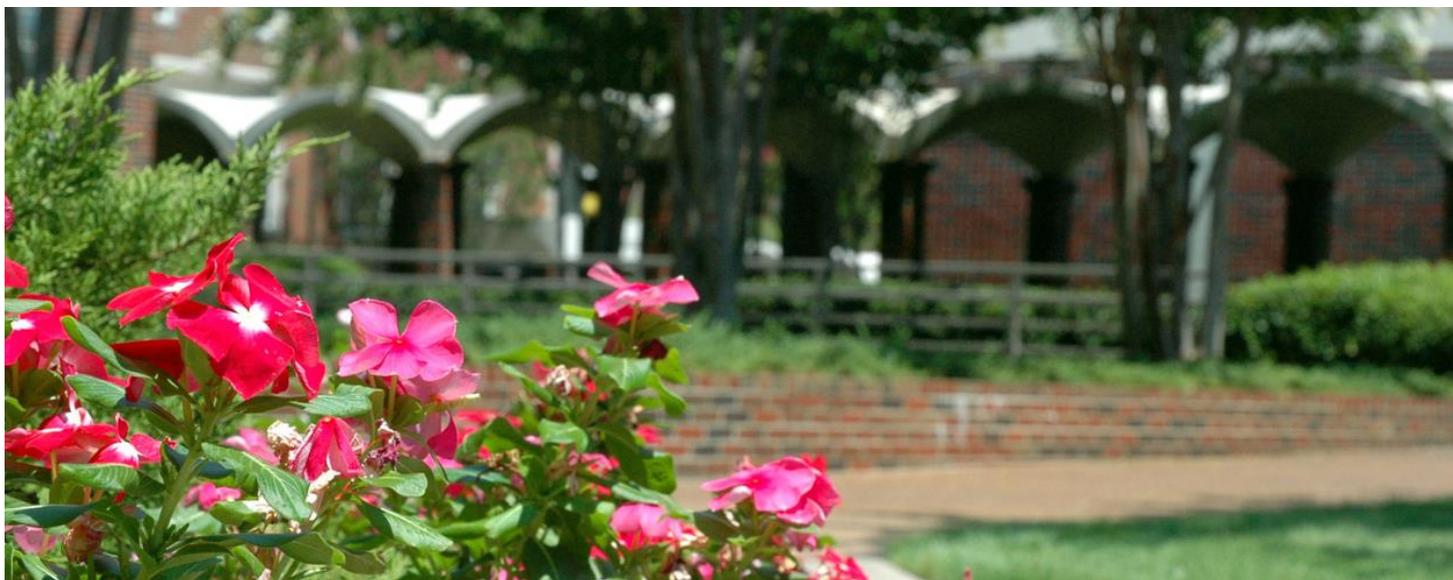


Western Collegiate Division Meeting of the Tennessee
Academy of Sciences

Hosted By:

Christian Brothers University

Memphis, Tennessee



Saturday, April 22, 2023

For more information, please contact Dr. James Moore (jmoore25@cbu.edu) or Dr.
Lyndsey Pierson (Lpierson@cbu.edu)

Schedule of Events
Tennessee Academy of Science
April 22, 2023
Christian Brothers University

Registration	Cooper-Wilson Foyer	8:00
Welcome and Introduction	CW 105	8:15
Sessions 1- 3 Oral Presentations	Various Rooms	8:30 – 12:00

Session One: Organismal Biology AH 122

Judges: Dr. Jerad R. Henson – Christian Brothers University
Dr. Karl N. Rohrer – Christian Brothers University
8:30 – 9:30; 9:45 – 10:45
Moderator: Dr. Jerad R. Henson

Session Two: Health & Medical Sciences / Physics & Astronomy CW 212

Judges: Dr. Dr. John Varriano – Christian Brothers University
Dr. Dr. Lyndsey M. Pierson – Christian Brothers University
8:30 – 9:30
Moderator: Megan Mosier

Session Three: Cell and Molecular Biology CW 212

Judges: Dr. John Varriano – Christian Brothers University
Dr. Lyndsey M. Pierson – Christian Brothers University
9:45 – 10:15
Moderator: Megan Mosier

Session Four: Cell and Molecular Biology CW 105

Judges: Dr. William E. Gundling – Christian Brothers University
Dr. James E. Moore – Christian Brothers University
8:30 – 9:30; 9:45 – 10:45
Moderator: Dr. William E. Gundling

Session 4 Poster Presentations	Cooper-Wilson Foyer	10:45 – 11:15
Lunch	Sabbatini Lounge Thomas Center	11:15 – 12:00

Closing:

