BIOFEEDBACK

THE NEWSLETTER OF THE BIOLOGY DEPARTMENT AT RHODES

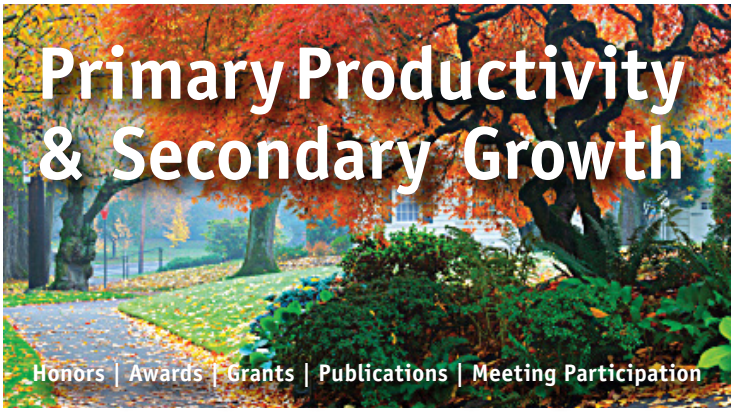
VOLUME 34 OCTOBER 2019 NUMBER 1

The Chair's Niche

What an exciting time to be a part of the Biology Department at Rhodes! I am so excited and honored to be serving as the Chair of the Department. First and foremost, I want to take a very special moment to thank the great work that Dr. Carolyn Jaslow has done over the past six years as chair – she has worked with great patience to ensure that the transition has been a smooth one. The rotation of chairs is a natural part of Departmental structure, and you can feel comfortable in knowing that it is a team effort. I am so thankful for all that she has done for the Department. Be sure to drop by her office and thank her!

The Department of Biology is truly a special community of support and learning – one that challenges and elevates us all. I look forward to supporting the fantastic work of our students and faculty as we come to understand the complexity and beauty of living systems.

Dr. Mary Miller, Chair



HONORS AND AWARDS
Congratulations to:

Alexa Alana BMB '20 Michael E. Hendrick '67 Award in Organic Chemistry

Tierin Burrow ENVS '19 Mel Grinspan Outstanding Internship Award

Amanda Cheang ENVS '21 Bob Buckman/Joyce Mollerup Scholarship for Study Abroad

Pooja Dave NEUR '19 Award for Outstanding Senior in Neuroscience

Abby Ellingwood '19 Fulbright U.S. Student Teaching Program grant to serve as an English teaching assistant in Malaysia for 2019-2020

Gretta Hotz '20 Bob Buckman/Joyce Mollerup Scholarship for Study Abroad

Layla Jubrial-Jaber '19 Award for Excellence in Biology

Margaret Larsen BMB '21 2019 Goldwater Scholar

Mary Maloney ENVS '21 Sophomore Award in Environmental Studies

Tanner Martinez BMB '19 Medical Scientist Training Program Award

Ericka McCormick '19 Award for Excellence in Biology

Claire McGuire ENVS '20 Rosanna Cappellato Award in Environmental Science

Meryl Musicante '19 Award for Outstanding Research in Biology and Award for Excellence in Biology

Tzvi Nadel NEUR '20 Rose and Solly Korsakov Psychology Research Award

Kudzai Nyamkondiwa '22 Award for Excellence in First-Year Biology

Maggie Palopoli BMB '20 Bob Buckman/Joyce Mollerup Scholarship for Study Abroad

Lauren Rowland BMB '19 Award for Outstanding Research in Biochemistry and Molecular Biology

Hamid Shirwany BMB '19 Elected to the Hall of Fame

Matthew Smith BMB '19 Award for Outstanding Senior in Biochemistry and Molecular Biology

Alana Strauss ENVS '21 Sophomore Award in Environmental Science

McKay Warren NEUR '19 Award for Outstanding Senior in Neuroscience

Allison Young '19 Fulbright U.S. Student Teaching Program grant to serve as an English teaching assistant in Malaysia for 2019-2020

Shehla Yousuf BMB '19 Award for Outstanding Research in Biochemistry and Molecular Biology

BIOFEEDBACK is published each semester. Please submit any content you wish to include to Dr. Carolyn Jaslow, cjaslow@rhodes.edu.

New Omicron Delta Kappa honor society members:

Tierin Burrow ENVS '19, Morgan Hill BMB '19, Kaylin Ryan NEUR '19, Allison Young '19

New Mortar Board Honor Society members:

Kendall Gasner '20, Liam Goldman NEUR '20, Vignesh Krishnan BMB '20, Alejandra Nawrocki ENVS '20, Filoteia Popescu BIOL/ NEUR '20, Maria Popescu '20, Sophia Quesada NEUR '20, Mallika Rao NEUR '20, Itthipoaln Rasasack BMB '20, Bilal Siddiq NEUR '20

New Phi Beta Kappa society members:

Caroline Bush BIOM '19, Morgan Hill BMB '19, Layla Jubrial-Jaber '19, Tanner Martinez BMB '19, Erika McCormick '19, Jacob Menke BMB '19, Meryl Musicante '19, Hamid Shirwany BMB and IS/HIST '19, McKay Warren NEUR '19, Allison Young '19

Publications

Acharya S, **Quesada S NEUR '20**, Coca K, Richardson C, Hoehn ME, Chiang J, et al. 2019. Long-term visual acuity outcomes after radiation therapy for sporadic optic pathway glioma. *Journal of Neuro-Oncology* doi: 10.1007/s11060-019-03264-2.

Dougherty K. 2019. Differential developmental refinement of the intrinsic electrophysiological properties of CA1 pyramidal neurons from the rat dorsal and ventral hippocampus. *Hippocampus*. 2019:1-17.

