Celebrating the Centennial

1923 - 2023

Virginia Academy of Science
Fall Undergraduate Research Meeting

Saturday, October 28, 2023

Virginia Union University
Richmond, VA

8:30 am - 5:00 pm

VIRGINIA UNION UNIVERSITY

The VAS Fall Undergraduate Research Meeting is a research grant proposal competition which has been held annually since the Fall of 2001. Undergraduate students conducting research projects under the mentorship of VAS members at Virginia colleges and universities are invited to participate.

Interested undergraduate students, along with their mentors, must submit their grant applications/research proposals by the October 1 deadline. The grant applicants subsequently present posters outlining their research projects at the Fall Undergraduate Research Meeting. Both the grant applications-research proposals and the poster presentations at the meeting are evaluated to determine the recipients of the grants.

Ten research grant awards of $900 each will be given to the top student grant applications/research proposals and poster presentations selected by the Fall Meeting Judges. The recipients of these research grant awards will be announced at the meeting's conclusion. The research grant award recipients will also be awarded Student Membership in the VAS for 2024 and are invited to present the results of their funded research at the 2024 VAS Annual Meeting held at the University of Mary Washington on May 16, 2024.

The Academy extends special thanks to the administration, faculty, staff and students of Virginia Union University for hosting the VAS 2023 Fall Undergraduate Research Meeting. Lunch for this event has been provided by the Science Departments of Virginia Union University.

VAS President-Elect Parrish Waters, Associate Professor of Biology at University of Mary Washington, serves as the Program Chair for the 2023 Fall Undergraduate Research Meeting.

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SCHEDULE OF EVENTS

8:30 - 9:30	**Check-in and Registration** *Living and Learning Center Atrium* *All meeting attendees should check in at the in the Registration Area.* *coffee, tea and other beverages to be served*
9:00-9:30	**Poster Set-Up** *Living and Learning Center 101A and 101C* *Following Check-In, students should set up their posters on their assigned board.*
9:15 - 9:30	**Preliminary meeting of judges** *Living and Learning Center Room 102* *We will discuss and disperse rubrics and criteria for judging proposals*
9:30-9:45	**Welcome and Opening Remarks** *Living and Learning Center Room 100B* *Conley McMullen, President of VAS, Professor of Biology, James Madison University*
9:45 - 10:45	**Poster session 1** *Living and Learning Center Room 100A*
11:00 - 12:00	**Poster session 2** *Living and Learning Center Room 100C* *Each poster will be evaluated by a team of judges. Presenters should be prepared to briefly summarize (≥ 5 min) their projects and respond to questions from the judges.*
12:00 - 1:00	**Box lunch** *Living and Learning Center Room 100B*
12:30 - 1:30	**Panel discussion** *Living and Learning Center Room 100B* *A panel of science professionals will discuss post graduate opportunities and provide advice for recent graduates.*
12:30 - 1:30	**Judges discussion** *Living and Learning Center Room 102*
1:45 - 2:45	**Keynote Speaker** *Living and Learning Center Room 100B*
3:10 - 4:00	**Lightning talks from select students** *Living and Learning Center Room 100B*
4:10 - 4:40	**Awards ceremony and closing remarks** *Living and Learning Center Room 102*
4:40 – 5:00	**Poster take-down and farewell**

POSTER PRESENTATIONS *(Session 1) – 9:45-10:45*

1 Genetically Modifying Escherichia coli to Produce Murine Insulin-like Growth Factor 1

Henry Loehr, Hampden-Sydney College-Biology
Marc Moroz, Hampden-Sydney College-Biology
Mentor: Michael Wolyniak, Hampden-Sydney College-Biology
*Mentor:*Kristin Fischer, Hampden-Sydney College-Biology

Insulin-like growth factor 1 (IGF-1) is a peptide needed for muscle cell maturation. *Escherichia coli* (*E. coli*) is a safe, cost-effective, and well-studied laboratory model organism. Using modern genetic manipulation techniques, *E. coli* could be made to produce the valuable IGF-1 peptide for laboratory research in tissue engineering.

2 Effects of chronic mild stress on sleep and cognition in female mice

Emma Ostrander, University of Mary Washington-Biological Sciences
Mentor: Parrish Waters, University of Mary Washington-Biological Sciences

Stress disrupts a healthy sleep schedule and diminishes cognitive performance. The direct role of sleep disturbance in the cognitive effects of stress has received little attention. This study will help to reveal how stress and sleep interact to affect cognition, and aims to develop better strategies to address cognitive decline.

3 Investigating Antimicrobial Properties Released from Developing Amphibian Eggs

Summer Cartwright, Liberty University-Biology and Chemistry
Elizabeth Williams, Liberty University-Biology and Chemistry
Olivia Grimsley, Liberty University-Biology and Chemistry
Mentor: Kyle Harris, Liberty University-Biology and Chemistry
*Mentor :*Matthew Becker, Liberty University-Biology and Chemistry
Mentor: Gordon Wilson, New Saint Andrews College-Natural History

Early amphibian development occurs in a hostile environment abundant with potential predators and pathogens, and while it is known that amphibian eggs are protected physically by 5-8 layers of glycoprotein jelly, additional protection mechanisms used against water pathogens is largely unknown. This project will investigate amphibian eggs and water around developing amphibian eggs for antimicrobial properties.