Announcement of Best Paper Awards
Business Meeting

Session Schedule by Topic and Time

Time	[1] Organismal Biology – AH 122	[2] Health & Medical Sci / Physics & Astronomy – CW 212	[4] Cell & Molecular Biology – CW 105
8:30	Prolactin profile of black-bellied whistling ducks across their breeding season. Savannah Crockett* and Jerad R. Henson , Christian Brothers University, Memphis, TN (SC, JRH).	Effect of signal of interest duration on ultrasonic backscatter measurements of cancellous bone. Blake Lawler* , Brent Hoffmeister , Ann Viano , and Joel Mobley , Rhodes College, Memphis, TN (BL, BH, AV), University of Mississippi, Oxford, Mississippi (JM).	The effects of ghrelin: bone, mitochondria, and senescence. Ainsley Harrington* and Neha Dole , Christian Brothers University, Memphis, TN (AH), University of Arkansas for Medical Sciences, Little Rock, AR (ND).
8:45	Changes in black-bellied whistling ducks' stress across the breeding season. Pierce Wirsig* , William E. Gundling , and Jerad R. Henson , Christian Brothers University, TN (PW, WEG, JRH).	Genomic differences within the prefrontal cortex among psychiatric disorders. Molly E. Gallagher* and William E. Gundling , Christian Brothers University, Memphis, TN (MEG, WEG).	Sex determination of black bellied whistling ducks using qPCR. Patric C. Becton* , Jerad R. Henson , William E. Gundling , Christian Brothers University, Memphis, TN (PB, JRH, WEG).
9:00	Hatch success and brood parasitism in black-bellied whistling ducks. Jalen Faulk* and Jerad R. Henson , Christian Brothers University, Memphis, TN (JF, JRH).	Does your favorite drink cause enamel softening? Karsen Springfield* and D. Versluis-Tantbirojn, DDS, MD, PhD , Christian Brothers University, Memphis, TN (KS), University of Tennessee Health Science Center, Memphis, TN (DVT).	Using DNA barcoding's molecular analysis to determine the relatedness of migratory patterns between brood parasitic <i>Dendrocygna autumnalis</i> individuals and their origin. Luis F. Micolta* , Jerad R. Henson William E. Gundling , Christian Brothers University, Memphis, TN (LM, JRH, WEG).
9:15	Determining body size trends of fossil <i>Phrynosomatidae</i> from the late Quaternary. Miryana Rafael* , David Ledesma , and Melissa Kemp , Christian Brothers University, Memphis, TN (MR), The University of Texas at Austin, Austin, TX (DL, MK).	The effects of the COVID-19 pandemic on vision. Lauren Malone* and Chaka Norwood, OD , Christian Brothers University, Memphis, TN (LM), Norwood Family Eye Care Clinic, Memphis, TN (CN).	Blood plasma analysis for development of blood metabolite index for mallards. Amy Guerrero , Jerad Henson Jacob Bethell , Doug Osborne , Therin Bradshaw , Heath Hagy , Auriel Fournier , Christian Brothers University, Memphis, TN (AG, JH), University of Arkansas at Monticello – College of Forestry, Agriculture, and Natural Resources, Monticello, AR, (JB, DO), Western Illinois University, Macomb, IL (TB), U.S. Fish and Wildlife Service, Stanton, TN (HH), University of Illinois at Urbana-Champaign, Havana, IL (AF).
9:30	BREAK	BREAK	BREAK
Time	[1] Organismal Biology – AH 122	[3] Cell & Molecular Biology – CW 212	[4] Cell & Molecular Biology – CW 105
9:45	Site specificity of the monogenean parasite <i>Onchocleidus</i> in bluegill sunfish. Jesus Rivas-Hernandez* and Kaitlin A. Gallagher , Christian Brothers University, Memphis, TN (JR, KAG).	Identifying potential Dube3a substrates involved in the symptomatology of Dup15q syndrome. Andrea Huerta* , Ben Geier , and Lawrence T. Reiter , Christian Brothers University, Memphis, TN (AH), University of	Differential gene expression of the p53 pathway in osteosarcoma. Marissa H Harrison* and William E. Gundling , Christian Brothers University, Memphis, TN (MH, WEG).

		<i>Tennessee health Science Center, Memphis, TN (BG, LTR).</i>	
10:00	Immunocompetence of black-bellied whistling ducks across the nesting season. Chisom Azogini* , Karl N. Rohrer , and Jerad R. Henson , <i>Christian Brothers University, Memphis, TN (CA, KNR, JRH).</i>	Isolation of EF-hand calcium-binding protein from <i>Punica granatum</i> . A. Baez Jimenez* and Dennis Merat , <i>Christian Brothers University, Memphis, TN (ABJ, DM).</i>	Historical occurrence of the amphibian killing fungus <i>Batrachochytrium dendrobatidis</i> in black spotted newts. Clarissa Bustamante* , Ryan Arnott , Maia Rogers , Anat Belasen , Kelly Zamudio , Drew Davis , <i>Christian Brothers University, Memphis, TN (CB)</i> , <i>University of Texas at Austin, Austin, TX (RA, MR, AB, KZ, DD).</i>
10:15	Prevalence of <i>Elhrilchia</i> and <i>Rickettsia</i> in ticks in southwest Tennessee. Jazmin Hernandez* , William E. Gundling , and Kaitlin A. Gallagher , <i>Christian Brothers University, Memphis, TN (JH, WEG, KAG).</i>		Assessing the role of Dube3a in regulating Piezo mechanosensitive ion channels in <i>Drosophila melanogaster</i> . Eli Coronado* , Logan Neely , Ben Geier , Lawrence Reiter , <i>Christian Brothers University, Memphis, TN (EC)</i> , <i>University of Tennessee Health Science Center, Memphis, TN (LN, BG, LR).</i>
10:30	Effects of <i>Lingustrum sinense</i> on surrounding flora. Emma Sorette* and James E. Moore , <i>Christian Brothers University, Memphis, TN (ES, JEM).</i>		Effect of osmolar stress on human meibomian gland epithelial cells. Madison Z Stevens* , Amanda Prislowsky , Nawajes Mandal , <i>Christian Brothers University, Memphis, TN (MZS)</i> , and <i>University of Tennessee Health Science Center, Memphis, TN (AP, NM).</i>
10:45	Poster Session		
11:15	Lunch		
12:00	Announcement of Awards		

