

# BIOFEEDBACK

THE NEWSLETTER OF THE BIOLOGY DEPARTMENT AT RHODES

VOLUME 35

OCTOBER 2020

NUMBER 1

## The Chair's Niche



Hello Biology,

It has been a big semester for new experiences! I am not sure if we still consider Zoom new – but it is certainly a new way to get to know people. I've really enjoyed interacting with you through this electronic format this semester – and I feel like

I have seen more pets of students than I ever have before. Such a great perk!

Other than the obvious “newness” of remote teaching and learning, we have a few more new things to be excited about in Biology.

First and foremost, we welcome two new faculty to the Department this semester. Dr. Syd Moyo and Dr. Qian Shen both join as tenure track members of Biology. Dr. Moyo is currently teaching Invertebrate Biology with lab and will be teaching our introductory course in the spring. Dr. Shen is currently teaching introductory Biology and will be teaching Microbiology with lab in the spring. Be sure to drop by and introduce yourself at our next Biology Department Zoom Social and ask them about their research!

You may have heard that we have a new Biology Inclusivity, Diversity, and Equity committee (BIDE). You can read more about BIDE in this edition of *BIOFEEDBACK*, and I encourage you to get in touch at [BIDE@rhodes.edu](mailto:BIDE@rhodes.edu) with any ideas you might have for the group.

Finally, the Biology major has changed! We now offer concentrations as part of the major. A student can major in Biology with a concentration in General Biology (GB), Integrative Biology (IB), Ecology, Evolution, and Behavior (EEB); or Biomedical Sciences (BMS). If you have any questions about what these different areas offer, please reach out to your advisor or your Biology professor.

I hope that you are also excited by what this semester will bring, and I hope that you are settling into a routine that is productive and healthy. Reach out to your professors. We miss you, and would love to hear from you (and your pets).

Best,

**Dr. Mary Miller, Chair**

## Primary Productivity & Secondary Growth

Honors | Awards | Grants | Publications | Meeting Participation

### HONORS AND AWARDS

#### Congratulations to: Students

**Yavin Alwis NEUR '20** Award for Outstanding Senior in Neuroscience

**Bailey Cate ENVS '20** The Steve and Riea Lainoff Crop Trust Fellowship in Honor of Cary Fowler

**Sophie Enda ENVS '22** Sophomore Award in Environmental Science

**Caroline Farrell NEUR/BUS '21** Theodore William Eckels International Intern

**Shirley Fontanié ENVS/BUS '20** Senior Award in Environmental Studies

**Mary Freyaldenhoven '23** Award for Excellence in First-Year Biology

**William Freyaldenhoven BMB '21** Award for Outstanding Senior in Biochemistry and Molecular Biology

**Shannon Kane ENVS '20** Senior Award in Environmental Science

**Swati Kinger '23** Award for Excellence in First-Year Biology

**Claire McGuire ENVS '20** Senior Award in Environmental Science

**Simon McSweeney '20** Award for Excellence in Biology

**Elise Moix NEUR '20** Award for Outstanding Senior in Neuroscience and Seidman Trophy in Athletics

**Tzvi Nadel NEUR '20** Korsakov Research Award in Psychology

**Annie Ouyang '20** Award for Outstanding Research in Biology and Rhodes Hall of Fame Inductee

**Maggie Palopoli BMB '20** The Algernon Sydney Sullivan and Mary Mildred Sullivan Award

**Itthipoaln Rasasack BMB '20** Award for Outstanding Research in Biochemistry and Molecular Biology

**Lily Roberts ENVS/ECON '22** Sophomore Award in Environmental Studies

**Maleelo Shamambo NEUR '20** Received the Peyton Nalle Rhodes Phi Beta Kappa Prize, which is the college's highest academic honor, as well as the Thomas J. Watson Fellowship - a highly competitive one-year grant for independent exploration outside of the United States.



**Maleelo Shamambo NEUR '20** received Rhodes College's highest academic honor, the Peyton Nalle Rhodes Phi Beta Kappa Prize, and was one of only 47 students nationally who were awarded a prestigious one-year Watson Fellowship for travel and exploration abroad. Lelo also received two top honors from the Neuroscience Program.

In addition to these extraordinarily prestigious honors, she received both the Hunter Award for Excellence in Neuroscience and the Award for Outstanding Senior in Neuroscience.

**Ramiz Somjee BMB '21** 2020 Goldwater Scholar

**Katie Tucker BIOL/ENVS '21** Rosanna Cappellato Award in Environmental Science

## Faculty

**Dr. Terry Hill** Council on Undergraduate Research (CUR) Biology Division 2020 Faculty Mentor Award - Advanced Career

**Dr. David Kabelik** Renewal of the James T. and Valeria B. Robertson Chair in Biological Sciences and 2020 ACS Zoom Mentor

**Dr. Gary Lindquister** The Jameson M. Jones Award for Outstanding Faculty Service for a current faculty member who has rendered exemplary service and provided leadership to the Rhodes community

**Dr. Mary Miller** Recognized by students and Rhodes as a faculty who have gone "above and beyond the needs of our international students as we have transitioned to remote learning"; supported by the ACS

## New Omicron Delta Kappa Honor Society members:

Alexa Alana BMB '20, Bernadette Badamo ENVS '21, Amanda Cheang ENVS '21, Emma DiMartini NEUR '21, Caroline Farrell NEUR/BUS '21, Katie Gaffney NEUR '21, Francesca Healy BMB '20, Margaret Larsen BMB '21, Katherine Petrinjak BMB '21, Itthipoaln Rasasack BMB '20, Amanda Salazar NEUR '20, Ramiz Somjee BMB '21

