



**WELCOME TO THE ONE HUNDRED AND THIRD ANNUAL
MEETING OF THE ALABAMA ACADEMY OF SCIENCE MEETING
JOINTLY WITH THE ALABAMA JUNIOR ACADEMY OF SCIENCE
AND THE GORGAS SCHOLARSHIP COMPETITION
HOSTED BY FAULKNER UNIVERSITY**



**THE ALABAMA
JUNIOR ACADEMY
OF SCIENCE**



**ONE HUNDRED THIRD
ANNUAL MEETING
of the
ALABAMA ACADEMY OF SCIENCE
Faulkner University**

Meeting Jointly With

ALABAMA JUNIOR ACADEMY OF SCIENCE

and

GORGAS SCHOLARSHIP COMPETITION PROGRAM

Feb 27th-28th, 2026

Faulkner University



November 20, 2025

Dear Alabama Academy of Science Members and Guests,

Welcome to Faulkner University! Faulkner is a purpose-driven, marketplace focused Christian university.

We are excited to have you on our campus for the 103rd Annual Meeting of the Alabama Academy of Science and the Gorgas Scholarship Competition. It is our pleasure to host this amazing event that brings together some of the brightest minds in a variety of science related fields to share ideas and recognize those who are making great strides in their respective disciplines.

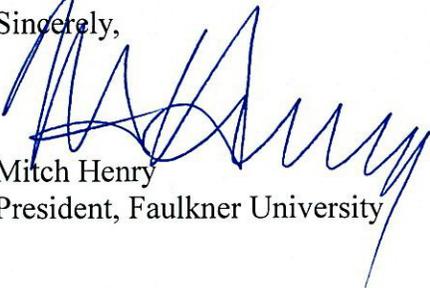
Since 1942, Faulkner has grown to be a premier choice for Christian education in the Southeast. Our academic offerings have expanded, our law school has achieved national recognition, and our College of Health Sciences is equipping the next generation of healthcare professionals with state-of-the-art facilities and programs that prepare students to lead in the evolving healthcare landscape.

Faulkner University trains students to compete with the best in the world in more than 90 relevant undergraduate degree programs on-ground and on-line, including rapidly growing degrees in Computer Engineering, Digital Media, Criminal Justice, Digital Ministry, and Secondary Education for new teachers.

In addition to our 90 undergraduate degree programs, we now offer 27 master's degrees, and 11 doctoral degrees. This includes our rapidly growing Master of Science in Management with business analytics, our growing Master of Justice Administration, Education Masters, Doctorate in Humanities, Speech Language Pathology Masters, and our top 10 ranked Doctorate in Health Sciences degrees, keeping our students on the cutting edge of leading developments in business, law enforcement, education, and healthcare.

We hope you enjoy your visit to Faulkner University and that the conference will be a memorable event that inspires new ideas and lasting connections. We appreciate your allowing us to host this event.

Sincerely,



Mitch Henry
President, Faulkner University

Office of the President



Dear Alabama Academy of Science colleagues and guests,

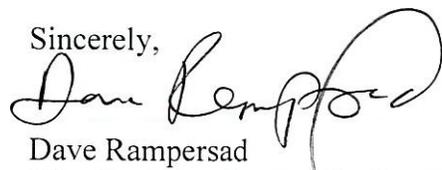
It is an honor and privilege to welcome you to Faulkner University for the 2026 Annual Meeting of the Alabama Academy of Science. We are grateful that you have chosen to join us on our campus, and we pray that your time here is both enriching and encouraging. As a Christian university committed to the pursuit of truth, we are delighted to host a gathering that celebrates discovery, advances scientific understanding, and highlights the God-given curiosity that drives us to explore His creation.

Faulkner University's academic mission is rooted in Christ-centered education, academic excellence, and service to our communities. Within our expanding academic landscape, we are especially proud of our science and health-related programs that prepare students to serve with excellence and compassion. Our biology, chemistry, computer science, and pre-professional tracks continue to grow, and the recently formed College of Health Sciences reflects our deepening commitment to preparing future healthcare professionals—through programs such as Nursing, Occupational Therapy, Physical Therapy, Physician Assistant Studies, Speech-Language Pathology, and other emerging health initiatives—to meet the needs of Alabama and beyond.

Over the next few days, you will encounter presentations, posters, and conversations that represent the strength of scientific work occurring across our state. We trust the sessions inspire fresh ideas, spark new collaborations, and strengthen the shared pursuit of knowledge that benefits our communities.

As you spend time on our campus and in the city of Montgomery, we hope you experience the warmth and hospitality that define our Faulkner community. May these days be filled with meaningful connection, fruitful dialogue, and moments that remind you of the purpose and wonder of scientific inquiry.

Thank you for joining us for this special event. We are honored to partner with the Alabama Academy of Science and grateful for the good work each of you carries forward.

Sincerely,

Dave Rampersad

Vice President for Academic Affairs



Fellow members of the Alabama Academy of Science and esteemed guests, it is my pleasure to welcome you to the 103rd Annual Meeting of the Alabama Academy of Science. We are delighted to gather on the beautiful campus of Faulkner University for this important event.

I would like to express my sincere gratitude to everyone whose hard work and dedication have made this meeting possible. In particular, I extend special thanks to Dr. Uduak Afangedeh, who has served as chair of the local planning arrangement committee. Dr. Afangedeh's leadership and commitment have been instrumental in ensuring the success of our gathering.

As you know, the Alabama Academy of Science has a long and distinguished history of bringing together educators, researchers, students, and the general public. Throughout my tenure as Executive Director of this esteemed organization, I have had the privilege to witness firsthand the remarkable collegiality and cooperation that define our members. I have truly never encountered a group more dedicated to their roles and more effective in accomplishing their goals.

I would like to extend my heartfelt appreciation to each of you for your willingness to serve on various committees and in officer roles. Your commitment and active participation are the cornerstone of the Academy's continued success. It is your collective efforts that ensure the Academy's existence and its ability to fulfill its mission year after year.

This year's meeting features a variety of engaging oral and poster presentations across our ten sections. I am also looking forward to the keynote address by Mr. John Cranston, Principal Research Scientist/Engineer III at Auburn University, during the Awards Banquet on Thursday evening. He will share insights from his distinguished career and passion for science.

Once again, I extend a welcome to all. This wonderful meeting reflects the Academy's ongoing commitment to advancing science and fostering collaboration throughout the State of Alabama.

Sincerely,

Ronald (Ron) N. Hunsinger, MS. Ph.D.
Executive Director
The Alabama Academy of Science

OUR SPONSORS



Fourwaves is a comprehensive event management software designed to streamline the entire lifecycle of academic and professional conferences. Their platform offers robust tools for abstract management, registration, ticketing, scheduling, and website creation, all integrated into one seamless system. Fourwaves empowers organizers to manage complex events efficiently, enhance attendee engagement, and reduce administrative overhead. Their goal is to provide intuitive technology that lets organizers focus on delivering exceptional event experiences. You can contact sales@fourwaves.com for any questions or visit <https://fourwaves.com>.

Faulkner University – Thank you for sponsoring a Banquet Table to honor your Administration, who so wholeheartedly hosted and supported the 103rd Annual Meeting of The Alabama Academy of Science.



YOUR CHOICE FOR CHRISTIAN HIGHER EDUCATION



Are you ready to embark on an unforgettable educational journey?

With multiple science degree options in fields such as Nursing, Biology, and Biochemistry, the sky is the limit for your future.

Join us on this extraordinary path of learning, faith, and personal development. Become a part of a community that values your aspirations, supports your dreams, and empowers you to embrace a courageously Christian journey. Faulkner University—Where Faith Shapes Futures.

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Schedule a visit today at: myfaulkner.org | (334) 386-7200 | admissions@faulkner.edu

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College of Arts & Science Faulkner University



VENDORS

Working To Reduce Opioid Overdose Deaths in Alabama

VitAL Project Freedom

VitAL is committed to bringing down Alabama's opioid overdose death rates. Through research and education, we can help members of our community from overdosing and lead them to recovery.

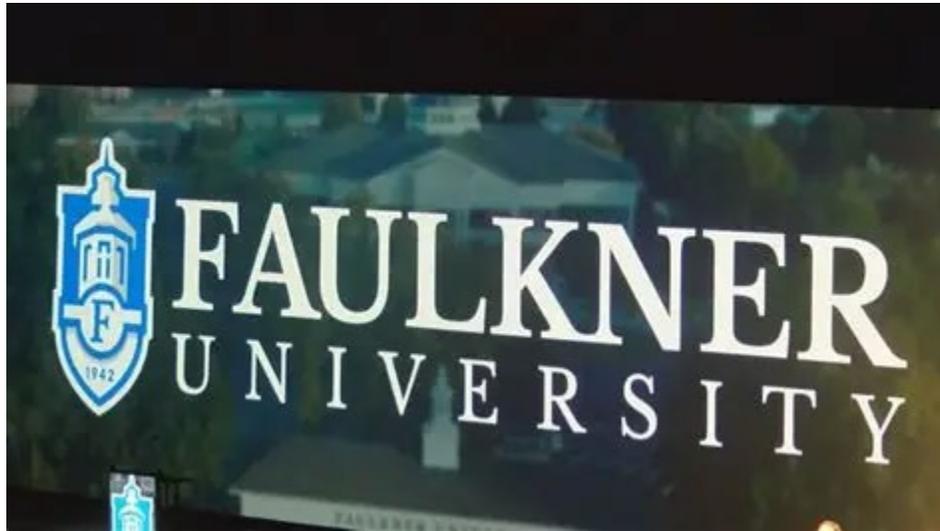


College of Education
Faulkner University



Social & Behavioral Science Department

Faulkner University



College of Health Science Faulkner University



Admissions Department Faulkner University



Thank you for providing coffee/donuts

Chappy's Deli

Natural & Physical Science Department

Department of Mathematics

Thank you, Faulkner University, for your Scholarship Award offer to the Gorgas Winner

Scholarship Award

Faulkner University will offer a Scholarship to the winner of the Gorgas Scholarship Competition if they choose to attend Faulkner University. This generous scholarship will have a dollar value of \$14,000 per year for 4 years for a total of \$56,000.00. This would be awarded \$7,000 per semester. This award is subject to the student meeting our Admissions requirements and continuing to make satisfactory academic progress during their time as our student.

LOCAL ARRANGEMENTS COMMITTEE

The Academy expresses its appreciation to Faulkner University and the Local Arrangements Committee for planning and hosting the 103rd Annual Meeting.

Chairperson

Uduak Afangideh

University Liaison Officer

Wayne Baker

Facilities/Equipment Coordinator

Nancy Itson

Food/Hospitality

Maisha Wester

Sponsorship/Publicity

Charlotte Morris

AAS Program Coordinator

Shelley Vardaman

AJAS Program Coordinator

Mark Brenneman

Poster Coordinator

Maisha Wester



PROGRAM OF THE ALABAMA ACADEMY OF SCIENCE – KEY EVENTS

Executive Committee Dinner Friday, February 26th, 2026, 6 pm (J.L. Perry Dining Room)

AAS Luncheon, Friday, February 27th, 2026, 12:15 PM in the Rotunda Auditorium



Dr. Larissa Strath

Dr. Larissa Strath, PhD, is an Assistant Professor at the University of Florida in the Department of Health Outcomes & Biomedical Informatics (HOBI). Hailing from Barrie, Ontario, Canada, she graduated from Faulkner University in 2016 with a Bachelor of Science degree in Biology: Pre-Medicine/Dentistry with a minor in Chemistry and was an active member of the Varsity Women’s Soccer Team which she was co-captain her senior year. She then earned her PhD in Behavioral Neuroscience from the University of Alabama

at Birmingham in 2021 under the mentorship of Dr. Robert Sorge, PhD. Dr. Strath is a translational neuroscientist whose research focuses on how dietary composition influences pain and aging through epigenetic and immune mechanisms. Her work spans basic science, clinical, and epidemiological studies, examining chronic pain conditions such as low back pain, osteoarthritis, and fibromyalgia, and endometriosis. Supported by a competitive National Institutes of Health/National Institute on Aging K99/R00 award, her recent research explores how nutrition, epigenetics, chronic pain, and cognitive health intersect, including potential links to dementia and Alzheimer’s disease. At UF, she participates in interdisciplinary research groups, mentors trainees, and leads studies aimed at improving understanding of pain and health outcomes across diverse populations.

AAS Awards Banquet Friday, February 27th, 2026, 6:30 pm in the Rotunda Auditorium Keynote address follows banquet immediately



John Cranston

Principal Research Scientist/Engineer III, Auburn University

John Cranston is a man of faith, family, and lifelong curiosity. A devoted husband of 51 years, father of four, and “Popi” to eleven grandchildren, he has spent the past 41 years working at the intersection of manufacturing, aerospace, and innovation. He is also a proud graduate of Faulkner University (1990). John’s professional journey began humbly—as a janitor—and evolved through roles as technician, engineer, senior materials and process engineer, senior research scientist, and principal research scientist/engineer. He has worked for NASA

contractors on programs including the Space Shuttle and the James Webb Space Telescope. Along the way, he founded five businesses—one of which has thrived for over 26 years—and operated across multiple structures: S-Corp, C-Corp, non-profit, and sole proprietorship. The first 33 years of his life, John describes as “training”—a foundation for the contributions to come. For 10 years, he worked with a NASA contractor developing composite manufacturing

processes for the Space Shuttle's External Tank, earning three patents and the company's Inventor of the Year Award.

John went on to serve as a Senior Research Scientist at the University of Alabama in Huntsville (UAH), where he also led NASA's Technology Transfer Program in Alabama, helping companies explore and commercialize space technologies. During his time at UAH, he developed a rapid tooling process that won over \$1 million in SBIR grants. He co-authored grant proposals, managed research projects, and trained as a Lean Manufacturing Process instructor through UAH's Manufacturing Extension Program.

John's passion for education and workforce development led him to create two award-winning outreach initiatives: *The Tube Factory*—a hands-on teacher training program in manufacturing—and *Bird Inc.: The 50-Minute Factory*, a mobile STEM and manufacturing program for students. Over eight years, John delivered more than 500 interactive presentations to 20,000+ Alabama students, sparking interest in STEM careers and the importance of hands-on learning.

After leaving UAH, John pursued a venture in golf technology, founding Balance Certified Golf and securing another patent. His innovations were showcased across the PGA, LPGA, and Senior Tours. He later returned to aerospace, spending 14 years as the Senior Materials and Process Engineer on the James Webb Space Telescope team.

Today, John is Principal Research Scientist/Engineer III at Auburn University and serves as the State Coordinator for *Bird Inc.*, now relaunched with a goal of reaching 28,000 middle school students across Alabama by 2026. Since 2023, he has engaged over 5,700 students with a message that connects STEM, manufacturing, and purpose.

Looking ahead, John is developing a hands-on science curriculum inspired by his work on the James Webb Space Telescope. The program combines exploration of telescope imagery with guided inquiry, prompting students to ask: *What does the evidence tell us?* Through this lens, he encourages discovery, critical thinking, and an understanding of the scientific method.

John is driven by a love for science—and the truth that drives it. His life's work reflects a calling: to innovate, to educate, and to inspire the next generation.

AJAS/Gorgas Scholarship Competition Luncheon, Saturday, February 28th, 2026, 12:00 Noon in Room 135, Harris-Parker Hall



Dr. Chelsea Ward

Dr. Chelsea Ward, Ph.D. is Head of the Department of Biology and Environmental Science, RHERI at Auburn University in Montgomery. Dr. Ward's research focuses on immunology and stress physiology as it relates to temperature and changing environments. She also has interest in latitudinal gradients in stress physiology, immunology, and metabolism in Anurans.

GENERAL INFORMATION

- Name tags can be picked up at the registration table upon arrival at the meeting. The registration table will be in Harris Hall on Friday and in the Harris-Parker building on Saturday. These name tags will be required for admission to paper/poster scientific sessions (including all presenters), the Friday evening SciMix, and the banquet. Registration link:

<https://event.fourwaves.com/aas2025/registration>

Tickets for the Joint AJAS/AAS banquet may be purchased at the registration desk until all tickets are gone.

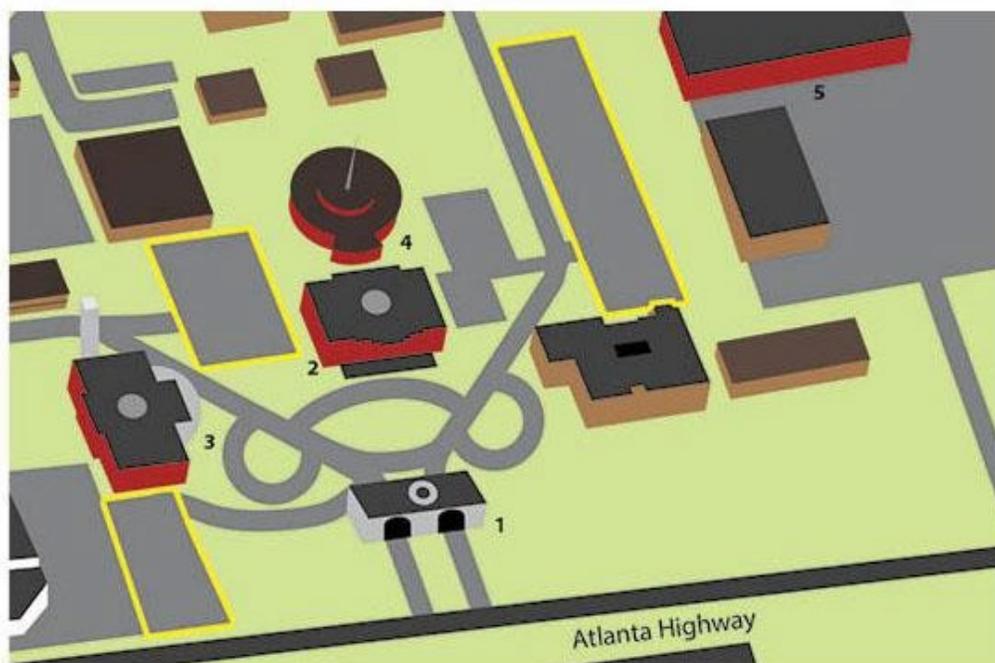
- At least one of the authors of a presented paper or poster must be a member of the Academy. Membership payment must be made at <http://www.alabamaacademyofscience.org/join-aas2/> and is separate from registration payment.

- Computers will be provided where needed for presentations (PCs for PowerPoint).

- Please follow signs to parking spaces closest to the venue and avoid construction areas. No permit is needed.

- A map of the Faulkner University campus can be found below. Please check the appropriate booklet section for location information. You may also access a campus map here:

<https://www.faulkner.edu/wp-content/uploads/Campus-Map-Montgomery.pdf>



1 Main Entrance - 5345 Atlanta Highway
2 Harris College of Business (HH) - Registration
3 Harris-Parker Building (HP)

4 EL Cullom Rotunda (R)
5 College of Health Sciences (CHS) - 5445 Atlanta Hwy
Parking

POSTER PRESENTATION INFORMATION

Senior Alabama Academy of Science Poster set-up begins at 1:00 PM Friday, February 27th in Harris Parker Hall. Senior AAS Posters are available for viewing on Friday from 2:00 PM until 3:30 PM.

Each poster is allotted up to 46”X46” of display space on mobile bulletin boards, but 42” wide by 32” high would scale to normal dimensions and is the recommended size. These are hard boards, so thumbtacks will be provided for poster display. Alternatively, presenters may bring tape to secure their posters.

Authors for the section posters should be present for discussions with viewers and competition judges from 2:00 PM until 3:30 PM. All posters should be removed at the conclusion of the session.

Junior Academy Posters may be set up beginning at 4:00 PM Friday, February 27th in the Rotunda for the Sci-Mix. Posters will be available for public viewing in the Sci-Mix from 4:30 – 5:45 PM. On Saturday, February 28th, Gorgas Posters should be set up at 7:30 AM in Harris Parker Hall. Each poster is allotted up to 46”X46” of display space.

POSTER VIEWING TIMES NOTE: Posters for the Senior AAS may be set up in Harris Parker Hall beginning at 1:00 PM, Friday, February 27th. Locate posters by cards on poster boards indicating Section and Poster # in the program booklet. All Senior Academy posters must be removed by 4:00 PM.

ORAL PAPER PRESENTATION INFORMATION: All presentation rooms are equipped with monitor screens and computers. Presenters are asked to bring their Windows compatible (PowerPoint, Word, etc.) presentations pre-loaded on a USB-A thumb drive. If presenters log into their email to download presentations, their email will show up on the screen for all to see. All thumb drives are to be removed at the conclusion of the presentation.

PROGRAM OF THE ALABAMA ACADEMY OF SCIENCE
Friday, February 27th, 2026
Faulkner University

8:00 AM – 10 AM	Registration,	Harris Hall, Foyer
8:00 AM – 8:30 AM	Coffee and Donuts	Harris Hall, Foyer

Morning Paper Session
(HH – Harris Hall; HP – Harris Parker Hall)

8:30 AM – Noon	BIOLOGICAL SCIENCE (Section I) HEALTH SCIENCES (Section IX) ENVIRONMENTAL AND EARTH SCIENCES (Section VIII)	Room HH 109
8:30 AM – Noon	CHEMISTRY (Section II) PHYSICS AND MATHEMATICS (Section III) ENGINEERING AND COMPUTER SCIENCE (Section IV)	Room HP 128

Morning Poster Session and Viewing
Harris Parker Atrium

Locate the Following Presentation Boards and Cards Identifying Your Poster Title to Display Your Poster.

10:00 AM – 11:00 AM	STEM EDUCATION (Section VII)	Room HP 135
12:00 Noon	AAS Photo	Rotunda Auditorium
12:10 – 1:00 PM	Sack Lunch	Rotunda Auditorium
12:15 – 12:45	Lunch Speaker: Dr. Larissa Strath	Rotunda Auditorium

Speaker: Dr. Larissa Strath - Assistant Professor at the University of Florida in the Department of Health Outcomes & Biomedical Informatics (HOBI)

1:00 PM	Poster Set-Up Completed	Harris Parker Atrium
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Afternoon Paper Session

1:00 PM – 2:30 PM	BIOLOGICAL SCIENCE (Section II) HEALTH SCIENCES (Section IX) ENVIRONMENTAL AND EARTH SCIENCES (Section VIII)	Harris Hall Room 109
1:00 PM – 3:00 PM	STEM EDUCATION (Section VII)	Harris Parker Room 135
1:00 PM – 3:00 PM	BIOETHICS AND HISTORY AND PHILOSOPHY OF SCIENCE (Section X) SOCIAL SCIENCES	Harris Parker Room 117

2:00 PM – 4:30 PM CHS Tour, every 30 minutes from registration center.

**Afternoon Poster Session and Viewing
Harris Parker Atrium**

2:00 PM – 3:30 PM	Afternoon Poster Sessions BIOLOGICAL SCIENCE (Section I) ENVIRONMENTAL AND EARTH SCIENCE (Section VIII) CHEMISTRY (Section II) PHYSICS AND MATHEMATICS (Section III) HEALTH SCIENCES (Section IX) ENGINEERING AND COMPUTER SCIENCE (Section IV) ENVIRONMENTAL AND EARTH SCIENCE (Section VIII) BIOETHICS, HISTORY, AND PHILOSOPHY OF SCIENCE (Section X)	Harris Parker Atrium
3:30 PM	Poster Take Down	
4:15 PM	Business Meeting Update to the membership of the AAS by the Executive Director. Voting for Officers	Harris Hall 103
4:45 – 5:45 PM	Sci-Mix/Viewing of AJAS and Gorgas Scholars' Posters	Harris Parker Atrium
6:30 PM	Joint AJAS/AAS Banquet	Rotunda Auditorium

Guest Speaker: Dr. John Cranston, Principal Research Scientist/Engineer III, Auburn University

PROGRAM OF THE ALABAMA JUNIOR ACADEMY OF SCIENCE

Friday February 27, 2026, Faulkner University, Montgomery

4:00 – 5:00 PM	Registration	Harris Parker Atrium
4:00 – 4:45 PM	Poster Set-up and Orientation	Harris Parker Atrium
4:45 – 5:45 PM	“Sci Mix” Viewing of AJAS	Harris Parker Atrium and Gorgas Scholars’ Posters
6:30 PM	Joint AJAS/AAS Banquet	Rotunda, Auditorium

*Banquet Speaker: John Cranston, Principal Research Scientist,
Interdisciplinary Center for Advanced Manufacturing Systems (ICAMS)
at Auburn University*

ALABAMA JUNIOR ACADEMY OF SCIENCE

Saturday, February 28th Harris-Parker Hall
Faulkner University, Montgomery

Breakfast on your own

Parking is available in front and side of Harris-Parker Hall

7:00 AM	Registration	Entry, Harris-Parker Hall
7:30 AM	Paper Reading Orientation (Students)	Room 135, Harris-Parker Hall
7:15 AM	ALL AJAS & Gorgas Judges Orientation	Room 117, Harris-Parker Hall
8:00 AM	Paper Competition	
	Environmental Science	Room 108, Harris-Parker Hall
	Physical Sciences	Room 117, Harris-Parker Hall
	Life Science	Room 128, Harris-Parker Hall
	Medicine, Health and Social Science	Room 130, Harris-Parker Hall
	Engineering, Math, and Computer Science	Room 135, Harris-Parker Hall
10:00 AM – Noon	College of Health Sciences Open House	
11:30 AM	Elections and Business Meeting	Room 135, Harris-Parker Hall
12:00 Noon	AJAS-Gorgas Group Photo	Entry, Harris-Parker Hall
12:00 Noon	Box Lunches	Pick up in Room 130, Harris-Parker Hall
	Return for lunches and Speaker	Room 135, Harris-Parker Hall
	Speaker Dr. Chelsea Ward	
1:15 PM	AJAS Paper Competition Finals	Room 135, Harris-Parker Hall
2:55 PM	AJAS Judges meeting	Room 108, Harris-Parker Hall
3:15 PM	Awards Reception, Joint AJAS/Gorgas	Room 135, Harris-Parker Hall

GORGAS SCHOLARSHIP COMPETITION

Friday, February 27, 202, Faulkner University, Montgomery

4:00 – 5:00 PM	Registration	Rotunda
4:45 – 5:45 PM	Poster Set-up and Orientation	Rotunda
4:45 – 5:45 PM	“Sci Mix” Viewing of Gorgas Scholars’ Posters	Rotunda
6:30 PM	Joint AJAS/AAS Banquet	Rotunda, Auditorium

Presentation of Alabama Academy of Science Honors and Awards

Presentation of Gorgas Finalists

***Banquet Speaker: John Cranston, Principal Research Scientist,
Interdisciplinary Center for Advanced Manufacturing Systems (ICAMS)
at Auburn University***

GORGAS SCHOLARSHIP COMPETITION

Saturday, February 28th Harris-Parker Hall, Faulkner University, Montgomery

Breakfast on your own

Parking is available in front and side of Harris-Parker Hall

7:00 AM	Registration	Entry, Harris-Parker Hall
7:30 AM	Paper Reading Orientation (Students)	Room 135, Harris-Parker Hall
7:15 AM	ALL AJAS & Gorgas Judges Orientation	Room 117, Harris-Parker Hall
7:00 – 8:45 AM	Set Up Gorgas Posters	Room 112, Harris-Parker Hall

Students competing in both competitions will begin
at AJAS Paper Reading in respective rooms.

8:45 – 9:45 AM	Gorgas: Demonstrations for Judges	Room 112, Harris-Parker Hall
10:00 AM – Noon	Individual Interviews with Judges will be conducted at the poster presentation sites	Room 112, Harris-Parker Hall
12:00 Noon	AJAS-Gorgas Group Photo	Entry, Harris-Parker Hall
12:00 Noon	Box Lunches	Pick up in Room 130, Harris-Parker Hall
	Return for lunches and Speaker	Room 135, Harris-Parker Hall
	Speaker Dr. Chelsea Ward	
1:15 PM	AJAS Paper Competition Finals	Room 135, Harris-Parker Hall
	Health Science Building Tour	
12:00 – 1:00 PM	Gorgas Judges Executive Session	Room 112, Harris-Parker Hall
1:15 PM	AJAS Paper Competition Finals	Room 135, Harris-Parker Hall
3:15 PM	Awards Reception, Joint AJAS/Gorgas	Room 135, Harris-Parker Hall

The Alabama Science Scholar Talent Search and Gorgas Scholarship Competition is sponsored and administered by the Alabama Academy of Science, Inc.

The Gorgas Scholarship Competition website contains detailed information on the annual competition and awards available to winners and finalists.