Fecchio A, Bell J, Pinheiro R, and **Collins, M.** 2019. Avian host composition, local speciation, and dispersal drive the regional assembly of avian malaria parasites in South American birds. *Molecular Ecology* doi. org/10.1111/mec.15094

Fecchio A, **Collins M**, Bell J, García-Trejo E, Sánchez-González L, Dispoto J, Rice N, and Weckstein J. 2019. Bird tissues from museum collections are reliable for assessing avian haemosporidian diversity. *Journal of Parasitology* 105:446–453

Gaudio E NEUR '19, Gienapp AJ, and Wheless J. 2019. Perampanel pharmacokinetics in children: correlation of dose with serum concentrations. *Journal of Child Neurology*. 34:427-31.

Hope K, Flatten D, Cavitch P, **May B '19**, Sutcliffe J, O'Donnell J, and Reiter T. 2019. The Drosophila gene sulfateless modulates autism-like behaviors. *Frontiers in Genetics*. doi: 10.3389/fgene.2019.00574

Julien A NEUR '14, Kouba A, **Kabelik D**, Feugang J, Willard S, and Kouba C. 2019. Nasal administration of gonadotropin releasing hormone (GnRH) elicits sperm production in Fowler's toads (*Anaxyrus fowleri*). *BMC Zoology*. 4(1):3

Kelly PT, Renwick WH, Knoll L, and Vanni MJ. 2019. Stream nitrogen and phosphorus loads are differentially affected by storm events and the difference may be exacerbated by conservation tillage. *Environmental Science and Technology*. 53: 5613-21.

Massad T, **Williams G BIOL/ENVS '18**, Wilson M ENVS '17, Hulsey C ENVS/BIOM '19, Deery E BIOM '18, and Bridges L. Regeneration dynamics in old-growth urban forest gaps. *Urban Forestry & Urban Greening*. https://doi.org/10.1016/j.ufug.2019.06.007

Meetings

Boyle S, Burrow T ENVS '19, Bobay M BMB '21 and de la Sancha N. Forest fragmentation in the Amazon: conservation impacts on mammals. Society for Conservation GIS Conference. Pacific Grove, CA (July 14-17, 2019)

de la Sancha N, McIntyre N and **Boyle S.** Graph theory analysis in highly fragmented Atlantic Forest remnants of eastern Paraguay. American Society of Mammalogists Conference. Washington, DC (June 28-July 2, 2019)

Bodine EN, **Bush C BIOM '19**, Campbell AM, Capaldi A, Crowell S, **Jones R BIOM '19**, Kula A, Oberle B, Sidoti B. An agent-based model of an endangered Florida *Tillandsia utriculata* population. The International Symposium on Biomathematics & Ecology, Education and Research. La Crosse, WI (October 4-6, 2019)

Brookover Z BIOM '21, Campbell AM, **Christman B BIOM '21**, Davis, S, Bodine EN. A demographic model of the endangered Florida native *Tillandsia utriculata*. The International Symposium on Biomathematics & Ecology, Education and Research. La Crosse, WI (October 4-6, 2019)

Dorn P '20, McArthur J '20, Boyle S and **Collins M.** Using GIS to identify sites for installation of Barn Owl nest boxes. American Ornithological Society. Anchorage, AK (June 24-28, 2019)

Giampapa R BMB '19, Hill M BMB '19, Antwine P NEUR '19, Frost C NEUR '19, Hodl M NEUR '19 and **Moix E NEUR '20.** Presented their work at the American Chemical Society National Conference. Orlando, FL (March 31-April 4, 2019)

Hamm L '19, Smith M BMB '19 and **Fitz Gerald J.** Dissecting the regulation of imprinted gene targets using natural ascensions of *Arabidopsis thaliana*. International Conference on Plant Science. Valencia, Spain (May 23-25, 2019)

Hansen M '21, Mabante M '19 and **Fitz Gerald J.** The *Arabidopsis* chromatin remodeling proteins demonstrates a novel parental effect on seed size and genomic imprinting. International Conference on Plant Science. Valencia, Spain (May 23-25, 2019)

Hou N NEUR '21, Bruneau A '19, and **Fitz Gerald J.** Using natural variation in *Arabidopsis thaliana* to describe the role of Parental Conflict in seed size and robustness. International Conference on Plant Science. Valencia, Spain (May 23-25, 2019)

Kelly PT, Gonzalez MJ, Renwick WH, and Vanni MJ. Increased light availability and nutrient cycling by fish provide resilience against reversing eutrophication in an agriculturally impacted reservoir. Ecological Society of America Annual Meeting. Louisville, KY (August 11-16, 2019)

Laport RG. The biodiversity consequences of whole genome duplication: polyploidy shapes pollinator-mediated assortative mating and herbivore diversity. Invited talk at the Botanical Society of America Annual Meeting. Tucson, AZ. (July 27-31, 2019)

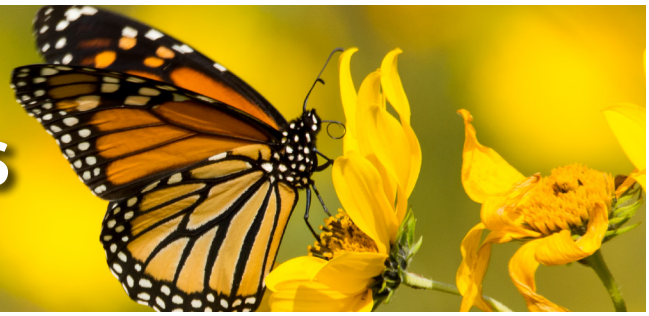
Laport RG. Patterns and drivers of biodiversity: Genome duplication shapes pollinator visitation, herbivore specialization, and plant community structure. Invited seminar at the University of Tennessee-Chattanooga, Department of Biology (October 2019)

McArthur J '20, Tucker K '21, Dorn P '20 and **Collins M.** Prevalence and diversity of avian malaria parasites in a raptor community. American Ornithological Society. Anchorage, AK (June 24-28, 2019)

Mugs for Majors!

