College of Science and Mathematics Festival of Research 2024

Abstracts begin on page 5 and are ordered alphabetically by last name

Podium Talk Schedule

Time	Name of Presenter	Presentation Title	Research Advisor
9:15 am	Raneen Jaber	Assessment of MRI Measurement Stability of Philips Health® dStream Achieva™ 3T Scanner	Dr. Matthew Sherwood
9:28 am	Olivia Johnson	Ash Tree Rescue at Wright State University	Dr. Don Cipollini
9:41 am	Khanzada Hasrat	Does Zn deficiency promote kidney damage?	Dr. Clintoria Williams
9:54 am	Keisha Barnes	Quantal size affects synaptic fidelity in Huntington's disease mouse neuromuscular junctions	Dr. Andrew Voss
10:07 am	Dakota McMeans	Occupational Exposure to the Pesticides Malathion and Methyl Bromide Impacts Neuromuscular Junction Anatomy.	Dr. Shannon Romer
10:20 am	Shelby Ward	C-bouton Changes Across Three Mouse Models of ALS	Dr. Sherif Elbasiouny
10:33 am	Rangarirai Makuku	FBXL16 stabilizes ERα by antagonizing FBXO45 mediated ERα ubiquitination and proteasome degradation in ER+ breast cancer.	Dr. Weiwen Long
10:46 am	Papa Andoh	Heavy metal detection using an electrochemical sensor	Dr. Suzanne Lunsford
		Session 2	
3:00 pm	Amelia Whorton	ETV1, ETS Binding sites and Where to find them	Dr. David Ladle
3:13 pm	Abdulghafar Alagili	The F-box protein FBXL16 regulates P-ERK signaling by mediating DUSP6 stability in lung adenocarcinoma that harbors KRASG12C mutation in Vitro.	Dr. Weiwen Long
3:26 pm	William Romine	Measuring Skin Temperature as an Indicator for Cognitive Flow Using a Wrist-worn Wearable	Dr. William Romine
3:39 pm	Spencer Seals	Evaluating the Deductive Competence of Large Language Models	Dr. Valerie Shalin
3:52 pm	Morgan Highlander	3D vs 2D motoneuron soma reconstructions from 60x immunohistochemistry: implications on cell characterization and somatic membrane protein expression analysis in amyotrophic lateral sclerosis	Dr. Sherif Elbasiouny
4:05 pm	Dan Cline	Sharks of Kansas: Diversification and Extinction in the Late Paleozoic	Dr. Chuck Ciampaglio
4:18 pm	Cassie Poeppelman	Systematic Review of How Development Under Chronic Hypercarbia Underlies Breathing Disorders Such as SIDS	Dr. Lynn Hartzler

Posters

Abstract & poster #	Name	Title of Abstract	Research Advisor
1	Riya Kiran Khadgi	Developing Sanger sequencing protocol to quantify mixed norovirus populations.	Dr. Abimbola Ola Kolawole
2	Suvechha Bhandari	Development of a host targeting antiviral molecule	Dr. Abimbola Kolawole
3	Makalia Robinson	Aquaporins significance in Human Astrovirus-Induced Diarrhea	Dr. Abimbola O. Kolawole
4	Olivia Blake	Silver Nanoparticles Modified Electrodes for Electroanalysis of Common Neurotransmitters	Dr. Suzanne Lunsford, PhD
6	Kaitlyn Miller	Repeated Occupational Exposure to the Organophosphate Pesticide Malathion Underlies Locomotor Performance Changes and Peripheral Neuropathy in Sprague Dawley Rats.	Dr. Shannon Romer
8	Madeline Greene	Quantifying root microbial diversity of Monterey pine (Pinus radiata) across its native range	Dr. Megan Rúa
9	Nehaal Patrick	The Implications of MDM4 Alternative Splicing In Metastatic Melanoma	Dr. Michael Markey
10	Mariah Slaughter	Quantifying the effect of soil pH and P on ectomycorrhizal exploration type in oaks (Quercus spp.)	Dr. Megan Rúa
12	Brooklyn Morris	Exploring the effects of choline treatment to attenuate dystrophic phenotype	Dr. Hongmei Ren
13	Tristan J. Coffey	3-D Simulation of Bedrock Geology, Fracture Networks, and Groundwater Flow in Crystalline Bedrock Beneath the Mirror Lake Watershed, Hubbard Brook Experimental Forest, Woodstock, New Hampshire	Dr. Christopher Barton
14	Abigail Tuttle, Benson Sparkman, Landon Shackleford, Justin Myers, Audrey McGowin	Insult of Road Salt	Dr. Audrey McGowin
15	John Karanja Kamau	Lipin1 as a potential therapeutic approach for the treatment of cardiac abnormalities in Duchenne Muscular Dystrophy	Dr. Hongmei Ren
18	Ishita Haider	Genetic analysis of α-synuclein's physiological function and pathological transformation	Dr. Quan Zhong
19	Amanda Chisholm	Endoplasmic Reticulum Stress Reduces Neuronal Activity and Axon Initial Segment Length	Dr. Keiichiro Susuki
20	Jasmine Duran	The Role of Source Trustworthiness in a Learning Task	Dr Valerie Shalin
22	Ibrahim Abdul Halim	Spinal Motor Neuron Excitability Changes in Aging	Dr. Sherif Elbasiouny
23	Jack Roades	Cadmium and Lead Levels in Light and Dark Hershey's Cocoa Powders	Dr. Audrey McGowin

24	Oakley Jones	Analysis of Cadmium and Lead in Cocoa Powders using ICP-OES	Dr. Audrey McGowin
25	Resha Shrestha	Human Genome instability at (CAG) 102 microsatellite DNA Repeats	Dr. Michael Leffak
26	Johnathan Reed	Determination of Lead and Cadmium in Cocoa Powder via Acid Digestion	Dr. Audrey McGowin
27	Jordan Shetterly, Ben Wright, Alex Grilliot, Chris Griesmeyer	Death By Chocolate: An Analysis of Cocoa Powder Cadmium and Lead Content	Dr. Audrey McGowin
28	Kole Spurgeon	Experimental Study of Molecular Saturation in the Millimeter Spectral Range	Dr. Ivan Medvedev
29	Kayci Johnson	Determining Genetic Population Structure of Endangered Northeastern Bulrush, Scirpus ancistrochaetus, using Genomic Sequences	Dr. Jeffrey Peters
30	Kalin Gerber	Spinal Motoneurons' Sex Dependent Size And Type Changes In Aging	Dr. Sherif Elbasiouny
31	Issac Reynaga	Lean Mass Changes During Aging	Dr. Sherif Elbasiouny
32	Daniel Tyree	Rotational Assignment of Isoprene in the Ground and First Five Excited States	Dr. Ivan Medvedev
33	Taylor Dommett	Friends of foes—characterizing cell type-specific toxicity of α-synuclein in yeast	Dr. Quan Zhong
34	Austin Reed	Molecular Scale Highways for Protons: Poly(Arylene Ether)s with Pendant Sulfonic Acid Groups	Dr. Eric Fossum
35	Yagami	Genetic buffering of cellular defects induced by α-synuclein	Dr. Quan Zhong
36	Kyndall Berner	The Role of Iron Metabolism in Amyotrophic Lateral Sclerosis	Dr. Shulin Ju
37	Grace Olive	Engineering Polymer Backbones for Improved Transport Properties in Blue-Emitting TADF Polymers	Dr. Eric Fossum
38	Jacob Ochs	Reduction and Removal of Hydrocarbon Contaminants with Glow Discharge Plasma	Dr. Ivan Medvedev
39	Olivia Steeves	Microplastics in Riverine Wetlands of West–Central Ohio	Dr. Katie Hossler
40	Lindsey Roberts	Lewy body-associated proteins promote cell survival against α-synuclein toxicity	Dr. Quan Zhong
44	Courtney Crone	The Formation of Prenucleation Clusters for Calcium Fluoride	Dr. Steve Higgins
45	Adeline Nshuti	Does Uromodulin Play a Role in Tacrolimus-Mediated Upregulation of the Sodium Chloride Cotransporter?	Dr. Clintoria Williams

46	Spencer Seals	Investigating the relationship between language fluency and student performance in student short answer responses	Dr. Valerie Shalin
48	Madelyn Smith	"The Effect of Repeated Occupational-Level Exposure to the Pesticide Malathion on EDL Muscle Spindles"	Dr. David Ladle
49	Keenan Callejo	Academic Performance, Self-Efficacy, and Social Support: An Analysis of First-Generation Undergraduate Students	Dr. Sarah Jackson
50	Josh Hivner	Coral reef and giant clam ecology	Dr. Volker Bahn
51	Rachel Mansfield	Birds as Sources of Nutrient Load in Reconstructed Wetlands	Dr. Volker Bahn

52	Hannah Davidson	Repeated Occupational Exposure to the Pesticide Methyl Bromide Causes Changes in Locomotor Gait	Dr. Shannon Romer
54	Andrew Deutsch	Dysregulation of Persistent Inward Currents in Spinal Motoneurons of Symptomatic SOD1-G93A Mice	Dr. Sherif Elbasiouny
55	Krisha Mehta / Yuki Kawabe	Yeast model of APOE4: uncovering cellular Impact and screening for therapeutic targets	Dr. Quan Zhong
56	Hannah Barrett	Does zinc deficiency promote renal inflammation?	Dr. Clintoria Williams
58	Kelia McMichael	The Epithelial Na+ Channel is a Zn2+ Sensitive Renal Na+ Reabsorption Pathway that Mediates Zn2+ Deficiency-induced Hypertension	Dr. Williams
60	Brooklyn Worthen	The Effects of Ecologically Relevant and Irrelevant Sounds on Earthworm Behavior in an Open Field Environment.	Dr. Dragana Claflin
61	Raegan Steele & Kyndall Berner	Investigating ALS-Associated Matrin-3 Cytotoxicity in a Yeast Model	Dr. Shulin Ju
62	Lauren Scott	Genetic interaction between two neurodegenerative disease-associated proteins	Dr. Quan Zhong
63	Jaed Duell	Impacts of invasive shrubs on native caterpillar communities	Dr. John O. Stireman
66	Arian McNeil	Repeated Occupational-level Exposure To The Pesticide Malathion Leads To Neuronal Atrophy In The Dorsal Root Ganglion	Dr. David Ladle
67	Adebayo C. Djanman	Developing a Method for Spectrophotometric Determination of Strontium Complexation with Methylthymol Blue	Dr. Steve Higgins
68	Smriti Bastakoti	Distribution and Fate of Select Non-Point Source (NPS) Pollutants in the Dayton Streams and Tributaries: Effect of Land Use in an Urban Watershed	Dr. Lindsay Starr
71	Anthony McLaughlin	Quantifying Soil Virus Abundance: The Impact of Phosphorus and pH on Viral Dynamics in Temperate Forest Soils	Dr. Megan Rua
72	Naga Gandi	Novel blockers of store-operated calcium channels	Dr. J. Ashot Kozak
73	Abacus O'Connor	Do Fungi Mediate the Competitive Success of Lonicera maackii over a Native Woody Shrub Species?	Dr. Don Cipollini
74	Preston Menke	Peer-Assisted Learning Benefits Low-Ability Learners Over High-Ability Learners	Dr. Ion Juvina
76	Sri Meghana Yerrapragada	Elucidating the biological effects of EV-associated adduct-containing DNA.	Dr. Mike Kemp
77	Sankhadip Bhadra	Potential role of Tti1 of TTT complex in regulating DNA replication checkpoint in fission yeast	Dr. Yong-jie Xu
78	Delaney Grant	Altered Proprioceptor Sensory Afferent Morphology After Sciatic Crush Injury	Dr. David Ladle
79	Shubhangi Shindkhede	Validation of a human B-cell line model to identify potential Immunotoxicants	Dr. Courtney Sulentic

