-1906146) and US Department of Defense (Grant number W911NF-19-1-0006). The National Science Foundation supported the purchase of the diffractometer (Grant CHE-0130835).

O3.17

9:15 SYNTHESIS OF STABLE LONGER NIR(II) EMISSIVE AND ABSORPTIVE DYES BASED ON DIBENZOSILINES

Daijun Feng

Mississippi State University, Mississippi State, MS, USA

Dibenzosilines compounds have received much attention in the past decade because of their use as far-red to NIR fluorophores with emission exceeding 700 nm to investigate biological processes. Generally, the common protocol to prepare dibenzosilines requires a multi-step synthetic process that goes through lithium-halogen exchange with silicon chloride to obtain the product. These synthetic routes usually require no fewer than 5-7 steps and involve harsh reaction conditions. Ir or Rh-catalyzed C–H silylation provide an opportunity to install Si by a concise approach under benign conditions. In this presentation, we will report on the synthesis of two Si-xanthene-based NIR dyes bearing phenoxazine and dihydro- phenazine wings, respectively, through two C-H silylation steps catalyzed by Ir. The introduction of Si into these two structures are not accessible by the conventional strategy. We will also discuss their applications in acoustic and fluorescence imaging in biological tissues.

O3.18

9:30 SYNTHESIS AND CHARACTERIZATION PHENOTHIAZINE-BASED POLYMER AS POLYANILINE MIMIC

Hari Giri and Colleen Scott

Mississippi State University, Mississippi State, MS, USA

Phenothiazines are widely used in drugs for psychotic diseases. They have a hetero-tricyclic polyaromatic structure with electrochromic and electrochemical properties which can be used for making electronic devices. They are potential candidates for developing sensors, biomedical materials, batteries, and fuel cells. They can act as a mimic of polyaniline (PANI), which further expands their scope. PANI is widely explored as electrochemical devices due to their low- cost monomer, flexible structure, electroactive behavior, and their ease of acidic doping/basic dedoping. But, PANI has some problems for example it is insoluble and unstable during a redox reaction, thus it is difficult to process which limits its scope. Phenothiazine-based polymers could be redox stable and adding solubilizing group can allow for solubility in most common organic solvents, which further opens the door for optoelectronic applications. Herein, we report the synthesis of a phenothiazine-based polymer by Buchwald/Hartwig cross-coupling reaction with 2,5-dimethyl-p-phenylenediamine as the co-monomer. The branched alkyl side chain on the nitrogen atom promotes its solubility. The generation of stable radical cation (polarons) along the polymer's backbone by acid doping is confirmed by EPR and UV/vis spectroscopy. The doping behavior with different dopants like polystyrene sulfonic acid (PSS), trifluoroacetic acid (TFA), and camphor sulfonic acid (CSA) on the polymer is studied by UV/vis spectroscopy. The conductivity of the polymer is measured by the four-point probe method.

O3.19

9:45 STRUCTURE AND DYNAMICS OF BRANCHED HARDWOOD AND SOFTWOOD LIGNIN IN WATER

Nusrat Jahan, Md Masrul Huda, Neeraj Rai

Dave C. Swalm School of Chemical Engineering, Mississippi State University, Mississippi State, MS, USA

Lignin, one of the main components of lignocellulosic biomass, presented as sustainable alternative for the current petrochemical industry. Delignification and further valorization of isolated lignin, both processes require thermal and solvolytic processing. Effective isolation and valorization of lignin raise the importance of understanding the solubilities of different types of lignin in a wide range of solvents and binary mixtures. We applied water model SPC/Fw, in order to understand the

conformational and dynamical properties of branched lignin (softwood and hardwood) in aqueous medium at different process temperatures. Here, using all-atom molecular-dynamics simulation, it appears that conformational properties of lignin do not show variation with the change of the monomer distribution, both types of lignin form globular conformation. Water models that poorly reproduce certain bulk properties of liquid water such as self-diffusion are likely to misrepresent water-water interactions. Since, SPC/Fw reproduce dynamic properties better than widely used water models for bio- molecular simulations, understanding the transport properties of lignin in SPC/Fw is important. Although, differences in topology of lignin did not result in significant variation in the average number of h-bonding surroundings the lignin but diffusion for hardwood lignin is noticeably different at higher temperature. And also the hardwood lignin showed higher chain mobility than the softwood lignin polymer. We hope our results will be useful for computational simulations of diffusion analysis of macro-molecules like lignin in complex aqueous system.

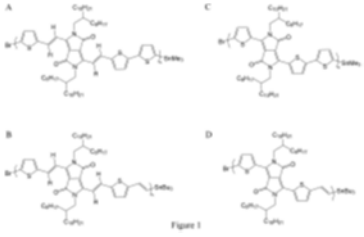
O3.20

10:00 SYNTHESIS OF NEW DIKETOPYRROLOPYRROLE SCAFFOLDS FOR THE FORMATION OF NOVEL DONOR-ACCEPTOR AND n-TYPE SEMICONDUCTORS

Ranganath W. Wahalathantrige Don and Colleen Scott

Department of Chemistry, Mississippi State University, Mississippi State, MS, USA

In recent years, conjugated polymers with diketopyrrolopyrrole (DPP) units in the backbone have caught the attention of the organic device community for their potential application in solar cells and ambipolar field-effect transistors (FETs). The high charge mobility, self-organizing properties, and electron-deficient nature of these polymers make them perfect candidates for the aforementioned applications. Co-polymerization of DPP units with electron-rich aromatic species such as thiophene makes it possible to control (lower) the optical bandgap of the polymer. In this study, four DPP- thiophene polymers containing alkenyl spacers were synthesized to investigate the effect of the alkenyl group on the optoelectrical properties of the polymer. The polymers were synthesized by Stille polycondensation polymerization and characterized for their structural, optical, electrical, and charge mobility properties. The polymers A and B (Figure 1) were synthesized from vinyl flaked DPP moiety, which was previously developed by our group, with bis- stannyl thiophene and bis-stannyl ethene, while C and D (Figure 1) were synthesized from thiophene flanked DPP with bis-stannyl thiophene and bis-stannyl ethene. The effect of the alkenyl groups' position on optoelectrical and charge mobility was characterized by UV/visible spectroscopy, cyclic voltammetry, and FET characteristics. Thermal properties of the synthesized polymers were characterized by Differential Scanning Calorimetry (DSC) and Thermal Gravimetric Analysis (TGA). The structural morphology of the polymers was evaluated with Grazing Incidence X-ray Diffraction (GIXD) and Atomic Force Microscopy (AFM). We will discuss the results of our study in this presentation.



10:15 Break

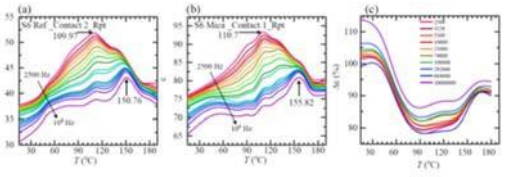
O3.21

10:30 HIGH ENHANCEMENT OF DIELECTRIC PROPERTIES IN POLYMER PVDF AND 2D MICA HETEROSTRUCTURE

Priyanka Das[1], Maninderjit Singh[2], Roshanak Nejat[3], Qiqi Zhang[1], Qilin Dai[1], Dharmaraj Raghavan[4], Alamgir Karim[2], Nihar Pradhan[1]

[1]Chemistry, Physics and Atmospheric Science, Jackson State University, Jackson, MS, USA, [2]Department of Chemical and Biomolecular Engineering, University of Houston, Houston, TX,USA, [3]Materials Engineering Program, University of Houston, Houston, TX, USA, [4]Department of Chemistry, Howard University, Washington, DC

Enhancement of dielectric properties such as dielectric constant, breakdown voltage and reducingdielectric loss of low dielectric constant polymer matrix using nanofillers are the forefront of the current research. Using minimum amount of nanofillers to enhance dielectric properties significantly is one of the challenging tasks. Here we observed a strong dielectric enhancement in PVDF polymer when combined with small quantity of layered 2D mica crystals in a heterostructure geometry. A PVDF/(mica-PMMA)/PVDF heterostructure layered devices were fabricated using spin coating and transfer techniques, where 2D mica layers were sandwiched between two PVDF layers. We observed 100 to 130% enhancement of dielectric constant when an exfoliated mica is sandwiched between two spin coated PVDF layers. The dielectric breakdown voltage also shows much larger than the pure polymer sample. The loss also decreases significantly with introducing mica layers between two PVDF layers. This shows that the dielectric constant is strongly related to the charge accumulation at the interface of 2D mica layer and polymer layer under applied electric field. The detail dielectric measurements in as a function of broad frequency range 1000 Hz - 10 MHz and temperature from room to 200 degree C will be presented.



(a) Dielectric constant of heterostructure sample of PVDF/MMA/PVDF layers. (b) Dielectric constant of heterostructure sample of PVDF layered Mica-MMA/PVDF layers and (c) Display the calculated enhanced dielectric constant of sample at (b) due to interfaced Mica layers.

O3.22

10:45 **EFFECTS OF EXOPOLYSACCHARIDES ON BIOACCUMULATION OF IN *Nerium oleander***

Naira Ibrahim, Fengxiang Han; Ahmet Celik

Jackson State University, Jackson, MS

Generally, U is present in the nature in two forms either as an oxidized form such as Uranite (UO2+2) or as secondary mineral as (Complex oxides, Silicates). The percentage of U in soil ranged between 80- 90% in the form of oxidation state as uranyl (UO2-2) as cation that easy in its mobility, while the other form is stable in water (UO2+2) and the last form is soluble carbonate complex as (UO2)2CO3(OH)3. Nowadays, Bacteria became abundant in environment with concentration ranged between 106 to 109 cell g-1 soils. Therefore, the huge surface area of soil microorganisms gives them the chance to interact easily with the metals that dissolve in the soil. This led to control the mobility of the overall metal in both aqueous and soil system through the bacterial surfaces. It seems that many bacteria have their capability to synthesize an external exopolysaccharide (EPS). However, the molecules of EPS from most bacteria are negatively charged, but it is known by it has efficiently to take up metal ions from aqueous solutions. In addition, it plays an important role in adsorbing the metals onto cell envelopes. The aim of our work is to a) Evaluate the capability of EPS on the adsorption of U in soil.

b) Measure the efficiency of EPS with phytoremediation by using

Nerium oleander in remediating the soil. Sixteen pots were filled with Yuma soil supplied with NPK fertilization and were spiked with two different concentration (100 and 1000ppm) (UO2, UO3, Uranyl Acetate and Shoepit), the EPS will be added in the soil. Plants will grow for a period between one month to two months. Therefore, this study will provide the scientific understanding of effects of EPS on phytoremediation of U contaminated soils with *Nerium oleander*.

O3.23

11:00 THE ROLE OF THE REACTION TEMPERATURE IN THERMAL DECOMPOSITION SYNTHESIS OF WATER- SOLUBLE SUPERPARAMAGENTIC IRON OXIDE NANOPARTICLES IN POLYOL SOLVENT

Pohlee Cheah[1], Jing Qu[1], Yu Li[2], Dongmei Cao[2]

[1]Jackson State University, Jackson, MS, USA and [2]Louisana State University, Baton Rouge, LA, USA

We investigated the role of the reaction temperature in the continuous growth of water-soluble superparamagnetic iron oxide nanoparticles in diethylene glycol (DEG) via thermal decomposition synthesis. The size growth, chemical composition, and magnetic properties of these nanoparticles were characterized by TEM, XRD, XPS, and SQUID magnetometry. The results showed that the nucleation rate is higher as well as the increasing growth rate of nanoparticles with increasing reaction temperature, resulting in larger final particles at each consecutive growth. Both the TEM and XRD crystallite sizes are well correlated. The crystal structure of the nanoparticles showed a magnetite phase. These nanoparticles are highly water-soluble but have limited stability in 1x PBS solution. In addition to that, we reported that synthesis at reflux temperature produced precipitation in the reaction mixture and lost its' water-solubility. The surface XPS and magnetization showed no difference when comparing the nanoparticle of the same size regardless of the reaction temperature used in the thermal decomposition. Nevertheless, we then showed how the size control of IO can be customized by tuning the reaction temperature and reported their effects on the performance of magnetite nanoparticles in MRI imaging by measuring their transverse (r_2) and longitudinal relaxivities (r_1).

O3.24

11:15 ION-EXCHANGEABLE K2SNMOS5 CHALCOGELS AS AN EFFICIENT AND EFFECTIVE ADSORBENT OF TOXIC HEAVY METAL CATIONS AND RADIONUCLIDES

Alicia Blanton

Jackson State University, Jackson, MS, USA

Chalcogels are porous materials that consist of interlocking aggregated nanoparticles extending in a 3D matrix of chalcogenides. This class of materials exhibit a wide range of applications in energy, heterogeneous catalysis, and environmental remediation. Heavy metals ions such as Hg^{2+}, Pb^{2+}, and Cd^{2+}, and radionuclide ions such as Sr^{2+}, Cs^{+}, and UO_2^{2+} contaminants of water essentially cause serious harm to humans and other biological species. Consequently, water must be decontaminated. To address these issues, we have designed and developed ion-exchangeable K_2SnMoS_5 chalcogels. Its xerogels demonstrate highly efficient removal and selective binding of heavy metal ions of Cu^{+}, Ag^{+}, Cd^{2+}, Hg^{2+}, and Pb^{2+} and radionuclides of Sr^{2+}, Cs^{+}, and UO_2^{2+} from aqueous solutions. These experiments determined its superior kinetics ~ 90 % removal for Ag^{+}, Cd^{2+}, Hg^{2+}, Cu^{+} only in 15 minutes, while

≥99% removal for Pb^{2+} Hg^{2+}, Cd^{2+}, Ag^{+}, and Cu^{+} in 6h. The xerogels of KTMS exhibit rapid and efficient ion-exchange behavior in a broad pH range 2~11. Likewise, the heavy metals KTMS is extremely effective for the sequestration of Cs^{+}, Sr^{2+} and UO_2^{2+}. Our study shows that it can reach over 92, 99, and 99%, removal of Cs^{+}, Sr^{2+} and UO^{2+}, respectively leading the final concentration from ppm to trace levels. The superior sorption of metal cations and radionuclides result from the ion-exchange of K^{+} and the Lewis acid-base interactions of between surface polarizable polysulfide species of the chalcogels and the Lewis acidic soft heavy metals and radionuclides cations. Large sorption of cadmium, lead, mercury, copper, silver, uranium, cesium, and strontium qualify the xerogels of K_2SnMoS_5 as a unique candidate for toxic heavy metal and nuclear wastes.

O3.25

11:30 HIGHLY EFFICIENT, RAPID, AND CONCURRENT REMOVAL OF A WIDE RANGE OF HEAVY METALS BY THE NOVEL 2D HYBRID LDH–[Sn2S6]

Ahmet Celik[1], David R. Baker[2], Zikri Arslan[3], Xianchun Zhu[4], Alicia Banton[1], Jing Nie[1], Shan Yang[1], Shulan Ma[5], Fengxiang X. Han[1], Saiful M. Islam[1]

[1]Department of Chemistry, Physics, and Atmospheric Sciences, Jackson State University, Jackson, MS, USA, [2]Sensors and Electron Devices Directorate, U. S. Army Research Laboratory, Adelphi, USA, [3]U.S. Geological Survey, MS 973, Federal Center, Denver, Co, USA, [4]Department of Civil Engineering, Jackson State University, Jackson, MS, USA, [e]College of Chemistry, Beijing Normal University, Beijing, China

Drinking water pollution with heavy metals is a global problem with dire public health consequences. Existing water purification methods are unable to the rapid and concurrent removal of toxic metals to trace levels. Here, we introduce the new 2D hybrid LDH–[Sn_2S_6] as an unprecedented sorbent that shows highly efficient and concurrent removal of Cu^{2+}, Ag^{+}, Cd^{2+}, Pb^{2+}, and Hg^{2+} from ppm (mg/L) to ppb (µg/L) level in seconds. In mixed-ion states of Zn^{2+}, Co^{2+}, Ni^{2+}, Ag^{+}, Cu^{2+}, Hg^{2+}, Pb^{2+}, and Cd^{2+} (10 ppm each, 80 ppm in total) in deionized water (DIW), LDH–[Sn_2S_6] shows simultaneous removal of > 99.9 % of Cu^{2+}, Ag^{+}, Cd^{2+}, Pb^{2+}, and Hg^{2+} enabling the final concentrations below 5 ppb following the selectivity order of Zn^{2+}, Co^{2+}, Ni^{2+} << Ag^{+}, Cu^{2+} < Hg^{2+} < Pb^{2+}, Cd^{2+}. Remarkably, LDH–[Sn_2S_6] removes over 99.0 % of Cu^{2+}, Ag^{+}, Cd^{2+}, Pb^{2+}, and Hg^{2+} at pH ~ 2 to 9 preserving high distribution constant (K_d) ~ 10^5 to 10^7 mL/g in the entire pH range. Besides, LDH–[Sn_2S_6] shows enormous sorption capacities (q_m) of 378, 978, 332, 579, and 666 mg/g for Cu^{2+}, Ag^{+}, Cd^{2+}, Pb^{2+}, and Hg^{2+}, respectively. In parallel to DIW, LDH-Sn_2S_6 displays extraordinary tolerance of the concentrations of existing ions of Ca^{2+}, Mg^{2+}, Na^{+}, Cl^{-}, CO_3^{2-}, SO_4^{2-}, and NO_3^{-} and other of the tap and river water; efficiently sequestrates Cu^{2+}, Ag^{+}, Cd^{2+}, Pb^{2+}, and Hg^{2+} from ppm to ppb levels yielding the World Health Organization (WHO) defined drinkable levels. LDH–[Sn_2S_6] shows the sorption kinetics that follows a pseudo-second-order model, suggesting that chemisorption adsorption mechanisms involve through M-S bonding. Altogether, the LDH–[Sn_2S_6] becomes an exceptional material that shows ultrahigh removal, unprecedented selectivity, extremely rapid adsorption kinetics, a wide range of pH stability, and a massive adsorption capacity. The integration of such an exceptional feature places LDH–[Sn_2S_6] at the top of all adsorbents known to date. Thus, this cost-effective material could be used for wastewater purifications.

11:45 Break

12:00 Business Meeting, Award Ceremony and Group Photos

Friday, August 6, 2021
AFTERNOON

12:00-1:00 Plenary Speaker

1:00-3:00 Mississippi INBRE/ Millsaps Symposia

ECOLOGY AND EVOLUTIONARY BIOLOGY

Chair: AHM Ali Reza

Delta State University

Vice-Chair: Nina Baghai Riding

Delta State University

Thursday, August 5, 2021

MORNING

Room D3

8:00 WELCOME

8:05-9:00 Invited Speakers' Presentation

O4.01

9:05 A NEW ATTENUATED ZIKA VIRUS WITH MODIFIED 5' UNTRANSLATED REGION ELICITS IMMUNITY IN MICE

Farzana Nazneen, E. Ashely Thompson, Biswas Neupane, Claire Blackwell, Faqing Huang, and Fengwei Bai

The University of Southern Mississippi, Hattiesburg, MS USA

Zika virus (ZIKV), a mosquito-borne Flavivirus with a history of causing an epidemic, has been considered a major public health concern. Although ZIKV infection causes asymptomatic illnesses lasting for 2-7 days in most cases, there is also an increased risk of severe neurological complications including Guillain-Barre Syndrome, neuropathy, and myelitis in human adults. ZIKV infection during pregnancy causes major concerns as it produces a wide range of complications such as pre-term birth, miscarriage, and congenital malformations including microcephaly in infants known as Congenital Zika Syndrome and even fetal demise. However, there are no approved vaccines or effective therapeutics available against ZIKV infection. We generated a new attenuated ZIKV strain, Z7, by inserting 50 nucleotides (nt) at 5′ untranslated region (UTR) of the wild type ZIKV, Z1, a Cambodian strain. The insertion of nt was confirmed by sequencing. Focus forming assay and QPCR assays in our *in-vitro* study confirmed that Z7 showed a lower replication rate than Z1measured by. In animal studies, we inoculated 10^5 PFU) of each of Z7 and Z1 into 4-week-old *Ifnar1*$^{-/-}$ mice through foot-pads. Following the primary infection, Z7 generated a lower level of viral loads in blood and tissue but a similar level of humoral response measured by anti-ZIKV IgG level in ELISA compared to that in Z1. The Z1- and Z7-immunized mice were also monitored for 21 days for weight change and survival. While the Z1-infection resulted in significantly decreased weight but increased mortality in mice, Z7 infection caused no mortality. Z7-infected mice were then challenged with 10^5 PFU of ZIKV (Puerto Rico strain). The post challenge data of blood and tissue confirmed that a single dose of Z7 inoculation provided a sterilizing immunity in *Ifnar*$^{-/-}$ mice. We hypothesized that the mutant ZIKV generated by 5′ UTR modification reduced the viral protein synthesis by decreasing the initiation of translation. Although the mutant had attenuated virulence, it could produce strong immunogenicity and sterilizing immunity against ZIKV infection. Therefore, 5′ UTR modified Z7 is a promising vaccine candidate to protect against ZIKV infection.

O4.02

9:20 DO FLUVIAL SEDIMENTARY PROCESSES HAVE NON-LOCAL CONSEQUENCES FOR METAPOPULATION AND METACOMMUNITY DYNAMICS?

Loren Stearman and Jake Schaefer

University of Southern Mississippi, Hattiesburg, MS, USA

Altered fluvial sediment regimes have clear and often deleterious effects on aquatic ecosystems. Researchers often explain ecological changes due to sedimentary processes through simple models of local habitat loss for specialist species via local sediment deposition, but evidence for these models is ambiguous. Both fluvial sedimentary systems and ecological systems are connected and maintained through spatial and temporal processes, and there is potential for non- local process interaction. In this project, we explore whether such interactions shape stream fish metacommunities in geomorphically unstable river systems in south Mississippi. We described basin-scale sedimentary activity utilizing both a GIS-based approach and field measurements and characterized local fish communities in headwater streams of multiple river systems. Both GIS-based analyses (e.g., channel profiles) and multivariate analyses of field measurements suggested many of these systems are either actively experiencing episodes of erosion from channel incision or recovering from these processes. Local channel morphology at sample stations varied across a gradient from stable (deep, narrow, sediment retention) to erosional (shallow, wide, bedrock exposure) forms. Multivariate analyses of fish communities suggested a complex relationship between whole-community beta diversity and degree of sedimentary activity in a river system. Separate analyses of beta diversity in two diverse and ecologically disparate groups, darters (Percidae) and minnows (Leuciscidae) found opposite responses. These data suggest that basin-scale sedimentary processes likely do influence metacommunity processes, but that metacommunity responses may be complex and driven by ecological trait mediated mechanisms. We explore next steps with metapopulation dynamics through genetics analyses of focal species.

O4.03

9:35 ARE FEEDING TRAITS SHAPING THE SPATIAL DISTRIBUTION OF THE FISH FAMILY SERRASALMIDAE IN THE AMAZON DRAINAGE BASIN?

Karold Viviana Coronado[1], Sandra Bibiana Correa[1], and Pablo A. Tedesco[2]

[1]Wildlife, Fisheries and Aquaculture Department, Mississippi State University, Mississippi State, MS, USA and [2]I Institut de Recherche pour le Développement (IRD) UMR 5174 EDB - Evolution & Diversité Biologique

Resource availability and niche breadth are important factors that can influence the spatial distribution and local abundance of a species. The fish Family Serrasalmidae exhibits a highly variable dietary composition and level of specialization within clades, being an ideal model to study the influence of feeding specialization on the spatial distribution of species. In this study, we explored the spatial distribution of the Serrasalmidae family clades across the Amazon region based on their feeding habits. We hypothesized that the differences in specialization level and feeding guilds will drive the distribution patterns of the species. Using stomach content data from literature, we classified the species in levels of specialization and feeding guilds (Frugivore, Herbivore, Piscivore, Scale-feeder, Invertivore) based on proportions of reported food items. We used a satellite-derived landcover image to estimate landscape metrics of aquatic habitat types and floodplain extent on three distance buffers around the occurrence points of the species as a proxy of distribution. As control variables, we calculated the position of the species within the drainage basin and extracted age estimates from the latest published phylogeny for the family. We modeled the response of distribution range size and the proxies of distribution to potential drivers like specialization level, feeding guild, species age, or position along the Amazon drainage basin, among different species and clades within the Serrasalmidae family. Preliminary results suggest that herbivores and low specialized species are related and have wider distributions. Differences among feeding guilds, regarding the food resource distribution, also are expected.

O4.04

9:50 A STUDY ON THE PATHOGENS CARRIED BY WILD BIRDS IN THE MISSISSIPPI DELTA

Madisyn White and AHM Ali Reza

Delta State University, Cleveland, MS, USA

Wild birds are important in the maintenance and transmission of many zoonotic pathogens. The importance of wild birds as potential vectors of disease has received recent renewed empirical interest, especially regarding human health. Understanding the spread of harmful pathogens in wild birds may serve as a useful model for examining the spread of other disease organisms, both amongst birds, and from birds to other taxa. With increasing urbanization and the resulting emergence of zoonotic diseases, it is critical to understand the relationships among birds, vectors, zoonotic pathogens, and the urban landscape. During this project, we used a microbial technique in attempt to discover the types of bacterial pathogen birds may carry in northern Mississippi, primarily in Cleveland, which is located in the heart of Mississippi Delta. We collected samples from birds in a non-lethal way by offering them food. After a bird was observed feeding on a particular food item, e.g. piece of fruit or loaf of bread, we took a swab from the food in order to grow a culture to study the bacteria. Samples were collected from five common bird species: American Robin (*Turdus migratorius*), European Starling (*Sturnus vulgaris*), House Sparrow (*Passer domesticus*), Common Grackle (*Quiscalus quiscula*), and Mourning Dove (*Zenaida macroura*). We placed the samples in petri dishes and let them grow in an incubator at 30°C for a week for growth measurement and identification. Gram stained, microbial growths were examined using Olympus compound microscopes to identify available bacteria. Pathogens noted were Campylobacter (from House Sparrows and Common Grackles) and Salmonella (from European Starlings); both pathogens are responsible for food-borne illnesses in humans. The other recorded microorganisms were mainly *Staphylococcus* (from American Robin) and *Streptobacillus* (common to most bird species) bacteria, which are not extremely harmful to humans. Overall, we observed that more than 80% of the collected bird samples contained some form of bacteria. Our results demonstrate that the presence of multiple bird- borne zoonotic pathogens may cause health risks to humans if they are in close contact with wild birds.

O4.05

10:05 ASSESSMENT OF ASBESTOS EXPOSURES IN RELATION TO CANCER AND COVID-19 FATALITIES IN LOUISIANA

Priyadarshini Dasgupta[1], Debarshi Roy[2], Mason Williams[1], and Ephraim Massawe[1]

[1]Department of IET, Occupational Safety Health and Environment, Southeastern Louisiana University, Hammond, LA, USA, [2]Department of Biological Sciences, Alcorn State University, Lorman, MS, USA

Louisiana has a comparatively high fatality rate (66.6 in 100,000 people) than the USA national average (58.7 in 100,000 people) for lung cancer and other lung related disorders. Our study is aimed to track the topographical source of exposure leading to lung cancer. We hypothesized that some parishes that have high COVID-19 incidences might be related to lung cancer incidences caused by industrial exposure in such parishes. We further compared the parishes with high lung cancer cases with other parishes that have high thyroid cancer cases and high colon cancer cases. In order to test our hypothesis, statistical data on asbestos related deaths were compiled from CDC's WONDER database (1999-2017), Louisiana Department of Health Report Card, Louisiana cancer registry; COVID-19 related data were compiled from Louisiana Departments of Health. In order to be able to predict the industrial exposure, we collected data on predominant occupation of the parishes. We focused on top ten Louisiana parishes on the basis for lung cancer, colon cancer and thyroid cancer cases. We also compared each of these selected parishes for existing COVID-19 cases. Our analysis revealed that the top ten Louisiana parishes for COVID-19 incidences and thyroid cancer cases were different indicating no correlation between the two diseases. Five among the top ten parishes for colon cancer cases were overlapped with high lung cancer parishes. Moreover, the COVID-19 triggered fatality rates in these parishes were high too. Occupational data of the parishes revealed that most of the parishes with high lung cancer and colon cancer cases have construction as the major occupation. It was although not possible for us to find out the specific trade of construction where the affected people have worked. Asbestos is a well-known risk factor behind lung and colon cancer. Having some overlapped parishes that are high in lung and colon cases indicate probable similar source of asbestos exposure. We conclude that asbestos as an exposure source predisposes the lung of the residents of the corresponding parishes to have some vulnerability towards the development of cancer. Therefore, COVID-19 related fatalities are also high in those parishes.

O4.06

10:20 WHAT NEW THINGS CAN BE LEARNED FROM STUDYING WHITE-TAILED DEER SCRAPING BEHAVIOR?

Scoty Hearst

Department of Chemistry and Biochemistry, Mississippi College, Clinton, MS, USA

White-tailed Deer (*Odocoileus virginianus*) are social animals that thrive in rural and urban settings. Scraping behavior is an olfactory reproductive communication used by White-tailed Deer to establish breeding networks. Male scraping is a complex scent-marking behavior, which advertises socio-sexual status and location to potential females as well as to competing males. Female scraping behavior is thought to be an estrus signal alerting males during times of optimal fertility. These scent markers are produced in body fluids such as urine, saliva, and glandular secretions released by males onto scrape sites. In our recent study, we described a new method to examine White-tailed Deer social networks by analyzing the scraping behavior of an urban population. This method is also useful in generating model predictions regarding the spread of communicable diseases through scraping networks. We suggest that network analyses combining both male and female scraping behavior can reveal a glimpse into the complexity of breeding networks. Using network measures, we were able to rank males based on competitiveness and female preference. Lastly, we generated a theoretical breeding network to explore female sociability, competitiveness, preference, and mate choice. Female choice is an exciting idea that has started to come to light in White- tailed Deer research. In our rural site study, we further examined this idea of female choice at scrape sites using a behavioral neuroscience approach. We also found different mating strategies used by individual males during the mating season. We compared urban and rural study sites to confirm these mating strategies are common in different deer herds. Also, we have also generated the largest male scraping network to date spanning over a range of 3.8 miles. The placement of large-scale cameras at multiple sites during the Mississippi hunting season has been challenging. Overall, we suggest that scraping network analysis will become a useful tool to investigate the complexity of White-tailed Deer breeding networks and the factors that influence these networks. Also, we see future applications of this method for predicting the spread of communicable diseases and for predicting mate selection within White-tailed Deer mating systems.

10:35 **Break**

11:00 **Business Meeting**

12:00 **General Session**

Thursday, August 5, 2021

AFTERNOON

Poster Area

DIVISIONAL POSTER SESSION 1:30-2:15

Posters will be judged in the division and will also be presented in the General Poster Session

Thursday, August 5, 2021

EVENING

3:30 Dodgen Lecture and Awards Ceremony (B5-6)
General Poster Session (Immediately Following Dodgen Lecture C-Poster Hall)

P4.01

PALEOVIRAL ELEMENTS MEDIATE A HERITABLE ADAPTIVE IMMUNE RESPONSE IN NATURAL INSECT POPULATIONS

Afsoon Sabet and Matt Ballinger

Mississippi State University, Mississippi State, MS, USA

Interactions between arthropod-borne viruses and invertebrate immune systems play a fundamental role in pathogen evolution and disease transmission. In insects, the primary defense against viral infection is RNA interference (RNAi), in which virus-derived small RNA sequences guide host endonucleases to viral genomes and transcripts. Exogenous small RNAs such as those derived from viruses are incorporated into and act through the siRNA pathway, while endogenous small RNAs have roles in gene regulation and transposon silencing via the micro RNA and PIWI-interacting RNA (piRNA) pathways, respectively. Interestingly, recent studies suggest an unexpected partnership exists between RNAi and endogenous viral elements (EVEs), which are virally derived sequences integrated into and transcribed from host genomes. While EVEs are widespread in invertebrates, the nature and extent of their interactions with related viruses are not well understood. We studied a natural insect-virus system in which the host has acquired and expresses a piece of the virus genome in order to determine how EVEs partner with RNAi and how this affects viral infection. Through broad geographic sampling, phylogenetics, and small RNA profiling, we provide evidence that this EVE is processed by the host's piRNA pathway and recruits endonucleases to the corresponding viral RNA. EVE activity appears to be developmentally and spatially regulated with peak activity occurring in female ovaries, where persistent viruses are transmitted into eggs. Our data also shows that viruses can persist over evolutionary timescales despite this activity, suggesting the ultimate function of EVEs may be to facilitate persistence by reducing virulence of vertically transmitted viral infections.

P4.02

DOES FOREST MATURITY INFLUENCE WOODPECKER POPULATION AND SPECIES DIVERSITY IN DAHOMEY NATIONAL WILDLIFE REFUGE IN NORTHERN MISSISSIPPI?

Hannah Pinter and AHM Ali Reza

Delta State University, Cleveland, MS, USA

Woodpeckers are regarded as an important keystone species for the ecosystem. They feed on a wide variety of carpenter ants and create cavities that are used by many insects, birds, small mammals, and other wildlife to rear their young, roost or perch. The objective of this study was to examine the relationship between woodpecker community and forest maturity within two landscapes in Dahomey National Wildlife Refuge (DNWR): the PawPaw trial and the Herbert nature trail. A plentiful supply of various sized snag trees undergoing decomposition by fungus is a requirement for woodpecker habitats; favored trees include pines, oaks, sweetgum, American elm, etc. Four woodpecker species were observed during the study period at DNWR: downy woodpecker (*Picoides pubescens*), pileated woodpecker (*Dryocopus pileatus*), redheaded woodpecker (*Melanerpes erythrocephalus*), and red-bellied woodpecker (*Melanerpes carolinus*). We recorded the number of woodpecker species heard or sighted, and counted the number of snag trees that were found along each trail. The diversity and abundance of woodpecker species were significantly higher along the PawPaw trail (24 individuals/hr) than at Herbert nature trail (2 individuals/hr); the most common species were pileated (31%), redheaded (26%) and downy (25%) woodpeckers respectively. A t-test confirmed there is a statistical difference in the number of woodpeckers per each site, based upon a 95% confidence interval. Our results showed that more snag trees and woodpeckers occurred along the PawPaw trail (n=45) compared to the landscape surrounding Herbert nature trail (n=4). This difference is probably attributed to the age of the forest; the area associated with the Herbert nature trail was reforested not more than

20 years ago and is probably not mature enough to support woodpecker populations whereas the PawPaw trail is located in one of the older patches of bottomland hardwood forest.

P4.03

THE IMPACT OF PREDATOR ACTIVITY AND DEMOGRAPHICS ON WHITE-TAILED DEER SOCIAL NETWORKS

Bryant Johnson, Elijah Rummells, and Scoty Hearst
Mississippi College, Clinton, MS, USA

White-tailed Deer (*Odocoileus virginianus*) are medium-sized ungulates native to North and South America. White-tailed Deer display a wide range of social networking behaviors and create social networking sites called scrapes in their environment by rubbing or licking trees, scrapping the ground with their hooves, and by marking the ground with their scent. Deer also form complex social groups such as family groups and bachelor groups. Bucks have been reported to make the majority of the scrapes. However, females also make scrapes throughout the year. Both male and female deer examine and visit scrapes repetitively over time. Scrapes are very significant forms of social media that can communicate social status, dominance, subornation, territory, breeding interest, fertility and the demographics of the deer in that area. Deer can be easily studied non-invasively using wildlife cameras to record social behavior and temporal movements. In our previous study, we described a new method of examining White-tailed Deer mating systems using social network analyses of scraping behavior reflected in an urban population. In this study, we examine how different factors such as predator activity and male demographics influence scraping networks by assessing scraping data from distinct study sites in rural areas over multiple years using social networking analysis and QGIS software. We compared how predator activity impacts scraping behavior and shapes scraping networks and the results suggests that predator activity in the form of coyotes, feral dogs, and human hunting activity can drastically impact White-tailed Deer social networks. These factors, especially hunting activity, also can influence the demographics of social networks. Additionally, social demographics among males can influence network activity and overall network density. Our modeling data suggest that male network density is a major factor that can influence the spread of communicable diseases, such as Chronic wasting disease (CWD) in White-tailed Deer. Male White-tailed Deer generally are infected three times more often than females. Overall, we suggest that predator activity and male demographics are important factors that shape White-tailed Deer social networks, network density, and can significantly impact transmission off communicable diseases like CWD.

P4.04

A PLANT ANATOMY SURVEY OF *VIOLA SORORIA* WILLD

YaeEun Yun, Megan Dickerson, Paige Powell, Amber Straw, and Nina Baghai-Riding

Division of Math and Sciences, Delta State University, Cleveland, MS, USA

During the Spring 2021 semester, students enrolled in Dr. Baghai-Riding's Plant Anatomy class at Delta State University, elected to do semester group projects on various herbaceous plants that exist in the Mississippi Delta. Our group selected *Viola sororia* Willd. (blue violet/common meadow violet), which is native to eastern and central North America. This species thrives in the Mississippi Delta and blooms throughout the early spring. It is found in woodlands, shady banks, sandy substrates, and forest edges. It grows 3" – 8" in height, has broad heart-

shaped leaves with an acute apex, and bilaterally symmetrical flowers that possess blue-violet petals with distinct purple veins and conspicuous white throats. The leaves and flowers have separate stalks. Internal anatomical sections of its roots, stems, leaves, and flowers were made using single-edged razor blades and then stained with methylene blue and neutral red dyes. Digital photographs were taken with an Olympus Q-Color 3 camera attached to an Olympus BX43 microscope. A phase-contrast condenser was utilized when viewing transparent features such as guard cells on leaf epidermal peels. Of special interest are anisocytic stomata on the lower epidermis of leaves. Green chloroplasts are visible in the guard cells and trichomes, and a few stomata occur on the upper epidermis. Stems and roots possess vessels with annular secondary thickening and starch grains were abundant throughout the cortical parenchyma cells in the root. A young lateral root was found emerging from the pericycle. In the stem, vascular bundles portray a eustele, siphonostele arrangement, and there are 6–10 rows of parenchyma cells and 5 – 6 rows of lamellar collenchyma in the cortex. When cutting transverse sections of the leaf petiole, the pith was soft and became separated and destroyed making it difficult to study. Other notable morphological features include the intense bright purple veins in the flower petals and syncolporate pollen. Future work will compare the internal anatomy of other winter herbaceous plants that exist in similar habitats throughout the Mississippi Delta; these studies may help in deducing ecological plant strategies.

P4.05

ANALYSIS OF RURAL WHITE-TAILED DEER SCRAPING NETWORKS TO MODEL THE SPREAD OF COMMUNICABLE DISEASE

Elijah Rummells, Bryant Johnson, and Scoty
Hearst Mississippi College, Clinton, MS, USA

White-tailed Deer (*Odocoileus virginianus*) are social animals that thrive in rural and urban settings. Scraping behavior is an olfactory reproductive communication used by White-tailed Deer to establish breeding networks. Male scraping is a complex scent-marking behavior which advertises socio-sexual status and location to potential females as well as to competing males. These scent markers are produced in body fluids such as urine, saliva, and glandular secretions released by males onto scrape sites. In our previous study, we described a new method to examine White-tailed Deer mating systems using social network analyses of scraping behavior using an urban population of White-tailed Deer as a model. This method is also useful in generating model predictions regarding the spread of communicable diseases through a male scraping network. Chronic wasting disease (CWD) is a fatal, contagious, prion disease occurring in cervids. Chronic wasting disease is a major concern to wildlife biologist and land managers and has been found in 23 states, including Mississippi. Infection rates for CWD in male White-tailed Deer are 3 times higher as compared to females. We speculate that the body fluids left at scrape sites are potential modes of CWD male transmission due to the fact that males scrape more often than females, and that multiple males visit the same scrape. In our previous work, we demonstrated disease transmission through an urban network of male White-tailed Deer. Here, we demonstrate the first rural scraping network by combining scraping data from multiple study sites in Yazoo County, MS, spread over a 1.8-mile radius. Using network analysis, we demonstrate the major types of potential super spreaders. We also documented a case of cutaneous fibromas and demonstrate how these papillomaviruses could potentially spreads through a scraping network from the infected male. This work also demonstrates the future applications of this method for predicting the spread of communicable diseases like CWD or other infectious diseases in rural populations of White-tailed Deer.

P4.06

PREY SKELETIAL ELEMENTS FOUND IN 46 OWL PELLETS FROM CAROLINA BIOLOGICAL SCIENCE

YaeEun Yun, Lilli St. Amant, Julie Hardy, James Parkerson, and Nina Baghai-Riding
Division of Math and Sciences, Delta State University, Cleveland, MS, USA

Dissecting owl pellets is an exercise used in assorted science classes at Delta State University. The contents are used to address broad ecological aspects including terrestrial food webs, prey and predatory distribution and abundance, habitat, and conservation. Owls are nocturnal hunters and have sharp talons, hooked bills, and heads that can swivel 270˚ in each direction. Most owls, including the barn owl (*Tyto alba*), consume mostly vertebrates but are unable to digest bone, hair, feathers, and plant matter. These remains are regurgitated as owl pellets. Biology and Human Concerns (BIO 110) students dissect approximately 50 owl pellets per year from Carolina Biological as a means of learning about terrestrial food webs. These students separate the bone elements from other regurgitated matter using forceps, tweezers, hand-held magnifiers, and microscopes. Contents from each pellet would be placed into separate plastic Ziploc bags and then stored. Forty-six of these pellets were reexamined by Materials and Methods in Environmental Science (BIO 415) and Conservation Biology (BIO 459) students. Approximately 1336 disarticulated cranial or postcranial elements from six different vertebrates (mouse, rat, mole, shrew, vole, and birds) were documented. Major skeletal elements included skulls, jaws, vertebrae, ribs, scapulae, humeri, and leg elements. Many elements were fragile and easily broken, but skulls were primarily unbroken. Color of the elements ranged from dark brown to a creamy white. Mole elements were the least numerous (1.7%); bird elements also were rare (2.7%). Shrews comprised 14.8% of the assemblage, voles made up 17.8%, mice comprised 31.3%, and rats entailed 32%. Many pellets contained multiple prey species with one to seven prey items in each pellet. Complete skeletons were not found. Rat skulls were the most common cranial element and leg bones were the dominant post- cranial element (24.8%). In comparison, 25 owl pellets from Shelby, Mississippi, possessed remains of snake (0.12%) and more bird elements (10.37%), but lacked moles. It is apparent that barn owls are responsible for helping to keep rodent populations down as well as other animal pests.

P4.07

COLOR PREFERENCES OF NORTH MISSISSIPPI GARDEN BIRDS AT BIRD FEEDERS

Kaitlin Vanderford and AHM Ali Reza
Delta State University, Cleveland, MS, USA

Feeding wild birds is popular in domestic gardens across the world, with around half of households in the UK, North America and Australia doing so. Supplementary feeding of garden birds generally has benefits for both bird populations and human well-being. Birds have excellent color vision, and show preferences for food items of particular colors, but research into color preferences associated with artificial feeders is very limited. During this study, we investigated the color preferences of common north Mississippi garden birds foraging at seed-dispensing artificial feeders containing identical food. We presented birds simultaneously with an array of six differently colored feeders in a rural north Mississippi yard, and recorded the number of visits made to each color over three months period in the spring of 2020. While choosing colors, we selected red, yellow, green, brown, black, and white color for our experiment. We placed trail cameras to each feeding station to record bird species visiting the feeders and kept them in operation throughout the entire time. In addition to trail cameras, we also directly observed visits made by birds to the feeders once a week for a total of 120 minutes following scan sampling technique. During our study, we identified a total of 10 common garden bird species: Northern Cardinal (*Cardinalis cardinalis*), Tufted Titmouse (*Baeolophus bicolor*), Carolina Chickadee (*Poecile carolinensis*), Red-winged Blackbird (*Agelaius phoeniceus*), White-throated Sparrow (*Zonotrichia albicollis*), Carolina Wren (*Thryothorus ludovicianus*), Brown- headed Cowbird (*Molothrus ater*), Chipping Sparrow (*Spizella passerina*), House Finch (*Carpodacus mexicanus*), and Brown- headed Nuthatch (*Sitta pusilla).* A total of 10,580 trips were recorded. Most visits were made by Northern Cardinal (84%), followed by Tufted Titmouse (7%), Carolina Chickadee (4%) and

Red-winged Blackbird (3%). With regard to color preference, our results suggest that black (25%), brown (21%) and green (16%) feeders were visited by higher numbers of common Mississippi garden bird species than white (14%), red (13%), and yellow (10%) feeders placed in the same location containing identical food. Color preference is widely prominent among some bird species than for others, for example Carolina Chickadee preferred red color feeders (24%) feeder over the five other colors. Our results suggest that garden birds show some preference in color and they tend to prefer natural colors (e.g. black, brown, and green) than bright colors (e.g. red or yellow), which varies among species.