The Pentaceratops dinosaur that occupied the FJ Lobby for 20 years was removed during renovations in 2013. We now have a mural and fond memories of its time in FJ, plus we also have Biology Dinosaur coffee mugs for majors! When you complete your declaration of a Biology major, stop by the Biology office in FJ 132 and ask Ms. Dianne Cox for your mug. You can also pick one up if you declared before this year and never got one. Cheers!

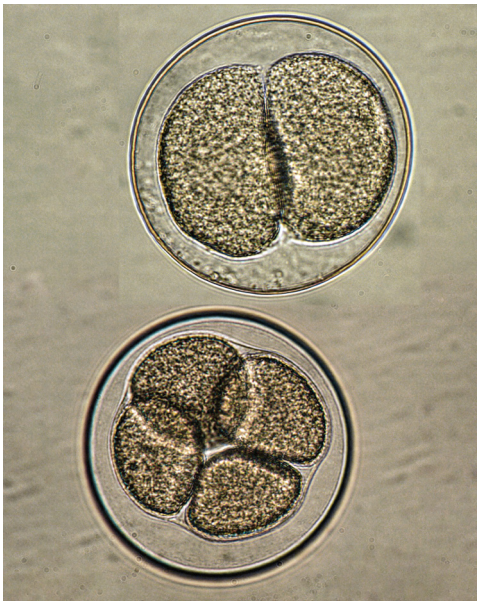
Curricular Evolution
Biology Course Updates
Spring 2020 and Beyond



New Course Offerings:

BIOL 201 Mycology
This spring, after a one-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 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 204 Animal Development
Between fertilization and birth, a single cell is transformed into community of organized tissues. The process is one of the most dynamic and mysterious in biology. How are genetically identical cells able to distinguish themselves from one another yet map out a coordinated body plan providing brain, muscle, bone, etc.? In this class we will explore the mysteries of early animal development and focus on its connections to modern medicine, such as **stem-cell therapy**, **cancer biology**, **childhood disorders** and **regenerative medicine**. We will analyze the vertebrate body plan and have a look at how this plan evolved from our invertebrate ancestors. We will also see how morphological features, like the beaks of Darwin's finches, can be rapidly shaped and molded in response to the environment. The lab will focus on invertebrate models, including sea urchin development, planaria regeneration, and cell adhesion in sponges. You will also develop your skills in microscopy and digital image analysis. This class covers all of Content Category 2C of the MCAT, in addition



to several other high yield topics. BIOL 204 fulfills an upper-level elective for majors in BMB and Neuroscience, as well as in Biology.

BIOL 260 The Science of Climate Change
Climate change is a pressing topic that relates to many aspects of the biological world, from tiny soil microorganisms to large-scale global patterns. This new course will address the science behind climate change, focusing on 1) what climate change is; and 2) how it interfaces with biology. Topics will cover the atmosphere, the oceans, and land. This course is a four-credit, upper-level, non-lab course, but students will work hands-on with climate data to learn about models, and understand how scientists use climate data to inform their studies on species distribution, conservation biology, agriculture, disease, ocean acidification, and much more! Students may pair BIOL 260 with BIOL 214 (Environmental Field Study in Namibia) to count as an upper-level with lab elective. ***Prerequisites: BIOL 130/131 and BIOL 140/141 OR BIOL 120/ENVS 111/CHEM 120.***

Brief Course Updates

BIOL 340 Animal Physiology: Starting next semester, the rodent surgery labs in BIOL 340 Animal Physiology will be replaced by experiments focused on cross-species comparisons of smooth and cardiac muscle, as well as whole-body metabolic function.

MATH 115 Applied Calculus will be taught this spring by Prof. Erin Bodine and it will focus primarily on biological applications. This is one of several courses that can fulfill the computational requirement for the Biology major. Other options (not all offered next semester) include COMP 141, INTD 225 (GIS), MATH 122, or MATH 214.

Rocky Mountain Ecology Field Research Maymester: Are you interested in studying and gaining ecological field experience in Grand Teton and Yellowstone National Parks? If so, check out the Rocky Mountain Ecology Field Research Maymester (ENVS 170; F7 and F11). This year the course will be held from May 24 – June 17. The course is appropriate for science and non-science majors. Applications (and financial aid) are considered on a rolling basis, so apply early! Applications are available through the Buckman Center's site. Please contact Dr. Collins if you are interested in this opportunity.

Environmental Field Study in Namibia (BIOL 214) is scheduled for May 13 – June 3, 2020 (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 and plan to attend a drop-in, informational session on Wednesday, October 23th, from 11:30–1:30 in FJ-100.

Semester in Environmental Sciences at Marine Biological Laboratory: The Marine Biological Laboratory at Woods Hole offers a Semester in Environmental Sciences Program every Fall. This 16-credit program is geared towards Biology, Chemistry, and Environmental Science majors interested in ecosystem science and biogeochemistry. Students take courses such as Aquatic and Terrestrial Ecosystem Analyses, Microbial Ecology, and Indepen-

