



Virginia Academy of Science Fall Undergraduate Research Meeting

Saturday, November 3, 2018

Ferrum College
Ferrum, VA

9:00 am - 4:30 pm



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 students, along with their mentors, must submit their grant applications and research proposals by the October 1 deadline. Students then present posters outlining their research projects at the Fall Undergraduate Research Meeting. Both the research proposals and the poster presentations are evaluated to determine the recipients of the grants.

Nine research grant awards of \$750 each will be given to the top student research proposals-poster presentations selected by the Fall Meeting Judges. The recipients of these grant awards will be announced at the meeting's conclusion. The grant award recipients will also be awarded Student Membership in the VAS for 2019 and will be expected to present the results of their funded research at the 2019 VAS Annual Meeting in May at Old Dominion University.

Financial support for this year's meetings has been provided by the Fellows of The Academy as well as an anonymous corporate donor. The Academy wishes to thank these individuals for supporting today's conference, and for promoting scientific research and science education.

The Academy extends special thanks to the administration, faculty, staff and students of Ferrum College for hosting the VAS 2018 Fall Undergraduate Research Meeting. Special thanks go to those who served on the Local Planning Committee: Timothy Durham, Delia Heck, Laura Grochowski, Maria Puccio, and Taylor Darnell. The support of President David Johns, Provost Aime Sposato, and Director of the Boone Honors Program Lana Whited are especially appreciated. Food for this event has been provided by Ferrum College's Dining Services.

VAS President-Elect Gary Isaacs, Professor of Biology & Chemistry at Liberty University, serves as the Program Chair for the 2018 Fall Undergraduate Research Meeting.

Special thanks are extended to the following individuals who are serving as Judges at this the meeting:

Kadie Britt, Virginia Tech
Taylor Darnell, Ferrum College
Jinnie Garrett, Ferrum College
Dana Ghioca-Robrecht, Ferrum College
Kyle Harris, Liberty University
Michael Korn, Liberty University
Elena Kuchina, Thomas Nelson Community College
Matthew Lazenka, Liberty University
Kimberly Mitchell, Liberty University
Deborah O'Dell, University of Mary Washington
Maria Puccio, Ferrum College
Nancy Richardson, Liberty University
Jim Tung, Hargrave Military Academy
Grant Waldrop, Virginia Tech
Parrish Waters, University of Mary Washington
Nathan Wright, James Madison University
Pei Zhang, Liberty University

Special thanks are also extended to the following individuals who are serving as panelists for the Science Careers Discussion:

Stephen Hobson, Liberty University
David McGuirt, Liberty University
Bob Pohlada, Ferrum College
Michael Price, Liberty University
Bethany Young, Virginia Commonwealth University



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Ferrum College
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SCHEDULE OF EVENTS

- 9:00 - 9:50** **Check-In/Registration** (Outside the Blue Ridge Mountain, Franklin Hall)
Poster Set-up and Meet and Greet (Blue Ridge Mountain Room, Franklin Hall)
- All meeting attendees should check in at the Check-In Table in the Registration Area.
- Following Check-In, student applicants for the Undergraduate Research Grants should set up their posters on their assigned poster boards.
- Coffee, tea and other beverages will be available for all meeting registrants in the Franklin Hall Atrium.
- 9:15 - 9:45** **Judges Meeting** (Virginia Room, Franklin Hall)
- All judges will meet with the VAS President-Elect and review the criteria for evaluating the proposals and posters as well as the procedure for selecting the grant recipients.
- 9:50 - 10:00** **Welcome, Opening Remarks and Instructions**
(Blue Ridge Mountain Room, Franklin Hall)
- Gary Isaacs**, Dept. of Biology & Chemistry, Liberty University, VAS President-Elect and Fall Undergraduate Research Meeting Coordinator