80	Seth Murdock	The Enigmatic Relationship and Regulation of ERK 3, FBXL16, and FBXW7 in Breast Cancer Cell Lines	Dr. Weiwen Long

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Poster # 22- **Ibrahim Abdul Halim |** abdulhalim.2@wright.edu

Research Advisor: Dr. Sherif Elbasiouny

Spinal Motor Neuron Excitability Changes in Aging

co-authors: Ibrahim Abdul Halim, and Sherif Elbasiouny

Over 40% of older adults struggle to perform daily tasks due to age-related weakness. Recently, age-related weakness is perceived to be stemming from the neurological system. The present study examines how spinal motor neuron (MN) intrinsic excitability is affected with age. *In vitro* intracellular recording from MNs in male and female C57BL/6 mice across three age groups were used to investigate MN intrinsic properties. Our results demonstrate reduced MN excitability in the older age group. Our findings indicate aging not only affects muscles however it also affects MNs. Ultimately, these findings provide insights to the membrane mechanisms underlying age-related weakness.

Presentation is oral - **Abdulghafar Alagili |** alagili.2@wright.edu

Research Advisor: Dr. Weiwen Long

The F-box protein FBXL16 regulates P-ERK signaling by mediating DUSP6 stability in lung adenocarcinoma that harbors KRASG12C mutation *in vitro*.

Lung cancer, mainly non-small cell lung cancer (NSCLC), is the second leading cause of cancer-related deaths in the United States. Within NSCLC, lung adenocarcinoma (LUAD) is the most common subtype, and it frequently has KRAS mutations. Although FDA-approved covalent inhibitors for KRASG12C mutations have shown promising results, resistance to these inhibitors reduces their effectiveness. Both intrinsic and acquired resistances pose challenges to treatment. FBXL16, is a member of the F-box protein family, is involved in regulating the ubiquitination and stability of oncoproteins, such as C-MYC, SRC-3, and HIF1α. Activation of the MAPK pathway, particularly the overactive P-ERKs, contributes to the toxicity of LUAD. Dual-specificity phosphatases (DUSPs) can reduce this activity. Taken together, this study focuses on the role of the FBXL16-DUSP6 axis in regulating P-ERK and RAS-mediated signaling pathways, providing insights into potential therapeutic targets for LUAD treatment.

Presentation is Oral - **Papa Andoh |** andoh.3@wright.edu

Research Advisor: Dr. Suzanne Lunsford

Heavy metal detection using an electrochemical sensor

This research, which is in its final phase after the detection of cadmium and lead now focuses on the detection of Chromium. Chromium which may exist in different oxidation states will be detected by using nanoparticle enhanced sensors. The selectivity of these nanoparticles towards different oxidation states of chromium will be studied. The detections will also be performed in both acidic and basic mediums while the effect of these mediums on the detection will also be extensively studied. Regression analysis will also performed to study how these sensors perform at various concentrations of the metal.

Presentation is Oral - **Keisha Barnes |** barnes.224@wright.edu

Research Advisor: Dr. Andrew Voss

Quantal size affects synaptic fidelity in Huntington's disease mouse neuromuscular junctions

Co-authors: Keisha M. Barnes, Katherine A. Trittschuh, Andrew A. Voss, Abhyudai Singh

In this study, we further examined the synaptic depression we previously identified at the neuromuscular junction (NMJ) in the R6/2 mouse model of Huntington's disease during high-frequency nerve stimulation. Unexpectedly, we found the response to a single synaptic vesicle (quantal size) increased during stimulation in control but remained constant in R6/2. The lack of quantal size plasticity may help explain the synaptic depression in R6/2 NMJs. Additionally, computational modeling reveals a decreased refilling rate of the readily releasable pool in R6/2 NMJs. This work contributes to our understanding of motor symptoms in Huntington's disease and possible development of future treatments.

ASK (Applying Scientific Knowledge)

Poster # 56 - **Hannah Barrett |** barrett.109@wright.edu

Research Advisor: Dr. Clintoria Williams

Does zinc deficiency promote renal inflammation?

Co-authors: Jananie Rockwood, Tara-Yesomi Wenegieme, Kelia McMichael, Khanzada Hasrat, Aston Waite, Adeline Nshuti, Dalia Elased, and Clintoria R. Williams

Background: Renal inflammation is implicated in the pathogenesis of Chronic Kidney Disease (CKD) and plays a critical role in kidney damage. CKD-associated tubular damage stimulates the secretion of proinflammatory cytokines (e.g. IL-1β, IL-6, and TNF-α) which expedite CKD progression, further instigating kidney damage and inflammation. Studies have shown that zinc deficiency (ZnD) elevates oxidative stress and affects proinflammatory cytokine abundance. Based on these findings, we hypothesize that ZnD will promote renal inflammation. Experimental Design: To examine if ZnD promotes renal inflammation, wild-type adult mice (C57BL/6J) were placed on a zinc-adequate (ZnA) or zinc-deficient (ZnD) diet for 10 weeks. At week 8, a subset of the ZnD mice were placed back on a ZnA diet (ZnR) for 2 weeks. The kidneys were harvested, embedded in paraffin, and both immunohistochemistry and immunofluorescence were performed to assess morphological changes and proinflammatory cytokine abundance. Results: Compared to ZnA kidneys, morphological changes were observed in ZnD kidneys such as loss of endothelial cells in the glomerulus and abnormalities in nuclei arrangement in tubular cells. However, these changes were mitigated with the replenishment of

zinc. There were no significant changes in TNF-α expression in the renal cortex and corticomedullary junction between the ZnA and ZnD kidneys. Compared to ZnA kidneys, IL-2 expression was reduced in ZnD kidneys. ZnR kidneys mirrored IL-2 expression seen in ZnA kidneys. Conclusions: Based on these findings, we can conclude that ZnD (1) promotes abnormalities in glomerular and tubular morphology, (2) does not have a significant impact on TNF-α expression, and (3) reduces IL-2 expression. Zinc repletion was shown to mitigate the glomerular and tubular abnormalities instigated by zinc deficiency and elevate IL-2 abundance. Significance: These findings provide evidence for zinc's influence on renal inflammation, and advocate for zinc supplementation as a plausible therapeutic strategy for CKD.

Poster # 68 - **Smriti Bastakoti |** bastakoti.2@wright.edu

Research Advisor: Dr. Lindsay Starr

Distribution and Fate of Select Non-Point Source (NPS) Pollutants in the Dayton Streams and Tributaries: Effect of Land Use in an Urban Watershed

Co-authors: Abinash Agrawal, Chia-Yu Wu

This study investigates chloride, nitrate, and sulfate using Ion Chromatography (IC) and orthophosphate using UV/Vis Spectrophotometry within Dayton Streams. Atrazine, Diazinon, and Dichlorophenoxyacetic acid (2,4-D) were identified using solid-phase extraction (SPE) followed by liquid chromatography with mass spectrometry (LC-MS). According to the land use types and classification of 2019, LBS has high buildings and urbanization areas. These watersheds regulate the flow of water, recharge groundwater and habitats for aquatic life so, it is crucial to maintain water quality by balancing urbanization and farmland within these two watersheds. Statistical analysis showed significant differences (F value 1.95 and p-value 0) in water quality parameters between LBS and BCS. LBS has higher average orthophosphate, chloride, nitrate (0.12 mg/L, 94.5 mg/L and 5.79 mg/L respectively) than those in BCS, while BCS had higher sulfate concentrations due to more agricultural areas. Atrazine and Diazinon were prevalent in both watersheds, while 2,4-D was only detected in LBS (0.45 mg/L). We found higher level of contaminants (orthophosphate, chloride, nitrate, and all three pesticides) in LBS than in BCS which has fewer development areas. However, the concentrations of sulfate were found higher in BCS (more agricultural areas in BCS than in LBS). The results of this study will contribute to the development of control measures aimed at minimizing their impact on both human health and the environment.

WestRock Scholar

Poster # 36- **Kyndall Berner |** berner.25@wright.edu

Research Advisor: Dr. Shulin Ju

The Role of Iron Metabolism in Amyotrophic Lateral Sclerosis

The pathogenesis of amyotrophic lateral sclerosis (ALS) remains elusive despite various proposed mechanisms. This review focuses on the involvement of iron metabolism in the disease. Dysregulation of iron metabolism is linked to the generation of oxidative reactive species, leading to oxidative damage. A particular form of programmed cell death known as ferroptosis, characterized by iron-dependent regulated necrosis due to the accumulation of lipid peroxides, has been identified as a mediator of motor neuron cell death in ALS patients. Managing iron homeostasis through anti-ferroptosis has shown promise in protecting cells from death. Interestingly, the iron chelator deferiprone, which eliminates excess iron from the body, has emerged as a potential and effective therapeutic approach for ALS.

Poster # 77 - **Sankhadip Bhadra |** bhadra.3@wright.edu

Research Advisor: Dr. Yong-jie Xu

Potential role of Tti1 of TTT complex in regulating DNA replication checkpoint in fission yeast

Co-authors: Yong-jie Xu, Saman Khan, and Kamal Dev

DNA replication can be perturbed by various agents that slow or stall replication forks, causing replication stress. If undetected, stressed forks collapse, causing chromosomal DNA damage or cell death. In response to the stress, eukaryotic cell activates the replication checkpoint controlled by the protein sensor kinases ATR of the phosphatidylinositol-3-kinase-related kinases (PIKKs) family. The current model demonstrates that co-translational maturation of all PIKKs by TTT (Tel2-Tti1-Tti2) complex promotes their proper folding and stability. Our previously reported tel2-C307Y mutant in fission yeast eliminates Rad3 (hATR)-mediated DNA replication checkpoint (DRC) signaling pathway but moderately reduces Rad3-mediated DNA damage checkpoint (DDC) signaling pathway, suggesting a potential role of the TTT in regulating the replication checkpoint. Here, we investigated this potential function of the TTT by taking a genetic approach to analyze the functions of Tti1, the largest component of the complex. Based on our screening data of the newly identified mutants of tti1 in the DRC and DDC checkpoint pathways, we hypothesize that Tti1 regulates DRC downstream of Rad3 and may possess a Rad3 independent alternative mechanism.