4 Public science addressing climate change: A test of data integrity during authentic research with students in the Fear to Hope project

Madelyn Steimer, Christopher Newport University-Organismal and Environmental Biology
Mentor: Robert Atkinson, Christopher Newport University-Organismal and Environmental Biology

Fear to Hope seeks to replace fear about global climate change with hope for local, research-based solutions that engage high school student researchers. To enhance research and educational objectives, the accuracy of plant morphology measurements recorded by 9th graders and their mentors will be contrasted.

5 Investigating Honeybee Parasite Load as Related to Immediate Environmental Factors

Jack Bittner, Liberty University-Biology and Chemistry
Mentor: Morgan Roth, Liberty University-Biology and Chemistry

This project seeks to assess environmental factors surrounding hives in an effort to establish predictors for parasite load in local honey bee colonies. This project will also assess *V. destructor* infestation levels and corroborate colony health with parasite levels through a series of lipid content bioassays.

6 Rho-GDP dissociation inhibitor affects growth and aflatoxin production in *Aspergillus flavus*

Nicholas Jones, Liberty University-Biology & Chemistry
Mentor: Michael Price, Liberty University College of Osteopathic Medicine-Molecular and Cellular Sciences

The protein produced by the rdiA gene in *Aspergillus flavus* has been shown to severely decrease aflatoxin production. This project looks to complement rdiA into an rdiA mutant in *A. flavus* and complement it an rdi1Δ of C. neoformans in order to positively characterize the rdiA gene.

7 Analysis of the Genotypic and Phenotypic Expression with CRISPR Induced Mutation of the TMM Gene in *Arabidopsis thaliana*

Eleanor Boyle, Emory and Henry College-Biology
Mentor: Christine Fleet, Emory and Henry College-Biology

This research aims to determine the percentage of penetrance of the CRISPR systems when targeting the TMM gene in *Arabidopsis thaliana*, through phenotypic and molecular testing.

8 The activation of GSK-3 in Alzheimer's Disease

Natalie Baca, University of Mary Washington-Biological Sciences
Mentor: Deborah O'Dell, University of Mary Washington-Biological Sciences

The aim of this project is to examine what factors cause the GSK-3 protein to shift from the inactive to active form in Alzheimer's Disease. In three different cell cultures we will apply either Beta-Amyloid, Interleukin 1B, or Compliment 3 to see their effect on GSK-3 using an ELISA assay.

9 Vulture Behavior in Central Virginia

Ben Zimmerman, George Mason University-Environmental Science
Mentor: Richard Groover, George Mason University-Environmental Science

To study the destructive behavior of black vultures, Coragyps atratus, in Central Virginia at the Dutch Gap Boat Landing on the James River. They have been observed pecking and damaging plastic trim and wipers on vehicles parked at this location. This study is to determine why they are doing this behavior. Vultures at this site exhibit the behavior during their roosting period.

10 Characterization of the mechanism(s) by which select low-molecular weight compounds, found in coffee, promote glucose homeostasis in 3T3-L1 adipocytes

Sierra Hall, Liberty University-Biology and Chemistry
Brooke Chapple, Liberty University-Biology and Chemistry
Rochelle Miller, Liberty University-Biology and Chemistry
Mentor: William Moore, Liberty University-Biology and Chemistry

One hallmark of type-2 diabetes (T2D) is a marked dysregulation of glucose homeostasis. We recently determined that several low molecular weight compounds, found in coffee, and their metabolites, attenuate biomarkers of glucose homeostasis in 3T3-L1 adipocytes. Here, we propose to further characterize the mechanism(s) by which glucose uptake is promoted.

11 Crayfish as a biological reservoir for the amphibian skin pathogen *Batrachochytrium dendrobatidis*

Liberty Nelson, Liberty University-School of Health Sciences
Kyra Goyette, Liberty University-School of Health Sciences
Anna Thompson, Liberty Univeristy-School of Health Sciences
Abby Piddock, Liberty University-School of Health Sciences
Jordan Tennis, Liberty Univeristy-School of Health Sciences
Mentor: Kyle Harris, Liberty University-School of Health Sciences
*Mentor:*Matthew Becker, Liberty Univeristy-School of Health Sciences

Batrachochytrium dendrobatidis (Bd) is a chytrid fungus that infects amphibians globally and is linked to widespread population decline. Crayfish are documented potential carriers of Bd in aquatic ecosystems. This study aims to evaluate the susceptibility of crayfish to Bd by exposing crayfish to this fungal pathogen in a lab-based setting.

12 Water Quality of a Marine and Freshwater Site to Identify Organisms.

Anius Prince, Norfolk State University-Department of Biology
Mentor: Joesph D'Silva, Norfolk State Univeristy-Department of Biology

The temperature, salinity, dissolved oxygen of a marine and freshwater body was recorded in Norfolk, Va. The six-week sampling in the summer showed air temperature ranged from 17-28 C and water temperature from 11-23 C. The dissolved oxygen was between 4 -8 mg/L. Salinity for the marine environment was 1.5 -2%. Some of the organisms identified were Bosmina, Daphnia (Cladocera, Branchipoda), a protist Chlamydophrys, naupliar stages of crustaceans. Comparisons between the two different water bodies are discussed. For example, the marine water body is polluted while the freshwater is not.