Session One Talk Titles and Authors: Organismal Biology

Moderator: Dr. Jerad R. Henson

- 8:30. Prolactin profile of black-bellied whistling ducks across their breeding season. **Savannah Crockett*** and **Jerad R. Henson**, *Christian Brothers University, Memphis, TN (SC, JRH).*
- 8:45. Changes in black-bellied whistling ducks' stress across the breeding season. **Pierce Wirsig***, **William E. Gundling**, and **Jerad R. Henson**, *Christian Brothers University, TN (PW, WEG, JRH).*
- 9:00. Hatch success and brood parasitism in black-bellied whistling ducks. **Jalen Faulk*** and **Jerad R. Henson**, *Christian Brothers University, Memphis, TN (JF, JRH).*

9:15. Determining body size trends of fossil *Phrynosomatidae* from the late Quaternary. **Miryana Rafael***, **David Ledesma**, and **Melissa Kemp**, *Christian Brothers University, Memphis, TN (MR), The University of Texas at Austin, Austin, TX (DL, MK)*.

9:30. BREAK

9:45. Site specificity of the monogenean parasite *Onchocleidus* in bluegill sunfish. **Jesus Rivas-Hernandez*** and **Kaitlin A. Gallagher**, *Christian Brothers University, Memphis, TN (JR, KAG)*.

10:00. Immunocompetence of black-bellied whistling ducks across the nesting season. **Chisom Azogini***, **Karl N. Rohrer**, and **Jerad R. Henson**, *Christian Brothers University, Memphis, TN (CA, KNR, JRH)*.

10:15. Prevalence of *Elhrilchia* and *Rickettsia* in ticks in southwest Tennessee. **Jazmin Hernandez***, **William E. Gundling**, and **Kaitlin A. Gallagher**, *Christian Brothers University, Memphis, TN (JH, WEG, KAG)*.

10:30. Effects of *Lingustrum sinense* on surrounding flora. **Emma Sorette*** and **James E. Moore**, *Christian Brothers University, Memphis, TN (ES, JEM)*.

Session Two Talk Titles and Authors: Health & Medical Sciences / Physics & Astronomy

Moderator: Dr. Lyndsey M. Pierson

8:30. Effect of signal of interest duration on ultrasonic backscatter measurements of cancellous bone. **Blake Lawler***, **Brent Hoffmeister**, **Ann Viano**, and **Joel Mobley**, *Rhodes College, Memphis, TN (BL, BH, AV), University of Mississippi, Oxford, Mississippi (JM)*.

8:45. Genomic differences within the prefrontal cortex among psychiatric disorders. **Molly E. Gallagher*** and **William E. Gundling**, *Christian Brothers University, Memphis, TN (MEG, WEG)*.

9:00. Does your favorite drink cause enamel softening? **Karsen Springfield*** and **D. Versluis-Tantbirojn**, **DDS, MD, PhD**, *Christian Brothers University, Memphis, TN (KS), University of Tennessee Health Science Center, Memphis, TN (DVT)*.

9:15. The effects of the COVID-19 pandemic on vision. **Lauren Malone*** and **Chaka Norwood**, **OD**, *Christian Brothers University, Memphis, TN (LM), Norwood Family Eye Care Clinic, Memphis, TN (CN)*.

9:30. BREAK

Session Three Talk Titles and Authors: Cell & Molecular Biology

Moderator: Dr. Lyndsey M. Pierson

- 9:45. Identifying potential Dube3a substrates involved in the symptomatology of Dup15q syndrome. **Andrea Huerta***, **Ben Geier**, and **Lawrence T. Reiter**, *Christian Brothers University, Memphis, TN (AH)*, *University of Tennessee health Science Center, Memphis, TN (BG, LTR)*.
- 10:00. Isolation of EF-hand calcium-binding protein from *Punica granatum*. **A. Baez Jimenez*** and **Dennis Merat**, *Christian Brothers University, Memphis, TN (ABJ, DM)*.

Session Four Talk Titles and Authors: Cell & Molecular Biology

Moderator: Dr. William E. Gundling

- 8:30. The effects of ghrelin: bone, mitochondria, and senescence. **Ainsley Harrington*** and **Neha Dole**, *Christian Brothers University, Memphis, TN (AH)*, *University of Arkansas for Medical Sciences, Little Rock, AR (ND)*.
- 8:45. Sex determination of black bellied whistling ducks using qPCR. **Patric C. Becton***, **Jerad R. Henson**, **William E. Gundling**, *Christian Brothers University, Memphis, TN (PB, JRH, WEG)*.
- 9:00. Using DNA barcoding's molecular analysis to determine the relatedness of migratory patterns between brood parasitic *Dendrocygna autumnalis* individuals and their origin. **Luis F. Micolta***, **Jerad R. Henson** **William E. Gundling**, *Christian Brothers University, Memphis, TN (LM, JRH, WEG)*.
- 9:15. Blood plasma analysis for development of blood metabolite index for mallards. **Amy Guerrero**, **Jerad Henson** **Jacob Bethell**, **Doug Osborne**, **Therin Bradshaw**, **Heath Hagy**, **Auriel Fournier**, *Christian Brothers University, Memphis, TN (AG, JH)*, *University of Arkansas at Monticello – College of Forestry, Agriculture, and Natural Resources, Monticello, AR, (JB, DO)*, *Western Illinois University, Macomb, IL (TB)*, *U.S. Fish and Wildlife Service, Stanton, TN (HH)*, *University of Illinois at Urbana-Champaign, Havana, IL (AF)*.
- 9:30. BREAK**
- 9:45. Differential gene expression of the p53 pathway in osteosarcoma. **Marissa H Harrison*** and **William E. Gundling**, *Christian Brothers University, Memphis, TN (MH, WEG)*.