Poster # 2 - **Suvechha Bhandari** | bhandari.28@wright.edu

Research Advisor: Dr. Abimbola kolawole

Development of a host targeting antiviral molecule

We developed a novel peptide molecule that could reduce the expression of an isoform of Coxsackievirus and Adenovirus Receptor (CAREx8) on the surface of polarized epithelia and, consequently, attenuate adenovirus infection. However, the level of CAREx8 reduction was low. To improve the efficiency of cellular entry and thus increase the anti-adenoviral activity of our newly developed molecule, we synthesized six different CPPs and evaluated the ability of each CPP-tagged novel peptide to significantly reduce CAREx8 expression levels and adenovirus-5 transduction in MDCK cells expressing human CAREx8. Our data suggested, targeting host for antivirals can bypass virus resistance in development.

Poster # 4 - **Olivia Blake |** blake.103@wright.edu

Research Advisor: Dr. Suzanne Lunsford, PhD

Silver Nanoparticles Modified Electrodes for Electroanalysis of Common Neurotransmitters

Co-authors Mikusa Mikusa, Papa Kofi Damte Andoh, Suzanne K. Lunsford, PhD

In recent years, nanoparticles (NPs) have become one of the key materials in the design of modern technologies such as sensors. There has been a great scientific interest in metallic NP's due to their optical, catalytic, magnetic, electronic and biological properties are appealing for various applications. Our research group, utilized the dipping of silver NPs onto the working electrode surface to detect common neurotransmitters in the presence of common interferences such as ascorbic acid, commonly known as Vitamin C. Electrochemistry has become a fundamental sensing method for monitoring the neurotransmitters by techniques such as cyclic voltammetry (CV) and differential pulse voltammetry. The AgNPs improved the sensitivity, enhanced the electron transfer, and rapid response compared to the bare electrode response in the detection of common neurotransmitters will be mainly illustrated by CV.

Poster # 49 - **Keenan Callejo |** callejo.2@wright.edu

Research Advisor: Dr. Sarah Jackson

Academic Performance, Self-Efficacy, and Social Support: An Analysis of First-Generation Undergraduate Students

This study explores the connections among academic performance, self-efficacy, and social support in college students of different majors and examines these variables within first-generation college students (N=231). Significant correlations were found among all study variables, but there was no interaction between social support and self-efficacy on GPA. No significant differences were found in social support or self-efficacy by major. Students who were active on campus had higher self-efficacy and support, whereas first-generation students reported lower self-efficacy. These findings highlight the importance of promoting social support and campus engagement, particularly for first-generation students, to enhance efficacy and academic success.

Poster # 19 - **Amanda Chisholm |** chisholm.8@wright.edu

Research Advisor: Dr. Keiichiro Susuki

Endoplasmic Reticulum Stress Reduces Neuronal Activity and Axon Initial Segment Length

Co-authors: Jennae Shelby, Islam Akhmedov, Ricky Hsu, Nathan Sheriff, Keiichiro Susuki

Our investigation of the underlying mechanisms of the neurological complications of type 2 diabetes is centered on the axon initial segment (AIS) of the neuron, which generates action potentials. In prefrontal cortices of diabetic mice with cognitive impairment, we found shortening of AIS length that reduces neuronal excitability. Endoplasmic reticulum (ER) stress induced by tunicamycin produces similar AIS shortening. Our multi-electrode array analysis of cultured mouse neurons treated with tunicamycin shows reduced neuronal activity when AIS shortening occurs. These results indicate potential AIS shortening mechanisms through known unfolded protein response pathways activated by ER stress, providing directions for further study.

Presentation is oral - **Dan Cline |** cline.74@wright.edu

Research Advisor: Dr. Chuck Ciampaglio

Sharks of Kansas: Diversification and Extinction in the Late Paleozoic

Co-authors: Chuck Ciampaglio, Ryan Shell, Lauren Fuelling

Near Manhattan, Kansas, an exposure of the Glenrock Limestone and Bennett Shale members of the Red Eagle Formation contains the boundary between the Carboniferous and Permian Periods in North America, deposited nearly 300 million years ago. Previous studies have reported abundant marine invertebrate fossils throughout the formation, but only sparse vertebrate remains from the Bennett Shale. Recent investigation has uncovered a variety of vertebrate taxa, primarily chondrichthyans, in both layers. Preliminary results suggest an increase in the number of chondrichthyan taxa from the Carboniferous to the Permian, as well as the first report of the ctenacanthiform Heslerodoides in North America.

Poster # 13 - **Tristan J. Coffey |** coffey.38@wright.edu

Research Advisor: Dr. Christopher Barton

3-D Simulation of Bedrock Geology, Fracture Networks, and Groundwater Flow in Crystalline Bedrock Beneath the Mirror Lake Watershed, Hubbard Brook Experimental Forest, Woodstock, New Hampshire

The flow of fluids in crystalline bedrock on takes place primarily through networks of intersecting fractures. Modeling of flow through a fractured media is dependent on input of the properties of fracture networks and the individual fractures that comprise them, both of which can vary with rock type. The Mirror Lake watershed, a small (0.85 km2), steep, watershed located in and adjacent to the Hubbard Brook Experimental Forest, Woodstock, NH. The bedrock geology is composed of the Silurian Rangeley schist (438-428 Ma). intruded by the Devonian Concord granite (370-365 Ma). Particle tracking is a technique used to visualize fluid flow in a discrete fracture network.

Poster # 44 - **Courtney Crone |** crone.8@wright.edu

Research Advisor: Dr. Steve Higgins

The Formation of Prenucleation Clusters for Calcium Fluoride

Co-authors: Brent Peterson

Previously, mineral nucleation was described by classical nucleation theory (CNT), a theory which is based on the thermodynamic properties of bulk materials. However, an alternative model, known as non-classical nucleation theory (NCNT), has been increasingly used to describe nucleation of minerals. This model considers the presence of thermodynamically stable ion clusters known as “prenucleation clusters” (PNCs). In this experiment, the nucleation mechanism of calcium fluoride was investigated to identify evidence of PNCs by means of the ion-selective electrode (ISE) method. It was determined that there was evidence of a similar nucleation mechanism when fluoride was in excess in comparison to calcium. However, under stoichiometrically balanced conditions, no PNC formation can be detected. It was also proven that the formation of ion pairs does not play a significant role in the results of the experiment.

Poster # 52 - **Hannah Davidson |** davidson.134@wright.edu

Research Advisor: Dr. Shannon Romer

Repeated Occupational Exposure to the Pesticide Methyl Bromide Causes Changes in Locomotor Gait

Co-authors: Davidson, H.S., McMeans, D.R., Phillips E.A., Sonner, M.J., Roberts, E.L., Stricker, J.L., Warwick, H.I., Frondorf, K.A., Ethridge, V.T., Gargas, N.M., Rohan, J., Romer, S.H.

Our objective was to identify functional and anatomical changes following occupational exposure to methyl bromide, a pesticide fumigant and known neurotoxicant. We used a nose-only exposure system to expose adult male Sprague Dawley rats to either room air, 50, 150, or 300 ppm of methyl bromide for 2 hours a day, 5 days a week for 4 weeks. Significant changes in locomotion and stability were observed coupled with a decrease in lumbar fast-type motoneurons and neuromuscular junction denervation in predominately fast-twitch skeletal muscle. We also found evidence of astrogliosis in the cerebellum, but not in the lumbar spinal cord.

Poster # 54 - **Andrew Deutsch |** deutsch.6@wright.edu

Research Advisor: Dr. Sherif Elbasiouny

Dysregulation of Persistent Inward Currents in Spinal Motoneurons of Symptomatic SOD1-G93A Mice

Co-authors: Sherif Elbasiouny

Persistent inward currents (PICs) regulate the firing of spinal motoneurons (MNs). Past studies have reported conflicting results on how PICs are affected in ALS. Also, the PIC components have never been measured in ALS before. We directly measured individual PIC components (sodium, calcium, and SKL currents) using electrophysiology voltage-clamp experiments. We show that all PIC components are altered in SOD mice, leading to an increased motoneuronal net PIC relative to WT. Specifically, sodium and calcium PICs were upregulated, whereas SKL was reduced in disease. Together, our results fill a knowledge gap on how PIC components are affected in SOD mice.

Poster # 67 - **Adebayo C. Djanman |** djanman.2@wright.edu

Research Advisor: Dr. Steve Higgins

Developing a Method for Spectrophotometric Determination of Strontium Complexation with Methylthymol Blue

Investigating how strontium (Sr) binds to methylthymol blue (MTB) is a crucial research project with environmental and analytical implications. Strontium needs in-depth research because it is present in radioactive waste streams, natural water, and it is used as a tracer in geological and biological processes. This study aims to investigate the nature of the complex formed between MTB, a well-established metallochromic indicator, and Sr. Also, this research seeks to determine essential parameters including the stoichiometry of complexation, the formation constant, the maximum absorption wavelength for the MTB:Sr complex, and the absorptivity coefficient of the complex. Using UV-Visible absorption spectroscopy, MTB was characterised as a function of solution pH. In a MTB solution, increasing the pH causes deprotonation, resulting in a bathochromic shift at 430 nm in the absorbance spectra. The molar absorptivities for the predominant MTB species at high pH along with revised acid dissociation constants have been determined. In addition, an increase in absorbance is observed at 610 nm with increasing pH. Future experiments will investigate the influence of pH on MTB:Sr complex formation. This abstract highlights the research aims and methods as the experimental data for the MTB:Sr complex is still pending. However, the results of this study will offer scientific insights into the interaction between MTB and Sr, which can be applied in different fields such as environmental sensing and analytical chemistry.

Poster # 33 - **Taylor Dommett |** dommett.4@wright.edu

Research Advisor: Dr. Quan Zhong

Friends of foes—characterizing cell type-specific toxicity of α-synuclein in yeast

Co-authors: Breonna Gillespie, Taylor Dommett, Lindsey Roberts, Annabel V. Almazan, Roselle B. Almazan, Rajalakshmi Santhanakrishnan, Pooja Shirahatti, Zoe Paxhia-poppaw, Eric Manishimwe, Angela Braunschweiger, Ishita Haider, Shulin Ju, Quan Zhong

Neurodegenerative diseases like Parkinson's and a few Dementia types share a common feature —Lewy bodies in brain neurons. The accumulation of α-synuclein, leading to Lewy body formation, is thought to disrupt cellular function, contributing to diseases. Using yeast, a unicellular eukaryotic model organism, we discovered that α-synuclein's toxicity is specific to distinct cell types. Interestingly, a family of conserved signaling proteins, which co-localizes with α-synuclein in Lewy bodies, exhibits cell type-specific pro-death or pro-survival effects. Our current hypothesis focuses on the endomembrane trafficking system and other organelles differentially affected by α-synuclein and its regulators in different types of cells.