- 10:00 - 12:30** **Evaluation of Posters** (Blue Ridge Mountain Room, Franklin Hall)
- Each poster will be evaluated by a team of judges. The judges will meet with the grant applicants and the applicants should be prepared to give a brief summary (≤5 minutes) of the proposed research and then respond to questions from the judges.
- 10:45 – 11:45** **Optional Activities for Faculty Mentors & Guests**
- Choose one:
- Sharing Session for Faculty (Virginia Room, Franklin Hall)
 - Tour of Campus, Garber Hall Science Building, and Titmus Agricultural Center (Meet outside of Virginia Room, Franklin Hall, for prompt departure at 10:45)
 - Or unwind in the Panther’s Den, Franklin Hall
- 12:00 - 1:45** **Lunch Break** (Dining Hall, Franklin Hall)
- Lunch and beverages will be available for all meeting registrants in Ferrum’s dining facility, compliments of the Provost’s Office.
- 12:30 - 3:00** **Judges Lunch and Meeting** (Magnolia Room, Dining Hall, Franklin Hall)
- During this lunch meeting the judges will select the recipients of the 2018-2019 VAS Undergraduate Research Grant Awards.
- 12:45 - 1:45** **Panel Discussion** (Blue Ridge Mountain Room, Franklin Hall)
- Advice from Science Professionals about Careers and Graduate School*
- 2:00 - 2:15** **Welcome to Ferrum College** (Blue Ridge Mountain Room, Franklin Hall)
- David Johns, President**, Ferrum College
- Aime Sposato, Provost**, Ferrum College
- 2:15 - 3:15** **Invited Keynote Speaker** (Blue Ridge Mountain Room)
- Carolyn Thomas, Director of the Smith Mountain Lake Water Quality Monitoring Program** (along with other program members)
School of Natural Sciences & Mathematics, Ferrum College
- Students, Citizen Scientists and Smith Mountain Lake: A Successful Collaboration***

The Ferrum College Smith Mountain Lake Water Quality Monitoring Program started in 1987 (32 years ago) with collaboration between Ferrum College aquatic scientists and the Smith Mountain Lake Association in order to preserve good water quality in Smith Mountain Lake. Dr. Carolyn L. Thomas and Dr. David M. Johnson were the founders of the program and which has always been based on the student technician interns' involvement and work and support of volunteer citizen scientists who live on Smith Mountain Lake and four other faculty and staff including, Dr.'s Heck, Puccio, Pohlad and Ms. Love. Each summer from approximately Memorial Day to Labor Day, the volunteer citizen scientists take water samples, filter and measure water turbidity every two weeks from June –August. The Ferrum College Water quality program hires four students each summer, who quite often are doing their internship required by their Ferrum College major. These students pick up the volunteer monitors' samples every other week by driving around the whole lake. The students and the Ferrum College faculty and staff collect 21 tributary samples for chemical and biological analyses in the same weeks they pick up the citizen scientists' samples.

The students and faculty also go out on Smith Mountain Lake in the Ferrum College's Boston Whaler boat and a volunteer monitor's boat each week sampling 14 bacterial samples sites for analyses. In alternate weeks they measure five depth profiles of the lake, measuring temperature, dissolved oxygen, pH and conductivity. Each week the water quality crew also samples algal populations alternating between vertical profiles and horizontal profiles.

When the season is over in September, the Ferrum College students who worked for the Ferrum College Water Quality Program make a presentation to the whole campus and public on a Friday afternoon for Natural Sciences and Mathematics Seminar series. The Ferrum College Water Quality Crew also hold a report and social session for the volunteer monitors, believing our citizen scientists should be the first to hear the summer's Smith Mountain Lake water quality results.

The next step is to compile all results and review all quality control measures and write a comprehensive report as we do each year on the Water Quality in Smith Mountain Lake, which are published in December - January.

3:15 - 3:45 **Announcement of Grant Recipients** (Blue Ridge Mountain Room, Franklin Hall)

Woodward Bousquet, Shenandoah University, VAS President

3:45 - 4:00 **2018-2019 Undergraduate Grant Recipients Assemble for Photographs** (Blue Ridge Mountain Room, Franklin Hall)

3:45 - 4:30 **Poster Removal** (Blue Ridge Mountain Room)
Check-Out and Departure (Franklin Hall Atrium)

Student applicants/poster presenters should remove their posters from their assigned poster boards and leave the poster board and push pins with the easel for subsequent pickup.

POSTER PRESENTATIONS

1 Putative Rho-GDP dissociation inhibitor influences aflatoxin production and morphology in *Aspergillus flavus*

Leah Beel

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

Potential changes in aflatoxin production and morphology after complementing an rdiA knockout mutation in *A. flavus* will be observed. In order to complement the rdiA gene knockout in *A. flavus*, the native rdiA gene will be cloned into a phleomycin-resistance vector that will then be transformed into the *A. flavus* Δ rdiA mutant.

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.

3 Behavioral acquisition and analysis techniques in bilaterally bulbectomized CD-1 mice

Sarah E. Balenger

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

We will perform olfactory bulectomy (OBX) surgery on sixteen mice; a 'sham' surgery in which mice are surgically manipulated but the bulb is not removed will serve as a balanced control group. Mice will be housed in groups of four according to their group (OBX or SHAM). Mice will be tagged with unique RFIDs tags and tracked using a system of grid readers. After 28 days we will perfuse mice and prepare brain tissue for histology to ensure complete and proper removal the olfactory bulb.