- 10:00. Historical occurrence of the amphibian killing fungus *Batrachochytrium dendrobatidis* in black spotted newts. **Clarissa Bustamante***, **Ryan Arnott**, **Maia Rogers**, **Anat Belasen**, **Kelly Zamudio**, **Drew Davis**, *Christian Brothers University, Memphis, TN (CB), University of Texas at Austin, Austin, TX (RA, MR, AB, KZ, DD).*
- 10:15. Assessing the role of Dube3a in regulating Piezo mechanosensitive ion channels in *Drosophila melanogaster*. **Eli Coronado***, **Logan Neely**, **Ben Geier**, **Lawrence Reiter**, *Christian Brothers University, Memphis, TN (EC), University of Tennessee Health Science Center, Memphis, TN (LN, BG, LR).*
- 10:30. Effect of osmolar stress on human meibomian gland epithelial cells. **Madison Z Stevens***, **Amanda Prislowsky**, **Nawajes Mandal**, *Christian Brothers University, Memphis, TN (MZS), and University of Tennessee Health Science Center, Memphis, TN (AP, NM).*

Session Five Poster Titles and Authors: Various Topics

1. The relationship between ultrasonic properties and hair follicle density of human scalp. **Phyu Sin M. Myat***, **Cecille Labuda**, **Blake C. Lawler**, **Shona C. Harbert**, **Ann Viano**, and **Brent K. Hoffmeister**. *Rhodes College, Memphis, TN, and University of Mississippi, Oxford, MS.*
2. Testing two ultrasonic bone assessment techniques using a bone simulating material. **Kate Hazelwood*** and **Brent Hoffmeister**, *Rhodes College, Memphis, TN.*

Abstracts

Session One: Organismal Biology
Moderator: Dr. Jerad R. Henson

- 8:30. Prolactin profile of black-bellied whistling ducks across their breeding season. **Savannah Crockett*** and **Jerad R. Henson**, *Christian Brothers University, Memphis, TN (SC, JRH).*

Black-bellied Whistling-ducks (BBWD) have undergone a massive range expansion that reached Memphis, TN in the last 15 years. BBWD form lifelong pair bonds and interestingly both incubate. Incubation and parental behaviors are known to be mediated by the hormone prolactin. The goal of this experiment is to compare prolactin levels in male versus female BBWDs across the breeding season. We hypothesize that prolactin levels will increase in incubating males and females. We caught and blood sampled 21 incubating BBWD from nest boxes in the Memphis area (16 females and 6 males). Blood was spun down and the plasma frozen until the assay was run using a prolactin ELISA kit. We found no significant difference in prolactin between sexes. This supports our hypothesis that incubating males will have similar prolactin levels to incubating females.

8:45. Changes in black-bellied whistling ducks' stress across the breeding season. **Pierce Wirsig***, **William E. Gundling**, and **Jerad R. Henson**, *Christian Brothers University, TN (PW, WEG, JRH)*.

Primarily found in South and Central America, Black-bellied Whistling-ducks (*Dendrocygna autumnalis*, BBWD) Have rapidly expanded their range. They now, breed between May to September into the southern United States. Little is known about the cause of the range expansion or how the change in latitude is affecting their wellbeing. Life history events such as migration, molt, and reproduction are known to alter bird's stress which can affect immunocompetence and body condition. We hypothesized that stress would change across the breeding season and nesting stage of BBWD that nest in SW Shelby County, TN. We measured stress effects on immunocompetence via Heterophil-Lymphocyte ratios and body condition via weight. We determined how time of breeding season and stage of nesting alter the duck's Heterophil ratio or weight. We found that there is no significant difference in these values throughout the breeding season.

9:00. Hatch success and brood parasitism in black-bellied whistling ducks. **Jalen Faulk*** and **Jerad R. Henson**, *Christian Brothers University, Memphis, TN (JF, JRH)*.

Black-bellied Whistling Ducks, *Dendeocygna autumnalis*, are cavity-nesting waterfowl that have recently migrated north of their native range and formed a reproducing population in Memphis, TN. These birds form life-long pairs, both the male and female incubate, and have prevalent brood parasitism. It was suspected that visibility, proximity to other nests, and proximity to water would affect nest use, hatch success, and brood parasitism. Nest boxes were placed at various locations and records were taken each week on the number of eggs present and boxes inhabited to observe any relationship. Overall, the location of the boxes was found to influence nest use and parasitism rates.

9:15. Determining body size trends of fossil Phrynosomatidae from the late Quaternary. **Miryana Rafael***, **David Ledesma**, and **Melissa Kemp**, *Christian Brothers University, Memphis, TN (MR)*, *The University of Texas at Austin, Austin, TX (DL, MK)*.

The purpose of the research was to find a trend in body size evolution for phrynosomatid lizards. A DSLR camera was used to photograph 800 fossil bones, consisting of five cranial bones. Each of the bones were measured using ImageJ. The dentary bone was the only bone that demonstrated a relationship between the measurement of the bone and time. Of all the species, *Phrynosoma hernandesi*, showed a significant trend between size and age. Based on the results, the dentary bone was the only bone that showed a decreasing trend in body size through time and this trend could also be found in *Phrynosoma hernandesi*. These findings imply that changes in body size are evidence for the evolution of phrynosomatid lizards.