FRAZIER JELKE SCIENCE CENTER

Optimal Foraging

The following courses will be offered next semester

Number	Course Title	Hours Offered
140	Biology II (4 sections)	MWF 9:00-9:50, 10:00-10:50, 11:00-11:50; TR 9:30-10:45
141	Biology II Lab (8 sections)	T 12:30-3:30, 4:00-7:00 W 1:00-4:00 R 12:30-3:30, 4:00-7:00
201	Mycology (Hill)	TR 9:30-10:45 T Lab 12:30-3:30
204	Animal Development (Fitz Gerald)	MWF 9:00-9:50 W Lab 1:00-4:00
260	The Science of Climate Change (Boyle)	TR 8:00-9:15
301	Microbiology (Frawley)	MWF 8:00-8:50 R Lab 12:30-3:30
304	Genetics (TBA)	TuTh 8:00-9:15 T Lab 12:30-3:30
320	Conservation Biology (Kelly)	TR 9:30-10:45 W Lab 1:00-4:00
325	Molecular Biology (Petrik)	MWF 9:00-9:50 R Lab 12:30-3:30
330	Virology/Immunology (Moore)	MWF 10:00-10:50
340	Animal Physiology (Kabelik)	MWF 10:00-10:50 M Lab 1:00-4:00
345	Ornithology (Collins)	TR 11:00-12:15 M lab 1:00-4:00
376	Molecular & Cellular Neuroscience (Dougherty)	TR 11:00-12:15 M lab 1:00-4:00
380	Topics in Biomedical Science (Miller)	TR 8:00-9:15
CHEM 414†	Biochemistry (3 sections)	MWF 11:00-11:50, TR 9:30-10:45; 11:00-12:15
CHEM 416†	Mech. of Drug Action (Jackson-Hayes)	TR 9:30-10:45
NEUR 270†	Neuroscience (Pandit)	MWF 9:00-9:50
Senior Seminar Sections		
486-01	Biofuels (Petrik)	MWF 11:00-11:50
486-02	Cancer Biology (Miller)	TR 11:00-12:15
Courses for non-majors (fulfill the F7 requirement)		
105	Infectious Diseases From the Past and Into the Future (Moore)	TR 8:00-9:15 R lab 12:30-3:30

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

dent Research, and get to know many of the staff and visiting scientists at Woods Hole. The SES deadline is March 20 for the Fall 2020 semester. There is an $17,000 scholarship available for one Rhodes student to participate in the program. Students who are interested in learning more about the program should contact Dr. Boyle.

Senior Seminar News

This spring the Biology senior seminars are BIOL 486-01: Biofuel Production, MWF 11:00-11:50 AM, taught by Dr. Petrik (see brief description below) and BIOL 486-02: Cancer Biology, TR 11:00-12:15 PM, taught by Dr. Miller. 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.

BIOL 486-01 Biofuel Production: This senior seminar will teach students to read and present primary literature articles in biofuel-related research. Topics will range from cell wall and lipid biosynthesis pathways (and metabolic engineering to improve these pathways to increase biofuel production or quality), to engineering of microbes for improvement in sugar fermentation to alcohol, to the ecological considerations for the use of various plants or algae as biomass feedstocks. Students will then delve deeper by writing a review article summarizing research on a biofuel related topic of their choosing.

Juniors note that senior seminars for the '20-'21 academic year will be listed in the spring issue of BIOFEEDBACK, along with information about the lottery for enrollment.

Botanical Research in South America

Traveling across the deserts of the southwestern U.S. and northern Mexico, you might be struck by the unique collection of plants and animals. Living in harsh environments, they have evolved unique adaptations to cope with the extreme heat, aridity, and sun exposure forming a distinct community. But, would you be surprised to find many of the same plants and animals while traveling in South America? In parts of Chile and Argentina climate and rainfall patterns are very similar to parts of Mexico and the southern U.S. occurring at equivalent latitudes, and plant communities are remarkably similar as well.

This summer, Dr. Laport traveled to northern Argentina (Fig. 1) on a research trip to explore the evolutionary relationships between his primary research subject, creosote bush (*Larrea tridentata*), and its

Figure 1. A) Guanacos in Parque Nacional Los Cardones in the foothills of the Andes of northern Argentina. B) Despite being the "foothills" of the Andes, these mountains were impressive in their own right with desert plateaus covered in *L. divaricata* at over 3,100m (10,000ft)!

intercontinentally disjunct sister species, jarilla (*Larrea divaricata*). As odd as it may seem that two closely related species occur on different continents, many species occupying temperate latitudes in North America have close relatives at similar latitudes in South America, a biological phenomenon known as amphitropical disjunctions. These disjunctions have fascinated biogeographers, ecologists, and evolutionary biologists for centuries. While such disjunctions have been characterized for coastal California and coastal Chilean species, desert endemics, and even alpine specialists, many questions remain about how such disjunctions arose. For example, did they all occur at similar times in history? Do these disjunctions represent interchange from north to south, south to north, or a combination of north-south interchange? Do they all represent ancient dispersals between North and South America, or are some of them the product of convergent evolution between distantly related species?

The disjunction between *L. divaricata* and *L. tridentata* is particularly interesting as these species have historically both been used for traditional medicines by native peoples, and they were both described as belonging to the same species since being collected and described by Spanish explorers and missionaries. While the two species are morphologically and ecologically very similar, they occur on two different continents separated by ~6,000km. How could a single plant species occupy enormous portions of two continents? Several hypotheses have been posed to explain the current distributions, including ancient land bridges and distributions that once stretched through the tropics, but current genetic divergence and biogeographic studies suggest a long-distance migratory bird (possibly an ancestor to the Golden Plover, *Pluvialis dominica*) carried seeds of the common ancestor of these species from South America to North America around 1 million years ago. In contrast, some taxa such as Mesquite (*Prosopis spp*.) occur trans-tropically, meaning they occupy arid habitats in North, Central, and South America with only modest disjunctions in their distributions through the tropics. Yet, other taxa like Saguaro Cactus (*Carnegiea gigantea*) in North America and the Argentine Saguaro or Cardon Grande (*Echinopsis terscheckii*) look amazingly similar and occupy similar habitat, but are not closely related representing an example of convergent evolution.

Dr. Laport set out to obtain *L. divaricata* leaf material (Fig. 2) from a broad swath of the species' range for DNA analyses to clarify the relationships between the North and South American creosote bush and jarilla, estimate when they diverged using molecular clock analyses, and even the source of dispersal from South to North America using models of molecular evolution. This meant flying to Salta in northern Argentina and driving south along the foothills of the Andes through the provinces of Salta, San Miguel de Tucumán, Catamarca, La Rioja, San Juan, Mendoza, San Luis, and Cordoba, a journey of nearly 3,000km in just over a week! Of course there was the adventure of working from sunrise to sunset to collect over 100 jarilla specimens. But, there was also the joy of meeting many interesting people, seeing some incrediblly beautiful landscapes, eating and drinking some amazing food and wine, and seeing many new (and some familiar) plants!