P4.08

WILDFIRE: ECOLOGICAL AND HEALTH EFFECTS

M. S. Zaman, Robert C. Sizemore, Suleyman Tufa, and Max Carlos Reyes

Alcorn State University, Lorman, MS, USA and South Texas College, McAllen, TX, USA

Wildfires exist as a natural phenomenon of the forests' ecosystems. For hundreds of millions of years, wildfires have been burning the forests, savannas, grasslands, and other wildland vegetations throughout the continents under varieties of climatic conditions. The discovery of 440-million-year-old fossils of charred remains of plants show that the history of wildfires can be traced back to the Silurian period. Although low intensity wildfires play an important role in the renewal of some ecosystems and are vital for life cycles and the survival of some plant species, larger and sustained wildfires may negatively impact the environment. In the U.S., about 85% of the wildfires are caused by human activities, while about 15% may occur naturally, such as lightning strikes. In recent times, wildfires have become more frequent and sustained with escalated force of destruction, and have been associated with enormous ecologic, economic and health consequences. Increasing anthropogenic activities and climate variabilities may have influenced the current situations. If the frequency, amplitude, and duration of wildfires maintain or exceed the current course, it could produce drastic effects on the environment, economy, and human health, and may affect the flora and fauna of various ecosystems.

Friday, August 6, 2021

AFTERNOON

The Field Trip

The field trip to the Sandhill Crane National Wildlife Refuge will involve a drive and walk through wet pine savannah, a mixed hardwood seepage area, and a tour of the refuge visitor center at the refuge headquarters.

- A sign up sheet to participate in the field trip will be provided on Thursday morning.
- We will have early lunch at the site. Please bring your own packet lunch with you. There is no restaurant or food place at the refuge.
- Free transportation will be provided by the organizers.
- We recommend all participants to have comfortable walking shoes and a bottle of drinking water**.**

or Friday, August 6, 2021

AFTERNOON

12:00-1:00	Plenary Speaker
1:00-3:00	Mississippi INBRE/ Millsaps Symposia

GEOLOGY AND GEOGRAPHY

Chair: Jonathan Leard

Mississippi Dept of Environmental Quality-Environmental Geology

Vice-Chair: Andrew Newcomb

Mississippi Dept of Environmental Quality-Environmental

Thursday, August 5, 2021

MORNING

Room D7

10:15 WELCOME

O5.01

10:30 RECRUITING THE FUTURE GENERATION OF GEOSCIENCES: PANDEMIC CHALLENGES WITHIN ONLINE COURSES

Renee M. Clary[1], Athena Owen[1], Nagel, Eric Shows[2]

Geosciences, Mississippi State University, Mississippi State, MS, USA, and [2]Jones College, Ellisville, MS, USA

In order to address the lack of introductory geology courses available to Mississippi's community college students, the NSF IUSE Geo-PAths project, Geo-SPARCC, developed online, place-based, introductory physical and historical geology lecture and lab courses. Through a partnership between Mississippi State University and Jones College, the online courses are made available to ALL Mississippi community college students through the Mississippi Virtual Community College consortium. Because geologists rally around the slogan that geology is best taught—and learned—in the field, the Geo-SPARCC project provided in-person opportunities so that students can accompany professors on field excursions within the state. Unfortunately, the coronavirus pandemic resulted in cancellation of all group field excursions from March 2020 through April 2021. Additionally, all recruiting activities planned for Mississippi community colleges were canceled. Since the pandemic, a decline in community college enrollment has been documented throughout the United States, and the Geo-SPARCC project experienced a halt in expansion beyond Jones College enrollment. The current challenge exacerbated by the pandemic is that recruiting activities are limited to e-communication and e-dissemination. While the Geo-SPARCC project can introduce potential geoscientists to the wonders and applications of our field, the COVID-19 pandemic has underscored the necessity to re-envision methods by which dissemination occurs. More communication is needed between the project, Mississippi's practicing, professional geologists and community college academic advisors —with publicizing of Geo-SPARCC beyond Jones College.

O5.02

10:45 FIELD TESTING AND SIMULATION OF VADOSE-ZONE RECHARGE WELLS AS AN ARTIFICIAL RECHARGE METHOD IN THE MISSISSIPPI RIVER VALLEY ALLUVIAL AQUIFER

Andrew M O'Reilly[1], Kyungwon Kwak[2], J.R. Rigby[3]

[1]USDA Agricultural Research Service, Stoneville, MS, USA, [2]Texas A&M University, College Station, TX, USA, [3]U.S. Geological Survey, Pearl, MS, USA

Past studies of the Mississippi River Valley Alluvial aquifer (MRVAA) in the Delta region of Mississippi indicate limited potential for infiltration and recharge due to fine-grained surficial sediments. An artificial recharge technique not dependent on permeable surficial soils is a vadose-zone well excavated into

underlying unsaturated higher permeability sediments. Data were collected at a field site near Ruleville, Mississippi, consisting of four vadose-zone wells, six monitor wells, and one production well. From pumping test data, transmissivity of the MRVAA at the site is 5,700 m^2/day and storativity is 0.33. A distinct inverse correlation existed between barometric pressure and groundwater level, indicating a barometric efficiency of approximately 60%. During a 50-hour injection test, well recharge of 272 m^3/day caused small water-table rises ranging from 4 cm at the nearest monitor well (6.1 m) to 1 cm at the most distant well (35 m). Small rises likely are due to the high hydraulic conductivity of the MRVAA, vertical heterogeneity, or screen location of the monitor wells. A three-dimensional numerical variably-saturated model of four vadose-zone wells was developed using HYDRUS-3D software. Head rise beneath the vadose-zone wells was 2 cm and dropped to 0.6 cm at 6.3 m distance. Different water-table responses between the field-test and model simulations are likely due to differences in the amount of injected water and lack of data on aquifer heterogeneity. Due to numerical instability, only 88 m^3/day was simulated in the model. This research provides understanding of the hydraulic properties controlling operation of vadose-zone wells.

12:00 General Session

Thursday, August 5, 2021
AFTERNOON
Room D7

1:00 Divisional Keynote

Dr. George Phillips - Paleontologist – Mississippi Museum of Natural Science

O5.03

2:00 GEOCOAST: VISUALIZATION AND DECISION SUPPORT FOR COASTAL FLOODING AND INUNDATION

John Cartwright and John van der Zwaag

Mississippi State University, Mississippi State, MS, USA

Effects of rising sea levels are already evident in many coastal communities. State and local decision-makers need to be pro- active in evaluating impacts of sea level rise on community resources and infrastructure. The cost of remediation following a flooding event is considerably higher than the preparations to avert or limit the impact of sea level rise on coastal communities. The Geosystems Research Institute at Mississippi State University has developed an interactive, web- based tool to allow decision-makers to simulate sea level rise along the Mississippi coast. GeoCoast is publicly accessible and allows users to visualize sea level rise impacts in both two-dimensional (2D) and three-dimensional (3D) environments. The base inundation simulation in GeoCoast uses a simple linear superposition model built on QL2 lidar data collected in 2015. This base model allows users to visualize water depth across the landscape (up to 15 feet) with a simple map slider. Additionally, data layers for buildings and roadways are visualized by depth of inundation based on the selected water depth. Other data sources for flood simulation include NOAA's sea level rise data from the Digital Coast and storm surge/flooding from ADCIRC model runs. The ADCIRC runs include hind cast data for hurricane Katrina and other significant tropical systems affecting the northern gulf coast. Current efforts are focused on expanding data simulations to include results from the Effects of Sea Level Rise in the northern Gulf of Mexico project, as well as the geography to include other areas of the northern gulf coast.

O5.04

2:15 SHIP ISLAND: A CASE STUDY OF GEOSPATIAL ASSESSMENT OF BARRIER ISLAND EROSION ALONG THE NORTHERN GULF COAST

Claire Babineaux[1], Randall McMillen[2], John Cartwright[2]

Northern Gulf Institute -Mississippi State University, Starkville, MS, USA and Geosystems Research Institute, Mississippi State, Mississippi State MS, USA

Through the National Oceanic Atmospheric Administration (NOAA) Regional Geospatial Modeling Grant (RGMG), the Geospatial Education and Outreach (GEO) Project is a collaborative effort between the Northern Gulf Institute and the Mississippi State Extension Service. The GEO Project offers geospatial training opportunities and has many research interests on the Northern Gulf Coast, one of which is shoreline erosion. Geospatial technologies are often utilized for the assessment of areas that are prone to various types of natural hazards. Coastal hazards, such as erosion and flooding, are common issues for the coastline of the northern Gulf of Mexico. Rising sea levels and the increasing frequency and intensity of tropical storm systems are amplifying these issues. Government agencies (federal, state, and local) utilize many management techniques for coastal and barrier island environments. Research funded by the NOAA at Mississippi State University is mapping the shorelines of Mississippi's barrier islands with high resolution DEMs. The DEMs were derived from LiDAR data sets from 2011, 2012, 2015, and 2019 with a maximum point spacing of one meter. The shoreline of Ship Island from each year was mapped based on the zero-elevation value of each raster dataset and extracted to vector feature classes for further analysis. The delineated shorelines were then entered into the Digital Shoreline Analysis System v5.0 software developed by the U.S. Geological Survey to perform shoreline change analysis and calculate rate-of-change statistics.

Thursday, August 5, 2021
EVENING

3:30 Dodgen Lecture and Awards Ceremony (B5-6)
General Poster Session (Immediately Following Dodgen Lecture C-Poster Hall)

Divisional Posters

P5.01

DIGITAL MAPPING OF SOIL pH IN GOPALGANJ DISTRICT OF BANGLADESH

Jannatul Ferdush[1], Varun Paul[1], Zia Ahmed[2], Hasan Muhammad Abdullah[3]

[1]Mississippi State University, Mississippi State, MS, USA, [2]University of Buffalo, Buffalo, NY, USA, [3]Bangabandhu Sheikh Mujibur Rahman Agricultural University, Bangladesh

Soil pH is an essential indicator of soil quality, which varies with topography, geology, climate, parent material, vegetation, and anthropogenic activities. While all of these factors affect spatial distribution patterns of soil pH, knowledge of pH variability becomes an intrinsic need for improving crop productivity and soil management. Geostatistical techniques; i.e., Ordinary kriging (OK) and Random Forest Regression Kriging (RFK) techniques have used to develop and compare digital maps of soil pH across the Gopalganj district of Bangladesh utilizing 545 soil datasets obtained from "Upazila Nirdishika" as published by the Soil Resource Development Institute, Bangladesh. The study area displays a wide range of pH variability ranging from 3.99 to 8.60 with a median of 6.20. High soil pH was observed mainly in the upland soils of the western part of the district. The Deltaic silt type geology at Low Ganges River Floodplain (AEZ12) showed a high pH, indicating alkaline soils. Most of the acidic soils with

low pH were concentrated in the lower elevation of the southeastern Gopalganj. Identifying the four most critical environmental variables: agroecology, land type, surface geology, and elevation, the RF regression model explained > 50% variability of soil pH with a root mean square error of 0.722. RF model has improved by 11% from OK, including the regression residuals in the RFK model. This method can be used to enhance understanding of the spatial pattern of soil pH to on-going climate changes and opportunities to recover soil quality with spatially targeted land management practices.

P5.02

PALEOENVIRONMENTAL AND TAXONOMIC IMPLICATIONS OF PALYNOMORPHS FROM THE FOREST HILL FORMATION

Nina Baghai-Riding[1], James Starnes[2], Carol Hotton[3], *Brian Axsmith[4], Jonathan Leard[2]*

[1]Delta State University, Cleveland, MS, USA, [2]Mississippi Department of Environmental Quality, Office of Geology, Jackson, MS, USA, [3]National Institute of Health, National Library of Medicine, National Center of Biotechnology Information, Bethesda, MD, USA, [4]University of South Alabama, Mobile, AL, USA [deceased]

Oligocene floras of the Gulf Coast region of the southeastern United States remain poorly known. As part of a larger study of floras of the late Paleogene and Neogene of Mississippi and Alabama, palynological samples were collected from the early Oligocene Forest Hill Formation by J. Starnes and J. Leard in Yazoo County and Smith County, Mississippi. The Forest Hill Formation (Vicksburg Group) is a nearshore terrestrial unit consisting of laminated sands and dark carbonaceous clays with lignite beds. The Yazoo County sample was collected at the most northern and up-dip limit exposure of the formation along the axis of the Mississippi Embayment. The Smith County sample is associated with a freshwater riverbank setting that is adjacent to a storm surge zone along the eastern side of the Mississippi embayment. Both samples possess well-preserved and diverse palynomorphs of pollen, spores, and algal cysts indicating a warm temperate climate. However, the two samples differ in taxonomic composition. Palynomorphs from the Smith County sample represent an oak-hickory-willow coastal forest bordering freshwater riverbanks and a storm surge zone flanking the eastern side of the Mississippi Embayment. In a 300-point count, angiosperms comprised 59%, conifers 11.4%, pteridophyte spores 20.5%, freshwater algal forms 9% and marine cysts 1.5% of the assemblage. This sample is associated with a rich and diverse assemblage of well-preserved plant macrofossils, including palm fronds. In contrast, the Yazoo County sample indicates a backwater, enclosed bay setting, based on the higher quantity of Anemia (22%) and Dictyophyllidites (7%) spores. In this 300-point count, angiosperms comprised 49%, conifers 3%, pteridophyte spores 40% and freshwater algal forms 9% of the assemblage. Seventeen taxonomic plant families represented by palynomorphs have been documented from these two samples. Families/orders common to both localities include Anemiaceae, Lycopodiaceae, Polypodiaceae, Cupressaceae, Pinaceae, Aquifoliaceae, Arecaceae or Liliales, Betulaceae, Cornaceae, Fabaceae, Fagaceae, Juglandales (including Normapolles, which may be reworked), Platanaceae, and Ulmaceae. Families/orders noted only in the Yazoo County site included Gleicheniales and Sphagnaceae and Ericaceae, Onagraceae, Sapotaceae, Symplocaceae, and possibly Myrtales. In contrast, families noted only in Smith County site include Ophioglossaceae, Osmundaceae, and Polypodiales,? Chenopodiaceae, ?Oleaceae, Salicaceae, and the pollen type Tetracolporites (a eudicot of uncertain affinities). A dinoflagellate cyst of ?Trithyrodinium and algal cysts of Zygnemataceae and Maculatasporites also occur in this sample.

Friday, August 6, 2021

MORNING

Room D7

10:00 Welcome/ Business Meeting and Awards

O5.05

10:15 RE-ORIENTATION OF MAGMATIC FABRICS AND IGNEOUS LAYERING IN THE OMAN OPHIOLITE, ODP HOLE GT1: IMPLICATIONS ON FORMATION OF THE LOWER OCEANIC CRUST

Jeremy Deans and Justin Guillot

University of Southern Mississippi, Hattiesburg, MS, USA

The oceanic crust makes up the majority of the earth, with fast spreading ridges making the majority of that oceanic crust. Several models have been proposed to explain how the lower oceanic crust forms, mostly based on geochemical or hydrothermal arguments. The Oman Drilling Project drilled several holes in the Oman ophiolite (exposed piece of the oceanic crust), the most continuous and well-exposed ophiolite in the world. One hole, GT1, was drilled through the lower crust, namely the layered gabbro section above the Moho just to the east of an inferred paleo-spreading ridge in the Wadi Tayin massif. Recovery was 100% over a 400 m depth and the hole was logged using different petrophysical tools (e.g., optical borehole imager), which provides an unprecedented opportunity to study the structural attributes millimeter by millimeter not afforded by typical outcrop mapping and/or ocean drilling. In this study we use the orientation and distribution of magmatic fabrics and igneous layering to test models of lower crustal formation since these structures likely record magma emplacement, magma chamber processes, and any processes that occurred during accretion. One of the main issues of structural analysis of cores is that cores lose their geographic orientation when drilled making it difficult to compare different core pieces and to regional structures. Re-orientation was completed by comparing fractures and veins in the core and in the borehole wall using an optical borehole imager that records an image of the borehole wall and its orientation using a fluxgate magnetometer and easily picks up discrete features like veins and fractures. The rotation of the veins or fractures was then applied to other features in the core like magmatic fabrics and igneous layering, thus rotating them back to their pre-drilled orientation. 183 magmatic fabrics and 213 igneous layers were re-oriented. Overall, the structures show a high level of variation compared to each other and in terms of distribution with depth, intensity of development, and orientation. The variation in orientation for both structures includes one main population and two subpopulations of strike. This variation does not correlate with depth or intensity of development and does not match predictions for 2-D extension along the ridge (increase of intensity with depth, all dip the same direction away from the ridge). Given the large variety, it may be expected that local processes like magmatic flow, grain settling, crystal slumps, magma intrusion and ballooning, and general flattening of the crystal laden lower crust due to the large overburden may explain the orientation observed and the deviation from current models. This suggests that models are too simplistic and need to include local and open system processes to better explain the formation of the lower oceanic crust.

O5.06

10:30 ANALYSIS OF GEOPHYSICAL LOG AND SAMPLES FROM F-0019 IN TISHOMINGO COUNTY, MISSISSIPPI

Paul C Parrish, RPG and Andrew Newcomb

Mississippi Department of Environmental Quality, Office of Geology, Jackson, MS, USA

F-0019, also known as Well #1 in Tishomingo County Water District, was logged by the Environmental Geology Division's Geophysical

Logging Program on January 22, 2021. The Environmental Geology Division was able to procure the drilling samples from the driller, National Water Services. The analysis of the log and samples was completed due to the rarity of samples in collection and the thirty years since the last stratigraphic analysis was completed in the area. The samples begin in the Tuscaloosa formation of the Lower Cretaceous which can be approximately 100.5-145 million years old. The well was drilled 400 feet to the Upper Silurian, which is approximately 419.2-427.4 million years old. From analysis of the samples, geophysical logs, and correlation with existing cross sections the final stratigraphic/formational picks have been made for F-0019.

O5.07

10:45 MISSISSIPPI CRETACEOUS NEOMESOGASTROPODA (IN PART) AND NEOGASTROPODA (STENOGLOSSA) ILLUSTRATED

David T Dockery

Mississippi Department of Environmental Quality, Office of Geology, Jackson, MS, USA

The Steptoneuran Gastropods, Exclusive of the Stenoglossa, of the Coffee Sand (Campanian) of Northeastern Mississippi was published as Mississippi Department of Environmental Quality, Office of Geology Bulletin 129 (191 pages, 42 plates) in 1993. Now the "Mississippi Cretaceous Neomesogratropoda (in Part) and Neogastropoda (Stenoglossa) Illustrated" is scheduled to be published as early as 2021. The whole of the Gastropoda of the Cretaceous Coon Creek Formation, following a systematic classification by Klaus Bandel, was published as Bandel and Dockery, 2016, "Mollusca of the Coon Creek Formation in Tennessee and Mississippi with a Systematic Discussion of the Gastropoda," p. 34-96, in Ehret, Dana Ehret, T. Lynn Harrell Jr., and Sandy Ebersole, editors, Paleontology of the Cretaceous Coon Creek Formation: Alabama Museum of Natural History, Bulletin 33, v. 1, August 1, 2016, 96 p. This publication contains three plates illustrating larval shells and protoconchs. The new publication will illustrate the adult shells, including many new species. Late Cretaceous fossil localities in Mississippi and Tennessee contain perhaps the best preserved and most diverse Cretaceous molluscan faunas worldwide.

O5.08

11:00 FLOOD DAMAGE ASSESSMENT: A CASE STUDY USING GEOSPATIAL TECHNOLOGIES

Yongqin Zhang and Sangita Regmi

Delta State University, Cleveland, MS, USA

Assessing potential damage of flood events is important in flood risk management. Geospatial technologies are cost effective tools for flood mapping, assessment, and risk analysis. In this research, we use geospatial technologies to map and assess a devastating flood occurred in the Baton Rouge, Louisiana. Louisiana suffers frequently from flooding due to hurricanes, storm surges, and massive rain pours. Baton Rouge, the capital city of Louisiana, is a heavily urbanized and populous area. The area is prone to flood events as it falls under East Baton Rouge Parish lying on the bank of Mississippi river. In August 2016, the Baton Rouge area had a massive flooding that caused a tremendous loss. We collect multiple datasets available to the area to conduct the research, including remotely sensed satellite imagery from Sentinel 2A, Digital Elevation model (DEM), demographic and land use data. Flood boundary is extracted using DEM data and maps of flooding are created in ArcGIS Pro. Satellite images of the area before and after the flood event are classified for analyzing flood damage. The demographic data is mapped to identify the spatial distribution of demographics. The results show that a vast population resides at areas of risk. The majority of the area is in low lying and very low-lying terrain below sea level, which makes Baton Rouge vulnerable to floods. The research helps decision-makers with informed decisions to make adaptation strategies and develop response and recovery plans accordingly.

HEALTH SCIENCES

Chair: Barbara Wilson
University of Mississippi Medical Center
Chair: Ritesh Tandon
University of Mississippi Medical Center
Vice-Chair: Candace M. Howard-Claudio University of Mississippi Medical Center
Vice-Chair: Edward Florez
University of Mississippi Medical Center
Program Coordinator: Olga McDaniel
University of Mississippi Medical Center
Program Committee: Frank Spradley
University of Mississippi Medical Center
Program Committee: Vibha Vig S
unshine Children's Clinic in Canton, MS

Thursday, August 5, 2021

MORNING

Room D11

Session I: Topic Population Health/Disease/Social Sciences/Policy

Moderators: Drs. Barbara Wilson and Ritesh Tandon

8:30 Welcome

O6.01

8:35 THE INCIDENCE OF RESPIRATORY DISEASE

Maricica Pacurari

Jackson State University, Jackson, MS

PURPOSE: Respiratory disease (RD) have a high mortality and morbidity. Worldwide approximately 400 mil people suffer from some form of RD either chronic such as asthma, chronic obstructive disease (COPD), cystic fibrosis and interstitial pulmonary fibrosis or hay fever or chronic sinusitis. To identify the prevalence of some of the RD in the USA alone, data sets from the National Health Interview Survey from 2018 were used. **METHODOLOGY:** Data sets were queried for population of 18 yrs of age and older. Reported most common RRD included: emphysema, asthma, hay fever, sinusitis, and chronic bronchitis. A total of 249,456 adults aged 18 and older were surveyed and the data was analyzed using characteristics such as sex (M, F), age (18-44, 45-64, 65-74, and over 75 yrs old), race (White, AA, AI, Asian or Hispanic), geographical region (NE, MW, S, W), and place of residence (Metropolitan area (MA) large, small or not in a MA). **RESULTS**: Of 249, 456 surveyed people 46% had one of the RRD. Asthma and sinusitis were the most common among the five RD. Overall, RD were more prevalent in female than male (52% vs 36%). Emphysema was more prevalent in male than female (1.5% vs 1.2%) whereas asthma, sinusitis, and chronic bronchitis were more prevalent in female than male. By age, asthma was more prevalent in the 18-44 yrs group, whereas emphysema sinusitis, and chronic bronchitis were more common in the 65-74 and 75 yrs and older groups. By race, emphysema, sinusitis, and chronic bronchitis were more prevalent in white people whereas asthma and hay fever were more common in the AI or Alaska Native. By region, asthma was more prevalent in the NE whereas emphysema in the MW and South, and chronic bronchitis in the South. **CONCLUSION:** These data does indicate that asthma and sinusitis are the most common respiratory disease, and with the exception of emphysema, asthma, hay fever, sinusitis and chronic bronchitis are more prevalent in women than men. While asthma is more prevalent in the

younger people, chronic respiratory disease such as emphysema and chronic bronchitis are more prevalent in the age group of 65 and over, and that with increasing aging population the incidence of chronic respiratory will most likely increase.

O6.02

8:45 OUTPATIENT SCHEDULING TEMPLATE OPTIMIZATION IN A PEDIATRIC CLINIC

Lu He

Mississippi State University, Mississippi State, MS, USA

The current scheduling templates for attendings and residents in a pediatric outpatient clinic of a large urban academic medical center caused longer wait times and reduced care access (days to next available appointment) to patients. This study proposes an optimization model to design a new scheduling template for the providers that (1) establishes new visit types and durations in line with patients' need and time required to complete each visit, and (2) provides prompt care for the patients in each of the visit types based on the demands. Current scheduling template designs did not consider earlier durations and supplies. The proposed scheduling template used seven months of patient visits and scheduling data from the electronic health system. We develop a simulation model tocompare the current and proposed scheduling template performances. The results show significant reductions in the average patient wait time and average access days. Other specialties in outpatient settings can use the proposed methodology.

O6.03

8:55 HEALTHY HABITS AMONG MISSISSIPPI STATE UNIVERSITY STUDENTS

Sara Cagle, Lauren Ramage, Sara Talley

Mississippi State University, Mississippi State, MS, USA

Introduction: Practicing healthy habits is essential to achieving and maintaining overall health. Beginning to practice these habits at a young age is especially important to support health throughout the lifespan. This research seeks to determine health habit practices among college students. Methodology: The methods include conducting independent T-tests, ANOVA One Way, and Kruskal Wallis testing through SPSS to find statistical significance in the health of higher education students. This study sampled 141 students and compared groups based on gender, student classification, and ethnicity. Dietary intake, the prevalence of smoking, and level of physical activity, and alcohol consumption were analyzed. Results: Males had a higher veggie meter score than females (297.42 ± 64.67 vs 255.26 ± 75.21, $p = 0.012$). Males also scored higher in high intensity physical activity (3.54 ± 1.41 vs 2.59 ± 1.15, $p = 0.0001$). Students with senior classification had significantly higher veggies meter scores than the sophomore classification (292.52 ± 83.808 vs 241.38 ± 72.676, $p = 0.044$). Moderate Intensity Physical Activity scores significantly differed by classification, with freshmen having a higher mean score than juniors. (3.28 ± 1.09 vs 2.60 ± 1.03, $p = 0.024$). Asian students reported a significantly higher intake of vegetables than Caucasians ($p=0.001$), African Americans ($p<0.001$), and Hispanic students ($p<0.001$). Discussion: While there were
multiple ethnicities included in the sample size, a greater representation would have led to better comparisons among the studied variables. Future studies could investigate other health habits such as sleep and stress management. Conclusion: Health consists of many different interrelated parts: nutrition, physical activity, social support, environments, and stress. This study helps to better understand the health of students and what healthy habits are being practiced. The findings support the effectiveness of campus health initiatives and their impact on Mississippi State University students.

O6.04

9.05 IMPACT OF COVID-19 ON ADOLESCENT MENTAL HEALTH

Amal K. Mitra, Azad R. Bhuiyan, Elizabeth A.K. Jones

Department of Epidemiology and Biostatistics, College of Health Sciences

Jackson State University, Jackson, MS

Introduction: The COVID-19 pandemic has created a havoc across the world, which has resulted in more than 171 million confirmed cases and about 3.7 million deaths globally and forced billions into isolation due to stay at-home orders. As a result of social isolation, and the constant concern of infectivity, mental health consequences that are associated with the COVID-19 crisis are monumental. However, researchers are focusing more on the mental health impact of this rapidly evolving global crisis in the elderly population. There has been very little attention to the psychological toll of COVID-19 on adolescent mental health. **Methods:** This systematic analysis aimed to evaluate the impact of the pandemic on adolescent mental health. This study followed the PRISMA guidelines for systematic reviews of 16 quantitative studies conducted in 2019-2021 with 40,076 participants .**Results:** Globally, adolescents of varying backgrounds experience higher rates of anxiety, depression, and stress to the pandemic. Secondly, Adolescents also have a higher frequency of using alcohol and cannabis during the COVID-19 pandemic. However, social support, positive coping skills, home quarantining, and parent-child discussions seem to positively impact adolescent mental health during this period of crisis. **Conclusions:** Whether in the United States or abroad, the COVID-19 pandemic has impacted adolescent mental health. Therefore, it is important to seek and to use all of the available resources and therapies to help adolescents mediate the adjustments caused by the pandemic.

9:20 Break

O6.05

9:30 RACIAL/ETHNIC AND GENDER DISPARITY IN RELATION TO DEPRESSION IN MISSISSIPPI: THE YOUTH RISK BEHAVIOR SURVEILLANCE SYSTEM,1999-2000 THROUGH 2019-2020

Nusrat Kabir[1], Azad R. Bhuiyan[2], Sophia Leggett[2], Pamela Mcoy[2], Yalanda Burner[2]

Department of Internal Medicine, University of Mississippi Medical Center[2] School of Public Health, Jackson State University

Introduction: Depression is a common cause of illness and disability in adolescence worldwide. The incidence of depression has increased more than a third over the past decade in the United States. A limited study has been conducted on the effect of race and gender on depression among adolescents in the United States. However, almost no research has been performed in Mississippi. Therefore, the disparities between race and gender in adolescents about depression in Mississippi need to be addressed. **Purpose:** Therefore, this study aimed to investigate the racial/ethnic and gender disparity in depression (sadness or hopelessness) in Mississippi adolescents.

Methods: Data were extracted using the CDC's Youth Risk Behavior Surveillance System (YRBSS) from 1999-2000 through 2019-2020. As YRBSS is a complex sampling survey design, proc survey frequency was applied using SAS (version 9.4; SAS Institute). **Results:** Of a total sample of 14372, the prevalence of depression was 28.9%. Among them, Hispanic 34.94%, other races 35.05% Black 29.13%, and Whites 28.31% had depression. Minority groups had the highest rate of depression ($p<0.018$). Female adolescents (36.76%) were more depressed ($p<0.0001$) than males (20.7%). **Conclusion:** This finding emphasizes the disparity that exists with depression among race and gender in the adolescents' population in Mississippi. As effective treatments and

prevention methods are available, early detection and intervention of the vulnerable groups and eliminating health disparities in depression are necessary to prevent morbidity and mortality related to depression.

O6.06

9:40 SARCOPENIC OBESITY QUANTIFIED BY CT IS ASSOCIATED WITH RISK OF CIRRHOSIS IN PATIENTS WITH NAFL

Juliana Sitta, Edward Florez, Baylor Obert, Jeremiah Reese, Jon-Michael Stork, Elliot Varney, Candace Howard

Department of Radiology University of Mississippi Medical Center, Jackson, MS, USA

Introduction: Ectopic fat deposition is associated with non-alcoholic fatty liver disease's (NAFLD) pathogenesis; however, its association with cirrhosis progression is unclear. This study assessed the relationship of skeletal muscle to fat volume ratio (SFR) and anthropometric measures with predictors of liver fibrosis in a population with NAFLD. **Methods:** For this retrospective study, adult patients diagnosed with NAFLD and non- enhanced CT images of the abdomen and pelvis were selected (N=681). Patients with CT artifacts and relevant comorbidities were excluded (N=116), totaling a final sample of 565 subjects. The segmentation of fat and muscle depots was performed on 24 CT slices centered at the L4-L5 intervertebral space using a segmentation software. Anthropometric measurements were obtained. Liver surface nodularity (LSN) scores were determined using a quantitative software. Linear regression and logistic models were used to analyze relationships between parameters. **Results:** SFR levels were lower in patients with high risk for liver fibrosis ($p<0.001$). SFR showed an inverse correlation with BMI ($rs = -0.53$, $p<0.001$) and NAFLD score ($rs = -0.30$, $p<0.001$), which was higher in diabetics ($rs= -0.61$ and -0.42 respectively, $p<0.001$). Total muscle attenuation showed an inverse correlation with visceral fat volume ($rs= -0.29$, $p<0.0001$) and with NAFLD score ($R= -0.41$, $p<0.0001$). Sagittal abdominal diameter showed a direct correlation with LSN score ($R=0.55$, $p<0.001$). **Brief Discussion**: In patients diagnosed with NAFLD, SFR and muscle attenuation, which are measures of sarcopenic obesity and myosteatosis, respectively, were linked to increased risk of cirrhosis, particularly in individuals with diabetes.

O6.07

9:50 INDEPENDENT EFFECT OF RACE/ETHNICITY ON OBESITY PREVALENCE AMONG ADOLESCENTS IN MISSISSIPPI: THE YOUTH RISK BEHAVIOR SURVEILLANCE SYSTEM (YRBSS), 1999-2000 THROUGH 2019-2020

Azad R. Bhuiyan, Amal K. Mitra, Marinelle Payton, Nusrat Kabir, Khalid Abed, Paul Tchounwou

Jackson State University, MS, USA

Introduction: Obesity among adolescents is a significant public health concern in the U.S. as it increased from 10.6% in 1999 to 15.5% in 2019, nationally. Mississippi has youth obesity rate 22.3% ranked 2nd among the 50 states and D.C. As race/ethnicity is considered as a social construct, the association between race/ethnicity needs to be addressed among Mississippi adolescents. The aim of the study was to investigate the association between race/ethnicity and obesity prevalence in Mississippi, controlling for dietary habits, physical inactivity, watching T.V., and playing video games. **Methods:** Data were extracted using the CDC's Youth Risk Behavior Surveillance System (YRBSS) from 1999-2000 through 2019-2020. As YRBSS is a complex sampling survey design, proc survey frequency and proc survey logistic regression model were applied using SAS. The odds ratios (OR) with 95% Confidence intervals were estimated. Multivariate survey logistic regression was performed. **Results:** Of a total sample of 14372, 17.0% of adolescents of 9 to 12 grades were obese. The obesity rate was significantly higher ($p<0.0001$) among minorities. The rates were 19.5%, 20.5%, 17.6%, and 14.3% among African Americans, Hispanics, all other race and Whites, respectively. After adjusting for gender, physical inactivity, and watching T.V., African Americans were associated with 33% increased odds of having obesity (OR: 1.33; 95% CI: 1.15 to 1.54), and Hispanics were 54%
higher odds of having obesity (OR: 1.54, 95% CI: 1.10 to 2.15), compared to Whites. **Conclusion:** This study finding emphasizes the importance of addressing social construct of race/ethnicity in reducing obesity among adolescents.

10:00 **Break 10 minutes**

10:30-11:45 AM
Virtual Workshop I
Room D11

"Virtual ELISA"

Moderator Dr. Ritesh Tandon,
Microbiology/Immunology, UMMC

Speaker Kristianna Felch
Microbiology/Immunology, UMMC

Thursday, August 5, 2021
AFTERNOON
Room D11

1:00-3:00 **Symposium I**
Disease and Pandemics

(Speakers information can be found in the section on Divisional symposia and Workshop)

Moderators: Drs. D. Olga McDaniel and Frank Spradley

Speakers

1:00-1:30 PM Dr. Thomas Dobbs, State Health Officer,
MS State Department of Health

"Updates on COVID-19 Pandemic in Mississippi vs. USA and Beyond"

1:35-1:55 PM Dr. John Bates,
Microbiology/Immunology, UMMC

"COVID Convalescent Plasma: Why Time Matters?"

1:55-2:05 PM **Symposium Group**

Discussion

2:10-2:30 PM Dr. John Neiswinger Biology
Belhaven University, Jackson

"Asymptomatic COVID-19 Screening and Contact Tracing on an Undergraduate Campus"

2:35-2:55 PM Dr. Ashley Robinson,
Micro/Immunology UMMC

"The spread of Antibiotic-resistant Bacteria Across Continents"

2:55-3:05 PM **Symposium Group Discussion**

3:05-3:15 PM **HSD Business Meeting**

Thursday, August 5, 2021

EVENING

3:30 Dodgen Lecture and Awards Ceremony (B5-6)
General Poster Session (Immediately Following Dodgen Lecture C-Poster Hall)

Divisional Posters

Coordinators for Health Science Posters:

Drs. Olga McDaniel and Michelle Tucci

Topics:

Molecular/Material Science and Cellular Studies

P6.01

FAMILY STUDY OF THREE GENERATIONS AFFECTED WITH RA, RAYNAUD'S PHENOMENON, VITILIGO, ALOPECIA BARBAE AND POLIOSIS PRESENTED WITH THE SAME HLA HAPLOTYPE.

D. Olga McDaniel[1] and Larry S. McDaniel[2]

[1]SOM-General Surgery, [2] SOM-Department of Microbiology & Immunology, University of Mississippi Medical Center Jackson, MS, USA

Background: We described a single Armenian family of three generations, each with related autoimmune phenomenon. Rheumatoid Arthritis (RA), Generalized Vitiligo (GV), Raynaud's symptoms, Alopecia areata (AA) of beard and single localized Poliosis of frontal scalp. In general, these diseases are characterized with multiple susceptibility loci in the HLA gene region, encodes several molecules that play key roles in the immune system. The RA and Raynaud's are both immune response disease with genetics and immunologic markers including HLA alleles and Allograft inflammatory factor-1 contributing to inflammatory responses thru the function of macrophages and T-cells. Vitiligo, AA and Poliosis are skin diseases with different characteristics but share a common dependence on inflammatory pathways for pathogenesis. Vitiligo presents with white skin patches, AA presents with patchy hair loss and Poliosis with depigmentation of hair often on the frontal scalp. **Methods**: Pedigree analysis and HLA genotyping. **Results:** The limited data available in the public domain on the association between the HLA genes and these diseases. We observed a broad variability in the age of onset in the three generations of this family. The proband of the understudy family was female who had seropositive RA approximately with an early onset at age 32-34. The individuals with Vitiligo or Poliosis were 2nd generation, with disease onset at age 50- 55 years of age and 30-35 years of age respectively. The individuals with Raynaud's or AA were the 3rd generation, with age of onset at 15-17 years of age and AA age of onset at 40-45 years of age respectively. These are polygenic diseases, but we have shown a familial aggregation of the HLA B35, DR4 and DR53 haplotype among the members with disease onset. No features of vitiligo or AA observed in the individual with Poliosis. **Conclusion:** The HLA allele association present in this study may not be disease specific. However, allelic linkage in different population have also reported an association between HLA complex and these diseases. Thus, exploring the underling immunogenetics association may highlight the challenges for better understanding of pathogenesis related to their inheritance in this multi-generation family.

P6.02

THE USE OF Y1R ANTAGONIST TO REDUCE NEUROPATHIC PAIN

Michelle Tucci, Lir Wan Fan, Xiaoli Dai, and Ham Benghuzzi

University of Mississippi Medical Center, Jackson, MS, USA and [2]Global Training Institute, Flowood, MS USA

Background: Based upon epidemiological estimates, 3-4% of global population suffers from **neuropathic pain (NP),** and it is believed these numbers will increase as our population ages. Severe pain that is chronic (lasting >3 months) represents a major complication associated with tissue or neuronal injury, and it has become clear these types of injuries produce dramatic alterations in the gene expression of peptidergic neurotransmitters and receptors at the level of the primary afferent neuron, spinal cord, dorsal horn, and brain[2]. The chronic pain state is characterized by persistent long-lasting activation of peripheral nociceptors. Such plastic changes are thought to take the subject from acute to chronic pain. Several neuropeptides and their receptors are expressed in these target regions and contribute to modulating the pain signals. One important neuropeptide, NPY, and its receptor, Y1, appears to be an important mediator of NP. Neuropeptide Y and especially the NPY Y1 receptor (Y1-R) are highly expressed at key sites of pain transmission, including lamina II of the spinal cord dorsal horn, and tissue or nerve injury dramatically alters their expression profiles. These anatomical findings position the NPY system as a key player in the development of pathological pain. **Question:** Unilateral sciatic nerve chronic constriction injury (CCI) rat model is widely used to study NP. This injury model is primarily used to investigate the pathophysiology and potential therapeutic agents for treatment of NP. Our pilot study data shows altered expression of NPY and increased Y1-R density within the constricted nerve ending. NPY reactivity was seen in the axon bundles proximal to the ligature within the first three days, and by 30 days many NPY-positive nerve fibers passed the ligature and innervated blood vessels. Therefore, we investigated the use of a selective Y1R antagonist to reduce NP. **Results**: NP as a result of CCI was attenuated using **5 ug/kg/ day** and **10µg/kg/day** doses of a selective Y1 receptor antagonist (Y1-RA), which had a significantly greater capacity to suppress pain in comparison to gabapentin which is used clinically to treat pain**.** Our pilot data shows 50% improvement in mechanical threshold from surgical baseline using a 5 µg/kg/day dose by 7 days, and administration of 10 µg/kg/day showed values comparable to baseline. **Conclusion:** Further investigation is warranted to determine if a plateau (like that observed for 5ug/kg/day) is reached for this higher dose and what long term anatomical changes along with behavior occur as a result of the Y1- RA.

P6.03

TEMPERATURE TRANSMITTAL DURING LASER APPLICATION THROUGH YSZ CERAMICS

Jaccare Jauregui Ulloa and Susana Salazar Marocho

University of Mississippi Medical Center, Jackson, MS, USA

Introduction:Lasers have been used in dentistry to debond ceramic restorations. However, temperatures produced by laser irradiation on the zirconia surface can cause a negative thermal effect on the pulp tissue and material itself. This study aims to determine the effect of low-power laser irradiation on the temperature through yttria- stabilized zirconia (YSZ) under body temperature conditions. **Methods:** YSZ opaque slices (n=10) of 0.5, 2, and 3 mm thickness were irradiated with an erbium, chromium: yttrium-scandium- gallium-garnet (Er,Cr:YSGG) laser for 2 minutes under body temperature environment. Low power settings (1 W and 20 Hz) and minimum water/air spray (1%/1%) were used during irradiation. Base temperature (T0) and temperatures (T) at 30, 60, 90, and 120 s through YSZ slices were recorded. Temperatures at each time point were analyzed using three-way ANOVA with a Tukey post hoc test to determine significant differences. **Results:** Mean temperatures at T30, T60, T90, and T120 per group are shown in Table 1. Temperature through the thinnest group was found to be significantly higher than the other groups. However, no statistical differences in temperature for each time point were found. **Brief Discussion:** Thin opaque YSZ slices irradiated at body temperature had the highest temperature able to travel through which suggests that care should be taken when irradiating thin areas of a restoration for debonding purposes.

Base Temperature and Temperature at Different Time Points in °C Mean (Standard Deviation)

T0	T30	T60	T90	T120
30.9 (0.6) ł	43.4 (7.2) ł	43.5 (7.2) ł	43.4 (7) ł	43.4 (6.8) ł
27.9 (2.4) ǂ	32.4 (3.2) ǂ	32.9 (3.3) ǂ	33.1 (3.3) ǂ	33.1 (3.3) ǂ
28.1 (0.8) ǂ	32.5 (2.2) ǂ	33.1 (2.3) ǂ	33.5 (2.4) ǂ	33.6 (2.3) ǂ

rscript symbols indicate similar groups (Tukey, p>0.05).

P6.04

THE EFFECT OF MINIMALIST FOOTWEAR TYPES ON STATIC POSTURAL STABILITY

Sachini N K Kodithuwakku Arachchige,| Harish Chander,

Adam C Knight

Neuromechanics Laboratory, Department of Kinesiology, Mississippi State University, Mississippi State, MS, USA

Introduction: Sports and recreation-related injuries are highly prevalent in young males, and falls have been identified as a major causative factor. Falls could occur following slips, trips, and loss of balance, with a greater incidence reported with the latter. Purpose: To investigate the impact of minimalist footwear on static postural stability. Methods: Twenty- four healthy males (age 21.38±2.50 years, height 1.74±0.06 m, mass 71.24±10.37 kg) recruited. Their postural stability was measured using a force platform in barefoot (BF), Vibram™ Bikila (VB), and Vibram ™ Trek Ascent (VT) footwear. Postural sway variables of interest [center of pressure (COP) average in the anteroposterior direction (COP-AP average), COP average in the medial-lateral direction (COP-ML average), average radial displacement (RD), and COP length (COP-L)] were analyzed using a one-way repeated- measures ANOVA. Results: The analysis revealed significant footwear main effects in COP- ML average ($p = 0.041$) and COP-AP average ($p = 0.033$), average RD ($p = 0.045$), and COP- L ($p = 0.034$). Follow-up tests (Bonferroni) revealed significantly higher sway values for VB and VT compared to BF. Discussion & Conclusions: The participants demonstrated superior postural stability in the BF condition compared to the shod conditions. This could be explained with the greater somatosensory feedback in the BF condition. Although no significant differences were observed between the minimalist footwear types, VT demonstrated higher postural sway values, suggesting poor postural stability compared to VB, which could be attributed to its design characteristics such as lesser weight, sole thickness, heel height, and greater sole hardness.

P6.05

1445 MODULATION OF MACROPHAGE PLASTICITY AND POLARIZATION BY CANCER STEM CELLS

Kuan-Hui E Chen ans Zaida T Lavernture

Delta State University, Cleveland, MS, USA

While metabolic reprogramming has been found to contribute to immunosuppression within the primary tumor microenvironment, it is not clear whether metabolic regulation contributes to immune escape during metastatic traveling in an exposed environment where the metastatic cancer cells are more subject to immune attack. Cancer stem cells (CSCs) are best known for their contributions to tumor metastasis. Using a syngeneic mouse breast cancer model, we have identified that an increased arginine metabolism in metastatic CSCs when encountering effector T cells especially when the effector T cells are activated. The increased arginine metabolic landscape includes increased expression of the cationic amino acid transporter 2 (SLC7A2), inducible nitric oxide synthase (iNOS), protein arginine deiminase and arginine decarboxylase, and Arginase. Using fluorescent Dansyl-Arginine, we established that CSCs exhibit greater competitive power to acquire environmental arginine, thus restraining the activation and expansion of approaching T cells. In addition, most of the arginine uptaken by CSCs are processed by arginine methyltransferases (PRMT1) leading to an increase in secreted asymmetric dimethylarginine (ADMA). Here, we further report that giving ADMA to monocytes guides the dichotomy of macrophages towards the M2 (tumor promoting) phenotype. In summary, our results show a novel regulation of immune responses by CSCs through reprogramming of arginine metabolism and modification, which in turn manipulates the functions in approaching immune cells including both T cells and macrophages leading to successful immune escape.

