

# VAS Fall Undergraduate Research Meeting Awardees

November 3, 2018  
Ferrum College, Ferrum, VA

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## Undergraduate Research Grant Recipients

### Poster # 2

#### **Establishing a rapid-screen methodology to monitor protein degradation in the presence of the endogenous protease calpain and various protease inhibitors**

Taylor Albertelli and Kendahl Ott

*Mentor:* Nathan Wright, Dept. of Chemistry & Biochemistry, James Madison University

To prepare for a high-throughput, fluorescence-based rapid screen of pharmaceutical protease inhibitors in the presence of purified desmoplakin protein and calpain, a methodology must be established to confirm that experimental design will yield significant results. Once all experimental conditions have been determined, this methodology will be applied to monitoring protein stability overtime in the presence of thousands of FDA-approved drugs.

### Poster # 6

#### **The effects of environmental conditions on expression of the ETTIN (ETT) gene in PERIANTHIA (PAN) mutant *Arabidopsis thaliana***

Emily Contompasis

*Mentor:* April Wynn, Dept. of Biology, University of Mary Washington

Environmental conditions, both light exposure and temperature, affect the expression of the ETTIN gene in PERIANTHIA mutant *Arabidopsis thaliana* plants and to examine the penetrance of PERIANTHIA mutant related floral patterning defects with regard to environmental conditions.

### Poster # 13

#### **pH regulation and virulence in the human fungal pathogen *Cryptococcus neoformans***

Kristen John

*Mentor:* Michael S. Price, Dept. of Biology & Chemistry, Liberty University

Mutant strains of two genes within the Rim pathway of the fungal pathogen, *C. neoformans*, will be characterized and reconstituted in order to determine the function of these genes within the pH regulation system of the pathogen and their role in infection.

## Poster # 14

### **The diversity and distribution of spiders (Arachnida: Araneae) along an urban gradient**

William Kish

*Mentor:* Sujan Henkanaththegedera, Dept. of Biological & Environmental Sciences, Longwood University

The species of spiders in the central Piedmont region of Virginia is relatively unknown. This project aimed to explore the spider diversity in the central Piedmont region along an urban gradient.

## Poster # 17

### **Autoinhibition mechanism of the endosomal trafficking protein Tom1**

Evan Littleton

*Mentor:* Daniel G. S. Capelluto, Dept. of Biological Sciences, Virginia Tech

Tom1 participates in transporting ubiquitinated proteins (cargo) targeted for degradation in the early and late endosomal/lysosomal pathway. As a mechanism of survival within the host cell, specific bacterial infections relocate Tom1 from early to signaling endosomes. Our studies focus on the structural mechanisms in Tom1 that drive its subcellular re-localization.

## Poster # 21

### ***Halyomorpha halys* feeding impact on industrial hemp yield and quality**

Mika K. Pagani

*Mentor:* Thomas P. Kuhar and Kadie E. Britt, Dept. of Entomology, Virginia Tech

The effects of insect pests on industrial hemp, particularly in Virginia, are uncertain. Through caging insect pests in various densities on plants and simulating insect defoliation, I aim to learn impacts on vigor and vitality and the threshold of damage at which hemp cannot recover. The knowledge of pest impacts will allow growers to take proactive measures where needed.

## Poster # 26

### **Investigating the role of STP1 in *Arabidopsis thaliana* exposed to salt stress**

Catherine Shola, Aya Andos, Alexis Foor and Ana Clem

*Mentor:* Janet Daniel, Dept. of Biology, James Madison University

The function of the *Arabidopsis* monosaccharide transporter, STP1 is not well understood. Previously, we observed that STP1 (STP1 k/o) knockout plants grow faster when grown in hypersaline conditions. Currently we are developing methods to generate tissue for gene expression studies in these plants to better understand the role of STP1 in the plant.

## Poster # 27

### **If you give a boy a baby: Encouraging empathy in preschoolers**

M. Davis Straske

*Mentor:* Megan Fulcher, Dept. of Psychology, Washington & Lee University

Two interventions for the development of empathy-related responding in preschool-age boys are proposed. Participants receive interventions of play, with toys and/or book-reading. After play, participants undergo empathy simulations, including a baby doll crying and a sympathy interview. The project tests the effectiveness of two student-designed interventions for young boys' empathy development in hopes of use by parents at home.

## Poster # 30

### **The effect of exercise on the gut microbiome**

Deepthi Thumuluri

*Mentor:* Sarah Blythe, Dept. of Biology, Washington & Lee University

This study will explore the impact of exercise, specifically swimming, on the gut microbiome in rats who suffer from diet induced obesity. Gut diversity, as well as underlying biochemical mechanisms, will be investigated. These results will improve our understanding of the role that exercise plays in potentially reversing the effects of diet induced obesity and improving gut health.

## Poster # 35

### **The temporal dynamics of the extrinsic process of apoptosis**

Catherine Zwemer

*Mentor:* Randall Reif, Dept. of Chemistry, University of Mary Washington

Apoptosis is a controlled regulatory process that occurs within the body in which a cell triggers its own death in response to a stimulus. The temporal dynamics of apoptosis and its component stages will be examined through microfluidic technology to further the understanding of the individual components, which can lead to the development of targeted cell therapies.

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## Honorable Mention

## Poster # 8

### **A geometric algorithm for the quantum satisfiability problem**

Shawn DiRocco

*Mentor:* Marco Aldi, Dept. of Mathematics & Applied Mathematics, Virginia Commonwealth University

In classical complexity theory, mathematical problems are classified in terms of the estimated amount of elementary operations that an algorithm requires in order to solve a given problem on a idealized classical computer. The goal of this project is to develop method for solving certain nonlinear systems that requires fewer elementary operations than currently available methods.

## Poster # 24

### **Reward seeking and wheel running in a mouse model of human depression**

Anna Rinko

*Mentor:* R. Parrish Waters, Dept. of Biology, University of Mary Washington

In this experiment, mice who have undergone olfactory bulbectomy (a model of depression) will have selective access (via RFID controlled gates) to a running wheel following performance of an operant task. Wheel running patterns will be monitored and compared to controls, probing questions regarding anhedonia, social rank, and hormonal activity in this model.

## Poster # 33

### **Preparation of polyaluminum polyoxometalate hybrid materials**

Jared Williamson

*Mentor:* Jason Powell, School of Natural Sciences & Mathematics, Ferrum College

Polyoxometalates are precipitated with an aluminum cation in order to maximize crystal lattice packing. This improved packing, compared to traditional cations, allows for crystal growth instead of powder precipitates. These crystals are then characterized via FT-IR, SEM-EDS, and single-crystal x-ray diffraction.

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