The role of neurotrophins and their receptors in *Gryllus bimaculatus* compensatory plasticity

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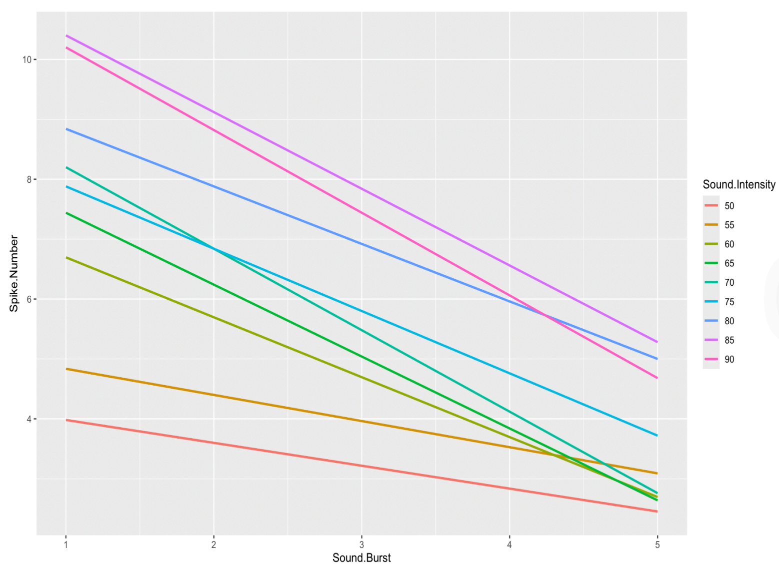
Neuroplasticity refers to the nervous system's ability to adapt and rewire itself. Neurotrophins are known to play a crucial role in neuroplasticity in vertebrates. For decades, scientists didn't believe that invertebrates had neurotrophins; however, recent studies have shown that the Spätzle-Toll signaling has been shown to play a role similar to neurotrophins in *Drosophila melanogaster* (the common fruit fly).

In the Horch lab, we have begun to characterize the Spätzle-Toll signaling pathway in a different invertebrate organism, *Gryllus bimaculatus* (two-spotted cricket). Crickets are a great example of neuroplasticity due to their ability to adapt their neural circuits in response to environmental changes, experiences, and learning. My focus was on the Toll 6-1 receptor because of its established role in *Drosophila* neuroplasticity. Through the lens of Toll 6-1 receptors, we sought to determine the dependency of neuronal plasticity on the Spätzle-Toll signaling pathway.

To answer this question, we focused on the cricket ascending auditory neurons AN-1 and AN-2. AN-1 responds best to 5 kHz sounds (commonly cricket songs) while AN-2 responds best to >15 kHz sounds (commonly bat ultrasounds). I played a repeated stimulus using a program called Audacity on the left and right side of the cricket starting at 50 dB and increasing by 5 dB until reaching 90 dB to record AN activity in both control crickets and crickets with down-regulated Toll 6-1 receptors. Although we haven't finished analyzing the data from the Toll 6-1 downregulated crickets, we observed a decrease in action potentials (spike number) as sound intensity decreases and after each subsequent auditory stimulation (sound burst) in control crickets.



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Funded by Surdna Foundation Undergraduate Research Fellowship Program