P6.06

A STUDY TO ASSESS THE EFFICACY OF NATURAL COMPOUNDS IN THE TREATMENT OF DRUG- RESISTANT BACTERIAL INFECTION

Justin Nash, Debarshi Roy, McKelvie Maxwell, Amber Wilson, Brenita Jenkins

Department of Biological Sciences, Alcorn State University, Lorman, MS, USA

Introduction: Given the increasing prevalence of drug-resistance among microbial populations, and the increasing difficulty in treating such infections, this study aims to test several natural compounds with known and purported antibiotic and antioxidant properties as primary and adjunctive therapies against such infections. **Methods:** We have used samples of drug resistant bacteria harvested and cultivated from inanimate, high-traffic areas of our institution for this study. Drug-resistance was tested based on growth of the organisms in an ampicillin-containing agar plate and organisms were identified based on morphology and gram-staining characteristics. The natural compound Curcumin, which has purported antibiotic and antimicrobial efficacy, has been used in these studies for observation against and in combination with standard antibiotic therapy (ampicillin). By exposing drug-resistant microbial populations to varied dosages of these treatment regimens in nutrient broth cultures every 24 hours, we have seen preliminary results that suggest that minimal dose combination of antibiotic drug ampicillin with curcumin could prevent growth of the ampicillin resistant microbes for up to 72 hours. **Conclusion:** This data suggests that combination of minimal doses of curcumin and ampicillin could represent a promising adjunctive therapy against drug resistant organisms, and a potential new treatment avenue in the fight against multi-drug resistance in microbial populations.

P6.07

ADAPTED QRT-PCR PROTOCOL FOR CAMPUS-WIDE ASYMPTOMATIC COVID-19 SCREENING ON UNDERGRADUATE- CAMPUS

Johnathan Neiswinger, Shelley Smith, Brandon Magers, Reid Bishop, Karlee McKinney, Laela Evans, D'Onna Manning, Madison McGuire

Belhaven University, Jackson, MS, USA

The COVID-19 pandemic has created difficulties for in-person instruction in higher education, but asymptomatic detection and contact tracing has allowed for outbreaks to be minimized. Several PCR techniques have been developed allowing for rapid individual testing, but can be cost-prohibitive for small private institutions, especially those who must adhere to NCAA testing requirements. The Thermo-Fischer TaqCheck qRT-PCR assay has been shown to have high sensitivity for detecting COVID-19 from saliva samples, but was only validated for individual testing. Here we have developed a modified screening protocol that allows for the detection of asymptomatic positive samples even with a 12-fold dilution, allowing for significant cost reduction without sacrificing sensitivity. By testing all faculty, students, and staff weekly (approximately 1,100 tests) during the spring semester, we saw our positivity rate drop from 9.25% in the fall to less than 0.5% the following semester. Apart from being able to maintain in-person instruction all year, the testing facility also allowed for students to receive practical hands-on experience in a laboratory setting. This protocol also utilizes common laboratory instruments and is therefore easily transferable to any undergraduate campus.

Topics:

Population Health/Epidemiology/Social Sciences/Disease

P6.08

ASSOCIATION OF SICKLE CELL TRAIT WITH RISK OF CHRONIC KIDNEY DISEASE IN AFRICAN AMERICANS: META-ANALYSIS

Kia Monique Jones

Jackson State University

SCD affects approximately 100,000 Americans. SCD occurs among about 1 out of every 365 African-American births. About 1 in 13 African-American babies is born with SCT. Significant evidence suggests that hemoglobin variants, including sickle cell trait (SCT) and hemoglobin C trait, have a role in kidney disease in African Americans. African American men and women with SCT have a significantly faster decline in kidney function than individuals with a normal hemoglobin. SCT has been associated with an increased risk for chronic kidney disease (CKD) and cardiovascular disease in the general population. Epidemiological study design, meta-analysis was used to systematically assess the results of previous research to derive conclusions about the associations of sickle cell trait with risk of CKD in African Americans. Findings identified that SCT is not only associated with prevalent CKD but is also associated with progression to ESRD. Socioeconomic, lifestyle, and clinical factors only partially explain this observed racial disparity in CKD, suggesting that genetic variation likely plays a considerable role in the progression of kidney disease in African Americans. The presence of SCT was associated with an increased risk of CKD, decline in eGFR, and albuminuria, compared with noncarriers. Several epidemiological studies findings suggest that SCT may be associated with the higher risk of kidney disease in African Americans. These findings support the need for further studies evaluating these potential risk factors and their underlying mechanisms with the associations of SCT and CKD.

P6.09

DOES HELMET TYPE HAVE AN IMPACT ON THE MOTORCYCLE ACCIDENT FATALITIES: PHASE II

Ham Benghuzzi, Chris Powe, and Dennis Watts

Global Training Institute, Flowood, MS, USA

Introduction: Several recent studies have indicated that the motorcycle accidents exceeded the number of cars accidents. In the United States there is no universal helmet law. In twenty-two states, motorcycle helmets are entirely optional, while in nineteen states and the District of Columbia universal motorcycle helmets laws requiring helmets for all riders regardless of age are implemented and nine states only require younger motorcycle riders to wear a helmet, with varying age limits. Objectives: The overall objectives of this study were to evaluate the following: (1) number of fatalities (with and without helmet use), (2) fatality rate per motorcycle using different helmet types (modular helmet, open face helmet, dual-sport helmet- off road helmet, and half helmet), (3) fatality percentage with age, and (4) location of collision impact to the rider in two southern states (Mississippi and Alabama) where helmet laws are established compared with a southern state (Florida) that only requires riders less than 20 years of age to be helmeted. Methods: Data from 2014-2019 were obtained from the National Highway Transportation Safety Administration Reporting System (FARS) and supplemented with state related and CDC data. Results: In all three states, the most common collision was a front-end impact. Mississippi had the highest percentage of motorcycle fatalities even with >80% of riders helmeted when the fatal accident occurred, followed by Florida motorcyclist who are only 50% of the time helmeted. In all three southern states similar percentage of fatalities were seen in each age group with higher fatalities associated with age range of 30-39 years. Conclusions: Variables such as helmet type modular helmet, open face helmet, dual-sport helmet-off road helmet, and half helmet), and visibility of the rider may also be factors that contribute to a higher incidence of fatality and need to be further investigated to reduce mortality associated with motorcycle accidents.

P6.10

RESPIRATORY SEVERITY SCORES CORRELATE WITH WEIGHT FOR LENGTH Z SCORES IN INFANTS WITH BRONCHOPULMONARY DYSPLASIA.

Kristen Harvey, Renjithkumar Kalikkot-Thekkeveedu, Kyle Hart, Trenton J. Hughes, Wondwosen K. Yimer, Pradeep Alur

University of Mississippi Medical Center, Jackson, MS, USA

Bronchopulmonary dysplasia (BPD) causes significant morbidity and mortality in infants and children. Obesity negatively impacts lung function in children and adolescents. The purpose of this study was to determine if higher Weight/Length (W/L) (a marker of obesity) in preterm infants with BPD correlated with higher Respiratory Severity Scores (RSS). Study preterm infants met the inclusion criteria: born <30 weeks, and required oxygen for at least three days at 30-33 weeks of gestation at the time of enrollment. Weight, infant's length and head circumference were measured weekly using standard protocol. Data on calories/kg/d, protein g/kg/d, and protein to calorie ratio between 30 through 36 weeks of CGA as well as weight for length percentiles with z-scores and BMI at 33 through 40 weeks CGA was collected. RSS was calculated as proposed by the STOP-ROP trial. Data was analyzed using descriptive and inferential statistics.Linear mixed effects model was employed and $p<0.05$ was considered statistically significant. We had 58 infants. RSS were higher in grade 3 BPD- 1.04 compared to 0.20 in grade 1 BPD ($p <0.001$). On regression analysis, RSS significantly correlated with W/L z-scores, and BMI after adjusting for postnatal steroids, gestational age, and sex. For every 1 change in W/L Z score and BMI, the RSS changed by 0.057($p=0.0009$) and 0.0426 ($p=0.0001$) respectively. Our study demonstrates that higher BMI and W/L z-scores may adversely affect respiratory severity in BPD infants. Hence, attention should be paid to avoid preterm obesity in infants with BPD.

P6.11

BOUND BY HISTORY: FATALISTIC VIEWS, FAMILY MEDICAL HISTORY, AND DIABETES WITHIN SOUTHEASTER NATIVE AMERICANS

Ozzie Willis and Sonny Mattera Mississippi INBRE Outreach Scholar

Fatalism by definition is "A person's belief that events occur regardless of one's effort." With that sort of outlook, an individual will have negative thoughts in regards to health or wanting to stay healthy that the individual would not feel compelled to continue with good health behaviors. There are factors presented that we looked into to see what impacts those with a family medical history of diabetes being influenced on fatalistic views as well as physical activity and diet within Southeastern Natives in Mississippi. We collected the data for this research by an online survey distributed to residents of Mississippi and Louisiana, with our sample being those who self- reported they were Native Americans in Mississippi. Our hypothesis for this is those with a Family Medical History of diabetes will have
higher levels of reported fatalism, lower levels of physical activity, and an unbalanced diet. From this survey, we will be examining Family Medical History of diabetes as our independent variable, with Fatalism, Physical Activity, and Predicted Intakes of Fruits, Vegetables, Sugar, and Processed Meats as the dependent variables. We will control for Education, Income, Gender, and Age as we believe those have influences on our variable. What we found was there there was no significant difference between groups of fatalism, physical activity, and diet when Family Medical History was used as the independent. What this implies is different factors may contribute to fatalism, one being that we believe may be cultural values and social support for individuals.

P6.12

SEX, HOUSEHOLD PHYSICAL ACTIVITY, AND HYPERTENSION STATUS AMONG AFRICAN AMERICANS: THE JACKSON HEART STUDY

Samantha Cohen-Winans[1], Elizabeth Heitman[2], Marino A. Bruce[3], Roland J. Thorpe, Jr.[4], Keith C. Norris[5], Robert Newton[6], Bettina M. Beech[7]

[1]Department of Health, Exercise Science and Recreation Management, University of Mississippi, University, MS, USA, [2]University of Texas Southwestern Medical Center, Dallas, TX, USA, [3]Department of Population Health Science, John D. Bower School of Population Health, University of Mississippi Medical Center, Jackson, MS, USA, [4]Johns Hopkins Center for Health Disparities Solutions, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA, [5]David Geffen School of Medicine at UCLA, Los Angeles, CA, USA, [6]Pennington Biomedical Research Center, Baton Rouge, LA, USA, [7]Department of Health Systems and Population Health Sciences, University of Houston College of Medicine, Houston, TX, USA

Introduction: The burden of hypertension (HTN) is disproportionately greater for African Americans. Studies have demonstrated an inverse dose-response between levels of leisure- time physical activity (PA) and risk of HTN. However, household activities are the most common type of daily PA reported by African Americans, compared to occupational and leisure-time PA. African American women report higher levels of household tasks than men. The purpose of this study was to examine sex differences in the association of household PA and HTN among participants in the Jackson Heart Study (JHS). **Methods:** Data from 3,887 African American participants were analyzed from JHS's Exam 1. HTN, the outcome variable, was defined using JNC-7's standards. Household PA, the primary independent variable, was categorized as high or low frequency. Total sample and sex-stratified multivariable logistic regression models were estimated to examine the association between household PA and HTN. **Results:** Approximately 55% of the sample had HTN and 65.6% reported low frequency household PA. A greater percentage of individuals under age 50 reported high frequency household PA. Household PA was not related with TN (OR = 0.98, 95% CI: 0.80-1.20); however, age was a confounder that attenuated the association. **Brief Discussion:** Household activities have been reported as the most common type of daily PA among African Americans. However, household PA is excluded from some PA questionnaires. Improving the understanding of the association between household PA, HTN, and age can result in better tailoring of PA interventions that focus more on habitual tasks.

P6.13

ASSESSING THE RELATIONSHIP BETWEEN FINANCIAL STRESS AND ALLOSTATIC LOAD AMONG AFRICAN AMERICAN WOMEN: THE JACKSON HEART STUDY

Rachel Tyrone, MS, Roland J. Thorpe, PhD[2], Marino Bruce, PhD, MSRC, MDiv[1], Bettina Beech, DrPH[3], Elizabeth Heitman, PhD[4], Keith Norris, MD, PhD[5]

[1]Department of Population Health Science, John D. Bower School of Population Health, University of Mississippi Medical Center, Jackson, MS, USA, [2]Department of Health, Behavior, and Society, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA, [3]Department of Health Systems and Population Health Sciences, University of Houston, Houston, TX, USA, [4] Program in Ethics in Science in Medicine, University of Texas Southwestern Medical Center, Dallas, TX, USA, [5]Department of Medicine, David Geffen School of Medicine at University of California Los Angeles, Los Angeles, CA, USA

Introduction: African American women have higher rates of financial stress as well as higher allostatic load. Financial stress is the psychological, subjective perception of hardship experienced with limited access to material resources when an individual is unable to meet their financial obligations. Allostatic load has been used to quantify the effects of chronic stress on the body. The purpose of this study was to assess the relationship between financial stress and allostatic load among African American women. **Methods:** Data was drawn from 3367 African American women within the Jackson Heart Study, a longitudinal observational cohort study. Financial stress, exposure variable, will consist of participants self-reported experiences of stress- did not experience stress, no stress, mild stress, and moderate to high stress. Allostatic load, outcome variable, was based on the following measures: cortisol, glycosylated hemoglobin A1c, total cholesterol, waist circumference, systolic blood pressure, diastolic blood pressure, heart rate, C-reactive protein, and white blood cells. Logistic regression models were used to estimate the association between the exposure and outcome variables. **Results:** Among our total sample, 39.1% of the participants had high allostatic load with 20% reporting moderate to high financial stress. Our fully adjusted model found that participants who reported experiencing moderate to high financial stress had 2.03 (CI 1.37, 3.00) higher odds of having higher allostatic load. **Discussion:** Financial stress may be one such mechanism contributing to the wear and tear of stress on the body. Further analysis should be conducted on financial stress and the incidence of cardiovascular disease among African American women.

P6.14

AN ANALYSIS OF SOCIO-ECONOMIC DISPARITIES AND NUTRITIONAL DEFICIENCY LEADING TO CHILD MALNUTRITION

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Introduction: Socio-economic factors such as income or health insurance status relate to the health statistics in the society. On the other hand, nutritional deficiency caused by eating disorders create physiological changes which could lead to systemic and metabolic diseases such as obesity and cardio-vascular diseases. Eating disorders result in severe malnutrition in children and adults. Malnutrition can occur in people who are undernourished or over- nourished. Therefore, malnutrition is now considered a global problem, which affects both developed and developing nations. **Methods**: Socio-economic data from different counties of Mississippi are obtained from publicly available data sources. Health related data was available from Mississippi State Department of Health. We have also analyzed the nutritional value of different meals provided to the children in the schools or in daycares. **Results:** Our preliminary data indicate a strong socio-economic disparity exists within various counties in Mississippi. Such disparity will lead to a poor lifestyle and lack of proper nutrition provided to the children. We have formulated the nutritional value for macro and micro- elements and caloric value of the food provided at the school to analyze the impact of school meals on the child malnutrition in the United States. **Conclusion:** Socio-economic disparities and improper nutrition both lead to a lifestyle that promote metabolic and chronic diseases. We recommended consuming alternative nutritional ingredients to prevent human body from getting into chronic and metabolic disorders.

P6.15

CHILDCARE STAFF FOOD INSECURITY DURING COVID- 19

Elizabeth Thorne

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In March 2020, the COVID-19 pandemic was declared a national emergency. With this, many businesses were closed for varying times. However, given the number of essential workers that remained in the workforce, many childcares remained open or were only closed for a brief period of time. Early childcare staff are a vulnerable population to food insecurity given their low income, even prior to the emergence of COVID-19. METHODS. Childcare staff, including teachers, food service and family advocates were provided a Qualtrics survey at three Head Start centers in Mississippi as part of a larger study investigating food insecurity and health during the COVID-19 pandemic. Survey items were adapted from the U.S. Household Food Security Survey Module. Frequencies were examined to understand how food insecurity has increased, decreased, or stayed the same among staff (n=36) after the pandemic among this population. RESULTS. Before COVID-19, only 5.6% of staff reported they were "very often" worried that they would run out of food before having more money to buy, but this increased to 25% after the start of the pandemic. Additionally, 38.9% of participants were

"extremely" or "rather" worried that grocery stores would run out of food; 75% of staff were "extremely" or "rather" worried that grocery stores would run out of water. CONCLUSION. There were many growing areas of concern amidst the pandemic of childcare staff. In order to enhance and support the workforce, it is important to ensure that the needs of staff are met.

P6.16

HOW DIRECT-TO-CONSUMER TELEMEDICINE COMPANIES COMPARE TO IN-PERSON HEALTH CARE

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With the expansion of Direct-to-Consumer Telemedicine Companies (DTCTCs), it is imperative to ask the question of whether or not online and traditional in-person medical practices are equivalent in quality. Companies such as Roman, Hims & Hers, Bluechew, NURX, Keeps, Lemonaid, Wisp, and Cove have established websites based around the premise of easy access to healthcare without the need of an in-person visit to a medical professional. After utilizing services from a select organization, a comparison was conducted between DTCTCs and in-person medical consultations through the following pertinent areas: patient illness presentation, medical history consultation, patient verification, vital sign collection, prescription dispensing, and inductive and maintenance therapy protocol. DTCTCs were found to increase access to healthcare and have the potential to increase communication with patients and medical professionals after consultations. However, we also found many areas for potential system abuse including the ability for patients to edit their illness presentation until a consultation is deemed appropriate, the need to rely on the patient's self-administration of vital sign testing, and decreased patient verification steps. A decrease in quality of patient care was also identified due to the inability of DTCTCs to administer physical exams and conduct patient blood tests – necessary evaluations used to meet standard of care for some of the medications offered by the DTCTCs. It was concluded that benefits of DTCTC therapy may outweigh the risk of potential patient harm, however, many reforms are necessary to improve patient safety within DTCTC medical practices.

P6.17

SLEEP DURATION, SLEEP QUALITY, AND MOBILITY LIMITATION AMONG AFRICAN AMERICANS: THE JACKSON HEART STUDY

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INTRODUCTION: Extremes in sleep duration and poor sleep quality are associated with poorer health. Few studies have considered how these sleep problems impact mobility limitation (ML) among African Americans. The purpose of this study is to examine the associations of very short or long sleep duration and low sleep quality on ML among Jackson Heart Study (JHS) participants.

METHODS: Data were drawn from Exam 1 of the JHS (n=2,268). All measures were self- reported. The outcome variable was ML, a binary variable derived from items asking respondents about their difficulty or inability to walk a half-mile and/or up and down stairs without help. The primary independent variables were sleep duration and quality. Sleep duration was categorized as very short (5 hours or less), short (5-7 hours), normal (7-8 hours), and long (8 or more hours). Sleep quality was categorized as high (excellent, very good, or good) or low (fair or poor). Covariates included demographic, socioeconomic status, and medical factors. Logistic regression models were stratified by sex and fit to examine the odds of ML by sleep duration or sleep quality after adjustment for covariates.

RESULTS: Compared to women with normal sleep, the odds of ML were higher among women with very short sleep (OR: 2.69; 95% CI: 1.47, 4.93) and low sleep quality (OR: 1.68; 95% CI: 1.21, 2.33). There were no associations between sleep and ML among men.

BRIEF DISCUSSION: The relation between sleep and ML varies by sex. Future work will examine the pathways linking sleep and ML among women.

P6.18

THE RELATIONSHIP BETWEEN CULTURAL PERCEPTIONS OF HEALTH TOPICS AND HEALTH BEHAVIORS AMONG SOUTHERN MISSISSIPPIANS

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The rate of obesity has been increasing in the last few decades with Mississippi having the highest rates (39.5%) in the United States. This southern state has a distinct culture that may influence the link between individuals' perceptions of health messages and lifestyle behaviors. The purpose of this study was to determine the relationship between cultural values of diet, physical activity and preventable diseases and diet and physical activity behaviors among Southern Mississippians. An online survey was administered for this cross-sectional study and distributed by researchers through text messaging and social media. A total of 108 participants (43.5% Whites, 38.0% African American, 18.5% American Indian or Alaskan Native) who were 18 years or older and resided in Southern Mississippi completed the survey. Multiple regression analyses were used to determine the predictability of cultural values on dietary variables, (including processed meat, added sugar, and fiber), and physical activity, while controlling for age, race, and gender. Results indicated that cultural values were a significant predictor of processed meat with increased cultural values associated with decreased processed meat intake (p= .01). In addition, American Indians consumed significantly more sugar than Whites daily (p< .01) and younger individuals ate more sugar than older individuals (p= .04). This study suggested that cultural values of health may influence diet behaviors. Future studies are needed to explore this relationship further and focus on the attitudes towards the diet and physical activity behaviors that may be contributing to lifestyle behaviors.

P6.19

THE RELATIONSHIP BETWEEN CULTURAL PERCEPTIONS OF HEALTH TOPICS AND HEALTH BEHAVIORS AMONG SOUTHERN MISSISSIPPIANS

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The rate of obesity has been increasing in the last few decades with Mississippi having the highest rates (39.5%) in the United States. This southern state has a distinct culture that may influence the link between individuals' perceptions of health messages and lifestyle behaviors. The purpose of this study was to determine the relationship between cultural values of diet, physical activity and preventable diseases and diet and physical activity behaviors among Southern Mississippians. An online

survey was administered for this cross-sectional study and distributed by researchers through text messaging and social media. A total of 108 participants (43.5% Whites, 38.0% African American, 18.5% American Indian or Alaskan Native) who were 18 years or older and resided in Southern Mississippi completed the survey. Multiple regression analyses were used to determine the predictability of cultural values on dietary variables, (including processed meat, added sugar, and fiber), and physical activity, while controlling for age, race, and gender. Results indicated that cultural values were a significant predictor of processed meat with increased cultural values associated with decreased processed meat intake (p= .01). In addition, American Indians consumed significantly more sugar than Whites daily (p< .01) and younger individuals ate more sugar than older individuals (p= .04). This study suggested that cultural values of health may influence diet behaviors. Future studies are needed to explore this relationship further and focus on the attitudes towards the diet and physical activity behaviors that may be contributing to lifestyle behaviors.

P6.20

THE IMPACT OF SYSTEMIC RACISM AND COVID-19 ON THE MENTAL HEALTH OF AFRICAN AMERICANS AGED 18-29 IN MISSISSIPPI

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The African American community has been the epicenter of examples of social inequality in the US since the 17th and 18thcenturies. Hundreds of years later, these communities are still experiencing variations of maltreatment and suppressed access to fundamental education, housing, public safety and healthcare due to historic and systemic racism. The recent global health pandemic of severe acute respiratory syndrome COVID-19, and recent national responses to a surplus of occurrences of acts of police brutality against African Americans (AA) has resulted in a confluence of mental health challenges in the US. A cross-sectional data analysis assessment explored the impact of COVID-19 and systemic racism on Americans, specifically AA youth aged 18-29 in Mississippi. A brief community assessment was developed to gauge each participant's knowledge/understanding of COVID-19 and systemic racism. Participants (n=102) completed the online assessment. Data analysis included descriptive statistics from both the surveys and review of scientific literature. According to research findings, the presence of COVID-19, as well as the recurring and amplified outcomes and impacts of systemic racism, have impacted the mental health in AA in Mississippi aged 18-29. This research focuses on identifying whether or not the presence of COVID-19, as well as the recurring cycle of racially driven discrepancies against the African American community, has created an increase in mental health disorders, specifically in Mississippi. The assessment unveils that the history of systemic racial and racial oppression has subjected the AA community to be more likely to face more health-related and survival issues than its counterparts.

P6.21

DIET, PHYSICAL ACTIVITY, AND PREVENTABLE DISEASES: EXAMINING THE RELATIONSHIP BETWEEN COMMUNITY CULTURAL VALUES AND HEALTH BEHAVIORS AMONG LOUISIANA NATIVE AMERICANS

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Preventable chronic diseases resulting from poor diet and lack of physical activity are major health concerns throughout the southeastern United States. Native Americans in the Deep South are a relatively underexplored population with regard to healthy behaviors that reduce preventable chronic diseases. Cultural values that promote healthy diets and physical activity have been identified as key determinants of diet and physical activity, but little is known about the relation in this population. The purpose of this study was to examine the relationship between cultural values that promote healthy diet and physical activity among self-identified Native American adults (18+ years) living in Louisiana (N=68). Data were collected online via Qualtrics survey regarding disease status, barriers and facilitators of healthy diet, and physical activity levels. A five- question measure was used to assess community cultural values for healthy dietary and physical activity behaviors. The Dietary Screener Questionnaire was used to assess dietary intake. The single question Global Physical Activity Questionnaire was used to assess weekly levels of physical activity. Demographic variables that served as covariates included age, income, gender, and education. Results from a regression of cultural values onto physical activity and dietary intake controlling for demographic covariates indicated no significant effects of cultural values on any of the diet variables or physical activity. Future interventions should consider more local networks, family, friends, and other kinships for their support and encouragement of healthy diet and physical activity behaviors that reduce preventable chronic diseases at the community level.

P6.22

THE INCREASE IN RISKY SEXUAL BEHAVIORS DURING THE COVID-19 PANDEMIC

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Risky sexual behaviors typically include multiple sex partners, unprotected intercourse, anal sex, sex while using drugs, and mouth to genital contact. These risky behaviors are the main cause of STDs and are extremely widespread in the ages ranging from 15 to 24, according to the CDC. Of the 20 million new STD cases reported yearly, 50 percent come from young people (ages 15-24). This STD epidemic is prevalent in the Jackson, MS MSA. Jackson, MS now has the second-highest rate for STDs in the country, surpassing 2019's ranking of number 15. The aim of this research is to explore the underlying factors that cause individuals to engage in risky sexual behaviors during the COVID-19 pandemic, while determining the correlation between risky sexual behaviors and the pandemic. The results came from an analysis of the positive and negative STD tests ranging from mid-March 2020 - June 2020. Data was retrieved directly from the Open Arms Healthcare Center in Jackson, MS. An anonymous survey was also created and distributed to over 100 people with ages ranging from 16 to 37 through social media and text messaging. The survey findings concluded 47.4 % of participants had unprotected sex during the pandemic; 86.1 % feel that condoms and contraceptives are easy to obtain during the pandemic; and 91% feel comfortable enough to get tested, although only 12% have gotten tested. The results gathered from this study show that there was an increase in risky sexual behaviors during the COVID-19 pandemic.

P6.23

DOES SEX EDUCATION AFFECT SEXUAL BEHAVIORS AND HEALTH OF TEENS IN RURAL MISSISSIPPI

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In the state of Mississippi, there is overwhelming evidence that young people in Mississippi lacked the information and access to health services they needed to make healthy decisions about their sexual behavior and health. Nationwide, 47% of high school students report ever having had sexual intercourse, in comparison to 58% of Mississippi high school students. In fact, data from the 2011 Mississippi Youth Risk Behavior Survey indicate that Mississippi youth engage in many sexual risk behaviors at rates higher than national averages. For example, Mississippi teens are nearly twice as likely to engage in sexual intercourse before the age of 13, and more likely to have multiple sexual

partners than their peers nationwide. This study examined the effects of sex education on the sexual behavior and health of teens in rural Mississippi (i.e., effectiveness of sex education, perception of contraceptives and contraceptive use). The research showed that 90.5% of teens in rural Mississippi thought that sexual health classes were very/somewhat helpful. Nine-six percent of teens viewed sexual health classes as a very good/good idea, 94.5% felt that that implementing condoms into their sexual relationships within next three months were a very good/good idea, and 91.5% of teens were very likely/likely to use a condom during sexual encounters during the next three months.

P6.24

THE EFFECT OF COVID-19 ON MENTAL HEALTH PATIENTS AT OPEN ARMS HEALTHCARE CENTER

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Public health emergencies affect the health, safety, and well-being of both individuals and communities. These public health emergencies result in insecurity, confusion, emotional isolation, and stigma. These effects may translate into a range of emotional reactions (i.e., distress or psychiatric conditions), or unhealthy behaviors (i.e., substance use/abuse). According to the World Health Organization (W.H.O.), fear and worry are normal responses to perceived or real threats and that stress levels during these unprecedented times are higher than normal. The data revealed that participants/patients at OAHCC displayed increased levels of stress and inadequate abilities and/or outlets to cope with the stress. Additionally, the research determined that 92% of the participants surveyed at Open Arms Healthcare Center (OAHCC) had been affected due to the COVID-19 pandemic. There was significant data that linked the COVID-19 pandemic and higher levels of stress and mental well-being of patients at OAHCC. The research also showed, that 86% of the participants felt that the COVID-19 pandemic has been overwhelming and that it has affected mental status and their relationships with their social groups and family. The support of mental health professionals, family and social networks assisted in curving the effects on the patient's mental health.

P6.25

ASSESSING THE PERCEPTIONS OF AFRICAN AMERICANS IN MISSISSIPPI ON THE IMPACT OF CORONAVIRUS/SARS-COV-2 (COVID- 19)

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Since December 2019, the global community has been impacted by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) (Rabi et al., 2020) or more commonly as the novel coronavirus disease (COVID-19). As of July 2020, the Mississippi State Department of Health, has reported more than 57,000 cases of COVID-19. African Americans have more coronavirus cases and deaths in comparison to any other race statewide. African Americans (AAs) in Hinds County alone account for 76% of the total reported cases, as well as 72% of the total COVID-19 related deaths (MSDH, 2020). With case numbers rising each day, the state of Mississippi is one of many that have yet to see a definitively flattened curve during the COVID-19 pandemic. It is supposed that the disparity in deaths and cases throughout African Americans in Mississippi results from a lack of education relating to COVID-19. The purpose of this study is to assess the perception of COVID-19 in African Americans in Mississippi. Semi-structured interview were conducted with 25 African American Mississippians ranging 18-54 years of age. Finding suggest that African Americans gain the greatest amount of information from social media, places of employment and essential businesses. Additionally, the study found that many don't seek testing due to fear and anxiety associated with the testing process of testing. Fiscally, 96% of the participants reported that COVID-19 has impacted them socioeconomically. Based on these findings, it is recommended that public health leaders utilized social media as a means to provide accurate and up to date information. Finally, we recommend, mental health therapists continue to host free virtual therapy sessions for communities to assist with anxiety, depression, or fear surrounding COVID -19. This will be used to help reassure people and let them know that they have resources available during this unprecedented time.

P6.26

SAME SCRIPT, DIFFERENT CASE: DID THE PRESENCE OF COVID-19 IMPACT THE SEXUAL BEHAVIORS OF YOUNG ADULTS

Quandejia Crockett[1], Alexandrea Johnson[2], Brian Jordan[3], Senedrian Paige[4], Obie McNair[5]

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The rapid increase in cases of Coronavirus-19 across the state led to the governor of Mississippi, declaring a Stay-At-Home order for the state. However, many people, particularly young adults continue to engage in intimate activities that would increase COVID transmission, including sex. Therefore, the purpose of this research is to examine the effectiveness of the governor's Stay-at-Home order on decreasing sexual contact among young adults in Mississippi. We developed an electronic survey via Qualtrics. We gathered responses from young adults ages 18-35 to (1) evaluate their sexual behaviors prior to the Governor's Stay-At-Home Order, (2) analyze the sexual behaviors during the Governor's Stay-At-Home Order, and (3) draw conclusions and determine whether or not the Governor's Stay-At- Home order had an effect on the sexual behaviors of young adults. From here, we performed demographic and outcome-based frequency analysis comparing pre and post data. While there was a decrease in the sexual activity of young adults, our hypothesis was not proven to be true as the decrease was not large. In addition, while prevention methods usage also decreased, this was due to a slightly higher increase in young adults engaging in abstinence. Based on the study, our hypothesis was not proven correct. Future research plans to expand our reach beyond the Jackson area and include additional questions regarding sexual behaviors and activity.

Topics: ***Clinical/Diagnostics/Therapeutics***

P6.27

THE THERAPEUTIC EFFICACY OF ANTIVIRAL DRUGS FOR THE TREATMENT OF COVID-19

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The COVID-19 outbreak forced a desperate search for an effective treatment that could ease the burden on United States healthcare systems. The initial response was the use of anti- viral drugs to treat the disease. In this retrospective study, we examined the effects of antiviral drug, Remdesivir (Veklury) on subjects from 20-105, who were diagnosed with Covid-19. The data were obtained from Mississippi Baptist Medical Center from July 1 to December 11, 2020 and were analyzed using the SPSS (v. 27) for various descriptive stats including correlations. The drug efficacy was measured by the patients' length of stay (LOS) and their outcome after they were discharged. The patients' length of stay was measured by the time they were admitted until the time they were

released on a weekly basis. The overall discharge outcomes were divided into seven categories with patients being sent home as the most favorable outcome, while those resulting in death as the least favorable one. The group, which received Remdesivir, had a positive outcome of being sent home compared to those who did not receive (39.7 vs 25.6%). There was a significant correlation ($p<0.05$) between the patients' age and length of stay. For the group that expired, the patients' age 71 and above had a higher frequency of stay compared to those who were between 61 to 70 (68 vs 28%) and were amongst the highest risk for morbidity and mortality. There was a significant correlation ($p<0.05$) between gender and LOS with male having longer stay than female (16 vs 12 wk). This study provides a critical insight on the use of Remdesivir particularly on the African American population in the state of Mississippi and could lead to examine other attributable factors of the disease in subsequent research.

P6.28

USE OF SIMPLE ANTHROPOMETRIC PARAMETERS TO PREDICT VISCERAL ADIPOSE TISSUE THROUGH AN ARTIFICIAL NEURAL NETWORK AND DIFFERENT REGRESSION MODELS

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Introduction: Cardiovascular disease (CVD) is a leading cause of death in the United States and due to the high rate of obesity, African American Mississippians are disproportionately affected. Previous studies have shown a strong correlation between visceral adipose tissue (VAT) compartments and CVD. Unfortunately, measuring a patient's VAT is time-consuming and costly. This study's purpose was to determine if simple anthropometric measurements such as waist circumference (WC) and sagittal abdominal diameter (SAD) can predict VAT volumes, in a low-cost manner. **Methods:** This is an IRB approval retrospective study of 2873 patients (1873 females and 1000 males, 60.96 ± 11.26 years old at CT scan). Anthropometric measurements (WC and SAD) were performed using CT abdominal images. Additionally, demographic information such as weight, age, and sex were collected and included in the analysis. Different approaches were implemented using in-house algorithms written in Python to predict the dependent variable VAT using independent variables such as WC, SAD, weight, age, and sex. The models tested were multiple linear regression (MLR), polynomial regression (PR), support vector regression (SVR), decision tree regression (DT), random forest regression (RFR), and artificial neural network (ANN). The full cohort was split into training set and test set before running the algorithms. The training set to test set ratio was 80/20 (2298/575). Statistical analysis was performed using IBM® SPSS® statistics software version 25. Comparisons between the models were based on their performance (r2), accuracy (Acc), and standard deviation (SD). **Results:** There is good correlation between anthropometrics and VAT (RVAT-WC=0.60, RVAT-=0.74, $p<0.001$). The models that most accurately predicted VAT were MLR (r2=0.6159, Acc=64.67%, SD=4.34%), SVR (r2=0.6288, Acc=64.81%, SD=3.77%), RFR (r2=0.5936, Acc=61.39%, SD=6.53%), and ANN (r2=0.6351, Acc=69.16%, SD=3.21%). **Brief Discussion:** This study shows that low-cost simple anthropometrics can be used to predict volumes of the metabolically active VAT depot through a variety of approaches, particularly by ANN. This could be a useful low-cost biomarker of CVD risk, particularly in those with central adiposity.

P6.29

COVID19 PREVENTION BEHAVIORS & CHRONIC DISEASE STATUS AMONG SOUTHEASTERN NATIVE AMERICANS IN MISSISSIPPI

Raven Mingo[1]; Reyes Willis[2]; Darlene Willis[3]; Mario Herrera, PhD[4]; Jennifer L. Lemacks, PhD, RD[4]; Dr. Tammy Greer, PhD[4]

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Early on during this pandemic, it quickly became apparent that individuals with pre-existing health conditions, such as diabetes, high blood pressure and others are at a greater risk for complications related to COVID-19. Native Americans have higher rates of chronic diseases (e.g., diabetes, high blood pressure) and have also been affected by COVID-19 at higher rates. COVID-19 related deaths have been greater among Native Americans in Mississippi compared to other race/ethnic groups, making recommendations of social distancing even more imperative for this population. In the current study, we examined the relationship between self and household adult medical history and COVID-19 preventative behaviors among Native Americans who reside in Mississippi. With approval of the USM IRB and tribal partners, data were collected from participants (N = 93) who were administered an online questionnaire and were awarded an e-gift card as an incentive for completion. Results from COVID-19 risk behaviors regressed onto self and household adult disease status and demographic variables revealed a positive relation between COVID-19 risk behaviors and self-disease status and a negative relation of risk behaviors with household adult disease status. Additionally, older participants and those with more education reported fewer risk behaviors. These results point to cultural differences among Native American community members who may respond more readily to COVID-19 prevention messages that focus on care for household members rather than messages that target individuals.

P6.30

AUTOMATED BODY COMPOSITION SEGMENTATION FROM CT IMAGES IN A DIVERSE POPULATION USING DEEP LEARNING

Edward Florez, Baylor Obert, Candace Howard

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Introduction: Body composition, the measure of muscle and fat tissues, is an important assessment tool due to its link to cardiovascular risks. The current gold standard for measuring body composition requires an expert reader to manually segment volumes on CT images using software like SliceOmatic. However, segmentation of a patient's CT images takes 35 minutes, making it tedious, expensive, and time-consuming. The goal of the study was to perform a fast and accurate segmentation of the muscle and fat depots from CT abdominal images. **Methods:** Deep learning (DL) is a type of machine learning in which a model learns to perform classification tasks directly from images. A deep neural network architecture was implemented in Keras to classify each pixel in an image from a predicted set of classes or semantic labels. The labels were chosen based on Hounsfield Unit (HU) values: adipose tissue from -190 to - 30 HU, and skeletal muscle tissue from -29 to 150 HU. Adipose tissue was divided into two anatomical compartments with different labels, subcutaneous adipose tissue (SAT) outside the abdominal wall and visceral adipose tissue (VAT) as the intra- abdominal fat surrounding and within organs. A training stage of the DL algorithm was executed using the data of four patients with 96 CT abdominal images contoured by an experienced reader through the initially established semantic labels. **Results**: Several convolutional layers, non-linear activations, batch normalization, up sampling layers, and pooling layers constitute the model with a symmetrical encoder- decoder framework. This complete pipeline allows the automatic segmentation of a single slice or a set of slices with an accuracy of 0.713 and a standard deviation of 0.065. The average inference time to segment a slice was 0.097 minutes. **Conclusion:** This pilot study suggests that fully automated body composition analysis is accurate, feasible, dramatically reducing the time spent for body composition analysis by other validated techniques and software.

Friday, August 6, 2021
MORNING
Room D11

Oral Presentation Session II A
Moderators: *Drs. Candace Howard and D. Olga McDaniel*

Topics: Clinical Diagnostics/Therapeutics

O6.08

8:30 CHANGES IN CYTOMORPHOLOGY OF PANC-1 CELLS WITH INCREASING GLUCOSE CHALLENGE

Gary L. Hamil[1], Michelle A. Tucci[1], Hamed A. Benghuzzi[2], Zelma Cason[1], Kenneth R. Butler[1,3]

[1]University of Mississippi Medical Center, Jackson, MS, USA,[2]Global Training Institute, Flowood, MS, USA, [3]Mississippi College, Clinton, MS, USA

PANC-1 is a human pleiomorphic epithelioid carcinoma of the exocrine pancreas. Previous studies in our laboratory provided evidence that these cells can be manipulated into insulin-producing cells by altering the culture medium with increasing amounts of glucose. There is a paucity in the literature regarding cytomorphologic characteristics of PANC-1 cells under normal culture conditions and when challenged with increased amounts of glucose. The goal of this experiment was to evaluate the nuclear and cytoplasmic characteristics of PANC-1 cells. Initially, cells were grown in flasks with a control medium and then split into four separate groups containing control media or media containing an extra 1%, 2.5%, or 5% glucose. Cells from the three cultures were plated (1 x 10^5 cells/well) and treated with control, 1%, 2.5%, or 5% glucose for 24, 48, and 72 hours. Cells and supernatants were harvested, and cell number and cytomorphology were compared at all phases. Nominal data were analyzed using non-parametric statistics calculating mean ranks to compare all four groups using the Kruskal- Wallace H statistic. While we saw statistically significant differences in most variables by glucose concentration at 24-, 48-, and 72-hours, the most telling was the increased glucose concentration detected by immunohistochemistry at all three phases rising from baseline, peaking at 2.5% glucose concentration, and rapidly declining to baseline levels indicating an inhibiting or toxic effect at 5% extra glucose ($p<.0.05$). This pattern was also consistent in the cytomorphologic changes observed as glucose concentrations increased and were more apparent by the 72-hour phase. This study contributes valuable quantitative data regarding the viability and function of PANC-1 cells as insulin-producing cells with increasing glucose challenge and demonstrates that PANC-1 or similar cells can be further engineered into useful components in drug delivery applications.

O6.09

8:40 CT-BASED RADIOMIC FEATURES PREDICT METASTATIC RENAL CELL CARCINOMA RESPONSE TO ANTI-ANGIOGENIC THERAPY

Edward Florez[1], Tanner Nielson[1], Seth Lirette[1,2], Candace Howard[1]

[1]Department of Radiology, University of Mississippi Medical Center, Jackson, MS, USA, [2]Department of Data Science, University of Mississippi Medical Center, Jackson, MS, USA

Introduction: Renal cell carcinoma (RCC) metastases are highly vascular and anti- angiogenic (AAG) agents are first-line therapy. AAG therapy causes tumor devascularization, leading to changes in tumor heterogeneity. It is known that texture analysis in CT images has the ability to measure changes in tumor heterogeneity. The aim of this study was to develop a CT texture algorithm to predict progression-free survival (PFS) in patients with metastatic RCC treated with AAG therapy. **Methods**: A multi-institutional prospective phase-III trial evaluating sunitinib as first-line agent in patients with metastatic RCC was conducted on 275 patients with digital CT images. CT radiomic features (RCT=250) were measured on baseline and initial post-therapy CT images using a quantitative software. Tumor length and CT radiomic features with high inter- observer agreement (ICC>0.60; RIO=14 candidate parameters) among 11 readers who independently evaluated 20 randomly selected patients were incorporated into a statistical model (CT radiomics algorithm) and associated with PFS using Cox-proportional hazards ratio and log-rank test. **Results:** The final CT delta-radiomics algorithm included: change in both target lesion length and tumor area, gray level non-uniformity, and run length non-uniformity. CT radiomics algorithm non-responders (NNR=135) on the initial post- therapy CT exam were 2.6 times more likely to progress than responders (NR=140; HR=2.6, $p<0.001$). The median PFS of 0.7 years for non-responders was significantly different than the median PFS of 1.6 years for responders ($p<0.001$). **Brief Discussion:** A CT radiomics algorithm with higher inter-observer agreement was predictive of PFS in patients with metastatic RCC treated with AAG therapy and could be used to identify non-responders after one cycle of therapy.

O6.10

8:50 RAPID SCREENING VALIDATION FOR ABNORMAL BONE DENSITY ON ROUTINE CT IMAGES IN A PROSPECTIVE COHORT

Aubrey Smyly[1], Elliot Varney[1], Edward Florez[1], Seth Lirette[1,2], Andrew Smith[3], Candace Howard[1]

[1]Department of Radiology, University of Mississippi Medical Center, Jackson, MS, USA, [2]Department of Data Science, University of Mississippi Medical Center, Jackson, MS, USA, [3]Department of Radiology, University of Alabama Birmingham, Birmingham, AL, USA

Introduction: Half of patients with an osteoporotic fracture never undergo bone density screening, and there are 60 million annual CT scans in the U.S. that include the spine. A rapid and accurate opportunistic method to screen for abnormal bone density of the spine on routine abdominal CT images could substantially improve screening efforts to detect abnormal bone density with no additional cost or radiation exposure. The objective of the study was to prospectively validate an opportunistic screening method utilizing color to detect abnormal bone density on abdominal CT images. **Methods**: For this IRB-approved study, 200 asymptomatic women
>50 years of age presenting for screening mammograms were recruited. Patients underwent nonenhanced CT imaging of the abdomen. The CT images were processed with software designed to color the vertebral bodies green if bone density was normal and red if abnormal. Four radiologists were timed as they interpreted L1/L2 bone density using various methods: quantitative CT (QCT), visual assessment of grayscale (Grayscale) and colored (Color) images, and measurement of vertebral attenuation (Attenuation). The mean bone density values at L1/L2 using QCT served as the reference standard. The average accuracy, sensitivity, and specificity were calculated. **Results:** Mean attenuation at L1/L2 was highly correlated with mean bone density ($r=0.85$, $p<0.001$). The optimal mean attenuation cut point for differentiating normal from abnormal bone density was 145 HU. The average accuracy, sensitivity, and specificity were higher with the Color method (Accuracy:92, Sensitivity:92, Specificity:93) than with the Attenuation (Accuracy:88, Sensitivity:89, Specificity:89) or Grayscale method (Accuracy:66, Sensitivity:69, Specificity:64). Mean time of assessment of 2.8 seconds using the Color method was significantly faster than 6.0 seconds for the Grayscale method or 15.2 seconds for the Attenuation method ($p<0.001$). **Conclusion:** An opportunistic screening method utilizing color to detected abnormal bone density on abdominal CT images was both rapid and highly accurate in a prospective validation cohort.

