

Connections in Behavioral Biology

~ Advice from a Senior ~

Introduction

Hi! My name is Leigh Kinsler. I'm a senior majoring in Behavioral Biology and minoring in Psychology. I do research in the Bat Lab on campus. Our research focuses on *Eptesicus fuscus*, commonly referred to as the big brown bat. In this News Piece, I will discuss my research experience on campus, ways to find research, and general advice I have on the Behavioral Biology major.



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My Research Experience

I began research on campus over Summer 2020 in the Bat Lab. I emailed my Behavioral Biology professors who put me in contact with our Research Program Coordinator. From there, I was connected with Brittney Boubilil, a Graduate Student at Hopkins studying Psychological and Brain Sciences. Our research Principal Investigator (PI) is Dr. Moss, who oversees various research projects in the Bat Lab. Before discussing my research contributions, I will provide background information on the bats we work with.

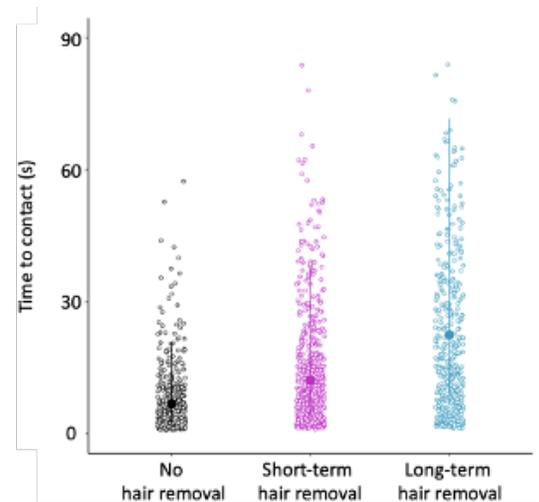
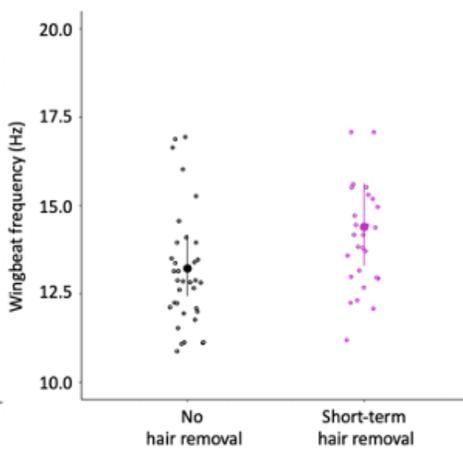
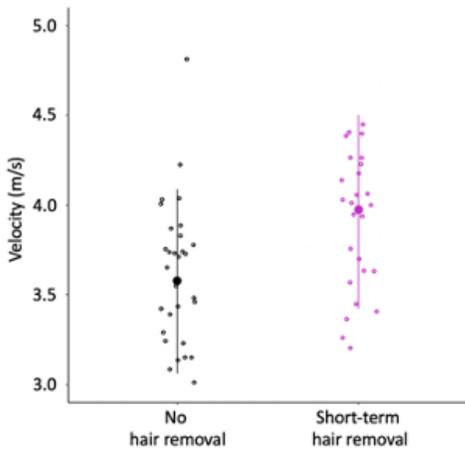


Bats “see” the world through echolocation. The big brown bat senses its environment by emitting calls and listening to the information in returning echoes. There are various forms of echolocation calls, such as for detecting prey or for social communication. Bats are not static when echolocating, rather, they fly through a complex, 3D environment. In order to adapt behavior accordingly, bats integrate sensory information from both flight and echolocation. This helps bats to navigate, avoid obstacles, and capture prey.

Our lab focuses on the role of bat wing sensory hairs used in flight control and a goal oriented task, such as prey capture. These sensory hairs are much different than fur hairs. The sensory hairs are microscopic and tapered. We hypothesize that removal of sensory hairs from the bat's wing and tail membranes will affect flight behavior and prey-capture performance. Specifically, we predict that when the sensory hairs are removed, there will be an increase in flight speed, wing beat frequency (how many times the bat beats its wings/sec), time to contact, and decrease in task performance (such as capturing a tethered worm).