ASK (Applying Scientific Knowledge)

Poster # 63 - **Jaed Duell |** duell.10@wright.edu

Research Advisor: Dr. John O. Stireman

Impacts of invasive shrubs on native caterpillar communities

Co-authors: John O. Stireman

Invasion by non-native species is one of the most pressing environmental threats to native ecosystems. Invasive plants may negatively impact ecosystems by not supporting native food-webs and not contributing to ecosystem processes. However, use of invasive species by native herbivores and impacts on their communities are poorly known. I examined the impact of invasive shrubs on native caterpillar communities. I found that caterpillar abundance and richness were significantly depressed on the invasive shrubs compared to native species. Herbivory was also lower on the invasive plants. These results indicate that invasive plants host fewer herbivores and contribute less to ecosystem services.

WestRock Scholar

Poster # 20 - **Jasmine Duran |** duran.5@wright.edu

Research Advisor: Dr. Valerie Shalin

The Role of Source Trustworthiness in a Learning Task

Co-authors: Trisity Carnes, Valerie Shalin

Trust in information sources is calibrated in part by a person's perception of benevolence —whether an information source intends to provide quality information (Sperber et al., 2010; Mayer et al., 1995). Seventy participants completed a learning task where they evaluated problem-solution pairs based on the Tragedy of the Commons social dilemma (Hardin, 1968). Participants were randomly assigned to receive solutions from a Malevolent Source or a Benevolent Source. Researchers collected ratings of perceived source trustworthiness and recorded whether participants accessed additional information to investigate the sources. The poster will provide results and implications for future research.

Poster # 72 - **Naga Gandi |** gandi.11@wright.edu

Research Advisor: Dr. J. Ashot Kozak

Novel blockers of store-operated calcium channels

Co-authors: Jananie Rockwood, Lijun Sun, J. Ashot Kozak

Calcium signaling is a ubiquitous phenomenon occurring in virtually every cell type in the body. In excitable cells like neurons, cardiac myocytes, or pancreatic β cells, the voltage-gated calcium channels constitute the main calcium entry pathway. In non-excitable cells, such as immune cells or fibroblasts, calcium entry primarily occurs through store-operated calcium channels (SOCC). SOCC-s are not voltage-gated but instead open when intracellular calcium stores are emptied. SOCC activity underlies many well described receptor-operated calcium entry pathways. The molecular identify of SOCCs was identified a decade ago and consists of endoplasmic reticulum calcium sensor STIM1 and the plasma membrane calcium-selective channel Orai1. Unlike the case of voltage-gated calcium channels, no specific inhibitors of Orai1 channels are presently known. In this study we ha ve screened several new compounds for their ability to inhibit Orai1/STIM1 channels using single-cell calcium imaging. The compounds were then tested in a cell based assay, measuring the T lymphocyte proliferation. The positive hits reversibly reduced calcium entry in single cells at micromolar concentrations. These compounds also reduced T-cell proliferation. We aim to discover new blocking compounds with higher affinities and fast onset rates.

Poster # 30 - **Kalin Gerber |** gerber.13@wright.edu

Research Advisor: Dr. Sherif Elbasiouny

SPINAL MOTONEURONS' SEX DEPENDENT SIZE AND TYPE CHANGES IN AGING

Co-authors: Teresa Garrett, Sherif Elbasiouny

A well-known consequence of aging is muscle weakness, the cause of which has long been attributed to muscular atrophy. However, little research has been conducted to investigate if different alpha-motoneuron (α-MN) types experience anatomical changes during aging and whether these changes are sex dependent. To answer these questions, we measured the size and density of lumbar slow (S), fast fatigue-resistant (FR), fast-intermediate (FI), and fast-fatigable (FF) α-MN types in young (3-4 months), middle-aged (11-13 months), and old (>26 months) male and female C57BL/6 mice. The four α-MN types were identified using immunohistochemistry labels via novel protocols that we developed. α-MN soma size was measured from the largest 2D cross-sectional area (LCA), and cell density was measured as the

number of α-MNs per unit tissue volume. Our results show that α-MNs undergo type and sex-dependent anatomical changes during aging. Specifically, while male and female young α-MNs have similar size, old female α-MNs are smaller than old male cells. For density, female α-MNs had lower cell density than male α-MNs. For α-MN types, larger fast cells, specifically FI, are the most vulnerable in both males and females with FI cells having declining density with aging. As the four α-MN types have never been co-labeled before in mice, these results provide novel data on the anatomical changes α-MN types undergo during aging in males *vs*. females and provide insights on the cellular mechanisms underlying motor weakness in aging.

Poster # 78 - **Delaney Grant |** grant.95@wright.edu

Research Advisor: Dr. David Ladle

Altered Proprioceptor Sensory Afferent Morphology After Sciatic Crush Injury

Traumatic peripheral nerve injuries (PNI) are caused by various injuries, including motor vehicle accidents and combat-sustained injuries. Recovery is slow, and complete recovery requires reinnervation by somatosensory and motor axons; however, there are often persistent deficits in sensory function after recovery. The recovery of proprioceptive sensory afferents and the mechanisms underlying their impaired function after injury remains largely unexplored. We demonstrated that after a sciatic nerve crush injury, the muscle spindle afferents supplied by the sciatic nerve exhibited altered morphology, characterized by a decrease in axonal width and an increase in inner rotational distance, compared to the uninjured leg.

Poster # 8 - **Madeline Greene |** greene.166@wright.edu

Research Advisor: Dr. Megan Rúa

Quantifying root microbial diversity of Monterey pine (*Pinus radiata*) across its native range

Co-authors: Dr. Megan Rúa

Forests occupy 30-40% of the total vegetated terrestrial land area and contain economically important plant species which depend on a suite of microbes to promote growth, defend against pathogens, and cycle nutrients. Yet, there is a lack of research identifying eco-evolutionary processes which structure microbe communities across broad plant ranges. I will conduct a landscape-level sampling of planted Monterey pine (Pinus radiata) to identify environmental factors that drive microbial community diversity and local adaptation. These results will improve our understanding of tree-microbe dynamics and contribute to the growing literature on eco-evolutionary processes which shape microbe communities at large scales.

Poster # 18 - **Ishita Haider |** ishita.haider@wright.edu

Research Advisor: Dr. Quan Zhong

Genetic analysis of α-synuclein's physiological function and pathological transformation

Co-authors: Yali Chi, Shuzhen Chen, Elliott Hayden, Shulin Ju, Quan Zhong

Parkinson's disease (PD), the second most common neurodegenerative disorder, is associated with mutations that alter the sequence or expression level of a small lipid-binding protein in the brain, α-synuclein. Abnormal accumulation of α-synuclein leads to the formation of prominent pathological structures like Lewy body in PD and other forms of dementia, yet the mechanism is still unclear. Here, we identified functional partners of α-synuclein when present at different levels in living cells. Our findings suggest that, under physiological conditions, α-synuclein regulates actin dynamics and endocytosis at the plasma membrane. Perturbation of these processes promotes its pathological transformation.

Presentation is oral - **Khanzada Hasrat |** hasrat.2@wright.edu

Research Advisor: Dr. Clintoria Williams

Does Zn deficiency promote kidney damage?

Co-authors: Khanzada Hasrat, Tara-Yesomi Wenegieme, Kelia McMichael, Jananie Rockwood, Hannah Barrett, Aston Waite, Adeline Nshuti, and Clintoria R. Williams

Background: Chronic kidney disease (CKD) impairs the kidneys' ability to filter blood. End stage renal disease (ERSD), which is characterized by irreversible kidney fibrosis, progresses from CKD. Significant events in kidney fibrosis include the transformation of activated renal cells into myofibroblasts which can be detected by the abundance of α-SMA, and the subsequent deposition of Extracellular Matrix Proteins (ECM). Previous studies have shown CKD patients are zinc deficient which is a critical micronutrient that is responsible for supporting several physiological processes in the body. Based on these findings, we hypothesize that zinc deficiency promotes kidney fibrosis. Experimental Design: To investigate the role of zinc in renal damage, wild type, adult mice (C57BL/6J) were on either a Zn-adequate (ZnA) or a Zn-deficient (ZnD) diet for 10 weeks. To examine the effects of Zn repletion (ZnR), at week 8, a subset of ZnD mice was returned to the ZnA diet. At the end of the study, kidneys were harvested and processed for immunohistochemistry to assess kidney fibrosis. Results: While ZnD mice had greater expression of α-SMA, enhanced ECM deposition was not observed. However, increased ECM deposition was present in ZnR mice. Conclusion: Even though ZnD promotes activation of ECM producing cells, renal fibrosis was absent. Significance: These findings indicate a complicated interplay between Zn homeostasis and kidney fibrosis that warrants further investigation. Funding: R21 DK119879, R01 DK-133698"

Presentation is oral - **Morgan Highlander |**highlander.3@wright.edu

Research Advisor: Dr. Sherif Elbasiouny

3D *vs* 2D motoneuron soma reconstructions from 60x immunohistochemistry: implications on cell characterization and somatic membrane protein expression analysis in amyotrophic lateral sclerosis

Co-authors: Sherif Elbasiouny

Relying on 2D representations of somas and considering only small portions of protein expression on the somatic membrane, existing methods for 60x immunohistochemistry morphological analysis are subject to sampling error and lack of repeatability caused by analyzer subjectivity. However, characterizing soma size and somatic protein expression precisely and reliably is of great importance for linking structural and functional changes of potassium channels in amyotrophic lateral sclerosis. Here, we present our novel and practical analytical approach using 3D soma

reconstructions and validate our somatic measurements and complete protein expression analysis by comparison to manual 2D analysis.

Poster # 50 - **Josh Hivner |** hivner.2@wright.edu

Research Advisor: Dr. Volker Bahn

Coral reef and giant clam ecology

Co-authors: Dr. Volker Bahn

Coral reefs face many threats, such as warming temperatures, acidification, fishing malpractice, and eutrophication. Giant clams may have a positive effect on coral reef health via harboring the corals' symbionts, zooxanthellae. This study investigates the effect of giant clam densities on coral reefs near the island of Koh Tao, Thailand. Roaming surveys were performed while SCUBA diving to obtain coral health and giant clam counts. Analysis was unable to show a significantly positive association between giant clams and coral health. This could be due to the distance at which the effect is observed, or relatively low abundance of clams present. *WestRock Scholar*

Presentation is oral - **Raneen Jaber |** jaber.16@wright.edu

Research Advisor: Dr. Matthew Sherwood

Assessment of MRI Measurement Stability of Philips Health® dStream Achieva™ 3T Scanner

Co-authors: Kelsie Pyle

Measurements from magnetic resonance imaging (MRI) are critical foundations to research. Research applications anticipate longitudinal stability in such measurements. Researchers will often establish normative data sets for MRI systems. The current study's main objective is to evaluate the stability of measurements from structural MRI sequences utilizing a 3T Philips scanner. This study included healthy students from WSU's Dayton campus. It was hypothesized that cortical thickness will remain unchanged across each acquisition. To accurately depict these critical measurements, specific post-processing software has shown limitations. A thorough comparison of software's segmented regions is to be conducted to precisely depict true measurement stability.