9:30. BREAK

9:45. Site specificity of the monogenean parasite *Onchocleidus* in bluegill sunfish. **Jesus Rivas-Hernandez*** and **Kaitlin A. Gallagher**, *Christian Brothers University, Memphis, TN (JR, KAG)*.

The goal of this study was to determine whether the monogenean *Onchocleidus*, a parasite of bluegill sunfish, are site specific and if their infection intensity correlates with fish length. Sunfish were collected in June 2022 via electro fishing and euthanized in the field. In the laboratory, fish length was measured and monogenean position within the gills was recorded. Although the sample size was limited, there were significantly more monogeneans on the first of the four gills and higher intensity of infection on the gills on the left side of the fish. There was also a moderate positive correlation between parasite intensity and fish length. There was, however, no significant difference in intensity between the inner and outer side of the gills. Moving forward we plan to increase the sample size and examine whether *Onchocleidus* shows any preference for position on the gill (anterior, middle, or posterior).

10:00. Immunocompetence of black-bellied whistling ducks across the nesting season. **Chisom Azogini***, **Karl N. Rohrer**, and **Jerad R. Henson**, *Christian Brothers University, Memphis, TN (CA, KNR, JRH)*.

Immunocompetence, the ability of the host to mount an immune response against a pathogen, plays a huge role in the survivability of Black-bellied whistling ducks. Nest failure and competition greatly increases stress in whistling ducks which hinders the effectiveness of their immune system. Their ability to kill pathogens is a reliable indicator of prolonged stress as nesting continues. The bacterial killing assay measures the capability of fresh plasma to kill pathogens. We predict the killing assay will show a decrease in ability to kill pathogens later in the nesting season. We plate E. coli, plasma, PBS, soy broth together and incubate at bird temperature. It was analyzed using a nanodrop spectrophotometer. Our findings indicate the bacterial killing assay did show varied inhibition of bacterial growth. While the number of samples could not show a significant difference, these findings can provide researchers with a flexible measure of immunocompetence in waterfowl.

10:15. Prevalence of *Elhrilchia* and *Rickettsia* in ticks in southwest Tennessee. **Jazmin Hernandez***, **William E. Gundling**, and **Kaitlin A. Gallagher**, *Christian Brothers University, Memphis, TN (JH, WEG, KAG)*.

The objective of this study is to document the prevalence of two bacterial pathogens, *Elhrilchia* and *Rickettsia*, in ticks located in western Tennessee. We hypothesized that there would be a higher prevalence of bacterial pathogens in forested sites in the more rural sampling location. A total of 82 ticks, representing three species (*Amblyomma americanum*, *Dermacentor variabilis*, and *Amblyomma maculatum*) were collected in the summer from two natural areas in Memphis, TN. Total genomic DNA was extracted from each tick and the presence of pathogen DNA was detected using qPCR. Thus far, all ticks have been negative for *Elhrilchia* and twelve were positive for *Rickettsia*. Overall, only 25% of ticks were carrying bacterial pathogens, however, testing is still ongoing.

10:30. Effects of *Lingustrum sinense* on surrounding flora. **Emma Sorette*** and **James E. Moore**, *Christian Brothers University, Memphis, TN (ES, JEM)*.

Lingustrum sinense, more commonly known as Chinese privet, is an exotic invasive that forms dense thickets where one is established. These dense thickets take up resources from other

species, over time decreasing the other populations present. To observe the influence *Lingustrum sinense* has on its environment, three site types were sampled – areas with little to no privet, areas that once had privet thickets about two years ago, and areas currently with privet thickets. Fifteen 1m² quadrats were used per area to record the plant species cover and abundance within each quadrat. We also calculated Shannon Weiner diversity and evenness. The results showed that the ‘no privet’ site richness was significantly different from the other two sites in richness, Shannon Weiner Diversity, and Simpsons Diversity.

Session Two: Health & Medical Science / Physics & Astronomy

Moderator: Dr. Lyndsey M. Pierson

8:30. Effect of signal of interest duration on ultrasonic backscatter measurements of cancellous bone. **Blake Lawler***, **Brent Hoffmeister**, **Ann Viano**, and **Joel Mobley**, *Rhodes College, Memphis, TN (BL, BH, AV)*, *University of Mississippi, Oxford, Mississippi (JM)*.

Ultrasonic backscatter measurements may be used to detect changes in bone. The acquisition method for ultrasonic measurements places the interrogated bone in the acoustic near-field. The goal was to determine how signal of interest (SOI) duration affects backscatter measurements of bone in the near-field. A rigid, open-cell polymer was used to simulate cancellous bone. Signals were acquired for five transducer-specimen distances: N/4, N/2, 3N/4, N and 5N/4 where N is the near-field distance at 56.3 mm. Three backscatter parameters were measured: apparent integrated backscatter (AIB), normalized mean of the backscatter difference (nMBD), and the backscatter amplitude decay constant (BADC). nMBD was most sensitive to changes in SOI duration with a maximum change of 52%. AIB was least sensitive with a maximum change of 1.5%. SOI duration may have a strong effect on backscatter measurements of cancellous bone.

8:45. Genomic differences within the prefrontal cortex among psychiatric disorders. **Molly E. Gallagher*** and **William E. Gundling**, *Christian Brothers University, Memphis, TN (MEG, WEG)*.