13 Multidrug co-crystals and drug-drug salts: Quinine and NSAIDs as pharmaceutical hybrids

Sarah Chapin, Old Dominion University-Chemistry & Biochemistry
Mentor: Silvina Pagola, Old Dominion Univeristy-Chemistry & Biochemistry

Quinine and ten non-steroidal anti-inflammatory drugs (NSAIDs) will be combined into new drug-drug salts or co-crystals by mechanochemistry in a ball mill using liquid-assisted grinding. The solid-state properties will be characterized by X-ray powder diffraction, single-crystal X-ray diffraction, and other suitable solid-state techniques.

14 The Impact of pvr on Muscle Phenotypes in *Drosophila melanogaster*

Delaney Baratka, University of Mary Washington-Biology Department
Mentor: Ginny Morriss, University of Mary Washington-Biology Department

Myotonic Dystrophy type one, DM1, is a multisystemic disorder. While it’s understood what causes DM1, the mechanics aren,Äôt understood. One potentially affected signaling pathway is the *pvr* pathway. The research aims to modulate pvr expression and its downstream components to determine pvr’s role in skeletal muscle development and function.

15 In vivo Alarmone Quantficaton of *Clostridioides difficile*

Brandon Card, Old Dominion University
Mentor: Erin Purcell, Old Dominion University-Biology Department

Alarmones are signaling nucleotides that govern the stringent response of bacteria to increase bacterial survivability in stressful environments. Most known bacteria synthesize alarmones with 4-5 phosphates (known as (p)ppGpp). *Clostridioides difficile* is a Gram-positive bacillus anaerobic bacterium that is the cause most prevalent hospital acquired infec,on. In 2021 it was discovered in vitro that *C. diff* alarmone synthetases make 3-phosphate pGpp alarmones exclusively.

16 Endoparasites Induce Differential Hemodynamics in Mosquito Fish

Gibson Huff, Liberty University-School of Health Sciences
Garrett Bohrnstedt, Liberty University-School of Health Sciences
Abbigail Piddock, Liberty University-School of Health Sciences
Ernesto Lopez, Liberty University-School of Health Sciences
Mentor: Kyle Harris, Liberty University-School of Health Sciences
*Mentor:*Allen Gillen, Liberty University-School of Health Sciences

Gambusia holbrooki, commonly known as mosquitofish, is known to become infected with Blackspot disease (Uvulifer ambloplitus). The effects of this disease on the Gambusia's hemodynamics are unknown and could impact the usage of mosquitofish as a biocontrol for mosquito larvae. This study aims to compare blood flow in tail capillaries of fish with and without Blackspot.

17 Assessing CORT levels and body condition of *Plethodon hubrichti* along an elevational gradient.

Cheyenne Brooks, Liberty University-Department of Biology and Chemistry
Mentor: Cory Goff, Liberty University-Department of Biology and Chemistry

This study was done to compare the effects of high and low elevation on CORT release rates and body condition in the Peaks of Otter salamander.

18 Glyphosate and PAX6/Shh Gene Expression in the Developing Chick Model: A Potential Teratogenic Mechanism Effecting Retinoic Acid Homeostasis

Megan Dufault, Washington and Lee University-Department of Neuroscience
Mentor: Fiona Watson, Washington and Lee University-Department of Neuroscience
Mentor: Sarah Blythe, Washington and Lee University-Department of Neuroscience
Mentor: Bob Stewart, Washington and Lee University-Department of Neuroscience

Using the chick model, I am to quantify the influence of glyphosate herbicide on developmental gene expression, specifically PAX6 and Shh. I expect a down-regulation of PAX6/Shh within the diencephalon. I hypothesize the application of a retinoic acid receptor antagonist will rescue the teratogenic phenotype induced by glyphosate exposure.

19 Examining the therapeutic efficacy of Paclitaxel chemotherapy in combination with methionine restriction in breast cancer cells.

Abigail Glenn, University of Mary Washington-Biology
Mentor: Laura Sipe, University of Mary Washington-Biology

Our research on breast cancer will examine the therapeutic efficacy of a combination treatment regimen involving methionine restriction and Paclitaxel chemotherapy. We will determine whether methionine restriction and paclitaxel work together to halt proliferation or if there is a combination effect on oxidative stress resulting in apoptosis in breast cancer cells.

20 Study of Mutually Unbiased Bases in a Quantum Theory over Finite Fields.

Hampton Smith, Hampton Tanner Smith-Hampton Tanner Smith
Mentor: Tatsu Takeuchi, Virginia Polytechnic Institute and State University-Physics

Mutually Unbiased Bases (MUBs) are a crucial problem within Quantum Mechanics. General methods for constructing MUBs in arbitrary dimension N are unknown. A special case for generating MUBs suggests connections to the Finite Fields. This study aims find methods by implementing programs to create novel structures and confirm previous findings.