Presentation is oral - **Olivia Johnson |** johnson.2005@wright.edu

Research Advisor: Dr. Don Cipollini

Ash Tree Rescue at Wright State University

Co-authors: Don Cipollini

The invasive emerald ash borer arrived at Wright State University in 2012. Previously protected by consistent pesticide treatment since 2008, this care halted during the 2020 pandemic. Consequently, Wright State campus trees were left in varying degrees of condition which was evaluated by their diameter at breast height and canopy health. Evaluation determined that over 50% of the white and green ash trees can be saved upon treatment of pesticide use against the

emerald ash borer. Without treatment, Wright State's ash trees will be gone within the next two years resulting in loss of scenery, canopy shade, and overall biodiversity.

Poster # 29 - **Kayci Johnson |** johnson.2014@wright.edu

Research Advisor: Dr. Jeffrey Peters

Determining Genetic Population Structure of Endangered Northeastern Bulrush, *Scirpus ancistrochaetus*, using Genomic Sequences

Co-authors: Dr. Peters

Climate change and anthropogenic stressors pose a devastating conservation threat to many species. *Scirpus ancistrochaetus*, commonly called Northeastern Bulrush, is listed as endangered by the U.S. Fish and Wildlife Service (2022), and it is estimated that there are only 120 sites where it can be found in the United States. Genetic diversity is critical to conserving endangered plants. The objective of this research is to use next-generation sequencing technologies to better estimate the amount of genetic diversity remaining in *S. ancistrochaetus*, determine the distribution of the diversity, and propose methods for conservation and management.

WestRock Scholar

Poster # 24 - **Oakley Jones |** jones.1414@wright.edu

Research Advisor: Dr. Audrey McGowin

Analysis of Cadmium and Lead in Cocoa Powders using ICP-OES

Co-authors: Brooks Terry, Cunningham Chase, Riley Rush, Justin Myers, Audrey McGowin

There have been reports that commercial cocoa powders contain toxic metals, including lead and cadmium. Both lead and cadmium poisoning cause severe health issues. Following digestion in nitric acid, inductively coupled plasma optical emission spectroscopy (ICP-OES) was used to measure the concentration of cadmium and lead in two commercial cocoa powders: Hershey's Natural Unsweetened Cocoa Powder and Trader Joe's Unsweetened Cocoa Powder. Detectable amounts of cadmium were found in both samples, and concentration of lead was found to be near the instrument's limit of detection of 8 ppb.

Poster # 15 - **John Karanja Kamau |** kamau.4@wright.edu

Research Advisor: Dr. Hongmei Ren

Lipin1 as a potential therapeutic approach for the treatment of cardiac abnormalities in Duchenne Muscular Dystrophy

Cardiomyopathy is the leading cause of death in Duchenne muscular dystrophy (DMD) patients. DMD is caused by mutations in the dystrophin gene, which plays a major role in maintaining cardiac membrane stability and protecting it

from contraction-induced damage. As a result, dystrophin mutation in DMD leads to sarcolemmal instability, inflammatory cell infiltration, cellular death, and fibrosis of the cardiac muscles, eventually leading to cardiomyopathy. Currently, there is no cure for the disease. Lipin1 has dual functions acting as phosphatidic acid phosphatase required for lipid synthesis and as a transcriptional coactivator. Our current study shows that lipin1 is critical in maintaining membrane integrity and stability in the skeletal muscles of the mdx mice model for DMD. In this study, we assessed the potential therapeutic effects of lipin1 in ameliorating mdx cardiac pathology using a gene delivery approach.

Poster # 55 - **Krisha Mehta / Yuki Kawabe |** kawabe.2@wright.edu

Research Advisor: Dr. Quan Zhong

Yeast model of APOE4: uncovering cellular Impact and screening for therapeutic targets

Co-authors: Breonna Gillespie, Shulin Ju, Quan Zhong

The human APOE gene encodes an apolipoprotein critically involved in packaging and transporting lipids in the body. APOE4, a common genetic variant, is associated with an elevated risk of Alzheimer's disease. Previous studies have shown that APOE4 expression disrupts endocytic membrane trafficking and lipid metabolism in both yeast and brain cells. Here, we aim to establish a new APOE4 model in yeast, allowing us to systematically screen for human genes capable of mitigating its detrimental effects on cells. Our overarching objective is to gain deeper insights into the role of APOE4 in diseases and to identify potential therapeutic targets.

Poster # 1 - **Riya Kiran Khadgi |** khadgi.4@wright.edu

Research Advisor: Dr. Abimbola Ola Kolawole

Developing Sanger sequencing protocol to quantify mixed norovirus populations.

Co-authors: Abimbola Ola Kolawole

Our goal is to develop a protocol that I would use during my research. Our lab stores wild-type (WT) murine norovirus (MNV) and a wide array of MNV-1 with single-point mutations. Ordinarily, my study requires deep sequencing. However, the process is expensive and time-consuming, I therefore proposed using Sanger sequencing as a cheaper and faster alternative protocol to carry out my studies. As a proof of concept, I mixed WT MNV with a single-point mutant MNV (A382K) in various proportions. I then performed RNA extraction, RT-PCR, gel electrophoresis, and Sanger sequencing using an MNV capsid-specific antibody. Finally, I checked the sequencing electropherogram to locate the mutation position and subsequently developed a method to calculate the proportion of each virus in the mixture.

Presentation is oral - **Rangarirai Makuku |**makuku.2@wright.edu

Research Advisor: Dr. Weiwen Long

FBXL16 stabilizes ERα by antagonizing FBXO45 mediated ERα ubiquitination and proteasome degradation in ER+ breast cancer.

Breast cancer is the leading non-skin female cancer in the U.S. Estrogen receptor alpha (ERα) plays a pivotal role in the development and progression of ER-positive (ER+) breast cancer. Recently, F-Box and Leucine-rich Repeat Protein 16 (FBXL16), an E3 ligase, was shown to stabilize ERα in ER+ breast cancer, but its mechanism has not been fully elucidated. We hypothesize that FBXL16 stabilizes ERα by antagonizing FBXO45-mediated E3 ligase activity on ERα. These findings suggest a mechanism by which FBXL16 influences ERα signaling and potentially contributes to ER+ breast cancer initiation and progression.

Poster # 51 - **Rachel Mansfield |** mansfield.26@wright.edu

Research Advisor: Dr. Volker Bahn

Birds as Sources of Nutrient Load in Reconstructed Wetlands

Wetlands perform nutrient retention, carbon sequestration, and sediment retention services. Over 90% of Ohio's wetlands have been destroyed or degraded. Nutrient runoff from agriculture has resulted in pollution leading to eutrophication and Harmful Algal Blooms, threatening ecosystems and human health. To improve water quality, the H_2Ohio program funds wetland reconstruction to mitigate nutrient load from surrounding land. Newly restored wetlands are not reducing nutrients as expected when comparing inflows to outflows. However, bird nutrient inputs are not considered. We will conduct bird inventories and quantify bird nutrient inputs to better evaluate the nutrient reduction services of these wetlands.

Poster # 71 - **Anthony McLaughlin |** mclaughlin.59@wright.edu

Research Advisor: Dr. Megan Rúa

Quantifying Soil Virus Abundance: The Impact of Phosphorus and pH on Viral Dynamics in Temperate Forest Soils

Temperate forests provide important ecosystem services due to their biologically diverse soils. Viruses in the soil regulate population dynamics and biogeochemical cycling, but how soil fertility governs their abundance is not well understood. We quantified viral abundance in a 14-year experiment that factorially manipulated soil phosphorus (P) and pH. Together, elevated P and pH increased viral abundance 60% while independently, they lowered viral abundance ~ 50% compared to ambient conditions ($p<0.0001$). These results suggest changes to soil fertility that increase P accessibility in the soil will stimulate virus production, necessitating the inclusion of viruses in ecosystem management and conservation strategies.

Presentation is oral - **Dakota McMeans |** mcmeans.5@wright.edu

Research Advisor: Dr. Shannon Romer

Occupational Exposure to the Pesticides Malathion and Methyl Bromide Impacts Neuromuscular Junction Anatomy.

Co-authors: Martha J. Sonner, Kaitlyn Miller, Elizabeth Phillips, Joyce G. Rohan, Shannon H. Romer

Almost 1 billion pounds of pesticides are used annually in the United States. While pesticides are necessary for controlling disease, they can also pose health risks. Organophosphates like malathion (MAL) inhibit acetylcholinesterase, causing locomotor changes. Methyl bromide (MB), a pesticide fumigant, has unclear toxic mechanisms but also affects locomotion. We found skeletal muscle denervation at neuromuscular junctions (NMJs) in rats repeatedly exposed to low concentrations of MAL or MB. In MAL-exposed rats, there was denervation followed by increased fragmentation of the NMJs after 4-weeks of recovery. The effects of MB exposure, however, appeared to target fast-twitch muscles specifically.

Poster # 58 - **Kelia McMichael |** mcmichael.9@wright.edu

Research Advisor: Dr. Clintoria Williams

The Epithelial Na+ Channel is a Zn^{2+} Sensitive Renal Na^{+} Reabsorption Pathway that Mediates Zn^{2+} Deficiency-induced Hypertension

Co-authors: Kelia E. McMichael, Tara-Yesomi Wenegieme, Aston M. J. Waite, Adaku C. Ume, and Clintoria R. Williams

We reported that Zn^{2+} deficiency induces hypertension by promoting renal sodium reabsorption. We hypothesize that ENaC mediates Zn^{2+} deficiency-induced hypertension. To this end, wild-type mice were placed on a Zn^{2+}-adequate or Zn^{2+}-deficient diet. A subset of Zn^{2+} deficient mice was treated with an ENaC inhibitor. Invitro, western blot analysis performed showed that TPEN-induced ZnD stimulated both αENaC and βENaC protein expression. Immunohistochemical staining of kidneys from Zn^{2+}-deficient mice revealed αENaC protein increased compared to Zn^{2+}-adequate mice. Our findings reveal that ENaC is a Zn^{2+} sensitive renal sodium reabsorption pathway and ENaC mediates ZnD-induced hypertension

ASK (Applying Scientific Knowledge); Considine Scholar; LSAMP Scholar

Poster # 66 - **Arian McNeil |** mcneil.19@wright.edu

Research Advisor: Dr. David Ladle

REPEATED OCCUPATIONAL-LEVEL EXPOSURE TO THE PESTICIDE MALATHION LEADS TO NEURONAL ATROPHY IN THE DORSAL ROOT GANGLION

Environmental exposure to organophosphate (OP) pesticides, such as malathion, is a risk factor for neuropathy and neurodegeneration. Toxic levels of OPs irreversibly inhibit acetylcholinesterase (AchE) activity, leading to acute paralysis and even death as the neurotransmitter acetylcholine accumulates at cholinergic synapses. In addition, there is compelling evidence that repeated low-level "occupational-like" exposure to OPs is associated with somatosensory defects but the cellular mechanisms for this effect are unclear. We show sensory neuron cell size in the dorsal root ganglia is significantly reduced in rats exposed to occupational level malathion. However, co-administration of a reversible AchE inhibitor, galantamine, prevented this effect.