Next, I will discuss our experimental set-up. In our flight room, bats were trained to capture a tethered worm. During data collection, flight behavior and capture performance were recorded using 3 high speed video cameras, and we monitored echolocation behavior with an array of ultrasonic microphones. We removed sensory hairs over the course of many days. For days 1-3, this was our baseline condition: there was no manipulation to the sensory hairs to observe normal flight. For days 4-6, this was our sham condition: water was applied to the wing membranes. This ensured that it was not the cream affecting flight behavior. For days 7-14, this was our short-term hair removal. We used a depilatory cream to remove hair from the ventral sides of the membrane. For days 15+, this was our long-term hair removal. We observed if there were any changes in flight behavior over extended time.

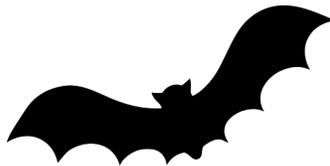
From our preliminary data, all of our predictions have held true. Here is some of our data:



FLIGHT KINEMATICS

The 2 plots on the left consider the average velocity and wing beat frequency per condition. Both increase with hair removal. We are still analyzing long-term hair removal.

All figures adapted from Brittney Boubli



TIME TO CONTACT

The plot on the right measures the average time that the prey item was made available until bat made a captured attempt. Time to contact increases with hair removal.

My Contributions:

I do all my research remotely. As previously mentioned, there are 3 cameras in the Flight Room that record the trials from different angles. I work with 2 of these videos per trial and map the tethered worm and bat's head during its flight trajectory. These trajectories will be combined to create a 3D pathway representing the bat's flight patterns per trial.

Ways to Find Research

1

ASK YOUR PROFESSORS

Search online for what your professors are currently researching. Find a topic that interests you! Reach out to your professors to see if they have any availability in their labs.

2

BULLETINS

Be on the lookout for the Behavioral Biology Weekly Email (and biweekly Pre-Health Opportunities Newsletter if you are Pre-Med). Current research and internships opportunities are frequently posted.

3

FORAGER ONE / HANDSHAKE

Forager One: is a great platform to connect faculty and students - you can see current research projects and directly contact PI's
Handshake: is a similar platform that posts job, research, and internship openings

Behavioral Biology Advice

Classes:

Search the Course and Cookies class spreadsheet from Nu Rho Psi, previous JHU course evaluations (found on the Hopkins website), or even ask classmates who have taken the course before about what the structure of the course is like, the workload, and if there is access to previous course syllabi. Do not go into a course unaware of the general expectations because it may be too much to balance with your schedule.

Balance is key! Take writing intensives during different semesters and do not stack work-heavy hard science courses. Consider taking writing-intensives within your major to maximize course efficiency. Check to see if what courses cross-check with major and/or minor requirements (sometimes, you may be eligible for a minor - and not even know it!).

Extracurriculars:

Hopkins offers multitudes of diverse student groups! Attend the Student Involvement Fair to see what you are interested in.

Balance school work with a few extracurriculars. Nu Rho Psi is a great club for neuroscience service, networking, program interface, and research opportunities. It is not restricted to Neuroscience majors. Establishing a peer network is fundamental for collaboration success, especially with studying for exams/quizzes/etc.

Faculty Connections:

Behavioral Biology is relatively a small student major at Hopkins. With smaller class sizes, there are many opportunities to get to know your Behavioral Biology peers and professors. Many of these professors teach multiple courses, so you are able to experience their teaching style and see what fits best for you. **Attend office hours!** Although it might seem daunting or scary at first, office hours are a perfect time to seek extra help on material you are unsure about. It is also another way to establish a relationship with your professor, who you may possibly do research with or take a future with!



CLOSING THOUGHTS

I became involved in research at Hopkins late in my academic career. I wish I would have started earlier because I absolutely love the research I do! Working with bats is truly a one-of-a-kind experience because they are not commonly studied in research labs. By getting involved in research early, you can see what you like and do not like to do during research. You may prefer working with a specific species or certain wet/dry lab techniques. The Behavioral Biology faculty is comprised of wonderful professors who always go the extra mile to help their students. It is essential to get to know your fellow Behavioral Biology peers and faculty because you will be with them for the next four years. Having a network to connect with not only helps during college but also for future careers. Many students follow different pathways - from pre-med, pre-law, research, to even something much different. By having these connections, you can seek advice from multitudes of Hopkins alumni. I wish you the best of luck!