<https://alabamajunioracademyofscience.org/home/gorgas-scholarship-competition/>

BANQUET and AWARDS

February 27th, 2026
The 103rd Annual Meeting of the
Alabama Academy of Science
Faulkner University

6:30 PM – 6:35 PM

Welcome: Ronald (Ron) N. Hunsinger, Executive Director, The Alabama Academy of Science

6:35 PM – 6:40 PM

Greetings from Faulkner University
Mitch Henry, President, Faulkner University

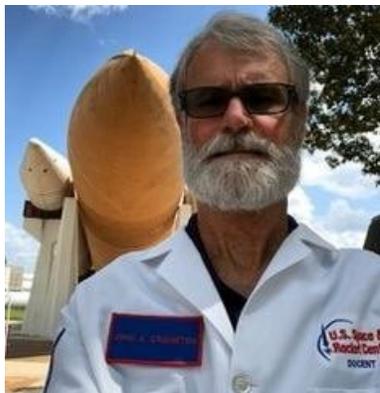
6:40 PM – 7:15 PM

Dinner

7:15 PM – 8:00 PM

Keynote Address: Mr. John A. Cranston

John A. Cranston



Principal Research Scientist/Engineer III, Auburn University

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8:00 PM – 8:15 PM

Alabama Junior Academy of Science: Dr. Mark Jones, Executive Director
Presidents
Parker Thompson, Wetumpka high School
Grishma Vinoy, Alabama School of Fine Arts

8:15 PM – 8:30 PM

Gorgas Program: Dr. Ellen Buckner, Chair

8:30 PM – 9:00 PM

Presentation of the Alabama Academy of Science Awards and Resolutions
Dr. Matthew Edwards, Chairperson, AAS Awards Committee

FELLOWS OF THE ALABAMA ACADEMY OF SCIENCE: For scholarly work and distinguished service

Dr. Jack Shelly – Tremblay, the University of South Alabama

Dr. Diann Jordan, Alabama State University

Dr. Manmohan Aggarwal, Alabama A&M University

EMMETT B. CARMICHAEL AWARD: The Emmett B. Carmichael Award recognizes the authors of the outstanding paper published in *The Journal of the Alabama Academy of Science* in the previous year. Dr. Carmichael was a distinguished biochemist, who served as the editor of the Academy journal from 1942 – 1948.

We recognize: “Biodiversity of plants on conservation land in North Alabama”
“Lessons learned from a study of Poales at Bloucher Ford Nature Preserve, Madison County”
Troy Alexander Bowman, Alabama A&M University
Loretta Lynne Weninegar, Alabama A&M University

RESOLUTIONS AND AWARDS OF THE ALABAMA ACADEMY OF SCIENCE

RESOLUTIONS OF THE ACADEMY

Resolution, in thanks to Faulkner University and Dr. Uduak Afangideh and the Local Planning Committee, and the University Administration for hosting the 103rd Annual Meeting.
Presented by Dr. Matthew Edwards

Resolution, in memoriam of Dr. Ketia Shumaker
Presented by Dr. Mickie Powell

THE WRIGHT GARDNER AWARD FOR LIFETIME ACHIEVEMENT IN SCIENCE

The Gardner Award is named for the founder of the Alabama Academy of Science who first convened the group in 1924. This is the highest award conferred upon an individual for the noteworthy achievements by the State Academy based upon exceptional quality of research and leadership in science conducted during residence in Alabama. The previous winners of this award were Noble Laureates, Clinicians, renowned Professors, and famous Academicians. This year the award goes to:

TO BE ANNOUNCED

Presented by Dr. Matthew Edwards

ELECTED OFFICERS 2026-2027

President: Ronald N. Hunsinger, Professor Emeritus, Department of Biological and Environmental Science, Samford University, Birmingham, AL 35229, 205-540-6732, rnhunsin@samford.edu

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Second Vice President: Mark Caulkins, Associate Professor, School of Health Professions, Department of Physician Assistant Studies, Samford University, 2A27 CHS Building 2, Birmingham, AL 35229, rcaulkin@samford.edu, 205-726-4835

Secretary: Grant Gentry, Department of Biological and Environmental Sciences, Samford University, Birmingham, AL 35229, 205-726-2110, ggentry@samford.edu

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Editors of Journal: Brian Toone, Editor-at-Large, Division Editor, Computer Sciences, Department of Computer Sci., Samford University, Birmingham, AL 35229, 205-726-2960, brtoone@samford.edu

Jean-Pierre Ardit, Division Editor, Health and Life Sciences, Department of Psychology, University of South Alabama, jarditi@southalabama.edu

Sharvare Palwai, Division Editor, Physical Sciences, Department of Physics, Tuskegee University, Tuskegee, AL 36088, spalwai@tuskegee.edu, 334-727-8998

Coordinator of State Science Fair: Virginia Vilardi, Wetumpka High School, 1251 Coosa River Parkway, Wetumpka, AL 36092, 334-799-0104, virginia.vilardi@elmore.k12.al.us

Coordinator of State Science Olympiad: Mary Lou Ewald, Director of Science and Math Outreach, 131 SCC Building, Auburn University, Auburn, AL 36849, 334-844-5745, ewaldml@auburn.edu

AAAS Representative: Stephen Watts, Department of Biology, University of Alabama at Birmingham, Birmingham, AL 35294-1170, 205-934-2045, sawatts@uab.edu

Executive Director: Ronald N. Hunsinger, Professor Emeritus, Department of Biological and Environmental Science, Samford University, Birmingham, AL 35229, 205-540-6732, rnhunsin@samford.edu

Associate Executive Director - Vacant

At Large Officers: Daniel Lerew, Southern Company, 501 12th Street South, Birmingham, AL 35217, 205-994-0126, delerew@uab.edu

At Large Officers: Vineeth Vijayan, Alabama State University, Montgomery, AL, vineeth@uab.edu

At Large Officers: Stephen Babalola, Department of Physics, Chemistry and Math., Alabama A&M University, Normal, AL 35762, 256-417-8196, stephen.babalola@aamu.edu

Graduate Student At Large Officers: Ranjith Pillai, Dept. of Materials Science & Engineering, University of Alabama at Birmingham, AL 35294, rrpillai@uab.edu

Graduate Student At Large Officers: Jean-Pierre Ardit, Department of Psychology, University of South Alabama, UCOM 1123, Mobile, AL 36688, 251-767-0416, jarditi@southalabama.edu

Graduate Student At Large Officers: Cyndi Von Ahlefeldt, 905 Lake Lily Dr, Maitland, FL 32751, 251-508-7067, ci748922@ucf.edu

Graduate Student At Large Officers: Angela Davis, Department of Physics, Chemistry and Math., Alabama A&M University, Normal, AL 35762, 256-899-8687, angeladavis@148yahoo.com

APPOINTED COMMITTEES 2026 – 2027

AJAS Committee:

- Mark Jones (Chair), 655 Spencer Ave., Auburn, AL 36832, 334-444-3099, jonesmt@troup.org
- Jean-Pierre Arditi, Division Editor – Biological and Health Sciences Department of Psychology, University of South Alabama, UCOM 1123, Mobile, AL 36688, 251-4606371 x2, jarditi@southalabama.edu
- Ellen Buckner, College of Health Sciences, School of Nursing, Samford University, Birmingham, AL, 35229, 205-726-2092(w); 205-810-9877(c), ebuckne2@samford.edu; ebbuckner@gmail.com
- Jill Chambers, The University of Alabama Birmingham, ASIM (AMSTI) Biology Specialist, Birmingham, AL 35294, jcham@uab.edu
- Michael Hallman, Scientist, hallman.michael@gmail.com
- Ron Hunsinger (AAS Executive Director-co-chair), The Alabama Academy of Science, 1070 Crest Road, Leeds, AL 35094, 205-540-6732, RNhunsin@samford.edu
- Diann Jordan, Chair, 915 South Jackson Street, Montgomery, AL 36101, djordan@alasu.edu
- Douglas Marshall, dougmarshall@southalabama.edu
- Catherine Shields, catherine.shields8@gmail.com
- Rebecca Thrash, rebecca.thrash@alsde.edu
- Virginia Vilardi, Wetumpka High School, 1251 Coosa River Parkway, Wetumpka, AL 36092 334-799-0104, 334-514-1770, virginia.vilardi@elmore.k12.al.us

Archivist:

- Larry Krannich, Professor and Chair Emeritus, Department of Chemistry, University of Alabama Birmingham, Birmingham, AL, 35295, 205-936-0823, krannich@uab.edu

Archives Committee:

- John Shelley-Tremblay, Editor-at-Large, (2030), Department of Psychology, University of South Alabama, UCOM 1123, 251-460-6883 Mobile, AL 36688, jstremblay@southalabama.edu.
- James Bradley, Department of Biological Sciences, Auburn University, Auburn, AL 36849, bradljt@auburn.edu
- Ellen Buckner, College of Health Sciences, School of Nursing, Samford University, Birmingham, AL, 35229, 205-726-2092(w); 205-810-9877(c), ebuckne2@samford.edu; ebbuckner@gmail.com
- Larry Krannich, Professor and Chair Emeritus, Department of Chemistry, University of Alabama Birmingham, Birmingham, AL, 35295, 205-936-0823, krannich@uab.edu

Auditing Senior Academy:

- Budget and Finance Committee

Auditing Junior Academy:

- Budget and Finance Committee
- Mark Jones, 655 Spencer Ave., Auburn, AL 36832, 334-444-3099, jonesmt@troup.org.

Budget and Finance:

- Trustee, Ellen Buckner, (2026) College of Health Sciences, School of Nursing, Samford University, Birmingham, AL, 35229, 205-726-2092(w); 205-810-9877(c), ebuckne2@samford.edu; ebbuckner@gmail.com

- President, Matthew Edwards, Department of Physics, Alabama A&M University, Normal, AL, 35762, 256-372-8119 or 256-372-8104, matthew.edwards@aamu.edu
- Secretary, Grant Gentry, (2030) Department of Biology, Samford University, Biological and Environmental Sciences, ggentry@samford.edu, 205-726-2110
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- Executive Director, Ronald N. Hunsinger, (2026), Executive Director. Alabama Academy of Science, Rnhunsin@samford.edu, 205-540-6732
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- Treasurer, Bettina Riley, (2026) USA College of Nursing, 161 N. Section Street, Suite C, Fairhope, AL, 36532, 251-517-5363, briley@southalabama.edu

Editorial Board and Associate Journal Editors: (staggered 3-yr terms)

- Ronald N. Hunsinger, Chair & Executive Director, The Alabama Academy of Science, 205-540-6732, Rnhunsin@samford.edu
- Jean-Pierre Arditi, Division Editor – Biological and Health Sciences (2030) Department of Psychology, University of South Alabama, UCOM 1123, Mobile, AL 36688, 251-4606371 x2, jarditi@southalabama.edu
- Sharvare Palwai, Division Editor – Chemistry and Physical Sciences, (2030) Department of Physics, Tuskegee University, Tuskegee, AL 36088, spalwai@tuskegee.edu
- Brian Toone, Editor-at-Large, Division Editor – Computer and Technology, (2030), Department of Computer Science, Samford University, Birmingham, AL, 35229, 205726-2960, brtoone@samford.edu

Electronic Media: (3-yr terms)

- Diann Jordan, Chair, (2030), 915 South Jackson Street, Montgomery, AL 36101, djordan@alasu.edu
- Warren Jones, (2030) Laboratory Manager for the Division of Hematology and Oncology in the School of Medicine at UAB Hospital, Designer and Teacher of Biology Courses Online, warrentjones@uab.edu, warrentjones@gmail.com 205-427-9827 (replaces Richard Hudiburg's term of service – At Richard's request)
- Brian Toone, (2030) Department of Computer Science, Samford University, Birmingham, AL, 35229, 205-726-2960, brtoone@samford.edu

Emmett B. Carmichael Award: (staggered 2-yr terms)

- Larry Davenport, (2028) Department of Biological Sciences, Samford University, Birmingham, AL 35229, ljdavenp@samford.edu
- Drew Hataway (2028) Department of Biological and Environmental Science, Samford University, Birmingham, AL 35229, 205-726-4190, rahatawa@samford.edu (replaces Richard Hudiburg's term of service)
- David Nelson, (2028) Department of Biology, University of South Alabama, Mobile, AL 36688, dnelson@usouthal.edu
- Brian Toone, (ex officio) Department of Computer Science, Samford University, Birmingham, AL 35229 205-726-2960, brtoone@samford.edu.

Gorgas Scholarship Program

- Ellen Buckner, Chair, College of Health Sciences, School of Nursing, Samford University, Birmingham, AL 35229 205-910-9877 ebbuckner@gmail.com & ellen.buckner@samford.edu
- Ronald N. Hunsinger (2026), Executive Director (Co-Chair), Professor and Chair Emeritus, Department of Biological and Environmental Sciences, Samford University, Birmingham, AL 35229, rnhunsin@samford.edu
- Mitzi Adams (2025) 320 Sparkman Drive, Huntsville, AL, 35805, mitzi.adams@nasa.gov
- Lauren Rast Boban, (2025) Department of Physics, University of Alabama at Birmingham, Birmingham, AL 35294, 205-975-0219 laurenr@uab.edu.
- Elizabeth Dobbins, (2025) Department of Biology, Samford University, Birmingham, AL 35229, egdobbin@samford.edu
- Michael Hallman, Alabama Department of Public Health, 205-657-7832, hallman.michael@gmail.com
- David H. Nelson, (2025) Department of Biology, University of South Alabama, Mobile, AL 36688, dnelson@southalabama.edu
- Prakash Sharma, (2025) Department of Physics, Tuskegee University, Tuskegee, AL 36088, psharma@tuskegee.edu.

Junior Academy:

- Mark Jones, 1233 Sanders St., Auburn, AL 36870, jonesmt@troup.org.

Junior Academy Regional Counselors:

- Virginia Vilardi, Wetumpka High School, 1251 Coosa River Parkway, Wetumpka, AL 36092, 334-799-0104, 334-514-1770, virginia.vilardi@elmores.k12.al.us.

Local Arrangements at Alabama State University – Montgomery, AL:

- Dr. Derrick Dean, Professor and Coordinator of Biomedical Engineering Program Biomedical Engineering, College of Science, Technology, Engineering and Mathematics, ddean@alasu.edu, 334-604-9314

Long Range Planning: (staggered 4-yr terms)

- Dr. Adriane Ludwick (Chair), Adjunct Professor, College of Engineering and Professor Emeritus, Chemistry Department, Tuskegee University, Tuskegee, AL 36088, 334-524-9855, aludwick@tuskegee.edu & adriane.ludwick@gmail.com
- Uduak Afangideh, Ph.D., Department Chair, Department of Natural & Physical Sciences, Faulkner University, 334-386-7563, uafangideh@faulkner.edu
- Mohit Anand, manand@miles.edu
- Dr. Ellen Buckner, College of Health Sciences, School of Nursing, Samford University, Birmingham, AL 35229 205-910-9877, ebbuckner@gmail.com & ellen.buckner@samford.edu
- Mark Caulkins, Associate Professor, School of Health Professions, Department of Physician Assistant Studies, 2A27 CHS Building 2, rcaulkin@samford.edu, 205-7264835
- Jill Chambers, ASIM Biology Specialist, jcham@uab.edu
- Matthew Edwards, (2030) Department of Physics, Alabama A&M University, Normal, AL, 35762, 256-372-8119 or 256-372-8104, matthew.edwards@aamu.edu
- Michael Hallman, Alabama Department of Public Health, 205-657-7832, hallman.michael@gmail.com

- Ronald N. Hunsinger (2029), Professor and Chair Emeritus, Department of Biological and Environmental Sciences, Samford University, Birmingham, AL 35229, rnhunsin@samford.edu
- Dr. Mark Jones, 655 Spencer Ave., Auburn, AL 36832, 334-444-3099, jonesmt@troup.org
- Dr. Larry Krannich, Professor and Chair Emeritus, Department of Chemistry, University of Alabama Birmingham, Birmingham, AL, 35295, 205-936-0823, krannich@uab.edu
- Akshaya Kumar (2025) Department of Physics, Tuskegee University, Tuskegee, AL 36088, 334-727-8968, akumar@tuskegee.edu.
- Ken Marion, 2026, Department of Biology, University of Alabama at Birmingham, Birmingham, AL, 35294-1170, kmarion@uab.edu
- Jeff Morris, Associate Professor, evolve@uab.edu, 3136 East Science Hall, Science & Engineering Complex, 205-934-9498
- Jim Sumpter, CERTIFIED FINANCIAL PLANNER™, President, CEO, 205-510-9074, jsumpter@cmcfp.com
- Vinoy Thomas, Associate Professor; Graduate Program Director, Gorrie Hall 5233, 205975-4098, thomas@uab.edu
- Brian Toone, (ex officio) (2029) Department of Computer Science, Samford University, Birmingham, AL 35229, 205-726-2960, brtoone@samford.edu.
- Virginia Vilardi, Wetumpka High School, 1251 Coosa River Parkway, Wetumpka, AL 36092 334-799-0104, 334-514-1770, virginia.vilardi@elmore.k12.al.us.
- To Be Chosen

Mason Scholarship: (staggered 3-yr terms)

- R. Melvin Blake, (2028) Department of Physical and Earth Science, University of North Alabama, Florence, AL 35632, rmlBlake@una.edu
- Michael Hallman (2028) Alabama Department of Public Health, PO Box 303017, Montgomery, AL 36130, michael.hallman@adph.state.al.us, hallman.michael@gmail.com.
- Enrique Jackson (2028) Miles College, emj.academic.consulting@gmail.com; ejackson@miles.edu
- Anthony Overton, (2028), Department of Biological and Environmental Science, Samford University, Birmingham, AL, 35229, aoverton@samford.edu
- Mickie Powell (Chair) (2028) Department of Biology, University of Alabama at Birmingham, Birmingham, AL 35294, mpowell@uab.edu

Membership and Development:

- Past President: John Shelley-Tremblay, (2026), Department of Psychology, University of South Alabama, UCOM 1123, Mobile, AL 36688, 251-460-6883, jstremblay@southalabama.edu
- Active Past Presidents

Adriane G. Ludwick.....	1989-90
Ken R. Marion	1991-92
Michael B. Moeller	1992-93
Prakash Sharma.....	1993-94
Eugene Omasta	1994-95
Ellen B. Buckner.....	1997-98
Richard Hudiburg.....	2000-01

Stephen A. Watts	2002-03
Anne M. Cusic	2003-04
Larry Davenport.....	2005-06
David Nelson	2006-07
D. Brian Thompson.....	2009-10
Brian Burnes	2010-11
Mickie Powell.....	2011-12
Ronald N. Hunsinger	2012-13
Emanuel Waddell	2013-14
John McCall.....	2014-15
Brian R. Toone	2015-16
Akshaya Kumar	2016-17
Ketia Shumaker.....	2017-18
Nixon Mewabi	2018
Drew Hataway	2018-20
Cameron Gren.....	2020-21
John Shelley-Tremblay	2021-22
J. Jeffrey Morris	2023-24
Vinoy Thomas.....	2024 -25
Matthew Edwards	2025-26

Nominating:

- Current President, 1st Vice President, and 2nd Vice President, Mark Caulkins, Associate Professor, School of Health Professions, Department of Physician Assistant Studies, 2A27 CHS Building 2, rcaulkin@samford.edu, (205)-726-4835, The 2nd Vice President shall serve as the presiding member.

Place and Date of Meeting: (5 members, staggered 5-yr terms)

- Kenneth Roblee (Chair) (2030) Department of Mathematics, Troy University, Troy, AL 36082, kroblee@troy.edu.
- Larry Krannich, (2030) Department of Chemistry, University of Alabama at Birmingham, Birmingham, AL 35294, 205-936-0823, krannich@uab.edu
- Manoj Mishra, (2030) Department of Biological Sciences, Alabama State University, Montgomery, AL 36104, 334-229-5085, mmishra@alasu.edu.
- Donna Perygin (2030) Department of Chemistry and Geosciences, Jacksonville State University, Jacksonville, AL 36265, dperygina@jsu.edu.
- Elsa Price, (2030), Department of Natural and Physical Sciences, Faulkner University, Montgomery, AL, Eprice@faulkner.edu

Research: (5 members with staggered 5-yr terms)

- Brian Burnes, Chair (2030), bburnes01@gmail.com
- Lawrence Drummond, (2030) Department of Natural and Physical Sciences, Talladega College, Talladega, AL, 35160, ldrummond@talladega.edu
- Vinoy Thomas, (2030) Department of Materials Science and Engineering, University of Alabama at Birmingham, 205-975-4098, vthomas@uab.edu
- Ruigang Wang (2030) Department of Metallurgical & Materials Engineering, The University of Alabama, Tuscaloosa, AL 35487, rwang@eng.ua.edu
- Brian Burnes, Chair (2030), bburnes01@gmail.com

Resolutions:

Science, Public Policy, and Public Relations: (staggered 4-yr terms)

- Scott Brande, co-Chair, (2030) Department of Geology, University of Alabama at Birmingham, Birmingham, AL 35294, sbrande@uab.edu
- Brian Burnes, co-Chair (2030) bburnes01@gmail.com
- James Bradley, co-Chair (2030) Department of Biological Sciences, Auburn University, Auburn, AL 36849, bradljt@auburn.edu
- Ellen Buckner, (2030), College of Health Sciences, School of Nursing, Samford University, Birmingham, AL 35229, 205-726-2092(w); 205-810-9877(c), ebuckne2@samford.edu; ebbuckner@gmail.com.
- Jill Chambers, (2030), The University of Alabama Birmingham, ASIM (AMSTI) Biology Specialist, Birmingham, AL 35294, jcham@uab.edu
- Marisol Alcantara Ortigoza (2030) Department of Physics, Tuskegee University, Tuskegee, AL 36088, malcantaraortigoza@tuskegee.edu.

Steering:

- President, Ronald N. Hunsinger, Rnhunsin@samford.edu, 205-540-6732
- First Vice President, Uduak Afangideh, Ph.D., Department Chair, Department of Natural & Physical Sciences, Faulkner University, 334-386-7563, uafangideh@faulkner.edu
- Second Vice-President, E. Mark Caulkins, Department of Physician Assistant Studies, School of Health Professions, Samford University, rcaulkin@samford.edu, 205-726-4835
- Immediate Past President, Matthew Edwards, (2030) Department of Physics, Alabama A&M University, Normal, AL, 35762, 256-372-8119 or 256-372-8104, matthew.edwards@aamu.edu
- Secretary, Grant Gentry, (2030) Department of Biology, Samford University, Biological and Environmental Sciences, ggentry@samford.edu, 205-726-2110
- Treasurer, Bettina Riley, (2030) USA College of Nursing, 161 N. Section Street, Suite C, Fairhope, AL 36532, briley@southalabama.edu.
- Past President, Vinoy Thomas, (2030) Department of Materials Science and Engineering, University of Alabama at Birmingham, 205-975-4098, vthomas@uab.edu

Wright A. Gardner Award: (4 members with staggered 2-yr terms)

- R. Melvin Blake, (2030) Department of Physical and Earth Science, University of North Alabama, Florence, AL 35632, rmlake@una.edu
- Matthew Edwards, (2030) Department of Physics, Alabama A&M University, Normal, AL, 35762, 256-372-8119 or 256-372-8104, matthew.edwards@aamu.edu
- Akshaya Kumar, (2030) Department of Physics, Tuskegee University, Tuskegee, AL 36088, akumar@tuskegee.edu
- Thomas Vinoy, (2030) Department of Materials Science and Engineering, University of Alabama at Birmingham, 205-975-4098, vthomas@uab.edu

I. BIOLOGICAL SCIENCES

Session 1 – 8:30 AM - Noon

Room Harris Hall 109

Co-Chairs Jean-Pierre Ardit and Cecilia Johnson, presiding

26 - Differential adaptation and genic divergence related to drought tolerance among rattlesnakes within a phylogenetic framework

Austin Biddy¹, Griffin McDaniels¹, Derek Benson², Kenro Kusumi², Dale DeNardo², Greer Dolby¹

¹The University of Alabama at Birmingham, ²Arizona State University

Species adapted to arid ecosystems exhibit phenotypes that facilitate surviving long periods of drought, which can evolve through several molecular mechanisms. The Sonoran Desert in Arizona exhibits a precipitation gradient where the west experiences long periods without rain, receiving rain almost exclusively in the winter; the east receives rain in the winter and late summer, limiting its duration of drought despite low overall annual precipitation. Within a phylogenetic framework, we studied the molecular mechanisms underlying drought adaptation across the Sonoran Desert in *Crotalus* rattlesnakes comprising three co-occurring lineage pairs with varying genetic divergences: *C. atrox* (between populations), *C. cerastes* (between subspecies), *C. tigris* and *C. pyrrhus* (between species). We hypothesized that nonsynonymous coding sequences would increase with phylogenetic distance and less differentiated pairs would have more epigenetic differences in lieu of coding ones. We analyzed 109 wild individuals across the precipitation gradient, generating whole genome sequence (WGS), transcription, ATAC-seq, whole genome methylation, and physiological data. Preliminary PCA results from WGS data and pairwise F_{ST} values reflect west/east differentiation following known phylogenetic distances. *Crotalus tigris* vs. *C. pyrrhus* exhibited strong coding sequence changes. Based on top 1% most differentiated genomic regions and selection tests, these loci were in genes functionally enriched for chromatin remodeling, skin barrier, and behavior. Chromatin remodeling might be linked to epigenetic mechanisms that further facilitate drought tolerance, but this is under investigation. Increased epidermal lipid concentration can reduce water loss. Genes underlying behavior might relate to circannual rhythm differences that cue activities tied to timing of precipitation. Therefore, preliminary evidence shows a large number of nonsynonymous mutations and genes under positive selection between the diverged species with functions related to known drought-tolerance strategies, which are absent from less diverged comparisons.

A Paper

Graduate Student

Biology

University of Alabama at Birmingham

I. BIOLOGICAL SCIENCES

27 - Hybridization dynamics of southwest tortoises along an environmental gradient

Jade Mellor¹, Kenro Kusumi², Greer Dolby¹

¹The University of Alabama at Birmingham, ²Arizona State University

Hybrid zones act as natural laboratories to understand the genomic loci underlying speciation; when that hybrid zone spans an environmental gradient, we can examine the role of ecological adaptation during the speciation process as well. The deserts of the American southwest exhibit environmental heterogeneity, with distinct seasonal rainfall patterns, changes in UV radiation, and vegetation differences along an east-west gradient. *Gopherus agassizii* and *G. morafkai* tortoises speciated ~ 5 Mya and are distributed along this gradient. They maintain a narrow hybrid zone at an ecological ecotone where the two ranges meet. The species exhibit differences in mating and egg-laying times, clutch size and number, and disease instances. Recent genomic work highlighted differences related to retina formation and circadian rhythms—which are thought to be related to the UV gradient—as well as differences in transcription regulation and sperm-egg recognition. Along with recently published chromosome-scale reference genomes, we used 349 low coverage samples across both species and hybrids to investigate population structure and local adaptation, paying special attention to how genes most diverged in parental lineages present in hybrids. We further characterized cline dynamics of these polymorphisms and how they associate with environmental factors versus expectations under migration-only models. In total, we analyzed 75,800 clinal variants that were found in genes related to circadian timekeeping and cell cycle progression after UV-induced DNA damage that exhibit a variety of different cline shapes.

A Paper

Graduate Student

Biology

University of Alabama at Birmingham

I. BIOLOGICAL SCIENCES

45 - Targeting FKBP_s to Regulate GSK3 β to Impact Aging

Nunaya Polycarp¹, Melissa Harris¹

¹The University of Alabama at Birmingham

Aging is characterized by a progressive decline in cellular function, regenerative capacity, and metabolic efficiency, leading to tissue dysfunction and age-related diseases. Pharmacological interventions targeting cellular resilience pathways represent a promising approach for delaying or reversing age-associated decline. The small molecule RT175, a non-immunosuppressive immunophilin ligand, has shown potential in enhancing mitochondrial function to promote healthy aging. Using a melanoblast cell line, our results showed that RT175 induced cell growth inhibition, enhanced pigmentation, altered mitochondrial gene expression, increased mitochondrial DNA content, and inhibit GSK3 β . RT175 also promoted in vivo tissue regeneration, suggesting that RT175 exerts pro-regenerative effects by regulating gene expression program governing mitochondrial metabolism, melanogenesis, and cellular plasticity. These findings highlight RT175 as a potential therapeutic for aging-related decline.

A Paper

Graduate Student
Biology
The University of Alabama at Birmingham
I. BIOLOGICAL SCIENCES

52 - Comparing Extenders for Cryopreservation of Sperm from the Sea Urchin, *Lytechinus variegatus*

Katie Gibbs¹, Stephen Watts¹, Gustavo Roveri²
¹Mentor, ²Presenter

Cryopreservation is an essential biotechnological method that preserves cells, tissues, or gametes at sub-zero temperatures, effectively halting metabolic activity. Sperm cryopreservation involves the rapid cooling of samples to sub-zero temperatures in the presence of chemical extenders and cryoprotectants to prevent ice crystal formation that can damage cellular structures. Extenders, which are salt or sugar solutions that preserve sperm viability, can increase storage time and dilute sperm to larger volumes for easier handling. In this experiment, we evaluated three potential extenders: KH7 solved in Instant Ocean synthetic sea salt, 1% NaCl, and artificial sea water solved in Instant Ocean as a control. Male sea urchins (n=2) were injected with 0.01 mL of 0.5 M KCl per gram wet weight to stimulate expression of sperm that was collected by pipette and stored in microcentrifuge tubes on ice. Fresh samples were diluted (1:100) in one of the tested extenders and stored at 4 °C. The concentration and motility of fresh and stored sperm were evaluated immediately, after 24 hours, and after nine days of storage using a 0.05% BSA solution in ASW to activate the sperm. After 24 hours, the KH7 extender, ASW, and dry sperm showed comparable motility post-activation (59%, 56%, and 58%, respectively), but sperm stored in 1% NaCl had < 10% post-activation. After nine days, sperm stored in KH7 had higher motility than those in ASW. Overall, KH7 is a promising extender for the next stage of testing cryoprotectant toxicity prior to sperm freezing.