Poster # 74 - **Preston Menke |** menke.21@wright.edu

Research Advisor: Dr. Ion Juvina

Peer-Assisted Learning Benefits Low-Ability Learners Over High-Ability Learners

Co-authors: Dr. Ion Juvina, Jarean Carson, Bethany Rodgers, Josh Wong, Afra Moharrami Nasirabadi

This study investigated the effectiveness of peer-assisted learning (PAL) on individual performance using a relatively complex task known as Miller Analogies. Participants (N = 162) were randomly assigned to a PAL learning condition or an individual learning condition presented by a software interface. Participants were able to answer each question in a "School" session, followed by an "Exam" session with the same questions. We found a significant interaction between School and Exam sessions, where PAL benefits low-ability learners greater than high-ability learners. Classrooms should apply PAL as a learning strategy for complex curriculum.

Poster # 6 - **Kaitlyn Miller |** miller.1591@wright.edu

Research Advisor: Dr. Shannon Romer

Repeated Occupational Exposure to the Organophosphate Pesticide Malathion Underlies Locomotor Performance Changes and Peripheral Neuropathy in Sprague Dawley Rats.

Co-authors: Miller, K.M., McMeans, D.R., Sonner, M.J., Procopio, H.M., Stricker, J.L., Warwick, H.I., Phillips E.A., Ethridge, V.T., Mumy K.L., Romer, S.H.

Malathion is a wide-spectrum organophosphate pesticide registered for use in the United States since 1956. Despite known neurobehavioral impacts, there are little data available as to how repeated malathion exposures impact locomotion and the structure of motoneurons and neuromuscular junctions. To examine this, we exposed male and female adult Sprague Dawley rats to 50 mg malathion/kg body weight via subcutaneous injections daily for 4-weeks total to model occupational-like exposures. Our results suggest that the effects of repeated low-level exposure to malathion can cause peripheral neuropathy effects with locomotor changes.

Poster # 12 - **Brooklyn Morris |** morris.330@wright.edu

Research Advisor: Dr. Hongmei Ren

Exploring the effects of choline treatment to attenuate dystrophic phenotype

Duchenne Muscular Dystrophy (DMD) is a devastating progressive muscular disorder caused by a mutation in the dystrophin gene affecting approximately 1 in 3,500 males. Currently, there is no cure for this disease. Dystrophin mutation leads to enhanced inflammation, fibrosis, cell death, development, and decreased muscle function. Phosphatidylcholine, synthesized by choline, is a major phospholipid used for maintaining cell membranes. This led us to hypothesize that the dystrophic membrane integrity could be improved through treatment with choline. Concentrated choline was used to treat B10 wildtype and mdx mice with concentrated choline for one month. Compared to untreated groups, treatment with choline showed less inflammation, fewer macrophage markers, and reduced fibrosis development within the skeletal and cardiac tissue of mdx mice. We will further evaluate the effects of choline treatment on dystrophic skeletal and cardiac muscle function and explore the potential mechanism. This study will determine whether choline could be a potential therapeutic agent for the treatment of DMD.

Poster # 80 - **Seth Murdock |** murdock.21@wright.edu

Research Advisor: Dr. Weiwen Long

The Enigmatic Relationship and Regulation of ERK 3, FBXL16, and FBXW7 in Breast Cancer Cell Lines

ERK-3, a member of the atypical MAPK subfamily has proven to be much more elusive compared to its MAPK counterparts when defining its function and regulation. However, as ERK-3 has been shown to play a major role in cellular proliferation and apoptosis, the identification of its functions and interactions remains an important puzzle to be solved. Recent studies have shown that interaction between ERK-3 and FBXW7 may contribute to its downregulation. Likewise, knockdown of FBXL16 (a known regulator of FBXW7) has also been shown to result in a decrease in ERK 3 expression. The goal of this study is to shed light on the potential intertwined regulation of FBXL16, ERK-3, and FBXW7 in breast cancer cell proliferation.

Poster # 45 - **Adeline Nshuti |** nshuti.2@wright.edu

Research Advisor: Dr. Clintoria Williams

Does Uromodulin Play a Role in Tacrolimus-Mediated Upregulation of the Sodium Chloride Cotransporter?

Co-authors: Adaku C. Ume, Tara-Yesomi Wenegieme, John Kamau and Clintoria R. Williams.

Background: Tacrolimus, a calcineurin inhibitor (CNI), is a medication commonly prescribed to prevent organ transplant rejection. However, chronic CNI use has several adverse effects, including hypertension. Recent studies have revealed that the renal sodium chloride cotransporter (NCC) mediates tacrolimus-induced hypertension. However, the mechanisms underlying NCC upregulation are not fully understood. Previous studies indicate that uromodulin plays a key role in sodium and chloride handling, and blood pressure regulation. As such, we hypothesize that uromodulin mediates tacrolimus-induced NCC upregulation. Experimental design: To test this hypothesis, male C57BL/6 mice received tacrolimus (10 mg/kg/day) or vehicle (ethanol/DMSO/saline) for 21 consecutive days via intraperitoneal injection. The impact of tacrolimus on systolic blood pressure (BP) was monitored by tail-cuff plethysmography. To examine uromodulin and NCC expression, kidneys were harvested and processed for immunohistochemistry. Results: The blood pressure of mice treated with tacrolimus was significantly higher (170 mm Hg ± 3.528) compared to those treated with vehicle (120 mm Hg ± 4.252). Tacrolimus treatment also resulted in increased expression of phosphorylated NCC (pNCC) and uromodulin. Lastly, uromodulin and pNCC co-localized within the renal distal convoluted tubule (DCT). Conclusions: Tacrolimus-induced hypertension is accompanied by the upregulation and association of pNCC and uromodulin in distal convoluted tubules. Significance: Overall, these findings highlight uromodulin as a possible regulator of NCC and blood pressure. Funding: R21 DK119879, R01 DK-133698, R25DK078381

LSAMP Scholar

Poster # 38 - **Jacob Ochs |** ochs.14@wright.edu

Research Advisor: Dr. Ivan Medvedev

Reduction and Removal of Hydrocarbon Contaminants with Glow Discharge Plasma

The effectiveness of D.C. glow discharge plasma for reducing and/or removing hydrocarbon contaminants is examined. Large high vacuum (HV) or ultrahigh vacuum (UHV) chambers have a need for stages, probes, thermocouples, and many

other components to reside in the vacuum chamber. The wiring for these components is particularly susceptible to damage, especially when operating at high temperature. The off-gassing and melting of wires introduces a significant level of hydrocarbon contaminants to the chamber. The rate and effectiveness of removing these hydrocarbons through D.C. glow discharge (Ar) is examined through residual gas analysis (RGA).

Poster # 73 - Abacus O'Connor **|** oconnor.37@wright.edu

Research Advisor: Dr. Don Cipollini

Do Fungi Mediate the Competitive Success of *Lonicera maackii* over a Native Woody Shrub Species?

Co-authors: Dr. Don Cipollini

*Lonicera maackii (*Honeysuckle) is an invasive woody-shrub species in eastern U.S. Several features permit Honeysuckle to dominate. However, their ability to out-compete natives by increased arbuscular mycorrhizal fungi (AMF) colonization, decreasing AMF of the native Spicebush or fostering distinct endophyte communities is understudied. We examine these hypothesized competitive advantages by: growing Honeysuckle with/without inoculation (*Rhizophagus intraradices* or *Trichoderma harzianum*) in monoculture or alongside Spicebush; staining the leaves of both plants for endophyte-colonization; identifying endophyte community composition with culture-dependent and PCR methods. These novel insights into Honeysuckle will give information behind their high-invasiveness and lead to more in-tuned conservation management strategies.

WestRock Scholar

Poster # 37 - **Grace Olive |** olive.5@wright.edu

Research Advisor: Dr. Eric Fossum

Engineering Polymer Backbones for Improved Transport Properties in Blue-Emitting TADF Polymers

Modern commercial light sources have evolved to exclude the use of metals in exchange for industrially available organic materials. Organic light-emitting diodes (OLEDs) can be fabricated using either small molecules or polymeric emitting layers. By using polymers as the primary emitting material, different functional layers can be condensed into a single organic layer. Careful polymer engineering can be performed to optimize charge carrier mobility and injection, thus improving the overall device efficiency. This work explores the effects of distinct hole- or electron-transporting moieties on charge injection and transport for a polymeric blue-emitting device.

Poster # 9 - **Nehaal Patrick |** patrick.113@wright.edu

Research Advisor: Dr. Michael Markey

The Implications of MDM4 Alternative Splicing In Metastatic Melanoma

Co-authors: Dr. Michael Markey

Genomics characteristics of melanoma and precursor lesions, such as copy number variation and gene expression, have been investigated in detail. However, there has never been a detailed survey of splicing changes that occur during melanomagenesis. Our preliminary data indicate that splicing changes can be a very early event in melanoma tumor progression, with characteristic changes in the p53 pathway already in place in early nevi. MDM4 is upregulated in a strong majority of melanoma cases and has been described as a "key therapeutic target in cutaneous melanoma". Identifying splicing changes in human tissue specimens will tell us what the proteins produced in patients are likely to look like and provide therapeutic targets during initiation, dysplasia, and progression toward metastatic melanoma. Splicing has been recently characterized in melanoma in reports published by this and other laboratories. However, these studies have utilized new or existing data obtained by next-generation (NGS) sequencing, which rely on short reads. A difficulty associated with this type of analysis is the loss of "connectivity" data. Full transcripts are inferred from the presence of splice junction reads, but whether splice junctions co-occur in the same mRNA molecule or represent multiple unique transcripts is lost to NGS. Novel junctions can also fail to align and are discarded. To address this problem, we will use long-read (so-called "third generation") sequencing to read the entire length of transcripts intact. This will directly quantify and identify the transcripts, alternative and canonical, that are present in a sample.

Presentation is oral - **Cassie Poeppelman |** poeppelman.42@wright.edu

Research Advisor: Dr. Lynn Hartzler

Systematic Review of How Development Under Chronic Hypercarbia Underlies Breathing Disorders Such as SIDS

Development of the sensitivity of chemosensory neurons involved in the control of ventilation can be altered by environmental factors such as long-term increases in CO_2 (chronic hypercarbia). Development under chronic hypercarbic conditions may be responsible for disordered breathing, including the increased risk of sudden infant death syndrome (SIDS) in babies whose mother smoked while pregnant. Mechanisms by which exposure to chronic hypercarbia during development results in disordered breathing remain unknown. Our systematic review of ventilatory data from perinatal babies (susceptible to SIDS) and animal models for disordered breathing suggests possible mechanisms for altered chemosensitivity and likelihood of failure to thrive.