O6.11

9:00 DCLK1 ISOFORM 1 CONTRIBUTES TO THE INVASION AND MIGRATION CAPABILITIES OF COLORECTAL CANCER CELLS

Brittnie-lee Duffus and Lianna Li

Tougaloo College, Tougaloo, MS, USA

Colorectal cancer (CRC) is the third most diagnosed cancer in women and men and is the second leading cause of cancer deaths. Treatment includes surgical removal followed by chemotherapy; however, some patients are unresponsive or resistant to chemotherapy. Approximately 50% of them relapse after surgery and die due to metastatic activity. Cancer stem cells (CSC), which make up 0.5%- 1% of cancer tumors, are identified to have the ability to survive under harsh conditions and differentiate into a variety of cancer cells. Double Cortin-Like Kinase (DCLK1) is a cancer stem cell marker that is overexpressed in CRC stem cells. It can enhance epithelial- mesenchymal transition and it might be associated with increased migration and invasion capability of CRC cells. The aim of this research is to investigate whether DCLK1 isoform 1 (DCLK1-L) affects the migration and invasion capability of HCT116 cells. In order to achieve our goal, isogenic cells with over-expression of DCLK1-L were established using HCT116 cells. Wound-healing assay was carried out to determine the migration of cells and quantitative real-time PCR was applied to evaluate gene expression of specific migration/invasion molecular markers. Our preliminary results demonstrated that DCLK1 isoform 1 over-expression does affect the migration capability of the CRC cells. Further experiments will be carried out to further confirm these preliminary findings and reveal the association of DCLK1-L with the invasion capability of CRC cells.

9:10 Break

O6.12

9:15

INHIBITION OF SARS-COV-2 ENTRY INTO THE HOST CELLS USING MARINE SULFATED GLYCANS

Poonam Sharma[1], Rohini Dwivedi[2], Vitor Pomin[2], Ritesh Tandon[1,2]

[1]Department of Microbiology and Immunology, University of Mississippi Medical Center, Jackson, MS, USA, [2]Department of BioMolecular Sciences, University of Mississippi, Oxford, MS, USA

Severe acute respiratory syndrome-related coronavirus-2 (SARS- CoV-2) has resulted in a global pandemic and continues to affect an exceptionally high proportion of the human population around the world. Although a few vaccines have been approved, there are presently limited number of effective therapeutics against Coronavirus Disease 2019 (COVID-19). Like several other enveloped viruses, SARS-CoV-2 attaches to host cells by initially interacting with cell surface heparan sulfate (HS) proteoglycans, which is followed by human angiotensin-converting enzyme 2 (hACE2) receptor engagement culminating in virus entry into the cell. The attachment and entry are mediated by the SARS-CoV-2 spike glycoprotein. In this study, we used baculovirus pseudotyped with SARS-CoV-2 spike glycoprotein to screen SARS-CoV-2 entry inhibitors. The pseudovirus requires a lower biosafety level lab (BSL-compared to working with live SARS-CoV-2 (BSL-3). We tested the ability of various mammalian and marine sulfated glycans to inhibit the attachment and entry of this SARS- CoV-2 pseudotyped virus in hACE-2 expressing HEK293T cells using a fluorescence- based reporter. The holothurian sulfated glycans, Pentacta pygmaea fucosylated chondroitin sulfate (PpFucCS), Isostichopus badionotus sulfated fucan (IbSF) and Isostichopus badionotus fucosylated chondroitin sulfate (IbFucCS) efficiently neutralized the pseudotyped virus with some differences in anti-viral activity and affinity to the spike protein. They showed significantly lower IC50 values (27.9 µg/L, 19.6 µg/L and 21.7 µg/L respectively) in comparison to heparin (249.7 µg/L). No cytotoxic effect was observed for these glycans in HEK293T cells at the highest doses tested. These findings have implications for the development of a novel antiviral agents against SARS-CoV-2 that competitively inhibit spike protein binding to the HS proteoglycan.

O6.13

9:25 THE FATAL IMPACT OF COVID-19 VARIANTS COEXISTING WITH DISEASES IN THE SOUTHEASTERN STATES

Justin A. Smith and Anwar A. Ahmad Jackson State University, Jackson, MS, USA

Introduction: The Covid-19 pandemic, caused by an acute respiratory coronavirus (SARs- CoV-2) has resulted in more than 150 million confirmed global cases with over three million deaths by the end of April 2021. This is a highly transmissible and rapidly replicating virus that has already developed into new variants leading to second and third wave of infections and death cycle around the world. Furthermore, the disease resulting from the virus is complicated through its interactions with other preexisting conditions, such as hypertension, diabetes, and kidney disease. **Methodology:** Various statistical models were developed to understand the relationships between Covid-19 variants (B.1.1.7, B.131, and P.1) and other pathological conditions. The number of deaths/100,000 per variant were compared with the deaths of Alzheimer's, Cancer, Diabetes, Heart Disease, Hypertension, Flu/Pneumonia, Kidney Disease and Stroke. The data, obtained from CDC, were focused only on the southeastern region of the US including Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Virginia and West Virginia. **Results:** There was a significant difference ($p<0.05$) between the southern states and time for the three COVID-19 variants with FL and GA leading in higher mortality rate. Regression analysis revealed an R-square value of 0.14 to 0.27 between the three variants of COVID-19 and hypertension and stroke, indicating a low to moderate association. **Brief Discussion:** This study was conducted to understand the distributions of three Covid-19 variants and their interactions with other pathological diseases, such as hypertension and stroke. Various statistical models highlighted those associations and dependency. However, due to limited amount of data available at this time, specific conclusions cannot be drawn with high degree of confidence. More data and time are needed to succinctly develop those relationships between Covid-19 variants and other diseases.

O6.14

9:35 AliC AND AliD OFNONENCAPSULATED STREPTOCOCCUS PNEUMONIAE ALTER LYTA AND MGTC EXPRESSION AND REDUCE VIRULENCE IN A GALLERIA MELLONELLA MODEL OF INFECTION

Courtney Thompson, Shelby G. Holcomb, Larry S. McDaniel, Lance E. Keller

University of Mississippi Medical Center, Department of Microbiology and Immunology, Jackson, MS USA

Streptococcus pneumoniae colonize the human nasopharynx and cause infections such as pneumonia and meningitis. Nonencapsulated Streptococcus pneumonaie (NESp) are found worldwide and can cause invasive infections. It is unknown how NESp colonize and cause disease while lacking a capsule, an important virulence factor. A compensatory mechanism could be the Ami-like proteins AliC and AliD, which are oligopeptide permeases that mediate the uptake of oligopeptides. Proteomic data have shown alteration in genes regulated by AliC and AliD, and we hypothesize that these regulated genes are responsible for altered phenotypes. AliC and AliD regulated genes include genes of unknown function, metabolism, and virulence. A knockout library was made, and virulence was tested using a Galleria mellonella larva model of infection as well as growth in various carbon sources. LD50 and Kaplan Meier curves demonstrate reduced virulence of LytA and MgtC mutants, which has not been previously observed in NESp. Wildtype bacteria were also more resistant to radical oxygen species (ROS) when compared to different mutants. No difference in growth between the wildtype and various mutants was observed when grown with various carbon sources. These findings indicate AliC and AliD play an important

role in gene regulation, which leads to variation in virulence and resistance to ROS. Future studies will examine interaction with immune cells and investigate AliD homologs in encapsulated backgrounds. Overall, this study will allow for a better understanding of NESp virulence mechanisms regulated by AliC and AliD and how NESp can evade the innate immune response during invasive infections.

O6.15

9:45 MECHANISMS OF IMMUNE SUPPRESSION BY METASTATIC CANCER STEM CELLS

Kuan-Hui E Chen

Delta State University, Cleveland, MS, USA

One critical issue for cancer treatment is the existence of a rare cell population, cancer stem cells (CSCs), that drive the inexorable growth of malignant tumors, resist several types of treatments and render the opportunity for cancer recurrence following treatment and remission. Eradication of CSCs is therefore one of the major challenges of cancer therapy. However, understanding of cellular and molecular mechanisms that underlie CSC properties is still very limited. To better tackle this population, our research work with a special focus on metastatic CSCs has identified three novel mechanisms that the circulated metastatic CSCs use to avoid immune surveillance. 1) Metastatic CSCs but not bulk tumor cells in response to the presence of activated T cells in the environment could release miRNAs which suppress both activation and proliferation of effector T cells. 2) Metastatic CSCs can recruit T regulatory cells through secretion of CCL5 and CCL17 and a physical interaction between CSCs and Tregs occurs once recruited. 3) Metastatic CSCs could determine the fate of macrophage polarization through the generation of an arginine metabolite, asymmetric dimethylarginine (ADMA), which leads macrophage polarization towards M2 end. Thus, our study not only provides mechanistic insights of tumor progression mediated by metastatic CSCs to escape from immune surveillance but may also lead to more effective therapeutic interventions specifically for CSCs. In addition, it may also serve as a proof-of- principle to support the development of therapeutic strategies for other types of cancers.

Friday, August 6, 2021

MORNING

Room D9

Oral Presentation Session II B

Moderators: *Drs. Edward Florez and Ritesh Tandon*

Topics: Molecular Diagnostics/Material Sciences

O6.16

8:30 TOWARDS LIVE TISSUE ANALYSIS WITH CELL DETECTION THROUGH ADVANCED DEEP LEARNING ON STIMULATED RAMEN SCATTERING IMAGES

Haifeng Wang and Yibin Wang

Mississippi State University, Mississippi State, MS, USA

Tissue histological structure identification is a significant issue in medical diagnosis. While standard hematoxylin and eosin (H&E) staining has been widely used in medical diagnoses, such as biopsy, there exist limitations concerning the laborious and time-consuming process. Stimulated Ramen scattering (SRS) imaging can generate virtually stained mapping images in cells level within live tissues rapidly, which provides a high potential for real-time intelligent medical diagnosis. The objective of this research is to detect the cells on SRS images by transferring the knowledge learned from H&E images using an unsupervised domain adaption model. The outcomes of this research can be used for cell counting as well as calculating the cell density which could classify tissues in order to assist the surgical decision making. The proposed model was tested using a public SRS dataset. Different test situations are designed. The approach obtains quite competitive results compared with other methods and it is compatible with any deep learning package and easy to be applied to other applications.

O6.17

8:40 ASSESSING CARDIOMETABOLIC PROFILE IN BARIATRIC SURGERY PATIENTS

Richard Covington[1], Elliot Varney[1], David Gordy[1], Edward Florez[1], Seth Lirette[1,2], Candace Howard[1]

[1]Department of Radiology, University of Mississippi Medical Center, Jackson, MS, USA, [2]Department of Data Science, University of Mississippi Medical, Jackson, MS, USA

Introduction: Bariatric surgical response rates are heterogeneous and little is known about the distribution of adipose tissue loss after surgery. A comprehensive, longitudinal assessment is needed to further understand the mechanisms behind surgical weight loss. This study correlated the distribution of adipose tissue loss, anthropometrics, and future cardiometabolic risk of bariatric surgical patients. **Methods:** For this prospective case series, 8 patients underwent surgical sleeve gastrectomy and completed up to at least a 6-month post-operative follow-up. Evaluations were conducted at each pre-operative visit, surgical visit, and 6-week and 6-month post- operative visits. Bone mineral density (BMD), total body fat (TBF), and visceral adipose tissue (VAT) were obtained from dual-energy X- ray absorptiometry (DXA) scans conducted at each visit. Vital signs, anthropometric measurements, and fasting plasma blood samples were also collected to assess cardiometabolic function. Simple change models were used to assess changes in DXA measures, and all associations were assessed using multi-parametric analyzes. **Results:** Each patient had significant weight loss with a mean weight loss of 30.2 pounds ($p<0.001$). The mean loss in VAT mass and volume was 284.1kg and 309.4cc, respectively ($p<0.001$, for both). Although there was only a slight increase in mean BMD of 0.012 g/cm2 ($p=0.044$), no patients experienced a decrease in BMD. When assessing the overall cardiometabolic health, with every 10cm decrease in WC, and 10% loss in body weight there was an average 9mmHg and 11mmHg drop in systolic blood pressure, respectively ($p=0.039$; $p=0.001$). With every 10% loss in body weight, fasting blood glucose measurements dropped by over 10 mg/dL ($p=0.048$). When assessing liver function, there was an increase in albumin production by 0.18 g/dL with 10cm decrease in WC ($p=0.021$). **Conclusions:** Sleeve gastrectomy resulted in significant VAT loss and improvement in blood *pressure, fasting glucose levels, liver function which all may be predictable with anthropometric measures.*

O6.18

8:50

A NEW ATTENUATED ZIKA VIRUS WITH MODIFIED 5′ UNTRANSLATED REGION ELICITS IMMUNITY IN MICE

Farzana Nazneen, E. Ashely Thompson, Biswas Neupane, Claire Blackwell, Faqing Huang, Fengwei Bai

The University of Southern Mississippi, Hattiesburg, MS, USA

Zika virus (ZIKV), a mosquito borne Flavivirus with a history of causing an epidemic, has been considered a major public health concern. Although ZIKV infection causes asymptomatic illnesses lasting for 2-7 days in most cases, there is also an increased risk of severe neurological complications including Guillain-Barre Syndrome, neuropathy, and myelitis in human adults. ZIKV infection during pregnancy causes major concerns as it produces a wide range of complications such as pre-term birth, miscarriage, and congenital malformations including microcephaly in infants known as Congenital Zika Syndrome and even fetal demise. However, there are no approved vaccines or effective therapeutics available against ZIKV infection. Thus, we generated a new attenuated ZIKV strain, Z7, by inserting 50 nucleotides (nt) at 5′ untranslated region (UTR) of the wild type ZIKV, Z1, a Cambodian strain. We hypothesized that this insertion/modification in ZIKV might reduce the viral protein

synthesis by decreasing the initiation of translation. The insertion of nt was confirmed by sequencing. Focus forming assay and QPCR assays in our *in-vitro* study confirmed that Z7 showed a lower replication rate than Z1measured by. In animal studies, we inoculated 10^5 PFU) of each of Z7 and Z1 into 4-week-old *Ifnar1*$^{-/-}$ mice through footpads. Following the primary infection, Z7 generated a lower level of viral loads in blood and tissue but a similar level of humoral response measured by anti-ZIKV IgG level in ELISA compared to that in Z1. The Z1- and Z7-immunized mice were also monitored for 21 days for weight change and survival. While the Z1-infection resulted in significantly decreased weight but increased mortality in mice, Z7 infection caused no mortality. Z7-infected mice were then challenged with 10^5 PFU of ZIKV (Puerto Rico strain). The post challenge data of blood and tissue confirmed that a single dose of Z7 inoculation provided a sterilizing immunity in *Ifnar*$^{-/-}$ mice. Thus, indicating that the mutant ZIKV generated by 5′ UTR modification may reduce the viral protein synthesis by decreasing the initiation of translation. Although the mutant had attenuated virulence, it could produce strong immunogenicity and sterilizing immunity against ZIKV infection. Therefore, 5′ UTR modified Z7 is a promising vaccine candidate to protect against ZIKV infection.

O6.19

9:00 FUNCTIONAL CHARACTERIZATION OF CHANNEL CATFISH TOLL-LIKE RECEPTOR LIGANDS

Kristianna Felch, Jonathan Crider, Eva Bengtén, Melanie Wilson

University of Mississippi Medical Center, Jackson, MS, USA

Toll-like receptors (TLRs) are important pattern recognition receptors (PRRs) of the innate immune system. They recognize structurally conserved microbe-associated molecular patterns (MAMPs) that are expressed by different classes of microbes. While ligands of mammalian TLRs have been well-characterized, there is very little information about TLR ligands in teleosts. As compared to the 10 TLR genes identified in humans, 20 different TLR genes are present in the genome of the channel catfish, Ictalurus punctatus. Notably, TLR26 is unique to channel catfish, and has not been found in other fish species or vertebrates. Amino acid similarities with mammalian counterparts may indicate shared ligand recognition. Preliminary PCR data indicated that stimulation with imiquimod, a TLR7 ligand, for 24 hours, resulted in an increase in NF-kB activation in catfish G14D clonal gd T cells. Currently, our laboratory is establishing a model to identify channel catfish TLR ligands. Full-length TLR5, TLR7 and TLR22 have been cloned into an expression vector and transfected into HEK Null cells. These cells are engineered to not express endogenous TLRs and are stably transfected with a reporter gene under the control of an NF-kB promoter. When transfected with catfish TLR expression vectors, the HEK Null cells will allow us to screen different potential MAMPs and synthetic ligands using reporter assays. Our goal is to determine channel catfish TLR ligands and verify these ligands in our clonal cell lines.

9:10 Break

O6.20

9:15 EFFECTIVE TARGETING OF HUMAN CYTOMEGALOVIRUS (HCMV) ESSENTIAL TEGUMENT PROTEIN PP150 BY PEPTIDES

[1]Dipanwita Mitra, [1]Ritesh Tandon, [2]Gene L. Bidwell

Microbiology and Immunology, University of Mississippi Medical Center, Jackson, MS, USA and Neurology, University of Mississippi Medical Center, Jackson, MS, USA

The human cytomegalovirus (HCMV) UL32 gene encodes a prominent betaherpesvirus conserved virion tegument protein pp150, which is essential for the completion of final steps in virion maturation. Cryo-electron microscopy reconstructions and atomic modeling of HCMV virions have illustrated the pp150 structure and its binding interface with capsid proteins. These studies indicate that three pp150nt (N terminal one-third of pp150) conformers cluster on each triplex (Tri1, Tri2A and Tri2B, also known as minor capsid binding protein) and extend towards small capsid proteins atop nearby major capsid proteins forming a net-like layer of tegument densities that enmesh and stabilize HCMV capsids. Based on this atomic detail, we designed several peptides targeting the betaherpesvirus-conserved regions 1 and 2 (CR1 and CR2) in pp150nt. These regions have been shown to be important for capsid binding and determining p150 function. Our data shows significant reduction in virus growth upon treatment with one of these peptides(pep- CR2) with an IC50 of 1.33 µM. Based on 3D modeling of protein-peptide structures, pep-CR2 specifically interferes with pp150-capsid binding interface. Cells pre-treated with pep-CR2 and infected with HCMV sequester pp150 in the nucleus indicating a mechanistic disruption of pp150 loading onto capsids and subsequent cytoplasmic egress. To enhance the in-vivo inhibitory potential and bioavailability of pep-CR2, we conjugated it with a carrier molecule (elastin like polypeptide (ELP)). Pep-CR2-ELP conjugate was expressed in E.coli and purified. Upon treatment with ELP-pep-CR2, both human and mouse CMV showed significant titer reductions. The in-vivo inhibitory potential and effectiveness of ELP-pep- CR2 vs. pep-CR2 is being studied in a mouse model of CMV infection. These results indicate that CR2 of pp150 is amenable to targeting by a peptide inhibitor and can be developed into an effective antiviral.

O6.21

9:25 HARMONIZATION OF CT AND DXA BODY COMPOSITION PARAMETERS TO UNIVERSALIZE ADIPOSE TISSUE MEASUREMENTS

Elliot T. Varney

University of Mississippi Medical Center, Jackson, MS, USA

Introduction: With the high cost and radiation exposure of computed tomography (CT) body distribution analysis, there is a need for validation and harmonization of a more economic and safe modality for body composition assessment. Therefore, the goal of this study was to harmonize CT and dual-energy X-ray absorptiometry (DXA) body composition measurements to allow for easy conversion between modalities in longitudinal assessments of obese patients. **Methods:** This retrospective analysis of prospectively collected data from 1996 to 2008 from participants from the Pennington Center Longitudinal Study (PCLS) includes 1967 adults. Anthropometric measures were obtained on all participants. Limited nonenhanced CT images at the level of the L4-L5 vertebral disk space were obtained. Multi-layer segmentation techniques (Analyze; Rochester, MN) was utilized to quantify visceral adipose tissue (VAT). Several known clinical biomarkers were obtained from routine blood samples. OLS regression and random forest models were used to examine the effects of demographic, anthropometric, and serum lab values on cross- sectional VAT. **Results:** CT-VAT showed an excellent and statistically significant correlation with DXA-VAT using the linear regression model ($R2 = 0.84, p < 0.0001$) and Bland-Altman analysis (Fig. 1). Predicted CT-VAT (calculated from DXA-VAT) was highly correlated to measured CT-VAT using both OLS linear regression analysis and random forest models ($R > 0.9$ for both, $p<0.0001$) (Fig. 2). Model stratification effects of race and race-sex showed low variability in correlation between races and sexes. Overall, among all model stratifications, associations between measured CT-VAT measurements and DXA-predicted CT-VAT using OLS linear regression associations were good ($R2 > 0.7$) or excellent ($R2 > 0.8$) and improved for all stratification groups except AA men using random forest models. The clinical effects on measured CT-VAT and measured DXA-VAT were nearly identical with no significant clinical difference in the measured adipose tissue areas (mean across all parameters = 0.22 cm2). **Brief Discussion and Conclusions:** The presented study is one of the first large scale analyses directed to harmonize CT and DXA measurements. Although there are potential geographic and environmental bias within the patient cohort, the presented data shows the feasibility of CT and DXA harmonization in a diverse, multi-racial population cohort. Using random forest model predictions or linear regression, one can seamlessly

predict CT-VAT from measured DXA-VAT to a degree of accuracy that falls well within the bound of universally accepted standard error.

O6.22

9:35 THE ROLE OF LEUKOCYTE IMMUNE-TYPE RECEPTORS (LITRS) IN RECEPTOR-MEDIATED PHAGOCYTOSIS BY G14D γδ T CELLS IN CHANNEL CATFISH, Ictalurus punctatus

Jonathan Crider[1], Kristianna Felch[1], Sylvie Quiniou[2], Melanie Wilson[1], Eva Bengten[1],

[1]University of Mississippi Medical Center, Jackson, MS, USA and [2]USDA-ARS, Stoneville, MS, USA

Gamma-delta (γδ) T cells are a lineage of T cells that exhibit both adaptive and innate immune functions. One important innate immune function, phagocytosis, is particularly vital in the context of antigen processing and presentation by professional phagocytes during the primary immune response. While historically this activity was thought to be restricted to myeloid lineage cells, recent studies have demonstrated that γδ T cells can also act as antigen-presenting cells (APCs). However, the full scope of mechanisms governing antigen uptake in γδ T cells is not completely understood. This study focuses on a family of immunoregulatory receptors termed Leukocyte Immune-Type Receptors (LITRs), a family of paired receptors that are unique to teleosts. Data suggest that subsets of these receptors play a role in the regulation of phagocytosis; and a mAb, termed 125.2, is thought to react with a subset of LITRs driving this activity. Here, receptor-crosslinking with 125.2 on G14D γδ T cells, via mAb- conjugated fluorescent beads (1.0 µm), is observed by flow cytometry. Bead uptake by G14D is verified by confocal microscopy, and the process of receptor crosslinking is also examined in catfish mixed leukocyte cultures (MLCs). Consistent with cytotoxic activity present in γδ T cells, 125.2-positive cells magnetically sorted from peripheral blood are also shown by RT-PCR to express perforin and granzyme. Together, these data suggest that phagocytosis by γδ T cells is an evolutionarily conserved immune mechanism in fish and that LITRs expressed by cytotoxic cells may play a role in the regulation of this activity.

O6.23

9:45 A CYTOMORPHOLOGIC CHARACTERIZATION OF PANC-1 CELLS EXPOSED TO INCREASING GLUCOSE CONCENTRATIONS USING REPEATED MEASURES ANALYSIS

Gary L. Hamil[1], Michelle A. Tucci[1], Hamed A. Benghuzzi[2], Kimberly S. Kennedy[1], Kenneth R. Butler[1,3]

[1]University of Mississippi Medical Center, Jackson, MS, USA, [2]Global Training Institute, Flowood, MS,USA, [3]Mississippi College, Clinton, MS, USA

Previous studies in our laboratory provided evidence that PANC-1 cells can be manipulated into insulin-producing cells by altering the culture medium with increasing amounts of glucose. There is a paucity in the literature regarding cytomorphologic characteristics of PANC-1 cells under normal culture conditions and when challenged with increased amounts of glucose. This experiment aimed to evaluate the nuclear and cytoplasmic characteristics within groups of PANC-1 cells at 24-, 48-, and 72-hours. Initially, cells were grown in flasks with a control medium and then split into four separate groups containing control media or media containing an extra 1%, 2.5%, or 5% extra glucose. Cells from the three cultures were plated (1 x 10^5 cells/well) and treated with control, 1%, 2.5%, or 5% glucose for 24, 48, and 72 hours. Cells and supernatants were harvested, and the cytomorphologic characteristics were compared across all three phases. Nominal data were analyzed using non-parametric statistics calculating mean ranks to compare changes within all four groups using the Kruskal-Wallace H statistic. There were statistically significant differences in morphological characteristics within groups at 24-, 48-, and 72-hours ($p<0.05$), the most telling was the stability in ranks observed in the nuclear characteristics at the 2.5% extra lucose concentration. At the 72-hour phase, ranks for the nuclear and other characteristics became more variable indicating stress and degeneration of the PANC-1 cell populations. This study contributes valuable semi-quantitative data regarding the viability and function of PANC-1 cells over 72-hours with increasing glucose challenge and demonstrates that PANC-1 or similar cells can be further engineered into useful components in drug delivery applications.

Friday, August 6, 2021
Morning 10:00-12:00 noon
Room:
Symposium II **10:00-11:30 AM**
Theme: **Precision Medicine**

Moderators: Drs. Barbara Wilson and Larry McDaniel

Speakers

(Speakers information can be found in the section on Divisional symposia and Workshop)

10:00-10:20 AM Edward Florez, PhD
University of Mississippi Medical Center
"Precision Medicine through radiomics"

10:25-10:45 AM Candace M. Howard-Claudio, MD, PhD.
University of Mississippi Medical Center
"Precision Medicine through gene therapy"

10:50-11:10 AM Pier Paolo Claudio, PhD.
University of Mississippi Medical Center
"Precision Medicine through stem cells"

11:15-11:30 AM **Symposium Group Discussion:**

11:30-12:00 Noon **Poster session II**
(High School Poster virtual)

P6.31

ASSESSING THE EFFICACY OF COVID-19 POLICIES USING MACHINE LEARNING

Andrew Yu

The Mississippi School for Math and Science, Columbus, MS, USA

To limit the spread of COVID-19, government policies are necessary. Current research focuses on documenting proposed policies rather than assessing the efficacy of said proposals. Thus, the goal of this research is to analyze COVID-19 policies using machine learning. Specifically, the aims of this project are to develop an accurate machine learning model to predict the effectiveness of COVID-19 policies and use that model to find the most effective COVID-19 policies. Data from the CoronaNet Research Project and Our World in Data was used to provide a list of over 50,000 government policies in 195 countries as well as the corresponding COVID-19 data. A random forest regression algorithm achieved an R2 value of 0.88 on training data and 0.63 on test data. These high values affirmed the strength of our model. Using the feature importances attribute of the model, the top 15 most important policy features were identified, and these results were affirmed by a feature selection algorithm. The model is novel because it conducts a holistic analysis of COVID-19 policies, meaning it can be used by policymakers to compare the effectiveness of a wide range of policies. Additionally, unlike others,

the model can predict the impact of proposed policies. Based on these findings, it is recommended that governments increase policy adherence through methods such as publicizing information concerning the pandemic. It is also recommended that governments prioritize policies restricting external borders and regulating businesses. Policies should target all residents and be mandated through consequences like jail time and fines.

P6.32

PANDEMIC COVID–19: HEALTH AND PHYCHOLOGICAL IMPACTS AND SAFETY MEASURES

Meghana Reddy[1], Rohini Reddy Remata[2], Aditya Remata[3], Remata Reddy[4]

Sri Chaitanya College, Vijayawada, AP, India, [2]Narayana Junior College, Kurnool, AP, India, [3]Clinton High School, Clinton, MS, USA, [4]Jackson State University, MS,, USA

In late December 2019, Pandemic COVID-19 emerged from a small town named 'Wuhan' and the Chinese authorities claimed it as an outbreak of pneumonia like disease. It is highly contagious causing a severe respiratory disease. Most common symptoms of this deadly virus are fever, dry cough and tiredness. People may also acquire aches, sore throat, and diarrhea, loss of taste or smell. The incubation period for this virus is 7-14 days. Apart from these physical sufferings the consequences of this disease on the mental health and well- being are many folds. The psychological impact of this disease can vary from immediate effects like irritability, fear of contacting and spreading infection to family members, anger, confusion, frustration, loneliness, denial, anxiety and other consequences including suicide. The coronal virus COVID-19 is affecting 213 countries around the world and the total cases reported 25.3 million and the total deaths reported 8, 48,000. The most affected countries are the United States and Brazil. India had very high surge rate in covid-19 cases in the past few months. The total cases reported 36, 19.169 and total deaths reported 64,617 in India. Wearing a mask, washing hands frequently, to avoid touching mouth and eyes and practicing social distancing are the basic and most effective preventive measures. Apart from this we have to take care of our mental health. Even if we get infected being mentally strong can help in coping up with this fatal disease. Safety and efficacy are most important for a vaccine. As the Virus has mutated into more than 10 types and one is more dominant across regions. Developing a vaccine to suit all mutated viruses are becoming difficult. Seven Indian pharmaceutical companies race to develop vaccine for deadly coronavirus. Bharat Biotech, Serum Institute, Zydus Cadila is top 3 among the domestic pharma firms working In India. Making vaccine for virus-related diseases is a bit complicated as the virus goes on changing its shape. Officials claimed that genetic engineering technology called DNA VACCINATION could hasten the development of vaccine.

12:00 Noon. HSD Students Awards, Certificates and group photo

Friday, August 6, 2021
AFTERNOON
Room D9

1:30- 4:30 PM Symposium III
"The L.C. Dorsey Research Honor Society Symposium"
Moderator: Marino Bruce, PhD, MSRC, MDiv
1:30-1:40 PM Ronald J. Thorpe, Jr., PhD
"Introduction to UMMC-GTEC"
1:40-3:00 PM Ronald J. Thorpe, Jr., PhD
"UMMC-GTEC Cohort"2
"Presentations"
3:00-3:10 PM Elizabeth Heitman, PhD
"UMMC-GTEC Accomplishments"
3:10-3:25 PM Break
3:25-3:45 PM "Presentation of L.C. Dorsey Research Honor Society Members"
3:45-4:30 PM "Networking"

HISTORY AND PHILOSOPHY OF SCIENCE Co-
Chair: Gregory Johnson
Mississippi State University
Co-Chair: Robert Waltzer
Belhaven University
Vice-Chair: Paula Smithka
University of Southern Mississippi

Thursday, August 5, 2021
MORNING
Room D3

9:50 WELCOME

O7.01

10:00 WHAT IS IT TO BE A MEMBER OF A NATURAL KIND?: AMORPHISM, PROPERTY CLUSTERS & THE ROLE OF ESSENTIALISM

Paula Smithka

University of Southern Mississippi, Hattiesburg, MS, USA

In his article, "Amorphic Kinds: Cluster's Last Stand?" (2018), Neil E. Williams claims to raise a puzzle for the cluster account of natural kinds. Characterizing diseases as natural kinds, he contends that some genetic diseases such as phenylketonuria (PKU), on which he focuses in this article, ultimately fails to meet the property cluster account of natural kinds because the disease is delimited to a single dispositional property—he calls this an 'amorphic kind'. Natural kinds, such as electrons and gold, also are examples of 'amorphic kinds'. He contends that the problem of PKU is analogous to the problem of polymorphism raised by Ereshefsky and Matten (2005) for homeostatic property cluster kinds (HPCKs) where some properties included in the cluster cannot be co-instantiated in some members (e.g. different sexes). While the latter can be accounted for on an HPCK account, I argue, Williams is correct that such amorphic kinds cannot be; though he does attempt to provide a property cluster account in terms of dispositions, which he (rightly) argues is unsuccessful. Where Williams goes wrong in his account is to think that all natural kinds need to be characterized by property clusters; they do not. He then argues that PKU and other amorphic kinds are better characterized by essences; they are "essence kinds", borrowing the term from Chakravartty (2007). I argue Williams is correct in this regard; however, I further contend that other natural kinds, such as biological species, which are HPCKs, also have essences, following, in part, Devitt (2008, 2018a, 2018b) and Wilson, et al. (2007). Eliminating the association of an 'essence' with the traditional set-theoretic definition for membership; namely, that inclusion requires properties that "all and only" members can have for inclusion in the group, and its misguided association with intelligent design theories provides an adequate account of what it means to *be* a member of a natural kind.

O7.02

10:30 IS PSYCHOLOGY SPECIAL?

Gregory Johnson

Mississippi State University, Mississippi State, MS, USA

It is generally agreed that explanations in cognitive psychology include components that are purely functional. Fodor (1974) argues that, while these purely functional components figure in laws (or useful law-like generalizations), if we tried to stipulate these generalizations in neurobiological terms, they would no longer be law-like because of their alleged multiple realizability. Fodor offers this argument, not just for psychology, but for all of the special sciences, and, in fact, his primary example, Gresham's

law, is from economics. Summarizing the resulting "Fodorian" stance, Buckner writes, "the claim was that the special sciences have discovered many laws holding between functionally-defined categories, so taking these sciences seriously requires us to acknowledge their purely functional kinds" (2015, p. 3916).

If we define *purely functional components* (or *kinds*) as those for which we can give a complete definition in relational terms and without invoking structural (or non-relational or physical) properties, then Buckner's characterization is too strong. One need not look far to find biological entities characterized, not only in terms of function, but also, size, shape, arrangement of parts, and so forth. Nonetheless, a weaker characterization still captures the basic stance: cognitive psychology is just another one of the special sciences and explanations in the special sciences are chiefly functional explanations.

I will argue that this view is misguided. While I agree that explanations in cognitive psychology are functional explanations, cognitive psychology is an anomaly. The entities that figure in explanations in the other special sciences do not merely have specifiable structural characterizations. Their structural properties figure, in important ways, in the explanations offered in these sciences. I examine three representative explanations: cellular respiration in chemistry, the antibody response to *Neisseria meningitidis* in molecular biology, and the partial equilibrium competitive model in economics. In each case, we find that functional characterizations of the entities in the explanation are important, but so are the entities' structural features. How they are important is not the same for the higher-level and the lower-level sciences. The explanations of cellular respiration and the antibody response to *Neisseria meningitidis* conform to a standard mechanistic analysis wherein the complete explanation requires the structural details. In economics, we find that, while economic theory can be cast in largely functional terms, an economic *explanation* is a combination of the theory, assumptions, and empirical data about specific (i.e., physical) goods and behaviors in the world.

Consequently, at best, cognitive psychology is importantly different than the other special sciences. At worst, if it is the case that structural properties are required for complete explanations in the special sciences, then cognitive psychology lacks the resources to provide complete explanations.

12:00 General Session

Thursday, August 5, 2021
AFTERNOON
Room D8

O7.03

1:00 FROM REALISM TO PRAGMATISM: A CONSIDERATION OF SCIENCE IN CONTEXT

Emma Cox

University of Southern Mississippi, Hattiesburg, MS, USA

Within the philosophy of science, the debate continues concerning the ontological status of scientific theories. The scientific realist perspective holds that empirical support for a theory is followed by the assumption that the components of that theory exist (Gutting 1982, 336). Conversely, anti-realists contest the truth value of theoretical entities, arguing that theories lack adequate evidence to support the existence of their components (Gutting 1982, 337). Some philosophers, however, forgo the complexities of the ontological debate and evaluate theories in terms of their utility within a sociological, historical, or cultural context. Thomas Kuhn acknowledges the limitations inherent in scientific theory and dismisses the myth of the disinterested observer who objectively understands and interprets reality. Kuhn argues that the scientific theories are value-laden and reflective of the social and historical context, so that even the criteria used for choosing among competing theories is contextually dependent (1998, 103). Thus, on Kuhn's view, scientific theories cannot provide objectively true claims about the ontological structure of the world. Rather, theories should be regarded in terms of their pragmatic utility. Bas van Fraassen regards theories in terms of the pragmatic relations they provide and their ability to "satisfy and eliminate wonder" within their encompassing social or historical context (1977, 150). I argue that Kuhn is correct concerning the contextual nature of scientific theories and defend van Fraassen's pragmatic view as the proper way to consider the success of scientific theories against the scientific realist's claims that theories are true or approximately true and accurately depict the ontology of the natural world.

O7.04

1:30 IT CAN'T SEEM THAT WAY: PROBLEMS WITH PHENOMENAL CONSERVATISM

Kaleena Stoddard

Tulane University, New Orleans, LA, USA

Phenomenal Conservatism (PC) is an internalist view within foundationalist epistemology which states that justification for perceptual beliefs is generated when a perceptual scene just strikes the perceiver as being a certain way. PC claims that justification for perceptual beliefs can be derived from a unique propositional state—a "seeming" state—that is different from beliefs, non-inferential, and phenomenally derived which secures its status as foundational.

In this paper, I focus on two specific problems that the PC view faces. The first problem I will refer to as the *overly- permissive problem* (OP). OP states that if all it takes to secure justification for a perceptual belief is that it just seems to the subject to be such-and-such a way, without the intervention of deliberation or inferential processes, then it is possible that all sorts of bad beliefs could be easily justified when they ought not be. The second problem is related to the first, *the problem of internal vagueness* (IV), and arises from the fact that seeming states lack a clear internal structure. To say that a mental state lacks a clear internal structure is to say that despite the explanation of what function that state serves, there is no fixed description of how it does so. This problem is closely related to the first because it is possible that exceedingly permissive doxastic outputs are the result of a structural problem within seeming state. It is not clear, however, whether having a specified internal structure guarantees a nicely restricted set of beliefs being produced, so these problems deserve separate treatments.

The standard response from PC to these kinds of problems is that the subject's ordinary backstock of concepts would not generate overly permissive or problematic seemings. However, this response then raises the question about the reliability of seemings and what an ordinary backstock of concepts might amount to. How do we know that the seeming state will correct for cases like this? The only answer to that question will call for meta-justification of the seeming state, which is clearly not a route that PC will want to take because it will result in a problematic reliabilist argument or a vicious regress. This unfortunate brand of consequences redound for PC, resulting in an apparent failure of the view. To illustrate this failure, I will attempt to answer the following questions on behalf of PC:

(1) What is p? That is, what kinds of things can "seem" under the PC construction of a seeming state.

(2) What is a defeater, and when does it need to show up for the subject of a seeming state?

(3) Can a propositional state that is phenomenally derived offer a fully explanatory description of perceptual justification?

Ultimately, the PC version of seemings cannot sufficiently surmount (OP) and (IV) because any successful responses to the three questions above will only undermine PC's central claim, thereby missing the view's epistemic target. I make a few concluding suggestions for the kind of state or mechanisms that might do better at capturing that target, through contributions made by views from cognitive science regarding theories on cognitive architecture.

2:00 Break

O7.05

2:15 ENVISIONING THE PAST FOR A PUBLIC AUDIENCE: CHARLES KNIGHT'S MURALS IN CHICAGO'S FIELD MUSEUM

Renee M. Clary

Geosciences, Mississippi State University, Mississippi State, MS, USA

In 1927, Charles Knight (1874-1953) delivered his first four murals to Chicago's Field Museum. Designed to bring fossil displays to life for visitors, Knight designed and painted 28 murals for the museum, depicting the progression of our planet's history from the earliest Precambrian through the Pleistocene. Although he was legally blind, Knight was recognized as the premier paleontological artist of his time. Knight also viewed himself as the paleoart expert. With his considerable experience observing and sketching living animals, and examining fossil bones, Knight thought that he possessed the critical knowledge needed to reconstruct the form and 'attitude' of extinct organisms. To Knight's dismay, the Field Museum's geologists provided scientific oversight and stipulated changes to his murals' artistic representations of extinct animals' body forms and postures. The disagreements between Knight and Field Museum geologists escalated to an acrimonious intensity over the position of the tail of the *Zeuglodon* (now *Basilosaurus*), an Eocenewhale that is identified as a state fossil of Mississippi. Though Knight acquiesced to the geologists' requests, the Field Museum correspondence documents a passive- aggressive exchange between Knight and the Field Museum Director. Even though some of Knight's reconstructions have been rendered archaic with new scientific discoveries, 23 of the murals remain on display in the Field Museum's Evolving Planet exhibit. The murals continue to bring fossils to life for visitors, with interpretive signage correcting mural imagery now deemed inaccurate with recent research.

Thursday,

August 5, 2021

3:30 Dodgen Lecture and Awards Ceremony (B5-6)

General Poster Session (Immediately Following Dodgen Lecture C-Poster Hall)

P7.01

WHERE HAVE ALL THE WOMEN GONE? AN ANALYSIS OF THE TRANSFORMATION OF GENDER DIVERSITY IN COMPUTING

Sarah B. Lee, Whitney Keith, and Allison Herrera Lopez University of Southern Mississippi, Hattiesburg, MS, USA

The history of computer science reveals a different face than the one that computer science and the computing profession offer today. Ada Lovelace is recognized as the first computer programmer for her work in the 1800s (Gürer, 2002). Actress Hedy Lamarr, during World War II, invented the technology that enabled Wi-Fi and Bluetooth technology of today (Balaji, 2016). Jean Bartik, along with several other women who worked on the ENIAC computer, developed many of the foundations of software programming that we use today (Kroeker, 2011). Grace Hopper, a United States Navy rear admiral, created one of the first compilers and the design of a high-level programming language that is still used in industry today (Gürer, 2002).

The development of software was considered "feminized clerical labor"; thus, it was thought of as something that women could and should do (Light, 1999). In 1967, an article in *Cosmopolitan* discussed how 'computer girls' are good at computer programming. However, as the 1960's progressed into the 1970s, a wider subset of society began to recognize that programming computers was actually hard, and that the pay could be very lucrative. The media began to portray in movies and advertisements the image of computer programmers as white males (Frank, 2011).

Resulting from this change in societal view was a movement from approximately half of computing professionals being women to only 27.3% today in the United States. Black women hold only 11% of these technical jobs, and only 2% of computing professionals are Latinas. Women comprise half of the population in the US, yet men hold 73% of the computing positions (www.bls.gov).

This paper will explore the reasons that women continue to be under-represented in computer science and computing careers. The authors will also report on promising interventions and outcomes in Mississippi that engage and retain women on computing pathways.

The National Center for Women and Information Technology's newest tagline reads: "The idea you don't have is the voice you haven't heard" (ncwit.org). As long as computer science remains hyper-masculine, we will miss out on the voice of half of our population in the design of our future technology. Women bring a different experience to draw from, thus a different way of approaching problem solving and engineering design.

Friday, August 6, 2021

MORNING

Room D3

8:50 Welcome

O7.06

9:00 BRIDGING THE TOPOLOGICAL WITH THE TOPOGRAPHICAL: WHY SPACE MATTERS TO PROCESS ONTOLOGY

Colby Clark

University of Kentucky, Lexington, KY, USA

In recent decades, process ontology (via complex systems theory) has become a staple in ecology. One of the more notable accounts is Robert Ulanowicz's "ascendency model." Ulanowicz blends philosophy and theoretical ecology to explain characteristic patterns of ecosystems (e.g. increasing efficiency, prolonged stability, and adaptation). At the heart of Ulanowicz's ascendency model is the use of autocatalytic cycle diagrams. There are three different types of flows attributable to autocatalytic cycles: 1) imports (into the ecosystem), 2) exports (from the ecosystem), and 3) exchanges between the different groups of the ecosystem. Although each type of flow is significant

to the overall nature of an ecosystem, the exchanges between groups are considered the most important because they turn the processes of the ecosystem inward on itself (i.e., centripetality). In short, imports are treated as a given influx of exogeneous resources, exports are simply the result of waste and dissipation, but the flows connecting groups actively restructure themselves (i.e., autopoiesis) as to strengthen the overall stability, resilience, and adaptability of the ecosystem.

Ulanowicz's ascendency model offers an insightful account of the metaphysics of ecosystems, but something is noticeably missing, space. The organizational structure and overall nature of an ecosystem is regarded as "topological" by Ulanowicz. Any spatial patterns that emerge are said to be the accidental result of complex topological processes playing themselves out. In this paper, I challenge the topology-centric view pushed by Ulanowicz (and most other process ontologists). I argue that the spatial features, or "topography," of an ecosystem plays a significant role in the establishment, maintenance, and dissolution of ecosystems. I focus primarily on how the topography of an ecosystem directly impacts the different types of flow dynamics referenced above. To guide my discussion, I rely heavily on concepts from island biogeography theory such as niche dimensionality and spatial heterogeneity.

The structure of the paper is as follows: First, I introduce process ontology and outline Ulanowicz's ascendency model. Second, I provide three qualitatively different instances in which topographical features overtly influence the organizational structure and overall nature of an ecosystem: 1) the effects mountains have on patterns of precipitation (i.e. orographic rain), 2) the effects the size of an island and its distance from the mainland have on the population density of groups inhabiting the island, and 3) the effects multiple niche dimensions have on regulating selective pressures (e.g. competition and predation). These examples show how topographical features influence resource availability, intragroup dynamics, and intergroup dynamics respectively. Thus, I conclude that Ulanowicz's ascendency model is incomplete. I recapitulate my view emphasizing the importance of an ecosystem's topography with respect to the fundamental principles adhered to by process ontology (i.e. emergence, openness, historicity, and contingency). Further, I suggest that we supplement network analysis with additional mapping methods that incorporate topographical features of ecosystems.