A Paper
Undergraduate Student
Biological Sciences
University of Alabama at Birmingham
I. BIOLOGICAL SCIENCES

54 - Integrating Molecular and Cultivation Approaches to Investigate the Microbial Communities in Sulfur Springs of Alabama

Kevin Drace¹
¹Samford University

Sulfur-rich temperate springs harbor unique microbial communities that remain understudied compared to thermal and marine sulfur systems. At Blount Springs in north-central Alabama, dense white biofilms develop along reduced-sulfur outflows at ambient temperatures, providing an easily accessible model system for studying sulfur-based microbial communities. Previous 16S rRNA surveys revealed that these biofilms are dominated by *Campylobacterota*, particularly *Sulfurovum* species, suggesting that

chemolithoautotrophic sulfur oxidation drives primary production in this ecosystem. To build on these findings, we are pursuing metatranscriptomic analysis and cultivation-based approaches to characterize community structure and metabolic activity. Shotgun metagenomes confirm the abundance of *Sulfurovum*-related sequences alongside other putative sulfur-cycling taxa. Preliminary metatranscriptomic data reveal active expression of sulfur oxidation genes and carbon fixation pathways. We are also conducting enrichment cultures using reduced-sulfur substrates under microaerophilic conditions to isolate key sulfur-oxidizing bacteria for more detailed characterization. This work represents one of the first comprehensive molecular investigations of a non-thermal sulfur spring in the southeastern United States and will provide insights into how sulfur-oxidizing bacteria function in these distinctive Alabama ecosystems.

A Paper
Not a Student
Biological and Environmental Sciences
Samford University
I. BIOLOGICAL SCIENCES

66 - Distribution of *Flavobacterium columnare* and *Flavobacterium covae* in tissues of channel catfish (*Ictalurus punctatus*) and hybrid catfish (*Ictalurus punctatus* x *I. furcatus*) following immersion challenge

Gordon Gibbs¹, Matt Griffin², Mark Lawrence², Robert Wills², Michael Mael²
¹Faulkner University, ²Mississippi State University, College of Veterinary Medicine

Flavobacterium columnare, the causative agent of columnaris disease, affects numerous freshwater fish throughout the world. It is of particular concern in the southeastern United States, where it significantly affects the commercial catfish industry. The recent reclassification of *F. columnare* isolates into four species with differences in host specificity makes understanding pathogenesis an important area of research. Isolates from different *Flavobacterium* species demonstrate predilection for different host fish species (LaFrentz et al. 2022), and they also demonstrate differences in virulence to channel catfish (*Ictalurus punctatus*) (Soto et al. 2008). Hybrid catfish (female channel catfish *I. punctatus* × male blue catfish *I. furcatus*) are more resistant to some diseases than channel catfish (*I. punctatus*), including columnaris disease (Arias et al. 2012; Wolters et al. 1996; Bosworth et al. 2003; Griffin et al. 2010). Experimental infections were conducted in catfish with *Flavobacterium* isolates representing two species: ATCC 49512 (*Flavobacterium columnare*) and 94-081 (*Flavobacterium covae*). Channel and hybrid catfish fingerlings (female channel catfish *Ictalurus punctatus* × male blue catfish *I. furcatus*) were resistant to mortalities caused by strain ATCC 49512 and susceptible to mortalities caused by 94-081 using bath immersion exposure. DNA copy numbers of the two strains in catfish tissues were determined by qPCR following immersion exposure. These findings confirm the need to understand differences between *Flavobacterium* species and the importance of diagnostic methods that discriminate between them.

A Paper
Not a Student
Natural and Physical Science
Faulkner University

67 - Dual Cathepsin S/L Inhibitor Suppresses Metastatic Proliferation and Enhances Oxaliplatin Efficacy

Olamide Crown¹, Kayode Komolafe², Olawale Adeyinka³, Victor Ogungbe³

¹Alabama A and M University, Normal AL, ²Jackson State University, Jackson, Mississippi, ³The University of Alabama at Huntsville

Background: Colorectal cancer (CRC) remains a leading cause of global cancer mortality, with nearly 50% of patients progressing to metastatic disease (mCRC). High mortality in mCRC is driven by therapeutic resistance and limited durable treatment options. We investigated the efficacy of a novel inhibitor, Compound 1, targeting cathepsins L and S, to enhance the apoptotic response to standard-of-care oxaliplatin.

Methods: The antiproliferative actions of compound 1 were evaluated across a panel of CRC cell lines, including HCT-116, RKO, SW480, and SW620. Furthermore, its combination with oxaliplatin was performed specifically in the metastatic SW620 cell line to evaluate synergy. Wound healing assays were conducted in SW620 cells to assess dose-dependent effects on migration over 96 hours. Molecular mechanisms were characterized using qPCR and Western blot to quantify markers for apoptosis (BCL2, BAX, p53, Caspases 3/9) and autophagy (LC3B, SQSTM1, ATG family).

Results: Compound 1 inhibits the metastatic CRC cell line SW620 at sub-micromolar concentrations (**IC₅₀ ~0.7 μM**), while non-metastatic colorectal cancer and other solid tumor cell lines, require **higher concentrations (~5 μM)** for comparable growth inhibition. In SW620 cells, **1** significantly inhibited wound healing in a time- and dose-dependent manner. The combination of 3.45 **μM 1** and 1.23 **μM** oxaliplatin yielded synergistic antiproliferative effects. Mechanistically, the combination significantly downregulated anti-apoptotic BCL2 mRNA and protein levels ($p < 0.001$) and increased the ratio of cleaved Caspase-3 and Caspase-9. While mTOR expression was not significantly altered, a reduction in key autophagy drivers (ATG3, ATG7, ATG10, SQSTM1) suggests an inhibitory effect on the autophagy pathway.

Conclusion: Our findings identify compound 1 as a potent cathepsin inhibitor with significant activity against metastatic CRC cells. The synergy observed with oxaliplatin in SW620 cells driven by the sensitization of apoptotic pathways and inhibition of cell motility suggests compound 1 is a promising candidate for further *in vivo* investigation to overcome chemoresistance in metastatic colorectal cancer.

A Paper

Not a Student

Chemistry

Alabama A&M University

I. BIOLOGICAL SCIENCES

84 - 3' UTR length, cis-acting regulatory elements, nucleotide composition, mRNA secondary structure, and genetic polymorphisms: an emerging landscape in the post-transcriptional regulation of gene expression

Syeda Saber Jahan¹, Mostafizur Rahman², Shubh Nahar¹, Sayeed Al Sahab¹, Long Ma², Jiling Zhong², Valeri Drozhenko¹, Alexander Kofman¹

¹HBVCG Filatov Institute, National Academy of Medical Sciences Ukraine, ²Troy University Department of Computer Science

Post-transcriptional mRNA processing is a tightly regulated set of molecular events that generates the mature coding sequence and establishes the polyadenylated tail within the 3'UTR. Although alternative splicing can alter the composition of the protein-coding region, the 3'UTR likewise exhibits substantial variability in both length and sequence composition. Multiple mechanisms contribute to the formation of alternative 3'UTRs, including alternative splicing, exonization, and, most prominently, alternative polyadenylation, a process widespread across eukaryotic mRNAs and numerous non-coding RNAs. Through differential selection of polyadenylation sites, a single gene can produce multiple transcript isoforms that encode identical proteins but harbor distinct 3'UTRs. These isoforms vary markedly in nucleotide sequence, overall length, and the presence or absence of cis-acting regulatory elements. Because the 3'UTR serves as a major regulatory hub for interactions with RNA-binding proteins, microRNAs, and other trans-acting factors, changes in its length can profoundly influence diverse aspects of mRNA metabolism. These include mRNA stability, intracellular localization, translational efficiency, and steady-state abundance. Consequently, variation in 3'UTR sequences can modulate numerous cellular behaviors, including proliferation, differentiation, developmental processes, stress responses, senescence, oncogenic pathways, and antiviral defense. Distinct 3'UTR isoforms often display strong tissue- and cell-type specificity, underscoring the role of alternative polyadenylation in fine-tuning gene expression programs. Alterations in 3'UTR length are increasingly recognized as molecular signatures of human disease. In cancers, for instance, widespread 3'UTR shortening is frequently observed and is associated with enhanced proliferative and metastatic capacity. Despite these associations, the mechanistic basis underlying the diverse functional outcomes of variation in 3'UTR length remains incompletely understood. Current evidence suggests that the interplay among 3'UTR length, distribution of cis-regulatory elements, nucleotide composition, RNA secondary structure, and genetic polymorphisms collectively shapes transcript fate. This multifactorial regulatory landscape underscores the importance of 3' UTR diversity as a fundamental component of post-transcriptional gene regulation.

A Paper

Biological Sciences

Other

I. BIOLOGICAL SCIENCES

BIOLpaper-1 - Population structure, adaptation, and demography in the Texas tortoise (*Gopherus berlandieri*)

Griffin McDaniels¹, Jacquelyn Tleimat², Sarah Baty³, Jade Mellor¹, Paul Crump⁴, Shawn McCracken², Kenro Kusumi³, Greer Dolby¹

¹The University of Alabama at Birmingham, ²Texas A&M University - Corpus Christi, ³Arizona State University, ⁴Texas Parks and Wildlife

The Texas tortoise (*Gopherus berlandieri*) is a dry-adapted species of conservation concern ranging from south central Texas to northeastern Mexico along the Sierra Madre Oriental. As ectotherms, they are tightly coupled to their environment and, along with the southwestern desert tortoise complex (*G. agassizii*, *G. morafkai*, and *G. evgoodei*), make an excellent study system for the adaptation and divergence of populations across a variable, dry landscape. Genomic studies of the southwestern desert tortoises revealed extensive differential ecological adaptation, conserved synteny, and demographic changes, raising questions about whether similar patterns exist in *G. berlandieri*. Previous work using microsatellite loci suggested weak divergence between northern and southern populations of *G. berlandieri*. Here, we expand this study system by generating a fully phased and annotated chromosome-scale PacBio long-read and Hi-C scaffolded reference genome for *G. berlandieri* (20,504 protein coding genes, scaffold N50 of 137.58 Mb, and a L50 of 6 scaffolds) as well as low coverage whole genome sequences of 66 individuals across its Texas range. We assess historical demography, evidence of population structure, and local adaptation. Results show a lack of population structure but clinal genetic variation across three clusters, which roughly align with shifts in seasonal precipitation. Historical effective population size estimates indicate a sharp increase ~ 100 kya and then decrease (20 kya) during the last glacial maximum. Pairwise comparative dN/dS results show 487 genes under positive selection between *G. berlandieri* and *G. evgoodei*, 585 between *G. berlandieri* and *G. agassizii*, and 298 between *G. berlandieri* and *G. morafkai*. Together, these results suggest the role of climate in weak geographic structuring and historical demographic changes in *G. berlandieri*.

A Paper
Graduate Student
Biology
University of Alabama at Birmingham
I. BIOLOGICAL SCIENCES

BIOLpaper-3 - Alabama Prairie Reconstruction: Comparing Management Pathways for a Southeastern Landscape

Cecelia Geyer¹, Tenzing Ingty¹

¹Jacksonville State University

Southeastern prairies are highly biodiverse yet increasingly threatened by land-use change, fire suppression, and habitat fragmentation. These disturbance-dependent systems rely on periodic fire and grazing to maintain plant diversity and ecosystem function. This study evaluates prairie restoration strategies by testing predictions from the Intermediate Disturbance Hypothesis and the Patch Mosaic Burn Hypothesis. The study site was divided into three treatments: prescribed burned only (B), prescribed

burned with mowing (BM) to simulate grazing, and an undisturbed control (C). A standardized mix of native plant seeds was broadcast across all treatments. Ecosystem health and function were evaluated using plant community diversity and nativity, aboveground net primary productivity (ANPP), and belowground net primary productivity (BNPP).

ANOVA results showed significantly higher plant diversity (species richness, Shannon, and Simpson indices) in disturbed treatments with the highest in the BM treatment, followed by B treatment, and the lowest diversity in control plots. Disturbed treatments also supported a higher proportion of native species, with the greatest native representation in burned plots. These patterns support predictions of the Intermediate Disturbance Hypothesis, suggesting that disturbance reduces competitive dominance and promotes coexistence among native prairie species.

BNPP was highest in B plots, indicating increased allocation to root biomass and potential enhancement of soil carbon storage and nutrient acquisition. In contrast, BNPP was the lowest in BM plots, and intermediate in C plots. This pattern suggests that prescribed burns alone may stimulate belowground biomass allocation by increasing nutrient availability and favoring deep-rooted native species. In contrast, the combination of fire and mowing may represent a higher disturbance intensity that limits root investment, potentially due to biomass removal and reduced carbohydrate storage. ANPP was highest in the control plots. The reduced ANPP observed in disturbed plots may reflect short-term biomass removal and reallocation following fire and mowing, rather than long-term declines in ecosystem function.

Overall, these findings demonstrate that managed disturbance enhances plant diversity and native dominance, key goals of southeastern prairie restoration, while undisturbed conditions may favor above ground biomass at the expense of biodiversity and belowground carbon allocation.

A Paper
Graduate Student
Biological and Environmental Sciences
Jacksonville State University
I. BIOLOGICAL SCIENCES

II. CHEMISTRY

8:30 AM – noon, Harris Parker Room 128
Chair Sharifah Albraiki, presiding

CHEM-2 - Rheological Characterization of PBAT/PHB Biodegradable Polymer Blends for Flexible Bone and Joint Applications

Evy Aracely Ortiz¹, Aboulfazl Barati²

¹Department of Biological and Environmental Sciences, ²Department of Chemistry and Physics

Rheological properties play a critical role in determining the processability and mechanical performance of biodegradable polymers intended for biomedical applications. In this study, the rheological behavior of poly(butylene adipate-co-terephthalate) (PBAT) and poly(hydroxybutyrate) (PHB) blends was investigated for potential use in flexible bone and joint replacement systems. The blends were prepared using a twin-screw extruder (Process 11) to ensure uniform melt mixing and controlled dispersion of the

components. PBAT was incorporated to improve melt elasticity and toughness, while PHB contributed stiffness and bio-based content. Oscillatory shear rheology was used to evaluate complex viscosity, storage modulus, and loss modulus as a function of frequency and blend composition. The results showed that increasing PBAT content significantly reduced melt viscosity and enhanced viscoelastic flexibility, improving processability compared to neat PHB. These findings demonstrate that tuning PBAT/PHB blend ratios allows for controlled rheological behavior suitable for manufacturing biodegradable materials for orthopedic applications.

A Paper
Undergraduate Student
Biomedical Engineering
Troy University
II. CHEMISTRY

III. PHYSICS AND MATHEMATICS

9:00 AM – noon, Harris Parker Room 128
Chair Padma Guggilla, presiding

16 - Insight into Mysteries of the Universe from a New Quantum World of Quarks

Tianxi Zhang¹
¹Alabama A&M University

Two biggest mysteries of the universe that have been puzzling scientists for many decades in physics and cosmology are the baryon asymmetry and dark matter origin. Attempting to solve why the present universe is missing antimatter but is fully filled with dark matter, the author has examined how hadronic particles were produced from combinations of quarks and antiquarks in the early universe after the end of the quark epoch. The results obtained indicate, in addition to the normal baryons that are formed by a simple color-charge binding of three quarks, a new type of superhadron baryons (called nonaquarks) could be formed via a two-level color-charge binding of three quarks with six antiquarks in the early universe. The lowest energy state neutral nonaquarks, formed from the ground state quarks and antiquarks can be a good candidate of dark matter particles. The nonaquarks formed from combinations of quarks with twice number of antiquarks provide us a possible solution for both the mysteries of the baryon asymmetry and dark matter origin. This presentation will show in detail from the new quantum world why the universe is missing antimatter but it is fully filled with dark matter. We will also investigate how quarks decay and get excited, how particles are formed and generated, and how they interact and transmute, including the mysterious neutrinos regarding oscillations and neutrinoless decay and conversion events as well as the neutron lifetime discrepancy, and so on. The work was supported by NSF HBCU-UP Research Initiation Award (#2400021) and IBM-HBCU Quantum Center.

A Paper
Not a Student
Physics
Alabama A&M University

35 - White Light Generation in $\text{Zn}_2\text{P}_2\text{O}_7$ Phosphors Co-Doped with Tb^{3+} , Sm^{3+} , and Dy^{3+}

Kevin Bennett¹

¹aas

In this study, $\text{Zn}_2\text{P}_2\text{O}_7$ phosphors doped with rare-earth ions Terbium (Tb^{3+}), Samarium (Sm^{3+}), and Dysprosium (Dy^{3+}) were synthesized via a solid-state reaction route to investigate their potential for white light generation under near-UV excitation. The structural integrity of the doped phosphors was confirmed through X-ray diffraction (XRD), indicating a single-phase formation. Photoluminescence studies under 375 nm excitation revealed distinct emissions: green from Tb^{3+} ($^5\text{D}_4 \rightarrow ^7\text{F}_j$), orange-red from Sm^{3+} ($^4\text{G}_{5/2} \rightarrow ^6\text{H}_j$), and blue-yellow from Dy^{3+} ($^4\text{F}_{9/2} \rightarrow ^6\text{H}_j$), contributing to a balanced emission spectrum. Commission Internationale de l'Éclairage (CIE) chromaticity coordinates were also measured and compared with standard values. These results demonstrate that $\text{Zn}_2\text{P}_2\text{O}_7:\text{Tb}^{3+}, \text{Sm}^{3+}, \text{Dy}^{3+}$ polycrystal is a promising single-phase, rare-earth-doped phosphor that only requires efficient, low energy transfer mechanisms that can be used for white LED applications. The sample displayed results that correspond to cool white light. The sample also displayed a 14 second green emission which corresponds to Tb^{3+} energy transition.

A Paper

Graduate Student

Physics

Alabama A&M University

III. PHYSICS AND MATHEMATICS

51 - Optimization of Endocrine and p53 Combination Therapies in Estrogen-Receptor Positive Breast Cancer Treatment

Segun Oke, PhD¹, Rachid Ouifki, PhD², Delfim F.M Torres, PhD³, Dilara Yapskan, PhD³

¹Alabama A & M University, ²Northwest University, South Africa, ³University of Aveiro, 3810-193 Aveiro, Portugal

Estrogen receptor-positive (ER+) breast cancer, characterized by estrogen receptor presence on cancer cells, is commonly treated with endocrine therapy. This approach inhibits cancer cell growth by disrupting hormonal signaling, either by blocking estrogen receptors or by inhibiting estrogen production. Nevertheless, when administered as a standalone intervention, this therapy exhibits limited success in treating breast cancer and is often used as adjuvant or neoadjuvant therapy. The p53 protein is crucial for inhibiting cancer development. Ongoing research explores the potential of p53-based treatments by addressing challenges arising from degradation and mutations of p53. Here, we aim to explore the potential of combining endocrine therapy with p53-based treatments in ER+ breast cancer treatment. We extend an existing mathematical model that accounts for the interactions between cancer cells, the estrogen hormone, and the p53 protein. We use optimal control theory to optimize the benefits of treatment of ER+ breast cancer with a combination of p53 and endocrine-based therapies. Our results

highlight the benefits of adding p53-based treatment to endocrine therapy in adjuvant and neoadjuvant therapies. Notably, in neoadjuvant endocrine therapy, our results show that the time needed to reach a suitable size for breast-conserving surgery (BCS) is in line with current findings. More importantly, the addition of p53-based therapy may lead to a significant reduction in the time required to reach a suitable size for BCS.

A Paper
Not a Student
Math, Computer, and Natural Science
Alabama A&M University
III. PHYSICS AND MATHEMATICS

60 - Independent Bondage Number in Planar Graphs Under Girth Constraints

Andrew Pham¹, E.G.K.M Gamlath², Bing Wei³

¹Alabama A&M University, ²Southern Arkansas University, ³University of Mississippi

Given a finite, simple, connected graph G with at least one edge, the independent bondage number $b_i^{\overline{f_0}}(G)$ of G is the minimum size of an edge set, such that its deletion results in a graph with a strictly larger independent domination number than that of G . While the bondage number of graphs under girth constraints has been studied, very few results have yet been established for the independent bondage number. In this study, we establish upper bounds on the independent bondage number of planar graphs under given girth constraints, extending results on the bondage number by Fischermann, Rautenbach, and Volkmann and on the structures of planar graphs by Borodin and Ivanova. In particular, we identify additional structures and establish bounds on the independent bondage number for planar graphs with $\delta_i^{\overline{f_0}}(G) \geq 2$ and $g_i^{\overline{f_0}}(G) \geq 5$, $\delta_i^{\overline{f_0}}(G) \geq 3$ and $g_i^{\overline{f_0}}(G) \geq 4$, $\delta_i^{\overline{f_0}}(G) \geq 2$ and $g_i^{\overline{f_0}}(G) \geq 7$, and $\delta_i^{\overline{f_0}}(G) \geq 2$ and $g_i^{\overline{f_0}}(G) \geq 10$, showing that the corresponding bounds are $b_i^{\overline{f_0}}(G) \leq 5$, $b_i^{\overline{f_0}}(G) \leq 6$, $b_i^{\overline{f_0}}(G) \leq 4$, and $b_i^{\overline{f_0}}(G) \leq 3$, respectively.

A Paper
Not a Student
Physics, Chemistry, and Mathematics
Alabama A&M University
III. PHYSICS AND MATHEMATICS

61 - Global Stability Analysis of Some Classes of Predator-Prey Models

Yinshu Wu¹, Wenzhang Huang²

¹Associate Professor, ²Professor

This talk presents a unified analytical approach to study the global stability of positive (co-existence) equilibria in several classes of predator-prey models. By identifying key properties of an auxiliary function derived from the system, the method establishes conditions under which local asymptotic stability implies global asymptotic stability. This equivalence significantly simplifies the analysis of complex ecological models. The framework is applied to systems with various commonly used nonlinear

functional responses, including Holling-type, Sigmoidal, Ivlev-type, and general rational forms. The results not only consolidate previous findings but also provide a foundation for extending global stability analysis to broader classes of predator-prey systems.

A Paper

Not a Student

Mathematics

Alabama A&M University

III. PHYSICS AND MATHEMATICS

75 - Modeling Alloy Disorder in Vacancy-Ordered Double Perovskites: Comparative Assessment of VCA, SCM, and SQS

Elijah Adedeji¹, Jingsong Huang², Eva Zarkadoula², Stephen Babalola¹

¹Department of Physics, Alabama A&M University, 4900 Meridian St. N., Normal, AL 35810, ²Centre for Nanophase Materials Sciences, Oak Ridge National Laboratory, Oak Ridge, TN 37831

Vacancy-ordered double perovskites such as Cs_2HfCl_6 and Cs_2ZrCl_6 are promising materials for optoelectronic and radiation-detection applications, where alloying offers a route to tuning structural and electronic properties. Accurately modeling compositional disorder in these systems, however, remains challenging. In this work, we present a comparative first-principles assessment of three alloy modeling approaches—the Virtual Crystal Approximation (VCA), explicit Supercell Method (SCM), and Special Quasirandom Structures (SQS)—to evaluate their ability to capture structural trends and deviations from Vegard's law in $\text{Cs}_2\text{Hf}_x\text{Zr}_{1-x}\text{Cl}_6$ alloys. Density functional theory calculations reveal that while VCA produces smooth compositional trends and lower total energies due to its averaged potential, it neglects local chemical environments and structural distortions. Explicit supercell calculations introduce local disorder effects and exhibit both positive and negative lattice-parameter bowing, indicating deviations from ideal Vegard behavior. Preliminary SQS results are discussed as a statistically rigorous framework for modeling random alloys, enabling a more realistic description of short-range order and local relaxation. These results demonstrate that apparent Vegard behavior is strongly method-dependent and highlight the importance of explicit disorder treatments in vacancy-ordered perovskite alloys.

A Paper

Graduate Student

Physics, Chemistry, and Mathematics

Alabama A&M University

III. PHYSICS AND MATHEMATICS

87 - Ab initio evaluation of the electronic and optical properties of VBCB defect in wurtzite boron nitride as potential single-photon emitter

Marisol Ortigoza¹, Sergey Stolbov², Brandon McClain¹

¹Tuskegee University, ²University of Central Florida

Single-photon emitters (SPEs) in the near-infrared range (NIR) with sharp and intense zero-phonon lines (ZPLs) of emission are highly desirable for applications in quantum communication technologies. Certain

local defects in wide-bandgap semiconductors may give rise to isolated occupied and unoccupied states within the bandgap of the host semiconductor that do not overlap with the valence or conduction band of the same and may thus exhibit sharp ZPLs of emission. In this work, we designed and studied a defect in the wurtzite allotrope of boron nitride (wBN) as a potential SPE. The defect consists of a boron vacancy and a carbon atom substituting another boron atom (the VBCB defect). Comparison with other related defects in regard to energy formation and phonon calculations are obtained within the density functional theory approximation to attest the stability of the VBCB defect. The independent quasiparticle density of states is obtained within the linear response GW method to identify favorable local defect states that may dominate the optical transitions in the desired range. The frequency-dependent dielectric function and the dipole oscillator strength of the optical transitions of the VBCB defect are obtained using the Bethe-Salpeter equation (BSE) method and used to identify that the VBCB defect in wBN can be a source of NIR emission with a narrow bright ZPL peak. We thus conclude that the VBCB defect could be an efficient single-photon emitter.

A Paper
Undergraduate Student
Physics
Tuskegee University
III. PHYSICS AND MATHEMATICS

Phypaper-1 - Design and manufacture of a photonic crystal light sail

Dimitar Dimitrov¹, Elijah Harris Taylor¹

¹Tuskegee University

Photonic Crystal Light Sails offer an innovative way to achieve propellant-free space propulsion by enabling continuous laser-driven acceleration with minimal onboard mass. We detail the design, simulation, and fabrication of nanoscale photonic crystal structures comprising three dielectric regions: high-index germanium pillars, air holes, and a low-index PMMA matrix. Using the finite-difference time-domain and plane-wave expansion methods, we evaluate various photonic crystal slab patterns and identify configurations that exhibit photonic band gaps with high reflectivity in a structure primarily composed of voids. These gaps provide high reflectivity at laser propulsion wavelengths while remaining transparent across most of the electromagnetic spectrum, thereby reducing thermal loads. Fabrication was carried out using electron-beam lithography and vacuum deposition at the Center for Nanophase Materials Sciences at Oak Ridge National Laboratory, yielding proof-of-concept devices with controlled nanoscale features. Samples show the feasibility of integrating three different dielectric materials into robust photonic crystal membranes. Challenges related to scaling up to three-dimensional multilayer structures are discussed, with plans to explore alternative materials and advanced fabrication techniques.

A Paper
Not a Student
Physics
Tuskegee University
III. PHYSICS AND MATHEMATICS

IV. ENGINEERING AND COMPUTER SCIENCE

9:00 AM – noon, Harris Parker Room 128

Chair Ravi Gollapalli, presiding

43 - Plasma surface engineered ACF mats for effective aerosol-mediated heavy metal remediation

Chandrima Karthik¹, Vinoy Thomas²

¹Graduate Research Assistant, ²advisor

Heavy metals are detrimental to humans, animals, and the environment because of their ability to attach to cellular components, impede biological functions, and accumulate in organisms and ecosystems.

Contamination by heavy metals is still a major global threat to the environment and public health. To address the sources of heavy metal pollution and lessen its effects on human health and the environment, better monitoring, stronger laws, and efficient mitigation techniques are required, as per the statistics and conclusions from recent studies. In this proposed work, plasma technology will be used as a powerful tool for modifying the surface properties of activated carbon fibre through controlled interactions with highly reactive species in a plasma state. The surface characteristics of activated carbon fibres can be significantly changed by plasma modifications, including the pore structure and the production of surface functional groups such as carboxyl, carbonyl, and acidic hydroxyl groups. These changes increase the adsorption capacity of activated carbon fibres, which boosts their effectiveness in removing heavy metals from tainted aerosols. By utilizing diverse plasma modifications with different precursors, it is possible to tailor the surface properties of activated carbon fibre mats to optimize heavy metal adsorption. To sum up, low-temperature plasma processing is an innovative method that minimizes the amount of chemicals used yet preserves the inherent qualities of materials including activated carbon fibre mats. Through the use of various precursors and plasma modifications, activated carbon fibre mats treated with plasma offer a flexible means of improving heavy metal adsorption from contaminated aerosols.