Poster # 34 - **Austin Reed |** reed.343@wright.edu

Research Advisor: Dr. Eric Fossum

Molecular Scale Highways for Protons: Poly(Arylene Ether)s with Pendant Sulfonic Acid Groups

Hydrogen fuel cells promise clean energy, but high costs and other limitations in current proton exchange membranes (PEMs) hinder widespread application. This project focuses on developing a series of sulfonated poly(arylene ether)s with unique geometries to address these issues. The synthesis of non-traditional sulfonated and non-sulfonated variants of difluorodiphenylsulfone (DFDPS) monomers provide an opportunity to develop PEMs with enhanced proton conductivity, reduced water uptake, and extended membrane lifetime while, potentially, reducing the cost compared to current materials. Successful completion of this study may bring the general adoption of hydrogen power one step closer to reality.

Poster # 26 - **Johnathan Reed |** reed.376@wright.edu

Research Advisor: Dr. Audrey McGowin

Determination of Lead and Cadmium in Cocoa Powder via Acid Digestion

Co-authorsL Shamal Chetty, Johnathan Reed, Zack White, and Braden Wickman, Justin Myers, and Audrey McGowin

In this project, the objective was to observe the concentrations of lead and cadmium in cocoa powder samples of Hersey's Special Dark, Trader Joe's, and Kroger's Baking Cocoa. The samples were digested using nitic acid and peroxide for approximately one hour then filtered. The data was gathered using Inductively Coupled Plasma (ICP) atomic emission spectrometry along with standards of each element of interest of known concentrations. Cadmium was detected in all samples.

Poster # 31 - **Issac Reynaga** | reynaga.3@wright.edu

Research Advisor: Dr. Sherif Elbasiouny

Lean Mass Changes During Aging

Co-authors: Abdul Halim, Ibrahim & Elbasiouny, Sherif

Age-related weakness is heterogenous, weakening many while barely affecting some. Developing a method to accurately measure strength is essential to deepen our understanding of age-related weakness. This study develops a conversion factor to relate lean mass to mouse strength to help predict weakness. Nuclear Magnetic Resonance techniques were utilized to measure the composition of lean mass in old mice. Relate grip strength measurements to lean mass and body mass. Our results demonstrate that mouse weight consists of 65% and 62% of lean mass in males and females, respectively. Utilizing this, strength can be accurately evaluated.

Poster # 23 - **Jack Roades |** roades.7@wright.edu

Research Advisor: Dr. Audrey McGowin

Cadmium and Lead Levels in Light and Dark Hershey's Cocoa Powders

Co-authors: Brandon Noel, Honore Kunda, Blaine Peltier, Justin Myers, Audrey McGowin

Recent reports have brought attention to possible heavy metals, including cadmium and lead, being present in consumer chocolates. To determine the validity of this statement, samples of Hershey's Special Dark Cocoa Powder and Hershey's Cocoa Powder were analyzed for heavy metals. The analysis was performed using inductively coupled plasma atomic emission spectrometry (ICP-AES) on digested samples of the two cocoa powders. The samples were digested using nitric acid to dissolve the metals into solution. After analysis of the samples and calibration standards it was determined that cadmium was detectible in the parts-per-billion (ppb) region with lead concentrations being lower.

Poster # 40 - **Lindsey Roberts |** roberts.448@wright.edu

Research Advisor: Dr. Quan Zhong

Lewy body-associated proteins promote cell survival against α-synuclein toxicity

Co-authors: Breonna Gillespie, Lindsey Roberts, Taylor Dommett, Annabel V. Almazan, Roselle B. Almazan, Rajalakshmi Santhanakrishnan, Pooja Shirahatti, Zoe Paxhia-poppaw, Eric Manishimwe, Angela Braunschweiger, Ishita Haider, Shulin Ju, Quan Zhong

A pathological hallmark of Parkinson's disease is the formation of Lewy bodies, primarily composed of abnormal protein aggregates of α-synuclein. α-synuclein accumulated in neurons causes dosage-dependent cytotoxicity. We found that, when expressed in a simple eukaryotic cell, a-synuclein is more prone to accumulate and induce cell death when cells are forced to undergo oxidative phosphorylation within mitochondria. By performing a genome-wide screen, we identified a set of Lewy body-associated proteins exhibiting conserved protective effects on cells against α-synuclein toxicity. Ongoing research focuses on the mechanism underlying cell survival in the presence of toxic levels of α-synuclein.

ASK (Applying Scientific Knowledge)

Poster # 3 - **Makalia Robinson |** robinson.368@wright.edu

Research Advisor: Dr. Abimbola O. Kolawole

Aquaporins significance in Human Astrovirus-Induced Diarrhea

Co-authors: Salina D. Daniels

Human Astroviruses (HAstV) are non-enveloped positive sense single-stranded RNA viruses. HAstV is commonly associated with diarrhea in children, the elderly, and immunocompromised individuals. However, the occurrence of HAstV-induced diarrhea remains unclear. Integral membrane proteins knowns as Aquaporins (AQPs) regulate water transportation across the cell membrane. In this study, we demonstrate the increase of AQPs 3, 4, and 10 after 3 days post infection. This implies that AQP expression may be involved in HAstV-induced diarrhea. However, the specific role of these AQPs during infection requires additional investigation.

Presentation is oral - **William Romine |** william.romine@wright.edu

Measuring Skin Temperature as an Indicator for Cognitive Flow Using a Wrist-worn Wearable

Co-authors: Tanvi Banerjee, Noah Schroeder

This research focuses on developing a framework for measuring cognitive flow using physiological data which can be readily collected through wearable sensors. In this case study, we collected data from a single participant across 79 unique activities. Based on visual inspection of the participant's skin temperature trajectories within each activity, the polynomial family of models was employed, and we found that a third-order polynomial provided the best balance between fit and parsimony. The trajectory parameters and r-square fit index for each activity resulted in predictions of the participant's flow state with moderate accuracy (AUC > 0.7). Statistical models suggest that being in flow is indicated by a positive skin temperature trajectory.

Poster # 62 - **Lauren Scott |** scott.520@wright.edu

Research Advisor: Dr. Quan Zhong

Genetic interaction between two neurodegenerative disease-associated proteins

Co-authorsL Breonna Gillespie, Annabel V Almazan, Md Moydul Islam, Shuzhen Chen, Ishita Haider, Shulin Ju, Quan Zhong

Lewy bodies, the common pathological feature of Parkinson's disease and certain types of dementia, are formed by aggregation-prone proteins like α-synuclein. Past research suggests significant genetic interaction of α-synuclein with other proteins involved in neurodegeneration, together contributing to disease. We have discovered one such interaction between α-synuclein and another neurodegenerative disease-associated protein. Co-expressing the two proteins drastically boost their toxicity and accumulation. When accumulated, both proteins tend to co-localize within the cell. Ongoing research focuses on the mechanism behind this interaction, examining the synergistic effects of the two proteins on cellular structures and functions.

Presentation is oral - **Spencer Seals |** seals.25@wright.edu

Research Advisor: Dr. Valerie Shalin

Evaluating the Deductive Competence of Large Language Models

The development of highly fluent large language models (LLMs) has prompted increased interest in assessing their reasoning and problem-solving capabilities. We investigate whether several LLMs can solve a well-studied classic deductive reasoning problem. The tested LLMs have limited abilities to solve these problems in their conventional form. We do find performance differences with changes to presentation format and content; however, they do not improve overall performance. Moreover, performance interacts with presentation format and content in unexpected ways that differ from human performance. Overall, our results suggest that LLMs have unique reasoning biases that are only partially predicted from human reasoning performance.

Poster # 46 - **Spencer Seals |** seals.25@wright.edu

Research Advisor: Dr. Valerie Shalin

Investigating the relationship between language fluency and student performance in student short answer responses

Co-authors: Kacey O'Hara, Mikayla Hensley, Noah Marlette, Lauren Pham, William Brown

Researchers have proposed artificial intelligence methods for automated and semi-automated grading tools (*e.g.*, McNamara *et al* 2015; Wijesiriwardene *et al* 2022). However, these tools may not measure course knowledge and may be sensitive to features that are not part of the instructor's desired evaluation criteria. We conduct an initial evaluation of the relationship between language fluency features and student performance. We use validated measures of text

including fluency, word choice, and related indices. In a dataset of neuroscience short answer questions, we find preliminary evidence that these text properties make substantial contributions to predicting variance in student performance.

Poster # 14 - **Abigail Tuttle |** shackleford.11@wright.edu

Research Advisor: Dr. Audrey McGowin

Insult of Road Salt

Co-authors: Abigail Tuttle, Benson Sparkman, Landon Shackleford, Justin Myers, Audrey McGowin

After sampling streams across Wright State's campus, we noticed extremely high levels of chloride. The highest levels are in the stream closest to Colonel Glenn Highway runoff. Along with our investigation, we observed little to no decrease in chloride levels compared to previous years. Streams were monitored from September 2023 to February 2024 and compared to previous data going back to 2018. Chloride levels remain high despite the remediation of the old salt barn site.

Poster # 61 - **Raegan Steele & Kyndall Berner |** shah.260@wright.edu

Research Advisor: Dr. Shulin Ju

Investigating ALS-Associated Matrin-3 Cytotoxicity in a Yeast Model

Co-authors: Rahul Shah, Widad El-Zein, Abby Chumley, Zach Thompson, Quan Zhong, Shulin Ju

Amyotrophic Lateral Sclerosis (ALS) is a fatal neurodegenerative disease characterized by the degeneration of motor neurons. Matrin-3, a nuclear matrix protein that binds DNA and RNA, is implicated in familial ALS. Mutations in Matrin-3 lead to its mislocalization to the cytoplasm, aggregation, and toxicity. Utilizing a yeast model, we observed a correlation between the expression of Matrin-3 and an increase in cell size. Additionally, we identified suppressor genes that rescue cells from toxicity. To investigate the link between cell size and Matrin-3 toxicity, we are employing these suppressor genes to assess their ability to reverse the cell size increase.

Poster # 27 - **Jordan Shetterly, Ben Wright, Alex Grilliot, Chris Griesmeyer |** shetterly.5@wright.edu

Research Advisor: Dr. Audrey McGowin

Death By Chocolate: An Analysis of Cocoa Powder Cadmium and Lead Content

Co-authors: Jordan Shetterly, Ben Wright, Alex Grilliot, Chris Griesmeyer, Justin Meyers, Audrey McGowin

There have been reports of heavy metals such as lead and cadmium being in cocoa powder. For this reason, we sought to investigate the heavy metal content of two store-bought samples of cocoa powder; Hershey's Special Dark Chocolate and Kroger Baking Cocoa. To extract the heavy metals, we used digestion via nitric acid. Inductively coupled plasma atomic absorption spectrometry (ICP-AES) was used to quantitatively determine the levels of these heavy metals and by extension the safety of these products for consumption.