There is no one cause for psychiatric disorders, but mood and psychotic disorders frequently have a genetic link, thus identifying differentially expressed genes associated with these disorders can provide further insight into the manifestation of psychiatric disorders. Mood disorders like major depressive disorder and bipolar disorder are characterized by extended periods of involuntary emotional highs and lows. Schizophrenia is a psychotic disorder, characterized by hallucinations, delusions, and disordered thoughts. We analyzed previously published data to compare the differentially expressed genes from postmortem samples from the prefrontal cortex. For the analysis, major depressive disorder and bipolar disorder samples were combined into a single depressive disorder sample group to compare with schizophrenia and the control samples from healthy unaffected individuals. We found genes associated with synaptic pruning and synaptic plasticity to be differently expressed between individuals with schizophrenia and those with a depressive disorder.

9:00. Does your favorite drink cause enamel softening? **Karsen Springfield*** and **D. Versluis-Tantbirojn, DDS, MD, PhD**, *Christian Brothers University, Memphis, TN (KS), University of Tennessee Health Science Center, Memphis, TN (DVT)*.

Fruit juices, sports drinks, and sodas all impose dental risk because of their high acidity coupled with the high sugar content in some. When the pH of the oral cavity drops below 5.5, tooth enamel can soften and wear away. This study investigates to what degree seemingly “healthy” drinks affect enamel hardness in comparison to “unhealthy” drinks. We expect to see a correlation between beverage acidity and enamel softening. Extracted human teeth were submerged in 7 different drinks using 10 teeth per beverage including tap water as the control. pH was measured using a pH electrode. Correlation tests demonstrated a significant correlation between beverage acidity and enamel softening. Submersion in fruit juices resulted in less enamel softening than submersion in carbonated beverages.

9:15. The effects of the COVID-19 pandemic on vision. **Lauren Malone*** and **Chaka Norwood, OD**, *Christian Brothers University, Memphis, TN (LM), Norwood Family Eye Care Clinic, Memphis, TN (CN)*.

The new requirements of the COVID-19 pandemic led to a series of challenges for the health of eyes. Transitioning from being in-person and in physical environments to strictly being on electronic devices and performing daily tasks virtually introduced many individuals to their new period of headaches, eye strain, and even symptoms of Dry Eye Syndrome. The goal of this study is to explore and study the relationship between the COVID-19 pandemic and vision decline. In order to collect data on this subject, a patient questionnaire was conducted. The site of research was the Norwood Family Eye Care Clinic and consisted of a patient group of 30 individuals. Using contingency tables, the collected data was analyzed and presented as either statistically significant or insignificant.

9:30. BREAK

Session Three: Cell & Molecular Biology
Moderator: Dr. Lyndsey M. Pierson

9:45. Identifying potential Dube3a substrates involved in the symptomatology of Dup15q syndrome. **Andrea Huerta***, **Ben Geier**, and **Lawrence T. Reiter**, *Christian Brothers University, Memphis, TN (AH), University of Tennessee health Science Center, Memphis, TN (BG, LTR)*.

Duplication 15q syndrome (Dup15q) is a neurogenetic disorder characterized by developmental delays epilepsy, intellectual disability, and autism spectrum disorder (ASD). Dup15q syndrome is caused by the over-expression of ubiquitin ligase E3A (UBE3A). Our lab previously used the novel biochemical system known as Ubiquitin Activated Interaction Trap (UBAIT), to capture and detect direct *Drosophila* UBE3A (Dube3a) substrates. To identify proteins associated with Dup15q symptoms, we utilized UAS-TRiP lines to knockdown expression of candidate UBAIT proteins. Three GAL4 drivers (actin-GAL4, repo-GAL4, elav-GAL4) were crossed with TRiP lines to identify potential seizure events and motor defects. UAS-TRiP lines, Rpn10 and ArgK, displayed the strongest BSA phenotypes. Proteins that induce seizures/motor deficits will undergo downstream in vitro validation to confirm specific ubiquitination by Dube3a.

Identification of these substrates will fill a gap in our knowledge regarding direct UBE3A substrates involved in the pathogenesis of Dup15q syndrome.

10:00. Isolation of EF-hand calcium-binding protein from *Punica granatum*. **A. Baez Jimenez*** and **Dennis Merat**, *Christian Brothers University, Memphis, TN (ABJ, DM)*.

Isolation and characterization of EF-hand binding proteins in plant fruits will help identify important calcium signaling pathways that lead to maturation. By identifying calcium-binding proteins, farmers can increase or slow the rate as needed for shipment and marketing. Protein was isolated from *Punica granatum*, known as pomegranate, using hydrophobic interaction chromatography on Phenyl-Sepharose. The protein binds in the presence of calcium and elutes with EDTA. This implies a conformational change consistent with those observed in other EF-hand calcium-binding proteins. The Bradford-Dye Binding Method was used to identify the amount of protein present. We observed 1.23 mg of protein per 171.62 grams of pomegranate. Studies looking at thermal stability of the isolated proteins indicated they were less stable when heated in the presence of calcium than when treated in the absence of it.

Session Four: Cell & Molecular Biology
Moderator: Dr. William E. Gundling

8:30. The effects of ghrelin: bone, mitochondria, and senescence. **Ainsley Harrington*** and **Neha Dole**, *Christian Brothers University, Memphis, TN (AH), University of Arkansas for Medical Sciences, Little Rock, AR (ND)*.