O7.07

9:30

PROTECTING OUR MOON FROM POTENTIALLY UNSUSTAINABLE FUTURE MINING

Daniel Capper

University of Southern Mississippi, Hattiesburg, MS, USA

Throughout human history a figure variously known as a woman, man, rabbit, or toad in the moon has played important roles in diverse cultures. Nonetheless, today that figure is under threat from the mining of our moon that already unfolds. As a part of NASA's current Project Artemis, NASA assists mining firms such as the Shackleton Energy Company in establishing themselves on our moon. Lunar miners like Shackleton covet the water ice that has proven to exist, rare metals, but especially the energy source helium-3. Helium-3, if fused with itself, in theory produces clean electricity, but exists on our moon rather than anywhere on Earth. Problematically, mining the moon for helium-3 will destroy two square kilometers of the lunar surface three meters deep per year just for a city the size of Dallas, so that providing helium-3 to many cities over numerous years potentially can disfigure the so-called man in the moon as well as other ecologically valuable lunar features. Worse, lacking in geological tectonics or atmospheric weathering processes, the moon cannot heal itself from such damage, leading to concurrent ecological, scientific, and ethical calamities. Ameliorating these outcomes, this proposal suggests protecting important environmental lunar landmarks such as the man in the moon, the grand peak Mons Malapert, and other magnificent natural treasures with multipurpose reserves Diverse-use reserves simultaneously will provide for the needs of science, environmental preservation, future recreation, and sustainable industry, leaving areas outside of the reserves open for desired business. Initiated according to international best practices as delineated by the noteworthy ecologist Aldo Leopold as well as current United Nations environmental policies, these reserves even will preserve locations like the spot of the first human landing on the moon, an immensely important piece of human history and culture. Supporting these proposed reserves, 121 American Buddhists from the ethnographic field provide, when set in context with a control group of 78 nonBuddhist Americans, quantitative and qualitative moral voices in support of these reserves. Innovatively American Buddhists philosophically stress the importance of interconnection rather than the salience of life in extending the value of nonharm to lunar features. In so doing, the American Buddhists in this study enable protecting outstanding plots on our moon with reserves as a contemporary reflection of a legacy of Buddhist philosophical support for nature reserves extending back to the time of the Buddha himself. In the end we find in response to lunar mining scenarios a clear argument for establishing multiuse nature reserves on our moon via international processes as soon as possible for cultural, ecological, scientific, and future recreational reasons. In this way we protect for generations to come what is most valuable on our moon while also allowing lunar industry that follows ecological and ethical best practices.

10:00 Break

O7.08

10:15 IDENTITY EXPERMENTS IN NEUROBIOLOGY: THE CASE OF THE NMDA RECEPTOR

John Bickle

Mississippi State University and University of Mississippi Medical Center, Mississippi State and Jackson, MS, USA

Carl Gillet usefully calls attention to *compositional explanations/models* in science and to their philosophical import. He builds an analysis of composition on two examples: the explanation of the diamond and its macroscopic properties in terms of bonding and alignment of its carbon atoms; and the explanation of the ion channel and its activities in terms of its protein subunits. Gillet is correct to call philosophical attention to this important aspect of modern science; but like most "metaphysicians of science," his exclusive focus on *scientific products* (i.e., *compositional explanations/models*) neglects the scientific *practices* that produce them. I contend, as do others in the science-in-practice movement, that a focus on these *practices* reveals more of philosophical interest about how science works than does a focus on scientific products.

To illustrate this shift of philosophical attention, I here investigate the scientific practices that produced our current understanding of N-methyl-D-aspartate receptors (NMDARs). We now know that NMDARs are involved in a crucial form of activity-driven synaptic plasticity, long-term potentiation (LTP); NMDAR-dependent LTP has been shown experimentally to be a

mechanism of memory induction (learning) for over thirty years. We now understand how the protein subunits and even the individual amino acids composing NMDARs generate the receptors' "coincidence- detecting" capacity for high activity in both pre- and post- synaptic neurons. We know the mechanisms by which activated NMDARs permit rapid calcium ion (Ca^{2+}) influx into the post-synaptic neuron. We know the cascade of chemical reactions this Ca^{2+} second messenger initiates to produce potentiated post-synaptic neurons, through the specific genes transcribed and proteins synthesized. In short, we here have one of neurobiology's most important *compositional explanations/models*. But the practices that produced this product were a forty-year conglomeration of time-dependent, luck-dependent and especially experiment tool-dependent experiments, a motley hodge-podge of *no special metaphysical significance*. There is no reason to suppose that there is anything special or unique about the practices that produced our current knowledge of NMDARs. Rather, all compositional explanations qua scientific products appear to be similarly generated.

What these hodgepodges of scientific practices together constitute is a type of *experiment*, dubbed "identity experiments" by Alcino Silva, Anthony Landreth and John Bickle. These are the experiments through which the basic features of neurobiological kinds are discovered. Aside from a few cursory remarks Silva, Landreth and Bickle say little about these kinds of experiments. This detailed historical investigation of the experiments through which NMDARs and their basic properties came to be understood puts meat on the skeleton of the "identity experiments" concept from science-in-practice. I suggest comparisons with some recent discussions of "exploratory experiments" in the philosophy of science-in-practice.

O7.09

10:45 PREPRINTS OF BIOMEDICAL RESEARCH—BENEFITS AND CONCERNS REGARDING A POSSIBLE PARADIGM SHIFT

Kenneth R. Butler[1], Lamar Hamil[1], and Amanda Brooks[2]

[1]University of Mississippi Medical Center, Jackson, Mississippi, USA

[2]Rocky Vista University, Ivins, Utah, USA

Preprint servers are online platforms that enable the free sharing of preprints of scholarly works that have either not been submitted or have not completed peer-review or been published in a traditional scientific publishing venue. Advantages of using these servers include faster facilitation and broader dissemination of research findings, easy solicitation of feedback from peers, the establishment of new collaborations, and prioritization of discoveries. Disadvantages of using preprint servers include the potential of sharing manuscripts that lack sufficient quality or details of the methodology and increasing the risk of wide dissemination of unreliable information to lay readership. While other disciplines have successfully used preprint servers for several decades to advance their science, the use of preprint servers among biomedical researchers is relatively new and may signal a paradigm shift in biomedical publishing. Several reputable biomedical journals have adopted preprint policies in their submissions process, perhaps signaling this shift toward more widespread use of preprint servers. Some preprint articles will undergo peer review and ultimately be accepted by journals. However, most of them will never undergo peer review. Biomedical research is fundamentally different compared to other disciplines. This paper aims to explore many of the concerns driving the adoption of preprint servers in biomedical research. These include the heightened expectation of grant awards and publications for career advancement by universities, the increase in journal article submissions from foreign institutions that place an additional burden on an already slow peer review system, and the citation of preprints in research articles and grant submissions.

11:15 Break

O7.10

11:30 THE EXTRAORDINARY DIVERSITY OF PROTEIN FUNCTIONS AND THEIR ORIGIN

Robert Waltzer

Belhaven University, Jackson, MS, USA

How did proteins originate to do diverse functions? An abbreviated list of functions would include information extractors, two-legged walking transporters, computational devices, quality control devices linked to disposal systems, and energy transfer systems. Information extractors consist of ribosomes, which are complex nanomachines involving 80 proteins and 4 RNA molecules working together to build proteins using the code taken from a "messenger" RNA (Lodish et al., *Molecular Cell Biology*, 9th ed., 2021). Two-legged walking transporters have been portrayed by Drew Berry in *Animations of Unseeable Biology*. They "walk" along microtubules carrying cargo from one end of the cell to another (stepping over obstacles when necessary). Computational properties of proteins relate to variations in the attachment of binding molecules which cause conformational changes that are exploited to form "circuits" capable of doing arithmetic and logarithmic operations and other logical functions (Sterling and Laughlin, *Principles of Neural Biology*, 2017). Quality control devices include chaperones, themselves proteins, which enable other roteins to properly fold and also help to correct misfolded proteins. A ready fail-safe system (proteasomes) destroys unrepaired misfolded proteins (Lodish et al.) Energy transfer proteins are involved in multiple systematic and incremental transfers of electrons from one recipient to another at the quantum level in order to carry out their functions. Some of them are even activated by sunlight. (Berg et al. *Biochemistry*, 9th ed., 2019). In assembling a living cell with all of these key molecules, it would seem these functions reflect intelligence and are comparable to what human designers do but far more complex and at a smaller scale. Any designer would have to have an amazing imagination to conceive of doing such functions with biochemical entities and an extraordinary knowledge of proteins and their capabilities. In addition, the designer would need to have knowledge of the cell and that it has both the instructions and a mechanism to construct the molecules, the raw materials from which to make them, and an ability to make sure that the molecules get to the right place at the right time in the right amounts. The emergence of proteins occurred in the past and is therefore a historical aspect of science. So, what are the competing hypotheses that use present day processes to explain past events or facts? The mainstream view of biology is that all things within living systems arose by a blind, unguided process involving chance and natural law. Linking such extraordinary systems with a blind unguided process seems like a mismatch or category error. If a blind, unguided process is to be held, then there must be some equally amazing laws that are superimposed upon it. No such laws are known; nor do we see any kind of present-day phenomenon that would account for this emergence A similar kind of historical reasoning could consider meaningful alternate explanations such as intelligence being involved.

O7.11

PREPRINTS OF BIOMEDICAL RESEARCH—BENEFITS AND CONCERNS REGARDING A POSSIBLE PARADIGM SHIFT

Kenneth R. Butler[1], Lamar Hamil[1], and Amanda Brooks[2]

[1]University of Mississippi Medical Center, Jackson, Mississippi, USA

[2]Rocky Vista University, Ivins, Utah, USA

Preprint servers are online platforms that enable the free sharing of

preprints of scholarly works that have either not been submitted or have not completed peer-review or been published in a traditional scientific publishing venue. Advantages of using these servers include faster facilitation and broader dissemination of research findings, easy solicitation of feedback from peers, the establishment of new collaborations, and prioritization of discoveries. Disadvantages of using preprint servers include the potential of sharing manuscripts that lack sufficient quality or details of the methodology and increasing the risk of wide dissemination of unreliable information to lay readership. While other disciplines have successfully used preprint servers for several decades to advance their science, the use of preprint servers among biomedical researchers is relatively new and may signal a paradigm shift in biomedical publishing. Several reputable biomedical journals have adopted preprint policies in their submissions process, perhaps signaling this shift toward more widespread use of preprint servers. Some preprint articles will undergo peer review and ultimately be accepted by journals. However, most of them will never undergo peer review. Biomedical research is fundamentally different compared to other disciplines. This paper aims to explore many of the concerns driving the adoption of preprint servers in biomedical research. These include the heightened expectation of grant awards and publications for career advancement by universities, the increase in journal article submissions from foreign institutions that place an additional burden on an already slow peer review system, and the citation of preprints in research articles and grant submissions.

12:30 **Student Awards**

12:45 **Business Meeting**

MARINE AND ATMOSPHERIC SCIENCES

Chair: Remata Reddy

Jackson State University

Vice-Chair: Francis Tuluri

Jackson State University

Thursday, August 5, 2021

AFTERNOON

Room D8

12:50 **WELCOME**

O8.01

1:00 EVALUATING ROTATING STORMS IN CONVECTIVE RAINBANDS ASSOCIATED WITH LAND FALLING TROPICAL CYCLONES USING CONVECTION ALLOWING MODELS

Dereka Carroll-Smith[1], Stanley Trier[2], David Ahijevych[2]

[1]Jackson State University, Jackson, MS, USA and [2]National Center for Atmospheric Research, Boulder, CO, USA

Storm surge and gale force winds are known hazards associated with landfalling tropical cyclones (LTCs) that pose a devastating threat to coastal communities. However, prior to a hurricane making landfall, other hazards such as tropical cyclone tornadoes (TCTs) can develop, complicating evacuation efforts. The risk of TCTs can persist well after a hurricane makes landfall, and can be collocated with inland flooding, requiring people to make difficult decisions regarding protective action. In this study we use convective allowing models (CAMs) to resolve antecedent environments for tornadoes generated along the coast near tropical cyclone (TC) landfall, and TCTs occurring inland days later. The majority of TCTs are within TC rainbands are spawned from "miniature" supercells. Both these tornadoes, and sometimes the low-level mesocyclones in which they are embedded, are not resolved in the current highest resolution numerical weather prediction (NWP) models used to produce both operational (e.g., the HRRR) and experimental (e.g., the HREF) forecasts. To help identify TCTs in the model simulations, we adapt the Sobash et al. (2016, Wea. Forecasting, p. 255-271) severe surrogate method used for Great Plains supercells, to more optimal values that are unique to LTC tornadoes. TCT surrogates will be constructed for TCs in widely varying TC environments, including those where tornadoes occur near the coast shortly after LTC landfall, and for TCs that interact with baroclinic weather systems several days later much farther inland. Sensitivities to physical parameterizations will be evaluated based on a model configuration similar to HREF (NOAA's High-Resolution Ensemble Forecast).

O8.02

1:30 COMPARISON OF FINE PARTICULATE MATTER (PM2.5) FILTER EXTRACTION TECHNIQUES FOR DETERMINING OXIDATIVE POTENTIAL

Amelia Craze and Courtney Roper University of Mississippi, Oxford, MS, USA

Fine particulate matter ($PM_{2.5}$) is a complex mixture of air pollutants that are 2.5 microns or smaller. $PM_{2.5}$ is associated with both acute and chronic adverse health effects, that are not limited to the respiratory system. Oxidative stress induced by $PM_{2.5}$ can target a variety of cells and $PM_{2.5}$ is often collected onto filters to study the toxic effects of exposure. For analysis, particles must be removed from filters. However, extraction techniques vary greatly, with recent studies demonstrating that differences in filter extraction methods cause variable toxicity responses. The objective of this study was to divide $PM_{2.5}$ filters into quadrants each undergoing a different extraction method to determine if the extraction method used impacts the oxidative potential of samples collected from the same location/time. The filter extraction techniques used were sonication in: 1) methanol 2) DCM, DI water or 4) 0.9% saline. Extraction was performed on co- located $PM_{2.5}$ filters collected by the Arkansas Department of Environmental Quality at four locations during the same 24- hour collection period during the winter of 2012. After extraction, filters were analyzed using a dithiothreitol (DTT) assay to determine oxidative potential. Data from January 4th, demonstrates that significant differences in DTT consumption (nmol/min/m^3) occur between both locations and extraction methods. Analysis of trends between oxidative potential and metrics of $PM_{2.5}$ (concentration, black carbon) are underway. These results will support identifying the importance of filter extraction in interpretation of oxidative potential results and studies designed to improve understanding of the health effects following $PM_{2.5}$ exposure.

O8.03

1:45 AN INVESTIGATION OF AIR-SEA INTERACTIONS, HURRICANE PREDICTIVE INDEX (HPI) AND 1995 HURRICANE ACTIVITY OVER THE GULF OF MEXICO

Remata Reddy, Duanjun Lu, Francis Tuluri, and Meheri Fadavi

Jackson State University, Jackson, MS, USA

(Reddy and Miller, 1997 and Reddy et.al, 1998, 1999) have established the relationship between ocean-atmospheric interactions and tropical cyclones/hurricanes over the Gulf of Mexico. They identified a predominant 2-5 day oscillation in heat, momentum and moisture fluxes during the formation and evolution of the hurricane Opal for the period September 27- October 10, 1995. They also identified that the average sea surface temperature (SST) over the Gulf of Mexico was 29°C. Hurricanes usually develop over the waters with SST exceeding 26°C. Hurricanes get their energy from evaporation over large expanse of warm tropical water. Evaporation from warm sea surface produces water vapor that condenses and releases latent heat, which intensifies the storm.

Therefore, sea surface temperature is considered a major force behind the development of a hurricane. Ocean-atmospheric interactions play a prevalent role in exchanging heat, momentum and moisture fluxes. In the present study, we further investigate air-sea interactions including heat, momentum and moisture fluxes over the Gulf of Mexico and their relation with hurricane Roxanne, which occurred during October 7-11, 1995. We also developed a Hurricane Predictive Index (HPI) to predict the formation and development of the hurricane in the Gulf of Mexico. The index was tested for the hurricane Opal during the period of its formation and development.

2:00 Break

O8.04

2:15 PRELIMINARY STUDIES ON THE TEMPORAL TRENDS OF AMBIENT TEMPERATURE AND COVID-19 IN JACKSON, MS, USA

Francis Tuluri and Alora D Taylor
Jackson State University, Jackson MS, USA

Introduction: Environmental parameters associated with weather may affect to some extent the COVID-19 cases. However, it is too early to make any prediction on the possibility that climate, and weather influence the increase of the pandemic virus. Currently, several other investigations are being undertaken in this regard. **Method**: The present study aims at preliminary studies on the effect of temperature on COVID-19 in Jackson, Mississippi, USA. **Results and Discussion**: The data of temperature and COVID-19 cases in the region will be used to run a machine learning model using python programming, to see the correlation and the results of the study will be presented.

2:45 Session Discussion

3:00 Business Meeting

Thursday, August 5, 2021

EVENING

3:30 Dodgen Lecture and Awards Ceremony (B5-6)

General Poster Session

(Immediately Following Dodgen Lecture C-Poster Hall)

P8.01

GUNSHOT RESIDUE PARTICULATE MATTER: COLLECTION AND ANALYSIS METHODS

Samuel Cole Smith, Oscar Black and Courtney Roper

University of Mississippi, Oxford, MS, USA

Exposure via inhalation of gunshot residue (GSR) has potential negative health effects in humans due to the organic and inorganic components found in GSR. Thus far, there is limited information on size-differentiation in GSR particles, which is a key factor in health effects research with particles less than 2.5 microns in aerodynamic diameter, $PM_{2.5}$, being able to enter deep into the respiratory system. This project collected size- selective $PM_{2.5}$ and non-size-selective particles to determine the composition and presence of GSR as well as examine different methods of GSR collection. Air was sampled during single and triplicate shots from a .22 caliber revolver. To collect $PM_{2.5}$ an ultrasonic personal air sampler (UPAS) with a 37 mm filter was used and double-sided tape was used to collect non-size selective particles. Following collection, the 37 mm filter underwent black carbon analysis in triplicate using a Sootscan and the double-sided tape was used to characterize particle morphology and chemical composition with scanning electron microscopy paired with energy dispersive x-ray spectroscopy (SEM/EDS). After direct contact analysis, all samples were extracted in methanol and underwent analysis for size distribution and oxidative potential. Blank filters and double- sided tape were used for all comparisons and all samples were collected in triplicate. The preliminary results suggest that multiple shots provide adequate GSR to conduct multiple morphological and chemical analyses. This research has identified collection methods and appropriate sampling procedures for future research into the impact that GSR has on human health and environmental health.

P8.02

UNDERSTANDING THE ROLES OF HEAT FLUCTUATIONS AND HIGH IMPACTS IN HURRICANE IRMA

Kayla Hudson[1], Remata Reddy[1], and Latrice Maxie[2]

[1]Jackson State University, MS, USA and [2]National Weather Service, Jackson, MS, USA

Hurricane Irma was a devastating tropical cyclone that occurred in 2017 that began near Cape Verde Islands and continued on to affect areas as far as Florida. The hurricane set many records of being the strongest hurricane dated in the Atlantic Ocean and one out of very few to have a wind speed of 185 mph. This monumental and powerful cyclone has driven many researchers to question the storm's forcefulness or access the damages. This research aims to seek clarification about heat fluctuations, the environmental impacts and outcomes of Hurricane Irma on society, and the analysis of buoy data and storm surge to see the impact it has on the intensification of hurricane itself. These elements are mainly displayed mostly through empirical models however analysis can show why the storm was continuous and how the simple understanding of the formation of a hurricane can aid in displaying how Irma was put in the exact conditions to make extreme conditions. Also, this research is relevant to NOAA and society because two of the organization's main purposes are to share knowledge and information of the weather with others and manage the coastal ecosystem. All conclusions are supported by graphs and analysis of conditions provided by buoy data and data recorded from Irma. Heat fluctuations are present and temperature changes are visually shown over time through Graph 3. Buoy data shows a rise in ocean levels and can be seen as evidence for potentially more destructive storm and storm surges contribute mostly to flooding.

P8.03

COMPARISON OF AIR-SEA INTERACTIONS, HIGH WINDS AND PRECIPITATION VARIABILITY ASSOCIATED WITH LAND FALLING HURRICANES IDA AND NATE OVER THE GULF OF MEXICO USING RADAR AND SATELLITE DATA

Avaionia Smith[1], Remata Reddy[1] and Latrice Maxie[2]

[1]Jackson State University, MS, USA and [2]National Weather Service, Jackson, MS, USA

Over the last decade, there has been an overall increase in the number of Atlantic Hurricanes and those making landfall in the United States. Understanding the genesis, evolution, intensity, and track of tropical cyclones is limited by a shortage of observations over the oceans and knowledge of key processes (atmospheric, oceanic and air-sea interactions). This research focuses on observational data investigations of the air-sea interactions and high winds of land falling hurricanes Ida and Nate over the Gulf of Mexico. RADAR, satellite, buoy, and ASOS data were used to compare air-sea interface and high winds in order to understand the structure and dynamics of hurricane activity and their impacts over the Gulf of Mexico. Hurricane Ida was the strongest land falling tropical cyclone and occurred between November 4-11, during the 2009 Atlantic hurricane season. On November 8-11, 2009 Ida strengthened to a category 2 hurricane with peak winds of 105 mph and a minimum pressure of 979 mb. Ida made landfall and began to slowly dissipate on November 10, 2009 along the Alabama coast. Hurricane Nate resulted in widespread destruction and casualties in Central America and was also the costliest natural disaster in Costa Rican history. Nate strengthened to a category 2 with peak winds of 90 mph and minimum pressure of 981 mb. The storm made landfall over the central Gulf of Mexico coast including Louisiana and

Mississippi. This research project comparing hurricanes Ida and Nate suggests strong air-sea interface and heat fluxes occurred before landfall with high winds and low pressure. RADAR and Satellite data comparing Nate and Ida shows varying degrees of impact from tornadic activity, heavy precipitation and high winds of 90 mph compared to Ida with high winds of 105 mph. Hurricane Nate also produced a large amount of storm surge ranging from 6 to 9 feet over the Mississippi and Alabama coastlines when making landfall.

P8.04

AIR QUALITY IN NORTHERN MISSISSIPPI

Ashton Swader, Amelia Craze, Samuel C. Smith, Chandler Tolbert, Tonia Voke, Courtney Roper

University of Mississippi, Oxford, MS

Air quality has risen to be a topic of concern within the scientific community, especially in regards to daily exposure to pollutants. One field of interest is the effect of fine particulate matter (PM2.5) on health. PM2.5 has been linked to negative health effects such as heart and lung issues following long-term exposure. Pollen is also of interest within our region due to its accumulation in this climate. It has been linked to respiratory issues as well as allergies in many individuals. We do not know much about the composition of air within our region due to a lack of sampling. By collecting and analyzing our samples, we will be able to provide data on the risks that face our community. In this study, we collected PM2.5 and pollen at two locations in Northern MS across seasons. Weekly samples were collected at two locations: Anderson Hall on the University of Mississippi Oxford campus and the University of Mississippi Field Station, Abbeville, MS. Each week a 47 mm filter was deployed to collect PM2.5 and a custom-built pollen sampler collected pollen samples onto glass slides. Following collection samples were stored and analyzed for black carbon (PM2.5 filters) and pollen types and counts (pollen slides). All samples were blank corrected using laboratory and field blanks. Preliminary results suggest that there are differences in black carbon concentrations between locations, across seasons. This work will help identify the currently unknown air quality in the northern region of Mississippi.

MATHEMATICS, COMPUTER SCIENCES AND STATISTICS

Chair: Jamil Ibrahim

University of Mississippi Medical Center

Co-Chair- Ping Zhang

Alcorn State University

Vice-Chair: Yuanyuan Duan

University of Mississippi Medical Center

Thursday, August 5, 2021

MORNING

Room D9

8:15 WELCOME

O9.01

8:30 SURVEY OF ARTIFICIAL INTELLIGENCE AND PATTERNRECOGNITIONAPPLICATIONS

Joycelyn Minor, Jessica Minor, Kyle Jenkins, Ping Zhang

Math and Computer Science Department, Alcorn State University, Lorman, MS, USA

In this presentation, the definition of Artificial Intelligence (AI) and Pattern Recognition (PR) and the history of their development are reviewed and the current research in the fields is introduced. Some algorithms and applications, such as Automatic Personal Check Recognition using AI technology, handwritten classifications, Video Based Face Recognition and Online Fingerprint Verification Algorithm and Distributed System using AI and PR theory and technologies are analyzed. The future of AI is also discussed in the presentation.

O9.02

8:50 THE EFFECT OF THE DIFFERENTIAL PRIVACY DISCLOSURE AVOIDANCE SYSTEM PROPOSED BY THE CENSUS BUREAU ON 2020 CENSUS PRODUCTS: FOUR CASE STUDIES OF CENSUS BLOCKS IN MISSISSIPPI

David A. Swanson[1,2] and Ron Cossman[3]

[1]University of California Riverside, Riverside, CA, USA, [2]The Center for Studies in Demography and Ecology, University of Washington, Seattle, WA, USA, [3]Social Science Research Center, Mississippi State University, Starkville, MS, USA

The Census Bureau plans to introduce a new Disclosure Avoidance System known as Differential Privacy (DP) for its 2020 census data products. Using a DP demonstration product file provided by the Census Bureau, we assess the errors introduced by DP on census block data in Mississippi in the form of four case studies and find them to be substantial by type and level. Because it is likely that the results we found in Mississippi will be found in other states, our examination leads us to conclude that it is likely that the errors introduced by DP of the type and at the level found in the demonstration product file we examined will render the nation's block level data essentially unusable.

O9.03

9:10 USING TERRAFORM TO DEPLOY ON- DEMAND INFRASTRUCTURE TO SECURE ENVIRONMENTS

Matthew Little

U.S. Army Corps of Engineers - Engineer Research and Development Center

Virtualized infrastructure is quickly becoming the defacto method for researchers needing multiple instances customized to meet the needs of the task at hand. On- demand infrastructure is relatively easy to accomplish in typical research environments by allowing users to access the Hypervisor software and create instances as needed. In a secure environment, the issue arises where users must have high-level certifications to access the Hypervisor, and resource access is limited and controlled by imposed security protocols. When approached to create an on-demand virtual infrastructure creation/delivery system housed in a secure environment, I realized a custom solution would need to be developed to deliver the product to the customer. One of the original solutions was to make OpenStack API calls that would create each resource in the required order and manage deployment straight through OpenStack. While this is the most straightforward approach, there is no mechanism to handle any resources in a partially created state. Leaving devices in a partially built state is a waste of OpenStack resources and can eventually prevent new devices from being made. Ultimately, I decided on the architecture of using Gitlab CI/CD pipelines to create Terraform plans, submit merge requests to Gitlab, and the plan is built and deployed on the secure OpenStack instance. This solution addresses the need for quickly delivering custom on-demand infrastructure for data scientists and researchers while maintaining security protocol and procedure compliance. This paper details each of the proposed solutions, the final design of the solution, the challenges faced, and how the challenges were overcome.

O9.04

9:30 RAPID ESTABLISHMENT OF DATA VISUALIZATION TOOLS FOR DISASTER RESPONSE MODELING

Brandon Randle

US Army Engineer Research and Development Center

As disaster scenarios unfold, flexibility is extremely important. Both tools and people need to rapidly adjust to changing situations. Simple, custom, and lightweight dependency solutions are the ideal position for such circumstances. Off-the-shelf solutions that are not easily modified or adapted can significantly impair making rapid changes and, ultimately, will not provide the response speed necessary to tackle the complexity and uncertainty characteristic of disasters. The result of thiseffort indicates that flexibility and performance are the two key metrics by which such tools should be gauged.The necessity of easy access to and analysis of large data sets is a common general need and is especially so in rapid response to large-scale disasters. The work presents an approach for rapidly delivering data analysis and visualization tools foruse by decision-makers. Such tools must be both flexible and performant in order to achieve their mission objectives.

O9.05

9:50 NUMERICAL STUDY ON LATE TRANSITIONAL BOUNDARY LAYER USING RORTEX/LIUTEX

Yonghua Yan[1], Yong Yang[2], Caixia Chen[3] Alitzel Serrano[3]

[1]Jackson State University, Jackson, MS, USA, West Texas A&M University, Canyon, TX, USA, [3]Tougaloo College, Tougaloo, MS,

USA

A direct numerical simulation (DNS) of late-stage of laminar-turbulent transitional flow was conducted on a flat plate at Ma 0.5. Beginning from symmetric perturbation, fully asymmetrical flow structures were observed in the numerical results. To study the origin/source of the asymmetry/turbulence, the newly developed vortex definition and visualization method – Rortex/Liutex was adopted. It shows that the origin of asymmetry of the transitional flow matches perfectly with the generation of asymmetrical Rortex/Liutex. The local minima of the gradient of Rortex/Liutex were captured in the whole domain to track the evolution of vortical cores. It is found that the evolution of asymmetrical flow structures developed along with large-scale Rortex/Liutex cores. The generation and evolution of asymmetry have a particularly large correlation with the vortex core defined by Liutex. The results provide new insights for a deeper understanding of the mechanism of turbulence

O9.06

10:10 POWER SPECTRUM ANALYSIS OF SBLI IN MVG CONTROLLED SUPERSONIC FLOWS AT DIFFERENT MACH NUMBERS

Yonghua Yan[1], Demetric l. Baines[1], Yong Yang[2], Caixia Chen[3], Tyler Hickman[3]

[1]Jackson State University, Jackson, MS, USA, [2]West Texas A&M University, Canyon, TX, USA, [3]Tougaloo College, Tougaloo, MS, USA

The driven source of flow frequency unsteadiness of Shock Wave Boundary Layer Interaction (SWBLI) is still unknown after several decades of intensive research. In this study, high-resolution Large Eddy Simulation (LES) was adopted to simulate the Micro Vortex Generator (MVG) controlled supersonic ramp flow with different Mach numbers. Power Spectrum Analysis was conducted on the numerical results of SBLI in the ramp corner. The frequency distributions of large-scale vortices and shock oscillation were investigated in the MVG controlled SBLI region at different Mach numbers. In each case, the low frequencies of unsteadiness of the flow were dominated by the frequencies of the large- scale vortices. The existence of a strong correlation between the low-frequency distributions of vortices and shock oscillation was observed. The correlation was not reduced with the increase of Mach number, although the vortex structures became more complicated.

Break 10:30

O9.07

10:50 BEST PRACTICES OF INCORPORATING MOBILE TECHNOLOGY IN THE LEARNING ENVIRONMENT

Jamil Ibrahim; Hidaya Ibrahim Al-Najah University, School of Pharmacy, Waseem Ibrahim, Arab American University, School of Medicine, Ibrahim Ibrahim, Arab American University, School of Dentistry, Saja Ibrahim, Jordan University, School of Medicine

Modern Technology devices usage is widespread among students today. There is no doubt that advances in technology continue to have a great impact on the way faculty, and other campus community stakeholders interact with learners. Opportunities and challenges are emerging for all of these groups and institutions from the increasing availability of low-cost mobile devices and associated infrastructures.

The aim of this research was to measure how students perceive mobile usage in the classroom, the types of mobile devices they own or use, and other educational activities. Also this study investigated whether students' perceptions are related to factors such as age, gender, race,

and school affiliation. During the fall of 2018-2019 academic year, a survey was administered online to students from an Academic Health Sciences Center (AHS) using Qualtrics as a data collection tool. A total of 2400 questionnaires were sent to students. Of these, 1185 responses were received for an approximately 49 percent response rate. Of a total of 1185 responses, 924 (79%) students said they used mobile devices to access course content and other learning activities. This paper reports the findings of this study and concludes with the pros and cons of using mobile technologies to support learning. It also offers recommendations on the best practices of incorporating mobile devices in learning environments.

O9.08

11:10 POD ANALYSIS OF THE VORTEX STRUCTURES GENERATED BEHIND MVG IN SUPERSONIC FLOWS WITH DIFFERENT MACH NUMBERS

Yong Yang[1], Yonghua Yan[2], Caixia Chen[3], Demetric I Baines[2], David Rop[2]

[1]West Texas A&M University, Canyon, TX, USA, [2]Jackson State University, Jackson, MS, USA, [3]Tougaloo College, Tougaloo, MS, USA

Micro Vortex Generator (MVG), as a low-profile passive control device, is widely used in shock wave boundary layer interaction (SWBLI) control to decrease the adverse effects of the separation. The ring-like vortices generated by MVG, which strongly interact with the shock waves, were found to play a critical role in the separation region reduction. Thus, to control SWBLI which commonly happens in most supersonic flows, the generation and evolution mechanisms of vortex structures behind MVG should be studied. The proper orthogonal decomposition (POD) method was adopted in this study to investigate the vortex structures behind MVG in supersonic flows with different Mach numbers. The numerical results of the turbulent supersonic flows were obtained using Large Eddy Simulation (LES). Newly developed vortex definition and visualization method

– Rortex/Liutex was used to define and analyze the vortex structures behind the MVG. It shows the relationship among the mode energy, mode frequency of the vortices, and Mach numbers. By investigating the POD results of the flow field, it can be found that the percentage of the vortex mode with higher energy increases as the Mach number increases. The Mach number has little influence on the frequency of ring- like vortices. However, more high-energy modes of stream wise vortices were observed in the high Mach number cases.

11:30 Divisional Business Meeting
12:00 General Session

Thursday, August 5, 2021
AFTERNOON
Room D9

1:00-2:30 WORKSHOP

THE RELATIONSHIP THE RELATIONSHIP BETWEEN RESEARCH PLANNING AND POWER ANALYSIS

Workshop/Symposium

Jamil Ibrahim; Hidaya Ibrahim Al-Najah University, School of Pharmacy, Waseem Ibrahim, Arab American University, School of Medicine, Ibrahim Ibrahim, Arab American University, School of Dentistry, Saja Ibrahim, Jordan University, School of Medicine

Statistics is useful in almost all fields especially in research studies. Statisticians should be involved from the beginning of these studies. In research practice, the most common requests to statisticians from investigators are sample size calculations or sample size justifications. The techniques of statistical power, sample size estimations and confidence intervals are the most important aspects of a research plan. Determining sample size is one of the most important steps in designing a study. In order to have reliable and valid results, it is important to determine the right sample in combination with high quality data collection efforts. Sometimes, researchers have different opinions as to how sample size should be calculated. Statisticians usually choose from many available formulas that can be applied for different types of data and study designs. The aim of this presentation is to clarify this issue and to provide examples on how to calculate sample size. The components of sample size calculations will be discussed and what factors to consider in choosing the sample size. Other concepts related to this issue such as power analysis, confidence intervals, variability, type I error, type II error, and minimum effect size of interest will also be discussed.

Thursday, August 5, 2021
EVENING
3:30 Dodgen Lecture and Awards Ceremony (B5-6)
General Poster Session
(Immediately Following Dodgen Lecture C-Poster Hall)

Divisional Posters

P9.01

RAPIDLY DEVELOPING WEB-BASED DATA DASHBOARD APPLICATIONS FOR COVID-19 RESPONSE USING REACTJS

Michael Clement

U.S. Army Corps of Engineers - Engineer Research and Development Center

During the onset of the COVID-19 pandemic, the U.S. Army Corps of Engineers (USACE) leadership at the Engineer Research and Development Center (ERDC) in Vicksburg, MS had need of a web-based application that would enable the reporting and tracking of COVID cases among ERDC personnel. Additionally, the application needed to support the visualization of COVID case data from specific USACE installations and geographic regions in order to provide context and metrics on the overall status of USACE when compared to the USA. This data was to be presented along with forecast data generated by an epidemiological model (which also required visualization). To meet the requirements within the significantly constricted timeline of a month, it was determined that the best technology f or accomplishing this task would be a React JS web application that leveraged the D3 visualization library. The rapid development and resulting successful application enabled ERDC leadership to track and manage COVID-19 case data across the ERDC, enabling important decision processes. This presentation documents the steps taken to identify React JS as the appropriate technology, as well as how the user interface was constructed and what methods were adopted to accelerate development of the application. Additionally, this presentation aims to provide insight into how development of similar applications can be approached and why certain approaches are preferred based on criteria such as speed, ease of development, and end results.

P9.02

9-APPLICATION OF LBM ON SWALLOWING PROCESS

Alitzel Serrano, Bradford Patton, Tyler Hickman, Caixia Chen

Tougaloo College, Tougaloo, MS, USA

Lattice Boltzmann Method (LBM) which is based on Boltzmann equation is becoming an alternative and promising numerical scheme for simulating fluid flows. With good parallel performance, it can be used for numerical simulation of fluid flow with high complex geometries in biomedical. In this study, LBM is implemented to simulate the bolus flow. A series of 2D simulations is performed. The results were compared with simplified analytical solution of bolus flow model in previous research. The detail flow field in the swallowing process was provided.

P9.03

SOLVING DEFINITE INTEGRALS USING THE SIMPSON'S RULE IN PYTHON

Danielle Dotson

Mississippi Valley State University, Itta Bena, MS, USA

There are four methods: midpoint, trapezoid, Riemannian sum to numerically evaluate definite integrals. But the Simpson's Rule is a common used in scientific computing since the error of the Simpson's Rule is proportional at the fourth derivative. This means that the integration for the polynomials of degree three or less are accurate. Python is a very versatile programming language. In this project, I will be using Python to implement the Simpson's Rule to calculate integrals. In order to increase the speed of computation, I will also be using the parallel computing capabilities of Python and PHP to compute these integrals as well.

P9.04

19-BEST PRACTICES OF INCORPORATING MOBILE TECHNOLOGY IN THE LEARNING ENVIRONMENT

Jamil Ibrahim

University of Mississippi Medical Center, Jackson, MS, USA

Modern Technology devices usage is widespread among students today. There is no doubt that advances in technology continue to have a great impact on the way faculty, and other campus community stakeholders interact with learners. Opportunities and challenges are emerging for all of these groups and institutions from the increasing availability of low-cost mobile devices and associated infrastructures. The aim of this research was to measure how students perceive mobile usage in the classroom, the types of mobile devices they own or use, and other educational activities. Also this study investigated whether students' perceptions are related to factors such as age, gender, race, and school affiliation. During the fall of 2018-2019 academic year, a survey was administered online to students from an Academic Health Sciences Center (AHS) using Qualtrics as a data collection tool. A total of 2400 questionnaires were sent to students. Of these, 1185 responses were received for an approximately 49 percent response rate. Of a total of 1185 responses, 924 (79%) students said they used mobile devices to access course content and other learning activities. This paper reports the findings of this study and concludes with the pros and cons of using mobile technologies to support learning. It also offers recommendations

on the best practices of incorporating mobile devices in learning environments.

Friday, August 6,
2021 MORNING
Room D9

8:20 Welcome

O9.09

8:30 ASYMPTOTIC STABILITIES OF HUMAN RESPIRATORY SYSTEM WITH MULTIPLE STATE-DEPENDENT DELAYS

Qingwen Hu

Alcorn State University, Lorman, MS, USA

Periodic breathing is a pattern of periodic fluctuation of the ventilation rate of the respiratory system accompanied by periodic variations of respiratory gas partial pressures in blood. Cheynes-Stokes respiration is a periodic breathing in which the depth of breathing first increases and decreases over an interval of about 30 seconds, and then breathing ceases altogether (apnea) for a further 30 seconds. Cheynes- Stokes respiration could occur in heart failure and stroke, where it is conceived that the failing heart causes low blood flow, which in turn leads to an increased delay before the central and peripheral chemoreceptors can respond to changes in arterial carbon dioxide (CO_2) concentration at lungs, such an increased delay can cause oscillations to occur. Periodic breathing, not necessarily apeanic occurs also in infants, and in climbers at altitude. The first CO_2 regulation model for human respiratory dynamics using control theory was proposed in the seminar work of Grodins et al. in 1954 and 1967, where the transportation time delays between the lung, brain, tissue compartments are dependent on the blood flow and hence implicitly on the carbon dioxide concentrations in the blood, whereby we see the delays are actually state-dependent delays. In this talk, we extend the Grodins model of human cardiovascular-respiratory system with multiple blood transport time delays into a model with four threshold type state-dependent delays, in order to investigate the asymptotic stability of carbon dioxide concentrations in the lung, brain, cerebrospinal fluid and tissue compartments. We show that the extended model can be transformed into a model with four discrete time delays and obtain sufficient conditions for local and global asymptotic stabilities of the extended model by constructing Lyapunov functionals. Numerical simulations are presented to illustrate the general results.

O9.10

8:50 NUMERICAL STUDY OF THE NORMAL SWALLOWING

Caixia Chen[1], Yonghua Yan[2], Yong Yang[3], Bradford Patton[1], Tyler Hickman[1]

[1]Tougaloo College, Tougaloo, MS, USA, [2]Jackson State University, Jackson, MS, USA, [3]West Texas A&M University, Canyon, TX, USA

Dysphagia refers to difficulty with eating or swallowing. It affects as many as nine million Americans. Understanding normal swallowing mechanics and how they may be disrupted is a vital patient safety goal in rendering care. In this study, the process of swallowing liquid food in the oral stage is modeled and simulated numerically. Numerical Simulation was investigated to simulate the bolus flow in the oral. The influence on the bolus flow field from some parameters such as bolus viscosity and swallowing speed is investigated. It shows that the bolus flow in the oral stage of swallowing process does not follow the similar solution along the streamwise direction. The convection in the normal direction becomes more significant during the faster swallowing process. The bolus flow presents acceleration zones of different sizes for different viscosities.

O9.12

9:30 NATURAL LANGUAGE PROCESSING CHATBOT APPLICATION USING NLTK FOR TEXT CLASSIFICATION

Sai Sri Madhuvani Godala and Ramakalavathi Marapareddy

The University of Southern Mississippi, Hattiesburg, MS, USA

In this Natural Language Processing (NLP) Artificial Intelligence (AI) application, we build the core conversational engine for a chatbot. We use the popular Natural Language Toolkit (NLTK) text classification library to achieve this. As NLTK mentions it basically provides us with tools to enable the computer to understand the Natural Language. Human language is astoundingly complex and diverse. When we write, we often misspell or abbreviate words, or omit punctuation. There is a lot of unstructured data around us. Natural language processing helps computers communicate with humans in their language and scales other language-related tasks. NLP makes it possible for computers to read text, interpret it, measure sentiment, and determine which parts are important. Understanding this will enable you to build the core component of any conversational chatbot. In this NLP application, we will create the core engine of a chatbot. We will learn text classification using the techniques of natural language processing by using the NLTK library.

Technologies	**Tools**
Development IDE	**Anaconda Navigator**
Programming Language	**Python**
Utilities	**NLTK tool**
Libraries	Regular expression(re), OS, CSV files, Snowball Stemmer, Random SK learn Classifier, Reg exp Tokenizer, Stop words, WordNet Lemmatize, NumPy, pandas

O9.11

9:10 MARKET BASKET ANALYSIS OF CUSTOMER USING ASSOCIATION RULE MINING ALGORITHMS

Varun Gaddamand Ramakalavathi Marapareddy

The University of Southern Mississippi, Hattiesburg, MS, USA

MARKET BASKET ANALYSIS OF CUSTOMER USING ASSOCIATION RULE MINING ALGORITHMS

Varun Gaddamand Ramakalavathi Marapareddy

The University of Southern Mississippi, Hattiesburg, MS, USA

In this Data science project, we perform market basket analysis with the application of association rule mining algorithms such as Apriori and FP- growth algorithms. The analysis of historical data of the customer has highlighted a certain combination of products purchased that make an additional purchase more likely. This association technique is known as market basket analysis which is also termed as MBA. This is a widely used technique to identify the best product association analysis. The set of items a customer buys referred to as an

itemset and market basket analysis seeks to checks the relationships between purchases. Market Basket analysis creates IF-Then scenario rules suppose we have a product A is purchased thenHarish Nuttaki Product B is likely to be purchased. The Association rules are probabilistic in nature or we can say that the words are derived from the frequencies of co-occurrence in the observations. Market Basket analysis is particularly useful for physical retail stores as it can help in planning floor space and product placements. Moreover, form the rules of the customer association can be segmented separately to meet the specific needs of customers with cost-effectiveness by using some special promotions for the general group. These experimental results show that association rule mining algorithms can analyze quickly and effectively informing customer patterns at a retail store and can increase the retail store revenue.

O6.13

9:50 HUMAN ACTIVITY RECOGNITION USING MULTICLASS CLASSIFICATION IN PYTHON

Sai Sri Madhuvani Godala and Ramakalavathi Marapareddy The

University of Southern Mississippi, Hattiesburg, MS, USA

In this human activity recognition project, we use multiclass classification machine learning techniques to analyze fitness datasets from a smartphone tracker. This machine learning project will help you to build a classification system to classify human activities. Human Activity Recognition or HAR is a broad field of study concerned with identifying the specific movement or action of a person based on sensor data. Movements are often typical activities performed indoors, such as walking, talking, standing, and sitting. They may also be more focused activities such as those types of activities performed in a kitchen or on a factory floor wearing a smartphone with embedded inertial sensors. The objective is to classify activities into one of the six activities performed by humans such as walking, walking downstairs, walking upstairs, sitting, standing, laying by wearing a smartphone on the waist. The sensor data is recorded directly on the subject such as by smartphones that have accelerometers and gyroscopes. The experiments have been carried out with a group of 30 volunteers within an age bracket of 19-48 years. Each person performed six activities (walking, walking upstairs, walking downstairs, sitting, standing, laying) wearing a smartphone (Samsung Galaxy S II) on the waist. Using its embedded accelerometer and gyroscope, we captured 3-axial linear acceleration and 3-axial angular velocity at a constant rate of 50Hz. The experiments have been video- recorded to label the data manually. The obtained dataset has been randomly partitioned into two sets, where 70% of the volunteers were selected for generating the training data and 30% for the test data.