21 Using Extant Primate Diets and Morphological Shoulder Variation in Extant Primates to Answer Paleoecology Questions

Esha Sharma, Virginia Commonwealth University-School of World Studies, Anthropology Unit
Mentor: Marie Vergamini, Virginia Commonwealth University-School of World Studies, Anthropology Unit
Mentor: Amy Rector, Virginia Commonwealth University-School of World Studies, Anthropology Unit

This study examines the association between non-human primate diet, substrate patterns, and variance in shoulder form, as shoulder joint anatomy provides details regarding ecological adaptations and locomotor activity. The effect of dietary adaptations and forest habitats on shoulder shape in populations of African primates is specifically observed in this study.

22 Following the Foot-print of Littoraria irrorata along Elizabeth River watershed salt marsh restoration projects

Kaitlin Rivera, Old Dominion University-Biological Science
Mentor: Eric Walters, Old Dominion-Biological Science

Following the density of the Common Periwinkle Snail (*Littoria irrorata*) in salt water marsh restorations alongside the Elizabeth River Project on residential properties. Data will be taken before planting of the marsh and months following the growing season to monitor population densities.

23 Studies on folliculogenesis in the domestic cat

Jocellyn Banks, Norfolk State University, Norfolk, VA-Biology
Mentor: Rajeev Chandra, Norfolk State University-Biology

The project aims to the study various stages of Ovarian Folliculogenesis in order to to understand abnormal follicle stages leading to various ovarian dysfunctions primarily Polycystic Ovarian Syndrome (PCOS).

24 Expression of Rbfox1l and Rbfox2 proteins in 3 day post-fertilization (dpf) zebrafish larvae

Matthew Miscikowski, Hampen-Sydney College-HSC Neurobiology
Mentor: Michael Berberoglu, Hampden-Sydney College-HSC Biology/Neurobiology

The project focused on identifying expression of the RNA binding proteins Rbfox1l and Rbfox2 in 3dpf (Days Post-Fertilization) larval zebrafish. These proteins play a critical role in proper brain function and identifying expression patterns in critical to determining the function of the Rbfox proteins.

POSTER PRESENTATIONS *(Session 2) – 11:00-12:00*

25 Using DNA Barcoding to Determine a Potential Case of Cryptic Species in Moringua and Kaupichthys Eels

David Baker, Old Dominion University-College of Sciences, Biological Sciences
Mentor: David Gauthier, Old Dominion University-College of Sciences, Professor of Biological Sciences
Mentor: John Whalen, Old Dominion University-College of Sciences, Biological Sciences

Morphological analysis and CO1 genetic sequencing will be performed on specimens of Moringua and Kaupichthys eels archived at the Smithsonian, in order to provide greater taxonomic clarity to these often miscategorized genera. Phylogenetic trees and PCA plots will be used to properly determine relationships.

27 The Effects of Caffeine Levels on Muscles Electrical Activity using Electromyography Sensors

Molly Elder, Liberty University-Department of Engineering
Mentor: Hector Medina, Liberty University-Department of Engineering

The focus of this study is to employ the use of Electromyography (EMG) sensors on the bicep brachii muscle group and study the effect that caffeine has on the voltage levels. This will be accomplished by running code through Arduino IDE that is connected to the EMG sensors which collect readings when the muscles are in relaxation and contraction. The purpose of this study is to show the correlation between caffeine content and voltage levels so that routine caffeine drinkers such as college students can see its effects.

28 Interplay between zinc exposure and competition on the life history and physiology of two benthic marine species

Jacob Gynan, Old Dominion University-Biology
Mentor: Gloria Massamba N'Siala, Old Dominion University-Biology

This project aims to assess the combined impact of zinc contamination (no, chronic, and high-level exposure) and competitive interactions on marine benthic species' physiology and life history, using two sympatric polychaetes as model species. Data collected will include fecundity, growth rates, bioaccumulation, metabolic rates, and survival rates.

29 Detection of PFAS using molecularly imprinted polymers

Joseph Redding, Liberty University-Department of Biology and Chemistry
Joshua Kim, Liberty University-Department of Biology and Chemistry
Luke Allen, Liberty University-Department of Biology and Chemistry
Mentor: Stephen Hobson, Liberty University-Department of Biology and Chemistry

Known to bioaccumulate and resist degradation, per- and polyfluoroalkyl substances (PFAS) have been shown to negatively affect human health. This study aims to synthesize novel fluorinated molecularly imprinted polymers (fMIPs) that will be effective and selective in their detection of these harmful compounds.

30 The Effect of BPC on Immune Polarization in Zebrafish

Asia Eskaros, Liberty University-Department of Biology and Chemistry
Daniel Leonard, Liberty University-Department of Biology and Chemistry
Oluwakonyinsola Adebayo, Liberty University-Department of Biology and Chemistry
Gavin Litchford, Liberty University-Department of Biology and Chemistry
Abigail Frommack, Liberty University-Department of Biology and Chemistry
Mentor: Lindsey Stevenson, Liberty University-Department of Biology and Chemistry

This research proposal seeks to understand how BPC, an estrogenic compound found in plastics, affects immune development. Specifically, the effect of BPC on immune development in *Danio rerio* (zebrafish) is being investigated by studying the effect of BPC exposure on the expression of the genes RAG-1, Ikaros, TdT, and EBF.

