Fighting Flier with Flier: Male Behavioral choice in Drosophila melanogaster

Abstract

Aggression is an innate behavior that evolved in the context of defending or obtaining resources, such as food, territory, or a potential mate. Essential to an animal's survival, aggressive behavior can also be extremely detrimental when expressed indiscriminately. Necessarily, a complex set of factors - genetic, hormonal, and environmental - interact to control when and how this behavior is expressed. As a means of better understanding these influences, I examine the model system *Drosophila melanogaster* at several levels. First, I affirm the significant role of the neuromodulator octopamine in mediating male behavioral choice by running aggression assays with male flies that have increased neuronal excitability in octopamine/tyramine circuitry; this intervention results in a significant increase in courtship behavior toward other males in the experimental group. Next, I describe the genetic tools I have helped develop that permit the visualization and functional characterization of cells expressing individual receptors of octopamine. Last, I explain my contribution to two projects that examine the effects of social experience on aggression, one that measured significant differences in expression of six proteolytic genes between flies that were group housed and those raised in social isolation, and a second that will test for differences in protein levels in the brains of the "winners" and "losers" of single pair, male-male fights. Together, these approaches work toward elucidating the complex mechanisms that underlie aggressive behavior.