## New Mortar Board Honor Society members:

Caroline Farrell NEUR/BUS '21, Katie Gaffney NEUR '21, Joshua Hill '21, Mary Maloney ENVS '21, Stewart Nichols BMB '21, Katherine Petrinjak BMB '21, Sara Scherer NEUR '21, Natalie Thomas ENVS/MUSC '21, Hoang-Viet Tran '21, Brandon Waddell NEUR '21, Deja Walls '21

## New Phi Beta Kappa Society members:

Alexa Alana BMB '20, Yavin Alwis NEUR '20, Samuel Cloyd '20, Toler Freyaldenhoven BMB '21, Katie Gaffney NEUR '21, Francesca Healy BMB '20, Anuradha Iyer ENVS/ANSO '20, Catherine Kirkpatrick BMB '20, Emily Korba NEUR '20, Simon McSweeney '20, Elise Moix NEUR '20, Catelyn Renna NEUR '20, Bilal Siddiq NEUR '20, Ramiz Somjee BMB '21, Jared Stover BMB '20, Trevor Van Vliet NEUR '20

## Publications

**Alwis Y NEUR '20** and Haberman J. 2020. Emotional judgments of scenes are influenced by unintentional averaging. *Cognitive Research: Principles and Implications*, 5(1): 1-10.

Balasubramaniam S, Vijayan S, **Goldman L NEUR '20**, **May X BMB '17**, Dodson K, Adhikari S, Rivas F, Watkins D, Stoddard S. 2020. Design and synthesis of diazine-based panobinostat analogues for HDAC8 inhibition. *Beilstein Journal of Organic Chemistry*, 16: 628-37. <https://doi.org/10.3762/bjoc.16.59>

**Brookover Z BIOM '21**, Campbell A MATH '20, **Christman B BIOM/ENVS '21**, Davis S MATH '21, Bodine E. 2020. A demographic model of an endangered Florida native bromeliad, *Tillandsia utriculata*. *SPORA: A Biomathematics Journal*, 6(1): 1-15. <https://ir.library.illinoisstate.edu/spora/vol6/iss1/2/>

Derefinko K, Ashby S, Hayes T, Kaplan C, Bursac Z, Salgado-García FI, Madjesi A, Tonkin L, Bowden M, **Popescu F BIOL/NEUR '20**, and Waters T. 2020. Sexually transmitted infections and contraceptive use in adolescents. *American Journal of Preventive Medicine*, 58(4): 536-46. <https://doi.org/10.1016/j.amepre.2019.11.012>

Fiore L, Takata N, Acosta S, Ma W, **Pandit T**, Oxendine M, and Oliver G. 2020. Optic vesicle morphogenesis requires primary cilia. *Developmental Biology*, 462(2): 119-28.

**Hill T**, **Wendt K BMB '14**, Jones D CHEM '22, **Williamson M BMB '18**, Ugwu U, **Rowland L BMB '19**, and Jackson-Hayes L. 2020. The *Aspergillus nidulans* IQGAP orthologue SepG is required for constriction of the contractile actomyosin ring. *Fungal Genetics & Biology*, 144: 103439. <https://doi.org/10.1016/j.fgb.2020.103439>

Jucá T, **Boyle S**, Cavalcanti G, Cavalcante T, Tomanek P, Clemente S, de Oliveira T, and Barnett A. 2020. Being hunted high and low: do differences in nocturnal sleeping and diurnal resting sites of howler monkeys reflect safety from attack by different types of predator? *Biological Journal of the Linnean Society*, 131: 203-19. <https://doi.org/10.1093/biolinnean/blaa102>

**Laport R**, Smith D, and Ng J. 2020. Remnant American chestnut (*Castanea dentata*) near the historical western range limit in southwestern Tennessee. *Castanea*, 85(2): 232-43. <https://doi.org/10.2179/0008-7475.85.2.232>

Magee C CHEM '19, **Selner E '18**, Peterson L, Cafiero M. 2020. The effects of ligand charge, orientation and size on the binding of potential inhibitors for aldehyde dehydrogenase. *Computational and Theoretical Chemistry*, 1185: 112868. <https://doi.org/10.1016/j.comptc.2020.112868>

**Petrik D**, Tryfona T, Dupree P, and Anderson C. 2020. BdGT43B2 functions in xylan biosynthesis and is essential for seedling survival in *Brachypodium distachyon*. *Plant Direct*, 4: 1-16. <https://doi.org/10.1002/pld3.216>

**Popescu M '20**, **Trychta M '16**, Jackson E CHEM '16, **Selman J BMB '16**, Houston A, and **Collins M**. 2020. Avian haemosporidian prevalence and its relationship to host traits in western Tennessee. *Journal of Ornithology*. <https://doi.org/10.1007/s10336-020-01783-8>

**Somjee R BMB '21**, Mitrea D, and Kriwacki R. 2020. Exploring relationships between the density of charged tracts within disordered regions and phase separation. *Pacific Symposium on Biocomputing*, 25: 207-18.

(continued next page)



Stoddard SV, Stoddard SD, **Oelkers B '23**, Fitts K CHEM '21, Whalum KT PSYCH '21, Whalum KT CHEM '21, **Hemphill A '23**, **Manikonda J '23**, **Martinez L '23**, **Riley E NEUR '22**, **Roof C NEUR '21**, **Sarwar N '23**, Thomas D PHYS '20, Ulmer E ENGL '22, Wallace F, Pandey P, and Roy S. 2020. Optimization rules for SARS-CoV-2 M<sup>pro</sup> antivirals: ensemble docking and exploration of the coronavirus protease active site. *Viruses*, 12: 942. <https://doi.org/10.3390/v12090942>

Stultz L, Hunsucker A, Middleton S, Grovenstein E, O'Leary J, **Blatt E BMB '16**, **Miller M**, Mobley J, and Hanson P CHEM '96. 2020. Proteomic analysis of the *S. cerevisiae* response to the anticancer ruthenium complex KP1019. *Metallomics: integrated biometal science*, 10.1039/d0mt00008f. Advance online publication. <https://doi.org/10.1039/d0mt00008f>