31 Ethylene-Forming Enzyme Kinetics and Ethylene Biosynthesis

Amala Clawson, University of Lynchburg-Chemistry
Mentor: Samrat Thapa, University of Lynchburg-Chemistry
Mentor: Jamie Brooks, University of Lynchburg-Biology

This project will investigate the kinetic and structural properties of the ethylene-forming enzyme isolated from recombinant Escherichia coli in an effort to advance existing research and determine whether ethylene biosynthesis is a viable future alternative to conventional methods used to obtain ethylene for commercial and medical use.

32 Cytotoxicity of Phage Jabberwock and Phage Atlee Proteins

Raesa Zia, University of Mary Washington-Biology
Tyler Downs, University of Mary Washington-Biology
Eleni Kepler, University of Mary Washington-Biology
Mentor: Swati Agrawal, University of Mary Washington-Biology

This study aims to expand current knowledge on phages for use in phage therapy, an alternative treatment to disease-causing bacteria such as *Bacillus anthracis* and *Bacillus cereus*. Analysis of Bacillus phages Jabberwock and Atlee's genes will be done in terms of gene model verification, determination of protein function, and analysis of cytotoxicity against antibiotic resistant bacteria.

33 Influence of SCP1 on *Cryptococcus neoformans* Virulence.

Carleigh Warsing, Liberty University-Department of Biology and Chemistry
Mentor: Michael Price, Liberty University College of Osteopathic Medicine-Molecular and Cellular Sciences

The gene SCP1, encoded in Cryptococcus neoformans, CNAG_01580, was identified as influencing pH adaptation, and was deleted in C. neoformans. Using a gene gun, I will replace the wildtype gene in the mutant and evaluate virulence phenotypes related to the original scp1Δ mutant, including invertebrate and mouse models of disease.

34 Identification and characterization of *Streptococcus mutans* bacteriophages for treatment of oral biofilm-based disease

Robert Frazier, Hampden-Sydney College-Biology
Mentor: Michael Wolyniak, Hampden-Sydney College-Biology

My research project will be to identify and characterize bacteriophages that infect Streptococcus mutans. As *S. mutans* is the most common tooth decay-causing bacteria, its prevalence seeks further methods of therapy. In dental applications, and the field of medicine, phage therapy requires new phages to be identified and characterized.

35 Characterization of the mechanisms by which enterolactone promotes Akt-phosphorylation and Glut4-mediated glucose uptake in 3T3-L1 adipocytes and its potential as an anti-inflammatory and bactericidal agent

Seth Woodfin, Liberty University-Biology and Chemistry
Mentor: William Moore, Liberty University-Biology and Chemistry

Type-2 diabetes (T2D) is characterized by chronic fasting hyperglycemia. We recently found that enterolactone, a metabolite of a coffee-derived compound, promotes Glut4-mediated glucose uptake and Akt phosphorylation in adipocytes. Here, we propose to further characterize the mechanism of these effects and determine its potential as an anti-inflammatory and bactericidal agent.

36 Documenting A Macroinvertebrate Community Using Macrophotography

Halle Gopee, Liberty University-Biology & Chemistry
Christian Gilbert, Liberty University-Biology & Chemistry
Mentor: Kyle Harris, Liberty University-Biology & Chemistry

This project seeks to illuminate macroinvertebrate communities associated with Opossum Creek and the connected freshwater habitats (Hydaway Lake and Kingfisher Pond). Field sampling techniques and the application of modern macrophotography techniques will be applied to showcase details of morphological characteristics of macroinvertebrates that live in and around these bodies of water.

37 Determining the DNA damage threshold for stress-induced cell invasiveness

Jada Walker, Norfolk State University-Biology
Mentor: Aylin Marz, Norfolk State University-Biology

Saccharomyces cerevisiae cells exhibit filamentous or invasive growth after exposure to nutrient limitation and exposure to some alcohols. This response requires components of stress response pathways. We propose that a threshold amount of DNA damage can act as a stressor activating similar stress pathways to induce or enhance cell invasiveness.

38 The effects of social isolation on hedonic behavior and orexin production in the lateral hypothalamus of mice.

Hudson McNerney, University of Mary Washington-Biology
Mentor: Parrish Waters, University of Mary Washington-Biology

Physical exercise has many beneficial effects on physiological and behavioral systems. A rather unexplored effect of exercise is its ability to increase and individual‚Äôs social rank by modulating neurobiological systems. This project will explore the effect of exercise to increase a mouse‚Äôs dominance by modulating central dopamine and norepinephrine systems

39 Time Course for Adult Onset Myotonic Dystrophy in *Drosophila melanogaster*

Kayla Rodriguez, University of Mary Washington-Biological Sciences
Ashlyn Rauch, University of Mary Washington-Biological Sciences
Mentor: Ginny Morriss, University of Mary Washington-Biological Sciences

Using Drosophila melanogaster as a model, we are studying the effect of the number of CUG repeat RNA on the time course of phenotypic expression of an adult-onset myotonic dystrophy type one model. The phenotypic expression will be evaluated with climbing velocity and flight distance tests. A histological analysis will allow for measurement of muscular atrophy.

