# January 2018

# THE OPEN READING FRAME

News and Recent Events from the Biology Graduate Program at the University of Kentucky

#### Thoughts from the DGS



This, our newest installment of the *Open Reading Frame*, is coming out just as we welcome a batch of prospects for joining our graduate program in Fall 2018 (not a coincidence!). Having outsiders visit us and examine the graduate program with fresh eyes offers me an opportunity to tout several major revisions to how we support our students. As always, the Gertrude Ribble Fund is supporting a superb seminar program and continues to provide small research grants and other types of support to our students. The new Block Funding scheme, now halfway through its

first year and continuing for next year, has allowed us to offer full fellowships to our highest performing students at several time points during their degree. Block funds combined with Ribble now support a revamped travel award fund that allows us to cover all or most of the costs of having our students present their research at national or international meetings. Finally, we recently announced the donation by George Scherr that backs, among other things, the new Scherr Opportunity Award, helping to fund special opportunities such as training at field stations or visits to prestigious labs to learn new techniques. Our program thus has a rich array of means to augment the experiences students in our program receive, and we are trying to expand those further. Some of activities reported in these pages could not have happened without that support, and nearly all have been influenced to some degree. And, this support has translated into success more broadly, as our students have won College Teaching Awards (reported in the last newsletter) and new College Fellowships (Congrats Brittany!). All of this is to say, if you do good work, we will try to reward you, so keep up the good work!

Dave Westneat, Director of Graduate Studies Department of Biology





### **Biology Graduate Student Association (BGSA) News**

2018 BGSA Officers President: Allyssa Kilanowski Vice President: Sruthi Purushothaman Treasurer: Courtney Waterbury Secretary: Zach Stanley Seminar Committee Reps: Rose Marks and Tim Salzman GAC Rep: Megan Rhoads (\*Kara Jones) GSC Reps: John Terbot and Tom Maigret (\*John Terbot and Ren Guerriero) Outreach Coordinator: Emily Bendall (\*Sandeep Saxena) BGSA Coffee/Tea: Kim Vertacnik (\*Kat Sasser) \*Indicates starting position on July 1, 2018



### **Getting it Done!**

<u>PhD Defenses</u> Melissa Keinath (Smith Lab) Michelle Giedt (Harrison Lab)

<u>Masters</u> Dlovan Mahmood Plan B Stephen Zumdick Plan B

Qualifying Exam Luc Dunoyer (Van Cleve Lab) Kaylynne Glover (Crowley Lab) Allyssa Kilanowski (Westneat Lab)



### Congrats to our Graduates and our new PhD Candidates!







# Awards, Fellowships, Grants and Honors



#### <u>Awards</u>

**Cagney Coomer** (Morris Lab) received the Community Service Award at the **2017 Women of Color STEM Conference** in Detroit, MI and received the **2018 MLK Leadership Award** from the Kentucky MLK Commission.





# Awards, Fellowships, Grants and Honors (Continued)

Awards (continued)



Megan Rhoads (Osborn Lab) competed and was selected as one of the onsite trainee poster competition winners for her poster titled ¦ Prevalence of Spontaneous Hypertension in African Green Monkeys is Age-related" at the American Heart Association Council on Hypertension September 2017 meeting in San Francisco, CA.

**Chelsea Weaver** (Osborn Lab) was awarded a \$700 Ribble mini-grant that allowed her to travel to St. Kitts for 10 days this summer and learn various techniques for working with the African Green Monkeys within the colony.

#### **Fellowships**

**Brittany Slabach** (Crowley Lab) Dean's Competitive Graduate Fellowship, College of Arts and Sciences, UK - Spring 2018.

**Emily Bendall** (Linnen Lab) received the Morgan Graduate Fellowship for spring 2018.

#### <u>Honors</u>

Kayla Titialii (Morris Lab) attended the 2017 Women of Color STEM Conference as a graduate student mentor.

**Ren Guerriero** (O'Hara Lab) Quantitative EEG and Neurofeedback Certificate Program Stens Corporation, July 25-28<sup>th</sup>, 2017. This four-day course included lecture and large amount of hands-on work with quantitative EEG (electroencephalography) and neurofeedback. Topics covered included basic neurophysiology and neuroanatomy, instrumentation, electrode placement, and neurofeedback.

### **Presentations and Publications**

#### **Presentations**

Sepideh Dadkhah (Harris Lab) poster won first place in the poster session of the Annual Commonwealth Computational Summit. The poster was titled "Use of HPC to analyze changes in gene expression during fruit fly spermiogenesis". She received a trip to the Supercomputing Conference in Denver, Colorado from the Center for Computational Sciences.