Weaver W, Ng J, and **Laport R**. 2020. LeafMachine: Using machine learning to automate phenotypic trait extraction from herbarium specimens. *Applications in Plant Sciences*, 8(6): e11367. <https://doi.org/10.1002/aps3.11367>



## Meetings

**Alana A BMB '20**, Robinson M, Colabroy K, Peterson L. Spectroscopic determination of pKa values for identifying enzyme intermediates in L-DOPA dioxygenase. BIOL-0066 259<sup>th</sup> American Chemical Society National Meeting. Philadelphia, PA (March 22-26, 2020 – Canceled due to COVID-19)

**Alwis Y NEUR '20** and Haberman J. Eye movement strategies do not predict recognition of own or other-race faces. Vision Sciences Society's Annual Meeting. St. Pete's Beach, FL (May 2020 – Abstract withdrawn due to COVID-19)

**Aronson E '20** and **Laport R**. Stomatal size and density variations in the polyploids of *Larrea tridentata*: landscape level and areas of co-occurrence. Botanical Society of America Annual Meeting. Virtual (July 27-31, 2020)

**Betonio M BMB '20**, Cafiero M, Colabroy K, Peterson L. Synthesis of 3,4-dihydroxyhydrocinnamic acid analogues to investigate dioxygenase activity. ORGN-0442 259<sup>th</sup> American Chemical Society National Meeting. Philadelphia, PA (March 22-26, 2020 – Canceled due to COVID-19)

**Brookover Z BIOM '21**, **Christman B BIOM '21**, and **Laport R**. Modeling population dynamics of the American chestnut (*Castanea dentata*) near the historical range limit in west Tennessee. Botanical Society of America Annual Meeting. Virtual (July 27-31, 2020)

**Kelly P**. Is it fertilizer or is it fish pee? The impact of external and internal sources of nutrients in lakes within agricultural watersheds. Queens University. Virtual (May 13, 2020)

**Kelly P**, Andersen I, Scott T, and Taylor J. Positive responses of net ecosystem productivity to increasing N:P ratios in experimental lake

mesocosms. Association for the Sciences of Limnology and Oceanography Annual Meeting. Madison, WI (June 6-11, 2020 – Canceled due to COVID-19)

**Leahey E NEUR '20** and Haberman J. Female faces perceived as sadder than male faces at both individual and ensemble levels. Vision Sciences Society's Annual Meeting. St. Pete's Beach, FL (May 2020 – Abstract withdrawn due to COVID-19)

**McKay M '20** and **Miller M**. THI73 mediates regulation of CLN3G1 cyclin activity in *Saccharomyces cerevisiae*. Genetics Society of America Trans Allied Genetics Conference. Virtual (April 24, 2020)

Nguyen K and **Laport R**. Investigating the origins of the American amphitropical disjuncts *Larrea tridentata* and *Larrea divaricata*. Botanical Society of America Annual Meeting. Virtual (July 27-31, 2020)

**Roberts J NEUR '21**, **Shamsi-Basha L NEUR '22**, Cohen M, and Haberman J. A cross-domain attentional blink for ensemble representations. Vision Sciences Society's Annual Meeting. St. Pete's Beach, FL (May 2020 – Abstract withdrawn due to COVID-19)

Solomon C, Jones S, Craig N, **Kelly P**, Koizumi S, Olson C, Ross A, Weidel B, and Zwart J. Dissolved organic matter controls zoobenthos productivity: results from a long-term whole lake experiment. Association for the Sciences of Limnology and Oceanography Annual Meeting. Madison, WI (June 6-11, 2020 – Canceled due to COVID-19)

**Strauss A ENVS/RELS '21**, **Velasquez M ENVS '21**, **Popescu M '20**, Park CY COMP '22, and **Kelly P**. Assessing variability in biogeochemical cycling and stoichiometry in an urban lake. Association for the Sciences of Limnology and Oceanography Annual Meeting. Madison, WI (June 6-11, 2020 – Canceled due to COVID-19)

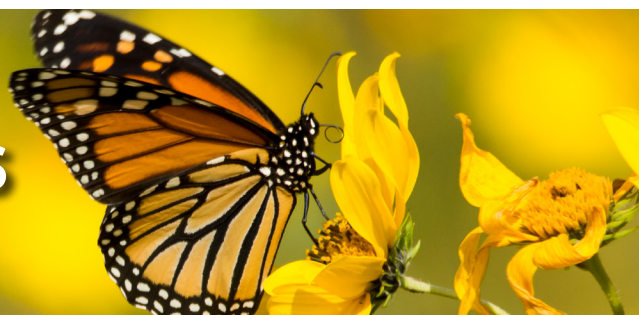




# Curricular Evolution

## Biology Course Updates

### Spring 2021 and Beyond



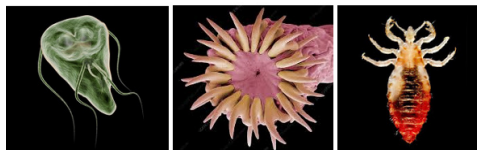
#### Returning Course Offerings:

##### **BIOL 201 Mycology**

Explore DIVERSITY in your major!

This spring, after a two-year hiatus, BIOL 201 Mycology (Biology of the Fungi) will again be taught. The lecture/lab course examines the many roles played by animals' closest evolutionary cousins, as symbionts and pathogens of animals and plants, as contributing members of a wide range of ecological communities, and as fascinating fellow creatures whose basic needs are really very like our own. (It's not really all that hard to "think like a fungus".) In addition to studying their relationships with other organisms, the course also examines fungi from perspectives of their diversity, reproductive strategies, and basic aspects of their genetics – as well as studying the many ways that fungi impact human activities such as the roles that fungi play in production of pharmaceuticals, foods, and tasty adult beverages. In laboratory, students gain experience in (among other things) isolating fungi from nature, identification of fungi based on microscopic observation, and hands-on experience in making beer and fermented foods. BIOL 201 is listed as an upper-level elective for majors both in Biology and in Environmental Science.