With the newly-collected specimens back at Rhodes, members of the lab are beginning the hard work this year of preparing to conduct PCR, DNA sequencing, and phylogenetic analyses. Additionally, lab members are gowing some seedlings of the South American jarilla from seed collected from herbarium specimens. These newly propagated individuals will make an important contribution to the collection of research plants that will occupy the new Rhodes College Greenhouse being constructed on the south side of Robertson Hall. Although the greenhouse currently doesn't look like much, after a late Fall 2019 opening, the new greenhouse will be home to botanical research conducted by the Biology Department!

Figure 2. Dr. Laport collecting *L. divaricata* leaves in Salta (A) and San Miguel de Tucuman, Argentina (B & C). Like its North American relative, *L. tridentata*, the South American creosote bush was found in extremely arid habitat, often dominating the landscape, but sometimes occurring mixed with mesquite trees and columnar cactus. This made for some collecting experiences that were eerily similar to working in southern Arizona!

The Hybridization Zone

Neuroscience Program Announcements

The Neuroscience Program keeps growing! We are now the second-largest major on campus! It seems that word has gotten out that Neuroscience is cool! Okay, so that's my old-person language... maybe I should say that Neuroscience is lit? Anyhow, along with the number of majors, we've also been trying to grow the number of faculty in order to keep up with the demand. This semester, we welcomed Dr. Tanushree Pandit to the Neuroscience Program. Dr. Pandit conducts research in Neural Development and has joined us from neighboring St. Jude Children's Research Hospital. We've also been trying to increase the number of Neuroscience-related course offerings. For instance, Dr. Klatzkin is offering PSYC 318 Clinical Neuroscience for the first time this semester.

As for Spring 2020 courses, we plan to offer one section of NEUR 270 Neuroscience, Dr. Dougherty's BIOL 376 Molecular and Cellular Neuroscience course, Dr. Blustein's PSYC 344 Movement Neuroscience course, and a pair of senior seminar sections. Dr. Haas in Philosophy will also be offering PHIL 340 Philosophy and Cognitive Science, a breadth course in Neuroscience. Unfortunately, Chemistry will not be able to offer the breadth course CHEM 411 Medicinal and Computational Chemistry this spring, but they plan is to offer it again next year. Remember that you can check out information about our courses and the program on our website (www.rhodes.edu/neuro), as well as our Facebook and twitter accounts.

If you have further questions about the Neuroscience Program, then please contact Dr. David Kabelik at kabelikd@rhodes.edu.

Environmental Studies and Science Program Announcements

On behalf of the Environmental Studies and Sciences (ENVS) faculty, here's a big welcome to the first-year students at Rhodes! There are a range of environmentally-focused courses being offered in Spring 2020. Please see the flyers in Rhodes Tower and FJ to see the full list. In addition to the Biology-focused courses in this issue of BIOFEEDBACK, ENVS 150 Environment & Society, ENVS 111 Physical Geology, and INTD 225 GIS will be offered. Furthermore, there will be two NEW courses on the books: BIOL 260 The Science of Climate Change and RELS 300 Socially Engaged Buddhism.

Students with environmental interests should contact Prof. Boyle, especially if students have questions about course planning for the Spring 2020 semester. It's also never too early to think about applying for the Rosanna Cappellato Award in Environmental Sciences (which is open to any science major, not just environmental science majors; deadline is March 31) or the Steve and Riea Lainoff Crop Trust Fellowship in honor of Cary Fowler (open to a graduating senior to work at The Crop Trust in Bonn, Germany for 12 months; deadline is January 31).

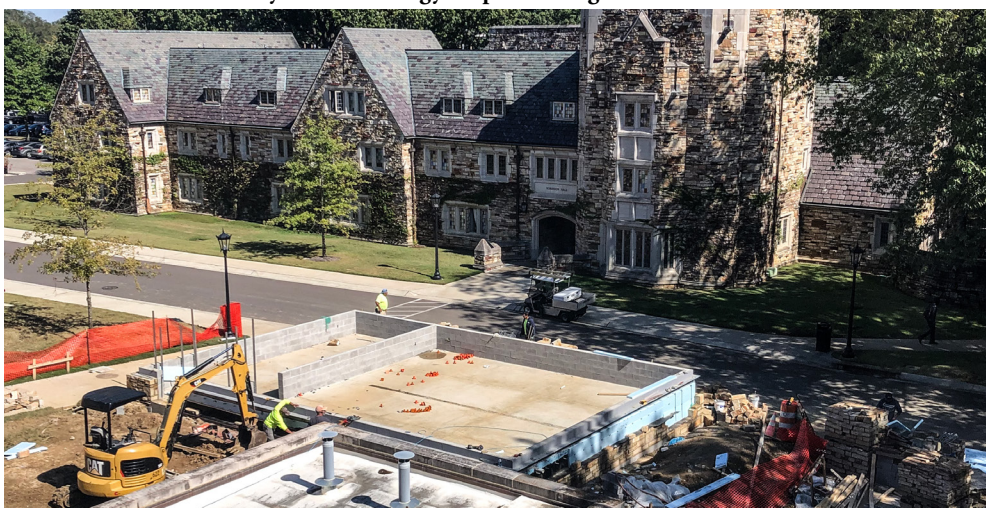
BioMath Major Announcements

- The next offerings of core Biomath courses **Math 214 (Discrete Math Modeling with Biological Applications)** and **Math 315 (Continuous Math Modeling & Scientific Writing)** will be in Fall 2020.
- **COMP 342 (Bioinformatics)** will be offered in Spring 2019 and has a prerequisite of **COMP 241**.
- The Spring 2019 offering of **Math 115 (Applied Calculus)** will be taught by Prof. Erin Bodine and will focus primarily on biological applications.