- 4 Microbial assemblages in association with crayfish ectosymbionts**
Matthew Cooke, Thomas Kepler, Kaleb Bohrnstedt and Luke Fischer
Mentor: Kyle J. Harris and Matthew Becker, Dept. of Biology & Chemistry,
Liberty University

Crayfish are ubiquitous in many freshwater streams where they provide a microhabitat for invertebrate organisms such as bacteria and annelids. As ectosymbionts, the annelid branchiobdellidans live out much of their life-cycle on crayfish feeding on epibionts such as bacteria. This project examines potential shifts in crayfish microbial assemblages associated with these branchiobdellidan ectosymbionts along a stream continuum.

- 5 Development of slow control read out**
Jeremiah Browne and Taylor Yeboah
Mentor: Narbe Kalantarians, Dept. of Natural Sciences, Virginia Union University

Slow control read-out is essential for sensors in that it ensures valuable data is obtained and archived. Raspberry Pi's can be useful as controllers for this because they serve as single-board, energy-efficient computers that can run a light-weight Linux operating system to run the necessary software for the sensors. This presentation will focus on the initial study at Virginia Union University and plans for future research and development. Moreover, these machines or tools can compile data of variables such as temperature. For example a thermometer, it picks up on the weather and collects the temperature data. Also, in the experiment we used a sense HAT which is a add-on for Raspberry Pi which had the temperature sensors as well as light emitting diodes also know as LED. Again, with that technology we were able to program the lights to illustrate word that said VUU Physics across the screen. Furthermore, there were some challenges that occurred with this stage. We kept receiving rainbow screens which could be various issues. For this reason we took a different approach by rebooting all the information and starting the process over. Next, these topics relate to what is a Raspberry Pi, what was it used to do, as well as how it relates to science. The near future goal is to use this for an experiment at Jefferson Lab for other to see what great work dedicated students from various backgrounds can do.

- 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.

7 Presence of *Ehrlichia* sp In ticks from Candler's Mountain, Virginia

Maria Gonchar

Mentor: Davis McGuirt, Dept. of Biology & Chemistry, Liberty University

A tick survey will be done by DNA extraction on Candler's Mountain Road. Various ticks have been collected and will be tested for *Ehrlichia* sp. within the region by polymerase chain reaction (PCR) to identify pathogens present within the field.

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.

9 Assessment of zebra mussel colonization potential using atomic absorption spectroscopy

Kyle Haley

Mentor: Maria Puccio, School of Natural Sciences & Mathematics, Ferrum College

We are assessing calcium levels in Smith Mountain Lake to determine if the zebra mussel (*Dreissena polymorpha*) can establish. If the suspended calcium is below 20 ppm, the larval stage of the mussel should not be able to develop and zebra mussel colonization should not occur. Additionally, lake turn over will be assessed by collecting water parameter profiles.

10 The effects of curcumin on fungi

Julia Guarini

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

Studies have shown that curcumin has strong antimicrobial properties against bacteria, virus, and fungi. The aim of this research is to repeat the tests done on to on *Aspergillus flavus* in a fungus with similar characteristics, *Cryptococcus*.

11 The effect of oxyntomodulin on food intake in Japanese quail

Bailey Halter

Mentor: Mark Cline, Dept. of Animal & Poultry Science, Virginia Tech

The appetite associated effects of oxyntomodulin are known, but the hypothalamic mechanism mediating this response is unknown. From this we will determine which other neurotransmitters are involved with the reduction of food intake.

12 Antimicrobial properties of polyoxometalates against gram-positive and gram-negative bacteria

Caitlin Hodges

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

The purpose of this research is to determine the effectiveness of polyoxometalate compounds as antimicrobial agents against both gram-positive and gram-negative bacterial types.

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.

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

William Kish

Mentor: Sujan Henkanaththegeedara, 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.

- 15 Gaze as a moderator of perceived rejection in socially anxious individuals**
Korena Klimczak
Mentor: Matt Judah and Nathan Hager, Dept. of Psychology, Old Dominion University

Socially anxious individuals spend less time looking directly at the faces of others (i.e., indirect gaze), yet little is known about how indirect gaze may lead to perceptions of being rejected by others. The proposed research will examine how indirect gaze is associated with anxious arousal and perceptions of facial expressions as rejecting.