A Paper

Graduate Student

Engineering

University of Alabama at Birmingham

IV. ENGINEERING AND COMPUTER SCIENCE

CmpEngg-1 - Organizational and Cybersecurity Determinants of Data Breach Resolution: An Ex-Post Facto Analysis

Belinda Patton¹

¹Faulkner University

In recent years, businesses across the United States have reported increasing challenges in preventing, detecting, and resolving data breaches, yet little was known about how organizational or cybersecurity factors influence the resolution process across different business sectors. In 2020, following the implementation of Washington State's HB 1071, which strengthened breach notification requirements, we gained access to new, standardized data that allowed us to examine patterns in data breach reporting more

closely. Using archival breach-notification records from 2020-2023, we analyzed 652 business-related data breaches to understand the relationships among Business Type, Cyberattack Type, Affected Range, and the likelihood of timely breach resolution.

Similar to early national studies that highlighted the growing role of ransomware and complex cyberattack vectors, our dataset revealed that ransomware and unknown/unclear attacks were among the most challenging for businesses to resolve. Approximately 500-999 affected individuals represented the range most associated with delayed resolution. While we expected organizational characteristics to play a major role, Business Type did not significantly influence outcomes, echoing past cybersecurity research suggesting that attack mechanics often outweigh organizational identity.

The HB 1071 policy shift, combined with the evolving cyber threat landscape, allowed us to compare breach-resolution dynamics with earlier national findings and observe how regulatory changes shape reporting behavior. Overall, our analysis demonstrates that even with stronger notification laws and improved security awareness, cyberattack type remains the most influential factor in resolution. When organizations are able to classify the attack quickly and respond with targeted security measures, breaches are more likely to be contained effectively. However, our results also suggest that businesses need improved strategies for managing ransomware and ambiguous attack vectors to strengthen overall breach response capability.

A Paper

Not a Student

Computer and Information Science

Faulkner University

IV. ENGINEERING AND COMPUTER SCIENCE

IX. HEALTH SCIENCES

9:00 AM – noon, Harris Hall 109

Chair Jean-Pierre Ardit, presiding

39 - Potential Danger Associated with One Headphone Connected to Different Devices

Bankole Fasanya¹, Precious Fasanya², Efrem Reeves³

¹The University of North Alabama, ²Lake county School Corporation Indiana, ³Erbium Consulting, LLC

According to a 2017 Technology and Telecommunications report, headphone sales in the United States (US) have increased exponentially. Research findings have also shown that today, many people are in the habit of listening to music, interacting on social media, watching movies, and playing games via headphones connected to devices such as cellphones, computers, and iPads while studying or doing other activities. Users' perception of headphone use is one-size-fits-all. However, different headphones might produce different decibel outputs on different devices at the same volume level. This study investigated the average sound level (L_{Aeq}) output of one headphone brand, paired with a cell phone (BlackBerry Android) and a laptop (Microsoft Laptop), at 5 volume levels (20, 40, 60, 80, 100). A GRAS 45CB Acoustic Test Fixture (ATF) was used to measure the headphone output. All devices were purchased from a regular store to mimic the natural use of the products by users. Findings revealed that the Billboard

headphone produced different outputs at the same volume level set on the two devices. Statistically, the differences in the outputs were significant at all volume levels tested, except at 80 % and 100 % volume in the right ear [(t = 2.005, p < 0.0001 for 20% and 40%, t = 2.005, p = 0.0283 for 60%)]. The differences range from 1.5 dBA to 15.1 dBA. At the left ear only at 100% volume; others are statistically significantly different: [(t = 2.005, p < 0.0001 for 20% and 40%, t = 2.005, p = 0.0028 for 60%, and t = 2.0049, p = 0.0141 for 80%)]. The differences range from 4.6 dBA to 15.5 dBA. The outputs from the laptop at 60%, 80%, and 100% volume levels, and at 80% and 100% in the left ear, exceed the recommended exposure levels set by the US EPA in its 2017 report and by OSHA. Findings from this study could help inform government intervention in the design and implementation of headphone manufacturing policy and standards. It could also help long-term headphone users limit their use and recognize that one headphone brand may not be safe for all devices.

A Paper
Not a Student
Engineering
The University of North Alabama
IX. HEALTH SCIENCES

57 - Historical Voices in Nursing: A Faculty Reenactment

Ellen Justice¹, Leslie Painter¹, Shellye Vardaman¹, Lauren Boutwell¹, Lindsey Walters¹, Rebecca Hayes¹, Bethany Phels¹

¹Faulkner University

According to Gonzalez-Gonzalez et al. (2022), historical reenactment enhances critical thinking through active learning. Educational programs for nursing rarely include standalone courses focused on nursing history, particularly nursing theorists. Instead, historical content is often sporadically and inconsistently embedded within nursing curricula (Matthias & Hundt, 2023). As a result, nursing students may lack a comprehensive understanding of the historical foundations of the profession and how these foundations influence the nurse-patient relationship. Studying nursing history enables students to appreciate the individuals, social contexts, and environmental conditions that shaped nursing practice and continues to inform modern healthcare.

To enhance student learning and generate interest in nursing history within an entry-level nursing course, faculty in our nursing program implemented an interactive reenactment-based teaching strategy. Faculty and staff members each selected a nursing theorist, prepared a written summary, and delivered the content through oral presentation. A PowerPoint presentation accompanied each reenactment, featuring the theorist's name, photograph, historical time period, and a representative quote. During each presentation, the corresponding slide was displayed while the presenter wore period-appropriate vintage attire.

This innovative approach actively engaged students, as evidenced by attentive participation, note-taking, and photographic documentation. Reenactment proved to be an effective and enjoyable method for introducing nursing theorists, fostering student engagement, and promoting appreciation for the historical foundations of nursing practice.

References

Matthias, A.D., & Hundt, B. (2023). The power of the past: A roadmap for integrating nursing history into the curriculum. *Journal of Professional Nursing* (46) 231-237. Elsevier.

Gonzalez-Gonzalez, J-M., Franco-Calvo, J-G., Espanol-Solano, D. (2022). Educating in history: Thinking historically through historical reenactment. *Social Sciences* 11: 256. <https://doi.org/10.3390/socsci11060256>

A Paper

Not a Student

College of Nursing

Faulkner University

IX. HEALTH SCIENCES

70 - Cadaver Anatomic Anomalies Found in Twenty Years of Student Cadaveric Dissections

Mark Caulkins¹, Nick Washmuth²

¹Samford University, ²The University of Alabama at Huntsville

Interesting Anomalies Found in Student Dissected Cadavers

A Paper

Not a Student

Biological Sciences

Samford University

IX. HEALTH SCIENCES

81 - PREDICTORS OF CATASTROPHIC HEALTHCARE EXPENDITURE AND IMPOVERISHMENT IN CHRONIC DISEASES PATIENTS ACROSS PUBLIC HEALTHCARE FACILITIES IN LAGOS, NIGERIA

Chineye Adili-George¹, Isaiah Uwemedimo², Uchechi Obiefule³, Uchenna Anyanwu⁴, Chika Chilaka⁵, Uchenna Amaechi⁴

¹The University of Alabama at Birmingham, ²University of Uyo, ³Lagos State University Teaching Hospital, Lagos, Nigeria, ⁴University of Geneva, ⁵Robert Wood Johnson Hospital, Hamilton

Background

Catastrophic Healthcare Expenditure (CHE) and medically related impoverishment remain critical public health concerns in low-and-middle-income countries, particularly among individuals managing chronic diseases that require long-term and resource-intensive care. In Nigeria, many households rely heavily on out-of-pocket (OOP) spending due to inadequate health insurance coverage, pushing vulnerable populations deeper into poverty. This study assessed the predictors of CHE and impoverishment among patients with chronic illnesses receiving outpatient care across primary, secondary, and tertiary public healthcare facilities in Lagos State, Nigeria.

Methods

A health facility-based cross-sectional study was conducted among 480 chronic disease patients selected through a multistage sampling technique across six high-burden government healthcare facilities in Lagos. Data were collected using a structured, validated interviewer-administered questionnaire. Descriptive statistics summarized household economic characteristics and healthcare expenditures, while multivariable logistic regression identified predictors of CHE and impoverishment. Analyses controlled for key demographic variables, including age, sex, and household size. Statistical significance was set at $p \leq 0.05$.

Results

Participants reported a mean monthly OOP expenditure of ₦364.30 (SD = ₦132.89), exceeding mean household income since illness (₦160.00; SD = ₦79.38). Food expenditure represented ₦112.00 (SD = ₦35.65) of monthly spending, highlighting substantial financial strain. Over half of households experienced CHE (CHE1 $\geq 10\%$ of income: 57.9%; CHE2 $\geq 40\%$ of non-food expenditure: 48.0%) and approximately 42% were pushed below the poverty line. Age was a strong predictor of CHE, with higher odds among respondents aged 36-50 years (AOR = 2.12), 51-65 years (AOR = 1.95), and ≥ 66 years (AOR = 2.45). Female sex (AOR = 1.78), large household size (≥ 7 members; AOR = 3.21), and moderate-income status (AOR = 1.78) were also associated with increased CHE risk. Health insurance showed a borderline protective effect (AOR = 0.63). Predictors of impoverishment included age ≥ 66 years (AOR = 2.05), female sex (AOR = 1.61), and large household size (AOR = 2.64). Other factors, including employment status, facility level, number of illnesses, and health-seeking behaviors, were not significant after adjustment.

Conclusion

Catastrophic healthcare expenditure and poverty resulting from chronic disease care are highly prevalent among socio-economically disadvantaged and uninsured populations in Lagos. Expanding coverage under state and national health insurance schemes is urgently recommended to enhance access and reduce reliance on out-of-pocket payments.

Keywords: Catastrophic Health Expenditure, Impoverishment, Chronic Diseases, Out-of-Pocket Payments, Health Insurance, Lagos State, Nigeria.

A Paper
Graduate Student
Biological Sciences
University of Alabama at Birmingham
IX. HEALTH SCIENCES

HSpaper-1 - Effect of tDCS on Cognitive Function in People with Parkinson's Disease

John Shelley-Tremblay¹, Celeste Reames¹

¹University of South Alabama

Transcranial direct current stimulation (tDCS) has been shown to temporarily modify behavior, as well as facilitate learning and task performance in healthy individuals. Cattaneo et al. (2011) found anodal tDCS over Broca's area can be used to increase verbal fluency in neurologically healthy individuals. The current project sought to determine if anodal transcranial direct current stimulation (tDCS) over the left

dorsolateral prefrontal cortex improves verbal fluency in depressed college students and adults with Parkinson's Disease (PD). While the single session tDCS did not change cognition in depressed college students, older adults with PD did show promising, but heterogenous improvements in function and EEG biomarker amplitude.

A Paper

Not a Student

Psychology

University of South Alabama

IX. HEALTH SCIENCES

VIII. ENVIRONMENTAL AND EARTH SCIENCE

9:00 AM – noon, Harris Hall 109

Chair Mojtaba Enayati, presiding

24 - Beyond the Field: Weather's Playbook in Sports - Unpacking Heat Impacts on Spectators' during Sporting Events, at a Southeastern University, through Interdisciplinary Mixed-Methods

Brandon Ryan¹, Chandana Mitra¹, Karen McNeal¹, Peter Crank²

¹Auburn University, ²University of Waterloo

Auburn University is home to multiple NCAA Division-I sports teams, which draw in hundreds of thousands of fans every year for sporting and other mass gathering outdoor events. For fan safety, the increase in the heat index, a combination of air temperature and humidity, particularly 105 °F (41°C) and above is considered dangerous and a major concern for organizers. Spectators come from all walks of life and have a myriad of medical conditions, backgrounds, and characteristics that may influence how greatly heat impacts them individually. This study aims to 1) understand the spatial distribution of heat within the sports stadiums on the university's campus and 2) learn about spectators' experiences during gamedays, in order to improve fan safety and health for future events. For aim one, fifteen (football) and twenty (baseball) iButton Hygrochron devices were evenly dispersed around the stadiums, recording data at 10-minute intervals. To date, it has been found that northern sections within Jordan-Hare (football) stadium (~125 °F/52 °C) and student sections within the Plainsman Park (baseball) (~111 °F/44 °C) had some of the highest gameday heat index. For aim two, a general survey was conducted to gather information about spectators' knowledge, risk perceptions, experiences, and behaviors related to heat on game days.

Individuals with personal experience of extreme weather may perceive an increased risk of experiencing such events, like extreme heat. Through inductive coding, it has been found that individuals are aware that heat is an issue during gamedays and take various actions to reduce their exposure. Some even take more extreme measures by no longer attending sporting events during the hottest part of the season or not attending games, period. This survey tool can be utilized by other organizations and event planners to support informed decision-making during game days, thereby contributing to the existing body of knowledge on heat perception literature. This project 1) communicates findings to Auburn Athletics and Campus Safety in order to improve their gameday 'Heat Action Plan', 2) informs and communicates to

the residents of Auburn University and City, and 3) collaborates with an interdisciplinary and multi-organization team to generate data-driven solutions.

A Paper

Graduate Student

Geography

Auburn University

VIII. ENVIRONMENTAL AND EARTH SCIENCE

ENVNpaper-1 - Determination of Polyethylene contamination level in commercially recycled polypropylene with Raman spectrometry using AI-assisted modeling

Caleb Chatfield¹, Nathan Mancos¹, Julie Le Bras¹, Chloe Higdon¹, Shaoyang Liu¹

¹Troy University

The presence of polyethylene (PE) in recycled polypropylene (rPP) is a critical quality concern, as the two polymers are inherently incompatible and PE contamination can degrade rPP mechanical performance. Building on our previous development of an AI-assisted partial least squares (PLS) predictive model using laboratory-prepared mixtures, the present study evaluates the model's performance on real-world materials. Commercial rPP feedstock and finished product samples were obtained from a local plastic recycler, and their Raman spectra were collected and preprocessed through despiking, smoothing, baseline correction, and normalization. When applied to these spectra, the PLS model successfully predicted PE contamination levels in the commercial samples. The finished rPP products were estimated to contain approximately 7-8% PE; meanwhile, one PE piece might be detected in the tested feedstock (Sample# 12). These results demonstrate the model's practical utility for rapid, non-destructive monitoring of PE contamination in industrial recycling streams.

A Paper

Undergraduate Student

Chemistry

Troy University

VIII. ENVIRONMENTAL AND EARTH SCIENCE

ENVNpaper-2 - Enhancing the Biodegradability of Recycled High-Density Polyethylene via Hemp-Hurd Reinforced Composites

Alexander Lawrence Jensen¹

¹Electrical and Electronic Engineering

Recycled high-density polyethylene (rHDPE) is widely used in consumer and industrial applications; however, its resistance to biodegradation limits its environmental sustainability. This study investigates the incorporation of hemp hurd as a natural, bio-based filler to enhance the biodegradability of rHDPE while maintaining processability. Recycled HDPE obtained from KW Plastics was blended with hemp hurd at loadings ranging from 5 to 60 wt% using both a batch mixer (Brabender Plasticorder) and a continuous twin-screw extruder (Process 11). The effects of filler content and processing method on the

processability, dispersion, and material integrity of composites were evaluated. Increasing hemp-hurd content promoted the introduction of biodegradable pathways and reduced the overall polymer content, while maintaining melt processing feasibility across a wide composition range. The use of twin-screw extrusion improved filler dispersion compared to batch mixing at higher loadings. These results demonstrate that hemp-hurd reinforced rHDPE composites offer a promising route toward more sustainable, partially biodegradable plastic materials.

A Paper
Undergraduate Student
Engineering
Troy University
VIII. ENVIRONMENTAL AND EARTH SCIENCE

ENVNpaper-3 - Assessment of Health Hazards from Volatile Organic Compounds (VOCs) Potentially Released by Recycled Plastics

Chloe Higdon¹, Julie Le Bras¹, Caleb Chatfield¹, Nathan Mancos¹, Shaoyang Liu¹
¹Troy University

Recycled plastics emit a diverse array of volatile organic compounds (VOCs), including substances with known or suspected human-health hazards. This study systematically characterizes the health hazard profiles of VOCs potentially released from recycled plastic materials. A list of 639 candidate VOCs was compiled from three sources: (1) 427 VOCs previously reported in recycled plastics; (2) 116 commonly used household and commercial pesticides and herbicides; and (3) 86 widely used plastic additives. Health hazard ratings for all compounds were assigned using the NFPA system, drawing on data from government agencies, major chemical manufacturers, and other credible sources. Of the evaluated VOCs, 14 received a hazard rating of 4, 100 a rating of 3, 264 a rating of 2, 153 a rating of 1, and 108 a rating of 0. These findings provide a foundation for evaluating the potential human-health risks associated with VOC emissions from recycled plastics and highlight priority compounds for further investigation.

A Paper
Undergraduate Student
Biological Sciences
Troy University
VIII. ENVIRONMENTAL AND EARTH SCIENCE

VII. STEM EDUCATION

1:00 PM – 3:00 PM, Harris Parker Room 135
Co-Chairs Uduak Afangideh and Diann Jordan, presiding

15 - Virtual Escape: A Workshop on Graph Constraints and Problem-Solving Strategies

CADAVIOUS JONES¹
¹Rust College

This presentation introduces *Virtual Escape*, a game-based learning activity designed to engage students with advanced concepts in graph theory and algorithmic reasoning through structured gameplay. The activity promotes accessible mathematics education by embedding formal ideas within an interactive and collaborative environment.

Virtual Escape is a nine-level game inspired by the Japanese logic puzzle **Goishi Hiroi (Hiroimono)**. Each level presents a grid-based structure in which students must determine whether a configuration admits a unique solution that satisfies specific global constraints, including visiting every vertex exactly once. Some configurations are intentionally deceptive, appearing valid while failing to meet these constraints. Students are challenged to identify structural obstructions and to minimally modify configurations to restore validity.

Through small-group collaboration, students investigate existence, uniqueness, and optimality conditions, leading naturally to discussions of Hamiltonian structures, necessary and sufficient conditions, and heuristic algorithms for NP-complete problems. Formal terminology is introduced after students have articulated these ideas informally, allowing definitions to emerge from discovery. The activity illustrates how gameplay can support rigorous mathematical reasoning while lowering barriers to advanced content across diverse learning settings.

A Paper

Not a Student

Mathematics

VII. STEM EDUCATION

STEM-6 - The STAMP (Stress Management Techniques Accelerate Mental Peace) model of stress management for STEM majors

Elsa Price¹

¹Faulkner University

Stress significantly alters neuroendocrine, cardiovascular, and immune system function, contributing to impaired performance, burnout, and reduced well-being. The STAMP model (Stress Management Techniques Accelerate Mental Peace) applies principles of Hans Selye's General Adaptation Syndrome to explain physiological transitions from alarm to resistance and exhaustion. This presentation examines sympathetic-adrenal-medullary and hypothalamic-pituitary-adrenal axis responses to stressors and their measurable biological indicators. Psychological perception, personality patterns, and environmental variables are analyzed as modulators of stress expression. Evidence-based interventions including cognitive restructuring, diaphragmatic breathing, progressive muscle relaxation, cue-controlled relaxation, the Three-Tens Method, and guided imagery are demonstrated as regulatory mechanisms supporting homeostasis. Participants explore how targeted behavioral techniques can reverse stress-induced inertia and restore adaptive physiological balance. The STAMP framework highlights translational applications for STEM education, healthcare, and applied research contexts. By integrating biological theory with practical intervention, this model provides a replicable approach for reducing stress-related dysfunction and promoting sustainable mental and physiological resilience among STEM majors and other populations.

A Paper

Not a Student

STEMpaper-1 - When Students Lead: A Team Based Strategy for Redefining Engagement In Tertiary STEM Education at Faulkner University

Uduak Afangideh¹

¹Faulkner University

STEM programs nationwide continue to struggle with student engagement, belonging, and persistence. To address these challenges, the Science Department at Faulkner University launched a student-led engagement model consisting of four teams—Activities, Outreach, Liaison, and Peer-Mentoring—designed to cultivate community, strengthen communication, and enhance academic support. Grounded in research on team-based learning and student partnership, the initiative positions students as co-creators of departmental culture rather than passive participants.

Using a mixed-methods approach, this study examines the program's first year through surveys, participation metrics, and faculty observations. Findings show increased student-faculty interaction, improved communication, enhanced visibility of departmental activities, and stronger peer connections. Students also reported a greater sense of belonging, a known predictor of STEM retention.

The results suggest that student-led structures offer a scalable, high-impact strategy for transforming engagement in STEM education. Empowering students to lead fosters environments where motivation, connection, and collaboration thrive.

A Paper

Not a Student

Biology

Faulkner University

VII. STEM EDUCATION

STEMpaper-2 - Using Reflection Journals to Improve Undergraduate Biology

Christel Whitehead¹

¹The University of Alabama at Birmingham

Active learning introduces student activity into traditional lectures using student-centered pedagogical strategies requiring deeper thinking and increased engagement. Fostering active and collaborative learning has been demonstrated to enhance student learning, attitudes (how students view the importance of learning the subject matter), and persistence in STEM. Understanding connections of learning and attitude is imperative since engaging classroom experiences can transform students' interest in science. This study utilized the active learning strategy of reflection journals in introductory biology courses to empower students to connect STEM knowledge to real world scenarios while encouraging new methods of material engagement. The overall study goal was to determine if there would be a shift in attitude towards learning a biological concept if students can understand its role in the real world. Throughout the semester students received 4 reflection journal prompts. The experimental journal assignments contain

questions that guide students to the correlation between the material and application, while control journals simply asked students to reflect on the material. Pre-and post-surveys were utilized to measure the change in students' attitude toward the relationship between science and society. While both groups displayed an increase in attitude, students in experimental groups experienced a greater change towards learning biology. Qualitative data from reflection journals is analyzed utilizing Braun and Clarke's (2006) reflexive thematic analysis using inductive methods to depict student interest and motivation. An overall theme of transformation was identified from student writings with students falling into three stages of learning transformation (anti-, pre-, & transformed). This study demonstrates that simple, deliberate modifications like journal reflections significantly impact students' approach, attitude, and knowledge application. Study insights could influence higher education curricula and improve STEM educational experiences.

A Paper
Graduate Student
Biology
University of Alabama at Birmingham
VII. STEM EDUCATION

STEMpaper-3 - Workshop #1: Informative Discussion for High School Students, Teachers and Newcomers to the Alabama Academy of Science

Ellen Buckner¹, Jack Shelley-Tremblay*², Uduak Afangideh³

¹Nursing, Samford University, ²Psychology, Univ. of South Alabama, ³Biology, Faulkner Univ. This informative discussion will feature Dr. Ellen Buckner, who has coordinated the Alabama Junior Academy and the Gorgas Competitions for several years and Dr. Jack Shelley-Tremblay, former executive director of AAS. It is a high school outreach program (grades 9-12) sponsored by the Alabama Academy of Science. It includes Alabama high schools that participate. This is a scholarship competition. The Gorgas Scholarship Program is the premiere scholarship program of the Alabama Academy of Science. The purposes of the Gorgas competition are to promote interest in science and to aid in the education of promising students.

Dr. Jack Shelley-Tremblay has worked with the Academy for several years and has been executive director and currently serves as the associate director will discuss a brief history and current benefits that the organization can offer high school students, teachers and any newcomers. Dr. Tremblay has several years of experience on the inner workings of the society.

Both these panelists will bring forth important information for potential new members and anyone interested in learning about the objectives of this organization.

A Paper
Not a Student
Biological and Environmental Sciences
Alabama State University
VII. STEM EDUCATION

STEMpaper-4 - Workshop #2: The How To Workshop Series: Mastering the Art of Writing a Powerful and Effective Abstract

Diann Jordan¹, Cadavious Jones²

¹Biology, Alabama State University, ²Mathematics and Dean, Rust College

This interactive workshop will be designed for high school students, their teachers, and any other interested participants to learn what an abstract is, the proper components of an abstract and how to write an effective abstract for presentation or scientific publication. Many students do not learn how to write an abstract until their college years. However, it is essential that potential STEM majors gain as much experience as possible before their college years. This interactive workshop will include a short presentation and hands-on-activities that will give participants confidence and basic skills of writing and recognizing effective abstracts. The goal of this workshop is to provide students with the opportunity to practice writing and “honed” their basic skills for effective communication to various audiences, especially in STEM fields.

A Paper

Not a Student

Biological and Environmental Sciences

Alabama State University

VII. STEM EDUCATION

V. SOCIAL SCIENCES

1:00 PM – 3:00 PM, Harris Parker Room 117

Chair Cynthia Lovelace, presiding

14 - Beyond Pheromones: Chemical Communication and Environmental Learning in Honey Bee Behavior

James C. Guy¹

¹Faulkner University

Honey bees (*Apis mellifera*) provide a robust model for examining the interaction between biological predisposition and environmental modulation of behavior. This presentation examines how pheromonal signaling systems interact with learning processes and environmental influences to shape individual and collective behavioral outcomes within the colony, demonstrating the integrative relationship between nature and nurture.

In this presentation, an overview of the principal pheromones operating within the hive will be presented, including queen-, brood-, drone-, and worker-derived compounds that regulate reproduction, division of labor, social organization, defensive responses, and mating behaviors. While these pheromonal cues are genetically encoded, research indicates that behavioral responses are not solely determined by pheromonal signaling but reflect the integrated effects of genetic predispositions, environmental context, and learning. Honey bees exhibit well-documented capacities for associative learning, memory formation,

environmentally influenced responses, and experience driven behavioral modification abilities similar to those of mammalian organism (including humans).

The presentation will further explore how environmental, situational, and anthropogenic influences interact with pheromonal signaling and genetic predispositions to influence behavioral expression.

By integrating chemical communication, learning theory, and environmental influence, this presentation highlights the plasticity and complexity of honey bee behavior. This synthesis contributes to a broader understanding of social insect behavior and synthesizes research indicating that the nature-nurture question is not either/or, but both/and in insects as in humans.

A Paper
Not a Student
Psychology
Faulkner University
V. SOCIAL SCIENCES

49 - Managerial Characteristics and Technical Efficiency of Beginning Farms in the Southeast

Syed Fuad¹, Valentina Hartarska¹, Denis Nadolnyak¹
¹Auburn University

This study examines the efficiency gaps between beginning farms and established farms in the Southeastern U.S. Using farm-level data from the 2022 Census of Agriculture, we apply propensity score matching to construct comparable samples of beginning and established farms, and then estimate technical efficiency scores using a one-step stochastic frontier framework. This approach not only measures which farms use current technologies more efficiently but also identifies the farm and operator characteristics that drive inefficiency. Robustness checks include alternative matching specifications and an expanded definition of beginning farms. Results show that beginning farms are, on average, more efficient than established farms, with the efficiency differential most pronounced in the full sample of all farms. In the subsample of market-oriented farms (those with total production value above \$10,000), efficiency gaps narrow but remain favorable to beginning farms. Inefficiency estimates reveal that farming experience reduces inefficiency in livestock operations but has no effect in crop farms, while the number of decisionmakers is generally associated with lower inefficiency in the full sample but higher inefficiency among beginning farms once they reach a market-oriented scale.

A Paper
Not a Student
Biological and Environmental Sciences
Auburn University
V. SOCIAL SCIENCES

50 - Efficiency Gaps between Female- and Male-Operated Farms in the Southeastern United States

Syed Fuad¹, Valentina Hartarska¹, Denis Nadolnyak¹

¹Auburn University

We explore gender disparities in Southeastern U.S. agriculture by comparing efficiency gaps between female- and male-operated farms, disaggregated by farm specialization and scale. Using farm-level data from the 2022 Census of Agriculture, we apply propensity score matching to construct comparable samples of female and male farms. We then estimate technical efficiency scores using a one-step stochastic frontier analysis; this simultaneously models the production process and inefficiency effects to measure how closely farms operate relative to the best-practice frontier given current technologies and to identify the farm characteristics that drive inefficiency. Results show that in the full sample, female farms in the Southeast are, on average, more efficient than male farms, though less efficient in livestock-specialized operations. Among market-oriented farms (those with production value exceeding \$10,000), female farms are more efficient in both crop and livestock operations. Inefficiency estimates highlight the role of managerial skills: greater farming experience reduces inefficiency for male farms but has no significant effect for female farms, while a larger number of decisionmakers increases inefficiency in both groups, though the penalty is more pronounced among market-oriented female farms. Robustness checks using alternative matching specifications, including one-to-many matching and tighter calipers, reinforce the main findings.

A Paper

Not a Student

Biological and Environmental Sciences

Auburn University

V. SOCIAL SCIENCES

Social-1 - The Mediating Role of Emotion Regulation with Perceptions of Parental Psychological Control and Autonomy Support on Emerging Adult Anxiety and Coping

Emily Maher¹, Jack Shelley-Tremblay¹

¹The University of South Alabama

Emerging adulthood is marked by instability, uncertainty, and change for many individuals. During this stage of life, mental health struggles, including anxiety, begin to emerge as individuals navigate new environments, and their well-being is influenced by how well they cope with these struggles. The present study seeks to understand potential influences on emerging adult cognitive health by assessing the relationship between maternal autonomy support and psychological control and emerging adult anxiety and coping as mediated by emotion regulation. A sample of 150 university students from southern Alabama were recruited (n = 111 cisgendered females, M age = 20.72, SD age = 6.08) and asked to complete several surveys assessing measures of parental bonding and psychological control, emotion regulation, academic stress, coping strategies, and anxiety. Emerging adults who reported higher levels of maternal psychological control reported higher emotion dysregulation, anxiety, and avoidant coping

strategies. Additionally, maternal autonomy support positively predicted higher usage of cognitive reappraisal and integrative emotion regulation strategies and lower usage of avoidant coping strategies. The relationship between maternal parenting and emerging adult cognitive health is mediated by the adult child's use of reappraisal to regulate their emotions. These findings contribute to the comprehension of risk factors relating to emerging adult mental health and well-being.