Biomathematics & Biostatistics Research Presentations on Rhodes Campus:

- Friday, Oct 18, 4-5 pm in Spence Wilson Room – Biostatistics Talk by Dr. Jeanne Pierzynski from St. Jude Children's Research Hospital, Department of Epidemiology & Cancer Control
- Tuesday, Dec 3, 3:30-4:45 pm in Spence Wilson Room – Math/CS Senior Seminar Poster Session; several Biomath posters will be presented.

Construction is underway on the Biology Department greenhouse.

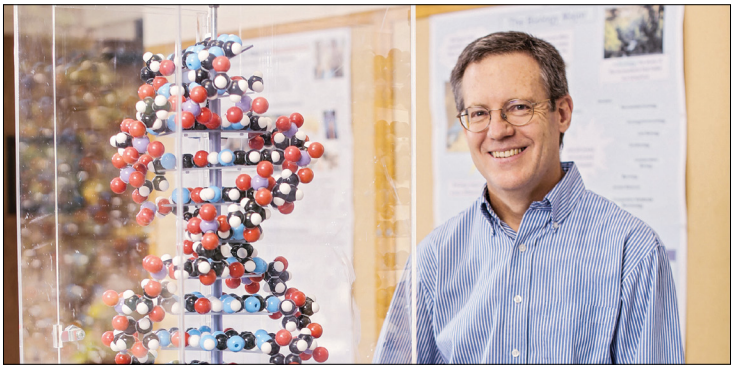


DEPARTMENTAL MIGRATIONS

Kyle Johnson Moore joins the Biology Department as a Visiting Associate Professor of Biology. Dr. Moore received her Ph.D. in Biophysics and Genetics from the University of Colorado Health Sciences Center in Denver in 1994. She comes to Rhodes after teaching as an Associate Professor at the University of Texas at El Paso since 2004. Moore's research interests center on virology and microbiology. She has taught courses titled Pathogenic Microbiology, General Virology, Techniques in Molecular Biochemistry, and Topics in the Study of Life with Organismal Biology Laboratory. Dr. Moore says she is an avid reader, a fan of all things Disney, and she loves to travel.

Tanushree Pandit joins Rhodes as a William Randolph Hearst Teaching Fellow in Neuroscience. Dr. Pandit received her Ph.D. in Molecular Medicine from the Umea Center for Molecular Medicine at Umea University in Sweden in 2013. She comes to Rhodes after serving as a Postdoctoral Research Assistant and Teaching Assistant at St. Jude Children's Research Hospital and Graduate School for Biomedical Sciences and has previously served as an Adjunct Professor at Rhodes. Dr. Pandit's research interests focus on understanding the mechanisms by which progenitors within the nervous system acquire their cellular identity and establish neuronal circuits during embryonic development. She has taught courses on Cellular Signaling and Topics in Biomedical Sciences. When she has any spare time in her hectic schedule, Dr. Pandit says she enjoys watching shows on Netflix and is currently watching "Disenchanted."

Deborah Petrik joins the Biology Department as a Visiting Assistant Professor of Biology. Dr. Petrik received her Ph.D. in Biological Sciences from Illinois State University in 2015. She comes to Rhodes after serving as a Postdoctoral Researcher at Pennsylvania State University where she studied the unique aspects of xylan biosynthesis and modification. Dr. Petrik has taught a first-year student research initiative course titled Fast Farming and has assisted in teaching courses in DNA and RNA molecular techniques in the laboratory. Dr. Petrik notes, "In my spare time, I enjoy hiking and fishing to relax. I also have a dog and a cat, and recently adopted an 8 year old chihuahua that was abandoned in my neighborhood."



Dr. Gary Lindquester, on sabbatical during the fall semester, has been appointed Visiting Scientist in the Department of Hematology at St Jude Children's Research Hospital. He will be working with Dr. Wilson Clements on the embryonic specification of hematopoietic stem cells in the Zebrafish model. This work deviates from the virological studies Dr. Lindquester has undertaken for many years as he cycles back to his graduate school roots in developmental biology.

Signals & Displays
Short Communications

Upcoming Seminar

Monkey Business in Research: An Invasive Species Case Study

On Thursday, October 24, at 4 pm in FJ B, Dr. Steven Johnson of the Department of Wildlife Ecology & Conservation at University of Florida will give a seminar on the ecological, human health, and conservation implications of free-ranging rhesus macaques in Florida. Yes, Florida!

With two job searches in progress, we anticipate that there will be several more seminars offered later in November.

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, Filoteia Popescu, at popfi-19@rhodes.edu.

Tri-Beta has some exciting service projects planned for the fall and spring semesters. One ongoing, community-serving project entails volunteering at the Springdale Elementary Science Saturday events. Other campus-serving events include Peer Advising hours

Jacob's ladder (*Polemonium reptans*) in the Overton Park Old Forest. This native spring ephemeral of eastern North America is indicative of high-quality deciduous forest.

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 haven't written a paper recently, think about helping out with the journal, editors are always welcome! Please contact coeditors Madison Holton (holmr@rhodes.edu) or Claire McGuire (mcgcl-20@rhodes.edu) if you are interested in submitting a paper or 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) by Friday, March 27th, 2020. Announcement of the award winner will be made at 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!

New Roots at Rhodes

Do you like plants, gardening, or hiking? If so, you should join Roots, the Rhodes Botany Club! We plan on visiting local state parks, hosting guest lecturers, and growing plants for a Spring plant sale! If you have questions or for more information about joining, contact Brian Christman (chrbd-21@rhodes.edu), Ali Campbell (camam-20@rhodes.edu), or Ellie Aronson (aroem-20@rhodes.edu)!

Camera trap capture of a yellow-throated marten (*Martes flavigula*) investigating a fat-soaked rag bait in the Himalayan mountains of Bhutan. Martens are members of the family Mustelidae, which includes weasels and otters.