##### **BIOL 302 Parasitology**



Parasitology is returning this spring after a hiatus of many years. Parasites are organisms that are dependent on another species for their reproductive success. Many spend most or all of their lives in close association with one or more host organisms.

This course will examine the morphology, development, molecular and cellular biology, life cycles, ecology, evolutionary adaptations, and host interactions of a variety of vertebrate and invertebrate parasites. Parasites that interact with humans as a primary or secondary

host will feature prominently but all parasitic taxa will be represented. BIOL 302 is listed as an upper-level elective for majors both in Biology and in Environmental Science.



#### Brief Course Updates

##### **Environmental Field Study in Namibia (BIOL 214)**

is scheduled for May 13 – June 3, 2021 (if a minimum of students enroll). The course visits the Namib Desert, dry thornveld savannas, and the Kalahari sands, along with meeting indigenous people, NGOs, and governmental officers involved in local environmental issues. This 4-credit Maymester to Namibia (BIOL 214) may be combined with BIOL 212 (Environmental Issues in Southern Africa) or BIOL 260 (Science of Climate Change) to fulfill one upper-level Biology course with lab, an Environmental Science elective, and the F11 requirement. Interested students should contact Dr. Collins ([collinsm@rhodes.edu](mailto:collinsm@rhodes.edu)) and plan to attend an informational Zoom session on Wednesday, October 21st, from 5-6 pm CST at this link: <https://rhodes.zoom.us/j/95862937623>.

##### **BIOL 380 Topics in Biomedical Science**

This spring we will continue our signature Topics in Biomedical Science course in partnership with St. Jude Children's Research Hospital. BIOL 380 will be taught by four post-doctoral fellows, each of whom will explore a subject related to his or her own research. The topics for this year will be announced before the registration period closes; however, they often relate to cancer, virology, immunology, cell biology and genomics. Each topic will include lectures on basic and advanced material relevant

to the research area, discussion of review and primary literature, and introduction to techniques and clinical application. For additional information, contact Dr. Gary Lindquister ([glindquister@rhodes.edu](mailto:glindquister@rhodes.edu)), the course supervisor.

#### Senior Seminar News

This spring the Biology senior seminars are BIOL 486-01: Prokaryotic-Eukaryotic Symbioses, MWF 11:00-11:50 AM, taught by Dr. Frawley and BIOL 486-02: Avian Biology, TR 11:00-12:15 PM, taught by Dr. Collins. Students who signed up for these senior seminars during the lottery last spring should list them on their tree under "Other Courses" when they register this fall.

**Juniors note that senior seminars for the '21-'22 academic year will be listed in the spring issue of BIOFEEDBACK, along with information about the lottery for enrollment.**

#### New Concentrations within the Biology Major!

Concentrations are an entirely new feature to the Biology Major. Based on your upper-level Biology courses you may be able to declare a major in one of FOUR areas: General Biology; Integrative Biology; Ecology, Evolution, and Behavior; and Biomedical Science. Please see the information on the next page about each. For all concentrations, the remaining requirements for the Biology major remain the same. These are Biology 130/131 and 140/141, one semester of Biology Senior Seminar, and four cognate courses (two in Chemistry, one statistics course, and one computational methods course such as calculus or computer science).

If you want to declare a Concentration in your Biology Major:

- Students who haven't declared a major yet can specify their concentration when they fill out the declaration of major form for Biology.
- Students who have already declared a Biology major and want to specify a concentration should send an email, from their Rhodes email account, to [Express@rhodes.edu](mailto:Express@rhodes.edu) requesting that their major catalog year be updated to

*(continued next page)*

# Optimal Foraging

The following courses  
will be offered next semester

Number	Course Title
120	Intro to Environmental Sciences (Kelly)
140	Biology II (4 sections)
141	Biology II Lab (8 sections)
200	Evolution (Laport)
201	Mycology (Hill)
301	Microbiology (Shen)
302	Parasitology (Frawley)
304	Genetics (Miller)
325	Molecular Biology (Wheeler)
340	Animal Physiology (Kabelik)
360	Histology (C Jaslow)
376	Molec & Cell Neuroscience (Dougherty)
380	Topics in Biomedical Science (Lindquester)
CHEM 414†	Biochemistry (3 sections)
CHEM 416†	Mech. of Drug Action (Jackson-Hayes)
NEUR 270†	Neuroscience (Pandit)

## Senior Seminar Sections

486-01	Prokaryotic-Eukaryotic Symbioses (Frawley)
486-02	Avian Biology (Collins)

† No more than two courses taken outside the Biology Department may count for the six upper-level courses required for the Biology Major

## The Biology Major: Concentrations at a Glance

### General Biology - GB

Maximum flexibility in choice of courses.  
Craft your own experience within the major and prepare for a diversity of careers.

### Ecology, Evolution, & Behavior – EEB

Emphasizing the comprehensive links between genes and genomes, individual organisms, populations, communities, and ecosystems.



#### Big Questions:

- Why do the tropics have so many species?
- Why cooperate?
- Why do so many species have sex?
- How many times have wings evolved?

#### Sample Careers:

- Environmental or Agricultural Research
- Conservation and Natural Resource Management
- Government Organizations like USDA or EPA
- Geographic Information Systems Specialist
- Zoo, Aquarium, or Museum Biologist
- Environmental Consultant
- Epidemiology and Emerging Disease Prevention
- Big Data Analytics and Computational Modeling

### Integrative Biology – IB

Blurring the boundaries between traditional biological disciplines and fostering a holistic and mechanistic approach to understanding living systems.