A Paper
Not a Student
Psychology
University of South Alabama
V. SOCIAL SCIENCES

Social-2 - The Politics of Science and the Science of Politics: A Consideration of the Influence of Politics in Scientific Research

Grover Plunkett¹

¹Faulkner University

THE POLITICS OF SCIENCE AND THE SCIENCE OF POLITICS:

A CONSIDERATION OF THE INFLUENCE OF POLITICS IN SCIENTIFIC R

Submitted By: Grover L. Plunkett, Assistant Professor

Political Science and History

A tension exists between our elected governmental officials, the federal bureaucracy, and scientific research community as to the extent to which political forces and desired funding outcomes affect what most Americans expect to be independent scientific research. This tension came to its breaking point amid the Covid-19 Crisis. During this crisis period, directives from the American government as to what business enterprises could remain open, what should be the appropriate distance individuals should maintain between one another while in public, the cancellation of events in which large numbers of people would be gathered including church services, when and where one should wear a mask, what existing pharmaceuticals might be used to treat or prevent the contraction of Covid-19, and why one should take the vaccine proposed by the governing officials who controlled the research and production of such vaccines.

To an astonished public, many Americans had to face the impossible decision as to whether they could keep their job if they were vaccinated or lose their jobs if they refused the vaccine. In the face of growing numbers of individuals who were permanently injured by the vaccine, both the federal government and the scientific community remained immune to recourse or remedy from those permanently injured. Common sense compelled many to refuse the vaccine and seek other employment and many were accused of contributing to the spread of the Covid-19 pandemic by their refusal. Americans were cajoled over and over again to "follow the science".

The work presented here is simply a framework of important research questions which demand that whatever the United States' mistakes were in addressing the pandemic of 2020-2023, we must avoid the same mistakes should a future national health crisis arise. In order to do so, hidden economic

outcomes associated with the funding of research must be investigated and removed from the overarching outcome of protecting the American people. It is my desire here to name those questions and propose ways by which the American people are made aware of the mistakes, to make certain those who are permanently injured are compensated, and to insure those who profited financially by advancing scientific claims that had little or no merit or substance are held accountable

A Paper
Not a Student
History
Faulkner University
V. SOCIAL SCIENCES

X. BIOETHICS, HISTORY, PHILOSOPHY OF SCIENCE

1:00 PM – 3:00 PM, Harris Parker Room 117
Chair Dennis Sansom, presiding

Bioethics-1 - Maximal Disability & Mere Difference: An Objection to Barnes

Aron, J.¹

¹The University of Alabama

Philosophers of disability generally divide themselves into two groups: mere-difference theorists, who contend that disabilities are not automatically or independently bad for their subjects, and bad-difference theorists, who contend that they are. In “The Minority Body,” Elizabeth Barnes advocates for a mere-difference view by arguing that all disabilities are neutral independently (“neutral simpliciter”), and that empirical harms stemming from them are instead the result of an ableist society that is insufficiently committed to the accommodation of people with disabilities. In particular, Barnes responds to an argument posed by Jeff McMahan, who suggests that the bad-difference view is proved by the fact that disabilities are aggregately harmful—an individual afflicted with every conceivable disability seems to be harmed regardless of society’s efforts to accommodate them. Barnes counters that cumulative harm is not sufficient to demonstrate that each component is harmful, in the same way that a visually unappealing outfit may be composed entirely of articles of clothing which are themselves inoffensive.

Although I believe that Barnes’s response to McMahan is successful, I argue that a revised version of McMahan’s argument survives Barnes’s objection and requires substantial revision to her argument. We need not conceive of this individual as being afflicted by every conceivable disability, but rather a single disability which entails all of these effects as symptoms. It appears that this hypothetical individual is (A) a person, (B) who is subject to a disability, (C) which harms them, (D) and these harms are not merely the result of an unaccommodating society—a set of premises which, if true, contradicts Barnes’s view. In this paper, I argue for each of these premises, explore and reject potential objections that a proponent of Barnes could make, and ultimately explore potential revisions to the Barnesian account which allow it to survive this line of argument.

More broadly, this argument bears on the conception of disability used in psychological and medical contexts. By examining whether certain impairments could be intrinsically harmful even in ideal social

conditions, this project connects the metaphysics of disability to questions in the biomedical classification of disability, and the role of empirical evidence in defining it.

A Paper
Graduate Student
Psychology
University of Alabama
X. BIOETHICS, HISTORY, PHILOSOPHY OF SCIENCE

Bioethics-2 - Origins of Modern Science The Influence of John Philoponus of Alexandria, 6th Century

Dennis Sansom¹
¹Samford University

It is customary to say that the 13th century philosopher Roger Bacon is the originator of modern science in that he emphasized empirical results over speculative theories. He does start the turn towards empirical research and testing in the scientific method. However, the emphasis on proper scientific theorizing starts much earlier. The sixth century philosopher, theologian, and scientist John Philoponus of Alexandria Egypt formulated a scientific approach that remains today--that is, a unified theory of both the terrestrial and celestial realms based on an impetus theory of motion. I present how John Philoponus developed this scientific methodology.

A Paper
Not a Student
Bioethics, History, & Philosophy of Science
Samford University
X. BIOETHICS, HISTORY, PHILOSOPHY OF SCIENCE

Bioethics-3 - A Living Breath in Dry Bones: The Strange Challenge of Evolution

Theodore Sabir¹
¹Faulkner University Department of Chemistry

In this paper I will contribute to the discussion about origin and development of life models. The dominant paradigms are represented by the evolutionary and the traditional Judeo-Christian Scriptural models. It's generally accepted that the evolutionary model enables atheism to be intellectually satisfying. However, does it mean that it is true? The author endeavors to identify some of the general scientific questions that may be raised.

A Paper
Not a Student
Bioethics, History, & Philosophy of Science
Faulkner University
X. BIOETHICS, HISTORY, PHILOSOPHY OF SCIENCE

Bioethics-4 - Logical Ethics: The Meaning of Life in Symbolic Notation

Laura Seger¹

¹The University of Alabama at Birmingham

I've taught Bioethics and Intro to Logic for nearly twenty years, with back-to-back sections for the past ten semesters or so. After not one but two near death experiences this past year, the courses I hold dear in my heart have now merged in my mind. In this talk I posit a simple to understand logical truth (if P and not P, then P or not P) as an analogy for living an ethical life, and I argue that the narrative you choose to assign to the logic formula constitutes your sense of self. I observe the formula's compatibility with both secular and religious notions of life's meaning.

To gain a higher reasoning perspective in your narrative formula, I argue in favor of following at least three guiding principles, and since I see Bioethics as relevant to all of life, I propose adopting those identified by the 1978 *Belmont Report: Ethical Principles and Guidelines for the Protection of Human Subjects of Research*. Attempting to maximize and balance the oftentimes competing principles of justice, beneficence, and respect for persons has led to less abuse and better outcomes in medical and scientific research, and attempting to do the same in everyday life may lead to less abuse and better outcomes as well, however you choose to define those terms. Because, as I promise my students at the start of each semester, "My job isn't to tell you *what* to think, it's to help you figure out what you *already* think." After this talk you'll still have the unending task of determining right from wrong, I merely suggest a mental framework and some guiding principles to organize and focus your efforts.

I intend this talk to be accessible to all audiences. No prior study of logic or philosophy is assumed or required.

A Paper

Not a Student

Bioethics, History, & Philosophy of Science

University of Alabama at Birmingham

X. BIOETHICS, HISTORY, PHILOSOPHY OF SCIENCE

Bioethics-5 - How A Focus on Human Dignity Can Enhance the Clinical Encounter

Jerry Jackson¹

¹M-Power Ministries

How a Focus on Human Dignity Can Enhance the Clinical Encounter

Jerry W. Jackson, MD

Retired Volunteer Physician

M-Power Ministries

The Clinical Encounter is the point of direct contact between a clinician and a patient. It is fundamentally of ethical nature. Various types of biomedical ethical systems are considered, with ones centered around clinician virtue being shown as most important for this Encounter. A case is made that human dignity is of special importance to the Clinical Encounter and compatible with virtue-based ethical systems. A subtype of the Clinical Encounter involving patients from a marginalized societal group is described and used to emphasize how a focus on human dignity can both facilitate the clinician's awareness of the

ethical nature of the Encounter and provide guidance for the clinician's interaction with the patient, leading to better outcomes. Suggested are ways the clinician can learn about human dignity and how best to incorporate the concept of human dignity into the Encounter.

A Paper

Not a Student

Bioethics, History, & Philosophy of Science

X. BIOETHICS, HISTORY, PHILOSOPHY OF SCIENCE

Bioethics-6 - Mothers of Gynecology: Abuses of Black Women in Medical Research and The Journey to Medical Autonomy

Natalie Tidwell¹

¹Emory University

For most of America's history, consent and autonomy were privileges intentionally withheld from Black women, especially those enslaved. America's longstanding and pervasive dynamic of commoditizing Black female bodies for medical discovery and experimentation, while refusing to acknowledge their personhood as patients, persists today through a disproportionate lack of access to care, poorer treatment outcomes, and discounted autonomy as patients. Part I of this paper describes historical violations of the autonomy of Black women and the subjugation of their bodies to medical violence. Part II reports the current persisting gynecological health disparities for Black women living in America. Part III discusses current areas of improvement in medical research to remedy past failures of the research community towards Black women. Part IV finally concludes that the subjugation of Black female bodies for research in the field of gynecology is cyclical in nature and requires remedy through targeted approaches and the embrace of principles of biomedical ethics.

A Paper

Graduate Student

Bioethics, History, & Philosophy of Science

X. BIOETHICS, HISTORY, PHILOSOPHY OF SCIENCE

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All senior AAS posters will be displayed for viewing in one poster session to be held in Harris Parker Atrium from 2:00 PM – 3:30 PM. Locate the proper presentation boards with cards identifying your poster title.

I. BIOLOGICAL SCIENCES

Co-Chairs Jean-Pierre Ardit and Cecilia Johnson, presiding

18 - A Literature Review of Symbiotic Relationships Between Spiders and Other Organisms

Asel Richards^{1,2}

¹Jacksonville State University, ²Dr. Lori Tolley-Jordan

Although parasitism and predation are known forms of antagonism within the spider community, there is little understanding of other forms of symbiotic interactions between spiders and other organisms. I selected peer-reviewed scientific articles using the key words *spiders*, *commensalism*, *mutualism*, and *relationship*. Mutualism is defined as an interaction in which both parties' benefit; commensalism is defined as an interaction in which one party benefits while the other receives no benefits or harm; parasitism is defined as an interaction in which one party benefits and the other party is harmed. I evaluated research approaches (survey, nonmanipulated hypothesis field testing, manipulated laboratory testing, phylogeny, and modeling) to determine which category interactions between spiders and other organisms (plants, other spiders, fungi, insect, or other animals) fell. I also evaluated whether or not the interaction fell on a sliding scale that deviated into another form of symbiosis. I found 50 articles ranging from 1987 to 2024 and most studies are from a global perspective, including America, Europe, Asia, Africa, and Australia. Most studies (80%) used a nonmanipulated hypothesis field testing approach followed by manipulated lab testing, surveys, modeling, and phylogeny. The most common interactions studied were spider-plant interactions (40%) followed by spider-animal interactions, spider-spider and spider-insect interactions, and spider-fungi interactions. The most common type of interaction was commensalism followed by mutualism and parasitism. Nearly half (42%) of the interactions were on a sliding scale that morphed into a different type of interaction. This literature review highlights the vast array of interactions in which spiders are involved. There are research gaps in the evolutionary side of these interactions, limiting our knowledge of how these interactions originated and persisted over a timescale. Further research will help us better understand how these complex spider relationships shape the ecosystem and ecosystem processes.

A Poster
Graduate Student
Biology
Jacksonville State University

20 - PARK2 Variant of Unknown Significance Asp243Asn Bioinformatic Analysis

Jonathan Zepeda Trejo¹, Skot Rodgers¹, Jenna Ridlen¹

¹Jacksonville State University

Parkinson's is a dopaminergic condition that leaves those afflicted with debilitating motor-control issues. Commonly associated with juvenile forms of Parkinson's is parkin (PRKN/PARK2), a gene that provides instructions for making the Parkin protein, an E3 ubiquitin ligase crucial for cellular quality control, especially removing damaged mitochondria (mitophagy) and misfolded proteins. Disruption of Parkin function will lead to an accumulation of damaged proteins and mitochondria, contributing to neuronal death.

Our research project aims to analyze a missense variant of uncertain significance NM_004562.3(PRKN):c.727G>A (p.Asp243Asn). A missense variant results in the substitution of a single amino acid that may alter protein structure or function. With the assistance of genomic and protein databases, protein visualization, molecular dynamic simulation, and other bioinformatic tools, our study will characterize the location and conservation, analyze function impact, and establish biological relevance of this specific variant with the parkin protein.

A Poster

Undergraduate Student

Biology

Jacksonville State University

21 - MPL Variant F105L Bioinformatic Analysis as Relates to Pericarditis

Mikayla Williams¹, Nakeeya Foroutan¹, Jenna Ridlen¹

¹Jacksonville State University

Pericarditis is a cardiovascular disease that causes swelling and irritation of the pericardium tissue surrounding the heart. A gene associated with this condition is MPL, located at 1p34.2. The variant studied is F105L, which indicates the change of phenylalanine with a leucine. The variant identifier is NM_005373.3(MPL):c.313T>C (p.Phe105Leu). The protein associated with the MPL gene is Thrombopoietin receptor (TPO-R). MPL gene is also responsible for essential thrombocythemia and primary myelofibrosis. Bioinformatic tools, protein folding programming, multiple sequence alignment, and molecular dynamic simulation are utilized to characterize this variant and its pathogenicity.

A Poster

Undergraduate Student

Biology

Jacksonville State University

28 - Integrated Experimental and Computational Evaluation of Estrogenic Activity for Bisphenol A and Structural Analogs in a Yeast-Based Reporter Assay

Cameron Sheeler¹, [Ajinkya Gaikwad](#)¹

¹The University of Alabama at Birmingham

Bisphenol analogs are widely used as replacements for bisphenol A (BPA), yet the understanding of their estrogenic potential and mechanisms of estrogen receptor (ER) interaction remain incomplete. This study evaluated the estrogenic activity of multiple bisphenol compounds and a potential green replacement bisguaiacol-F (BGF) using a yeast-based estrogen receptor reporter assay and examined the relationship between functional activity and molecular docking predictions. BGF is a derivative of lignin, a byproduct of paper production. A genetically engineered *Saccharomyces cerevisiae* strain expressing human ER α (hER α) and an estrogen-responsive reporter was used to determine ligand-dependent hER α transcriptional activity and used to calculate EC₅₀ values relative to BPA. Several bisphenol analogs induced dose response curves in the yeast model, while BPS and BGF did not exhibit receptor activity. The rank order of estrogenicity using EC50 values is as follows:

Estrogen >> BPC > BPB = BPF > BPAF > BPA = BPE > DHBP > Benzophenone.

Molecular docking studies were performed using AutoDock Vina and LigPlot to identify potential binding affinity and interactions between bisphenol ligands and amino acid residues in the ligand-binding domain of ER α . Compounds that produced the highest levels of receptor activation in the yeast assay showed the strongest agreement between docking interactions and biological activity, whereas compounds with weaker predicted binding affinities displayed poor correlation with functional outcomes

Our findings indicate that ER computational binding predictions do not uniformly translate to transcriptional activation and underscore the importance of integrating functional assays with computational modeling. Our results also suggest that BGF is a potentially safer alternative to bisphenols. The combined use of a yeast-based ER reporter system and molecular docking provides a more comprehensive framework for evaluating the estrogenic potential of bisphenol analogs.

A Poster

Graduate Student

Biological Sciences

The University of Alabama at Birmingham

31 - Targeting FKBP_s to Regulate GSK3 β to Impact Aging

[Nunaya Polycarp](#)¹, Chase Ryan¹, Noha Ahmed¹, Gloria Benavides¹, Jianshua Zhang¹, Victor Darley-Usman¹, John Hartman¹, Melissa Harris¹

¹The University of Alabama at Birmingham

Aging is characterized by a progressive decline in cellular function, regenerative capacity, and metabolic efficiency, leading to tissue dysfunction and age-related diseases. Pharmacological interventions targeting cellular resilience pathways represent a promising approach for delaying or reversing age-associated decline. The small molecule RT175, a non-immunosuppressive immunophilin ligand, has shown potential in enhancing mitochondrial function to promote healthy aging. Using a melanoblast cell line, our results showed that RT175 induced cell growth inhibition, enhanced pigmentation, altered mitochondrial gene expression, increased mitochondrial DNA content, and inhibit GSK3 β . RT175 also promoted in vivo tissue regeneration, suggesting that RT175 exerts pro-regenerative effects by regulating gene expression program governing mitochondrial metabolism, melanogenesis, and cellular plasticity. These findings highlight RT175 as a potential therapeutic for aging-related decline.

A Poster
Graduate Student
Biology
The University of Alabama at Birmingham

32 - Comparative epigenetic aging between rhesus and Japanese macaques.

Saerimam N Markus¹, Baptiste Sadoughi², Isabelle Shinn¹, Samuel Peterson³, Amanda J Lea⁴, Samuel Ellis⁵, Lauren J N Brent⁵, Noah Snyder-Mackler², Kenneth L Chiou¹

¹Department of Biology, The University of Alabama at Birmingham, Birmingham, AL, USA,

²Center for Evolutionary Medicine, Arizona State University, Tempe, AZ, USA, ³Division of Neuroscience, Oregon National Primate Research Center, Beaverton, OR, USA, ⁴Department of Biological Sciences, Vanderbilt University, Nashville, TN, USA, ⁵Center for Research in Animal Behaviour, University of Exeter, Exeter, UK

Characterizing patterns of biological aging across species is important for comparing and contrasting environmental or evolutionary processes that regulate lifespan and age-related health. Non-human primates, particularly macaques, are valuable models for aging research because of their close evolutionary relationship to humans, well-characterized variable life histories, and robust research infrastructure. In this study, we examine both shared and species-specific patterns of epigenetic aging in Japanese macaques (*Macaca fuscata*) and rhesus macaques (*M. mulatta*) using genome-wide DNA methylation data. We analyzed DNA methylation profiles spanning the full adult lifespan in both species to estimate epigenetic age and evaluate differences in the rate of biological aging between species. We trained epigenetic clocks using elastic net penalized regression models and assessed model performance and generalizability using leave-one-out (LOOCV) and leave-one-species-out cross-validation (LOSOCV). Results showed a strong relationship between chronological age and DNA methylation age estimates in both species (LOOCV: Pearson's $r = 0.918$; $R^2 = 0.84$), with mean absolute error of 1.8 years across the age range. We are currently identifying genes and biological pathways that show both age and species-divergent patterns of epigenetic aging. Additionally, to understand evolutionary differences in epigenetic aging, we are in the process of extending this framework to include a wider variety of macaque species (including pig-tailed,

long-tailed, and Tonkean macaques). Taken together, these studies are enhancing our knowledge of how evolution and environment shape biological aging in primates, yielding novel insights into the molecular underpinnings of health and age-related disease in our lineage.

A Poster
Graduate Student
Biology
The University of Alabama at Birmingham

37 - DNA Extraction and Characterization of Plant Samples at Faulkner University

Thomas Clark III¹
¹Faulkner University

DNA barcoding is a widely used molecular approach for plant species identification, and its success depends strongly on DNA quality and barcode selection. This study evaluated DNA extraction and purification procedures from 20 randomly selected plant species collected on the campus of Faulkner University as a preliminary step toward developing a local DNA barcode reference library. Leaf samples were identified using publicly available plant databases and processed using a modified InstaGene™ Matrix extraction protocol. DNA concentration and purity were measured by spectrophotometry, and high-quality samples were selected for PCR amplification using the *rbcL* locus. All samples produced measurable DNA, with concentrations ranging from low to extremely high values. However, DNA purity varied widely, and most samples exhibited A260/A280 ratios below the optimal value. Statistical analyses showed that while some differences in DNA concentration occurred among plant families, most variation was species-specific rather than associated with broader plant traits. These findings demonstrate that although simple extraction methods can yield large quantities of plant DNA, additional purification is necessary for successful DNA barcoding. The study highlights the challenges of working with diverse plant tissues and provides a foundation for refining extraction protocols and developing a campus-specific DNA barcode database.

A Poster
Undergraduate Student
Biological Sciences
Faulkner University

41 - Functional Trait Responses to Simulated Warming in a Southeastern Prairie

Claudia Williams¹, Tenzing Ingty¹, Kayla Shands¹, Summer Zamora¹
¹Jacksonville State University

Southeastern prairies are highly biodiverse yet understudied ecosystems. Climate change poses a major threat to biodiversity, with rising global temperatures expected to alter ecosystem

structure and function. This study investigates how simulated warming affects plant functional traits and productivity in southeastern prairie communities. We used open-top chambers (OTCs) to simulate future climate conditions and measured key functional traits—including specific leaf area (SLA), biomass (above- and belowground net primary productivity (ANPP, BNPP), pubescence density, and stomatal density. SLA, calculated as leaf surface area divided by leaf dry mass, provides an index of leaf thickness and potential photosynthetic productivity and was measured across a suite of prairie species, including *Rudbeckia hirta*, *Acalypha* sp., *Plantago* sp., *Diodia* sp., and *Lespedeza* sp., while pubescence and stomatal density were measured for *Rudbeckia hirta* only.

Warming significantly increased stomatal density across all leaf sections of *R. hirta*, from 8.1-8.8 stomata/mm² in controls to 14.1-14.5 stomata/mm² in OTC leaves, raising total leaf density from 25.7 to 42.9 stomata/mm². Leaf pubescence density also increased substantially under warming, with total hairs per leaf rising from 562 to 1084. While total NPP decreased under OTC conditions (1082 vs. 1619 g m⁻²), ANPP and BNPP differences were not statistically significant, suggesting warming may shift carbon allocation between above- and belowground components.

Simulated warming produced species-specific responses in leaf morphology. Native species (*R. hirta* and *Acalypha* sp.) showed reductions in leaf surface area, consistent with a heat-avoidance strategy to reduce radiant heat absorption and water loss. By contrast, non-native species (*Plantago* sp., *Diodia* sp., *Lespedeza* sp.) showed increases or trends toward larger leaf surface area and significant increases in SLA, indicating thinner leaves that may enhance evaporative cooling or faster growth under warming. These patterns suggest that non-native species may exhibit greater flexibility in adjusting leaf traits under warming, whereas native species rely more on morphological constraints such as smaller, thicker leaves. Overall, functional trait shifts in *R. hirta* and differential responses in SLA across species indicate that warming may alter leaf morphology, growth strategies, and potentially community composition, with implications for ecosystem structure, function, and resilience in southeastern prairies.

A Poster
Graduate Student
Biology
Jacksonville State University

46 - Variation in chromatin accessibility between populations of *Crotalus atrox* under different precipitation patterns

Bryan Holmes¹, Austin Bidby¹, Greer Dolby¹

¹Department of Biology, The University of Alabama at Birmingham

The molecular mechanisms underlying changes in phenotype are paramount to understanding how species can persist in resource-limited environments. While gene expression is the foundation of building a phenotype, characterizing environment-driven changes to chromatin accessibility is understudied, particularly in the context of lineage divergence. Chromatin is the packaged DNA inside the nucleus, and changes to its three-dimensional structure impacts

DNA's accessibility to be transcribed. Chromatin configuration has a complementary role to epigenetic modifications (e.g., methylation) for how an organism responds to environmental changes. In this study, we are quantifying chromatin accessibility via ATAC-Sequencing with skin samples collected from *Crotalus atrox* populations in the Sonoran Desert across three seasons. We collected samples from two populations that experience similar seasonal conditions except for late summer, when the eastern population experiences monsoon-sourced rainfall and the western population experiences continued drought. Using standard bioinformatic methods, we will statistically analyze differences in chromatin accessibility between populations and time points, comparing these with gene expression data. We expect to see changes in chromatin accessibility in regions with genes related to water balance, including those involved in dermal and lipid processes. We predict to see more differentially accessible chromatin regions during the late-summer time point, coinciding with an uptick in resource availability in the eastern population and resource paucity in the western population. Results from this study will reveal if changes in chromatin accessibility contribute to drought-tolerant phenotypes between two climatically distinct populations of a panmictic snake in the Sonoran Desert.

A Poster
Graduate Student
Biology
The University of Alabama at Birmingham

55 - A Mark-Recapture study of Freshwater Turtle Populations in Mullis Pond, Troy University Arboretum.

Elijah Ward¹, Alvin Diamond¹
¹Troy University

We conducted a mark-recapture survey of freshwater turtles in Mullis Pond, an isolated urban pond located on the campus of Troy University in Pike County, Alabama, as part of a long-term population monitoring program. Mullis Pond is a 1-ha man-made impoundment constructed in the 1950s that is spring-fed, receives substantial urban runoff, and drains into an unnamed tributary of Walnut Creek, the westernmost tributary in the upper Pea-Choctawhatchee River drainage, adjacent to the Conecuh River watershed. Sampling occurred from April 2024 through December 2025 and employed baited funnel traps (cat food, sardines, or peanut butter) in conjunction with basking traps. To date, 56 unique individuals representing four species have been documented. Captures included 44 pond sliders (*Trachemys scripta*), three common musk turtles (*Sternotherus odoratus*), five eastern mud turtles (*Kinosternon subrubrum*), and four common snapping turtles (*Chelydra serpentina*). The primary objectives of this study are to quantify the resident turtle population within Mullis Pond and to document temporal patterns of immigration into this isolated urban system.

A Poster
Undergraduate Student
Biological and Environmental Sciences
Troy University

56 - Influence of Dietary Composition on the Overall Health of the Water Flea, *Daphnia pulex*

Yuna Kim¹, Rebecca Iglesias¹, Gus Roveri¹, Michelle Zheng¹, Katie Gibbs, Ph.D.¹

¹The University of Alabama at Birmingham

Daphnia pulex is a freshwater crustacean widely used as a model organism due to its short lifespan and ease of laboratory maintenance. This study examined how two diets, live green algae (*Raphidocelis subcapitata*, GA) and a commercial Shellfish Diet (SD), influence life-history traits. Four clonal brood lines were maintained in COMBO medium, yielding 24 individuals per diet group housed individually under standardized conditions. GA-fed individuals received 1 mL of live GA every other day and 2 mL on weekends, while SD-fed individuals received SD diluted 1:100 in COMBO medium, with 0.5 mL provided at each feeding. Long-term survival differed between diet groups. GA-fed *D. pulex* exhibited a median lifespan of 38 days, whereas SD-fed individuals showed an extended median lifespan of 74.5 days. Growth patterns also varied with diet. At week 5, GA-fed individuals averaged 3.06 ± 0.15 mm in body length and reached a maximum mean size of 3.12 ± 0.10 mm at week 6. In contrast, SD-fed individuals averaged 2.64 ± 0.08 mm at week 5 and reached 2.95 ± 0.07 mm near their median lifespan at week 10. Reproductive investment also differed, with GA-fed individuals producing larger mean clutch sizes (11 ± 3.53 neonates) but fewer total clutches (12 ± 6.79), while SD-fed individuals produced smaller clutches (8 ± 1.52) but a greater total clutch (20 ± 7.16). These results indicate that diet drives distinct life-history strategies in *D. pulex*, with GA promoting rapid growth and higher per-clutch investment and SD supporting increased longevity and sustained reproduction.

A Poster
Undergraduate Student
Biological Sciences
The University of Alabama at Birmingham

59 - Characterizing Microbial Communities in Wastewater Biosolids for Antibiotic Resistance

Sydney Smith¹, Kevin Drace¹

¹Samford University

Biosolids (treated sewage sludge) are commonly applied to agricultural land as fertilizer due to their nutrient content. While biosolids can benefit soil by adding nutrients and organic matter, they may also contain contaminants including heavy metals, pesticides, and bacteria carrying antibiotic resistance genes. Understanding the microbial communities in biosolids is important for assessing potential environmental and health risks. We are characterizing the microbial communities in treated biosolids from Valley Creek Water Reclamation Facility and in soil from a nearby land application site using culture-based resistance profiling and metagenomic sequencing. We are currently analyzing the data to compare microbial community composition

between biosolids and land-applied soil, and to identify potential antibiotic resistance genes. This work will help determine whether land application significantly alters soil microbial communities and whether antibiotic resistant bacteria persist after biosolids are applied to land. Understanding these microbial communities can inform wastewater treatment facilities about the safety of current biosolid management practices.