Most individuals who are obese suffer from or are at risk for osteoarthritis (OA). With OA, the subchondral bone deteriorates, and by association, so does the cartilage and surrounding bone area. Ghrelin is an orexigenic acylated peptide hormone that helps regulate formation and metabolism. Ghrelin has proven to be protective against OA and is suppressed in obese individuals. This research aimed to identify genes that regulate mitochondrial activity and senescence targeted by ghrelin and to test their association with obesity in bone. The methods of this experiment included identifying, designing, and optimizing primer binding conditions for mitochondria and senescence genes in human and mice known to be regulated by ghrelin. Human and mouse specific primers for these genes were designed and PCR conditions were optimized. Significant evidence concluded that both mitochondrial and senescence genes were targeted by ghrelin which supports their association with obesity in bone.

8:45. Sex determination of black bellied whistling ducks using qPCR. **Patric C. Becton***, **Jerad R. Henson**, **William E. Gundling**, *Christian Brothers University, Memphis, TN (PB, JRH, WEG)*.

The purpose of this study is to see how quantitative polymerase chain reaction(qPCR) can be used to determine the sex of black-bellied whistling ducks(*Dendrocygna autumnalis*) using DNA from their blood. These ducks are not sexually dimorphic, which makes it extremely difficult to correctly identify their sex in the field. However, the extraction of the blood from the ducks allows us to more accurately determine their sex. By isolating the DNA from the blood, performing PCR, gel electrophoresis and qPCR, we can locate and amplify the W chromosome.

Since males have two Z chromosomes, it is expected that Cq scores for males will be higher than females, signifying low amplification and lack of W chromosome. The results showed that females have lower Cq scores than males since females have more amplification. This shows that qPCR can be an effective way to identify the sex of the ducks.

9:00. Using DNA barcoding's molecular analysis to determine the relatedness of migratory patterns between brood parasitic *Dendrocygna autumnalis* individuals and their origin. **Luis F. Micolta***, **Jerad R. Henson** **William E. Gundling**, *Christian Brothers University, Memphis, TN (LM, JRH, WEG)*.

The *Dendrocygna autumnalis* has become a widespread species in Memphis as of 2019. But its brood parasitic behavior has posed several threats to avian species. Brood parasitism is a parasitic reproductive strategy that impedes proper taxonomic classification and analysis of geographical range size. Thus, this experiment aims to trace potential maternal/paternal relationships between *Dendrocygna autumnalis* individuals in Memphis and South America. By isolating DNA from the duck's blood, performing PCR, gel electrophoresis, and sanger sequencing the cytochrome oxidase I gene(COI), we can generate a DNA sequence comparable to the sequences of the South American *Dendrocygna autumnalis* individuals found in the BOLD database. If there are any similarities in DNA sequences between both ducks, we can utilize these maternal/paternal connections to delimit taxonomic ambiguity. Moreover, we can predict migratory trends in brood-parasitic *Dendrocygna autumnalis* individuals.

9:15. Blood plasma analysis for development of blood metabolite index for mallards. **Amy Guerrero**, **Jerad Henson** **Jacob Bethell**, **Doug Osborne**, **Therin Bradshaw**, **Heath Hagy**, **Auriel Fournier**, *Christian Brothers University, Memphis, TN (AG, JH)*, *University of Arkansas at Monticello – College of Forestry, Agriculture, and Natural Resources, Monticello, AR, (JB, DO)*, *Western Illinois University, Macomb, IL (TB)*, *U.S. Fish and Wildlife Service, Stanton, TN (HH)*, *University of Illinois at Urbana-Champaign, Havana, IL (AF)*.

Plasma metabolites can yield valuable physiologic information about the current health state of migrating waterfowl and the habitats they select. As birds accumulate lipids from their food, they build triglycerides, and as they burn fat, there is an increase in β -hydroxybutyrate. Plasma metabolite concentrations have been found to fluctuate with daily mass change in diving ducks, and therefore can index foraging habitat quality where the birds were sampled. Our goal was to determine if plasma metabolites could also be used as an index of foraging habitat quality for dabbling ducks. We assayed blood metabolite concentrations from captive, wild-caught mallards (n=82). We found that when triglyceride levels were above 0.5, there was a significant correlation between both, triglycerides and β -hydroxybutyrate, and daily mass change in Mallards ($R^2 = 0.77$). We believe that this index could be a useful tool to assess the effectiveness of habitat management and quality.

9:30. BREAK

9:45. Differential gene expression of the p53 pathway in osteosarcoma. **Marissa H Harrison*** **and William E. Gundling**, *Christian Brothers University, Memphis, TN (MH, WEG)*.

Osteosarcoma is the most common type of cancer that starts in the bones. Cells in osteosarcoma tumors look like early forms of Osteocytes that normally help make new bone tissue, but the

bone tissue in an osteosarcoma is not as strong. One of the main pathways that may contribute to this is the p53 pathway. The p53 pathway is composed of a network of genes and their products that are targeted to respond to a variety of intrinsic and extrinsic stress signals that impact upon cellular homeostatic mechanisms to monitor the cell cycle. This signaling pathway is associated with 242 protein-coding genes. We tested for differential gene expression among genes in the p53 pathway in 5 different data sets that compared osteosarcoma to health tissues. We found genes associated with cell cycle regulation such as cyclin dependent kinases were under expressed in osteosarcoma suggesting less regulated division.