40 Synthesis Optimization of BGF

Jessica Bryant, Liberty University-Biology and Chemistry
Mentor: Stephen Hobson, Liberty University-Biology and Chemistry

Bisphenol A (BPA) is a monomer used to produce epoxy resins and in thermal printing processes. BPA is problematic from environmental and toxicological perspectives since it is synthesized from non-renewable sources and is an estrogenic compound. Research is being conducted on the synthesis of monomers with structures mimicking BPA.

41 Purification and characterization of three predicted proteins from *Cryptococcus neoformans*

Ethan Carlile, Liberty University-Department of Biology and Chemistry
Mentor: Gary Isaacs, Liberty University-Department of Biology and Chemistry

Three putative proteins with suspected enzymatic histone acetylation activity in the pathogenic yeast *Cryptococcus neoformans* will be purified and characterized. We plan on expressing the proteins in E. coli as His-tagged proteins and determining if they have histone acetyltransferase activity in vitro.

42 Unravelling hints of particle dark matter among unidentified gamma-ray objects

Maria Carrillo, Virginia Tech-Physics
Mentor: Tatsu Takeuchi, Virginia Tech-Physics
Mentor: Shunsaku Horiuchi, Virginia Tech-Physics

Dark matter is a crucial component of the standard cosmological paradigm, yet its properties beyond gravity has never been detected. Astronomical gamma rays offer a unique way to identify this dark matter. In this project, we look for smoking-gun features of dark matter in a catalog of unidentified gamma-ray objects.

43 Effects of Salinity Variation on the Life History and Thermal Tolerance of the marine annelid, *Ophryotrocha labronica*

Gabrielle Newton, Old Dominion University-Biological Sciences - Marine Biology
Mentor: Gloria Massamba N'Siala, Old Dominion University-Biological Sciences

This study explores how climate change-induced ocean variability affects coastal marine organisms, focusing on salinity's impact on the lifespan, growth, and thermal tolerance of the annelid Ophryotrocha labronica. Results will shed light on adaptation strategies in coastal habitats amidst changing environmental conditions, bridging the gap between abiotic stressors and species performance.

44 The Protective Properties of Msrb3 Regulation on Oxidative Stress

Rachel Walker, University of Mary Washington-Biological Sciences
Mentor: Laura Sipe, University of Mary Washington-Biological Sciences

The uncontrollable proliferation of cells, commonly known as cancer, originates from DNA damage. Lifestyle factors, carcinogen exposures, and hypoxia result in oxidative stress, a known cause of DNA damage. Oxidative stress develops when high levels of reactive oxygen species (ROS) are unable to be regulated by antioxidants. This proposal examines the novel protective capabilities of the antioxidant enzyme Methionine sulfoxide reductase b3 (Msrb3) throughout cancer progression.

45 The Effect of Myoglianin Knockdown on DM1 Symptoms in *Drosophila*

Charlotte Russell, University of Mary Washington-Biology
Mentor: Ginny Morriss, University of Mary Washington-Biology

The objective of this research study is to determine the relationship between myostatin and DM1. The fly model for MSTN that will be used in this research study is myoglianin. This research will examine whether or not inhibition of myostatin could be an effective treatment option for muscular dystrophies.

46 Measuring the Adiabatic Index of Gases Using an Ultrasonic Sensor

Hayden Deans, University of Lynchburg-Chemitry
Kit Price, University of Lynchburg-Chemistry
Mentor: Matthew Brynteson, University of Lynchburg-Chemistry

This project seeks to develop an apparatus capable of measuring the adiabatic index of gases over a wide temperature range. The apparatus will use an ultrasonic sensor to measure the speed of sound in the gas from which the adiabatic index will be determined

47 CORT level comparisons between allopatric and sympatric habitats in *Plethodon hubrichti*

Cassie Fox, Liberty University-Department of Biology and Chemistry
Jason Porter, Liberty University-Department of Biology and Chemistry
Mentor: Cory Goff, Liberty University-Department of Biology and Chemistry

This research is a comparative study on the salamander, Plethodon hubrichti from sympatric and allopatric sampling sites within its habitable range. We performed non-invasive hormone collection to quantify corticosterone levels. Analysis of corticosterone levels can be used as a metric to determine the health of this population, especially as it pertains to competition with other salamanders.

48 Developing High-throughput Assays for Alarmone Quantification in C. difficile

Lane Tong, Old Dominion University
Mentor: Erin Purcell, Old Dominion University-Biology Department

C. difficile is exceptional among bacteria due to its unique alarmone signaling mechanism, characterized by the release of inorganic phosphate. Utilizing a phosphatase assay offers a facilitated method of further study of the organism through its enzymatic processes, unlocking a piece of the puzzle toward its evolutionary success as one of the most prevalent infectious agents in the field.