A Poster
Undergraduate Student
Biological Sciences
Samford University

62 - Attempts to Cultivate Sulfur-Oxidizing Bacteria from Blount Springs Biofilm

James Michael Mellinger¹, Kevin Drace¹
¹Samford University

In Blount Springs, Alabama, dense white biofilms form along sulfur-rich groundwater springs. Previous 16S rRNA gene analysis showed these biofilms are dominated by *Sulfurovum*, a sulfur-oxidizing bacterium. We attempted to isolate and culture *Sulfurovum* from these biofilms to study its growth characteristics and metabolic activity. Biofilm samples were collected from the spring and plated on agar media prepared with spring water. Plates were incubated under both aerobic and microaerophilic conditions at room temperature to determine optimal growth conditions. We also established liquid cultures using reduced-sulfur substrates. Aerobic plates showed diverse microbial growth, but microaerophilic plates produced minimal colonies despite microaerophilic conditions being expected to favor *Sulfurovum*. Most importantly, none of our cultures formed the long filamentous structures seen in the biofilms, even when plated directly from biofilm samples. Microscopic examination showed that isolated colonies looked different from the natural filament structure. These results may suggest the biofilm structure requires interactions between multiple bacterial species rather than *Sulfurovum* growing alone or more appropriate growth conditions. Ongoing work includes incubating growth media directly in the spring and attempting to combine different bacterial isolates to recreate the filamentous biofilm structure.

A Poster
Undergraduate Student
Biological and Environmental Sciences
Samford University

63 - Effects of Trace Elements in Culture Medium for Daphnia Rearing

Michelle Zheng¹, Yuna Kim¹, Rebecca Iglesias¹, Gus Roveri¹, Victoria K. Gibbs, Ph.D.¹
¹The University of Alabama at Birmingham

Daphnia, a genus of freshwater crustacean, is highly sensitive to environmental changes and pollutants. They have a relatively short lifespan and typically reproduce via parthenogenesis,

making them great models for genetic and aging studies. When rearing *Daphnia*, the culture medium is vital; thus, a synthetic medium that mimics natural sources is necessary. The Environmental Protection Agency in the United States recommends reconstituted moderately hard freshwater (EPA medium) for *Daphnia pulex* studies. COMBO medium contains various trace elements that support both algae and *Daphnia* growth. If trace elements within COMBO are essential for the growth and reproduction of *Daphnia*, we predict that body size, reproduction, and lifespan will be better supported for *Daphnia* held in COMBO medium. In this study, twelve individuals were isolated from four clonal lines (n=48), with six of each clonal line reared in EPA medium and COMBO medium. Both groups were fed three days a week with green algae, *Raphidocelis subcapitata*. Survival and reproduction were assessed daily, with weekly length measurements. No significant differences were observed for median lifespan (36.5 days in COMBO and 35.5 days in EPA medium), or average body size at median age (3.09 ± 0.12 mm COMBO and 3.10 ± 0.16 mm EPA medium; mean \pm SD). The average total offspring produced by an individual in COMBO was 160 ± 92 and only 99 ± 73 in EPA medium. These findings suggest that trace elements within COMBO may not support increased growth or lifespan but do increase reproduction in *D. pulex*.

A Poster
Undergraduate Student
Biological Sciences
The University of Alabama at Birmingham

72 - Effects of a gentle sleep deprivation protocol on motor function and activity levels in *Drosophila melanogaster*

Vivian Crump¹, Jaxon Dildine¹, Hensley Elrod¹, Jordyn Partain¹, Alyssa Tarpley¹, Katelynn Corder¹

¹Samford University

Sleep is an essential process for the execution of cognitive functions in many organisms. The fruit fly, *Drosophila melanogaster*, has been used as a model organism for studying the effects of sleep loss. In *Drosophila*, insufficient sleep has been shown to impair activity levels, learning, and memory similar to other organisms, including humans. This study utilized a gentle sleep deprivation protocol aimed to observe the effect of sleep deprivation on motor function and the amount of time required for normal circadian activity levels to resume.

A Poster
Not a Student
Biological and Environmental Sciences
Samford University

77 - The Turning Logger

Scotland C Cooper¹, Dhananjay Tambe^{2,3}

¹Student, ²Associate Professor, ³Research Mentor

Hospital-acquired pressure injuries (HAPIs) remain among the most common preventable adverse events in inpatient care, affecting approximately 2.5 million patients annually and contributing to significant morbidity, mortality, and economic burden. Although systematic patient repositioning every 3-4 hours has been shown to significantly reduce HAPI incidence, adherence to repositioning protocols is inconsistent, largely due to reliance on manual documentation and workflow constraints. To address this gap, this project proposes the development of a low-cost, automated patient-turning monitoring system - the Turning Logger - that integrates low-resolution thermal imaging with dual-point distance sensing to detect patient orientation and elapsed time in each position while preserving patient anonymity.

The system processes combined thermal and distance data to differentiate turning events from non-turning movement and generate automated alerts when repositioning thresholds are exceeded. Design requirements were established in collaboration with clinical geriatrics leadership and translated into functional objectives and constraints. Multiple conceptual designs were evaluated, with ongoing validation focused on minimizing false positives and missed turning events. Upon achieving >95% detection accuracy, the system will undergo pilot testing in a hospital setting pending IRB approval.

Anticipated outcomes include improved adherence to repositioning protocols, reduced documentation burden for care staff, and decreased incidence of HAPIs. Because the system relies on inexpensive components and minimal computational resources, it is designed for scalability across diverse care environments, including low-resource and high-burden settings. This work advances a clinically grounded, resource-efficient approach to automated patient monitoring with the potential to improve patient safety and reduce preventable harm.

A Poster

Undergraduate Student

Biomedical Engineering

The University of South Alabama

78 - Both Private and Public Lands Provide Important Habitat to Belize's Big Cat and Mammal Populations

Hannah Sanavi¹, Andrew Coleman¹, Kayla Windelspecht², Michael Windelspecht²

¹Samford University, ²Inspire Edventures

The importance of not only large tracts of preserved lands but also adjacent private lands has been stressed in the conservation of species, especially those with extensive home ranges, such as the jaguar (*Panthera onca*). Migratory corridors have also been shown to be critical in providing necessary habitat, and these corridors can be made up of both public and private lands. Wildlife cameras have become widely used tools to document and monitor wildlife populations, and this technology was incorporated to study Belize's big cat species (jaguar, puma, ocelot, jaguarundi, and margay) as well as other mammal populations on various sites in central Belize. Two of the study sites were part of parks and preserves, whereas one study site

was privately owned. Four of the five big cat species were documented on at least one study site, and several potential prey species (collared peccary, agouti, paca, armadillos) were also documented at the study sites. Catch per unit effort (# of individuals per trap night) was calculated for each species and compared across sites. Overall, both private and public lands studied in Central Belize showed the capability of supporting these important species.

A Poster

Undergraduate Student

Biological and Environmental Sciences

Samford University

82 - Preliminary Study on Transformation of a *Trichoderma* species L-Asparaginase Gene in Strains of *Pichia pastoris*

Sarmila Yesmin¹, Oanh Nguyen¹, Laken Kay¹, Benedict Okeke*¹

¹Auburn University at Montgomery

L-asparaginase catalyzes the conversion of the amino acid L-asparagine to L-aspartate and ammonia. L-asparaginase can be found in living organisms including animals, plants, and microorganisms. However, microorganisms are the major industrial sources of L-asparaginase. One of the notable uses of L-asparaginase is in the treatment of Acute Lymphoblastic Leukemia (ALL). It helps treat ALL by breaking down the amino acid asparagine, depriving ALL cancer cells of L-asparagine. In the food industry it is also used to reduce acrylamide formation during baking and frying of carbohydrate foods. While L-asparaginase is used to treat ALL, there are negative side effects including hypersensitivity. This has necessitated more research on L-asparaginases. This work focused on transformation of putative L-asparaginase genes from *Trichoderma* SG2 in strains of *Pichia pastoris* for potential expression. *Trichoderma* species SG2 produced L-asparaginase in liquid and solid medium. Putative L-asparaginase genes were identified from the genome of *Trichoderma* species SG2. The genes were synthesized and ligated onto an expression plasmid (pPICZαA). The plasmid construct carrying each gene was first subjected to digestion using two restriction enzymes Sac1 and Pme1 to linearize it and then transformed into *Pichia pastoris* strains. Transformants resistant to zeocin, the antibiotic marker on the plasmid construct, were isolated. Further studies include evaluation of potential expression of L-asparaginase genes in liquid and solid media by the isolated zeocin resistant *Pichia pastoris* transformants and biochemical characterization.

A Poster

Not a Student

Biological and Environmental Sciences

Auburn University in Montgomery

BIOLpaper-2 - A Fourfold Male-Specific Lifespan Extension via Canonical Insulin/IGF-1 Signaling

Michael Russell¹, Michelle Lin¹, Evan Toler¹, Tate Lasher¹

¹The University of Alabama at Birmingham

The insulin/IGF-1 signaling (IIS) pathway is an evolutionary conserved regulator of longevity, and its modulation is a hallmark of aging research. The 1993 ground-breaking report of a *daf-2* mutation (e1370) that reduced IIS and doubled *C. elegans* lifespan in hermaphrodite worms paved the way for molecular approaches to modulating aging. However, the impact of that mutation on the male sex has remained largely unstudied. Here we report that the same mutation extends male lifespan by a staggering fourfold, to over 110 days. This extreme longevity is coupled with a dramatic extension of healthspan as well, characterized by the robust maintenance of youthful morphology and preserved metabolic homeostasis deep into old age. These findings establish sex not as a secondary variable but as a primary determinant of longevity potential, capable of amplifying the output of a core aging pathway to an astonishing degree. This work provides a powerful new tool for dissecting the interplay between sex and aging and suggests that sex-specific interventions may be critical for developing future anti-aging therapeutics.

A Poster

Graduate Student

Biology

The University of Alabama at Birmingham

BIOLposter-2 - Newly Documented Tori in Two Species of Thymelaeaceae

Roland Dute¹, Curtis Hansen¹

¹Auburn University

Torus-bearing pit membranes are structures that control water flow from one tracheary element to another. These structures are commonly found in gymnosperms but are rare in angiosperms. We describe for the first time two species of Thymelaeaceae, *Gnidia nodiflora* and *Lachnaea grandiflora*, as having torus-bearing pit membranes.

A Poster

Not a Student

Biological Sciences

Auburn University

BIOLposter-3 - Investigation of the antiproliferative effects of hydroxytyrosol on the expression of Proteinase Inhibitor 9 and Granzyme B in breast cancer cell types

Madison Peters¹, Stephen Azar¹, Lizabeth Jacome¹, McKenna Ware¹, Padmamalini Thulasiraman¹

¹The University of South Alabama

Hydroxytyrosol (HT), a simple phenol abundant in olive oil, is recognized for its antioxidant, anti-inflammatory, and anti-cancer properties. Evidence suggests that HT plays a notable role in triggering immune responses, specifically through mechanisms that induce apoptosis. Proteinase Inhibitor 9 (PI-9) affects the ability of immune cells to kill cancer cells, and as a result, it is associated with poor prognosis in carcinomas. PI-9 targets Granzyme B (GrB) released by cytotoxic cells and protects cells from apoptosis. In this project, we studied the antiproliferative effects of HT in Estrogen Receptor-Positive (ER+) and Estrogen Receptor-Negative (ER-) mammary carcinoma cells. We also examined whether HT regulates PI-9 and GrB in these cells. Our results demonstrated the suppression of cell growth in the three breast cancer cell lines. Findings also indicate that HT exposure suppressed PI-9 protein levels in ER+ MCF-7 and T47D cell lines, yet triggered GrB upregulation exclusively within the T47D cells. In ER-MDA-MB-453 cells, we observed that HT suppressed the protein expression of PI-9 and did not alter the expression of GrB. These results show that HT modulates PI-9 in all the three mammary carcinoma cells, however the regulatory effects of GrB by HT is not universal among breast cancer models. Subsequent studies will explore the potential of fine-tuning PI-9 and GrB expression as a strategy to augment immune-targeted cytotoxicity in diverse breast cancer phenotypes.

A Poster
Undergraduate Student
Biological Sciences
The University of South Alabama

BIOLposter-4 - A Fourfold Male-Specific Lifespan Extension via Canonical Insulin/IGF-1 Signaling

Michael Russell¹, Michelle Lin¹

¹The University of Alabama at Birmingham

The insulin/IGF-1 signaling (IIS) pathway is an evolutionary conserved regulator of longevity, and its modulation is a hallmark of aging research. The 1993 ground-breaking report of a *daf-2* mutation (e1370) that reduced IIS and doubled *C. elegans* lifespan in hermaphrodite worms paved the way for molecular approaches to modulating aging. However, the impact of that mutation on the male sex has remained largely unstudied. Here we report that the same mutation extends male lifespan by a staggering fourfold, to over 110 days. This extreme longevity is coupled with a dramatic extension of healthspan as well, characterized by the robust maintenance of youthful morphology and preserved metabolic homeostasis deep into old age.

These findings establish sex not as a secondary variable but as a primary determinant of longevity potential, capable of amplifying the output of a core aging pathway to an astonishing degree. This work provides a powerful new tool for dissecting the interplay between sex and aging and suggests that sex-specific interventions may be critical for developing future anti-aging therapeutics.

A Poster
Graduate Student
Biological Sciences
The University of Alabama at Birmingham

BIOPoster-1 - Role of Calcium Sensitive RabGAPs in Endocytic Trafficking Pathway

Amelia Herron¹

¹senior undergraduate research assistant

Rab GTPases are master regulators of endocytic and secretory pathways. The activity of Rab GTPases is tightly regulated cascade depends on guanine nucleotide exchange factors (GEFs) and GTPase-activating proteins (GAPs). Rab GAPs facilitate Rab dissociation from membranes, ensuring proper boundaries and transition of different membrane compartments during trafficking. Dysregulation of Rab-GAP activity has been shown to disrupt the Rab-cascades and cause impairment of endocytic and secretory pathways. A fundamental yet unresolved question is how the precise spatial and temporal activation of Rab GAPs is regulated. In this study, we identified a novel RabGAP, namely TBC1D9B, which contains an EF-hand calcium-sensing domain. Of note, calcium flux, regulated by calcium channels, has been implicated in various membrane trafficking pathways, including endocytosis, exocytosis, and endolysosomal fusion. To evaluate whether TBC1D9B functions as a bona fide Rab10 GAP and whether its GAP activity is dependent on Ca^{2+} , we performed a GTP hydrolysis assay using purified recombinant TBC1D9B and Rab10 proteins. Our findings demonstrated that TBC1D9B exhibited robust GAP activity toward Rab10 only in the presence of calcium. Additional immunofluorescence staining suggests that TBC1D9B is primarily localized on endolysosomes in neurons and macrophages, indicating that TBC1D9 may sense calcium signal on these subcellular organelles to control downstream Rabs. Importantly, EF-hand-containing Rab GAPs are implicated in diseases such as nephrotic syndrome, breast cancer, and Alzheimer's disease, underscoring the broad disease-relevance of these pathways. This research could shed light on how dysregulation of calcium-dependent GAP activity contributes to the pathogenesis of a variety of diseases.

A Poster
Undergraduate Student
The University of Alabama at Birmingham

II. CHEMISTRY

Chair Sharifah Albraiki, presiding

33 - The research of Urea influence on growth of plants

shalong hu¹, Mashburn Steven², Tedd Sabir²

¹Student, ²Professor

This is research between Fertilizer and Urea influence on green onions and lettuce, this research record the stem diameter and plant length, leaves number, the color to show the difference,

A Poster

Undergraduate Student

Chemistry

Faulkner University

40 - Chemical Depolymerization of Polyethylene Terephthalate (PET) Using Multifunctional Alcohol Pentaerythritol

Tatum Owen¹, Michael Enayati¹, Bahareh Mirmashhour¹

¹Troy University

Polyethylene terephthalate (PET) is one of the most commonly used synthetic polymers, but the polymer runs into sustainability obstacles due to a high reprocessing temperature that causes thermal degradation and chain scission. This project explores the chemical depolymerization of PET by use of the multi-functional alcohol pentaerythritol (PE) to produce an oligomeric mono-pentaerythritol ester (mono-PEE) as a sustainable approach of using PET waste to produce a material with new applications. To do this, PET alcoholysis reactions were performed in a high-pressure reactor at 200°C with zinc acetate as a catalyst, and PET:PE molar ratios of 1:1, 1:2, and 1:4. Intrinsic viscosity (IV) measurements showed significant decreases in chain length and molecular weight as PE concentration was increased, indicating an inverse relationship between the two. Mono-PEE exhibited an average chain length of ~18-23 repeat units. Other structural analysis including ¹H-NMR, ¹³C-NMR, and FTIR spectroscopy were employed to characterize the product(s). These methods confirmed ester formation, aromatic PET repeating units, hydroxyl presence, and oxygen-bonded methylene groups, all of which are consistent with the proposed mono-PEE structure. The findings of this project indicate that PE loading can be used to control the depolymerization of PET and induce oligomers of a desired length. The produced mono-PEE shows possible uses as a precursor for PET-derived chain extenders or as an asphalt and adhesive additive, presenting a pathway toward more sustainable PET recycling methods.

A Poster

Undergraduate Student

Chemistry

Troy University

48 - The study of carbamide and fertilizer influence on the growth of plants

shalong hu¹, Therdore Sabir², Steven Mashburn^{3,4}

¹student, ²Principal investigator, ³director, ⁴professor

A study that compares the 0.5g/L urea and 2.0g/L urea with fertilizer influence on the scallion and lettuce. The research lasted for 1 month, and the length, stem diameter and leaves numbers are recorded for the research.

A Poster
Undergraduate Student
Chemistry
Faulkner University

85 - Correlation Between Structural Differences of Wildtype and Mutant miR-133 on Dicer Processing

Elaina Seal¹, Derrick Watkins¹

¹Athens State University

miRNAs are 22 nucleotide RNAs that play an important role in the regulation of protein synthesis. Mature miRNAs, function by binding to a specific mRNA through complimentary base paring to the target mRNA and preventing translation of the mRNA, must be trimmed from their original transcript in two steps. The second step of the processing in which the pre-miRNA is trimmed from a ~75 nt single stranded hairpin to the double stranded duplex 22 nt duplex by the RNase enzyme Dicer. Mutations in a miRNA sequence have been linked to disease, and the mutation 79T>C in miR-133 are associated with familial atrial fibrillation. In this study, we look to correlate the differences between the wildtype and mutant version of miR-133's thermal stability with processing by DICER using molecular dynamic (MD) simulations. In this work, simulations of the wildtype and variant mi-RNA were studied in the absence and in the presence of DICER for a period of 20 ns. Analysis of the data from the MD simulation indicates variation in the RMSD of the 5' and 3' end between the wildtype and mutant forms of the miR-133 in proximity to the mutation. Based on this data, we conclude that mutation 79T>C disrupts the base pairing between the first nucleotide of the 5' end and allows this nucleotide greater freedom of movement compared to the wildtype. The greater movement of the mutant version of the miR-133 could more easily be positioned into the proper cleavage state by DICER and result in a more efficient cleavage of the miRNA and therefore, an increase in the regulation of the target mRNA by the mutant miR-133.

A Poster
Undergraduate Student
Math, Computer, and Natural Science
Athens State University

86 - Significant Conformational Changes Required by mutant miRNA-142 to Conform to the Dicer Bound State Compared to Wild-Type

Derrick Watkins¹, [Jordan Doucet](#)¹

¹Athens State University

The function of miRNA is to regulate the production of proteins by silencing a mRNA's code to inhibit the production of proteins. Dicer is a protein that processes a ~78-nucleotide strand of pre-miRNA cleaving it down to a single stranded mature miRNA that is 22 nucleotides in length. A mutation in a miRNA can lead to disease by contributing to an upregulation of a downregulation of a protein if it forms a silencing complex more often or less efficiently. We hypothesized that a mutation in the miRNA will cause a structural difference in the mutant miRNA that could alter the processing of the pre-miRNA by Dicer. This study investigates the 54G>A mutation of miRNA-142. This mutation occurs in the stem region of miR-142 in close proximity to one of the catalytic sites of the Dicer protein and disrupts the base pairing of the nucleotide in the stem of miR-142. We used molecular dynamic simulation studies to determine the change in the RMSD of the backbone atoms of the pre-miRNA in the Dicer bound and the Dicer unbound miR-142 state of both the wildtype and mutant forms of miR-142. From these studies we observed the average structure of the wildtype unbound miR-142 more closely aligns with backbone of the miRNA in the Dicer bound state than the mutant miR-142. We conclude that mutant miR-142 would require a greater conformational change to conform to the dicing state than would the wild-type miRNA-142. Therefore, the mutant miRNA-142 will potentially require more energy to reach the dicing state and a reduced number of mature 22 nt miR-142.

A Poster

Undergraduate Student

Math, Computer, and Natural Science

Athens State University

CHEM-1 - Sustainable Hemp-Hurd Reinforced Acrylamide-Acrylic Acid Hydrogels as Biodegradable Dental Wedges

[Timberly Shyann Golden](#)¹, Aboulfazl Barati²

¹Department of Biological and Environmental Sciences, ²Department of Chemistry and Physics

Dental wedges are commonly manufactured from plastic or wood, materials that are either non-biodegradable or prone to inconsistent mechanical performance and moisture sensitivity. In this study, a sustainable hydrogel-based alternative for dental wedge applications was developed using an acrylamide-acrylic acid polymer network reinforced with hemp hurd as a bio-based filler. The hydrogel was synthesized via free-radical polymerization, incorporating varying hemp hurd loadings (up to 20 wt% based on the total mass) to evaluate their influence on swelling behavior, mechanical integrity, and dimensional stability under moist conditions relevant to dental procedures. Acrylic acid provided hydrophilicity and ionic functionality, while acrylamide contributed to structural strength and elasticity. The incorporation of hemp hurd significantly enhanced the compressive resistance and reduced excessive swelling compared to the neat

hydrogel (250% reduction), while maintaining sufficient flexibility for interdental placement. These results demonstrate that hemp-hurd reinforced hydrogels offer a promising biodegradable and renewable alternative to conventional dental wedges, combining sustainability with functional performance suitable for clinical use.

A Poster
Undergraduate Student
Biomedical Engineering
Troy University

III. PHYSICS AND MATHEMATICS

Chair Padma Guggilla, presiding

19 - Investigation on Formation and Decay of Heavy Baryonic Particles based on the Newly Developed Two-Flavor Multi-Excitation Model of Quarks

Hannah Sukarloo¹, Tianxi Zhang¹
¹Alabama A&M University

Based on the newly developed two-flavor multi-excitation quark model, matter in the universe is made up by only two building blocks or quarks with only two flavors, denoted by up and down quarks as done in the standard model of particle physics. Consisting of the three fundamental elements (mass, electric charge, and color charge), a quark gets to be excited and decayed, caused by the quark internal interactions among the three fundamental elements, especially the weak interaction between electric and color charges. A combination of two quarks, in which one is antiquark, at different states from the ground to excited ones, forms various mesons when a quark-antiquark annihilation does not occur and forms leptons or bosons when their masses, electric charges, and/or color charges are annihilated. Baryons are formed from combinations of three quarks. Recently, four-quark mesons (called tetraquarks) and five-quark exotic baryons (called pentaquarks) are also observed. Protons are the lightest and most stable baryons and all heavy baryons, once produced, quickly decay into lighter ones towards the most stable ones, protons, with emissions of leptons and gamma rays. This study examines formations and decays of heavy baryons including Lambdas, Sigmas, Xis, and Omegas and their fine structures of Feynman diagrams based on the two-flavor multi-excitation quark model to reveal how various decay modes of these heavy baryons occur and process via quark-antiquark pair emissions and annihilations. In this poster presentation, we will present new results obtained from our recent studies, supported by NSF HBCU-UP Research Initiation Award (#2400021).

A Poster
Graduate Student
Physics
Alabama A&M University

34 - A Geant4-based Model of Cesium Hafnium Chloride-based Scintillator Detectors

Nicholas Glenn¹, Jonathan Lassiter¹, Amari Williams¹, Stephen Babalola¹

¹Alabama A&M University

Cesium Hafnium Chloride (CHC) is a novel scintillator detector material, which demonstrates promising performance at a radiation detector with a demonstrated high light yield, and high detector resolution, comparable to benchmark scintillators, while also having low moisture sensitivity. In this effort, computational approaches were applied to the development of models of CHC-based scintillator detectors and devices, utilizing Geant4. Through a modeling and simulation approach, time and monetary resources can be defrayed with such systems while simultaneously verifying an experimental gamma response system against this robust *Monte Carlo* model-based benchmark. Such an approach expedites down-selection of detector configurations and material stoichiometry, while providing more reliable performance metrics, along with an improved iteration and throughput of materials fabrication and device engineering. Through this approach, a proper model to elucidate the performance of detector materials is demonstrated. The first phase of this effort shows ¹³⁷Cs decay product, a 662 keV photon, interacting with a CHC crystal. The modeled gamma spectrum, along with a photopeak, is generated as the output, against which CHC experiments are to be compared. Future research will include higher granularity models by including electric fields, and photopeak broadening.

A Poster

Not a Student

Physics, Chemistry, and Mathematics

Alabama A&M University

36 - XPS studies of Novel Scintillator Cesium Hafnium Chloride

Jonathan Lassiter¹, Nick Glenn², Claudiu Muntele¹, Oluseyi Babalola¹, Amari Williams³

¹Mentor, ²partner, ³Presenter

This study examines the surface chemistry, stoichiometry, and electronic states of the novel scintillator cesium hafnium chloride (CHC). As a novel scintillator detector material, CHC demonstrates promising performance across many figures of merit. Among these, there is a high demonstrated light yield, a high detector resolution comparable to benchmark scintillators, as well as the advantage of low moisture sensitivity, unlike many scintillators. To verify the growth quality of these crystals, and to reconcile any shortfalls in performance, X-ray photoelectron spectroscopy (XPS) was utilized as a primary characterization technique. XPS functions as a non-destructive, spectroscopy technique that makes use of low-energy X-ray irradiation to eject electrons via the photoelectric effect, which are then measured and are input into a spectrum. XPS has been widely used to characterize an array of materials such as elements and compounds, to provide meaningful information about surface-mediated processes.

The utility of characterizing electronic states is in determination of oxidation, local bonding and coordination, charge transfer, band alignment/offset, and density of occupied states. Specific to

CHC, this means of characterization demonstrates promise in elucidating the points of failure due to surface quality. In addition to appraising the quality of crystal growth material degradation, and the presence of contaminants in the growth process, these features are correlated with any shortfalls to performance figures of merit such as light yield, detector resolution, and material stability.

The scintillator due to its radiation-to-light conversion process is strongly influenced by variety of material properties with surface chemistry, stoichiometry, and electronic states all playing crucial roles because xps is normally used to analyze the outermost 1-10 nm of a material which is especially relevant for scintillator crystals where it will be used to help mitigate the impurities. The resulting spectra will be presented on a plot that shows binding energy on the x-axis with measured photoelectron counts on the Y-axis. These spectra provide comprehensive information about the elemental composition of material surfaces, the relative abundances of these components on surfaces (semi-quantitative analysis), and the chemical state of polyvalent ions by measuring the binding energies of elements, which is related to the nature and strength of their chemical bonds.

CHC is a novel scintillator detector material, which demonstrates promising performance due to many attributes. Among these characteristics of interest are a high demonstrated light yield (~30,000), a high detector resolution comparable to benchmark scintillators (~3.0-3.5%), while also having low moisture sensitivity. Additionally, CHC does not require dopants to operate within these parameters, making it of especial interest. To effectively grow CHC-based, a novel scintillator-based radiation detector, it is crucial to know the elemental and compound composition of the sample. This is critical to optimize the growth process for

A Poster
Graduate Student
Physics
Alabama A&M University

80 - Phonon-Driven Dielectric Tuning in $\text{Cs}_2\text{Hf}_x\text{Zr}_{1-x}\text{Cl}_6$ Alloys

Elijah Adedeji¹, Jingsong Huang², Eva Zarkadoula², Stephen Babalola¹

¹Department of Physics, Alabama A&M University, 4900 Meridian St. N., Normal, AL 35810,

²Centre for Nanophase Materials Sciences, Oak Ridge National Laboratory, Oak Ridge, TN 37831

We investigate how lattice vibrations influence the dielectric behavior of halide double perovskites $\text{Cs}_2\text{Hf}_x\text{Zr}_{1-x}\text{Cl}_6$ using first-principles calculations. Through phonon dispersion and frequency-dependent dielectric analysis, we uncover that while electronic contributions remain steady, ionic dielectric response increases with Zr content—reflecting the softer, more polarizable Zr-Cl bonds. This phonon-driven dielectric tuning enables smooth modulation of dielectric strength across the alloy series. The $x = 0.5$ composition exhibits intermediate behavior, balancing vibrational softness and structural stability. Our study reveals how subtle vibrational dynamics in $\text{Cs}_2\text{Hf}_x\text{Zr}_{1-x}\text{Cl}_6$ can be harnessed to enhance performance in dielectric-sensitive applications like scintillators and radiation detectors

A Poster
Graduate Student
Physics, Chemistry, and Mathematics
Alabama State University

Physics-1 - Discerning the Axisymmetric Shape of Mars

Samaiyah Farid¹, Arjun Tan¹
¹Alabama A&M University

The notion of the 'Pear-shape of the Earth' is relatively well-known to the public-at-large since the early days of satellite launches. When the altitudes are averaged over circles of latitude, the so-called 'pear-shape of the Earth' emerges about the rotational axis of the planet. In this study, the figure of the planet Mars is investigated. The Martian surface has been thoroughly surveyed by the Martian Orbiter Laser Altimeter (MOLA) aboard the Mars Global Surveyor (MGS) spacecraft for a period of nine years. Topographical maps produced by the MOLA measurements are of the finest quality. A Lambert's equi-angular cylindrical projection map of the Martian surface is used. The coordinate system is defined as a planetocentric right-handed spherical polar coordinate system with its z-axis coinciding with the rotational axis of the planet; and the prime meridian passing above the crater Airy-0. The zero elevation is defined as the equipotential surface (formed by gravitational and centrifugal forces) whose average value at the equator is the mean radius of the planet. The results show that the Martian topography was quite similar to that of the Earth, with a major distinction being that its south polar region is an elevated area rather than a depressed one. Consequently, the averaged figure of Mars about its rotational axis is 'lemon-shaped' rather than pear-shaped'.