Technologies	Tools
Development IDE	Anaconda Navigator
Programming Language	Python
Utilities	Machine learning
Algorithms NumPy, Pandas, Matplotlib, Libraries	Seaborn, HTML, CSV files.

O9.14

10:10 SPRING WEB APPLICATION WITH REST CALLS USING SPRINGBOOT AND JAVA

Harish Nuttaki and Ramakalavathi Marapareddy

The University of Southern Mississippi, Hattiesburg, MS, USA

The objective of this project is to build a Spring Web Application using Spring Boot, Java, and SoapUi. A RESTful Spring Boot Project is very useful in demonstrating and build standalone and production- ready spring applications. It has embedded Tomcat (so no need to deploy war files). No XML configuration is required. Provides optioned 'starter' dependencies to simplify build configuration. RESTful Web Services are basically REST (Representation State Transfer) architecture-based and are lightweight, highly scalable and maintainable, and very commonly used to create APIs for web-based applications. It allows requesting systems to access and manipulate the data. The application is meant for simple demonstration purposes only. The objective is to get acquainted with REST calls and operations, processing the request and response. It gives you the foundation on how to build a web application using Spring Boot and. Aims and Objectives: Build a backend microservice web application using Spring Boot, Java, Maven, and Restful web service. This report highlights a basic outline of the languages and frameworks involved, setup, code flow, and results.

Technologies and Tools:

Framework: Spring Programming Language: JAVA

MavenSOUPUI for triggering the HTTP request Development IDE: STS

10:30 Break

O9.15

10:50 A CLASS OF INTEGRAL OPERATORS ON ZYGMUND SPACES ON THE UNIT DISK

Snehalatha Ballamoole and T. L. Miller

Mississippi State University, Mississippi State, MS, USA

We consider a class of integral operators:

Need equation

on the Zygmund space Z of the unit disk. Specifically, we obtain the boundedness, spectrum, subjectivity and point spectra of $T_{\mu,\nu}$ on Z. We also obtain conditions that are necessary and sufficient for a multiplication operator to be bounded below on the Zygmund space.

O9.16

11:10 SOURCE TO FIND SUBJECT TERMS OF DOCUMENTS IN AUTOMATIC SUBJECT INDEXING OF TEXT

Lixin Yu

Alcorn State University, Lorman, MS, USA

Subject search has the advantage of being specific and consistent comparing with keyword search. It also allows the user to broaden or narrow a search. The bottleneck of the subject search is the subject indexing – to identify the terms representing the subject of a document. This is done by human traditionally, but many studies have been carried out to make this process automatic by computer programs. The amount of work increases drastically from title analysis, abstract analysis, to full-text analysis. Title, abstract, and full-text are the three record components that carries subject information. This study used a set of randomly selected 20 articles in the field of information science. The articles are all full-text with subject terms. This study explores the possibility that the subject terms can be found in title, abstract, and full-text of a bibliographic record. Each record may have multiple subject terms. The result reveals the percentage of subject terms that can be obtained automatically by software from the three record components. The research method and the result could be used as a reference for larger scale studies. If the method is proved to be valid, it can be used by the indexing agencies to form the indexing policy with predictable result. Another

the rest of calls like GET, POST, PUT and DELETE requests and the processing of data with respect to each call. The message

format used in all these request calls will be in JSON representation. These implementations of RESTful calls are ideal for beginners in developing a MICROSERVICE application. Spring Framework is an application framework and inversion of the control container for JAVA platform. The framework's features can be used by any Java application and provide a wide variety of extensions for building a Web application on top of Java. Spring Boot is very useful to create a microservice and build a standalone and production- ready platform. The framework's features can be used by any Java application and provide a wide variety of extensions for building a Web application on top of Java. Spring Boot is very useful to create a microservice goal of this study is to study the chance that a word or its synonym may be one of the subject terms if it shows in more than one of the three record components.

Friday, August 06, 2021
AFTERNOON

12:00-1:00 Plenary Speaker
1:00-3:00 Mississippi INBRE/ Millsaps HHMI Symposia

PHYSICS AND ENGINEERING

Chair: Jason Griggs
University of Mississippi Medical Center

Co-Chair- Pradip Biswas
Tougaloo College

Vice-Chair: Shanti Bhushan
Mississippi State University

Vice-Chair: Ramakalavathi Marapareddy
University of Southern Mississippi

Vice-Chair: Shan Yang
Jackson State University

Thursday, August 5, 2021
MORNING
Room D6
7:50 Welcome
8:00 – 9:40 AM Session I

Moderator: Dr. S. Bhushan

8:00 Keynote Speaker

DOD HIGH PERFORMANCE COMPUTING MODERNIZATION PROGRAM PET/GDIT

Wesley Brewer, PhD

O10.01

8:40 DMD STABILITY ANALYSIS ON THE MOMENTUM DEFICIT GENERATED BY MVG IN TURBULENT SUPERSONIC FLOWS

Yong Yang[1], David K. Rop[2], Yonghua Yan[2], Caixia Chen[3], Bradford Patton[3]

[1]West Texas A&M University, [2]Jackson State University, [3]Tougaloo College

Micro Vortex Generator (MVG) is proved to be a reliable, applicable, and robust device to control the turbulent boundary layer in supersonic flows recently. The ring-like vortices generated by MVG were found to play a critical role in reducing the flow separation with shock boundary layer interaction (SBLI). In this study, the flow behind MVG was investigated by dynamic mode decomposition (DMD). Numerical data of flow structures behind MVG were generated by Large Eddy Simulation (LES) of MVG controlled supersonic turbulent boundary flow at different Mach numbers. Through DMD analysis, the dominant flow structures were obtained. The frequency of the dominant structures matches one of the ring-like vortices very well. In addition, DMD-based spatial stability analysis was performed. Flow snapshots are taken at different streamwise positions. The shear layer stability was analyzed at different streamwise sections behind the MVG. Unstable modes were obtained from the sections that are close to MVG. It validated that the shear layer instability right behind the MVG is the mechanism of the generation of ring-like vortices.

O10.02

9:00 ASSESSMENT OF FLUID FLOW PREDICTIONS FOR TURBULENT FLOW CONDITIONS USING LIQUID METALS

Christopher Pilmaier

Mississippi State University, Mississippi State, MS, USA

The world is continuously finding ways to enhance energy consumption while reducing emissions. Nuclear energy is an appropriate avenue to accomplish this task while minimizing the world's carbon footprint. While effective, nuclear energy is still developing in many ways to optimize distribution. One such principle that this research will test and focus on is predicting fluid flow to evaluate the heat transfer effects in a nuclear power plant. Specifically, this research aims to study liquid-metal cooled nuclear reactors to predict the cooling liquid fluid properties during turbulent fluid-flow conditions. This is done using High-Performance Computers (HPC) to conduct Computational Fluid Dynamics (CFD) analyses on the fluid flow. Such fluid predictions can help the nuclear engineering field understand how these cooling fluids are changing through nuclear-reacting processes. This research is intended to verify previous research conducted in this field while creating in- depth flow simulations and producing mathematical models to be used in the nuclear industry. This will assist the nuclear industry to understand momentum and thermal turbulent diffusion mechanisms in low Prandtl number (Pr) liquid metal flows and develop high- fidelity Large Eddy Simulation (LES) turbulence models to improve CFD predictive capability for nuclear engineering applications. The resulting predictions will be compared to Direct Numerical Simulations (DNS). Quantifying the compared results will yield trustworthy research to be implemented and tested in a nuclear laboratory. The goal of these simulations and models are expected to be presented to a U.S. Department of Energy's (DoE) engineering research center and laboratory to be used for further development of nuclear reacting cooling systems. Useful developments that stem from this research can include designing nuclear cooling systems to maximize heat transfer capacity from liquid metals. Other developing measures can occur from this research such as safety management.

O10.03

9:20 EVALUATING THE VALIDITY OF AN ELASTIC MODULUS MEASUREMENT METHOD FOR POLYMERIC MATERIALS

Megha Satpathy[1], John J. Mecholsky Jr.[2], Nader Abdulhameed[3], Jason Griggs[1]

1University of Mississippi Medical Center, [2]University of Florida, [3]Lake Erie College of Osteopathic Medicine

Introduction: Ultrasonic pulse apparatus along with density apparatus (Archimedes' principle) is a standard method used to calculate elastic modulus (E) of materials. However, the ultrasonic pulse apparatus is not available in many research laboratories. In this project, we tested the ability of a microhardness indentation test (a more common instrument) to calculate elastic modulus of polymers and resin composites.

Methods: Four specimens were prepared from each of the following polymers :polymethylmethacrylate sheet, epoxy, cast polymethyl-methacrylate and polymethylpentene. Young's modulus (E) measurements for the samples were carried out using 2 methods: (a)

ultrasonic pulse velocity (ASTM D2845) and (b) an indentation technique that was originally developed for use on ceramics (Marshall et al., 1982). The a*, b* and bR values were measured from the Knoop indentation, and the Vickers' hardness (H) was measured from the Vickers' indentation. The corresponding data for resin composites was obtained from a study by Abdulhameed et al. Using these parameters, a plot of bR/a* vs H/E was constructed, and linear regression was used to formulate the equation similar to the one tested for ceramics in the study by Marshall et al. **Results and Discussion:** An equation relating H/E to bR/a* of polymers and resin composites was constructed. The slope of this equation (-0.99) was different from that of ceramics (-0.45), but the intercept was the same (0.14). **Conclusion:** We concluded that laboratories without an ultrasonic pulse apparatus may use a microhardness indenter (more common instrument) to estimate the stiffness of polymers and resin composites.

9:40 – 10:20 **Break**

10:20– 12:00 **Session II**

Moderator: Dr. Ramakalavathi Marapareddy

O10.04

10:20 DIFFERENTIATION OF WHITE AND GREY MATTER IN PARAMETRIC IMAGES OF SHEEP BRAIN WITH ULTRASONIC SLOPE OF ATTENUATION

Claudia Kendyl MacGregor Chambliss[1], Cecille Labuda[1], Will K. Newman[2], Brent Hoffmeister[2]

[1]University of Mississippi, University, MS and [2]Rhodes College, Memphis TN, USA

In this work, the frequency slope of attenuation (FSA) in sheep brain specimens was measured at multiple locations to generate parametric images that characterize its spatial distribution. The goal was to determine whether grey and white matter can be differentiated in a single specimen by measuring the FSA in regions containing only grey matter and only white matter. Tissue specimens were 1-cm- thick slices of preserved sheep brain prepared from the transverse cardinal plane. Ultrasonic measurements were performed using broadband transducers with center frequencies of 3.5, 5.0, 7.5 and 10 MHz. The transducers were mechanically scanned to acquire signals over entire specimens. The FSA was calculated at each scan location and these values were imported into image processing software to generate the parametric images. By comparing the parametric images to photographs of the specimens, regions of interest (ROIs) containing white matter were selected in the parametric images and similarly, ROIs containing grey matter were selected. The average FSA was measured in each ROI along with the standard deviation. Measured values in white matter for the mean and standard deviation over all samples and frequencies of the FSA ranged from 0.634 – 1.459 dB/cm MHz and 0.019 – 0.169 dB/cm MHz respectively. For grey matter FSA ranged from 0.429 – 0.955 dB/cm MHz with standard deviation ranging from 0.016 – 0.08 dB/cm MHz. These results indicate that the spatial mean of the FSA is higher for white matter than for grey matter and thus a high probability of differentiating these types of matter in a single specimen.

O10.05

10:40 CHRONIC KIDNEY DISEASE PREDICTION USING MACHINE LEARNING

Anusha Chirla, Ramakalavathi Marapareddy

The University of Southern Mississippi, Hattiesburg, MS, USA

The objective of this project is to predict whether the patient has chronic kidney disease or not. Chronic kidney disease (CKD) is a worldwide public health problem, with adverse outcomes of kidney failure, cardiovascular disease, and premature death. According to the latest published evidence, CKD has resulted in almost one million deaths worldwide and is the direct cause of one out of 57 fatal outcomes. The major problem faced by the CKD-affected persons was not diagnosed until the final stages. With the use of the Machine Learning model, there will be no limitation of the complexity in increasing the number of variables. The performance of classification models with different classification algorithms will be used to predict the CKD and non-CKD status of patients. This model trains and tests the given factors which cause Chronic kidney disease and with best- performing machine learning algorithms it can effortlessly predict the result of the patient with much higher accuracy than the traditional model. The objective of this project is to predict whether a patient is infected by Chronic Kidney disease (CKD) using Jupyter Notebook, HTML, Flask, and Machine Learning algorithms. A machine learning algorithm i.e., Date Tree classifier will be a good model in terms of accuracy to predict whether the patient is infected by chronic kidney disease. This report highlights a basic outline of the languages and frameworks involved, setup, code flow, and results. Technologies and Tools: Programming Language: Python, Jupyter Notebook, Anaconda Prompt, Front End: Html, Python Web Framework: Flask.

O10.06

11:00 DRIVER DROWSINESS DETECTION SYSTEM WITH OPENCV AND DEEP LEARNING

Venkatesh Gutta, Ramakalavathi Marapareddy

The University of Southern Mississippi, Hattiesburg, MS, USA

Drowsiness detection is a safety technology that can prevent accidents that are caused by drivers who fell asleep while driving. The objective of this Python project is to build a drowsiness detection system that will detect if a person's eyes are closed for a few seconds. If so, this system will alert the driver when drowsiness is detected. Machine learning focuses only on solving real-world problems. In addition, it takes few ideas of artificial intelligence. Moreover, machine learning does through neural networks. These are designed to mimic human decision-making capabilities. Machine Learning tools and techniques are the two key narrow subsets. That only focuses more on deep learning. This security system will be developed using the most popular programming language Python. Python is an object-oriented language, which means that it can model real-world entities. It is dynamically typed because it carries out type checking at runtime. This report highlights a basic outline of the languages and frameworks involved, setup, code flow, and results. Hardware Requirements: Processor: i3 or higher, RAM: 8GB or higher, Hard disk: 1 GB or higher, GPU: (Optional if you have a higher RAM and the latest processor). Note: I used a system with an i7 processor, 8GB RAM. Software requirements: Operating System: Windows or Linux, Python 3+, PyCharm, Cascade Trainer GUI, Libraries Required: Numpy, OpenCV, Pandas.\

O10.07

11:20 PREDICTION OF COVID 19 DEATH RATE USING KALMAN FILTER ALGORITHM

Krishna Chaitanya Nunna, Ramakalavathi Marapareddy

The University of Southern Mississippi, Hattiesburg, MS, USA

The novel coronavirus disease 2019 (COVID-19) pandemic continues to possess a destructive effect on the health and well-being of the worldwide population. an important step within the battle against it is the successful screening of infected patients, alongside one among the effective screening methods being radiology examination using chest radiography. Recognition of epidemic growth patterns across temporal and social factors can improve our capability to make epidemic transmission designs, including the critical job of predicting the estimated intensity of the outbreak morbidity or mortality impact at the top. The study's primary motivation is to estimate with a particular level of accuracy the number of deaths because of COVID-19, managing to model the progression of the pandemic. Predicting the number of possible deaths from COVID-19 can provide governments and decision-makers with indicators for purchasing respirators and pandemic prevention policies. Thus, this work presents itself as an important

contribution to combating the pandemic. Kalman Filter is a widely used method for tracking and navigation and filtering and time series. So here we use the Kalman filter algorithm to predict the covid 19 deaths by taking the population worldwide data set, confirmed, recovered, and death cases data set using time series plot. Here, 3 months of time series data is taken and plotted for 1 day and 1-month estimation of the most affected countries death rate and the clear stimation of USA death rate of COVID-19.

O10.08

11:20 THE BASIC PHYSICS BEHIND COVID-19 SOCIAL DISTANCING LIMITS

Jamie Bozeman, Jerbrea Powell, Pradip Biswas

Tougaloo College, Tougaloo, MS, USA

On March 11, 2020, four months after its discovery, the World Health Organization (WHO) declared a global pandemic due to widespread cases of Coronavirus Disease 2019 (COVID-19). This global health crisis has led to drastic changes in everyday life and has significantly impacted human beings worldwide. The transmission mechanism of the virus is still not fully understood, but it is being heavily studied. Infected persons release the virus, SARS-CoV-2, through respiratory droplets as they speak or breathe. The World Health Organization and the Centers for Disease Control and Prevention (CDC) released guidelines to help contain the spread of COVID-19. Individuals were advised to stay home when possible, wear masks, sanitize hands and surfaces, and social distance at a minimum of six feet when in public spaces to avoid direct exposure of the virus from other individuals. As the respiratory droplets carrying the virus travel through air, their trajectory is fully guided by a fundamental principle in physics– projectile motion. Using findings from previously published literature on the possible speed and angle ranges of aerosol particles, we studied the motion of the aerosols in two dimensions. Our study aims to understand the trajectory and maximum distance aerosols travel based on various physical conditions. The speed and releasing angle in which aerosol particles travel vary from both males and females when either speaking or coughing. Simple application of a two-dimensional projectile motion shows that the horizontal distance traveled by an aerosol could reach 4.45ft (1.358m) when the source and the receiver are at the same heights and when air drag is not taken into consideration. To reveal the effect of the air drag forces on the aerosols, we solved the second order differential equations numerically. We found that the air drag forces reduce the effective horizontal distance. However, wind can carry the aerosols further increasing the effective horizontal distance and hence the possibility of airborne transmission. Our results reveal how the application of simple physics can provide us with basic guidelines for safest social distancing under various conditions to avoid airborne transmission.

12:00 General Session

Thursday, August 5, 2021

AFTERNOON

Room D7

1:15 – 3:15 Session III

Moderator: Dr. Luca Bombelli

O10.09

1:20 COMPUTATION OF BINARY BLACK HOLE SPIN TILTS AT INFINITY

Sumeet Kulkarni

University of Mississippi, University, MS, USA

The LIGO & Virgo ground-based gravitational wave observatories record a characteristic chirping strain signal that rises in frequency as the black holes get closer and finally merge. From this signal, it is possible to infer several parameters of the binary, like: How heavy were the black holes? At what sky location and distance did they merge? How fast were they spinning? And more importantly, it gives us their tilts angles i.e. the angle at which their spin axis is oriented with respect to the the orbital angular momentum of the binary. Knowing the tilt angles is important for figuring out how the black holes formed: as an isolated binary or through dynamical interactions in a cluster environment.The tilts inferred by the LIGO-Virgo parameter estimation are given at a fiducial reference frequency where the gravitational wave signal starts appearing in the detector, for eg. 20 Hz. Evolving them back in time to lower frequencies provides a good approximation (accuracies of a few percent or better) to the tilts at binary formation. Additionally, quoting the tilts at this formally infinite separation removes the arbitrariness associated with quoting them at areference frequency. In this work, we present a hybrid framework that evolves tilt angles to infinite separation, using orbit-averaged and precession- averaged evolution equations. We present an empirically determined transition frequency to make the switch between the two evolution equations, and show an application of this code to selected events from the LIGO-Virgo O3a catalog of gravitational wave detections.

O10.10

1:40 IDENTIFICATION AND CLASSIFICATION OF DRONES USING KNN

Jaya Sai Gopi Krishna Paruchuri, Ramakalavathi Marapareddy

The University of Southern Mississippi, Hattiesburg, MS, USA

Flying drones in safety zones are strictly prohibited. However anti- social elements are likely to hit important targets in such zones, by using drones. The aim of this project is to continuously monitor safety zones using images and raise an alarm as soon as a Drone is detected. This project contains three modules: DII (Drone Image Input) module is used to provide different drone images as input for the system. The DI (Drone Identification) module is used to monitor the images of the safety zone and to identify drones when they enter the safety zone. The 'alarm' module is used to send the message to the safety officers as soon as a Drone is detected in the safety zone. This project uses the OpenCV algorithm to identify different types of drones and a distance calculation algorithm to measure the distance of the Drone from the safety zone. The images of various types of drones are stored in an image file system. The file system will be stored at a specific location in the directory structure. The location will be fed as input to the system. KNN (K-Nearest Neighbors) classification is used to classify the drone as one of the drone's types. The KNN algorithm is a non- parametric method used for classification. The input consists of the k closest training examples in the feature space. The output is a class membership. An object is classified by the class that is most common among its k nearest neighbors. The classification is based on the length, width, height, and curvature of the drones. Vision: The project aims at developing a tool for providing security to the important structures against Drone attacks, with all the above-mentioned advantages. Mission: This tool is developed by using Python along with its layout toolkit PyQt, PyUIC along KNN classification. Project Advantages: The project is very useful to the security officers, as they get immediate security alerts when any drone enters the security zone. The project useful, as it provides security, to the lives and important properties, against the attacks of Drones.

O10.11

2:00 UNIVERSALITY IN ACTIVATED BARRIER CROSSING

Sudeep Adhikari, Kevin S.D. Beach

University of Mississippi, University, MS, USA

The thermal activation process by which a system passes from one local energy minimum to another by crossing an energy barrier is a recurring motif in physics, chemistry, and biology. For instance, biopolymer chains are typically modeled in terms of energy landscapes, with folded and unfolded configurations represented by two distinct wells separated by a barrier. The rate of transfer from the unfolded to folded state depends most importantly on the height of the barrier with respect to the temperature of the heat bath---but also in seemingly idiosyncratic ways

on the details of the shape of the barrier. We consider the case of bias due to an external force, analogous to the pulling force applied in optical tweezerexperiments on biopolymers. We identify universal behavior of the barrier crossing process and demonstrate that data collapse onto a universal curve can be achieved for simulated data over a wide variety of energy landscapes having barriers of different height and shape.

O10.12

2:20 D DECAYS USING DIAGRAMS AND SU(3) MATRIX ELEMENTS

John Waite

University of Mississippi, University, MS, USA

Analysis of D meson decays to two pseudoscalar mesons is typically done either through a diagrammatic approach or using SU(3) matrix elements. Looking primarily at the Cabibbo-Favored decays using both schemes and it can be shown that each method works well only after making some dynamical assumptions. Through the use of $\chi 2$ minimization techniques the dynamical assumptions that give the best agreement with the data currently available are identified. An explicit relationship between the diagrams and the matrix elements is also established. **Conclusion**: MCT was found to be a reliable method of making linear measurements, and the 3D models had a good resemblance to the physical specimens. Although the DataViewer and Mimics software packages gave us different values of measurements, this could be rectified by assigning the appropriate pixel value in Mimics. In future, the 25 design parameters will be screened using DOE++ to evaluate their significant effects on fatigue lifetime of the implant. NIH grant R01 DE026144.

O10.13

2:40 ABEL TRANSFORMS OF CAVITY RINGDOWN SPECTROSCOPY MEASUREMENTS IN NITROGEN/OXYGEN MIXTURES IN THE PRESENCE OF ALPHA RADIATION

Sidney Gautrau, Tyler Reese, Patrick Ables, Chris Winstead The

University of Southern Mississippi, Hattiesburg, MS, USA

Cavity Ringdown Spectroscopy (CRDS) has previously been used to measure the concentration of chemical products created along a centered beam path as a result of alpha radiation interactions in a controlled atmosphere. Current work uses Abel transforms to investigate the unknown symmetric distribution of chemical products from CRDS's measurements taken along off-center beam paths. Preliminary measurements have been performed in a stainless- steel vacuum chamber interfaced with a gas introduction system that controls the initial atmospheric composition. CRDS measurements were made for ozone production resulting from Polonium-210 alpha radiation interactions in nitrogen-oxygen mixtures. Using a pneumatically actuated stainless-steel shield to control source exposure and an adjustable source holder and shield to allow for repositioning, the position of the Polonium-210 alpha sources was changed relative to the beam path before each run for Abel transforms. The talk will briefly review ionizing radiation, ozone formation, CRDS, Abel transforms, and the vacuum/optical system used for measurements. Preliminary results showing the rapid production of ozone following exposure of the alpha radiation to the controlled atmosphere at different starting positions as well as the results from an Abel transform will be presented. Current work status as well as future works will also be discussed.

Thursday, August 5,

2021 EVENING

3:30 Dodgen Lecture and Awards Ceremony (B5-6)

General Poster Session

(Immediately Following Dodgen Lecture C-Poster Hall)

Divisional Posters

P10.01

EMERGING TECHNOLOGIES TO IMPROVE EMERGENCY MANAGEMENT

HuiRu Shih, Amaris Edwards, Kionna J. Taylor

Jackson State University, Jackson, MS, USA

There has been continued advancement in emergency response technology in hopes of providing a more efficient, rapid response to emergencies. Among these many emerging technologies include Internet of Things, data analytics, artificial intelligence, and virtual reality. An emergency management plan needs to make maximum use of the best information available and deliver it to the key stakeholders. Data analytics can help deliver the best information to emergency management professionals during a disaster. The Internet of Things (IoT), a rapidly emerging framework, connects a variety of objects to the Internet by using wireless/wired technologies to reach desired goals. As it relates to emergency management, IoT can be used to enhance data collection from the physical environment, quickly communicate this data to different emergency management agencies, and prevent disasters from spreading out of control. Artificial Intelligence (and machine learning) can help disaster and emergency management efforts. For instance, Artificial Intelligence (AI) can be used to analyze disaster-related data for patterns, identify at-risk areas, and model future needs. Virtual Reality (VR) can give a realistic perspective of what is being viewed, very similar to attending in person. Virtual reality technology opens doors to multiple opportunities in the field of innovative training and education. New technology can have tremendous benefits to our society and the way we handle emergency management. Technology presents the opportunity to transform disaster response efforts and help communities to develop resilience for when the next disaster strikes. Enter Title on the line above which states title in capital letters. Then add your abstract here: Include an introduction, methods, results, and brief discussion and conclusions.

P10.02

EXPLORING MANIFOLDLIKE CAUSAL SETS AND THEIR DIMENSIONS

Santosh Bhandari, Luca Bombelli

University of Mississippi, University, MS, USA

Introduction: Causal Set Theory is an approach to quantum gravity that tries to replace the continuum spacetime structure of general relativity with the spacetime that has the property of discreteness and causality. From the standpoint of causal set theory, our spacetime is made up of discrete points that are causally related to one another. A causal set is said to be manifoldlike if it can be faithfully embedded in a Lorentzian manifold. One of the fundamental features of Manifoldlike Causal Sets is discussed in this presentation. **Methods:** One of the ways of obtaining a Manifoldlike causal set is by taking a Lorentzian Manifold and randomly sprinkling points in it. My presentation will talk about this method of obtaining a manifoldlike causal set in both flat and curved spacetime in detail. In addition to it, my presentation discusses one of the fundamental properties of the causal set, i.e., Dimension. In particular, two different ways of obtaining Dimensions of a manifoldlike causal set are mentioned: Modified Myrheim–Meyer dimension Estimator and Midpoint Scaling Dimensional Estimator. The Modified Myrheim–Meyer dimension Estimator calculates the dimension by counting the number of k-length chains in a causal set, whereas Midpoint Scaling Dimensional Estimator uses the relationship between proper time between points and volume element to calculate dimension. **Results:** Manifoldlike Causal Sets are hard to obtain in a conventional way where one would take causal sets and identify if they can be embeddable within a Lorentzian Manifold. The Modified Myrheim– Meyer dimension Estimator has a less statistical error when calculating dimensions in flat spacetime than the Midpoint Scaling Dimensional Estimator **Conclusions:** The Modified Myrheim–Meyer dimension Estimator

provides a better approximation of dimensions in flat spacetime than the Midpoint Scaling Dimensional Estimator.

P10.03

CURVED SPACETIME IN THE CAUSAL SET APPROACH TO QUANTUM GRAVITY

Ayush Dhital

University of Mississippi, University, MS, USA

Causal Set theory is an approach to quantum gravity. In the viewpoint of causal set theory, the spacetime continuum is discrete rather than continuous at the most fundamental level. The discrete points in a causal set can approximate a spacetime continuum if they can be embedded in a manifold such that the causal structure between every pair of points is preserved. We sprinkled points inside a causal diamond uniformly during our research with the use of computer- generated random number r ∈ [0 1]. These sprinklings were done for the number of points ranging from 100 to 1000 at an interval of 100 points. The sprinkling of points randomly and uniformly inside the causal diamond, which was dictated by the spacetime metric, was used to obtain the relations matrix R. Finally, with the use of this relations matrix R, chain-length distributions were obtained. Chains of length greater than two were used to acquire information about the dimension and curvature of the manifold the causal set was embedded into. The dimension was estimated with the aid of chains of length three for two and higher dimensional flat spacetime manifold. Similarly, the scalar curvature of several spacetime manifolds (Minkowski, de Sitter, and Anti-de Sitter) was approximated using chains of length three. These results, averaged over fifty causal sets with the number of points ranging from 100 to 1000 with 100 point increments, demonstrated excellent accuracy with minimal fluctuations from the continuum limit even for a 100 point causal set.

Friday, August 6, 2021

MORNING

Room D10

7:50 Welcome

8:00 – 9:20 AM Session

IV Moderator: Dr. Cecille Labuda

O10.14

8:00 OVERVIEW OF CAUSAL SET THEORY

Luca Bombelli

University of Mississippi, University, MS, USA

This talk will present a review of the current status of the causal set approach to quantum gravity, and is intended for a non-specialist audience. I will start with a review of the motivation for quantum gravity, followed a by brief overview of some of the approaches to the theory and of what we expect it to say about the structure of spacetime. I will then summarize the mathematical concepts used in the causal set approach, based on discrete combinatorial structures, and some results on the main aspects of the theory -- kinematics, dynamics, and phenomenology. A greater emphasis in the talk will be placed on kinematics, or the study of how we can establish a correspondence between these discrete structures and the continuum spacetime of modern gravity theories such as general relativity. This has been the focus of much of the work by the quantum gravity group at the University of Mississippi in recent years.

O10.15

8:20 INVESTIGATING THE PERFORMANCE LIMITATIONS OF THE AVERAGED LOSS METHOD WHEN COMPARED TO MONTE CARLO SIMULATIONS OF ELECTRON IMPACT EFFECTS IN MOLECULAR NITROGEN AT VERY LOW ENERGIES

Tyler Reese and Chris Winstead

The University of Southern Mississippi, Hattiesburg, MS

When predicting the effects of relatively low energy electron collisions on molecular Nitrogen, the Averaged Loss method has previously been shown to offer a significant reduction in required runtime when compared to Monte Carlo simulations while maintaining a reasonable agreement between the results generated by the two methods. One distinct exception to this agreement shows up in the prediction of occurrences of the molecular excitation state with the lowest energy threshold. An investigation into what causes this difference was conducted as well as what energy range along the incident particle's interaction history contributes most to this issue. This presentation will include both the methods for exploring these properties as well as the results found regarding the energy dependence of this phenomenon. Additionally, potential solutions to this issue will be discussed.

O10.16

8:40 G-2 AND B TO K PI WITH AXION LIKE PARTICLE

Alakabha Datta

University of Mississippi, University, MS, USA

We propose a solution to the long standing B to K pi puzzle and the recent g-2 of the muon from the Fermilab experiment in terms of an axion like particle with mass near the neutral pion. This new particle can be observed via a careful search of di photon final states near the neutral pion mass.

O10.17

9:00 SPATIAL VARIATION OF SPEED OF SOUND AND FREQUENCY SLOPE OF ATTENUATION IN FIXED SHEEP BRAIN TISSUE

Cecille Labuda[1], Will R. Newman[2], Brent Hoffmeister[2]

[1]University of Mississippi, University MS, USA and [2]Rhodes College, Memphis, TN, USA

Brain specimens are inhomogeneous due to their composition of different tissue types (gray and white matter), anatomical structures within the brain (such as the thalamus and cerebellum), and cavities in the brain (the ventricles). These inhomogeneities give rise to spatial variations of the ultrasonic speed of sound and attenuation as well as other ultrasonic properties. In this work, we report on the spatial variation of the speed of ultrasound and frequency slope of attenuation in sheep brain specimens. The specimens used in this study were 1-cm thick slices cut from whole sheep brain in the coronal, sagittal and transverse cardinal planes. Four samples from each cardinal plane were used in this study. Ultrasonic measurements were performed using broadband transducers with center frequencies of 3.5, 5.0, 7.5 and 10 MHz. The transducers were mechanically scanned to acquire signals over entire samples and parametric images of the speed of sound and frequency slope of attenuation were produced. Spatial variation of the ultrasonic properties are clearly visualized in the parametric images and white and gray matter are distinguishable by inspection in the parametric images. Over all samples and frequencies, the spatial mean and standard deviation of the frequency slope of attenuation was 0.75 ± 0.3 dB·cm-1·MHz-1. Measured values for the spatial mean and standard deviation of the speed of sound over all samples and frequencies was 1535 ± 12 m/s. The FSA and SOS are consistent with values in the published literature.

9:20 Break

Workshop: 9:30 – 11:00 AM

CONVINCING OTHERS TO SUPPORT YOUR RESEARCH

Jason A. Griggs, PhD, FADM

University of Mississippi Medical Center, Jackson, MS, USA

Friday, August 6, 2021

AFTERNOON

12:00-1:00 Plenary Speaker

1:00-3:00 Mississippi INBRE/ Millsaps Symposia

PSYCHOLOGY AND SOCIAL SCIENCES
Chair: Shaila Khan
Tougaloo College

NEUROSCIENCE SYMPOSIUM
Chair: Nicolas Brunet
Millsaps College

Thursday, August 5, 2021
MORNING
Room D8

8:50 WELCOME

PSYCHOLOGY AND SOCIAL SCIENCES

O11.01

9:00 THE BIG FIVE MODEL, EMOTIONAL INTELLIGENCE, AND ACADEMIC PERFORMANCE ACROSS ACADEMIC DIVISIONS

Caitlin Fisher and Shaila Khan

Tougaloo College, Tougaloo, MS, USA

Emotional intelligence can be used to predict academic performance; Also, it is possible that emotional intelligence is stronger among the students in some majors than others; specifically, social science majors possess stronger emotional intelligence than other academic. The purpose of the present study was to determine whether the Big Five Model (BFM) and Emotional Intelligence (EI) would differ significantly by academic division, academic performance, gender, classification and age. It was also hypothesized that a significant relationship exists between the BFM and EI. The target population included eighty (66 females; 14 males) undergraduate participants (18 and 28 years old). The participants were contacted through email, social media, and messaging apps, and given link to the questionnaire located on Microsoft Forms. Each participant were given the Emotional Intelligence Inventory (Goleman 2006), with 25 items, the The Big Five Model (BFM) inventory (John 1990), with 50 items and some demographic questions. ANOVA results showed no significant difference in BFM and EI between academic divisions or GPA. However, there was a significant positive relationship between EI and four of the five traits of BFM, which were extraversion (r= .367**, p=.001), consciousness (r=.235* p=.036) emotional stability (r=.341** p=.002) and openness to experience (r=.363** p=.002). T- tests results showed a gender differences in EI (t (78) =-3.779, p=.000), extraversion (t (78) = -2.13, p = .044) and emotional stability (t (78) = -2.638, p=.010). This research is important for college students to discover their emotional intelligence and personality types to help them choose their major.

O11.02

9:15 LEARNING STYLES AND MATH ANXIETY: A GENDER STUDY AMONG AFRICAN-AMERICAN COLLEGE STUDENTS

Kiesha Hardison and Shaila Khan

Tougaloo College, Tougaloo, MS, USA

Students that get nervous at the thought of a math teacher asking them a question, assigning math homework, can make the student extremely anxious. Therefore, the link between knowing your learning style and dealing with math anxiety can result in academic success. The purpose of this study was to determine if there is a relationship between learning styles and math anxiety among African American College students. It was hypothesized that there would be a positive correlation between learning styles and math anxiety. It was also hypothesized that learning Styles and math anxiety will vary according to gender, age, and classification. Eighty (80) college students, (females=62, males=21) between the age range of 18-24 were recruited from an HBCU institution. The materials included a demographic sheet, 15-item "Learning Styles Questionnaire," and 10- item "Math Anxiety Questionnaire." The participants through social media were distributed the Microsoft Forms. The results showed a positive correlation between only visual learning styles and math anxiety (r = .278, p = -.05). T-test results showed no significant gender difference in Visual Learning (t (81) = -1.113, p =.269), in Auditory Learning (t (81) = -0.98, p =.9220 and in Kinesthetic Learning (t (81), = -.416, p =.678). Additionally, Math Anxiety also had no significant gender differences (t (81) =-.672, p=.239). Mathematics anxiety is one psychological factor that affects students' achievement, and their general practices and facilitators/teachers should strive to understand mathematics anxiety and implement teaching and learning strategies and study habits that can help them overcome anxiety.

O11.03

9:30 IMPACT OF THE COVID-19 PANDEMIC ON WORK PRODUCTIVITY FOR AFRICAN AMERICAN MOTHERS

Tyra Franklin and Carman Lewis

Tougaloo College, Tougaloo, MS, USA

The purpose of this study was to identify whether there was a relationship between the impacts of the Covid-19 pandemic (Covid- 19—a period during which the work and home environment were disrupted e.g., increased frequency of telecommuting and children completing school from home) ((Mustajab, Bauw, Rasyid, Irawan, Akbar, & Hamid, 2020) and work productivity for African-American mothers. The projected hypothesis is that there is a relationship between the Covid-19 pandemic and work productivity. A total of 90 employed African American mothers were asked to report on their distress caused by the Covid-19 pandemic (i.e., The Covid-19 Exposure and Family Impact Survey) and their work productivity (i.e., The Endicott Work Productivity Scale). A Pearson correlation indicates that there is a Positive relationship. The null hypothesis was rejected, and the alternative/ research hypothesis was accepted. When southern and non-southern residents were examined separately, both exhibited a positive significant correlation, but the difference lied within the strengths of the correlations. The correlation between the impacts of the Covid-19 pandemic and work productivity for southern African American mothers yielded a low positive correlation (r=.395**, p=0.01), and the non-southern mothers also demonstrated a high positive correlation (r=.750* p=0.01). The findings in this study are important because they provide access to pandemic research on minority populations disproportionately affected by the pandemic and isolates specific components of work productivity to operationalize the definition. It can be used to inform African American mothers of the psychological distress associated with the Covid-19 pandemic.

O11.04

9:45 THE RELATIONSHIP BETWEEN COVID-19 DISTRESS AND ANXIETY IN AFRICAN AMERICANS

Frankeya Weatherspoon and Carman Lewis

Tougaloo College, Tougaloo, MS, USA

Recently, questions have arisen as to how the COVID-19 pandemic has increased anxiety in African Americans. Most published studies involve samples from other countries, such as China. Upon review, there are no published studies that assess COVID-19 stress in relation to anxiety with an African American sample. The purpose of this study is to investigate if there will be a relationship exists between COVID-19 distress and anxiety in African Americans. The predicted hypothesis was that the COVID-19 pandemic did not increase levels of distress and anxiety in African Americans. To investigate such a relationship, 80 African Americans between the ages 18 to 40, 16 males and 64 females,

were recruited and provided data. For data collection, the COVID-19 Per traumatic Distress Index (CPDI) and Generalized Anxiety Disorder 7-item (GAD-7) have been used. Pearson correlation analysis rejected the predicted hypothesis and accepted the null hypothesis. The results of the study indicate that there is a positive relationship between COVID-19 distress and anxiety in African Americans (r =.586** p= 0.01). It can be concluded that the COVID-19 pandemic did increase distress and anxiety levels. This research is important because the effects of distress and anxiety of the pandemic have received less attention than the physical effects of the corona-virus. This research offers an effective, accessible method for determining the nature of stressors affecting African Americans. It also provides a way of establishing baseline data for subsequent longitudinal studies of African Americans.

10:00 Break

O 11.05

10:15 HOW PSYCHOLOGICAL DISTRESS IS ASSOCIATED WITH LEVEL OF OUTNESS IN GAY, LESBIAN, AND BISEXUAL

Karinton T. Johnson and Jennifer Miller

Tougaloo College, Tougaloo, MS, USA

The level of outness and psychological distress of lesbian, gay, and bisexual (LGB) individuals can serve a significant part of their everyday lives. The level of outness a LGB individual is, can determine or affect their level of psychological distress. The level of psychological distress and outness can differ depending on the race, identity, age, and social factor. This study was to determine if there is a relationship between level of outness and psychological distress among individuals who identified as gay, lesbian, or bisexual. The data for this investigation was collected from 80 individuals who identified as LGB, through an online survey. The data was collected during the COVID-19 pandemic. Consistent with the hypotheses, there was a positive relationship between psychological distress and level of outness, but the relationship is weak (r = .237, p = .031). Higher psychological distress was found in individuals who were the most out. Black LGB individuals, who were the majority race in this data collection (n=44), were found to be the least out (3.63). Also, they were the least out to their religion groups and in general (F(5, 77) = 2.142, p = .069). Lesbians were reported to be the most out of all the identities that were taken for collection of data (4.57).

O 11. 06

10:30 WHO'S GOT YOUR BACK? A PRELIMINARY ANALYSIS OF FACTORS RELATED TO WOMEN'S HEALTHCARE UTILIZATION

TyKera Marrow, Dawn Bishop Mclin and Natasha N. Hardeman

Jackson State University, Jackson, MS, USA

This pilot research was conducted to examine women's perceptions of discrimination and its impact on health-related outcomes, including healthcare utilization and overall trust in the healthcare system. Previous research has found that group-based medical mistrust, centrality (Black Racial Identity), and perceived social support, particularly peer support, collectively account for 24% of the variance in perceived discrimination (Marrow, 2020). This research is vital in understanding how discrimination, particularly in healthcare settings, negatively impacts gender minorities, potentially contributing to dichotomies in health outcomes. Data were collected via a Qualtrics link posted to Facebook and from an in-person site. Of the 106 responses collected, data were analyzed from participants at the Lakeland Premier Women's Clinic in Flowood, Mississippi (n = 38). Of those participants, the majority married (42%), mothers (74%), had insurance (95%), and access to a primary care physician (84%). A correlational analysis yielded a significant negative relationship between medical mistrust and healthcare utilization, $r(33) = .57$, $p < .01$ over the last year. Additionally, a significant positive relationship was identified between factors of healthcare utilization, healthcare satisfaction and accessibility, $r(37) = .33$, $p < .05$, as well as with affordability, $r(37) = .46$, $p < .01$. The regression model comprised medical mistrust, healthcare utilization, satisfaction, accessibility, and affordability; however, none of the predictors significantly projected variance in the dependent variable. Thus, future research should further investigate healthcare utilization factors concerning medical mistrust to better understand their potential contributions to health disparities and patient-practitioner relationships.

O11.07

10:45 COVID-19 STRESSORS AMONG HISTORICALLY BLACK UNIVERSITY STUDENTS

Lashanda Brumfield

Dillard University, New Orleans, LA, USA

Introduction: As of 2019, the Annual Report of the Center for Collegiate Mental Health [2] reported that anxiety continues as the most common problem among students who completed the Counseling Center Assessment of Psychological Symptoms, with 67.7% of 82,685 respondents participating in the report. Clinicians also reported that anxiety continues to be the most common diagnosis of the students that seek services at on-campus counseling centers. Mental illness can affect students' motivation, concentration, and social interactions, and college success. (Unger, 2007). The effects of the lockdown and stay-at-home orders have brought a negative impact on higher education. It has brought into focus the mental health of various affected populations and the many disparities facing them, as well as the need for more programming aimed to serve students at historically black universities. A recent review of virus outbreaks and pandemics documented stressors such as infection fears, frustration, boredom, inadequate supplies, inadequate information, financial loss, and stigma (Lai, 2020). Much of the current literature on the psychological impacts of COVID-19 has emerged from the earliest hot spots in China. Although several studies have assessed mental health issues during epidemics, most have focused on health workers, patients, children, and the general population (Xie 2020 &Kirginger 2020). **Methods:** This study will focus on the effect of anxiety and depression on the student body of Dillard University, as a result of the Covid-19 pandemic, and its effect on students' ability to matriculate through studies successfully. Students will be emailed a survey to assess their past and current experiences with anxiety and depression. **Results:** Results will be analyzed using SPSS. **Conclusion:** The result will be used to assist with identifying a baseline need for future university programming needs that are anticipated to be funded by way of an applied grant through the Baylor University School of Medicine; to better serve the disparities faced by the students on the Dillard University Campus, as a result of the Covid-19 pandemic.

