The effects of hunger on the innate fear response
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I was fortunate enough to spend the past summer working in the lab of Dr. Nicholas Betley of the Department of Biology. The lab's primary focus is on understanding how the brain processes information coding hunger and how this neural circuitry regulates/is regulated by external stimuli such as pain and fear. The goal of my project is to determine how the neural circuits underlying the survival needs of hunger and fear interact, and to uncover the neuron subpopulations responsible for directing behavior in response to these conflicting stimuli.

In this project I was interested in a particular type of fear, innate fear, which is critical for survival. An example of innate fear is the fear of a potential predator, which for many animals is detected as an odorant originating from the predator's fur or feces. The first phase and challenge of the project was determining how to present the odor of a predator to a mouse. For the first few weeks I tested different odors such as bobcat and lion urine to see which one constantly induced a fear response in mice. I ended up using a synthetic predator odor called TMT, which is derived from fox feces and has been proven in past studies to reliably induce the stereotypic fear response of freezing in mice when they are exposed to it. The next phase of the project was to determine the effects of hunger on the innate fear response. To do so I tested fed and food-deprived mice on different days and concluded that hungry mice were more mobile when presented with the predator odor. Even more intriguing was that when presented with food, hungry male mice overcame their fear of the odor, thus revealing that the need for food was more important than the need to evade a potential predator. It was during this phase that I also discovered a potential sexual dimorphism present in how hungry male and female mice modulate their innate fear response when presented with food.

One important skill I gained over the summer was how to work with mice, which at times proved difficult, especially when the mice did not want to cooperate with me. More importantly, I gained valuable insight into the work involved in developing an experiment, such as doing extensive reading of the relevant literature and even building the apparatuses needed to conduct the experiments. No matter how well you design your experiment, nothing ever seems to work out the first time, a fact that I had to deal with on an almost weekly basis. While my patience was certainly tested when dealing with these setbacks, I actually had fun coming up with inventive solutions to keep making progress on the project. There is still much work to be done but I am excited to learn

new techniques in the coming years with the help of my mentor to develop a definitive answer to a question that has yet to be convincingly answered in the exciting field of neuroscience.