Subject: Thesis Defense - Heather Walters, MS Biology
Date: Monday, June 16, 2025 at 11:05:10 AM Eastern Daylight Time
From: SSB Faculty List on behalf of Diane St. Germain
To: SSB-FACULTY-LIST-L@LISTSERV.GMU.EDU

Thesis Defense Announcement
To: The George Mason University Community
Candidate: Heather Walters
Program: M.S. in Biology

Date: July 1, 2025

Time: 12:00 PM Eastern Time (US and Canada)

Location: Krasnow Bldg. Room 229, Fairfax campus

and via Zoom

Join Zoom Meeting

https://gmu.zoom.us/j/96534044224?pwd=ukjJsEsMh0N1g0mc1b8dZ50yNWJ8Vi.1

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Committee Chair: Dr. Lauren Guerriero
Committee members: Dr. Nadine Kabbani, Dr. Ancha Baranova

Title: The Intersection of Sleep and Wallerian Degeneration: Exploring Neurodegeneration Mechanisms in *Drosophila melanogaster*

Abstract: Neurodegenerative diseases such as Amyotrophic Lateral Sclerosis (ALS), Multiple Sclerosis (MS) or Parkinson's Disease, have started to elevate to the top of the list for medical health concerns. This has kickstarted the demand for deeper insight into shared molecular

mechanisms and finding more effective therapies. They share what is known as a protein misfolding and aggregation, which is considered to be caused by a cellular stress response. This research focuses on how Wallerian degeneration (WD) breaks down the axonal and myelin sheath when an injury or disruption to the axon occurs. WD is essential for clearing damaged neuronal debris, particularly axons and myelin, and findings suggest that sleep significantly aids in this critical cleanup process, thereby supporting neuronal health and recovery. Using *Drosophila melanogaster* as a model, we investigated how WD impacts the sleep behaviors of those that have undergone an Antenna removal assay, while comparing to those who have not. This assay is particularly useful because it causes Central Nervous System (CNS) degeneration by axotomy of the olfactory receptor neuron (ORN) axons that originate within the antenna and project into the antennal lobe of the *Drosophila's* central brain. It is particularly important for this study of WD and the association with the glial responses in the CNS because it's a precise, non-lethal injury that is targeting a specific population of neurons with projection into the central brain. The *Drosophila* are separated out by sex and genotype, with a total of 3 different genotypes (Dsarm, Axed, Nmnat), 6 crosses of those genotypes with Gal4 drivers, while using W1118 as a control that is being performed. The study leverages advanced genetic tools (UAS-Gal4 system) and behavioral monitoring (DAM2 system), to explore the link between sleep and WD. Our preliminary results reveal that sleep disruption during WD in *Drosophila* supports the hypothesis that WD impacts sleep behavior and neuronal recovery. This study provides a crucial foundation for understanding the intricate relationship between neurodegeneration and sleep, offering insights into potential therapeutic avenues that leverage sleep as a protective mechanism to mitigate neuronal damage and improve outcomes in neurodegenerative diseases.

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