- 16 Pollution tolerance of crayfish ectosymbionts (branchiobdellidans)**
Samuel Owens and MacKenzie Lecher
Mentor: Kyle Harris, Paul Miller and Mark Blais, Dept. of Biology & Chemistry, Liberty University

Pollutants within aquatic ecosystems have a diverse range of effects on biota. Aquatic invertebrates exposed to pesticide pollution have been shown to have a diverse range of effects, ranging from mortality to displacement and other sublethal consequences. This project will investigate the pollution tolerance of crayfish ectosymbionts (branchiobdellidans) with low dose acute exposure to pesticides

- 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.

- 18 Enhanced performance of UV glass photomultipliers via application of wavelength shifters**
Patrick McCormick
Mentor: Donal Day, Dept. of Physics, University of Virginia

Using various application methods (dipping the tube into a mixture, airbrushing a mixture onto the tube, and dripping the mixture onto the tube via a syringe) of p-terphenyl (a wavelength shifter) to enhance the sensitivity of UV glass photomultipliers at lower wavelengths.

19 Evaluation of a carbon utilization mutant of *Cryptococcus neoformans* for use as a vaccine

Hannah Philips and Emily Oglesby

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

Due to the lack of effective therapeutic treatments, preventative measures are a growing area of interest in cryptococcosis research. An avirulent strain of *Cryptococcus neoformans* will be transformed with an interferon-gamma producing construct with the expectation of future use in vaccinations.

20 Identifying resource trade-offs between vegetative stem growth and seed production in Virginia soybeans

Keller Nocera-Smith

Mentor: Anne Alerding, Dept. of Biology, Virginia Military Institute

Seed yield in Virginia soybeans has topped out at 40 bushels per acre, which limits income for farmers. My goal is to identify competitive resource trade-offs during seed filling. I will use fluorescence microscopy to determine if growth in secondary cell walls competes with seed production during reproductive growth.

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.

22 Presence of *Dirofilaria immitis* in mosquitos in Lynchburg, VA

Nadya Prince

Mentor: Davis McGuirt, Dept. of Biology & Chemistry, Liberty University

I will be catching mosquitoes and testing them for *Dirofilaria immitis* DNA.

23 Role of the short-tailed shrew (*Blarina* spp.) in *Borrelia* spp. transmission in southeastern Virginia

Kasey Parker

Mentor: Wayne Hynes and Holly Gaff, Dept. of Biological Sciences, Old Dominion University

Study of the role of *Ixodes affinis* and the short-tailed shrew (*Blarina* spp.) in the maintenance, cycling, and transmission of *Borrelia* spp. Comparison of *Borrelia* spp. prevalence in areas with and without known *Ixodes affinis* populations. Tick and short-tailed shrew tissue samples from southeastern Virginia, Minnesota, Kansas, and North Dakota will be tested and compared.

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.

25 Microplastic presence and abundance in crayfish and associated food webs within urban and rural streams

Alexandra Reddy and Brittany Carnathan

Mentor: Kyle Harris and Michael Bender, Dept. of Biology & Chemistry, Liberty University

This project explores the occurrence of microplastic pollution on an abundant and ecologically important species: crayfish. Microplastic particulates in the digestive tracts of crayfish and environmental substrate in Central Virginia freshwater ecosystems will be identified and quantified. With organismal and environmental sample collections from commercial and rural creek locations, this study examines the presence and consequent implications of microplastic contamination.

- 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.

- 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.

- 28 Investigation of the estrogenic nature and mechanism of action of BPA derivatives by a yeast genetic system**
Levi Schiefer and Lauren Clines
Mentor: Cameron Sheeler, Dept. of Biology & Chemistry, Liberty University

The widely-used compound BPA has been shown to exert harmful effects in humans by mimicking the hormone estrogen. Consequently, manufacturers have turned to alternatives of BPA, often compounds of the same structural family. This research project is a comprehensive examination of the estrogenic properties, cellular mechanisms of action, and toxicological developmental effects of such derivative compounds.

- 29 The repellency of cinnamon and cloves to pest ant species**
Daisy Titsch
Mentor: Deborah Waller, Dept. of Biological Sciences, Old Dominion University

The proposed research will test the repellent effects of common household spices, cinnamon and cloves, against ten species of ants that invade houses. Experiments will be conducted in both the field and in the laboratory with different spice preparations and mixtures to determine the most effective formulation to repel ants.

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.

31 O-GlcNAcylation and activity of succinate dehydrogenase

Abigail Vickers and Nhat Truong

Mentor: Pei Zhang, Dept. of Biology & Chemistry, Liberty University

O-GlcNAc modification of proteins is a significant post-translational modification of proteins that is catalyzed by O-linked N-acetylglucosamine transferase (OGT). Our research will attempt to determine whether O-GlcNAc modification of succinate dehydrogenase (SDH) has an effect on activity by transfecting SDH plasmids harboring mutations at specific O-GlcNAcylation sites into cell lines and comparing their enzymatic activity with wild type SDH.

