WIU CENTENNIAL HONORS COLLEGE
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Abstract

Poster

Major: Biology

Faculty Mentor(s): Dr. Jeffrey Engel

Documenting the development of a wings-down phenotype in Drosophila melanogaster that carry potassium channel mutations

Cali Wilson

Potassium ion channels of neurons and muscle cells are crucial for moderating the excitability of those cells. In Drosophila melanogaster mutant for two K+-channel genes, eag and Sh, a subset of double-mutant flies carries their wings continuously held downward. This wings-down phenotype is presumed to result from hyperexcitability of the neurons, but how flies acquire the mutant phenotype has never been described. It must happen shortly after they eclose (emerge from the pupal case), when their wings unfold and harden. The wings-down phenotype only occurs in some flies of the mutant stock and higher rearing temperatures lead to more wings-down. This instance where a developmental pathway is on the brink of abnormal morphology is useful for studying how environmental factors and neural excitability can influence development and morphology. It is of particular interest in ectothermic or “cold-blooded” animals because of global warming and climate change.

I studied how the wings-down phenotype manifests in K+-channel-mutant Drosophila by watching wing development in newly-eclosed adults. Mutant flies that ultimately presented as wings-down were not distinguishable from other flies until their wings expanded following eclosion, and then their wing phenotype was immediately clear. If wings-down is caused by flight muscles contracting too much during this time as hypothesized, we would expect increased activity such as wing movements to correlate with wings-down. However, wings-down mutant flies in fact appeared less active than normal-winged mutants and wild-type flies. This could indicate that the phenotype negatively affects coordinated activities like flying and buzzing their wings.