Keynote Speaker

Dr Carlos Velasco

Dr Velasco is originally from Mexico and received his BS in physics at the University of Texas at El Paso. His undergraduate research advisor moved to Jefferson Lab in Virginia, and this proximity provided him the motivation to come to Virginia and pursue a graduate degree. He received his PhD in Medical Physics from Hampton University and went on to do a clinical residency at the University of Arkansas for Medical Sciences.

After completing his work in Arkansas, he returned to Virginia and has been practicing medical physics for the last thirteen years with both Bon Secours and the Sentara medical systems. Nine months ago, he joined the Hampton University Proton Therapy Institute (HUPTI) and is now enjoying studying the physics of protons for therapeutic use, as well as the diverse technologies that accompany this novel technique.

He also serves as an adjoint professor for at Hampton University, helping to train students in the medical physics program. He has served as an academic advisor for a successful PhD candidate (who is now a colleague of Dr Velasco), and his most recent student recently accepted a clinical residency.

Today, Dr Velasco will speak to us about his experiences in medical physics and introduce us to some of the innovative technologies that are used at the HUPTI. These include multiple imaging techniques and modern surgery techniques. Finally, he will speak to opportunities that may interest undergraduates interested in the world of Medical Physics.

‘Seeking Careers in Science’ Panel Members

During the latter half of lunch, we will host a diverse panel of professional scientists who can speak to opportunities that are open to individuals with with a bachelor’s in science. This will be an informal discussion/Q&A session that may guide our undergraduates in their best options and practices as they approach graduation (and even after graduating). Our panel members are:

Deborah O’Dell

Dr O’Dell is a professor of Biology at the University of Mary Washington Dr. O’Dell teaches the core course in Cell Biology and capstone of their neuroscience program, Neurobiology. She is also the Pre-Health advisor for UMW, and liaisons with medical colleges around the country to gather information and secure opportunities for UMW students seeking careers in the medical field. Her extensive experience provide a unique ability to advise and direct students seeking careers that involve clinical care.

Richard Groover

Dr. Richard Groover is a Fellow of the Virginia Academy of Science. He teaches ecology at Randolph Macon College and graduate seminars at George Mason University. Dr. Groover is the author of The Environmental Almanac of Virginia, 2nd edition and Environmental Cartoons for Teachers. He is a also co-author of Cicada Olympics. His current research examines coyote populations of Hanover County, VA and black vultures’ behavior in Central Virginia.

Keith Arthur

Keith Arthur did his undergraduate studies under a dual-degree program and graduated from both Furman University and the Georgia Institute of Technology. During his time at Georgia Tech, he co-opped at the Jet Propulsion Laboratory, and after getting his Master’s degree in 1989 he began his career with the U.S. Army as a civilian managing aviation R&D. In 2014, he took a job at NASA’s Langley Research Center in Hampton, where he has served in several roles including Associate Director of the Intelligent Flight Systems Product Line. He now serves as the Branch Head of the Crew Systems and Aviation Operations research branch.

Ahkinyala Cobb-Abdullah

Dr. Ahkinyala (AH ken yaa Lu) Cobb-Abdullah, currently serves as the Executive Director of the Union National Research Center, a burgeoning research enterprise at Virginia Union University. She previously served as the Dean of the School of Arts and Sciences at Virginia Union University. Dr. Cobb-Abdullah is a three-time graduate of two HBCU' s and is passionate about paying it forward to help college and graduate students navigate and matriculate through higher education. Dr. Cobb-Abdullah works to promote research and STEM education on campus and through civic engagement.

Pryor Jourdan

Mr. Jourdan is a Vice President of Engineering at POWER engineers, Inc. POWER is a 100% employee-owned engineering and environmental consulting firm, who team together to create integrated, multidiscipline solutions. Mr. Jourdan has been involved in various aspects of consulting engineering with POWER for 23+ years. The first part of his career was spent on the technical side of the utility engineering business, focused primarily on physical design of substations ranging from 12kV to 500kV including Flexible AC Transmission projects. Later, he took on a project leadership with management roles responsibilities. For the last 8+ years, he has taken on personnel management roles in POWER’s Substation business unit as a Department Manager, Regional Manager and then currently role as a Vice President of Engineering.

Lightning Talks (session 1)

Selected students will deliver their proposals in an oral format, allowing them to elaborate on their projects. These students volunteered for this portion of the meeting, and their talks are not considered in the judging for awarded grants. Instead, these presentations provide students the chance to deliver a more seminar style talk (albeit brief), expanding the experience they will gain from this meeting.

LT1 **Abigail Glenn**
University of Mary Washington- Biology
Examining the therapeutic efficacy of Paclitaxel chemotherapy in combination with methionine restriction in breast cancer cells.

