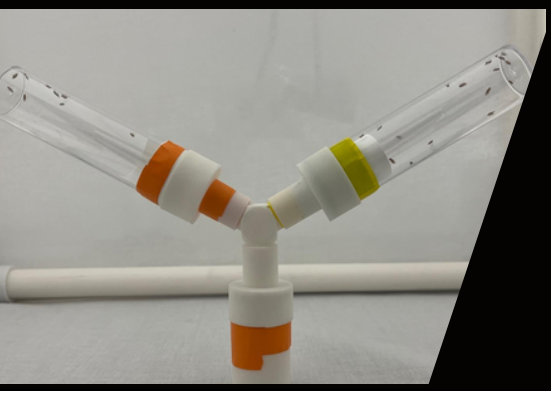

Identifying the genetic basis of learning skills in Drosophila melanogaster through directional selection

Jamie Baumann*, Reiley Heffern*, Victoria Hamlin, and Dr. Elizabeth King

*indicates dual award winners

Spring Forum Abstract Award Winner

Learning skills are necessary for organisms to adapt to their changing environment. For example, if a population migrates, those organisms may use olfactory stimuli to learn where food or threats are in their new environment. Studies have shown that these skills are influenced in part by one's genetic makeup. Learning ability is a complex trait, meaning that multiple genes and the environment contribute to these skills. In our investigation using Drosophila melanogaster, the common fruit fly, we are aiming to identify which genetic variants are associated with higher performance on learning tasks.

Operant conditioning is the process by which organisms learn to predict an outcome from a certain stimulus. We utilize operant conditioning to train flies to associate a certain odor with a sugar reward. We then use Y-mazes to present them with a choice between the odor we conditioned them to (the positive stimulus) and an odor that is not associated with a reward (the negative stimulus). After the test, we collect the flies that correctly chose the positive stimulus and allow them to mate and reproduce, creating our high-performance population. For our experiment, we will be conducting ten generations of directional selection, which allows us to isolate genotypes that are associated with higher performance on olfactory learning tasks and increasing the chance of more flies from each successive generation making the correct choice.

In this poster, we will be discussing the preliminary data from the first three generations of selection, where we expect a relatively minor increase in performance. However, we expect a larger increase in performance by the tenth generation. At the conclusion of the experiment, we will compare the genomes of the high-performance and control populations to identify significant genetic differences that may contribute to learning skills.

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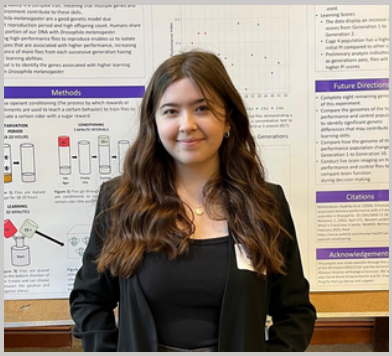

Jamie Baumann

My name is Jamie Baumann, and I am from St. Peters Missouri. I am a first-generation college student majoring in Biological Sciences with a minor in Psychology. Growing up I have always been interested in science, so when deciding what to major in when coming to Mizzou it was an easy choice to make. With doing a large amount of lab work for my science classes, I knew that I wanted to do much more in the lab than just for an outcome of a letter grade. I wanted to be a part of something that had much more meaning, and a larger impact to the world of science. With my strong interest for genetics, my hope for the future is after I graduate, I want to get a master's in Genetic Counseling and eventually become a Genetic Counselor.

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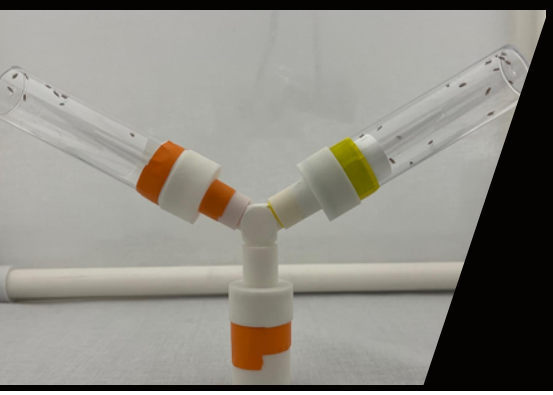

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About the Author

Reiley Heffern

I'm Reiley Heffern and I'm a Biological Sciences major from St. Louis, Missouri. I'm a freshman and I work in the King Lab as a part of my Honors College Discovery Fellows program. I work alongside sophomore Jamie Baumann under PhD student Victoria Hamlin on a directional selection experiment aiming to identify the genetic basis of learning skills in *Drosophila melanogaster*. Being involved in research has exposed me to a new side of biology that I'm passionate about and allowed me to develop skills that only hands-on experience can provide. In the future, I hope to pursue my interest in biology through a career in genetic counseling.

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