### **Presentations and Publications (Continued)**

#### Presentations (continued)



**Ren Guerriero** (O'Hara Lab) presented her poster at the **Neuroscience 2017 Meeting**, November 12, 2017, Washington, DC. "The Effect of Previous Night Sleep on the Psychomotor Vigilance Boost Following Meditation".

Summary: In a previous study by our lab, 40 minutes of meditation was shown to improve psychomotor vigilance even in novices. This length of meditation can be challenging for novices to main-

tain attention and sit in a constant position. Meditation of a shorter duration, 20 minutes, was also shown to improve psychomotor vigilance in novices. Current experiments are preliminary, but current trends suggest that 5 minutes of meditation may also be effective to give novices a performance boost. It is also hypothesized that sleep duration before meditation may affect the quality or effectiveness of meditation.

**Rose Marks** (McLetchie Lab) went to the **International Botanical Congress** in China this summer and gave two talks entitled:

• Dehydration tolerance in a tropical liverwort: genomic patterns and Dehydration tolerance in a tropical liverwort: ecological patterns.

Summary: These talks addressed genomic and ecological factors (respectively) behind an observed sex difference in dehydration tolerance in *Marchantia inflexa*. Females have more copies of genes associated with tolerance encoded in their genomes, which likely supports females' higher relative tolerance of drying compared to males. In addition, plants collected from dry environments have increased dehydration tolerance compared to plants collected from more moist environments. This difference is persistent even when plants are reared in a common garden.

Rose presented the same material at the KAS Meeting at Murray State this fall.

• Dehydration tolerance in a tropical liverwort: genomic patterns. **Rose A. Marks** and D. Nicholas Mcletchie. Kentucky Academy of Science annual meeting. Murray State University, KY (**2017**).







# **Presentations and Publications (continued)**

Presentations (continued)

Sruthi Purushothaman (Seifert Lab) presented at the 14th International Conference on Limb Development and Regeneration, Edinburgh, United Kingdom.

Tim Salzman (Westneat Lab) presented at the joint meeting of the American Ornithological Society and the Society of Canadian Ornithologists, Michigan State University, East Lansing, MI. July 31-August 5, 2017. | Energetic trade-offs and feedbacks between behavior and metabolism influence correlations between pace-of-life attributes".



**Ben Cloud** (Westneat Lab) also presented at the **American Ornithological Society** and the **Society of Canadian Ornithologists** meeting at Michigan State University, East Lansing, MI. July 31-August 5, 2017. His talk was on "Heterospecific extra-pair fertilizations as a mechanism for hybridization between two species of wood warblers."

**Brittany Slabach** (Crowley Lab) presented a portion of her dissertation work focusing on cause-specific mortality of cow elk in Kentucky and the potential role of sociality in decreasing the probability of mortality via hunter harvest at the **Wildlife Society Meeting**, Albuquerque, NM. Sept. 22 - 27, 2017;

**Chanung Wang** (O'Hara Lab) presented a poster at **Neuroscience 2017**, November 12 in Washington, DC. "Spiny mice (*Acomys cahirinus*) have distinct activity patterns and sleep with their eyes open"

> Summary: We aimed to characterize sleep and wake in a murid rodent, *Acomys cahirinus*. Previous research, using a well validated, non-invasive, piezoelectric system, has shown that *A. cahirinus* and *Mus musculus*



have relatively similar sleep and wake profiles, but with a few interesting differences. The activity of *A. cahirinus* decreases sharply one hour after dark onset and *A. cahirinus* get a large amount of REM sleep. Most strikingly, *A. cahirinus* do not close their eyes while sleeping.





# **Presentations and Publications (continued)**

#### Presentations (continued)

**Chelsea Weaver** (Osborn Lab) gave an oral presentation at the **American Heart Association Council on Hypertension** from September 14-17, 2017 in San Francisco, CA. The abstract was titled, "Fetal Growth Restriction is Associated with Spontaneous Gestational Hypertension in African Green Monkeys". Chelsea was awarded \$300 from the Graduate Student Congress to support travel for this conference.



#### **Publications**

**Glover, Kaylynne M**. and Philip H. Crowley. 2017. Female Mate Choice and the Emergence of Sexual Coercion. Behavioral Ecology and Sociobiology 71(2): 181

Summary: Our game theory model examined mate choice in six species of primates, fish birds, and insects to identify patterns predicted to persist from an evolutionary perspective. We found that differences in ecological, physiological and behavioral characteristics resulted in the persistence of individual or multiple male mating strategies generally consistent with observations in nature. In particular, coercive males could persist in a population when fertilization rates and reproductive outcomes were similar to those of less forceful males.