LT2 **Amala Clawson**
University of Lynchburg- Chemistry
Ethylene-Forming Enzyme Kinetics and Ethylene Biosynthesis - Amala Clawson, University of Lynchburg

LT3 **David Baker**
Old Dominion University- College of Sciences, Biological Sciences
Using DNA Barcoding to Determine a Potential Case of Cryptic Species in Moringua and Kaupichthys Eels

LT4 **Delaney Baratka**
University of Mary Washington- Biology Department
The Impact of pvr on Muscle Phenotypes in Drosophila Melanogaster

LT5 **Eleanor Boyle**
Emory and Henry College- Biology
Analysis of the Genotypic and Phenotypic Expression with CRISPR Induced Mutation of the TMM Gene in Arabidopsis thaliana

LT6 **Ethan Carlile**
Liberty University- Department of Biology and Chemistry
Purification and characterization of three predicted proteins from Cryptococcus neoformans

LT7 **Jacob Gynan**
Old Dominion University- Biology
Interplay between zinc exposure and competition on the life history and physiology of two benthic marine species

LT9 **Megan Dufault**
Washington and Lee University- Washington and Lee University Department of Neuroscience
Glyphosate and PAX6/Shh Gene Expression in the Developing Chick Model: A Potential Teratogenic Mechanism Effecting Retinoic Acid Homeostasis

Lightning Talks (session 2)

Selected students will deliver their proposals in an oral format, allowing them to elaborate on their projects. These students volunteered for this portion of the meeting, and their talks are not considered in the judging for awarded grants. Instead, these presentations provide students the chance to deliver a more seminar style talk (albeit brief), expanding the experience they will gain from this meeting.

LT10 **Carleigh Warsing**
Liberty University- Department of Biology and Chemistry
Influence of SCP1 on Cryptococcus neoformans Virulence.

LT11 **Henry Loehr**
Hampden-Sydney College- Biology
Genetically Modifying Escherichia coli to Produce Murine Insulin-like Growth Factor 1

LT12 **Anius Prince**
Norfolk State University- Department of Biology
Water Quality of a Marine and Freshwater Site to Identify Organisms.

LT13 **Kaitlin Rivera**
Following the Foot-print of Littoraria irrorata along Elizabeth River watershed salt marsh restoration projects

LT14 **Henry Loehr**
Hampden-Sydney College- Biology
Genetically Modifying Escherichia coli to Produce Murine Insulin-like Growth Factor 1

LT15 **Hudson McNerney**
University of Mary Washington- Biology
The effects of social isolation on hedonic behavior and orexin production in the lateral hypothalamus of mice.

LT16 **Jada Walker** *Norfolk State University- Biology*
Determining the DNA damage threshold for stress-induced cell invasiveness

LT17 **Jocellyn Banks** *Norfolk State University, Norfolk, VA- Biology*
Studies on folliculogenesis in the domestic cat

LT18 **Matthew Miscikowski**
Hampen-Sydney College- HSC Neurobiology
Expression of Rbfox1l and Rbfox2 proteins in 3 day post-fertilization (dpf) zebrafish larvae

2023-2024 VAS Officers

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The Virginia Academy of Science

Celebrating the Centennial

1923 - 2023

Spring Meeting

The **2024 VAS Annual Meeting** will be held on ***Thursday, May 16 at The University of Mary Washington in Fredericksburg***. During this meeting, participating section will hold Oral Presentation Sessions and a general Poster Session will take place in the afternoon.

- Morning oral presentations will be scheduled at 15-minute intervals and presenters should be prepared for a talk of 10-11 minutes followed by 3–4 minutes Q&A.

- The poster session will be held from approximately 2 – 5 pm. Poster presenters are assigned an hour during which they should be present to discuss their posters and answer questions.

Award recipients from the Fall Undergraduate Research Meeting are invited and expected to present the results of their projects at the Annual Spring Meeting, and all of today's participants are encouraged to present the results of their projects at the 2024 Annual Meeting.

Specific details about online submission of titles and other information for both oral and posters presentations, as well as more detailed information about the 2024 Annual Meeting, will be made available on the VAS website (www.vacadsci.org) as it becomes available.

Grants and Scholarships

VAS and VJAS Scientific Research Grants, Awards, Scholarships, etc. are made possible by hundreds of corporate and individual donors who believe in our work to benefit the people of Virginia. Many have found this a meaningful way to memorialize a loved one, support a student's education, or recognize the work of a colleague.

For Information and Applications for Research Grants, please contact: Philip M. Sheridan, Executive Officer, Virginia Academy of Science at psheridan@vacadsci.org or 804-633-4336

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General information

The **Virginia Academy of Science** (VAS) is the fifth largest state, region, or city academy of science in the US; it was founded in 1923 to promote the civic, academic, agricultural, industrial, and commercial welfare of the people of Virginia. Exemplary programs have included *Flora of Richmond and Vicinity* (published, 1930), the first comprehensive multidisciplinary studies of the James River Basin and the Great Dismal Swamp, volunteer research assistance to Virginia in the instance of the kepone pollution disaster, and leadership in establishing the Science Museum of Virginia.

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To become a VAS Individual Member, Institutional Member, or Business Member, please contact The Virginia Academy of Science at vasoffice@vacasci.org or 804-633-4336.

VAS Membership Applications for Individuals, Institutions and Businesses, are available at http://vacadsci.org/vas-membership/.

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To Create an Endowment or Make a Donation, please contact Philip M. Sheridan, Executive Officer, Virginia Academy of Science at psheridan@vacadsci.org or 804-633-4336.