Poster # 79 - **Shubhangi Shindkhede |** shindkhede.2@wright.edu

Research Advisor: Dr. Courtney Sulentic

Validation of a human B-cell line model to identify potential Immunotoxicants

Co-authors: Venkata Sailaja Rachakonda, Clayton Buckner, Andrew Snyder, Courtney Sulentic

Exposure to chemicals may dysregulate antibody production. This project aims to evaluate the effect of several different environmentally relevant chemicals on antibody production from a human B-lymphocyte cell line. Additionally, humans have genetic variations in the antibody gene, which may result in differences in sensitivity to chemical exposure. Our cellular model incorporates some of these genetic differences and will allow us to determine the impact of genetics and the environment on antibody production. Understanding how genetic differences alter chemical sensitivity will lead to improved risk assessment and identification of at-risk populations.

Poster # 25 - **Resha Shrestha |** shrestha.39@wright.edu

Research Advisor: Dr. Michael Leffak

Human Genome instability at (CAG) 102 microsatellite DNA Repeats

Co-authors: S. Dean Rider, Michael Leffak

Microsatellites are tandem repeats of short nucleotide sequences that are inherently unstable. These repeats can form non-Watson-Crick structures that can pose obstacles to DNA replication leading to double strand breaks (DSBs). When unrepaired, these breaks can threaten genomic integrity and cause various neurological diseases and cancers. These replication-induced breaks can be repaired by a highly mutagenic mechanism known as break induced replication (BIR). Here, we focus on CAG trinucleotide repeats capable of forming hairpin structures which stall the replication fork, eventually causing its collapse. Expansions in CAG repeats have been implicated in Huntington's disease and Myotonic Dystrophy. To study instability caused by this repeat, we are using an engineered HeLa cell line with dual fluorescent reporter constructs harboring a repeat of 102 CAG units in the lagging strand template adjacent to a c-myc origin of replication. This allows us to use flow cytometry, inverse PCR, and DNA sequencing to study the effects of these repeats at the single DNA molecule level. We find that the repair of these replication-induced breaks leads to 1000x elevated levels of DNA mutagenesis including insertions, deletions, base substitutions and the formation of extrachromosomal circular DNAs (eccDNAs).

Poster # 10 - **Mariah Slaughter |** slaughter.31@wright.edu

Research Advisor: Dr. Megan Rúa

Quantifying the effect of soil pH and P on ectomycorrhizal exploration type in oaks (*Quercus spp*.)

Co-authorsL Jared DeForest, Megan Rúa

Oak success in temperate forests is threatened by changing soil properties, which alters community composition of their obligate partner ectomycorrhizal fungi (EMF). To evaluate changes, we microscopically examined EMF colonization of oak roots from a long-term experiment factorially manipulating soil pH and phosphorus. Frequency of EMF from contact exploration type increased 49.2% under high phosphorus compared to low phosphorus (p=0.038) while EMF from the

long-distance exploration type increased 72.5% in neutral soils compared to acidic soils (p=0.0021). Increasing soil P promotes high biomass-high carbon investment exploration types, while neutral soil favors low biomass-low carbon investment exploration types.

Poster # 48 - **Madelyn Smith |** smith.2378@wright.edu

Research Advisor: Dr. David Ladle

The Effect of Repeated Occupational-Level Exposure to the Pesticide Malathion on EDL Muscle Spindles

Research Advisor: Dr. David Ladle

Organophosphate pesticides, such as malathion, are commonly used in U.S. agricultural industries and homes. Environmental exposure to organophosphate pesticides is an identified risk of neuropathy and neurodegeneration. This study investigates the morphological changes of muscle sensory neurons in rat hindlimb muscles in response to environmental malathion exposure. Animals were exposed to low-dose malathion 5 days a week for 4 weeks and tissue was collected within 5 days of the last exposure. We measured muscle spindle axon length, inner rotational distance, and axonal width. This research will help us understand the adverse effects of pesticide exposure, even at low doses.

Poster # 28 - **Kole Spurgeon |** spurgeon.6@wright.edu

Research Advisor: Dr. Ivan Medvedev

Experimental Study of Molecular Saturation in the Millimeter Spectral Range

Co-authors: Kole L. Spurgeon, Daniel J. Tyree, Ivan R. Medvedev

Rotational spectroscopy is a versatile analytical tool for sensing astronomical and environmental gases. However most quantitative methods are restricted to high pressure or low power regions, because of an effect known as power saturation. As the power of the probing laser increases the shape of the spectral line is suppressed. This is due to molecules rapidly transitioning between quantum states while restorative processes cannot maintain thermal equilibrium, reducing the number of absorbing molecules. A model of rotational spectroscopy was developed to correct for the effects of power. Four lines of OCS in the 215- 260 GHz range were measured at varying powers. These lines were fitted with this line shape model to estimate the incident power. These fitted powers are well correlated with the expected power.

Poster # 39 - **Olivia Steeves |** steeves.4@wright.edu

Research Advisor: Dr. Katie Hossler

Microplastics in Riverine Wetlands of West–Central Ohio

Co-authors: Mitchell Link, James Tyler Retherford, Katie Hossler

Riverine wetlands are a class of wetlands that form in riparian zones and floodplains along rivers and streams. Riverine wetlands play a critical role in flood control and provide a wide range of other ecological benefits. Due to some of their properties, riverine wetland soils are susceptible to the increasing threat of microplastic pollution. This project aims to

create a larger understanding of the types and distributions of microplastics found in riverine wetland soils by examining fifteen riverine wetland sites. Five soil samples from each will be processed for microplastics by physical fragmentation, density separation, digestion, and microscope identification.

ASK (Applying Scientific Knowledge)

Poster # 32 - **Daniel Tyree |** tyree.14@wright.edu

Research Advisor: Dr. Ivan Medvedev

Rotational Assignment of Isoprene in the Ground and First Five Excited States

Co-authors: Thomas Chapman, Ivan Medvedev, and Zbyszek Kisiel

Isoprene is the second most abundant atmospheric hydrocarbon. It is produced by plants and animals at appreciable levels and is thought to be present in gas and dust clouds in space, but has yet to be definitively detected in the interstellar medium. To aid detection and provide tools for quantitative sensing, the rotational spectrum of isoprene in its ground and first five excited vibrational states has been measured over a range of 210-500 GHz. The spectra were assigned to a rotational Hamiltonian and fitted with an RMS error of ~1 MHz. Spectral intensities were used to estimate the vibrational energies of excited states.

Presentation is oral - **Shelby Ward |** ward.252@wright.edu

Research Advisor: Dr. Sherif Elbasiouny

C-bouton Changes Across Three Mouse Models of ALS

Co-authors: Shelby Ward, Morgan Highlander, Teresa Garrett, and Sherif Elbasiouny

Amyotrophic lateral sclerosis (ALS) is a progressive neurodegenerative disease affecting motor neurons (MNs) in the central nervous system leading to paralysis and death. MNs undergo hyperexcitability during ALS warranting investigation of C-boutons, an excitable input. Immunohistochemistry was used to label MNs in mouse lumbar spinal cord at symptom onset in three of the most common ALS mutations: C9orf72, SOD1, and TARDBP. 2D and 3D measurements were collected using automated analysis. Our results show a decrease in c-bouton cluster size only in slow cells across two ALS mutations. This indicates similar C-bouton behavior across two ALS mouse models at symptom onset.

Presentation is oral - **Amelia Whorton |** whorton.10@wright.edu

Research Advisor: Dr. David Ladle

ETV1, ETS Binding sites and Where to find them

Research Advisor: Dr. David Ladle

ETV1 is a member of the ETS transcription factor family, and is essential for the development and the maturation of many tissues and processes, including the development of the stretch reflex, which is imperative for movement

coordination. However, little is known about the genes regulated by ETV1, which limits our understanding of mechanisms through which ETV1 exerts its developmental effects. This project aims to computationally identify binding sites for ETV1 in the various regions of putative target genes. Specifically, we investigated if the number of binding sites correlates with change in gene expression after ETV1 knockout.

Poster # 60 - **Brooklyn Worthen |** worthen.17@wright.edu

Research Advisor: Dr. Dragana Claflin

The Effects of Ecologically Relevant and Irrelevant Sounds on Earthworm Behavior in an Open Field Environment.

Co-authors: Lydia Herb, Amanda Burton, Emi Arzola

We are interested in exploring whether earthworms exhibit differential behavioral responses to ecologically relevant sounds, such as predator sounds, as compared to ecologically irrelevant sounds. We know that earthworms process sounds through vibrations and we hypothesize that they have developed specific adaptive behavioral responses to sound frequencies that indicate threat. Our initial findings indicate that the worms present a typical fear response (freezing) more in reaction to the "worm grunting" sound than to the moles. Further behavior characterization and analyses will be presented. This information will help us extend our research to more complex adaptive learning processes in invertebrates.

Poster # 35 – **Yagami |** yagami.2@wright.edu

Research Advisor: Dr. Quan Zhong

Genetic buffering of cellular defects induced by α-synuclein

Co-authors: Breonna Gillespie, Ishita Haider, Rajalakshmi Santhanakrishnan, Shulin Ju, Quan Zhong

α-synuclein is a key player in neurodegenerative disorders such as Parkinson's disease. Consistent with the hypothesis that abnormal accumulation of α-synuclein in the brain leads to detrimental cellular defects causing neurodegenerative diseases, increased α-synuclein expression induces cellular toxicity in diverse model systems, including a simple genetic model organism, yeast. Here, we have found a family of human and yeast transcription factors that alleviates the deleterious effects of a-synuclein without altering its expression levels. We are in the process of identifying how these transcriptional factors may change specific cellular pathways that counteract the cellular defects induced by α-synuclein.

LSAMP Scholar

Poster # 76 - **Sri Meghana Yerrapragada** **|** yerrapragada.2@wright.edu

Research Advisor: Dr. Mike Kemp, Ph.D.

Elucidating the biological effects of EV-associated adduct-containing DNA.

Co-authors: Alexandra Carpenter, Aleena Alex

On a daily basis, the human body is exposed to various genotoxins. Chemotherapeutic agents are one of them. Cisplatin is one of the most efficient and widely used chemotherapeutic agents for a variety of cancer types. The platinum atoms in cisplatin bind covalently to DNA and forms DNA adducts. These DNA adducts are potentially mutagenic and lethal to cells if not removed by the repair machinery. The final fate of these DNA-adducts is not yet known. However, we have found cisplatin adduct-containing DNA to be enriched in smaller extracellular vesicle (SEV) fractions. Furthermore, we have found that the loading of these cisplatin DNA adducts into SEVs can be reduced by caspase-3 inhibitor treatment. Because the content of SEVs can be transferred to other cells, transfer of damaged DNA via SEVs to bystander cells may activate the DNA damage response in recipient cells throughout the body to contribute to the systemic effects of cisplatin chemotherapy regimens. Further research in this direction can help us understand the role of SEVs containing cisplatin-DNA adducts in the toxicity caused by cisplatin treatment in the kidney and brain and developing a targeted drug delivery system to limit the side effects of cisplatin regimen.