Marks, R. A., Smith, J. J., Cronk, Q., & McLetchie, D. N. (2017). Variation in the bacteriome of the tropical liverwort, *Marchantia inflexa*, between the sexes and across habitats. *Symbiosis*, 1–9. <u>https://</u>doi.org/10.1007/s13199-017-0522-3

Summary: This paper describes the diversity, variability, and community composition of bacteria associated with the tropical liverwort, *Marchantia inflexa*. Local environmental conditions had a strong affect on the abundance and type of bacteria detected, and within a single environment the sex of the host plant further impacted bacteriome composition. Although not definitively shown, we speculate that the sex specific bacteriome may impact other sex differences in these plants, such as dehydration tolerance.



# Presentations and Publications (continued)

#### Publications (continued)

**Salzman TC, McLaughlin AL,** Westneat DF, Crowley PH (in press) Energetic trade-offs and feedbacks between behavior and metabolism influence correlations between pace-of-life attributes. Behav Ecol Sociobiol: topical collection on Pace-of-life syndromes

Summary: We expect that metabolism and a suite of traits that depend on energy should be jointly under selection, potentially creating patterns of correlated traits, called the "pace-of-life syndrome" (POLS), both within and among species. Considerable empirical study, especially in birds, has produced variable results, and there has been little theory about this idea. We analyzed an optimality model of basal metabolic rate (BMR) in environments that varied in food availability



and two types of mortality: activity-related and activity-independent. The results emphasize that variation in resources and mortality risks creates a diversity of correlation structures despite the central role of metabolism, indicating that the POLS is likely to be a variable construct that is highly context dependent

Fanrui Meng, **Sandeep Saxena**, Youtao Liu, Bharat Joshi, Timothy H. Wong, Jay Shankar, Leonard J. Foster, Pascal Bernatchez, and Ivan R. The phospho-caveolin-1 scaffolding domain dampens force fluctuations in focal adhesions and promotes cancer cell migratio Nabi. Mol Biol Cell. 2017 Aug 1;28(16):2190-2201.

Summary: Caveolin 1 (Cav1), a 178 amino acid protein has a Src-dependent tyrosine-14 phosphorylation site that regulates integrin signaling and focal adhesion dynamics, and a Caveolin Scaffolding Domain (CSD) that physically interacts with multiple proteins. Glutathione-S-transferase (GST) pulldowns and quantitative proteomics analysis of Cav1Y14D showed the increased interaction with Vinculin and other focal adhesion proteins. pY14Cav1 enriched CSD-dependent Vinculin tension in focal adhesions stabilizes actin cytoskeleton and hence cancer cell proliferation/progression.

S.Hotaling+, **B.L.Slabach**, and D.W.Weisrock. Next generation teaching: a template for bringing genomic and bioinformatic tools into the classroom. *Journal of Biological Education* 1-13.

Summary: We present a course-based undergraduate research experience (CURE) designed to aid in overcoming the limitations of integrating next-generation sequencing technology (NGS) into the classroom. Specifically, we use 16S rRNA sequencing to explore patterns of diversity stemming from student-directed hypothesis development. This CURE addresses three learning objectives: (1) it provides a forum for experimental design hypothesis generation, (2) it introduces modern genomic tools through a hands-on experience generating an NGS data-set, and (3) it provides students with an introductory experience in bioinformatics.









### **Outreach Activities**

**Brittany Slabach** (Crowley Lab) and Michael Thamann (UK Engineering Alum, currently Senior Engineer, General Atomics Aeronautical Systems Inc.) developed a workshop introducing girls ranging from 6th to 9th grade to the mechanics of flight through hands on exploration of aircraft and bird wing specimens. The participants of **GEMS - Girls, Engineering, Mathematics, and Science** event at UK held November 11, 2017, compared specimens and calculated wing characteristics to develop hypotheses about the type of flight represented. This highly collaborative event was a success thanks to the help of several stel-



lar undergraduate volunteers including Maya Gershtenson (Biology), Abby Marshall (Biology), Clara Wood (Human Health Sciences), Janie Ward (Mechanical Engineering), and Patrick Heelan (Mechanical Engineering). Dr. James Krupa (Biology) provided bird wing specimens and led a discussion for the parents on the natural history of the specimens. All plane wings were provided by the Unmanned Systems Research Laboratory led by Dr. Suzanne Smith (Mechanical Engineering) and General Atomics.



**Graduate Student Life Events** 

ville University, in Campbellsville, KY.

Recent Biology Graduate, **Jonathan Moore** (McLetchie Lab) is currently a Postdoctoral fellow, with Plant and Soil Sciences, at the University of Kentucky. Starting in June of 2018 he will start his new position as a Tenure-track faculty, at Campbells-

Sandeep Saxena, Fatemah Safaee, Sruthi Purushothaman and Shishir Biswas (Seifert Lab) hosted a table at Meadowthorpe Elementary School Science Night showcasing the amazing regenerative abilities of salamanders and spiny mice.







Allyssa Kilanowski (Westneat Lab) got engaged to Andy Batts in Yellowstone National Park this summer.





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