O11.08

11:15 IDENTIFYING AND ADDRESSING HEALTH DISPARITIES IN BIPOLAR DISORDER

Vladimir Tchikrizov[1], Mark E. Ladner[1], Felicia V. Caples[2], Monica J. Taylor-Desir[3],Mark A. Frye[3], Joyce E. Balls-Berry[4], Eric Vallender[1]

[1]University of Mississippi Medical Center, Jackson, MS, USA, [2]Jackson State University, Jackson, MS, USA, [3]Mayo Clinic, Rochester, MN, USA,[4] Washington University, St. Louis, MO

Introduction: Racial and gender disparities in diagnosis and treatment strategies for bipolar disorder have long been recognized. Both systemic racism and biological differences in patient populations have been suggested as relevant factors, but modern studies have largely focused on white populations without addressing these underlying concerns. **Methods**: Demographics associated with diagnosis and treatment of bipolar disorder locally and nationally were compared using patient records from UMMC's Patient Cohort Explorer and the All of Us Dataset v4 respectively. A community advisory board and patient survey were used to examine concerns and motivating factors related to research on

bipolar disorder and willingness to participate. **Results:** Locally and nationally, white patients are significantly more likely to be diagnosed with bipolar disorder than Black patients; the inverse being true for schizophrenia. White patients with bipolar disorder are significantly more likely to be treated with lithium, anticonvulsants, and antidepressants, while Black patients with bipolar disorder are significantly more likely to be treated with first generation antipsychotics. While Black patients voiced unique concerns surrounding issues of trust and privacy, this did not translate to decreased likelihood in participation in research. Conversely, across all races, those individuals unlikely to participate in research cited a lack of positive motivating factors. **Discussion:** These studies show that racial, and to a lesser extent gender, disparities in diagnosis and treatment of bipolar disorder persist and further demonstrate the need for continued work. And while emphasizing the importance of continued community engagement, it also shows that these efforts will not be unrequited.

O11.09

11:30 TEACHING DURING A PANDEMIC: REDESIGNING UNDERGRADUATE COURSES USING METACOGNITION STRATEGIES

Cassandra Hawkins

Mississippi Valley State University, Itta Bena, MS, USA

The COVID-19 pandemic forced willing and unwilling faculty and students to embrace virtual learning. The transition proved to be stressful for both faculty and students. Additionally, numerous students had trouble adjusting to the virtual learning environment and retaining interest in course material. Considering how I was teaching my undergraduate courses, I decided to redesign my Intro to Public Administration course to include more metacognition strategies. The Intro to Public Administration (PA 101) undergraduate course, which usually has a minimum of 40 students, is a General Core Curriculum course under Social and Behavioral Sciences block for Mississippi Valley State University students. Since this course is an overview of the principles of administration in the field of public management, the course redesign contributes to ensuring students understand the relevance of public administration to their daily lives. This presentation presents metacognition strategies used to redesign the PA 101 curriculum at Mississippi Valley State University. By incorporating metacognition strategies, I can facilitate student learning and use teaching strategies that focus specifically on the reflection of course material and how public administration impacts their lives and the lives of society members. Redesigning PA 101 to include metacognition strategies encourages students to control their academic and cognitive performances. Students develop skills to apply their learning experiences efficiently and effectively to their academic, personal, and professional lives. Students exhibit more accountability for their learning in the course and increase awareness about how they learn and recognize the significance of independent learning through their self-reflection.

12:00 General Session

Thursday, August 5,

2021 EVENING

3:30 Dodgen Lecture and Awards Ceremony (B5-6)

General Poster Session

(Immediately Following Dodgen Lecture C-Poster Hall)

P11.01

CULTURAL VALUES OF DIET, PHYSICAL ACTIVITY, AND PREVENTABLE DISEASES INFLUENCE ON DIET AND PHYSICAL ACTIVITY BEHAVIORS AMONG AFRICAN AMERICANS

Raegan Bishop[1], Jada King[2], Michael Ramsey[3], LaShaundrea Bradford[3], Jennifer L. Lemacks[3],Tammy Greer[3], Jaqueline Reese- Smith[3]

[1]Mississippi INBRE Outreach Scholar, University of Southern Mississippi, Hattiesburg, MS, USA, [2]Mississippi INBRE Outreach Scholar, University of Mississippi, University, MS, USA, [3]Mississippi INBRE Telenutrition Center, The University of Southern Mississippi, Hattiesburg, MS, USA

Chronic diseases, such as hypertension, diabetes, and cardiovascular diseases are among the most common and deadly public health concerns in the United States (U.S.). Across age groups African- Americans in the Deep South have higher rates of chronic diseases than Whites, leading to higher rates of disability and mortality. Increasing diet and physical activity (PA) can prevent or reduce the impact of chronic diseases. Past research indicates cultural beliefs may influence engagement in diet and PA. This study examined the relationship between cultural values (CV) (e.g., diet, PA, and preventable diseases) and health behaviors (e.g., diet and PA) among African-Americans (aged 18-45 years), in the Deep South. Data were collected online via Qualtrics, a computer-based program. Dietary habits were self-reported food consumption (e.g., sugar, fiber, processed meat); PA behaviors were self-reported minutes of exercise per week (e.g., "In the past week, how many days have you done a total of 30 minutes or more of physical activity that raised your breathing rate?"). CV was a composite score of attitudes and beliefs regarding health behaviors and preventable disease. Regression analysis was used to investigate the relationship between CV and self- reported health behaviors. Expectedly, processed meat was found to have a negative relationship with CV while PA had a positive relationship with CV. Conversely, fiber intake had a negative relationship with CV. Results suggests that CV may be related to African-Americans' PA and diet behaviors. Research should examine the role of CV in other health behaviors, an older population, and a larger sample.

P11.02

NESTING BEHAVIOR OF A GYNANDROMORPH ZEBRA FINCH: MALE OR FEMALE TYPICAL BEHAVIOR

Zahra Jiwani, Asma Obad, Tucker Davis, Lainy Day University of Mississippi, University, MS, USA

In zebra finches (ZF), females are the heterogametic sex (ZW) and males are homogametic (ZZ). ZFs are sexually dimorphic and behaviorally distinct. Males, identified by orange cheeks, red beaks, and zebra-striped chests, are the only sex to sing. Bilateral gynandromorphs have bilaterally asymmetric expression of sex- specific traits. In zebra finches, bilateral gynandromorphs have female plumage, ovaries, and W-linked genes coincident with female- like song nuclei on their female side. Such studies provide insights into sexual development, in this case indicating that neither plumage nor song-learning is induced solely by circulating hormones and is linked to W chromosome genes. Gynandromorphism can be mosaic, as was the case for a bird in our lab that had male plumage, but produced viable young. In this gynandromorph, all tissues, including sexually dimorphic feathers and skin had W chromosomes. Implying a genetic rather than chromosomal mutation. Song nuclei in this gynandromorph were intermediate between males and female size, and it sang. To determine if behaviors outside of singing were more typical of males and females, we recorded nesting behavior of the gynandromorph and its male partner and control pairs. Previous studies suggest zebra finch females, compared to males, spend more time in the nest box and spend more time arranging nesting material. Data thus far suggest that, consistent with females in other labs, our gynandromorph spent more time in the nest box than its partner. However, our control female did not fit the typical pattern. Our gynandromorph arranged nesting material for less time than its partner, but our control female spent approximately the same time arranging material as its male partner. Thus far, we have analyzed data from only one nesting bout of a control pair. Additionally, the data analyzed for controls thus far is biased to pre-incubation and to post-incubation for the gynandromorph. Thus, we may not be comparing

similar nesting stages in these preliminary analyses. We are therefore hesitant to make final conclusions as to the gynandromorphs sex-specific nesting tendencies and believe that the data will be more informative than speculation in helping us understand how mosaic gynandromorphs inform sexual differentiation in zebra finches.

P11.03

NEUROPROTECTIVE EFFECTS OF ESTRADIOL AND GENISTEIN IN THE ZEBRA FINCH (*TAENIOPYGIA GUTTATA*) CEREBELLUM POST-LESION

Renee Breaux, Emily McFatridge,Sarah Chong, Ethan Garett Zadrozny, Estelle Blair,BelindaBagwandeen, Chyna-Rae Dearman, Lainy B. Day

University of Mississippi, University, MS, USA

Steroidogenesis is associated with neuroprotection.The estradiol (E2) synthetic pathway, which converts testosterone to E2 via aromatase (AROM), plays a particularly important role in neurogenesis and neuroprotection. However, exogenous E2 increases cancer risk and interferes with normal gonadal function. Phytoestrogens, plant-based compounds with estrogenic effects, may provide neuroprotection without the negative consequences associated with E2. Genistein (GEN), a phytoestrogen found in soy, binds to neural estrogen receptor beta in the cerebellum. The cerebellum does not express AROM constitutively, but upregulation occurs in glial cells post- injury leading to a local increase in E2. The songbird cerebellum is particularly well suited as a model for steroid-mediated plasticity as songbird brains are highly plastic and contain all steroidogenic synthetic enzymes. Previous studies in zebra finches have shown that AROM and E2 prevent secondary degeneration surrounding neural insults in the telencephalon and that behavioral deficits produced by cerebellar lesions are reduced via access to AROM and E2. In this study, adult male ZFs (n=6/group) were implanted with either E2, GEN, or the vehicle, silastic compound, 12 days prior to cerebellar lesion surgery. Saline or letrozole (LET), an AROM inhibitor, was injected locally during delivery of a unilateral puncture lesion to the cerebellum with a 26-gauge needle. Birds were weighed at implantation, on post-implant day 5, day 12 (before lesions), and day 14 (before sacrifice). Following sacrifice, the brain and testes were excised and testes were weighed and processed for histology to quantify testes health. Brains were sectioned and the extent of apoptotic and necrotic cells were identified by Tunnel and Fluoro- jade assays and the labeled volume of secondary degeneration around the lesion was measured using stereological methods. Testes mass, subjects with spermatozoa, sperm density and laminarity were all reduced in E2 compared to GEN and control birds and body mass decreased in E2 and control, but not GEN birds. Preliminary measures of necrosis (n=3/group), suggests birds treated with GEN had less degeneration than controls as expected, but degeneration was greatest in the presence of E2, contrary to expectations. In GEN birds, LET had the expected effect of increasing lesion size, given that AROM activity was impaired, however birds treated with saline had more degeneration than LET birds in E2 and control birds. If replicated in our full sample, these results support the use of GEN in providing neuroprotection while aiding in body mass maintenance and testes health, but they contrast with previous results demonstrating a role for E2 and AROM in neuroprotection in the zebra finch cerebellum.

P11.04

UNCOVERING THE NEURAL CORRELATES OF MID- LEVEL VISION

Katelyn Norse, Landon Mears, Anne Marie Loftin, Nicolas Brunet Millsaps College, Jackson, MS, USA

Visual information travels through the brain, and splits across two different pathways. One path leads to the parietal lobe (the dorsal stream or "where pathway") and the other path leads to the temporal lobe (the ventral stream or "what pathway"). At the early stages, the visual information is processed retinotopically, based upon the visual characteristics of a visual scene. Higher visual brain areas, located along the ventral stream, however, are specialized to respond to specific classes of stimuli such as faces, body part, tools, and places. Their neurons respond to the content rather than the physical characteristics of a scene. How the visual code transitions from retinotopical to functionotopical areas is largely unknown. Using electroencephalography (EEG) and ambiguous stimuli that can be interpreted either as faces or houses, we aim to characterize mid-level vision, the gray area between those early visual areas and the specialized higher areas. Doing so, we hope to contribute in solving a piece of the puzzle in one of the biggest unresolved mysteries in neuroscience. We present an update of our research.

P11.05

WHAT COMPLICATES READING THE FACIAL EXPRESSION OF OLDER INDIVIDUALS? WRINKLES OR WEAKENED FACIAL MUSCLES?

Carolina Teague, Sabrina N. Grondhuis, Angela Jimmy, Nicolas Brunet Millsaps College, Jackson, MS, USA

Introduction: Previous studies have found that it is more difficult identifying an emotional expression displayed by an older than a younger face. It is unknown whether this is caused by age-related changes such as wrinkles and folds, interfering with perception, or by the aging of facial muscles, potentially reducing the ability of older individuals to display an interpretable expression. **Method:** To discriminate between these two possibilities, 28 participants attempted to identify facial expressions under different conditions. To control for the variables (wrinkles/folds vs facial muscles), we used Generative Adversarial Networks (GAN) to make faces look older or younger. A generalized linear mixed model using binary logistic regression was employed to predict participant accuracy identifying the displayed facial expression. **Results**: Our model predicts that the odds of correctly identifying the expressed emotion of a face reduced 16.2% when younger faces are artificially aged. Replacing younger faces with natural old-looking faces, however, results in an even stronger reduction (50.9%). Counterintuitively, making old faces look young resulted in the strongest negative effect (a decrease by 74.8 % compared with natural young faces). **Conclusions:** Whereas other studies ascribe this deficit to the wrinkles and folds that are characteristic of the age-related weathering of the face, our study suggests that it is mainly the facial muscles' ability to generate emotions – which declines with age – that complicates the interpretation of facial expressions.

P11.06

THE EFFECTS OF INTRAVENOUS ADMINISTRATION OF NICOTINAMIDE ADENINE DINUCLEOTIDE ON COGNITIVE PERFORMANCE IN HUMAN SUBJECTS

Garrett Dyess[1], Susan L. Broom[2], Richard F. Mestayer[2], Jade Berg[3], Ross Grant[4]

[1]William Carey University, Hattiesburg, MS, USA, [2]Springfield Wellness Center; NAD Research, Inc Springfield LA, USA, [3]Australasian Research Institute, Sydney Adventist Hospital, Wahroonga, NSW, Australia

Introduction: Research suggests that intravenous administration of nicotinamide adenine dinucleotide (NAD+) possesses therapeutic potential in the treatment of conditions such as acute withdrawal from opioid and alcohol abuse, as well as neurodegenerative diseases associated with aging. This pilot study assessed the incorporation of a standardized cognitive test into a protocol measuring the effects of IV NAD+ on cognitive performance in healthy male subjects. Hypothesis: I.V. NAD+ will significantly improve cognitive performance scores as compared to baseline .Methods**:** Fifteen healthy male participants (4 SAL 11 IV NAD+) between the ages of 30-55 met inclusion criteria. The protocol consisted of 5 consecutive days of IV NAD+ (750 mg/day) or saline infusions. The MicroCog™ Assessment of Cognitive Function (short form) measured cognitive abilities on three inter-related levels: attention, reaction time, memory, reasoning and spatial processing (Level 1); information processing speed and accuracy (Level 2); global cognitive functioning and global cognitive proficiency (Level 3). Participants completed baseline assessment (DAY 0) and repeated the task after the end of the IV infusion protocol (DAY 6). Findings**:** No differences

between SAL and NAD+ groups were noted on DAY 0 indicating that groups were controlled for age, level of education and cognitive performance prior to IV NAD+ treatment. No significant differences between NAD+ vs SAL groups on any of the 8 subtests were noted; however, groups showed differences in the magnitude of improvement over days compared to their respective baselines. The NAD+ reached significance on 6/8 tests (global cognitive functioning, global cognitive proficiency, information processing speed, accuracy, reasoning, memory), while the SAL group showed significant improvement on 2/8 tests (information processing speed, reasoning). **Discussion:** No adverse events were reported throughout IV NAD+ administration. Although no significant differences between groups were noted on any of the cognitive performance measures, the findings when compared to respective baseline performance scores indicate a greater magnitude of change over and above "practice effects**".** These results suggest that implementation of a standardized cognitive assessment is a practical and effective way to establish efficacy of IV NAD+ treatment for clinical conditions involving cognitive impairment.

P11.07

USING ELECTROENCEPHALOGRAPHY TO EXPLORE VISUO-GUSTATORY INTERACTIONS.

Rodreekas Bush, Landon Mears, Anne Marie Loftin, Katelyn Norse, Kurt Thaw and Nicolas Brunet

Millsaps College, Jackson, MS, USA

Vision is one of the most important sensory modalities that contributes to the perception of food. Several studies have investigated how the brain responds to images of food. However, few neuroimaging studies have investigated if EEG signals elicited by those images are modulated by motivation; and those who did, used a between-person rather than a within-person approach. We argue that current research in the obesity neuroimaging field skipped a crucial basic science step: to show how the brain responds within the same individual in the case of two diametrically opposed mental states: that of hunger and that of satiety. To fill that gap, we (1) invited participants who agree to not consume food or high calorie drinks up to 16 hours before the experiments; (2) measure their EEG signals, more specifically ERP components (P100, N170, P300, etc.) and neuronal oscillations while they are watching pictures of food randomly mixed with control pictures; (3) subsequently, serve them their favorite pizza ad libitum while they are still hooked up onto the EEG system; (4) and finally let them repeat the same EEG tasks, but this time while being in the satiated state. We will present the results of this research in progress.

P11.08

THE MENTAL HEALTH OUTCOMES OF FEMALE RAPE SURVIVORS OF A SINGLE RAPIST

Dakota Joseph Conway

Delta State University, Cleveland, MS, USA

Previous literature on rape has discussed the mental health of rape survivors and the criminal punishment of rapists, but little to no research has been conducted on the effect of a rapist's being criminally punished on the rape survivor. The purpose of the research was to investigate whether rapists' being criminally punished betters or worsens the mental health of the survivors. Participants were given a link to an online survey that asked them questions regarding the general nature of the rape committed against them, the criminal aspect of the rape committed against them, and the severity at which they suffered from select mental health symptoms on the DSM-5 Self- Rated Level 1 Cross-Cutting Symptom Measure—Adult. The results showed that a rapist's being criminally punished had a positive and significant correlation with feeling that someone could hear one's thoughts, or that one could hear what another person was thinking ($r(57)=.305$, $p<.05$) and a positive correlation with drinking more than four alcoholic drinks in a single day($r(57)=.322$, $p<.01$). These results could have mixed interpretations. The biggest indicator of more mental health problems, however, was the age at which participants were raped and also their current age. Those who were raped more recently and at a younger age were more likely to suffer select mental health problems. These results suggest that much should be done to help younger women that have been raped.

P11.09

NEONATAL SYSTEMIC LIPOPOLYSACCHARIDE EXPOSURE INTERFERES WITH REM SLEEP AND HOMEOSTATIC RESPONSES TO SLEEP DISTURBANCES IN RATS

Joseph C Crosby[1], Silu Lu[2], James P Shaffery[3], Jonathan W Lee[2], Tembra K Jones[2], Lu-Tai Tien[4],Yi Pang[2], Norma B Ojeda[2], Michelle A Tucci[5], Lir-Wan Fan[2]

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Inflammation may play an important role in the association between sleep disturbances and Parkinson's disease development. The objective of the current study was to examine whether neonatal systemic lipopolysaccharide LPS exposure results in chronic inflammation, neurodegeneration, and related sleep disturbances later in life. Intraperitoneal (i.p) injections of LPS (2 mg/kg) or saline was performed on postnatal day 5 (P5) Sprague-Dawley male rat pups, and surgery/sleep recording electrode implantation was conducted on P39. A sleep baseline recording was started on P46 for 24 hours, sleep disturbances were conducted on P47 consisting of automatically, remotely shaking the recording cage for 1-1.5s every 5 min for 24 hours, and recovery sleep was recorded on P48 for 24 hours. The brain inflammation and neuronal damage were examined at P49. Our results showed that neonatal LPS treatment interfered with REM sleep and sleep homeostatic responses (recovery sleep) to sleep disturbance in adolescent rats (P49). Neonatal LPS treatment also induced chronic microglia activation (Iba1+) and brain damage including the loss of TH+ neurons in the locus coeruleus of the P49 rat brain. These data suggest that neuroinflammation initiated at early development persists in adolescent age, which may contribute to neurodegeneration and sleep disturbances by disrupting sleep homeostatic responses, namely, recovery sleep. Our results underscore the importance of studying the sleep biological mechanisms involved in the pathogenesis in locus coeruleus TH+ neuronal injury induced by infection/inflammation, which could lead to development of potential therapeutics to improve disordered sleep in inflammatory-driven Parkinson's disease models. (Supported by NIH grant NH/NINDS R01NS080844 and NIH-NIGMS-P20GM121334-MSCEPR-COBRE, Brain Wellness Constellation (BWC) Neuroscience Summer Research Education Program, University of Mississippi, and Newborn Medicine Funds from the Department of Pediatrics, University of Mississippi Medical Center).

Friday, August 6, 2021
MORNING
Room D12
NEUROSCIENCE SYMPOSIUM

9:05 WELCOME

O11.10

9:15 CELECOXIB ATTENUATES NEONATAL LIPOPOLYSACCHARIDE-ENHANCED ADULT SUSCEPTIBILITY TO THE ROTENONE-INDUCED NIGROSTRIATAL DOPAMINERGIC DISORDER

Jonathan W Lee[1], Silu Lu[1], Lu-Tai Tien[2], Asuka M Kaizaki[3], Sachiko Tanaka[3], Satoshi Numazawa[3], Ashton C Castle[1], Yi Pang[1], Norma B Ojeda[1], James P Shaffery[4], Michelle A Tucci[5], Lir-Wan Fan[1]

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Chronic neuroinflammation has been proposed to play an important role in the development of neurodegenerative disorders. Our previous study showed that perinatal lipopolysaccharide (LPS) exposure induced a chronic neuroinflammation that could persist into adulthood. For example, chronic activation of cyclooxygenase-2 (COX-2)+ cells was found to be associated with increased vulnerability of dopamine neurons to rotenone, a commonly used pesticide. Therefore, the objective of this study was to test whether celecoxib, a selective COX-2 inhibitor, attenuates LPS-induced motor behavioral dysfunction and LPS-enhanced susceptibility to rotenone toxicity later in life. Intraperitoneal (i.p.) injections of LPS (2 mg/kg) or saline was administered to postnatal day 5 (P5) Sprague- Dawley male rats. On P70, rats were challenged with rotenone through subcutaneous mini-pump infusion (1.25 mg/kg per day for 14 days), and celecoxib (20 mg/kg) or vehicle was administered (po) daily for 14 days. Motor behavioral tests were carried out from P70 to P98 and brain injury was examined on P98. Our results showed that neonatal administration of celecoxib provided protection against rotenone-induced neurobehavioral impairments including bradykinesia, akinesia, and rigidity in rats with neonatal exposure to LPS. Celecoxib treatment also reduced microglial activation and ameliorated brain injury, as shown by mitigating loss of tyrosine hydroxylase positive neurons and decreases in mitochondrial complex I activity in the substantia nigra upon LPS+rotenone double hit challenge. Our study suggests that celecoxib has protective effects against perinatal brain inflammation-enhanced adult susceptibility to environmental toxin-induced neurodegenerative disorders by blocking cyclooxygenase-2 (COX-2) activation.

(Supported by NIH grant NH/NINDS R01NS080844 and NIH-NIGMS-P20GM121334-MSCEPR-COBRE, and Newborn Medicine Funds from the Department of Pediatrics, University of Mississippi Medical Center).

O11.11

9:30 FOOD RESTRICTION INDUCES CYTOKINE RELEASE IN BLOOD SERUM: A BEHAVIORAL LINK TO EATING DISORDERS

Andrew Thaw

Millsaps College, Jackson, MS, USA

Introduction: The early immune response factors (cytokines) inter- leukin 1-beta and tumor necrosis factor-alpha are dramatically increased in patients with anorexia nervosa and bulimia. The levels of these cytokines return to baseline once the patients weight begins to approach normal. These cytokines are known to be potent appetite suppressants during illnesses and also are directly involved in the central nervous system regulation of satiety. However, given the above noted findings, they may also be involved in the development of eating disorders. In this study we examine the putative release of cytokines in response to sudden weight loss. The release of cytokines during weight loss may exacerbate additional weight loss due to their anorexigenic effects. **Methods:** To test this, juvenile Sprague- Dawley rats were allowed to eat ad libitum for 4 weeks. Next, experimental groups were reduced to 85% and 70% of their maximum weight by restricting food to 40%-60% of their baseline (pre- experimental) average caloric intake over a 4-week period. Thus, we had three groups of rats: control, 85% body weight and 70% body weight. This procedure mimics a sudden caloric restriction that might be imposed by someone beginning a strict diet. Once experimental weight was achieved, cytokine levels were examined from blood serum of all groups using standard ELISA procedures. **Results:** Results support the hypothesized increase of one of these cytokines (inter-leukin 1-beta) in response to food restriction. Moreover, the cytokine levels increased in relative proportion to the amount of weight lost. Tumor-necrosis alpha levels were not significantly affected in blood serum during these experiments. **Brief Discussion:** We conclude that the cytokines inter-leukin 1-beta are likely present in excess amounts prior to cachexia and muscle wasting associated with eating disorders. Furthermore, these cytokines may play a critical physiological role in dramatic weight loss. Tumor necrosis alpha levels were not elevated in serum, but may be altered in cerebrospinal fluid. Additional research will be required to assess the possible role of these cytokines in humans with eating disorders.

O11.12

9:45 IMPROVING THE RELIABILITY OF EYE TRACKING TO DIAGNOSE CONCUSSION

Nicolas Brunet

Millsaps College, Jackson, MS, USA

Although concussion or mild Traumatic Brain Injury (mTBI) affects more than a million of Americans each year, and represents a great societal burden, diagnosis is still difficult, and reliable biomarkers are still lacking. Many researchers agree that eye tracking to monitor oculomotor behavior shows great potential of revealing mTBI. Results from studies, using eye movements as a biomarker to predict concussion, are encouraging albeit not sufficiently strong to proof its clinical utility. We predict that inclusion of microsaccades, the tiny eye movements made when the gaze is fixed on a target, in the continuum of eye movements, will increase the diagnostic strength of this method and, in addition, will be useful in assessing to what extent an individual has recovered from injury. To test those hypotheses, we are running a longitudinal study at Millsaps College and are currently in the process of recruiting more than 300 students who will conduct a ~25-minute oculomotor task while their eye movements are recorded. Athletes who sustain a head injury are invited to retake the test. An update of our research efforts will be presented.

10:00 Break

O11.13

10:15 SLEEP DEPRIVATION INDUCES OPPOSING EFFECTS ON DENDRITIC SPINE REMODELING IN AMYGDALA-HIPPOCAMPAL MEMORY CIRCUIT

Lindsay E. Rexrode, Ratna K. Bollavarapu, Jake R. Valeri, Harry Pantazopoulos, Barbara Gisabella

University of Mississippi Medical Center, Jackson, MS, USA

Sleep is critical for memory consolidation, and disturbances in sleep and memory processing are widely reported in people with psychiatric disorders including post-traumatic stress disorder, major depression, and bipolar disorder. Recent advances have revealed insight into the

molecular and morphological processes involved in memory consolidation during sleep, pointing to key overlap between memory consolidation processes and molecular and morphological abnormalities in psychiatric disorders. However, the morphological and molecular processes underlying memory consolidation in brain circuits regulating emotional memories are currently unknown. Chronic stress is a key feature associated with psychiatric disorders. Previous studies in rodents showed that chronic stress has differential effects on dendritic spine density, resulting in increased dendritic spines in amygdala and dendritic atrophy in the hippocampus. These findings suggest that these two key regions of the emotional memory circuit may also be differentially regulated during sleep. We tested the hypothesis that sleep deprivation differentially affects dendritic spines in the mouse amygdala and the hippocampus. **Methods:** We used viral vector labeling of dendric spines combined with confocal imaging and three-dimensional (3D) analysis in sleep deprived and control male C57/Bl6 mice to determine how sleep deprivation broadly affects dendritic spine density and size on specific dendritic segments of CA1 hippocampal pyramidal cells and in amygdala neurons. **Results:** We observed region- and branch-specific synaptic downscaling in the hippocampus, supporting the theory of broad but selective synaptic downscaling during sleep. In addition, analysis of dendritic spine measures divided into proximal versus distal branch segments showed greater spine density selective for distal branch segments and selective increases in spine volume and spine head diameter in proximal segments, supporting the hypothesis that selective synapses are strengthened during sleep. In the amygdala, we observed opposing effects. Sleep deprivation resulted in decreased dendritic spine density during sleep, particularly in mushroom spines, and increased neck length, and decreased spine head diameter in mushroom dendritic spines. **Discussion:** Our results demonstrate differential effects of sleep deprivation on dendritic spines in the hippocampus compared to the amygdala. These results suggest that dendritic spines are downscaled in the hippocampus during sleep but are instead strengthened in the amygdala, reflecting the reported effects of chronic stress in these two regions. Our data provide key insight into the morphological correlates of memory consolidation during sleep as well as the processes that may be affected in this circuit in psychiatric disorders.

O11.14

10:30 ON STATIC AND DYNAMIC CHARACTERISTICS OF RESTING STATE NETWORK FOR BRAIN DISORDER DIAGNOSIS

Haifeng Wang[1], Harun Pirim[1], Miaolin Fan[2]

[1]Mississippi State University, Mississippi State, MS, USA and
[2]Massachusetts General Hospital, Boston, MA, USA

Brain resting-state functional connectivity (rs-FC) analysis using functional magnetic resonance imaging (fMRI) can help understand various psychiatric disorders, such as Alzheimer's disease, schizophrenia, and attention deficit/hyperactivity disorder (ADHD). This research studies both static and dynamic characteristics of brain rf-FC based on fMRI data for ADHD diagnosis. In this study, sliding correlations are collected for different sliding window sizes based on ADHD-200 dataset. Each sliding correlation is applied to construct a brain network, which generates time variant networks for each patient. Descriptive network analysis approaches are used to analyze brain functional connectivity patterns between ADHD and Control groups. Network metrics are computed. From the static analysis, significant changes in the network features are observed after a certain time point. The density and median of triangles are the most distinguished features. In distinguishing ADHD and Control, the average shortest path distance and the average number of neighbors are the most significant features. Our results indicate that using static network metrics can improve machine learning model performance for ADHD diagnosis. For the dynamic analysis, we investigate the changes of significant brain network metric features over time. The statistical results show that the brain rf-FC shows strong dynamics, which makes the network structure change significantly over time. In addition, results show that the behavior of the significant brain network metric is inconsistent for ADHD vs. Control groups, which challenges the development of an effective machine learning model for ADHD diagnosis. However, experimental results also indicate that some network metrics are highly potential informative features, which show a strong relationship to diagnose ADHD from the Control group, such as betweenness centrality. We expect this study could provide insights for the future machine learning-based ADHD diagnosis.

O11.15

10:45 EXTRAMATRIX ABNORMALITIES IN THE HIPPOCAMPUS OF CHILDREN WITH AUTISM SPECTRUM DISORDERS

Lindsay E Rexrode[1], Ratna Bollovarapu[1], Rhenius B. Antonyraj[1], Barbara Gisabella[1], Theoharis Theoharides[2], Harry Pantazopoulos[1]

[1]University of Mississippi Medical Center, Jackson, MS, USA and
[2]Tufts University School of Medicine, Boston, MS, USA

Introduction: Despite the continued rise in the prevalence of Autism Spectrum Disorder (ASD, 1:59 children), its pathogenesis remains unknown. Several lines of evidence implicate neurodevelopment, synaptic, and immune system signaling pathways in ASD. Chondroitin sulphate proteoglycans (CSPGs), a family of extracellular matrix molecules, represent a potential key link between these systems. CSPGs and their endogenous proteases, including matrix metalloproteinase 9 (MMP9), are critically involved in regulating neurodevelopment, synaptic plasticity, and immune system signaling. We tested the hypothesis that CSPGs are altered in the developing brain of children with ASD, along with inflammatory and synaptic markers. **Methods:** We used post-mortem human brain samples containing the hippocampus from male children with ASD and normal children (3-14 yrs old) from the NIH NeuroBioBank. Protein expression of CSPGs (brevican, neurocan, aggrecan, versican), endogenous proteases (MMP9 and ADAMTS4), inflammatory molecules (IL-1ß, IBA1, GFAP) and synaptic markers (PSD95 and SYN1) were examined using Western blotting. We used multiplex immunofluorescence to analyze cell-type specific expression of BCAN and MMP9 in the same cohort. Linear regression analysis of covariance was performed between ASD and control groups. **Results:** We report decreased expression of glycosylated ($p<0.02$) and native ($p<0.03$) brevican, but increased expression of the cleaved form of brevican ($p<0.03$) in children with ASD compared to age-matched controls. In addition, we detect increased expression of MMP9 in children with ASD ($p<0.03$), along with decreased expression of synaptic proteins PSD95 ($p<0.02$) and SYN1 ($p<0.02$). Immunofluorescence analysis shows expression of MMP9 in microglia and mast cells in the hippocampus of children with ASD, and BCAN expression in developing astrocytes, synaptic boutons, and perineuronal nets. Western blotting of neuroinflammatory markers reveals decreased GFAP expression in children with ASD ($p<0.03$), increased IL-1ß ($p<0.04$), and no difference in IBA1 protein expression. **Discussion:** Our results suggest that increased MMP9 expression in microglia and mast cells of children with ASD contributes to decreased brevican, which in turn impacts inflammatory signaling and synaptic destabilization in the developing hippocampus of children with ASD.

O11.16

11:00 NEUROINFLAMMATION-INDUCED DIFFUSE WHITE MATTER INJURY IN THE DEVELOPING RAT BRAIN

John Waddell, Kathleen Carter, Norma Ojeda, Lir-Wan Fan University of Mississippi Medical Center, Jackson, MS, USA

Introduction: Thanks to advances in neonatal care, the survival rate for very premature infants has improved significantly. Unfortunately, up to 50% of survivors live with life-long neurological disabilities, primarily caused by diffuse white matter injury (WMI). In contrast to cystic WMI, the previously predominant type of brain injury in preterm infants, diffuse

WMI primarily affects the development of Oligodendrocytes (OL) and neurons as well as injury to axons. In order to develop therapeutic interventions, relevant animal models of diffuse WMI are critically needed. We have previously established a cystic WMI model by inducing severe neuroinflammation via intracerebral injection of lipopolysaccharide (LPS) to neonatal rats. We hypothesized that low-grade neuroinflammation (caused by lowering the LPS dose to 1/10th of the previous model's dose) may disrupt development of OLs and neurons without causing acute cell death. **Methods:** LPS was injected to the white matter of postnatal day 5 (P5) rat pups, and developmental milestones of OLs and neurons, activation of glial cells, and markers of axonal injury were assessed. Behavioral outcomes were assessed on P6 and P20. **Results:** We found that a low-grade neuroinflammation led to activation of Iba1+ microglia and GFAP+ astrocytes, resulting in acute axonal damage indicated by beaded ß-app+ positive neural fibers, a significant reduction of Rip+ immature OLs but not PDGFR+ OL progenitor cells, and impairments of neurogenesis indicated by downregulation of Doublecortin in the hippocampus. Behavioral assessments indicate developmental delay and sensorimotor disturbances in LPS-exposed rats. **Discussion**: Results show that we succeeded in creating a diffuse WMI rat model.

O11.17

11:15 ELECTRICAL NEUROMODULATION TO ASSESS THE LUMBOSACRAL SPINAL CORD FOR MOVEMENT RECOVERY IN HUMANS WITH SPINAL CORD INJURY

Matthias J. Krenn[1], Elizabeth A. Gordineer[1], William A. Pierce[1], Dobrivoje S. Stokic[2]

[1]University of Mississippi Medical Center, Jackson, MS, USA and [2]Methodist Rehabilitation Center, Jackson, MS, USA

Traumatic spinal cord injury (SCI) is a devastating neurological condition that impairs the interactions between supraspinal structures and the spinal cord below the lesion. In the case of cervical or thoracic SCI in humans, the nervous structures below the injury level are mostly intact. The lumbosacral network has become a common target for neuromodulation interventions to restore impaired motor function after SCI. The underlying premise is that the spinal networks can be modified to augment or suppress motor output. Our study investigates the effect of transcutaneous spinal stimulation (TSS) to determine the capacity of the lumbosacral network for neuromodulation. The emphasis is on the role of stimulation intensity (below/above threshold for evoking short-latency reflexes) and stimulation frequency (10, 20, 40, 80 Hz). The study protocol is carried out first during rest and then repeated during robotic stepping. In the conditioning-test paradigm, TSS is used both as an intervention for electrical neuromodulation and an assessment for assessing changes in multi-segmental reflexes without and with intrinsic peripheral input elicited by robotic stepping. From the preliminary results in 12 participants, we highlight two participants with SCI of different severities (AIS A, AIS D). We found large suppression across all conditioning intensities and frequencies in the AIS A participant and no modulation in the AIS D participant while resting supine. In both cases, however, robotic stepping alone decreased the test reflexes regardless of the step phase. When conditioning TSS-generated input and robotic stepping were combined, further suppression was observed that was greater in the extension than the flexion phase and at higher stimulation intensities and frequencies. The current findings support our predictions that multi-segmental reflexes are susceptible to changes in stimulation intensity, frequency, and intrinsic peripheral input. This work will determine factors that influence the capacity of the lumbosacral network for neuromodulation.

O11.18

11:30 THE RELATIONS OF IMPULSIVITY, PHYSIOLOGICAL AROUSAL, AND GAMBLING NEAR MISSES ON A SLOT MACHINE: A MODERATED MEDIATION MODEL

James Broussard, Joanne Lebrun, Nathaniel Cox Jackson State, University, Jackson, MS, USA

Introduction: Decision-making while playing games of chance is believed to be influenced by individual personality traits, physiological arousal, and the structural characteristics of the games themselves. We examined the relationships between impulsivity, skin conductance level (SCL), and decision making on a slot machine task when different proportions of near-miss outcomes were presented. **Methods:** After completing baseline measures (e.g., Barrett Impulsivity Scale-11th revision), Fifty-five college students were brought into a simulated casino environment and placed in front of a slot machine that had been pre-loaded with 30 credits. All participants wore a Q electrodermal skin conductance monitor on their left hand. Participants were informed that after beginning play, they would be allowed to stop on any trial and exchange for real money any credits they had accumulated beyond the starting amount. Unbeknownst to participants, the sequence of wins and losses was programmed to be identical for all participants and in such a way that several larger wins occurred early on in the sequence, followed by a pattern of diminishing returns that reduced credits to zero on a predetermined trial. Furthermore, participants were randomly assigned to receive one of two programmed sequences, one sequence where up to 19% of losing trials were near misses and another sequence where only 2% of losing trials could be near misses. We tested a moderated mediation model where SCL during play was hypothesized to mediate the relationship between impulsivity and the number of trials played by participants. We also posited that being exposed to a larger number of near misses would enhance the relationships between (1) impulsivity and number of trials and (2) SCL and number of trials played, potentially moderating both of these relationships. **Results:** Consistent with our hypotheses, SCL was found to mediate the relationship between impulsivity and number of trials played on the slot machine. Furthermore, we found that near-miss condition moderated this relationship, such that the effect of SCL on number of trials played was greater in the 19% near-miss condition than in the 2% near-miss condition. **Conclusions:** These results provide evidence that near misses increase persistence on a realistic gambling task for those with greater trait impulsivity and higher physiological arousal, both of which are risk factors for problem gambling. This study gives insight into the potentially deleterious effects of certain structural characteristics in games of chance.

O11.19

11:45 IMPLICATIONS OF MATRIX METALLOPROTEASES AS THERAPEUTIC TARGETS IN THE SCA1 NEURODEGENERATIVE DISEASE

Scoty Hearst

Department of Chemistry and Biochemistry, Mississippi College, Clinton, MS, USA

Spinocerebellar ataxia type 1 (SCA1) is a fatal neurodegenerative disease caused by a polyglutamine mutation in the ataxin-1 protein. Currently, there is no treatment for SCA1. SCA1 mice display similar neurodegeneration as SCA1 human patients and are the model of choice for exploring treatments for the SCA1 disease. Matrix metalloproteases (MMPs) are present in many cells of the central nervous system (CNS). MMPs are endopeptidases that once activated participate in the regulation of diverse physiological and pathological processes. MMPs have gained much attention as therapeutic targets in neurodegenerative disorders due to up-regulation of MMPs observed in a variety of CNS disorders, their key role in neuroinflammation, and their destructive degradation of the blood brain barrier. MMPs have been shown to be a therapeutic target in other polyglutamine diseases such as Huntington's disease. MMPs have been shown to degrade the Huntingtin protein contributing to the neurodegenerative pathology. In this study, we explored the role of MMPs in the SCA1 disease using cell culture and the SCA1 mouse model. Cell culture experiments revealed a possible role of MMPs in the proteolysis of mutant atxin-1 aggregates. Transcriptome analysis of the SCA1 mouse cerebellum revealed significant upregulation of destructive

MMPs as compared to WT mice. Treatment of SCA1 mice with MMP substrates showed improvements in neurodegenerative behavior deficits, increases in key neuronal proteins, a reduction in destructive MMP mRNA expression, and a reduction in histological markers of SCA1 neurodegeneration. Taken together, this data implies that MMPs are possible therapeutic targets that may play a pathogenic role in the SCA1 disease.

Friday, August 6, 2021

AFTERNOON

12:00-1:00 Plenary Speaker

O11.20

1:00 SEXUAL SELECTION FOR ACROBATIC COURTSHIP COMPLEXITY DRIVES INCREASES IN CEREBELLUM VOLUME AND TARSUS LENGTH

Lainy B. Day[1], Wilson Helmhout[1], Urban Olsson[2],Jason D. Hoeksema[1], Willow R. Lindsay[2]

[1]Department of Biology, Neuroscience Minor, University of Mississippi, University, MS, USA and [2]Department of Biological and Environmental Sciences, University of Gothenburg, Medicinaregatan and Gothenburg Global Biodiversity Centre, Germany

Brightly colored manakin (Aves: Pipridae) males are known for performing highly acrobatic displays punctuated by non-vocal sounds (sonations) in order to attract dull colored females. The elaborative complexity of the display sequence and assortment of display elements involved (e.g. sonations, acrobatic maneuvers, and cooperative performances) varies considerably across manakin species. Species-specific display elements coevolve with display- distinct specializations of the neuroanatomical, muscular, endocrine, cardiovascular, and skeletal systems in the handful of species studied. Conducting a broader comparative study, we previously found positive associations between display complexity and both brain mass and body mass across 8 manakin genera, indicating selection for neural and somatic expansion to accommodate display elaboration. Whether this gross morphological variation is due to overall brain and body mass expansion versus size increases in only functionally relevant brain regions and growth of particular somatic features remains to be explored. Here we test the hypothesis that cross-species variation in male brain mass and body mass is driven by mosaic evolution. We predicted positive associations between display complexity and variation in the volume of the cerebellum and sensorimotor arcopallium, brain regions which have known roles in sensorimotor processes and learning and performance of precisely timed and sequenced thoughts and movements, respectively. In contrast, we predicted no associations between the volume of the limbic medial ventral arcopallium nucleus or the visual thalamic nucleus rotundus and display complexity as these regions have no- specific functional relationship to display behavior. For somatic features, we predicted that the relationship between body mass and complexity would not include contributions of tarsus length based on recent studies suggesting selection on tarsus and wing length are more constrained than on body mass. We tested our hypotheses in males from 12 manakin species and a closely related flycatcher. Our analyses support mosaic evolution of neural and somatic features functionally relevant to display and indicate sexual selection for acrobatic display increases the capacity for procedural learning via cerebellar enlargement and maneuverability via a reduction in tarsus length in species with lower overall complexity scores.

O11.21

1:15 EXTRACELLULAR MATRIX-GLIAL ABNORMALITIES IN SUBSTANCE USE DISORDERS

Jake Valeri, Ratna Bollavarapu, Lindsay Rexrode, Barbara Gisabella, Craig Stockmeier, Harry Pantazopoulos

University of Mississippi Medical Center

Introduction: Substance use disorders (SUD) are a prevalent and debilitating family of psychiatric disorders. Emerging evidence points to a critical role of extracellular matrix (ECM) molecules as mediators of drug memories. Chondroitin sulfate proteoglycans (CSPGs) are a subset of ECM molecules that form perineuronal nets (PNN) around inhibitory neurons. PNNs restrict synaptic connections and help maintain synapses. Rodent models suggest that PNNs are degraded by endogenous proteases to allow for formation of reward memories and then reconsolidate around synapses involved in reward memory to protect these memories from erasure. Despite this compelling evidence, there is currently a lack of information regarding PNNs in the brain of people with SUD. We used human postmortem brain samples of the hippocampus from subjects with SUD and psychiatrically-normal control subjects to test the hypothesis that PNNs are increased in subjects with SUD. *Methods:* A cohort of 64 human postmortem hippocampi from donors with substance use disorders (n=20), SUD and comorbid major depressive disorder (n=24), and healthy controls (n=20) was used to histochemically labelled CSPGs using Wisteria floribunda agglutinin lectin. Samples were quantified using stereology-based software and stepwise linear regression analysis of covariance was used to test for effects of diagnosis group and confounding variables. *Results:* In a pilot cohort of approximately 5 subjects per group, we found significantly increased densities of CSPG-labeled glial cells in subjects with SUD ($p < 0.003$), and increased density of PNNs in subjects with opioid dependence ($p<0.04$).*Conclusions:* Our preliminary findings suggest that PNNs are increased in SUDs, and point to a previously unsuspected role for CSPG expression in glial cells. Heightened levels of CSPG-labeled glia suggest enhanced CSPG biosynthesis in astrocytes in SUDs. Our observations indicate a novel glial cell mediated pathway regulating synaptic plasticity that therapeutics for substance use problems can target.