A Poster
Not a Student
Physics, Chemistry, and Mathematics
Alabama A&M University

Physics-2 - Unveiling an Axisymmetric Pear-shape of the Moon

Samaiyah Farid¹, Arjun Tan¹
¹Alabama A&M University

The notion of the 'Pear-shape of the Earth' is well-known to many in the field of science. In this study, the possibility of the existence of an analogous 'Pear-shape of the Moon' is investigated. We begin with a topographic map of the lunar surface in Lambert's azimuthal equal-area projection for both the near and far faces of the Moon in selenographic coordinates. A preliminary inspection of this map indicates that a pear-shape of the Moon similar that of the Earth may be possible if the axis of the pear is situated in the prime meridional plane with its north pole tilted 15° towards the direction of the Earth. A Lambert's azimuthal equi-angular map is constructed on which a simplified highland and lowland areas are drawn. Next, the angular coordinates in pear-axis frame of reference are calculated. A simplified elevation model of the

lunar surface is assumed, in which the highland area elevations are assumed to be 1 km above the mean elevation and the lowland areas assumed to be 1 km below the mean elevation. The mean elevations of circles of latitude in the pear-axis coordinates are estimated graphically for intervals of 15°. Finally, these mean elevations are displayed around an axisymmetric Moon. An emphatic pear-shape of the Moon strikingly similar to that of the Earth clearly emerges. The most fascinating feature of this pear-shape is that its amplitude is many times greater than that of the terrestrial counterpart.

A Poster
Not a Student
Alabama A&M University

Physics-3 - Characterization and Optimization of Tertiary Dye in Photo- Cured Plastic Scintillators for the LEGEND Experiment

Karishma G¹
¹physics

Plastic scintillators are essential detection materials in nuclear and particle physics experiments due to their rapid response times, cost-effectiveness, and ability to discriminate between neutron and gamma-ray interactions. The LEGEND (Large Enriched Germanium Experiment for Neutrinoless Double-Beta Decay) collaboration requires scintillating materials with exceptional optical clarity, high light yield, mechanical durability, and low radioactive backgrounds. This project investigates the optimization of photocurable plastic scintillator formulations with varying concentrations of Coumarin 450 (a tertiary dye/UV-blue shifter) to identify the ideal composition for LEGEND applications. Six custom-formulated resin samples (labeled A through F) were synthesized, characterized for structural and optical properties, subjected to cryogenic stress testing, and evaluated for light yield through radiation detection measurements. Results demonstrate that Sample E, while not exhibiting the highest optical clarity, achieved superior low-temperature mechanical durability and stable energy response characteristics, making it the most promising candidate for integration into LEGEND's detection systems.

A Poster
Graduate Student
Physics
Alabama A&M University

IV. ENGINEERING AND COMPUTER SCIENCE

Chair Ravi Gollapalli, presiding

25 - The development and evaluation of chitosan-coated enzyme magnetic nanoparticles for cellulose hydrolysis

Heejoon Park¹

¹The University of North Alabama

The recycling capability, colloidal and thermal stability of exo-cellulase, endocellulase, and β -glucosidases with magnetic particles (MNPs) were evaluated. Coprecipitation and oxidation of Fe(OH)₂ methods were used to fabricate magnetic nanoparticles. Three different enzymes were covalently bound to the surface of MNPs using 3-(aminopropyl) triethoxysilane (APTES) and a common protein crosslinking agent, glutaraldehyde. To evaluate the increase in colloidal dispersion stability, chitosan-coating was applied on MNPs and evaluated through particle settlement tests. The results showed that the chitosan-coated MNPs had 3.7 times higher colloidal dispersion stability than the bare MNPs. X-ray photoelectron spectroscopy (XPS) confirmed each magnetic nanoparticle surface modification step and successful enzyme binding. The optimum bioconjugate ratio in exo-cellulase, endo-cellulase, and β -glucosidases was evaluated, and having a high endo-cellulase bioconjugate in the reaction produced the highest glucose. The bioconjugates showed superior glucose productivity 39.4% at 65°C and 22.2% at 88°C in which the native enzyme is inactivated completely after 5 h of exposure. Recycling stability studies showed approximately 78% of activity was retained after 10 cycles and 32% of activity was retained after 20 cycles. The bioconjugates demonstrated equivalent total product conversions as a single reaction of an equivalent amount of the native enzyme after the 10th cycle this work introduces a novel method for covalently binding individual exo-cellulase, endo-cellulase, and β -glucosidases. These bioconjugates showed superior thermal stability and recyclability. It was also demonstrated that chitosan coating significantly improves the colloidal dispersion stability of bioconjugates. Thus, this work validates the use of enzyme-MNP bioconjugates to effectively glucose production and promising technique for eventual continuous biological processes

A Poster

Biological and Environmental Sciences

The University of North Alabama

44 - Plasma/Ozone Induced PolyNaSS Graft-Polymerization onto PEEK Biomaterial for Bio-integrated Orthopedic Implants

Chandrima Karthik¹, Vinoy Thomas²

¹graduate research assistant, ²advisor

Owing to its superior bulk mechanical properties, poly (ether ether ketone) (PEEK) has gained popularity over the past 15 years as a metal substitute in biomedical implants. Low surface

energy is a fundamental issue with PEEK implants. This low surface energy caused by a moderately hydrophobic surface may be able to inhibit cellular adherence and result in the development of an inflammatory response, which may result in cell necrosis and apoptosis. In this work, plasma and ozone treatments have been utilized to surface activate PEEK and graft ionic bioactive polymer polyNaSS (poly (sodium styrene sulfonate)) successfully on the surface to promote cellular attachment and biomineralization. The main goal of our research has been to find a stable green process for surface modification of PEEK by plasma/ozone approaches to increase PolyNaSS grafting efficiency and biomineralization. To further the field of bioactive orthopedic and dental implant technology, this research attempts to address a significant constraint of PEEK implants while preserving their favorable mechanical properties.

A Poster
Graduate Student
Engineering
The University of Alabama at Birmingham

47 - Digital Twin Frameworks of Embedded Mechanoluminescent Sensor

Md Abu Sayeed Shohag¹

¹The University of North Alabama

Embedded mechanoluminescent sensors enable real-time damage sensing under impact loading; however, existing approaches remain largely empirical, limiting their ability to quantitatively predict damage severity and location under loading. This study presents a digital twin framework for embedded mechanoluminescent sensors that links impact loading to mechanoluminescent emission using experimentally validated relationships between impact force, emission intensity, and damage location. The framework will integrate transient mechanical response with mechanoluminescent behavior to predict light intensity and spatial sensing range during impact events. This framework will transform mechanoluminescent sensors from qualitative damage indicators into predictive sensing elements, supporting practical deployment in smart coatings, impact sensing, and structural health monitoring of composite structures.

A Poster
Not a Student
Engineering
The University of North Alabama

VII. STEM EDUCATION

Co-Chairs Uduak Afangideh and Diann Jordan, presiding

38 - S.T.E.M

Tyearnest Williams¹

¹Faulkner Unio

Poster for STEM

A Poster

Undergraduate Student

School of Education

Faulkner University

58 - A Faculty Journey into Engineering Education Research & Lessons Learned Launching a Summer Bridge Program

Ravi Gollapalli¹, Andrea Hunt¹, Sara Johnson¹, Candice Quinn¹

¹The University of North Alabama

Recently, the University of North Alabama (UNA) was awarded an NSF Research Initiation in Engineering Grant to create a path for an engineering faculty member to engage in Engineering Education Research. The grant objective is to prepare the faculty member for a successful career as an engineering education researcher through structured mentorship and program development. The department of Engineering and Industrial Professions (E&IP) at UNA is a relatively new department offering degrees in engineering and engineering technology; and this grant will provide the opportunities for enhancements of the E&IP department and promote engineering education.

To initiate research in engineering education, the research team has chosen to develop and launch a Summer Bridge program for incoming freshmen students in the engineering and engineering technology programs at UNA. The goal and aim are to understand the limits and hindrances faced by students who pursue engineering education. These students are offered a course in mathematics and another course in engineering basics, and the students are also provided mentorship by peer students, faculty, and industry professionals, the aim of which is develop relationships that will help students continue engineering education and have successful engineering careers.

In this poster, I share what it was like to build the program from the ground up: navigating the dynamics of creating a new initiative. It captures not only the development of the program itself and lessons learned, but also the evolution of my own thinking as I moved into the world of engineering education research for the first time.

A Poster

Not a Student

Engineering

The University of North Alabama

71 - The effects of a cadaver-based anatomy course on the perception of professional soft skills in undergraduate students

Emma Wasden¹, Katelynn Corder¹

¹Samford University

The continued necessity of cadaver dissections in anatomy education has continued to be questioned as technology advances. Previous studies have shown that cadaver dissection can lead to both positive and negative emotional responses in students, which can potentially affect so-called “soft skills” associated with effective healthcare professionals among students. In this study, we evaluated if completion of an undergraduate course which included cadaveric dissection led to alterations in student perceptions of the effect of cadaveric dissection on empathy, confidence, and professional boundaries.

A Poster

Not a Student

Biological and Environmental Sciences

Samford University

STEMposter-1 - Technology in the General Biology Classroom: Student Attitudinal Surveys (Pre-2012 and Post-2024 Pandemic) Reveals Students Preferred an Active, Engaging Classroom

Kartz Bibb¹, Timetria Bonds¹, Almut Haboeck², Cadavious Jones³, Sabita Saldanha¹, Praseetha Subbarayan¹, Diann Jordan¹

¹Department of Biological Sciences, Alabama State University, ²Division of Online Education and Programs, Alabama State University, ³Division of Science and Mathematics at Rust College

In the summer of 2012, we surveyed 53 students in our introductory biology classes about the current use of technology in the classroom and how we could improve resources for non-major students. We were encouraged to look for effective ways for providing technology in the classroom but we had no way of knowing as instructors if students found our resources effective. About 93-95% of these students agreed or strongly agreed that using technology was effective in their learning process. In 2024, we administered an online survey during class time on very similar questions anonymously asked in 2012 to more than 3 times the number of students (n=185). Twelve years after the initial “snapshot” study, we were able to ask additional questions that were more relevant to their experiences: Impact of the Pandemic, new relevant technology, etc. Again, students echoed the importance of technology use in the biology classroom (49%) and 86% felt technology made it easier to learn general biology. In 2020, COVID-19, a virus that affect millions of Americans required that institutions worldwide “shutdown” all in-person activities. Therefore, technology became even more important factor in teaching any course. The COVID Pandemic impacted students’ ability to pass biology both negatively and positively due to various issues. Our results were similar whether in 2012 or 2024, regardless of technology used in the classroom. When properly used, technology can be

an effective teaching tool in the classroom but clearly our 2024 data suggest that ASU students want a more active and engaging biology classroom with appropriate use of technology.

Keywords: technology, general biology, pre-post pandemic, active learning.

A Poster

Not a Student

Biological Sciences

Alabama State University

VIII. ENVIRONMENTAL AND EARTH SCIENCE

Chair Mojtaba Enayati, presiding

13 - Bacterial Community Microbiology of Surface and Subsurface Irrigation Water at the Winfred Thomas Agricultural Research Center.

Ajani Brooks¹, Elica Moss¹

¹Department of Natural Resources and Environmental Sciences, Alabama A&M University, Normal, AL 35762.

Wildlife and human inputs impact irrigation water's microbial quality, including runoff from manure and pasture lands, fecal deposition from wildlife, and discharge from sewer infrastructure. Due to these factors, irrigation water has been identified as a potential source of contamination in several disease outbreaks. The main pond at the Winfred Thomas Agricultural Research Station (WTARS) is five acres and is stocked with fish, so it is common for migrating local fauna to take up residency, with their droppings affecting the water quality. The pond can potentially be used as an additional water source for the irrigation of crops and animals at the WTARS. Ten samples were taken from the interior of the pond and ten from the perimeter, using GPS to determine consistent spacing, then parameters at each sample site were taken via YSI-ProDSS. The objectives of this study were to: enumerate and determine the seasonal variability of *E. coli* fecal indicator bacteria; evaluate the physicochemical parameters that may serve as drivers to the presence and density of *E. coli* in the irrigation system; and create a machine-learning algorithm that would predict *E. coli* concentrations in the pond. Using *E. coli* geometric mean data and concentrations of environmental parameters such as dissolved oxygen (DO), total dissolved solids (TDS), pH, specific conductivity, turbidity, and temperature, the Mean Relative Difference (MRD) and Relative Difference (RD) were determined. We then used the RD of the parameters to predict the RD of *E. coli*. Finally, the negative log of these measurements was used to find the correlation between the parameters and the *E. coli* concentrations. Results from this study revealed a high positive correlation between *E. coli* and pH, turbidity, and temperature, and a low negative correlation between *E. coli* and TDS, specific conductivity, and dissolved oxygen. The bacterial community of the pond was no cause for concern as the Geometric mean for all months did not meet or exceed 126 CFU(colony-forming units). Testing indicated that machine learning algorithms can accurately predict *E. coli* concentrations.

A Poster

Graduate Student
Biological and Environmental Sciences
Alabama A&M University

29 - Preliminary Investigation of a New Late Pleistocene Mammalian Fauna from South Alabama, USA

Violet Morin¹, Jun Ebersole²

¹University of Alabama at Birmingham, ²McWane Science Center

The Late Pleistocene fossil record of southern Alabama remains surprisingly understudied despite the region's complex geological history and high paleobiodiversity. Prior studies of Late Pleistocene mammalian diversity in Alabama has concentrated on those from the northern (mountainous) half of the state, whereas the faunal diversity from the Alabama Coastal Plain remains largely understudied. In 2023, employees at a limestone quarry in Conecuh County, AL uncovered a large fossil-bearing vug containing an enormous diversity of Late Pleistocene remains. One of the present authors (JAE) led several salvage operations to recover over 30,000 lbs. of this bone-filled deposit before the site was destroyed by subsequent mining operations. A preliminary analysis of these remains has identified a plethora of Late Pleistocene mammals, including *Mammuth americanum*, *Mylohyus nasutus*, *Tapirus veroensis*, *Holmesina septentrionalis*, *Odocoileus virginianus*, *Palaeolama mirificus*, *Dasyurus bellus*, *Lepus cf. californicus*, *Spilogale putorius*, *Equus* sp., *Cervus canadensis*, Felidae indet., and Chiroptera indet. This new discovery offers the most comprehensive view to date of Late Pleistocene mammalian life within the Gulf Coastal Plain of Alabama.

A Poster
Graduate Student
Biology
The University of Alabama at Birmingham

42 - Shifts in Vegetation Phenology Across Alabama and Their Relationships with Seasonal Temperature Using MODIS Time-Series Data

Kayla Shands¹, Tenzing Ingty¹

¹Jacksonville State University

Climate change is altering plant phenology worldwide, yet long-term phenological studies in the United States have primarily focused on temperate and high-latitude regions. While studies in the northeastern U.S. commonly report earlier spring greenup and delayed autumn senescence, phenological responses in the biodiverse southeastern United States remain poorly understood. This study addresses this gap by quantifying long-term vegetation phenology trends across Alabama and evaluating their relationships with seasonal temperature.

We analyzed Moderate Resolution Imaging Spectroradiometer (MODIS) vegetation phenology products over a 24-year period (2001-2024) for four phenophases: start of season (SOS),

maturity (MAT; peak greenness), end of season (EOS), and dormancy (DOR). Pixel-wise linear trends were calculated statewide, and associations between phenophase timing (day of year) and seasonal mean temperatures (spring, summer, fall, winter) were assessed using Mann-Kendall correlations. Seasonal temperature trends were also evaluated over the study period. Advancing phenological trends dominated SOS (85.3% of pixels), EOS (66.1%), and DOR (63.7%), with most statistically significant pixels exhibiting earlier timing. Statewide annual aggregates showed negative slopes for SOS (-0.21 days yr^{-1}), EOS (-0.17 days yr^{-1}), and DOR (-0.13 days yr^{-1}), though these trends were not statistically significant. Maturity exhibited greater spatial variability and no consistent temporal trend.

Seasonal temperatures increased significantly from 2001 to 2024 across all seasons, including spring (0.55 $^{\circ}\text{C}$ yr^{-1} , $P = 0.043$), summer (0.48 $^{\circ}\text{C}$ yr^{-1} , $P = 0.021$), fall (0.56 $^{\circ}\text{C}$ yr^{-1} , $P = 0.043$), and winter (1.40 $^{\circ}\text{C}$ yr^{-1} , $P = 0.0036$), with winter warming most strongly. SOS timing was strongly associated with spring temperature, with warmer springs leading to earlier greenup (-0.37 days $^{\circ}\text{C}^{-1}$, $P < 0.0001$, $R^2 = 0.51$). EOS timing was negatively associated with spring and summer temperatures, while DOR timing was significantly associated with summer temperature. MAT showed weak, non-significant temperature relationships.

These results indicate widespread seasonal warming across Alabama accompanied by earlier timing of multiple phenological stages. Unlike northern U.S. ecosystems that often exhibit delayed senescence, southeastern vegetation appears to be responding through phenological compression rather than growing-season extension, with potential implications for ecosystem functioning and species life-history strategies.

A Poster
Graduate Student
Biological and Environmental Sciences
Jacksonville State University

64 - Reductive Cleavage of Keratin Disulfide Bonds Using N-Acetylcysteine

Dylan Park¹, Bahareh Mirmashhour¹, Tatum C. Owen¹, Michael Enayati*¹

¹Troy University

Poultry feathers represent an abundant industrial waste byproduct composed of approximately 85% keratin by mass, a biodegradable and biocompatible structural protein. However, keratin's extensive disulfide cross-linking renders it insoluble, and therefore difficult to extract and process. In this project, keratin was extracted from poultry feathers through reductive cleavage of disulfide bonds using N-acetylcysteine (NAC) in the presence of urea, which is a comparatively mild and environmentally favorable reducing system compared to the common sodium sulfide system. The extraction process was optimized by varying reagent concentrations and processing conditions to improve yield while preserving structural integrity. Extracted keratin was isolated through acid precipitation, followed by characterization using FTIR and NMR, to confirm structural integrity, along with DSC and TGA to evaluate thermal behavior. Keratin powders were subsequently processed into films through hot pressing, and mechanical

performance was assessed using tensile testing to determine strength, Young's modulus, and elongation at break. The results demonstrate that NAC-mediated reduction effectively cleaves keratin disulfide bonds, enabling the production of processable keratin. This study supports the use of keratin derived from poultry feathers for applications in films, and potentially biomedical materials (as keratin is a promising source of sustainable biopolymer), while contributing to waste valorization and environmentally conscious material design.

A Poster
Undergraduate Student
Chemistry
Troy University

76 - Geochemical and Sedimentological Investigation of a Potential Tsunamiite at Mussel Creek, Alabama: An Update

Bethany Cobb Faulk¹, Yuehan Lu¹, Takehito Ikejiri¹, Man Lu²

¹The University of Alabama, ²China University of Petroleum – Beijing

The Cretaceous Period of Earth's history ended catastrophically with the impact of an asteroid in a shallow sea off the Yucatán peninsula. The resulting water displacement generated megatsunami waves that travelled in all directions. In the surrounding Gulf of Mexico and Caribbean Sea coastlines, multiple geological deposits from the Cretaceous-Paleogene (K-Pg) Boundary have been discovered that record evidence of deposition by these tsunamis.

Certain strata at Mussel Creek, a K-Pg outcrop in Lowndes County, Alabama, have been proposed to have originated from sediment carried by the end-Cretaceous megatsunami event due to peculiar lithologic and stratigraphic features. We have been characterizing these strata using multiple geochemical, sedimentological, stratigraphic, and paleontologic analyses in order to better elucidate their origins. Here, we share recent updates from our ongoing investigation of Mussel Creek.

A Poster
Graduate Student
Physical and Earth Science
The University of Alabama

83 - Thermo-Regulative Textile Coating by AC Electrospinning

TOM SAMUEL¹, Dr. Vinoy Thomas¹

¹The University of Alabama at Birmingham

The rapid increase in global atmospheric temperature has raised serious concerns about heat exposure among outdoor workers, increasing the risk of sunburn and thermal discomfort. This study focuses on the development of thermos-regulative textile coatings using AC electrospinning to enhance worker's safety and comfort. Electrospun fiber mats were fabricated using a 1:1 blend of polyvinylpyrrolidone (PVP) and hydroxypropyl cellulose (HPC) dissolved in

ethanol. Silica was incorporated as the primary additive, and boron nitride nanoparticles were added at various concentrations (6%, 12%, 18%) to evaluate their influence on thermal performance.

Optimized AC electrospinning parameters enabled the production of continuous, bead free fiber mats. SEM analysis showed moderate uniform fiber morphology with an average fiber diameter of approximately 1 μ m. Thermal characterization revealed that silica-based coatings exhibited higher specific heat capacity and lower thermal conductivity. The incorporation of boron nitride nanoparticles resulted in a reduction in both specific heat capacity and thermal conductivity as the concentration increased. FTIR analysis confirmed the presence of characteristic functional groups, including Si-O-Si and BN related peaks, verifying successful additives incorporation.

The developed electrospun coatings demonstrate promising potential for thermos-regulative textile applications designed to improve thermal protection and personal comfort under elevated temperature conditions.

A Poster
Graduate Student
Material Science Program
The University of Alabama at Birmingham

ENVMposter-1 - Assessing Microbial Community Responses to Cold Atmospheric Plasma Treatment in Agricultural Soils

Gianna Porter¹, Elica Moss¹, Srinivasa Mentreddy¹, Gabe Xu²

¹Alabama A&M University, ²University of Alabama in Huntsville

As the global population continues to rise and the demand for agriculture intensifies, the need for fertile, uncontaminated soils increases. However, current soil decontamination methods disrupt the soil microbiome, leading to reduced plant productivity and soil health. Cold atmospheric plasma (CAP), a relatively new treatment method in the field of agriculture, shows promising results in sustainably amending contaminated soil and eliminating harmful bacteria. Currently, the influence of these treatments on soil bacteria is not well understood. Previous research suggests that while most major bacterial phyla - including Acidobacteria, Actinobacteria, and Proteobacteria - are highly susceptible to CAP, members of the Firmicutes phylum exhibit notable resistance. In this study, soil samples collected from an organic plot at the Winfred Thomas Agricultural Research Station were treated with CAP using argon as the carrier gas for 30, 60, 90, and 120 seconds. Untreated control samples and the treated samples were then analyzed using next-generation sequencing (NGS) by Zymo Research Laboratory to determine preliminary absolute abundance, community composition, and microbial diversity. Results indicate that community composition after treatment shifted towards Firmicutes dominance and displayed a decrease in absolute abundance and microbial diversity relative to the controls. Findings from this study contribute to the growing field of plasma-based soil remediation and provide insight into optimizing treatment parameters to meet specific agricultural needs.

A Poster
Graduate Student

IX. HEALTH SCIENCES

Chair Jean-Pierre Arditi, presiding

17 - *Lactobacillus*-derived Postbiotics Alleviate Locomotor Deficits in an Aged Fruit Fly Model of Alzheimer's Disease

Flaming, A.C.¹, Taylor, H.¹, Snow, L.¹, Jesser, R.¹, Bennett, B.¹, Jumbo-Lucioni, P.²

¹Biological and Environmental Sciences, Samford University, ²McWhorter School of Pharmacy, Samford University

Alzheimer's Disease (AD) is the most common form of dementia, one of the fastest-growing age-related diseases. *Lactobacillus*-based probiotics have been identified as a therapeutic intervention to mitigate behavioral deficits in AD. Therapeutic benefits have been attributed to postbiotics, the soluble secretions of live bacteria. However, the impact of *Lactobacillus* postbiotics on an aged AD model is unknown. This study explores the impact of *Lactobacillus plantarum*-based postbiotics (*Lp*-PBx) in slowing the progression of the locomotor deficits in an aged *Drosophila melanogaster* model of AD. Female flies overexpressing human amyloid- β protein precursor and β -site cleaving enzyme were randomized to receive sucrose or *Lp*-PBx, 14 days post-eclosion. Intervention was administered in four 24-hour doses twice a week for 2 weeks. Total food intake (FI) was recorded. Locomotion was assessed using a negative geotaxis assay, testing the flies' ability to cross a 2, 4, and 8cm mark in 10 seconds. Preliminary data indicated both genotype ($p=0.0002$) and supplementation ($p=0.0008$) significantly affected total FI. While control flies consumed more than AD flies regardless of supplementation (4.25 vs. 2.88 $\mu\text{l}/\text{fly}/24\text{h}$), flies (i.e. control and AD) supplemented with *Lp*-PBx ate more than those fed sucrose (4.14 vs. 2.99 $\mu\text{L}/\text{fly}/24$ hours). Regardless of genotype, *Lp*-PBx supplementation significantly improved climbing speed to pass a 2, 4, and 8cm mark with 1.6-, 2.3- and 5-fold increases, respectively, compared to sucrose supplementation ($p<0.05$). In summary, our preliminary data suggest that *Lp*-PBx supplementation mitigates age-associated locomotor deficits in aged AD flies, with benefits also being observed in normal aging flies.

A Poster
Undergraduate Student
Biological and Environmental Sciences
Samford University

22 - Basil Extract as a Surface Decontaminant for Lettuce Leaves

Kayden Heisler¹
¹Faulkner University

Basil Extract as a Surface Decontaminant for Lettuce Leaves

Kayden Heisler

Department of Natural and Physical Sciences, Faulkner University, Montgomery, AL

Faculty Advisor: Dr. Uduak Afangideh

Foodborne illness associated with leafy greens remains a significant public health concern, prompting interest in natural alternatives to chemical sanitizers. This study evaluated the effectiveness of basil (*Ocimum basilicum*) extract as a natural surface decontaminant for lettuce leaves. Fresh lettuce samples were divided into three treatment groups: water control, vinegar treatment, and basil extract treatment prepared using a 70% ethanol extraction method. Uniform leaf sections were treated, incubated on agar plates, and assessed after 24 hours for bacterial growth using colony-forming unit (CFU) counts. Leaf appearance was also evaluated using a standardized visual quality scoring scale. Both basil extract and vinegar significantly reduced microbial growth compared to the control ($p < 0.05$), with basil extract achieving an approximate 81% reduction in CFUs. No significant difference was observed between basil extract and vinegar treatments, and neither treatment adversely affected leaf appearance. These findings indicate that basil extract is an effective, consumer-friendly, and natural alternative for reducing microbial contamination on lettuce surfaces. The results support further investigation into plant-based sanitizers as sustainable food safety interventions.

A Poster

Undergraduate Student

Biology

Faulkner University

23 - From Gut to Brain: Comparing Probiotic and Postbiotic Effects on Memory in a *Drosophila* Alzheimer's Model

Harrison Taylor¹, Anna Caroline-Flaming¹, Yousef Addassi², Ry Jesser¹, Liz Snow¹, Brad Bennett¹, Patricia Jumbo-Lucion²

¹Biology and Environmental Sciences, ²McWhorter School of Pharmacy

Background: Alzheimer's disease (AD) is characterized by progressive cognitive decline but lacks effective treatment. The gut-brain axis has emerged as a therapeutic target, with oral administration of probiotic bacteria such as *Lactobacillus* providing cognitive benefits. These benefits may arise from the secreted molecules of the probiotic, known as postbiotics, but their potential effects remain unclear. This study compared the effectiveness of *Lactobacillus* probiotics and its derived postbiotics at correcting memory deficits in a fly AD model.

Methods: *Lactobacillus plantarum* (*Lp*) was cultured in MRS broth at 37 °C for 18 hours, centrifuged to obtain a probiotic pellet, and the pellet re-suspended to a concentration of 1.0×10^9 CFU/mL. The upper 80% of the supernatant was collected and filtered through a 0.2-micron filter to obtain a cell-free postbiotic fraction. Flies expressing human AD transgenes were fed sucrose, *Lp* alone (the probiotic fraction), or *Lp* derived postbiotics (*Lp-PBx*) for two weeks. The *Lp* and *Lp-PBx* preparations were diluted 1:2 in 5% sucrose. Flies expressing the driver alone were used as controls. Flies underwent four 24-hour feeding sessions twice weekly for two

weeks. Memory performance was assessed using an aversive phototaxic suppression assay that measures changes in dark preference after training.