Study Abroad with the School for Field Studies

by Gretta Hotz '20, a Biology major who is planning a career in Physical Therapy

Studying abroad in Paro, Bhutan through the School for Field Studies allowed me to fulfill three upper level biology requirements, complete an environmental research project, and experience it all while immersed in a beautifully complex Himalayan environment. What I loved most about my program was that it relied heavily on field-based learning opportunities to teach course material, rather than focusing on textbooks and in-class lectures. I'll always remember the four-day treks we would go on to study changes in vegetation along elevation gradients, or practice taking plot inventories. We even got to work with camera traps and lures to capture images of wildlife and study their distribution in Paro. This was definitely one of the most engaging and memorable experiences during my time in college, and I'd highly recommend it to anyone interested in taking sciences abroad!

Student Presentations | April 2019
The Rhodes Symposium for Undergraduate Research & Creative Activity
(Rhodes faculty supervisors listed)

Dempsey E '20. Social Safari: An ethnographic study of the Memphis Zoo (Dr. Susan Kus)

Dave P NEUR '19. Converting pediatric and young adult patients from a shunt to a third ventriculostomy: a multicenter experience (Matthew Weeks, Department of Psychology; David Hersh and Paul Klimo Jr., University of Tennessee Health Science Center; Brandy Vaughn, Le Bonheur Children's Hospital; Todd Hankinson and Susan Staulcup, University of Colorado Anschutz Medical Campus; Brandon Karimian, Mark Van Poppel, Scott Wait, Carolina Neurosurgery and Spine Associates) (Dr. David Kabelik)

Aramandla M '19, Palopoli M, Stoddard S, Patel R and Welsh C. Characterization of the THSD7A antigen and protein engineering for the design of novel therapies for idiopathic membranous nephropathy (Dr. Shana Stoddard)

Elder C BIOM '21 and Welsh C. MitoMut: an efficient approach to detecting mitochondrial DNA deletions from paired-end next-generation sequencing data (Dr. Catherine Welsh)

Mazumder R NEUR '19, Starr E, and Cafiero M. Synthesis of C6 substituted L-Dopa analogs (Dr. Mauricio Cafiero)

Bush C BIOM '19, Crowell S and **Jones R BIOM '19**. Predicting potential recovery of the endangered long-lived epiphytic bromeliad *Tillandsia utriculata*: an agent-based modeling approach (Dr. Erin Bodine)

Forehand E '19. Translingualism and decolonization of linguistic binaries (Dr. Elizabeth Pettinaroli)

Heimann R NEUR '20. French intellectual engagement with torture testimonies during the Algerian War (Dr. Etty Terem)

Martin T NEUR '19. The context of symptomology (Dr. Susan Satterfield)

Alwis Y NEUR '20. Individuals with low other race effect employ a global eye movement strategy when recognizing other race faces (Dr. Jason Haberman)

Aronson E '20, Ellingwood A '19, and Laport R. Assessing stomatal size and density variation among diploid, tetraploid, and hexaploid southwestern desert creosote bush (*Larrea tridentata*) from areas of natural co-occurrence (Dr. Robert Laport)

Aronson E '20, Brookover Z BIOM '19, Dempsey E '20, **Li K '20, Phebus M '20, Sands R '20, Walls D '20,** and Laport R. Floristic survey of "The Cut" section of the Vollintine & Evergreen Greenline (Dr. Robert Laport)

Brookover Z BIOM '21, Campbell A, **Christman B BIOM/ENVS '21,** and Davis S. Matrix demographic models to understand life history strategies using stage-structured matrix models to understand demographic impact of life history strategies in Florida *Tillandsia* (Dr. Erin Bodine)

Burrow-Edwards T ENVS '19 and Boyle S. Spatial analysis of Amazon forest fragmentation for Amazon mammals (Dr. Sarah Boyle)

Cook E, **Hatstat K CHEM/NEUR '16,** Peterson L and Cafiero M. Design of novel inhibitors for the Catechol-O-Methyltransferase enyzme (Dr. Mauricio Cafiero)

Dave P NEUR '19, Sabio J NEUR '19, Morales G NEUR '20, and Kabelik D. Vasopressin receptor expression in green anole (*Anolis carolinesis*) brains in relation to season (breeding vs. non-breeding) and sex (male vs. female) (Dr. David Kabelik)

Hague B ENVS '19 and **Dorn P BIOM '20.** Interactions between captive waterfowl in the tropical birdhouse (Dr. Sarah Boyle)

Hague B ENVS '19, Pike D, and Roznik E. Movement patterns and survival of headstarted dusky gopher frogs (Dr. David Pike)

Hameed M BMB '21, Carroll M, Craft A, **Freyaldenhoven T BMB '20, Betton B BIOM '20,** Campbell L, **Vanderwall D BMB '20.** Analyzing protein kinase C interactions with Rho-type GTPases in the filamentous fungus *Aspergillus nidulans* (Drs. Terry Hill and Loretta Jackson-Hayes)

Heimann R NEUR '20, Baker J. Effect of genetics on neuroinflammatory responses following neonatal ethanol exposure in BXD mice (Kristin Hamre, University of Tennessee Health Science Center Neuroscience Institute) (Dr. David Kabelik)

Hodl M NEUR '19, Hutchison P, Tinker C, **Manohar S NEUR '21,** and Eckenhoff W. Thiosalen nickel complexes as light driven proton reduction catalysts (Dr. William Eckenhoff)

Husley C BIOM/ENVS '19 and Bodine E. Using matrix models to predict long-term population dynamics of two tree species (Dr. Erin Bodine)

Kirkpatrick C BMB '20. Determining whether PaxB protein requires actin filaments in order to localize in *Aspergillus nidulans* (Drs. Terry Hill and Loretta Jackson-Hayes)

Laird W '19. Reducing risk of necrosis in children with recurrent ependymoma treated with a second course of irradiation (Chia-ho Hua, Jinsoo Uh, Melissa Gargone, and Thomas E. Merchant, Department of Radiation Oncology, St. Jude Children's Research Hospital) (Dr. Jonathan Fitz Gerald)