32 Elucidating the hypothalamic mechanism by which neuropeptide S (NPS) induces satiety in Japanese quail

Addison Webster

Mentor: Mark Cline, Dept. of Animal & Poultry Science, Virginia Tech

Our group demonstrated that Neuropeptide S causes reduced appetite, although the precise mechanism mediating this response is unknown. The proposed research is designed to elucidate the hypothalamic mechanism by which other neuropeptides participate in this response.

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.

34 Temperature sensitive pyk1Δ rescue mutation in *C. neoformans*

Mara Weigner

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

My research has two main foci: regulation of pathogenicity in fungi, and regulation of secondary metabolism by environmental cues. For the first focus, I utilize the *Cryptococcus neoformans*-mouse pathosystem as a model for understanding how nutrient or environmental cues impact pathogenicity. Carbon regulation has recently been shown to be important for *Cryptococcus* virulence, and we have identified several genes involved in carbon regulation during infection. Monies from this grant would allow me to investigate these genes and their relationship to carbon regulation in this important emerging pathogen.

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.

2017-2018 VAS Officers

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The Virginia Academy of Science

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.

The **2019 VAS Annual Meeting** will be held on May 22-24 at Old Dominion University in Norfolk. During this meeting, Oral Presentation Sessions (for participating VAS sections) and a Poster Session (for all VAS sections) will take place on Thursday morning and afternoon, May 23.

- Most section 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 for questions and/or comments.
- The poster session will be held from 10 am – 5 pm. Poster authors must be present from noon to 2 pm to discuss their posters and answer questions.

Award recipients from the Fall Undergraduate Research Meeting are expected to present the results of their projects at the Annual Meeting, and all of today's participants are encouraged to present the results of their projects at the 2019 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 2019 Annual Meeting, will be made available on the VAS website (www.vacadsci.org) as it becomes available.

To become a VAS Individual Member, Institutional Member, or Business Member, please contact The Virginia Academy of Science at vasoffice@vacasci.org or 804-864-1450.

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

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.

To Create an Endowment or Make a Donation, please contact Philip M. Sheridan, Executive Officer, Virginia Academy of Science at psheridan@vacadsci.org or 804-864-1451.

For Information and Applications for Research Grants, please contact one of the following individuals.

- Philip M. Sheridan, Executive Officer, Virginia Academy of Science at psheridan@vacadsci.org or 804-864-1451
- Carolyn M. Conway, Associate Executive Officers, Virginia Academy of Science at vasoffice@vacadsci.org or cconway@vacadsci.org or 804-864-1450

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Remember

Founded the Science Museum of Virginia ... With the Garden Clubs of Virginia, established the Virginia State Parks System ... Established, with the early support of the DuPont family, the first Scientific Research Fund in Virginia ... Founded the Virginia Institute for Scientific Research (erected at the University of Richmond), the forerunner of Virginia Centers for Innovative Technology, funded by the Virginia General Assembly ... Founded The Virginia Junior Academy of Science to foster original research in Virginia middle and high schools ... Published the Flora of Richmond and Its Vicinity ... Leaders' testimony at the Scopes Trial and later resolutions on evolution and its teaching in science curricula of Virginia schools ... Advocated inclusion of women and African-American scientists and science educators in professional meetings ... Founded the Virginia Journal of Science ... Hundreds of teacher education and training programs in the sciences, mathematics, medicine, and technology ... Established the Kiser Fund for Science Teacher Education ... Published The James River Basin: Past, Present, and Future, funded by the Virginia General Assembly, the first comprehensive, multidisciplinary account of the James and its resources, landforms, flora, fauna, industries and businesses ... Established the VJAS Research Fund to support scientific investigations by Virginia's secondary school students ... Annually sponsors "The VJAS Experience" bringing hundreds of secondary students to Virginia colleges and universities to stay on campus and visit research facilities ... Founded the Virginia Science Resource Network to mentor Virginia's teachers and students ... Established the Annual Undergraduate Research Conference to financially support original research in four-year and two-year curricula ... Established scientific advisory service to Virginia Governors and state agencies beginning with the state's kepone disaster ... Supported the founding of the Virginia Institute of Marine Science (College of William and Mary) ... Decades of leadership for the publication of the first *Flora of Virginia* since 1739 (to be published 2012)... ... Annually awards over \$80,000 in sponsored/endedowed scholarships and prizes to Virginia middle and high school students for original research ...

NEXT ...???

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