#### Big Questions:

- How do proteins fold to the correct shape?
- How is cell fate determined?
- How do biological systems tell time?
- How do you model complex systems?

#### Sample Careers:

- Evolutionary Development (“Evo-Devo”) Research
- Genomics and Bioinformatics
- Synthetic Biology and Computational Modeling
- Genetic Counseling
- Human Computer Interaction –Prosthetics
- Biomimetics –Robotics
- Science Outreach and Communication
- Biological Photography

### Biomedical Sciences – BMS

Understanding how living systems normally function, and what goes wrong when there is disease or pathology in all species of animals.



#### Big Questions:

- Why do organisms age?
- How do organs grow to the right size and shape?
- What are the origins of cancer?
- How does the body function?

#### Sample Careers:

- Biomedical Research/Biomedical Engineer
- Health Professions (Physician, Dentist, PA, Vet, Pharm., etc)
- Dietician/Nutritionist
- Embryologist/Fertility Specialist
- Occupational Safety Specialist
- Speech-Language Pathologist
- Toxicologist
- Pharmaceutical Development



this year (2020-2021) and also indicating their concentration. They should also copy their adviser on that email!

If you think one of these concentrations may be right for you, talk to your Biology advisor or to the Department Chair, Dr. Mary Miller ([millerm@rhodes.edu](mailto:millerm@rhodes.edu)).

### Biol 131 Bench Skills Workshop

In the spring, the Biology Department is planning a voluntary workshop for any students currently enrolled in BIOL 131 who

would like to gain experience with the hands-on skills normally covered in this core lab. During the workshop, students would learn to do various bench techniques including pipetting, dilutions, measurements, and sterile technique. These hands-on techniques will complement the variety of critical scientific skills students have been learning remotely this semester, such as hypothesis development, experimental design, and analyzing and interpreting data. In addition, these bench skills are important for lab work

in a range of cellular and molecular upper-level Biology classes.

We expect to offer the BIOL 131 Bench Skills Workshop on a couple of evenings during the spring semester. Details will be sent to all students enrolled in BIOL 131 after the end of the semester. Additional workshops may be held next fall if there are interested students who miss these opportunities.



# The Hybridization Zone

### Neuroscience Program Announcements

Greetings Neuroscience Majors! In Spring 2021, the Neuroscience Program will offer Neur 270 Neuroscience, Biol 376 Molecular and Cellular Neuroscience, Psyc 318 Clinical Neuroscience, Psyc 344 Movement Neuroscience, and two sections of senior seminar. Additionally, Chemistry will offer Chem 411 Medicinal/Computational Chemistry, and Philosophy will offer Phil 340 Cognitive Neuroscience. Remember that you can check out information about our courses and the program on our website ([www.rhodes.edu/neuro](http://www.rhodes.edu/neuro)), as well as our Facebook and Twitter accounts. With us all scattered around the globe due to the COVID-19 pandemic, we have also developed a Slack site, where you can socialize with other Rhodes Neuroscience majors, as well as find out important information about the program. If you have not received your Slack invite, then please let me know! And if you

have further questions about the Neuroscience Program, then please contact me, Dr. David Kabelik, at [kabelikd@rhodes.edu](mailto:kabelikd@rhodes.edu).

### Environmental Studies and Science Program

We are looking forward to a great line up of Spring 2021 courses! BIOL 120 Intro to Environmental Science, ENVS 150 Environment & Society, INTD 225 GIS, BIOL 200 Evolution, BIOL 201 Mycology, CHEM 206 Environmental Chemistry, and many other regulars will be back! There will also be opportunities for students to take courses that have not been offered in quite some time (or ever): ENVS 211 Geomorphology, ENVS 325 Advanced GIS and Remote Sensing, BIOL 302 Parasitology, and INTS 222 Global Health Politics.

The Environmental Studies and Sciences (ENVS) Program has a new Canvas site that provides information about upcoming courses, advising, planning for careers, sustainability,

diversity & inclusion resources, opportunities for students, upcoming virtual events, and much more. Any student with environmental interests may join. If interested, please email Dr. Boyle ([boyles@rhodes.edu](mailto:boyles@rhodes.edu)).

### BioMath Major Announcements Course Information

Spring 2021 offerings that count towards the Biomath Major:

- **Math 122 (Integral Calculus)**, 2 sections – required
- **Math 211 (Applied Statistics for the Formal & Natural Sciences)** – required
- **Math 223 (Multivariable Calculus)** – elective
- **Math 261 (Linear Algebra)** – elective
- **Math 315 (Continuous Math Modeling & Scientific Writing)**, F2i – required
- **Math 352 (Partial Differential Equations)** – elective
- **Comp 141 (Computer Science I)** – required
- **Comp 142 (Computer Science II)** – elective
- **Math 333 (Time Series & Forecasting)**

will also be offered in Spring 2021. If you are interested in having the course count as a math elective towards the Biomath Major, please contact Dr. Bodine ([bodinee@rhodes.edu](mailto:bodinee@rhodes.edu)) about petitioning to have the course count.

Junior Biomath Majors should plan on enrolling in 1 credit of **Junior Seminar (Math 386)** in Spring 2021.



(continued next page)



### Information for the Statistics Minor

The **statistics minor** is a highly marketable minor that pairs well with majors in Biology, BMB, ENVS, or Neuroscience. The statistics minor aims to equip students with a solid foundation of statistical concepts, a mastery of professional statistical software, and a strong understanding of how to apply and interpret a wide variety of statistical techniques on real world datasets. This minor is open to students with any mathematic or statistical background. Additionally, there is a path through this minor without having to take any additional courses as pre-requisites.