O11.22

1:30 THE EFFECTS OF INTERACTIVE OBJECT PROVISIONING ON CORTICOSTERONE, STRESS-RELATED BEHAVIORS, AND COGNITION IN JUVENILE AND ADULT ZEBRA FINCHES (*TAENIOPYGIA GUTTATA*)

Laura West and Lainy Day

University of Mississippi, University, MS, USA

Providing captive animals more interactive environments that encourage exercise and species-typical manipulative behaviors can reduce stress by meeting physical and psychological needs. The effects of such "environmental enrichment (EE)" have been heavily studied in rodents, where it reduces stress and anxiety, enhances cognition, and dampens reactions to stressful events. While there is evidence that EE is similarly effective in birds, few studies have been completed in zebra finches (ZFs), a common lab model. To address this, I compared adult (1-4 yrs) and juvenile (1 mo) ZFs of each sex housed in "standard" or "enriched" cages (n=8 per group). Beyond basic provisions, enriched cages had natural and swinging perches, as well as three commercial bird toys. Birds were moved from their aviary into experimental cages to habituate for at least 10 days prior to introducing enrichment. To measure baseline plasma levels of the stress hormone corticosterone (CORT), I took blood samples prior to addition of the enrichment (Day 0), at the midpoint (Day 30), prior to behavioral testing (Day 60), and after this testing. The last baseline sample was followed by a stressed-state sample. During the treatment, I recorded birds to quantify enrichment item interaction, and abnormal repetitive behaviors (ARBs). My behavioral tests included a novel object test and a novelty-suppressed feeding test (to measure anxiety); and a test of spatial memory (which is negatively affected by chronic stress). Currently, birds in unenriched housing spend more time engaging in ARBs. I aim to determine if providing ZFs a more complex environment reduces their baseline and event- induced stress; lowers anxiety indicators; and enhances their spatial cognition; which will inform whether this intervention can increase the quality of lives of the birds, and demonstrate that these methods allow ZFs to be used as scientifically valid models of healthy, relatively low stress animals.

O11.23

1:45 INFLUENCES OF POST-FLEDGING PROTEIN SUPPLEMENTATION IN JUVENILES AND ADULTS ON GROWTH, SECONDARY SEXUAL CHARACTERISTICS, MATE PREFERENCE, COGNITION, STRESS REACTIVITY AND NEURON NUMBERS IN RELEVANT BRAIN REGIONS IN ZEBRA FINCHES (*TAENIOPYGIA GUTTATA*).

Belinda J. Bagwandeen and Lainy B. Day

University of Mississippi, University, MS, USA

All vertebrates require dietary protein, especially during periods of growth. While captive zebra finches (ZF) can live on low-protein dried birdseed, a protein rich diet during the nestling period improves adult attractiveness and learning, but effects post-nestling period are unclear. Our subjects included ZFs starting at 36 days old (juveniles), and over one year old (adults) in both sexes. All received dried birdseed, with half also receiving 20g of boiled chicken eggs daily. At days 0, 14, 50, and 90 on these diets, we measured indicators of body growth to determine growth rate, and collected reflectance data for sexually dimorphic regions to detect brightness changes. After 90 days, we tested stress response, mate preference, spatial memory, and fear conditioning. We also quantified neuron numbers in related brain regions: the hippocampus, cerebellum, and avian amygdala. Preliminary results show inconsistent influences of added protein on growth rate. We expect to see improved attractiveness and learning,
decreased stress response, and increased neuron numbers. These results will be important in understanding how age alters susceptibility to low protein in songbirds.

2:00 Business Meeting

SCIENCE EDUCATION
Chair: Marie Barnard
University of Mississippi
Vice-Chair: Johnny Mattox
Blue Mountain College

Thursday, August 5, 2021

MORNING
Room D10

8:00-9:00 WELCOME
Co-Sponsor with Ecology Division
Symposium: Conservation through Science Education

Thursday, August 5, 2021

AFTERNOON
Room D5
O12.01

1:00 CREATING ACCESS TO PARTNERSHIP RESOURCES TO PROMOTE COMMUNITY WELLNESS

Jasmine Hendrix[1], Sarah Lalk[1], Devon Brenner[1], Amanda Tullos[1,2]

Mississippi State University, Mississippi State, MS, USA and Partnership Middle School, Starkville, MS, USA

The purpose of this session is to share examples from a collection of health and wellness instructional resources that have been developed and piloted at a local middle school and that are freely available for community educators. During the 2020-2021 school year, partners at MSU developed and collected instructional resources based on authentic science practices and focused on topics such as personal and individual health, physical activity, living environments, and food and nutrition. All themes included a focus on the history and culture of Mississippi's people and agriculture. There are limited validated cross-curricular resources related to health and wellness available to community educators. The partnership resource collection has the potential to increase access to and awareness of available national and statewide health and wellness resources. These health and wellness resources include both instructional strategies and materials and can be shared with youth and adults in any community. Lessons focus on self-care practices (e.g., meditation) and other healthy practices (yoga/tai chi, meal planning, food nutrition), as well as share about local community activity groups (cycling, gardening, hiking, native species identifying). Resources include short videos show casing local expertise of community partners, virtual mini-tours of research facilities, local citizen science projects, interviews with different community organizations, and conversations about future academic and career opportunities. Partners at Mississippi State University will share examples of videos and resources linked to topics of expertise in Food Science, Nutrition, and Health Promotion, Environmental Sciences, and Plant and Soil Sciences, and videos highlighting community groups and partnerships.

O12.02

1:15 GEOLOGY COURSES WITH SERVICE: LEVERAGING COMMUNITY ENGAGEMENT TO BENEFIT MISSISSIPPI'S GEOLOGIC HERITAGE

Renee M. Clary

Geosciences, Mississippi State University, Mississippi State, MS, USA

Community engaged learning in geology courses provides students with content opportunities that also address a community need. Within the course community project, students apply course objectives, engage in ongoing analysis of the project, and disseminate their results. Reciprocity is required between the community partner and the course participants; shared goals establish consistent collaboration and communication. These opportunities result in student contributions and impact to our state. Relevance for the course content is also established for student participants. At Mississippi State University, paleontology students have regularly engaged with community partners since 2018, including Friends of Osborn Prairie, Union County Heritage Museum, and the W.M. Browning Cretaceous Fossil Park. Students apply the course content to deliver products—including solution proposals, informative brochures, and prototype kits—that the community partner can use after the course concludes. Government institutions, non-profit organizations, and informal associations can consider community engaged learning partnerships with university courses for institutional and group benefits. Students also reported greater understanding of the local environment and an appreciation of the local Geoheritage. Importantly, community engaged learning introduces students to community service and develops good habits of community involvement within our future geoscientists, both within Mississippi and beyond.

O12.03

1:30 STUDENT REACTIONS TO ISSUES OF THE COVID-19 PANDEMIC

Johnny L. Mattox

Blue Mountain College, Blue Mountain, MS, USA

A total of thirty-three students were given a survey consisting of five questions concerning the COVID-19 pandemic indicating their beliefs about the virus, how it is spread, whether protective measures that have been used are effective in controlling the spread of the virus, and the effectiveness of a vaccination. 52% of the students surveyed indicated that either they or one or more of

their family members had contracted the COVID-19 virus. Only 33% of the students surveyed believed that wearing a mask was an effective technique to use in control of the spread of the virus. 55% of those surveyed believed that maintaining a social distance of six feet from other individuals would help prevent transmission of the virus. 82% of the students believed that establishment of herd immunity would effectively control spread of the virus and 70% indicated that they would take or had already taken the vaccination of COVID-19.

O12.04

1:45 SCIENCE EDUCATION DURING THE COVID-19 PANDEMIC - THROUGH THE LENSE OF SCIENCE TEACHERS

Xiaoshan Gordy[1], Wesley Sparkmon[2], Hyllore Imeri[2], Andrew Notebaert[1], Marie Barnard[2], Caroline Compretta[1], Erin Dehon[1], Juanyce Taylor[1], Stephen Stray[1], Donna Sullivan[1], Robin Rockhold[11]

University of Mississippi Medical Center, Jackson, MS, USA and [2]University of Mississippi, Oxford, MS, USA

The national or local lockdowns in response to COVID-19 forced education systems to rapidly shift from in- person to distance learning. The hasty transition undoubtedly imposed tremendous challenges on teachers, students and distance learning infrastructure. The purpose of this study was to investigate how high school science teachers who had previously been trained in flipped-learning and advanced educational technology through the Science Teaching Excites Medical Interest (STEMI) program perceived their transition to distance learning during this pandemic. In this study eleven teachers were interviewed with a semi-structured interview guide. Data were analyzed using the deductive-inductive content analytic approach. Our results indicated that teachers reported having more confidence in using technology for teaching online due in part to their participation in the STEMI program. They also reported internet access as one of the most significant barriers, both for students and teachers. While some teachers thought that students may feel more in control of learning due to absence of time and place limits with distance learning, others may struggle to stay engaged without the classroom support they would normally have received. Teachers generally experienced increased workloads and harder work–life balance with online teaching. In spite of the unforeseen challenges, the pandemic situation afforded teachers with opportunities to adopt different technology in teaching and foresee the need for technology integration in order to better prepare for the unexpected in the future.

O12.05

2:00 INTEGRATING A DIVERSITY, EQUITY, AND INCLUSION (DEI) MODULE INTO A PHYSICS COURSE FOR NON-MAJORS

Maria Weber

Delta State University, Cleveland, MS, USA

The curriculum of introductory physics is awash with theories, equations, and problem- solving exercises. One might expect, based on the technical subject matter, that all students have the same access to achievement. However, underrepresented minorities often experience feelings of disbelonging and structural barriers to opportunity within physics classrooms (Dalton & Hudgings, Phys. Teach., 2020). In an effort to introduce life science majors to issues of diversity, equity, and inclusion (DEI) impacting the STEM field, we outline an equity-based, week-long DEI module based on the work of Dalton & Hudgings (2020). This was delivered as an online module within the second semester of an introductory physics laboratory course for life science majors. The primary goals of this module were to: (1) bring awareness of diverse perspectives and experiences within STEM and higher education, and (2) introduce students to broader social issues that impact minority groups within STEM. This self-guided module included a DEI glossary, a 'pre' and 'post' survey, and two discussion boards based on reflections to a selection of DEI material. Among the topics tackled in the discussion boards were imposter syndrome, stereotypes, microaggressions, experiences of women in physics and astronomy, institutional racism, and decolonizing science. We present the student outcomes of this DEI module and share future plans for improvement.

O12.06

2:15 IT'S TIME TO ABANDON THE CALCULATOR

James Gerald

Delta State University, Cleveland, MS, USA

Any instructor working one-on-one with a large number of students has realized that many students have poor calculator skills. Among other hindrances, they struggle with implementing the correct order of operations even when they understand the concepts. That deficit, along with the wide variety of calculators, makes it difficult to provide useful skills training without being able to examine exactly what calculations the student is performing. We've employed a methodology with two different groups of students using Microsoft Excel that enable concrete and specific feedback to students. The classes involved include a general education Physical World course and a more complex Physics for Aviation class. Both classes were offered online. In the general education course, students completed our internally developed pre/post assessment. In both classes, we also asked that the students complete a Self-Assessment of their Learning Gains. Those results along with details of our feedback methodology will be reported here.

O12.07

2:30 HEALTH SCIENCES AND WELLNESS ACADEMY: A SCIENTIFIC EXPERIENCE FOR HIGH SCHOOL STUDENTS

Janet R Donaldson[1], Kendrick Buford[2], and Rob Rockhold[3]

[1]Cell and Molecular Biology, The University of Southern Mississippi. Hattiesburg, MS, USA

[2]Center for Science and Mathematics Education, The University of Southern Mississippi. Hattiesburg, MS , USA

[3]University of Mississippi Medical Center. Jackson, MS, USA

This study was designed to assess the effectiveness of the Science Teaching Excites Medical Interest (STEMI) high school program, called the Health Sciences and Wellness Academy (HSWA), in improving the interest of students in STEM disciplines. The program utilized two approaches to accomplish this objective. First, flipped-classrooms were employed for 9th graders at two local high schools. Second, a summer camp was developed for these same students. Both programs involved exposing students to biomedical research techniques and topics pertaining to critical health issues. As part of the experience, students' knowledge and interest in science was assessed prior to beginning the exercises and at the conclusion of the programs. The flipped-classroom involved 3 laboratory based classroom sessions provided to 48 students. The sessions were focused on DNA biotechnology, health-related disparities, and antibiotic resistance. The summer camp involved a virtual platform for understanding vector-borne diseases. For this program, traps were made to collect mosquitos and the DNA was subsequently isolated. Students made their own gel electrophoresis apparatuses and analyzed migration patterns of dyes. The students also received training in bioinformatics.

Students in both programs were exposed to current topics in biomedical research and health disparities relevant to Mississippi. Students were also introduced to a variety of careers for people interested in science and health. The flipped classroom experience indicated that incorporating a more rigorous, student centered lesson can enhance the students' understanding of complex issues while teaching about topics that are relevant to their health and wellness. Data collected from students that participated in the summer camp indicated that interest in science did, on average, increase from "very little" to "quite a lot" at the conclusion of the camp. Additionally, students also reported improvements in their ability to 1) identify issues that require community-level attention or effort, 2) write effective letters to government officials, newspapers, or organization, and 3) collaborate with members of the community, even ones that are different than themselves. Students also reported that their camp experience had a significant impact on the health of their family and community. Together, the camps provided a series of biomedical research experiences that improved the interest of students in STEM and health disciplines. Future studies will involve expanding the programs to additional schools.

Thursday, August 5, 2021

EVENING

3:30 Dodgen Lecture and Awards Ceremony (B5-6)

General Poster Session

(Immediately Following Dodgen Lecture C-Poster Hall)

P12.01

CONSTRUCTION AND TESTING OF AN ELECTRONIC AVIAN DETERRENT DEVICE (E.A.D.D.) FOR CATFISH FARMS IMPACTED BY FLOODING

Scoty Hearst

U.S. Department of Homeland Security

Natural disasters such as wildfires, earthquakes, flooding, and extreme weather are on the rise worldwide. Flooding has become a major problem for Mississippians in the past few years, especially for the Mississippi catfish farmer. Mississippi is the nation's largest catfish producer, producing 60% of the catfish on the market today. The Mississippi Delta was hit hard with around 200,000 acres impacted by flooding in June of 2019. Farmland and catfish farms were underwater destroying vital crop production of corn, soybean, and cotton as well as catfish operations. Although the floodwaters have receded, new problems have emerged making recovery from the flooding disaster more difficult for catfish farmers. A new aquatic habitat produced by flooding attracted more avian pests to the Mississippi Delta region, which now have made Mississippi catfish farms a regular food stop along with their yearly migration. This increase in avian pest activity has left catfish farmers and their crops vulnerable causing a huge financial burden to farmers and the catfish industry as a whole. As a result catfish farmers have had to increase the use of butane cannons, bangers, poppers, and other deterrents to maintain fish production. To help reduce this burden, we have built an electronic avian deterrent device (E.A.D.D.), that would be a more long-term and sustainable solution to the avian pest problems harming catfish farmers recovering from the recent flooding disaster. Here, we detail the construction and field testing of our E.A.D.D. prototype at a catfish farm in the Mississippi Delta. We created over 21 unique bird deterrent sounds and tested their efficiency in deterring wading birds such as Egrets and Herons away from catfish ponds. We used the most efficient deterrents in our E.AD.D. and examined changes in bird activity at the catfish farm site over a 26 day survey period. Overall, we found that the use of our
E.A.D.D. significantly reduced the number of avian pests inhabiting the catfish farm, and was more effective than the current deterrent methods. The E.A.D.D. significantly reduced the number of avian pests from over 900 birds down to less than 200 birds. This data validates further study into the unique spectral properties of the sounds that deterred birds most efficiently. With further research and development, we suggest that our prototype E.A.D.D. could ideally be used to create a non-lethal bird deterrent useful for reducing catfish predication from wading birds on catfish farms and ultimately improve crop yields for catfish farmers impacted by flood-related avian pests.

P12.02

USING GRAPHIC NOVELS TO STRENGTHEN ENGAGEMENT IN MARINE AND ATMOSPHERIC SCIENCES AND THE CHANGING ENVIRONMENT

Jamie Stanfield[1] and Joyce Shaw[2]

[1]USM-Gulf Coast Library, Long Beach, MS, USA and [2]Gunter Library/GCRL, Ocean Springs, MS, USA

The use of graphic novels in classrooms across the spectrum significantly increased over the past few decades. While graphic novels in medical fields have earned broad acceptance, using graphic novels in STEM areas has begun gaining momentum. Whether it is grade school or a senior class at a university, graphic novels offer different types of learners the opportunity to engage in conversations about marine and atmospheric sciences, ecology, and environmental issues while learning about ways they can help care for the Earth. Graphic novels appeal to reluctant readers and visual learners. Text and pictures are retained longer in the brain and have easier memory recall than text alone. This poster presentations is supplemented with a bibliography of recent graphic novels, comics, and other graphic publications to help teachers and other find age appropriate materials for teaching and learning. These works include the disciplines of marine and atmospheric sciences, climate change, sea level rise, and other environmental issues that impact our beautiful earth.

P12.03

THE PANDEMIC PLANETARIUM: BENEFITS OF VIRTUAL VERSUS FACE-TO-FACE PLANETARIUM LABS WITH AN ANALEMMA CASE STUDY

Maria A Weber

Delta State University, Cleveland, MS, USA

When the pandemic struck, STEM laboratory courses were suddenly forced to navigate a largely new realm – virtual content delivery. This new method of content delivery begs the question 'Are virtual labs just as valuable as face-to-face experiences?' The Wiley Planetarium at Delta State University is used as a 'classroom under the heavens' for introductory astronomy courses. Unlike larger public planetariums, the Wiley Planetarium does not yet have the capability to live stream. Combining both physical distancing requirements and a series of winter weather events, typical astronomy labs could not proceed in the planetarium during the spring 2021 semester. We converted a number of face-to-face labs to virtual at-home labs using the free, open source planetarium software 'Stellarium'. In particular, we report on the results of an at-home lab where students were asked to construct an analemma calendar using Stellarium. Analemmas are diagrams that show the position of the Sun in the sky at the same mean solar time during the course of one year. We compare these outcomes to analemma calendars created by students 'observing' the Sun's position in the planetarium pre-pandemic. Both groups successfully created analemmas with the characteristic 'figure 8' shape, but the student learning outcomes and level of enjoyment varied based on delivery method

ZOOLOGY AND ENTOMOLOGY

Chair: Daniel Oyugi

Mississippi Valley State University

Vice-Chair: Alex Acholonu

Alcorn State University

Thursday, August 5, 2021

MORNING

O13.01

9:00 VERNONIA AMYGDALINA EXTRACTS INHIBIT CANCER CELL GROWTH BY DISRUPTING MICROTUBULE ASSEMBLY

Dr. Daniel Oyugi

Mississippi Valley State University

Vernonia amaygdalina (VA), one of the medicinally- important plants of Africa is considered the most used plant in the genus Vernonia. Previously we reported the in- vitro growth inhibition and anti-proliferative activities of VA extracts on cancer cells. In the present study, we examine whether VA elicits the aforementioned effects by targeting and disrupting cellular microtubule. Using immunocytochemical and fluorescence analyses, we probed the effects of VA fractions on microtubule assembly, disassembly and apoptosis in prostate (DU-145) and breast (MCF-7) cancer cell lines. Cell viability was tested using Calcein-AM Red Orange. Apoptosis was measured using Double Stain Apoptosis Detection Kit (Hoechst 33342 and Propidium Iodide (PI)). Our results indicate that organic and aqueous fractions of VA extracts abrogated the steady state-microtubule pattern into a disassembled form in DU-145. In MCF-7 cells, the fractions caused retraction, condensation and clustering of tubulin protofilaments into aggregates within the cytoplasm. Examination of cell structure and morphology revealed marked cell shrinkage, nuclear fragmentation, chromatin condensation, DNA fragmentation and formation of membrane blebs and apoptotic bodies. Further analysis of cell death by fluorescence staining indicated manifestation of condensed chromatin and nuclear fragmentation, confirming an apoptotic death, with greater quantities of apoptotic phenotypes observed in MCF-7 than in DU- 145.Viability assay showed a dose-dependent reduction in viable cells, with petroleum ether and aqueous fractions exhibiting a higher reduction effect (IC_{50} 61.02 µg/mL; 65.82 µg/mL) than methanol fraction (IC_{50} 80.77 µg/mL) in MCF-7 cells. In DU-145 cells, methanol fraction exerted highest viability reduction (IC_{50}44.21µg/mL) than aqueous (IC_{50} 131.7 µg/mL) and petroleum ether fractions (IC_{50} 130.5 µg/mL). Taken together, these observations demonstrate that VA contains active components capable of inhibiting growth of cancer cells, exerting their properties by disrupting microtubule organization, effectively causing apoptotic death.

O13.02

9:00 COMPARATIVE STUDY ON THE WATER QUALITY OF GROUND WATER FROM ALCORN STATE UNIVERSITY (ASU) AND THE TREATED WATER FROM THE ASU WASTEWATER TREATMENT FACILITY

Alex Acholonu

Department of Biological Sciences, Alcorn State University, Lorman, MS, USA

Water quality deals with a measure of how suitable water for a particular use is based on selected physical, chemical and biological characteristics and water is an essential commodity for life. The purpose of this study is to compare the quality of ground water (well) with treated waste water at the ASU Waste water Treatment Facility(WWTF) and to find out if they met the Mississippi Water Quality Criteria (MSWQC). During the month of October and November of 2014, water samples were collected from a well at ASU as well as from WWTF. The water samples were taken to the laboratory and tested according to the methods indicated in the various LaMotte water pollution detection kits supplied by Carolina Biological Supply Co. Next, the biological tests for coliform bacterial presence were conducted and the results were recorded. A comparison between the test results from both kinds of samples with the MSWQC showed that both met the MSWQC with the exception of Alkalinity , Carbon dioxide, Hardness and Phosphate. The biological tests conducted showed no coliform bacterial growth in the MacConkey agar plate in both kinds of samples and confirms the fact that both the ground water and waste water are of good quality and free from pollution. Although Alkalinity, Carbon dioxide, Hardness and Phosphate concentrations exceeded the MSWQC in both cases, these were more in WWTF water. It also showed generally that the ground water quality was better and safer to drink than the treated waste water

O13.03

9:30 MOLECULAR CLONING OF RYANODINE RECEPTOR, A TARGET OF DIAMIDE INSECTICIDES, IN SOYBEAN LOOPER, CHRYSODEIXIS INCLUDENS

Sena Isbilir, Fred R. Musser and Seung-Joon Ahn

Department of Biochemistry, Molecular Biology, Entomology and Plant Pathology, Mississippi State University, Mississippi State, MS, USA

The soybean looper (*Chrysodeixis includens*) is one of the most serious pests in soybeans, migrating from southern latitudes up through Mississippi. Since the introduction of the diamide insecticides, the pest has been successfully managed for more than a decade. However, we have recently detected a resistant population of the soybean looper to the diamide insecticide in Mississippi, leading us to study the molecular mechanism of the diamide resistance in soybean looper. Diamide insecticides, such as chlorantraniliprole, target ryanodine receptors (RyR), the intracellular calcium channels play an important role in muscle and nerve functions in insects. In this study, we aim to clone RyR gene from the soybean looper to evaluate its molecular structure for future studies on the resistance mechanism. Due to its uncommonly long sequence, we cloned the RyR gene using a strategy to subclone partial sequences and then to combine them into a full-length. The partial RyR sequences were PCR amplified using gene specific primers and cDNA as a template. As a result, we obtained a full-length sequence of RyR gene from the soybean looper, resulting in 15,360 kb in length. The deduced protein sequence showed over 94% amino acid similarity to those known from other lepidopteran insects. The structural information based on the full-length sequence provides an insight on the important domains of RyR in relation to the putative diamide resistance, paving a way to the future investigations on the resistance mechanisms to the diamide insecticides.

O13.04

9:45 CHARACTERIZATION OF MYCOTOXINS AND ASPERGILLUS ISOLATES FROM SESAME

Hamed K. Abbas[1], Perng-Kuang Chang[1], Vivek H. Khambhati[2] Cesare Accinelli[3] , W. Thomas Shier[4]

[1]USDA-ARS, Stoneville, MS, USA [2] Mississippi State University, Mississippi State, MS, USA, [3] University of Bologna, Italy and [3]University of Minnesota, Rochester, MN, USA

Sesame is extensively cultivated in Asia since antiquity, but more recently, the demand for sesame products and seeds has resulted in increased acreage in the US. In the Mississippi Delta harvested sesame seeds had low levels of aflatoxin and cyclopiazonic acid

(CPA). A follow-up study assessing the effect of prior applications of atoxigenic biocontrol strain NRRL 21882, commercialized as Afla-Guard®, on the *A. flavus* populations was carried out using a rapid molecular fingerprinting method. *A. flavus* isolates (~500) collected from four sesame varieties planted in the MS Delta in 2014 and 2015 and in the Florida Panhandle in 2015 were characterized. We found that the isolates from the MS Delta sesame seed samples belonged to the NRRL 21882-type (no biosynthesis gene clusters for aflatoxin and CPA) 66.7% to 95.9% of the time, whereas only 5.0% to 32.5% of the Florida isolates had lost both gene clusters. Prior applications of Afla- Guard® in the MS Delta likely are the reason for the high incidence of the NRRL 21882-type *A. flavus* isolates, which were unable to produce aflatoxin and CPA. These results support the use of sesame for crop rotation with corn,cotton,peanutandsoybean.

O13.05

10:00 SILK GLAND-SPECIFIC EXPRESSION OF UGT34 GENE IN MOTHS

Courtney Wynn and Seung-Joon Ahn

Department of Biochemistry, Molecular Biology, Entomology and Plant Pathology, Mississippi State University, Mississippi State, MS USA

UDP-glycosyltransferase (UGT) is a multigene family, of which enzymes play a critical role in the detoxification of xenobiotics and biotransformation of endobiotics in all living organisms including insects. A recent genomic analysis identified over 45 UGT genes in the corn earworm (*Helicoverpa zea*), a serious agricultural pest species feeding on numerous economically important plants. We found that a UGT gene (named UGT34) showed high expression levels exclusively in the silk gland tissue, which is not supposed to be directly involved in detoxification. In order to confirm the tissue-specific expression of UGT34, we first performed a comparative transcriptome analysis of eight different larval tissues including silk glands. Quantitative PCR for UGT34 was conducted to compare different developmental stages and silk gland sub-segments. Furthermore, the same analysis was carried on another moth species, the soybean looper, to determine the tendency of the UGT34 expressions. Transcriptome analysis showed that the UGT34 gene was highly expressed in the silk glands, whereas the other UGT genes were expressed in different larval tissues such as guts, fat body and Malpighian tubules. The silk gland-specific expression of UGT34 was confirmed by quantitative PCRs. In addition, the UGT34 gene showed the similar expression patterns also in the soybean looper, suggesting an important role of UGT34 in the silk glands in moths. Silk plays an important role in the lives of many lepidopteran insect species, such as feeding, protecting, and metamorphosis. The present study provides a clue on a novel function of UGT34 in the silk production in insect.

O13.06

10:15 UNDERSTANDING THE FUNCTIONAL ROLE OF SELENOPROTEINS AND THE UNFOLDED PROTEIN RESPONSE IN THE BLACK-LEGGED TICK (*Ixodes scapularis)*

Latoyia Downs[1] and Shahid Karim[2]

[1]School of Biological, Environmental, and Earth Sciences, The University of Southern Mississippi, Hattiesburg, MS, USA and [2]Center for Molecular and Cellular Biosciences, The University of Southern Mississippi, Hattiesburg, MS, USA

Tick-borne diseases are a public health issue, affecting people every day. Ticks rank thefirst in their importance as vectors of human pathogens in the United States. Despite a robust innate immune response, pathogens find a way to persist inside the tick vector and eventually be transmitted to a mammalian host. This study examined the functional role of selenoproteins and the unfolded protein response by utilizing an *Ixodes scapularis* cell line (ISE6). Our previous studies show that the silencing of selenogenes in ticks significantly impaired the pathogen replication. To further evaluate the tick antioxidant (selenogenes) and stress responses, we examined cellular responses to chemically induced and pathogen- induced ER and oxidative stress. Confluent ISE6 cells were either infected with *R. parkeri* or *Borrelia burgdorferi* or exposed to chemicals to induce stress (Paraquat, H_2O_2, Thapsigargin, or Tunicamycin). The ISE6 cell RNA was extracted and multiple endoplasmic reticulum-associated degradation (ERAD) and Unfolded Protein Response (UPR) genes were analyzed using qRT-PCR. Our results show that the cell system's stress response to pathogens differ from the response to the induced stress. During *R. parkeri* infection there is significant upregulation of up to a 6-fold increase of ERAD component selenoprotein genes, SelenoK, SelenoM, SelenoN, SelenoS, and SelenoT, and UPR genes, ATF6, IRE1, and Derlin. Interestingly, *B. burgdorferi*, an interstitial pathogen, caused an upregulation of up to a 100-fold increase of ERAD and UPR genes, a much higher increase than the intracellular pathogen, *R. parkeri*. A complete understanding of the role of ER stress in pathogen facilitation and maintenance will generate new strategies to reduce and tick-borne pathogen transmission.

O13.07

10:30 EFFECTIVENESS OF NEEM OIL AS PESTICIDE AGAINST MYCOPHAGOUS BEETLE FEEDING DAMAGE TO EDIBLE MUSHROOMS

Frank Mrema

Alcorn State University, Lorman, MS, USA

Medicinal mushrooms such as shiitake (Lentinula edodes), oyster (Pleurotus ostreatus), and Almond (Agaricus subrufescens) mushrooms are a promising source of fresh food to minimize the impact of food insecurity in southwest Mississippi. The reported nutritional values of these mushrooms include anti-cancer, anti-microbial, anti-tumorigenic, and immunological properties. Many small-scale farmers have learned and adopted the cultivation technology of mushrooms on lignocellulosic substrates such as hardwoods and agricultural residues. The major challenge these farmers encounter is insect infestation by fungus beetles, Triplax spp. which affects the crop yield. The objective of this study was to evaluate Terramera – Rango™ (neem oil-based biopesticide) to manage the population of Triplax spp. On mushrooms. Different treatment concentrations of the biopesticide formulation at 0.625%, 1.25%, 1.8% and 2.4% (v/v) were compared with the conventional insecticide, permethrin. The control treatment consisted of sterilized water only. The results showed that none of the neem oil concentration treatments was significantly different from the control treatment and did not cause any significant mortality. However, neem oil concentrations deterred the insects from the food source and therefore resulted in reduced feeding. Nevertheless, the permethrin caused higher insect mortality (100%) and was significantly different from all other treatment concentrations. These results suggest that neem-oil may discourage the population of Triplax spp. from mushrooms and that permethrin is effective even at lower concentrations by causing significant mortality of these beetles. Further studies to evaluate the toxicity of permethrin against Triplax spp. in laboratory bioassays are proposed.

O13.08

10:45 EFFECTS OF PLANT DENSITY ON VETIVER GRASS (*Vetiveria zizaniodes*) BIOMASS PRODUCTION AND CHEMICAL COMPOSITIONS

Phraubrandi M. Magee and Patrick E. Igbokwe

Department of Agriculture, Alcorn State University, Alcorn, MS, USA

Two field experiments were used to determine the effects of four within-row plant spacings (10.16, 20.32, 30.48, 40.64 cm) on vetiver grass (*Vetiveria Zizaniodes*) biomass productions and chemical compositions. The study was conducted in a Memphis silt loam (Fine silty, mixed thermic Typic Hapludolfs) at the Alcorn Experiment Station in southwest

Mississippi. The experiment design was Randomized Complete Block (RCB) with four replications of each within-row spacing. Test plants obtained from the vetiver grass nursery on campus were clipped to 30.48 cm shoot length and 15.24 cm zoot length before single tillers were separated and transplanted into rows 6.1 m long and 1.2 m wide within each block. Standard agronomic practices were applied during field preparations, planting and field managements. Data collections were on growth components and plant chemical compositions, during both study periods. Findings suggest that plant heights generally increased with increase in plant density, whereas the number of tillers generally increased with the decrease in plant density. The root and shoot dry weights also increased with the decrease in plant density and with age of the plant. The percent shoot chemical compositions were similar for the two study periods. Soil chemical compositions were not affected by plant spacing except for potassium which was generally greater with decrease in plant density.

11:30-12:00 Divisional Business Meeting and Awards

Thursday,

August 5, 2021

AFTERNOON

Room Poster Hall

1:30-2:30 Divisional Poster Session

P13.01

TOP SCIENTIFIC TECHNIQUES FOR DIAGNOSING COVID-19 INFECTION

Eniola Afolabi and Julius O. Ikenga

Mississippi Valley State University, Itta Bena, MS, USA

The objective of this research was to investigate the top two reliable, scientific techniques for diagnosing Covid-19. This undertaking as well involved studying the makeup of Covid- 19 virus, how it enters the host cells, its effect on the host body system and how it is transmitted from one individual to another. The detailed approach was necessary to expedite a search for a cure or a vaccine. Samples from infected individuals were aseptically obtained using sterile techniques and cotton swab. The samples were promptly processed using a methodological approach that required a reverse transcriptase polymerase chain reaction (RT-PCR) to detect the presence of SARS-CoV-2 and provide quantitative information on viral loads.

The RT-PCR required the reverse transcription of SARS- CoV-2 RNA into complementary DNA (cDNA) strands, followed by amplification of specific regions of the cDNA and then PCR testing. The presence of virus is confirmed by the fluorescence level surpassed and the number of cycles. The fewer the cycles, the more severe the viral infection is.

The second was a serological technique using enzyme linked immunosorbent assay (ELISA) which required the use of a whole blood, plasma, or serum samples aseptically collected from Covid-19 infected individuals. Both techniques use fluorescence measurements to detect the presence of viruses in tested samples. ELISA relied on the use of chem-plates coated with viral proteins of interest, such as the Spike protein before the plates were incubated with test sera to check for bound antibody-protein complex can be detected with another wash of antibodies that would produce a color or fluorescent-based readout, to indicate positive for Covid-19 infection.

P13.02

AN ANALYSIS OF COVID-19 INFECTION AND HEALTH DISPARITY IN MISSISSIPPI

Debarshi Roy[1], Sanjoy Sarkar[2], Martha Ravola[1]

[1]Alcorn State University, Lorman, MS, USA and [2]UNC-Chapel Hill, Chapel Hill, NC

Introduction: According to the World Health Organization (WHO), more than 66.2 million confirmed cases of COVID-19, a global pandemic caused by SARS-CoV2 virus, have been reported so far. Researchers are working relentlessly to find effective solutions to this catastrophe, using genomic sequence-based investigation, immunological analysis and more. The role of health disparity has also emerged as an intriguing factor that made a huge impact on the lives of people. **Methods:** We analyzed various factors that triggered the health disparity in the United States of America along with the rate of COVID-19 morbidity and mortality. Furthermore, we have also focused on the State of Mississippi which is suffering from an extreme health disparity. Data has been obtained from publicly available data sources including, CDC and Mississippi State Department of Health (MSDH). **Results:** Our analysis suggested that the COVID-19 infection rate per 100,000 people is directly correlated with the increasing number of the African American population in the United States. We have found a strong correlation between the obesity and the COVID-19 cases as well. All the counties in Mississippi demonstrate a strong correlation between a higher number of African American population to COVID-19 cases and obesity. Our data also indicate that a higher number of African American populations are facing socio-economic disadvantages which enhances their chances of becoming vulnerable to pre-existing ailments such as obesity, type- 2 diabetes and cardiovascular diseases. **Conclusion:** We propose a possible explanation of increased COVID-19 infectivity in the African American population in the United States. This work has highlighted the intriguing factors that increased the health disparity at the time of the COVID-19 pandemic.

P13.03

INVESTIGATION OF ENDOPHTYES FROM ROOT OF PEA PLANTS

Jennifer Laifa, Oluwapelumi Shodubi, Hattie Spencer, Jordan Johnson

Mississippi Valley State University, Itta Bena, MS, USA

Endophytes are bacteria found inside plants that protect the plant and enhance plant growth. They are found in all species of plants; however, their relationship is not well understood. The study hypothesized that the endophytes would be found in the roots of pea plants. In the present study, seeds of the pea were purchased and grown for six weeks. After six weeks, the plants were harvested, measured, and weighed. The roots were separated from the shoots. The roots were cleaned to remove debris. The roots were then surfaced sterilized using sterile water and 70% ethanol. The roots were mixed in magnesium sulfate solution using a mortar and pestle. The tryptic soy agar plates were used to grow bacteria. After 24 hours of incubation, the morphology of the colonies was observed. Simple staining procedures using methylene blue and Gram strain reactions were conducted. Biochemical test such as catalase test was conducted as well. A starch hydrolysis test was also performed. The colonies were also grown on MacConkey agar. The result indicated that the colonies were round, smooth, and elevated, cocci and Gram-negative bacteria cells. The cells were catalase- positive and could not hydrolyze starch. Although the cells grew on MacConkey, they could not ferment lactose. The strains of bacteria were found to be from the genus *Pseudomonas*. In conclusion, *Pseudomonas* is one of the endophytes found in pea plants.

P13.04

BIO-ECOLOGICAL CHARACTERISTICS OF HONEY PLANTS IN MISSISSIPPI

Elena N. Kostyleva

Alcorn State University, Lorman, MS, USA

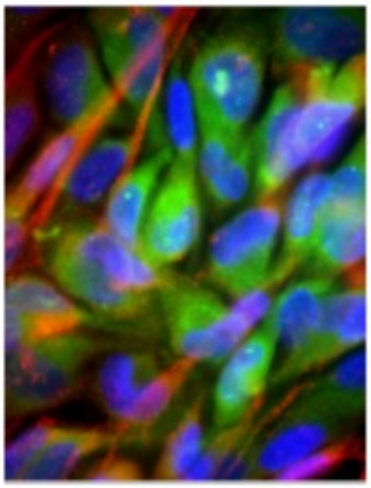
To determine the potential of honey plants growing in an area to produce honey, it is necessary to know, besides the species composition, their biological and ecological characteristics. The aim of this work was to study the origin, life forms, life cycle and

places of habitat of honey plants in the state of Mississippi. The results of the study show that, the honey flora of the area is divided by its origin as follows: the majority of more than 180 species of honey plants found - 123 species (almost 68%) are native, 53 (29%) - introduced from different countries, and 6 (3%) - distributed universally. By the life forms, honey plants of the region are divided as follows: trees represent 51 species (28 %); shrubs, undershrubs, subshrubs and vines – 42 species (23 %); herbaceous plants – 89 species (49%) of all honey plants found here. By the life cycle, honey plants of the area are divided: annuals – 25 species (14%), biennials and perennials – 157 species (86%) of all registered species. By the place of vegetation (type of land), the registered honey plants are divided into: forestry ones – 79 species (37%); forest belts, parks, greenery and ornamental plantations plants – 54 species (24%); field and fodder plants – 20 species (9%); plants of meadows, pastures, marshes and wetlands – 53 species (24%); fruit garden, berry and vineyards plants – 9 species (4%); plants of vegetable and melons plantations – 4 species (2%) of all honey plants reported in this study.

Thursday, August 5, 2021
EVENING
3:30 Dodgen Lecture and Awards Ceremony (B5-6)
General Poster Session
,(Immediately Following Dodgen Lecture C-Poster Hall)

Friday, August 6, 2021
MORNING
Room D2
Co-Sponsor Symposia with Agriculture and Plant Science

Friday, August 6,
2021
AFTERNOON
12:00-1:00 Plenary Speaker
1:00-3:00 Mississippi INBRE/ Millsaps Symposia



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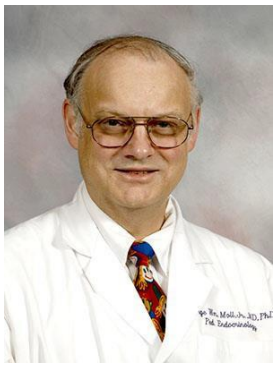
In Memory



In 2020, the MAS/Health Science Division lost a great friend and colleague, Dr. George W. Moll, to the COVID-19 Pandemic. We extend our condolences to the family, friends and colleagues of Dr. Moll. George was an Emeritus Professor of Pediatric Endocrinology at the University of Mississippi Medical Center (UMMC). He died, August 13, 2020, at age 72, after a month struggle with COVID-19 infection at UMMC. George for many years was the only pediatric endocrinologist in Mississippi. "He was literally on call 24 hours a day for 17 years before the 2nd endocrinologist was recruited". He was the last faculty recruited by late Dr. Blair Batson, who the Children Hospital is named after.

George served as a Co-Vice then Co-Chair and Committee Member for the HSD from 2017- until the time of his illness in 2020. The HSD Committee is grateful to have known him and worked with him. His steadfast support will be missed.

George was born in Milwaukee, WI. He graduated Cum Laude from Carlton College in 1969 with a BA in Chemistry. He received his PhD in Biochemistry and then MD from the University of Chicago, Pritzker School of Medicine in1977. He then Joined the Pediatrics Residency Program at the University of Michigan, followed by fellowship in Pediatric Endocrinology at the University of Chicago in 1981.

Dr. Moll was an Assistant Professor, at the University of Chicago (1981-1985) and at Emory University (1985-87) prior to coming to Mississippi as Division Chair of Pediatric Endocrinology at the Children's Hospital. Dr. Moll was a Tenured Professor of Pediatrics and remained the Division Chair for 25 years. Dr. Moll was a dedicated physician to his patients and to the children he treated. He was a brilliant scientist and excellent teacher to his students and peers, even beyond his retirement in June 2018.

Dr. Moll was the President of the UMMC Chapter of Sigma Xi, Fellow of the American Collage of Endocrinology, Fellow of the American Academy of Pediatrics, Life Member of the Mississippi Academy of Sciences. In 2016 when the HSD Chair was in need for a Vice-Chair, Dr. Moll a prominent member of the HSD and the President of the Sigma Xi, was at the HSD business meeting volunteered to take the position. He also worked to secure Sigma Xi Sponsorship. Since 2017-present, the Sigma Xi, has been a faithful sponsor for the HSD student's award by monetary gift honoring Dr. Moll's legacy.

Dr. Moll published over 50 peer reviewed papers and 100 abstracts with interests in all areas of Pediatric Endocrinology including childhood obesity, quality control projects and over 40 years of diverse practice experience in endocrinology and Pediatric Medicine. Dr. Moll co-authored manuscripts regarding hormone receptor and neuroendocrine associated genetic mutations and autoimmune endocrine disorders including Type 1 Diabetes Mellitus (T1DM).

He loved to travel and sing, whether in the church choir or with family on the "Karaoke machine". He loved Star Wars, Disney, Doctor Who and NOVA. To quote one of his favorite shows, "Doctor Who", "We are all STORIES in the end, just make it a good one" and George certainly did.

Those wishing to honor George's legacy, please consider making donations to the George Moll-HSD-Student Award Fund at MAS.

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- **45** concentrations
- **17** graduate majors,
- **38** concentrations

- Nearly **100%** job placement
- **2,210** acres of farm land
- Research opportunities
- Scholarships

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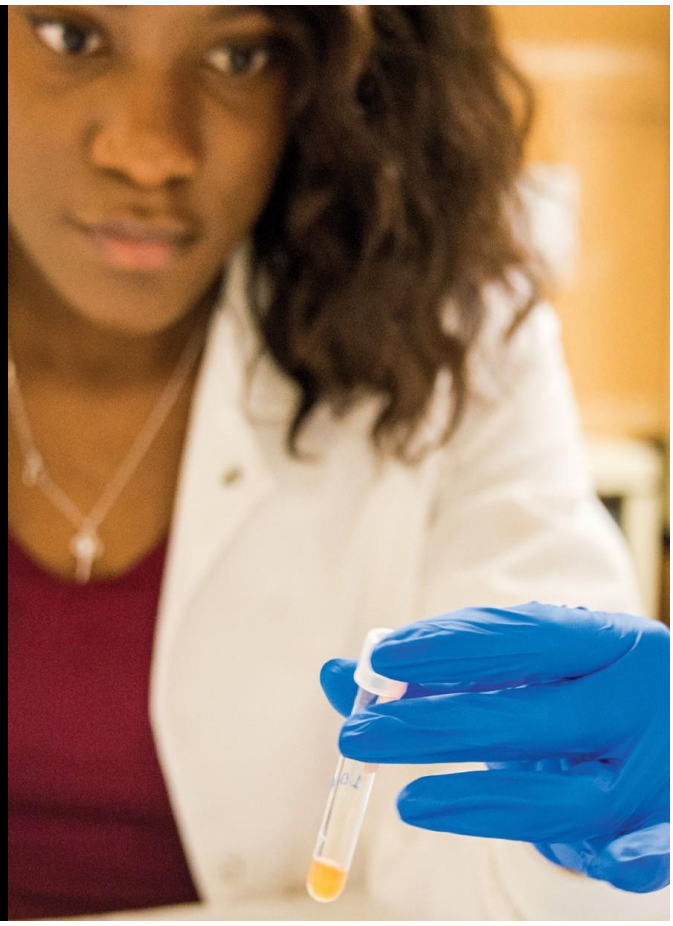

MAFES

We Research...

- Plant Production Systems
- Animal Production Systems
- Food Safety and Quality
- Sustainable Agriculture
- Human Health and Well-being
- Sustainable Communities

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FOOD SCIENCE, NUTRITION & HEALTH PROMOTION

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Undergraduate Education:

- Food Science
- Nutrition
- Pre-Health
- Culinology®

Graduate Education:

- Dietic Internship
- Food Science
- Health Promotion (available online)
- Nutrition
- Functional Foods

Certificates

- Clinical Health Promotion and Wellness Coaching

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Undergraduate Education:

- Agricultural Education, Leadership, and Communications
- Agricultural Science
- Fashion Design and Merchandising
- Human Development and Family Science

Graduate Education:

- Agricultural and Extension Education
- Early Intervention
- Fashion Design and Merchandising
- Human Development and Family Science

Certificates:

- Retail
- Trauma-informed Advocacy

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