Results: Sucrose-fed control males showed increased dark preference after training ($p < 0.05$), while dark preference was unchanged in AD males. *Lp* supplementation did not alter dark preference in either group. In contrast, *Lp-PBx* significantly enhanced dark preference after training in both control and AD males ($p < 0.05$).

Conclusion: Postbiotic treatment improved memory deficits in AD flies, supporting its potential as a stable and effective alternative to probiotics for mitigating cognitive decline in Alzheimer's disease.

A Poster
Undergraduate Student
Biological and Environmental Sciences
Samford University

30 - The Identification of a Safer Green Alternative to BPA Using a Zebrafish Model

Cameron Sheeler¹, Amy Soulis¹, Annsley DeMent¹
¹The University of Alabama at Birmingham

Bisphenol compounds, such as bisphenol-A (BPA), are linked to negative health outcomes like diabetes, obesity, and hormone-dependent cancers. BPA and BPA analogs like bisphenol-B (BPB) and bisphenol-C (BPC) are found in products such as plastics, thermal receipts, and food packaging. BPA, an endocrine disruptor, binds to and activates estrogen receptors. Previous studies have identified bisguaiacol-F (BGF) as a potential replacement for BPA due to lack of estrogenic activity. Our research uses a zebrafish model to determine the effects of BPA, BPB, BPC, and BGF on development and seeks to determine if BGF is a safer alternative. Our acute toxicity experiments have identified BPC as the most toxic with BGF being the least toxic at 96 hours post fertilization. The LC₅₀ values for the compounds are as follows: BPC ($16.0 \pm 1.1\mu\text{M}^*$), BPB ($24.0 \pm 2.6\mu\text{M}^*$), BPA ($35.3 \pm 1.3\mu\text{M}^*$), and BGF ($82.3 \pm 0.8\mu\text{M}^*$) (mean \pm SEM, of at least three independent experiments, $*p < 0.05$). Ongoing studies include effect on expression levels of known estrogen-responsive genes such as *vtg1*, *vtg3*, and *cyp19a1b* and the expression levels of estrogen receptors ER α , ER β 1, and ER β 2. RNA-seq will establish a transcriptional profile of these of each compounds at 24, 48, and 72 hours post fertilization. Genes with altered expression levels identified from RNA-seq will be confirmed and quantified using real-time quantitative polymerase chain reaction (qPCR). Genes of interest will be classified according to their function. Our studies using a zebrafish model will further understanding of the health risks posed by potential environmental toxins.

A Poster
Undergraduate Student
Biological Sciences
The University of Alabama at Birmingham

53 - National Norms for Hospital Frailty Risk Score among Hospitalized Adults in the US

Brittany Jackson¹, Ohm Patel¹, Christine Loyd¹

¹The University of Alabama at Birmingham

Frailty among hospitalized adults increases the risk of disability and death but is rarely screened due to limited standardized tools and the time required by hospital staff. This project focuses on establishing U.S. normative values for the Hospital Frailty Risk Score (HFRS) by age, sex, and race. Data from the 2018 National Inpatient Sample were analyzed for adults aged 18 and older, with emphasis on those 45 and above. The HFRS, based on ICD-10 codes, measures frailty risk among hospitalized patients. Results showed that frailty scores increased significantly with age across all groups ($p < 0.001$). Among patients aged 65 and older, males and females had similar frailty levels (mean range 6.71-9.62; median range 5.40-8.70). Black inpatients showed the highest frailty risk compared to other races (mean 7.56-10.47; median 6.30-9.50), while Asian/Pacific Islander patients aged 90 and older had similar scores (mean 10.48; median 9.50). These findings establish national reference values for HFRS, providing a standardized way to compare frailty risk among hospitalized adults in the United States. Frailty in hospitalized patients is strongly linked to higher risks of hospital-associated disability and mortality. Regular assessment of frailty in acute care could help clinicians direct therapeutic resources to the patients who need them most, reduce prolonged hospital stays, and lower the risk of both in-hospital and post-discharge death. Despite these benefits, frailty is not routinely screened in many acute care settings, largely because standardized methods are lacking. This gap highlights the need for a rapid, reliable tool that can assess frailty during hospitalization using data that are already collected in routine clinical care.

A Poster

Undergraduate Student

Biological Sciences

The University of Alabama at Birmingham

65 - Adhesion of Antibiotic-Resistant Bacteria to Thermoplastic Materials Used In Fabricating Medical Devices: Patient Consequences

Dev Mehta¹, Aden Patel¹

¹The University of South Alabama

Healthcare-associated infections (HAIs) are a serious concern, especially for burn patients wearing a contaminated orthotic medical device harboring harmful bacteria posing a risk of serious infection. Occupational Therapists fashion orthotic splints (orthoses) from thermoplastic materials. Orthoses are externally applied devices that are vital in the burn rehabilitation process by protecting skin grafts, preventing contractures, and helping to restore range of motion. These devices are also commonly used to immobilize patient limbs after surgery or injury. Thermoplastics are widely used due to their ability to be heated to conform to individual

patient body contours but are prone to bacterial contamination during patient use. This investigation examines how differences in gram-positive and gram-negative bacteria cell exteriors affect their adhesion to three orthotic thermoplastic materials when they are prepared in solutions of either physiologic saline, artificial perspiration, or ascites fluid. Test antibiotic-resistant HAI bacteria were gram-positive vancomycin-resistant *Enterococcus faecalis* (VRE) and gram-negative *Pseudomonas aeruginosa*. Separately prepared bacterial suspensions were applied to triplicate target squares drawn on each thermoplastic sheet. Inoculated materials were transferred to a 35°C incubator prior to sampling. Recovery sampling of target squares was performed at 1 hour and 24 hours. Variation was noted in the recovery of VRE from each thermoplastic sheet and for each fluid at both 1- and 24-hour sampling intervals. However, *P. aeruginosa* was not recovered at either 1- or 24-hour sampling intervals from any thermoplastic, regardless of the application fluid used. These results indicate that gram-negative *P. aeruginosa* demonstrated better adhesion to test thermoplastic materials. It also suggests that *P. aeruginosa* may be creating adhesive biofilms on thermoplastic surfaces. The ultimate goal is to create a better understanding of bacterial-thermoplastic associations that will lead to the generation of thermoplastic materials that are less prone to contamination. These investigations will help ensure positive patient outcomes by decreasing infection risk.

A Poster
Undergraduate Student
Biological Sciences
The University of South Alabama

68 - Split Sciatic Nerve and Split Piriformis Muscle in Student Dissected Cadaver

Mark Caulkins¹, Sophie Bodiford¹, Raney Collins¹, Anneston Curles¹, Kayla Hollinsworth¹, Allison Kerins¹, Kayln Purnell¹, Wes Johnson¹, Brad Cantley¹, Nick Washmuth²
¹Samford University, ²The University of Alabama at Huntsville

The sciatic nerve forms in the sacral plexus inside the pelvis. It consists of two separate nerves (Tibial and Common Peroneal) that normally exit the pelvis together with a layer of connective tissue holding them together. They normally separate into the two separate nerves in the lower thigh. The piriformis muscle originates from the anterior sacrum, and the muscle exits the pelvis and attaches to the femur.

The sciatic nerve most commonly exits the pelvis by coursing below the piriformis muscle.

In this cadaver, the sciatic nerve exits as the two separate nerves, and the piriformis is split as well. The tibial nerve passes through the piriformis muscle, and the common peroneal nerve passes inferior to the piriformis. This anomaly is a very rare presentation of a split sciatic nerve.

A Poster
Not a Student
Biological Sciences
Samford University

73 - Split Extensor Digiti Minimi Tendon in Hand of Student Dissected Cadaver

Mark Caulkins¹, Maggie Bryan¹, Maggie DeCastro¹, Annalyn Duke¹, Katy Moses¹, Harley Robertson¹, Ryann Schidler¹, Nick Washmuth²

¹Samford University, ²The University of Alabama at Huntsville

The Extensor Digiti Minimi (EDM) Tendon is a tendon that inserts on the little finger. In this student dissected cadaver, the EDM divides into two tendons near the wrist and both travel to the little finger.

A Poster
Not a Student
Biological Sciences
Samford University

74 - Split Extensor Digitorum Longus in Foot of Student Dissected Cadaver

Mark Caulkins¹, Reese Carwile¹, Emma Houston¹, Gracie Matt¹, Rachel Metzler¹, Lindsey Nelson¹, Ruhi Patel¹, John Hurt¹, Heather Hallman¹, Nick Washmuth²

¹Samford University, ²The University of Alabama at Huntsville

The fibularis tertius and extensor digitorum longus are two muscles in the anterior compartment of the leg and travelling to the foot. The fibularis tertius inserts on the base of the fifth metatarsal, and the extensor digitorum longus usually splits into four separate tendons that travel down to the second through fifth toes. In this cadaver, the extensor digitorum longus tendon to the fifth toe splits, and one part inserts on the base of the fifth toe near the fibularis tertius

A Poster
Not a Student
Biological Sciences
Samford University

88 - The relationship between GABA and social cognition in schizotypal participants

Kennedy Powell¹, Madeleine Rein¹, Sharlene Newman¹

¹The University of Alabama

Kennedy F. Powell, Madeleine Rein, B.A., Sharlene Newman, PhD

A Poster
Not a Student
Neurobiology
The University of Alabama

HSposter-1 - Endometrial Carcinosarcoma with Heterologous (Rhabdomyosarcomatous) Differentiation Presenting as Post-Menopausal Bleeding

Kathleen Clark¹, Tillie Schumann², Emma Karesh¹, Kaitlyn Unterman¹, Amelia Dorr¹

¹Alabama College of Osteopathic Medicine, ²Orlando Health Winnie Palmer

Background:

Uterine carcinosarcoma (UCS) is a rare, highly aggressive malignancy characterized by biphasic epithelial and mesenchymal components. Tumors with heterologous sarcomatous differentiation, such as rhabdomyosarcoma, demonstrate particularly aggressive behavior, with high rates of recurrence, extrauterine spread, and poor overall prognosis. Due to its rarity, optimal management strategies remain incompletely defined.

Case Presentation:

We present the case of a 70-year-old postmenopausal woman who presented with heavy daily vaginal bleeding, uterine cramping, abdominal pain, and a large protruding cervical mass on examination. Endometrial biopsy revealed carcinosarcoma with heterologous rhabdomyosarcomatous differentiation. Histopathologic evaluation demonstrated a biphasic tumor composed of high-grade adenocarcinoma and sarcomatous components with prominent rhabdomyosarcoma confirmed by desmin and MYOD1 co-expression. Imaging showed no evidence of distant metastatic disease.

Management and Outcomes:

The patient underwent robotic-assisted total laparoscopic hysterectomy with bilateral salpingo-oophorectomy and sentinel lymph node mapping and biopsy. Final pathology revealed deep myometrial invasion (83%), focal cervical stromal involvement, lymphovascular space invasion, and negative lymph nodes, corresponding to FIGO Stage IIC disease (2023 classification). Immunohistochemistry demonstrated diffuse p53 overexpression and a high Ki-67 proliferation index. Postoperatively, the patient recovered without complications and reported resolution of vaginal bleeding and improvement in symptoms. Adjuvant therapy with paclitaxel, carboplatin, and vaginal cuff brachytherapy was recommended.

Conclusion:

This case highlights the aggressive nature of uterine carcinosarcoma with heterologous rhabdomyosarcomatous differentiation and underscores the importance of early endometrial biopsy, comprehensive surgical staging, and multidisciplinary oncologic management. Continued reporting of such cases is essential to refine treatment strategies, improve prognostic understanding, and guide the development of standardized management guidelines for this rare malignancy.

A Poster

Graduate Student

Cell Developmental and Integrative Biology

Alabama College of Osteopathic Medicine

HSposter-2 - Global Health Immersion as a Catalyst for Professional Growth: Themes from Graduate Student and Faculty Reflections in Guyana

Robin Irwin¹, Hayden Ford²

¹Primary researcher, ²Co-researcher

Background:

Experiential learning in global health contexts offers unique opportunities for professional growth and cultural humility. This study examined how first-year graduate Health Science students and faculty reflected on these experiences during an immersion program in Guyana.

Objective:

To explore participants' perceptions of cultural humility, ethical awareness, and professional identity through daily reflective journaling.

Methods:

Daily journals were collected from 8 graduate students and five faculty members during a week-long immersion experience in Guyana. Data was analyzed using thematic analysis to identify recurring patterns and insights.

Results:

Three major themes emerged: (1) **Navigating Cultural Differences**—participants described strategies for adapting to unfamiliar norms and practices; (2) **Evolving Professional Identity**—reflections revealed growth in confidence and understanding of global health roles; and (3) **Ethical Tensions and Humility**—journals highlighted dilemmas related to resource limitations and the importance of humility in practice.

Conclusions:

Structured reflection during global health immersion fosters cultural humility and ethical awareness, supporting the development of globally competent health professionals. Future programs should integrate guided reflection to maximize learning outcomes.

Keywords:

Experiential learning, cultural humility, global health education, qualitative research, professional identity

A Poster

Not a Student

Physical Therapy or Physician Assistant

Faulkner University

HSposter-3 - Physical Therapy Students' Perceived Depression, Anxiety, and Stress Levels Throughout the Didactic and Clinical Experience in the Doctor of Physical Therapy Program (Report on an On-Going Pilot Study)

Robin Irwin¹, Michelle Bond¹, Kingsley Kana¹, Sharon Rhodes¹

¹Faulkner University

Mental health is a critical factor in the success and professional development of Doctor of Physical Therapy (DPT) students.^{1,2} The intensity of graduate health science programs can contribute to elevated stress, anxiety, and depression. To better understand these patterns within the College of Physical Therapy, this ongoing study utilizes the Depression, Anxiety, and Stress Scale-21 (DASS-21), a validated tool for monitoring psychological well-being.³

Voluntary DASS-21 data are being collected at multiple points during students' progression through the DPT program to identify trends and inform targeted support strategies. Currently, data has been collected for 2 1/2 years among three cohorts. The goal of this longitudinal project is to enhance student wellness, guide program-level interventions, and contribute to a broader understanding of mental health needs within professional education

Methods:

This longitudinal observational study is being conducted to monitor psychological well-being among DPT students. All enrolled DPT students were invited to participate voluntarily, with the option to opt out at any time. No incentives were provided. The **DASS-21** is administered electronically at each midterm and used to measure symptoms across the three domains throughout the academic year, tracking changes over the 3-year program. Students are completing the survey anonymously to encourage honest reporting. The DASS-21 subscales (Depression, Anxiety, Stress) were scored according to standardized scoring guidelines with the collected data. Subscale totals were calculated and categorized by symptom severity to identify patterns across cohorts. Survey responses were downloaded into secure, de-identified datasets. The study is ongoing, and standard statistical analysis will be used when full three-year data sets are obtained.

Results:

Moderate, severe, and extremely severe symptoms of depression, anxiety, and stress were identified across cohorts 3-5. Across domains, moderate symptoms comprise the largest proportion of elevated distress, while severe and extremely severe symptoms are less prevalent but recur across multiple semesters, with greater variability observed for anxiety and depression compared with stress. Since the study is still in progress, percentages were used to summarize baseline levels and track trends across timepoints. Bar graphs were used to display semester-by-semester distribution. As the study continues over multiple cohorts, traditional statistical analysis will be used to examine longitudinal changes as additional data are collected.

Conclusion:

Based on these preliminary results, voluntary participation of DPT students utilizing the DASS-21 electronically appears to be effective in identifying the perceived level of depression, anxiety,

and stress among Faulkner University's Doctor of Physical Therapy students. Since the data are collected at midterms each semester, the completed study may prove useful in identifying trends and informing targeted support strategies. The goal of this longitudinal project is to enhance student wellness, guide program-level interventions, and contribute to a broader understanding of mental health needs within professional education

Sources

1. Bogardus J. *Mental Health Disorders in DPT Students: Identifying Needs, Support Systems, and Challenges* [dissertation]. Nova Southeastern University; 2019.
2. Eisenberg D, Lipson SK, Heinze J, et. Al. The Healthy Minds Study:2024-2025. Healthy Minds Network; 2025.
3. Lovibond SH, Lovibond PF. *Manual for Depression Anxiety Stress Scales (DASS-21)*; 2nd ed. Psychology Foundation of Australia; 1995.

A Poster

Not a Student

Physical Therapy or Physician Assistant

Faulkner University

X. BIOETHICS, HISTORY, PHILOSOPHY OF SCIENCE

Chair Cynthia Lovelace, presiding

79 - Ethical Issues Involved in Conducting Medical Research in Developing Countries

Shuntele Burns¹

¹Alabama State University

A consequence of the globalization of science and medicine is that more medical research is being conducted in developing countries, often by scientists and clinicians from wealthier countries. This research has the potential to benefit not only the local populations but people around the world. However, conducting health care research in low-income countries also raises important ethical issues. Prioritizing profit, some research entities may wish to take advantage of reduced expenses and less stringent regulations in some countries, and sufficient oversight may be lacking. Should researchers observe the same standard of care in the host countries that they would follow in their own countries, or should they be guided at least in part by local standards? How important is cultural sensitivity in conducting health care research abroad? Socially, economically, and educationally disadvantaged populations are more susceptible to coercion and exploitation, compromising their capacity to provide informed consent. Are placebo controls used more frequently in clinical trials in low-income countries, depriving participants of potentially effective treatments? Even studies conducted in accordance with rigorous medical and ethical standards and focused on diseases most prevalent in developing regions may yield treatments, therapies, and procedures that are beyond the economic reach of many of the people in these regions. What steps should be

taken to increase local access to treatments resulting from research? These and other ethical questions are essential in discussions and efforts related to health care research in developing countries.

A Poster

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Biological Sciences

Alabama State University

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Alabama Junior Academy of Science

Engineering Math and Computer Science

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2. *Mason Hilburgh, *Torpedo Bats*, Wetumpka High School, *Wetumpka*
3. Isabella Harwell, *Power Paths*, Wetumpka High School, *Wetumpka*
4. Joseph LeFevre, *A Momentum Realization Formulation of Aerodynamic Lift*, Wetumpka High School, *Wetumpka*
5. Dominic Vilaridi, *Weather Balloon*, The EDGE, *Wetumpka*
6. Jessica Shu, *ThermalPypils: A Passive Power-Saving Artificial Intelligence Driven Shell that Makes your Building Cooler in Summer and Warmer in Winter*, Auburn High School, *Auburn*
7. Jude Alabsi and Malak Alabsi, *Darth Vader*, Islamic Academy of Alabama, Homewood
8. Mia Hall and Michael Mazur, *Parametric Evaluation of a Deployable Kresling Origami Lattice Structure for Enhanced Automotive Crashworthiness*, Alabama School of Fine Arts, *Birmingham*

Life Science

1. Neil Srikantha, *Comparative Longitudinal Analysis of Antimicrobial Activity*, Hoover High School, *Hoover*
2. Zubayr Rasheed, *Evaluating CRISPR-Cas12a Efficacy in E. coli Using Blue-White Screening*, Islamic Academy of Alabama, Homewood
3. Harsha Bheemanathini, *The Effects of Menstrual Product Leachates on Planarian Survival*, Alabama School of Fine Arts, *Birmingham*
4. Leen Zidan, *Evaluating CRISPR-Cas12a Efficacy in E. coli Using Blue-White Screening*, Islamic Academy of Alabama, Homewood
5. Yasmina ghannoum, *Pure Enough?*, Islamic Academy of Alabama, Homewood
6. Annabelle Johnson, *Significance of Caffeine Reliance among Adolescents*, Central Freshman Academy, Phenix City
7. Mays Mango, *Antiparasitic properties of honey*, Islamic Academy of Alabama, Homewood
8. Minlu Wang-He, *Identification and Experimental Verification of Key Microbial Interactions Relevant to Bacterial Spot Disease in the Tomato Plants*, Davidson Academy Online, *Auburn*

Medicine, Health and Social Science

1. *Parker Thompson, *Perceived Access vs. Actual Access: Mental Health Resource Utilization among College Students*, Wetumpka High School, *Wetumpka*
2. *Finley Davisson, *The Effects of Herbal Tinctures and Plant Salves on E.coli*, Wetumpka High School, *Wetumpka*

Medicine, Health and Social Science (cont)

3. *Rhyana Mahatsente-Tewelde, *Voxel-Based Morphometry and Time Frequency Analysis of Epilepsy for Detection of Ictal Impaired Consciousness*, Northridge High School, Tuscaloosa
4. Colyn Cole, *Does Distraction Affect Reaction Time?*, Wetumpka High School, Wetumpka
5. Advitiya Kana, *Social Communication and Neural Correlates of Autism*, Hoover High School, Hoover
6. Nikita Prabhakar, *A Low Cost Portable Electrography Monitoring System for Rapid Diagnosis of Coagulopathy*, Bob Jones High School, Madison
7. Alexis Linschoten, *Mass Media: It's Influence in Parasocial Relationships and Celebrity Worship*, New Century Technology High School, Huntsville
8. Gabriel Mark, *From Personality to Pathology: Identifying Trauma in SAGEs through the Presence of Low Extraversion*, New Century Technology High School, Huntsville
9. Imisioluwa Alonge, *Sickle Cell Disease Mortality: The Role of Awareness and Early Screening*, Hoover High School, Hoover
10. Shreyas Keshava, *Methyltransferase identified to decrease sensitivity to menin inhibition in Acute Myeloid Leukemia*, Alabama School of Fine Arts, Birmingham
11. Gehad Khuzimy, *Does Multitasking Affect Memory and Focus Compared to Doing One Task at a Time?*, Islamic Academy of Alabama, Homewood
12. Jasra Star Pfannkuch, *Manifestations of Antisocial Personality Disorder in Female Adolescents' Romantic Relationships*, New Century Technology High School, Huntsville

Physical Sciences

1. *Corbin Hawkes, *Using low-cost Circuitry to detect Quantum Entanglement*, Covenant Christian Academy, Huntsville
2. Maryam Rasheed, *Microplastic Imaging: Does Filtering Your Water Really Work? - Testing the Efficiency of Widely used Filtration Method against Microplastic at a Micro Level*, Islamic Academy of Alabama, Homewood
3. Jackson Gilmore, *Up Up and Away*, Wetumpka high school, Wetumpka
4. Jackson Taylor, *up up and away*, Wetumpka high school, Wetumpka
5. Madeline Harper, *Stabilization of Anthocyanin for Natural Food Color*, St. John the Baptist Catholic Middle School, Madison
6. Noor Abouhouli, *The Effect of Wind Speed and Internal Baffle Geometry on Airflow and Cooling Performance in an Adobe Windcatcher Model*, Islamic Academy Of Alabama, Homewood
7. Mira Menon, *Dynamic Modulation of Axonal Trafficking of Synaptic Vesicles in Activity-Dependent Presynaptic Function*, Loveless Academic Magnet School, Montgomery
8. Leen Dabbous, *Microplastic Imaging: Does Filtering Your Water Really Work?*, Islamic Academy of Alabama, Homewood
9. Junehyuk Lee, *Use of Leucomethylene Blue to Detect Bleach*, Auburn Junior High School, Auburn
10. Greeshma Vinoy, *Fabrication of Laser-induced Carbon-based Interdigitated Electrodes for Vitamin B12 Sensing via Impedance change*, Alabama School of Fine Arts, Birmingham

Environmental Science

1. Jeremiah Ray, *Simulating Narcotic Introduction in a Micro-Ecosystem: Effects of Diphenhydramine on Crickets and Worms*, Wetumpka High School, Wetumpka
2. Kira LeFevre, *Will Different Volume of Tanks Affect the Size of Fish Growth? A Space Comparison for Increasing Meat Production*, Wetumpka High School, Wetumpka
3. Margot Beukelman and Leah Imbragulio, *The Effects of Land Usage and MS4 Capacities on PFAS in the Cahaba River*, Hoover High School, Hoover
4. Naanya Kana, *Silent Seas: Anthropogenic Vessel Noise and Marine Mammal Communication*, Hoover High School, Hoover
5. Anushka Behara, *Epigenetic Memory of Environmental Pollution: Long-Term Effects of Urban Toxicants on Planarian Regeneration*, Vestavia Hills High School, Vestavia Hills
6. Saisha Sahoo, *Investigating the Phytoremediation Abilities of Pontederia Cordata in the Metals Cobalt, Lead, and Lithium*, Alabama School of Fine Arts, Birmingham
7. Rania Masri, *The Effects of Olive Oil on the Growth and Life Span of Caenorhabditis Elegans*, Alabama School of Fine Arts, Birmingham
8. Tennaë Chowfen, *Scrolling into the Season Early: How TikTok Shapes Gen Z's Emotional Experience of Christmas*, New Century Technology High School, Huntsville

*Gorgas Finalist

Gorgas Scholarship Competition

1. Bonds, Kennedy, *Do certain hairstyles help servers make more money?*, Wetumpka High School, Wetumpka
2. Chumley, Carlynn, *The Effect of Music Tempo on Sprint Speed in High School Students*, Wetumpka High School, Wetumpka
3. Davisson, Finley, *The effects of herbal tinctures and plant salves on E.coli*, Wetumpka High School, Wetumpka
4. Dinh, Nathan, *Digitizing Handwritten Documents with the help of AI*, Wetumpka High School, Wetumpka
5. Hawkes, Corbin, *Using low-cost Circuitry to detect Quantum Entanglement*, Covenant Christian Academy, Huntsville
6. Hilburgh, Mason, *Blast Off The (Torpedo) Bats!!*, Wetumpka High School, Wetumpka
7. Mahatsente Tewelde, Rhyana, *Voxel-Based Morphometry and Time Frequency Analysis of Epilepsy for Detection of Ictal Impaired Consciousness*, Northridge High School, Tuscaloosa
8. Mracek, James, *How Accurate is a low cost Colorimeter*, Wetumpka High School, Wetumpka
9. Myrick, Walter, *The Impact of Social Media Usage on High School Students' Stress Levels*, Wetumpka High School, Wetumpka
10. Thompson, Parker, *Analysis of Harmful Chemical Residues in Common Clothing*, Wetumpka High School, Wetumpka

SECTION OFFICERS, 2025-2026 Section

I: Biological Sciences:

- Co-Chair: (2026) Jean-Pierre Arditi, The University of South Alabama
Jarditi@southalabama.edu
- Co-Chair: (2026) Cecilia Johnson, Instructor of Biology. Jacksonville State University,
cdavis35@jsu.edu

Section II: Chemistry:

- Chair: (2026) Sharifah Albraiki, salbraiki@jsu.edu
- Vice-Chair: Meikun Shen, mshen@jsu.edu

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- Chair: (2026) Padma Guggilla, Dept. of Physics, Chemistry, and Mathematics, Alabama A&M, Normal, AL, padmaja.guggilla@aamu.edu
- Vice-Chair (2026) Youngsoo Kim, Dept of Mathematics, Tuskegee University,
ykim1@tuskegee.edu

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- Chair: (2026), Dr. Ravi Gollapalli, rgollapalli@una.edu
- Vice Chair: (2026) Dr. Dony Dongqing Pan, dpan1@una.edu

Section V: Social Sciences:

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- Co-Chair: (2026) Mohit Anand, Division of Business and Accounting, Miles College, Fairfield, AL 35064, manand@miles.edu

Section VI: Anthropology:

- Chair: (2026) Jordan Kiper. Department of Anthropology, The University of Alabama at Birmingham, jkipper@uab.edu
- Vice Chair: Camille Westmont, Department of Anthropology, The University of Alabama at Birmingham, westmont@uab.edu

Section VII: STEM Education:

- Co-Chair: (2026). Uduak Afangideh, uafangideh@faulkner.edu
- Co-Chair: (2026). Diann Jordan, djordan@alasu.edu

Section VIII: Environmental and Earth Science:

- Chair: (2026) Mojtaba Enayati, 119 CMMS, Troy University, Troy, AL 36082,
menayati@troy.edu
- Vice Chair: (2026) Aboulfazl Barati, 119 CMMS, Troy University, Troy, AL 36082,
abarati@troy.edu

Section IX: Health Sciences:

- Chair: (2026) Jean-Pierre Arditi, Jarditi@southalabama.edu
- Vice Chair: Stephanie Varghese, PhD, MBA, FFAO | OPSEL Instructor. The University of Alabama at Birmingham, bvarghese@uab.edu

Section X: Bioethics and History and Philosophy of Science:

- Dr. Dennis Sansom, Professor and Chair Emeritus, Department of Philosophy and Religion, Samford University, Birmingham, AL, dlsansom@samford.edu
- Special Section Alabama Honors Scholars:
- Chair: (2026) Douglas Marshall, Dean of the Honors, The University of South Alabama, dougmarshall@southalabama.edu

**THE 104TH ANNUAL MEETING OF
THE ALABAMA OF SCIENCE**

**TO BE HOSTED BY
ALABAMA STATE UNIVERSITY
MONTOMERY, ALABAMA**