Courses that will be offered in Spring 2021 that count towards the Statistics Minor:

- **Math 211 (Applied Statistics for the Formal & Natural Sciences)** - required (requirement can also be fulfilled by taking Pysch 211 or Econ 290)
- **Math 212 (Applied Regression)** - required
- **Math 333 (Time Series & Forecasting)** - elective

If you have questions about the statistics minor, please contact Dr. Bodine ([bodinee@rhodes.edu](mailto:bodinee@rhodes.edu)) or Dr. Abdelrazeq ([abdelrazeqi@rhodes.edu](mailto:abdelrazeqi@rhodes.edu)).

### Biochemistry and Molecular Biology Program Announcements

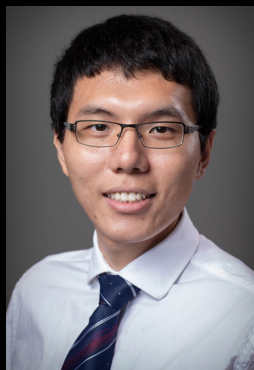
The Biochemistry and Molecular Biology Program (BMB) recently received results that 93% of our students passed the 2020

certification exam administered by the American Society for Biochemistry and Molecular Biology (ASBMB) last spring, with 53% achieving certification with distinction. Of the 926 students across the nation that took the exam this year, about 40% met the threshold for degree certification. Only 16% of students met the threshold for certification with distinction. Not only does their performance show how excellent our students are, it confirms the strength of our faculty and program. There are only 90 programs in the nation that are accredited by ASBMB. Congratulations everyone!

As always, please feel free to contact program chair Dr. Peterson ([petersonl@rhodes.edu](mailto:petersonl@rhodes.edu)) if you have questions concerning the BMB program.



## DEPARTMENTAL MIGRATIONS



**Qian Shen** joins the Department of Biology as Assistant Professor. Dr. Shen grew up in Zhejiang, China, and received his bachelor's degree from China Agricultural University. In 2011, he came to Mississippi State University to pursue a master's degree. He received a Ph.D. from Ohio State University in 2019. He was an instructor at Ohio Wesleyan University and a postdoctoral researcher at Ohio State University before joining Rhodes College. He studies the deadly fungal pathogen *Histoplasma* that

causes life-threatening infections to immunocompromised people (e.g., HIV patients). His research seeks to understand the molecular mechanisms employed by *Histoplasma* to proliferate in immune cells (i.e., macrophages). In his spare time, Dr. Shen enjoys hiking, swimming, and playing board games.



**Sydney Moyo** joins the Department of Biology as an Assistant Professor. Dr. Moyo received his Ph.D. from Rhodes University (South Africa) in 2016. He comes to Rhodes after serving as a postdoctoral researcher at Louisiana State University (LSU), and a postdoctoral fellow at Albany Museum (South Africa). Dr. Moyo's research is broadly cast in using invertebrates (e.g. insects, spiders, crabs), biochemical techniques, and mathematical models

to reveal the connections between terrestrial and aquatic ecosystems, and how those connections are shaped by humans. "In my spare time I enjoy mountain biking, flying drones, and playing FIFA on my Xbox".



# Signals & Displays

## Short Communications

### The Biology Inclusion, Diversity, and Equity (BIDE) Committee

We in the Biology Department recognize that the burdens of racism in this country, in academics, and in science are borne disproportionately by our students, staff, and faculty of color, and have recently created the Biology Inclusion, Diversity, and Equity (BIDE) committee.



The BIDE committee's goals are to understand how students and faculty, with an emphasis on those from historically underserved and/or underrepresented groups, experience our classrooms, and to provide actionable resources to support teaching approaches that promote equity and foster a sense of belonging. During our departmental retreat in August, the BIDE committee led the Biology Department in an exploration of strategies to increase equity in our classrooms, with an emphasis on strategies relevant to this semester's

remote experience. We discovered common desires to broaden access, learned about new resources to help us promote inclusion and a decolonization narrative in biology, heard examples of historical and continuing modes of exclusion in STEM fields, and discussed how to combat these issues. We also learned of areas in which BIDE can provide additional resources to support our department's work towards ensuring that our students have equal access to opportunities inside and outside our classrooms.

We want to hear your thoughts and experiences surrounding the issues of inclusion, diversity, and equity. Please feel free to reach out via email ([bide@rhodes.edu](mailto:bide@rhodes.edu)).

### Upcoming Seminars

- "A mechanism for *Clostridioides difficile* adaptation to the host environment" by Rhodes alumna Emily Woods '12 on **Wednesday, October 14, 2020 at 4:15 pm (CDT)** via Zoom



**Emily Woods:** I graduated from Rhodes College in 2012, after which I entered the Medical Scientist Training Program (MD/PhD dual degree program) at Emory University. My PhD work focused on the bacterial pathogen, *Clostridioides difficile*. *C. difficile* can cause severe diarrhea and colitis. Infections typically occur after a patient has taken antibiotics that disrupt the normal gut flora. In order to cause infection, *C. difficile*

must resist killing by components of the immune system and adapt to the unique environment of the human colon. Using a variety of molecular, genetic, and biochemical techniques we identified ClnR as a global regulator that binds directly to the host-produced antimicrobial peptide LL-37. Our data suggest that ClnR senses LL-37 as a host signal and regulates gene expression to adapt to the intestinal environment.

- "Evolution and development of the avian voicebox" by Evan Kingsley on **Monday, October 19, 2020 at 3:30 P.M. (CDT)** via Zoom



**Evan Kingsley:** An animal embryo develops from a single, undifferentiated cell into an organism with intricate anatomy: organs and tissues, heads and tails, hands and feet. How does that one cell know how to produce all this complexity? Our work seeks to understand this developmental process and how it evolves to make the huge range of animal shapes and sizes. To do this, we use a combination of computer modeling and embryological

experiments in eggs to study the evolution of the bird voicebox and how the diversity of avian vocalization evolved.

