



# BIOLOGY COLLOQUIUM

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Hosted by A/P Antonia Monteiro

## Ancient Anxiety Pathways Influence *Drosophila* Defense Behaviors



*Adam did his undergraduate studies at the Australian National University, pursued his doctoral work on circadian rhythms with Michael Young at The Rockefeller University and did postdoctoral work on olfactory learning with Gero Miesenböck at Yale University. He was previously a Nuffield Leadership Fellow in the Wellcome Trust Centre for Human Genetics, University of Oxford*

**By Adam Claridge-Chang**

Assistant Professor | Neuroscience | Duke-NUS Medical School  
Principal Investigator | Institute of Molecular and Cell Biology

Modeling anxiety and its disorders with a small neurogenetic animal would assist the elucidation of their neuronal and molecular bases. Two *Drosophila* behaviors - wall following and light-dark choice - were proposed to be anxiety-related defense behaviors. Meta-analysis of behavioral manipulations in rodents identified a panel of authentic anxiety-related interventions. These pharmacological treatments, genetic lesions, environmental manipulations and molecular stress responses all produced effects in fly defense behaviors that were concordant with anxiety-related behaviors in mammals. These fly assays were then used to establish conserved roles for orthologs of novel candidate mammalian anxiety genes. In addition, thermogenetic activation of serotonergic neurons revealed that this system reduces fly anxiety-related behaviors. Behavioral-anatomical analysis of serotonergic circuits identified a specific cluster of seven posteromedial 5-HT neurons that promote behavioral tranquillity. These results verify the hypothesis that the insect brain uses a multimodal stress signaling system to regulate an anxiety-like state through highly conserved neurogenetic mechanisms.