10:00. Historical occurrence of the amphibian killing fungus *Batrachochytrium dendrobatidis* in black spotted newts. **Clarissa Bustamante***, **Ryan Arnott**, **Maia Rogers**, **Anat Belasen**, **Kelly Zamudio**, **Drew Davis**, *Christian Brothers University, Memphis, TN (CB), University of Texas at Austin, Austin, TX (RA, MR, AB, KZ, DD)*

The amphibian species *Notophthalmus meridionalis* (black-spotted newts) is an endangered species that's been affected by the fungus *Batrachochytrium dendrobatidis* (Bd). Bd causes chytridiomycosis which affects their skin function and has attacked several amphibian species throughout time. The research was to determine if Bd played a role in their population decline and if it can be detected from museum specimens. Preserved specimens from South Texas and the East coast of Mexico were swabbed dating back to 1938 up to 2014. A phenol-chloroform DNA extraction protocol was done from these samples and then a quantitative PCR to determine if there was any trace of the fungus. Majority of results showed no trace of Bd fungus and only a small portion was positive which indicated that ethanol-preserved specimens could have degraded trace of Bd and also that Bd may have not been a factor in decline of these individuals.

10:15. Assessing the role of Dube3a in regulating Piezo mechanosensitive ion channels in *Drosophila melanogaster*. **Eli Coronado***, **Logan Neely**, **Ben Geier**, **Lawrence Reiter**, *Christian Brothers University, Memphis, TN (EC), University of Tennessee Health Science Center, Memphis, TN (LN, BG, LR)*.

Angelman syndrome (AS) is a genetic disorder characterized by intellectual disability, ataxia, seizures, and easy excitability. This study focuses on hyperphagia, another unique phenotype of patients with AS. Researchers know little about the physiological process responsible for these symptoms, yet investigation of Piezo proteins may provide a possible explanation. This project serves to determine whether *Drosophila* UBE3A (Dube3a) affects Piezo ion channel function leading to the gut distention phenotype. We expect that when compared to the wildtype, Dube3a loss of function mutation will down regulate Piezo and cause an increase in feeding and gut distention. Flies of different genotypes were fed yeast expressing green fluorescent protein. The abdomen of each fly was imaged, and we quantified the fluorescent intensity and gut distention. This study revealed Dube3a loss of function mutations displayed increased feeding and gut distention. Gut distention was comparable to their respective Piezo knockout counterparts, suggesting a possible relationship.

10:30. Effect of osmolar stress on human meibomian gland epithelial cells. **Madison Z Stevens***, **Amanda Prislowsky**, **Nawajes Mandal**, *Christian Brothers University, Memphis, TN (MZS), and University of Tennessee Health Science Center, Memphis, TN (AP, NM)*.

Dry eye (DE), a disease of the ocular surface where tear film homeostasis is lost causing symptoms that come from tear film instability, hyperosmolarity, ocular surface inflammation and damage. One subgroup of DE is evaporative dry eye (EDE). It stems from a condition called meibomian gland dysfunction (MGD) where the meibum, the oil-producing glands in the eyelids, become obstructed or secrete abnormally thick lipids. We will use an in vitro model to observe if there is any role of osmolar stress in the survival and functionality of meibomian gland epithelial cells (HMGECE). We hypothesize NaCl treatment leading to osmolar stress will induce cell death and activate inflammatory pathways in cultured HMGECEs. This experiment tested cell viability, activation of inflammation and cell death. We found that salt stress inhibited cell proliferation, produced inflammatory cytokines, and caused cytotoxicity in HMGECEs, providing potential evidence for the role of osmolar stress on MGD.

Posters
Session Five

1. The relationship between ultrasonic properties and hair follicle density of human scalp. **Phyu Sin M. Myat***, **Cecille Labuda**, **Blake C. Lawler**, **Shona C. Harbert**, **Ann Viano**, and **Brent K. Hoffmeister**. *Rhodes College, Memphis, TN, and University of Mississippi, Oxford, MS.*

Ultrasonic properties of human scalp may inform the use of transcranial ultrasound. The goal of this study was to determine how the number density of hair follicles affect the ultrasonic properties of human scalp. 32 specimens of formalin-fixed human scalp from four donors were measured ultrasonically to determine the speed of sound (SOS), frequency slope of attenuation (FSA) and integrated backscatter coefficient (IBC). Optical images of the specimens were analyzed using a particle counting tool in ImageJ to measure the number density of follicles in each specimen. Linear regression analysis was used to determine the correlation between follicle density and the ultrasonic properties of the specimens.

2. Testing two ultrasonic bone assessment techniques using a bone simulating material. **Kate Hazelwood*** and **Brent Hoffmeister**, *Rhodes College, Memphis, TN.*

Ultrasonic techniques are being developed to detect changes in bone caused by osteoporosis. Many bones in the body have a porous interior of cancellous bone surrounded by a non-porous layer of cortical bone. Recently, a polymer foam with a thin (~2 mm) non-porous epoxy outer layer was developed to simulate the ultrasonic properties of bone. The material was used to test two ultrasonic techniques that analyze signals reflected from the interior of bone. One technique measured AIB, a parameter which represents the frequency-averaged power in a portion of the signal. The other technique measured nMBD, a parameter which represents the power difference between two portions of the same signal. Measurements were made with and without the epoxy layer. AIB decreased 13 dB, while nMBD remained relatively unaffected. This indicates that AIB is sensitive to cortical and cancellous bone, whereas nMBD may be sensitive only to cancellous bone.