- "How a Rhodes biology graduate got to help astronauts live on Mars" by Andrew Jackson '90 on **Wednesday, November 4, 2020 at 4:15 P.M. (CST)** via Zoom



**Dr. Andrew Jackson** graduated from Rhodes College as a Biology major in 1990. In the spring of 1990, he happened to read a letter from another Rhodes Biology alum, encouraging those interested in working in the environment to consider graduate work in environmental engineering. With only the vague idea of what that was and a desire to conduct research and study the environment, he left to pursue an advanced degree. Dr.

Jackson's graduate work focused on bacterial transport in soils and bioremediation of oil spills in fresh and salt marshes. After earning his Ph.D., he was offered a position at Texas Tech University, where he is currently a Professor of Environmental Engineering. Over the last 22 years, Dr. Jackson's research interests have meandered through various topics including: developing biological reactors to sustainably recycle wastewater in closed loop space habitation systems, biogeochemistry of oxyanions on Earth and Mars, and the fate of legacy contaminants in sediments and groundwater. He will discuss his current development work on bioreactors for future manned Mars missions as well as highlight how his Rhodes biology degree prepared him for the diversity of his research interests.

(continued next page)



- “Titan Cell Formation in *Cryptococcus neoformans*” by Rhodes alumna Sophie Altamirano ‘12 on **Tuesday, November 10, 2020 at 4:00 P.M. (CST)** via Zoom



**Sophie Altamirano:** After graduating from Rhodes College in 2012, I received my PhD in Genetics from Clemson University. During my graduate studies, I became interested in the human fungal pathogen, *Cryptococcus neoformans*, and have continued studying *C. neoformans* as a postdoctoral fellow at the University of Minnesota. *C. neoformans* is an opportunistic pathogen that causes life-threatening meningitis primarily in

immunocompromised individuals. It is predominantly a haploid yeast that reproduces asexually via budding. Interestingly, *C. neoformans* can form polyploid cells, known as titan cells, during infection. Titan cells are characterized by their increase in ploidy level and their enlarged cell size. Despite evidence that titan cells are critical during infection, the mechanisms underlying their formation still remain largely unknown. Through cell cycle and deletion mutant analyses, we have begun to characterize the unique cell cycle of *C. neoformans* to gain a better understanding of the molecular processes underlying titan cell formation.

**Additional seminar information and Zoom links will be emailed to you before each date.**

### Tri-Beta News

Beta Beta Beta (Tri-Beta) is a national biological sciences honor society with an active chapter at Rhodes College. Tri-Beta is dedicated to the enrichment of its members’ scientific experiences and to the distribution of knowledge gleaned from those experiences. Current chapter activities include participation in the Rhodes Journal of Biological Science, coordination of student research presentations, organization of various fundraising events, and hosting of biological seminars. Tri-Beta provides a forum to recognize those students, with a biological science as their undergraduate major, who excel academically. May it be noted that Rhodes has an array of biological science disciplines, meaning there are Tri-Beta members who are not only passionate Biology majors, but also Neuroscience, Environmental Science, and Biochemistry and Molecular Biology majors. Regular membership can only be attained through invitation but any student meeting the criteria who is interested in becoming an associate member for the next school year should contact the current president, Brandon Waddell, at [wadbr-21@rhodes.edu](mailto:wadbr-21@rhodes.edu).

Tri-Beta has some exciting service projects planned for the spring semester. One ongoing, community-serving project entails volunteering at the Springdale Elementary Science Saturday events. Other campus-serving events include Peer Advising hours in which students interested in the biological sciences can seek advice and suggestions about classes from upperclassmen majoring in Biology, Neuroscience, Environmental Science, or Biochemistry and Molecular Biology. In addition, Tri-Beta will be inducting new members in the spring semester. We are excited to welcome new individuals into the society and congratulate them on their commitment to biological excellence.

### Get Your Research in Print

After hours of hard work in the lab or field, why not publish your research in the Rhodes Journal of Biological Science? We encourage you to submit papers from your summer research or

research conducted during the school year, as well as commentaries and reviews of biological topics. You do not need to complete research specifically in biology, so please ask if you can publish with us! Also, if you have not written a paper recently, think about helping out with the journal: Editors are needed! Please contact faculty sponsor Dr. Boyle ([boyles@rhodes.edu](mailto:boyles@rhodes.edu)) if you are interested in working with the journal. The deadline for paper submissions will be at the start of Spring semester, so start thinking about your submission now!

### \$\$ Biology Research Award \$\$

This spring, the Biology Department will be presenting the “Award for Outstanding Student Research in Biology.” Any Biology Major who has completed research at Rhodes or elsewhere is eligible for this award. The winner will receive a cash prize, be honored at the award convocation ceremony, and have their name engraved on the Biology Research Award plaque that is displayed outside of the Biology office. To be considered, a student must submit a three to five-page research paper, plus a recommendation from the research supervisor, to Dr. Dougherty ([doughertyk@rhodes.edu](mailto:doughertyk@rhodes.edu)) by Friday, March 26, 2021. Announcement of the award winner will be made at the spring awards convocation ceremony.

### Love Biology? Teach it!

The **Noyce Program** at Rhodes College offers scholarships for STEM students in their Junior and Senior years to pursue teaching. This program also provides stipends for a summer-plus research experience and guaranteed job placement in Shelby County Schools after graduation. Do you want to inspire the next generation of Memphis Scientists? Then consider becoming a teacher!

