

Evaluating the Effects of Probiotics on Neurology in the Model Organism *Drosophila melanogaster* Adult Flies and Third Stage Instar Larvae Utilizing Environmental Stressors and Behavioral Assays

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With an increased link between neurological diseases and microbiota stability, this research elucidates the ability of probiotics to influence the link between the digestive system and neurological function. Probiotics are microorganisms taken to supplement the current bacterial colonization in the gut. The adult *Drosophila melanogaster*, a model of a mature organism, and third stage instar *Drosophila melanogaster* larvae, a model of a developing organism, were fed probiotics and then exposed to environmental physiological stressors: acidity, alcohol, and *P. fluorescens*, a food spoilage bacteria, to stimulate stress response in the microbiota or an environmental neurological stressor: strobe light to stimulate neurological stress response. The *Drosophila melanogaster* were then evaluated for mobility and digestive function, utilizing the Rapid Iterative Negative Geotaxis, Locomotion, and Peristalsis Assays, which were modified to evidence specific behavioral responses. The *Drosophila melanogaster* on the probiotic diet were able to influence response to environmental physiological and neurological stressors at a significant level for eighteen of twenty neurophysiological assays evaluated with a $p\text{-value} < .01$, significant evidence to reject the null hypothesis. The data suggests promising applications for the influence of probiotics on short term stress response in mature and developing organisms and a definitive link between probiotic-rich diets and improved neurophysiological function.