Lam H ENVS '19. The effects of Memphis temperatures on captive African elephants (*Loxodonta africana*) (Dr. Sarah Boyle)

Lam H ENVS '19. Visitors' effect on captive grey wolves (Dr. Sarah Boyle)

Levesque C '19 and **Tiwari A BMB '21.** The role of Lrrc1 in the growth and folding of the neocortex (Jun Young Park, Lei Wang, Bryan Kuo, Young-Goo Han, Developmental Neurobiology, St. Jude Children's Research Hospital) (Dr. Kelly Dougherty)

Litten M NEUR '19, Krull K, Phillips N, Banerjee P, Jones C, Lawson J, Studaway A, Wassef A, Mirzaei S, Robison L, and Hudson M. Use of transcranial direct current stimula-

tion of the lateral temporal cortex to improve measures of cognitive function in long-term childhood cancer survivors (Dr. David Kabelik)

McDonagh D NEUR '19 and Haberman J. Irrelevant ensemble information may successfully be ignored… sometimes (Dr. Jason Haberman)

Mesa N NEUR '21. Exploration of ordering effects in psychophysical assessments (Dr. Daniel Blustein)

Mosman D, **Salazar A NEUR '20,** and Brien K. Generation of aza-crown ethers using 2,6-bis-hydrazinopyridine (Dr. Kimberly Brien)

Musicante M '19. Centromeric repeats are differentially silenced (Dr. Bayly Wheeler)

Mysiewicz S NEUR '19 and Dougherty K. Local network synchronization in the rat dorsal and ventral hippocampus throughout development (Dr. Kelly Dougherty)

Nadel T NEUR '20. Perceived life stress enhances the association between negative affect and snacking under stress (Dr. Rebecca Klatzkin)

Nichols S BMB '21 and **Slyter L '20.** Elucidating the relationship between MtlA and Pkc in *Aspergillus nidulans* (Dr. Darlene Loprete)

Nyamkondiwa K '22, Ho T '22. Localization of mutant forms of the PaxB and Hof1 proteins in *Aspergillus nidulans* (Drs. Terry Hill and Loretta Jackson-Hayes)

Popescu F BIOL/NEUR '20, Owen C NEUR '20 and Kabelik D. Reproductive behavior boldness in female green anoles (*Anolis carolinesis*) (Dr. David Kabelik)

Quesada S NEUR '20. Visual outcomes after radiation therapy for optic pathway gliomas (Kenneth Coca, Mary Hoehn, MD, Ibrahim Qaddoumi, MD, Thomas Merchant, DO/PhD, Sahaja Acharya, MD, St. Jude Children's Research Hospital) (Dr. David Kabelik)

Rao M NEUR '20. Functional neurologic symptom disorders present an excessive burden on healthcare resources (Jack R., McCoy E., Ledet D., Le Bonheur Children's Hospital) (Dr. Kelly Dougherty)

Rhodes L and **Hodl M NEUR '19.** Cobalt complex with dithiothiophene ligand for the light driven production of H2 (Dr. William Eckenhoff)

Rowland L BMB '19. The Hof1 protein of *Aspergillus nidulans* is necessary for cytokinesis. (Drs. Terry Hill and Loretta Jackson-Hayes)

Sanders E, **Morris M NEUR '16,** Peterson L and Cafiero M. DFT analysis of water clusters, dopaminergic derivatives, and their desolvation energies (Dr. Mauricio Cafiero)

Schupp W NEUR '20. Brain-Derived Neurotrophic Factor Concentrations in Peripheral Organs of Wild-Type and Promoter IV Defective Mice Across Standard Caged and Enriched Environment Treatments (Dr. Kazuko Sakata, Shannon O'Brien UTHSC Department of Pharmacology) (Dr. David Kabelik)

Somjee R BMB '21. Characterizing the phase separation potential of NUP98 interactors for co-localization within NUP98 fusion oncoprotein cellular puncta. (Mitrea D, Kriwacki R, St. Jude Children's Research Hospital) (Dr. Terry Hill).

St. Cyr L NEUR '20, Cantwell H, and Brien K. Qualitative and quantitative analysis of purity and composition in lavender essential oil (Dr. Kimberly Brien)

Starr E, **Mazumder R NEUR '19,** Cochrane S, Cafiero M, and Peterson L. Synthesis of Dopamine and L-DOPA analogues (Dr. Larryn Peterson)

Stocks O '20. Development of epitope binding protein monobodies as an antigen specific treatment for autoimmune disease (Dr. Shana Stoddard)

Suresh S NEUR '19, Roberts J NEUR '21 and Haberman J. An attentional blink for ensemble representations (Dr. Jason Haberman)

Szuwalski J BMB '19, Karabell S '21, McGuire C ENVS '20, and **Ferrar G '20.** The effects of herd members and spatial location on the stereotypic behaviors of a captive elephant (Dr. Sarah Boyle)

Thelven J, **Goldman L NEUR '20,** and Stoddard S. Design, Synthesis, and Effect of Diarylcyclopropanehydroxamic acids as histone deacetylase (HDAC) inhibitors: improving possible therapy for Huntington's disease (Dr. Roberto de la Salud Bea)

Velrajan S '20 and Hotz K. Hope in the face of unlikely cure: from parent's and physician's perspective (Dr. Kendra Hotz)

Wittwer E '20, Wehenkel M, Richardson S, and McGargill M. Innate immune stimulation may serve as a second hit in an osteochondroma mouse model (Marie Wehenkel, St. Jude Children's Research Hospital)

Woody A, **Jelinek S NEUR '18,** Peterson L and Cafiero M. DFT Study of the selectivity of monoamine oxidase B (MAOB) (Dr. Mauricio Cafiero)

Zhang Y '20. Maternal protectiveness in a captive adult hippopotamus (*Hippopotamus amphibius*) (Dr. Sarah Boyle)

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