### Society for Mathematical Biology Annual Conference

The SMB annual conference was held online this year with some Rhodes students and faculty attending. The plenary talks were recorded and posted online at [youtube.com/channel/UCI8n6gChUAULa0qmLau-xTw](https://youtube.com/channel/UCI8n6gChUAULa0qmLau-xTw). The closing plenary talk by Carl Bergstrom entitled **MISINFODEMIC 2020: How quantitative misinformation misleads the public about COVID-19, and what mathematical biologists can do about it** was particularly noteworthy and aimed to a wide audience.

### Rhodes Biology Instagram

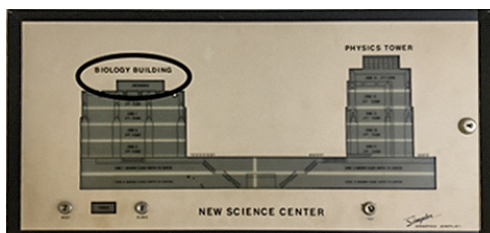
You can find the department on Instagram by following [@rhodescollegebiology](https://www.instagram.com/rhodescollegebiology) to stay up to date with the latest news and events in Biology! If you have questions about the Biology department’s social media, contact Dr. Patrick Kelly ([kellyp@rhodes.edu](mailto:kellyp@rhodes.edu)).





# Rhodes College Greenhouse

## Plant Science Research Facility



**Fig. 1.** Old fire alarm system map on the wall of FJ-West showing the location of the old greenhouse atop Ohlendorf Hall (circled; known as the Biology Building pre-1968)

Cell and molecular biologists need incubators and cell culture rooms to grow their study organisms. Plant biologists need growth chambers and greenhouses to grow their plants for experimental manipulations. It's been over 30 years since Rhodes College

had a greenhouse, and back then it was perched atop Ohlendorf Hall, which used to be the home of the Biology Department as is still shown on the old fire alarm map on the wall in FJ-West (**Fig. 1**). Over the last year, a new Plant Science Research Facility (PSRF, affectionately known as “the Greenhouse”) has slowly emerged on campus between Robertson Hall and Rhodes Tower. Far from simply impeding the most convenient path between the Refectory and your residence hall, the newly constructed PSRF is a cutting-edge facility to house living collections of plants for both teaching and research.

Extensive planning occurred during the 2018-2019 academic year, with multiple meetings to study and discuss the best options for situating the facility on campus (i.e., where is the best light with easy access that won't flood?), design details (i.e., how many square feet, how many discrete growth spaces, what are the cooling and heating options?), and construction timelines. After the ground-breaking in September 2019, the facility received its first residents this August. The PSRF comprises 800ft<sup>2</sup> devoted to growing space and a 200ft<sup>2</sup> head house for potting and measuring plants, storage, and housing the computerized system that maintains ideal growing conditions all day, every day (**Fig. 2**). The system does this by sensing temperature conditions in the facility, autonomously opening roof vents, actuating fans, and turning on the pump for the evaporative coolers to lower internal temperatures. It also automates the closing of the overhead sun shade to help cool the greenhouse during sunny days, or to retain heat on chilly winter nights.

The recent construction of the PSRF reveals the important role of plant sciences and biology in the liberal arts curriculum at Rhodes. Though many other peer institutions have some sort of plant growth facility, relatively few have undertaken the recent construction of a new free-



**Fig. 2.** Construction of the Rhodes College Plant Science Research Facility began in the beginning of the 2019-2020 academic year and ended in May 2020. A) September 2019: foundation poured and leveled. B) December 2019: foundation finished with the signature Rhodes College stone facade. C) February 2020: fabrication of the greenhouse structure finished and framed on the foundation. D) May 2020: glazing, evaporative cooling system, fans, and control unit installed and a completed, functioning research facility is ready to go!

standing greenhouse prominently situated in the center of campus. As is often the case with roof-top greenhouses, the old facility atop Ohlendorf was prone to leaks, was exposed to hazardous and damaging weather conditions, and made lugging plants and growth supplies up and down the elevators (or stairs!) a chore, outweighing the benefit of enjoying unobstructed sun exposure. Despite being dismantled long ago, a new plant growth facility has long remained a major component of the Rhodes College Master Plan to enrich the educational experience of Rhodes students. Difficulties with finding a new site during a dynamic period of development at Rhodes (including construction of the BCLC, West Village, Barret Library, and Robertson Hall) and integrating the greenhouse into other Biology Department research facilities led to a prolonged “mulling it over” stage. During this time, Biology faculty, such as Dr. Jonathan Fitz Gerald, made fundamental research contributions in plant genetics and development by raising the model organism *Arabidopsis thaliana* in small growth chambers. Others worked on large plots of vegetation in Overton Park and other urban areas. However, organismally-focused plant research was hindered by a lack of space for raising plants under defined experimental conditions, and student opportunities to experience the audacious world of plant form and function were limited. In the new PSRF, Dr. Robert Laport is currently growing creosote bushes (**Fig. 3**) from the southwestern US (*Larrea tridentata*) and their close relatives from Argentina (*L. divaricata*) to investigate how whole genome duplication (polyploidy) might contribute to the origins of new plant biodiversity. In addition, there are plans to accumulate a teaching collection of plants to highlight plant diversity as a component of Plant Diversity & Evolution (BIOL 322) and to investigate comparative plant anatomy.

Due to the COVID19 pandemic, the Biology Department was not able to celebrate the completion of the PSRF and the end of a 30+ year greenhouse “drought” on campus. We are eagerly awaiting an opportunity for a “Grand Opening” with the Rhodes community when we can all be on campus again. Nevertheless, we are all very excited about this new research facility and the opportunities it presents for cutting edge plant research involving students!



**Fig. 3.** Tables arrayed with creosote bush (*Larrea tridentata*) in the new Plant Science Research Facility that Dr. Laport is growing to investigate how genome duplication influences the origins of plant biodiversity.





Rhodes College