

# **The role of canonical Wnt signaling in leg regeneration and metamorphosis in the red flour beetle *Tribolium castaneum*.**

## **Abstract:**

Many organisms across the Metazoa have regenerative abilities with potentially conserved genetic mechanisms that can enlighten both medicine and evolutionary studies. Here, the role of canonical Wnt signaling was examined in the red flour beetle *Tribolium castaneum* in order to explore its role during metamorphosis and larval leg regeneration. Double-stranded RNA mediated silencing of Wnt-1 signaling resulted in a loss of wings and appendages with a dramatic reduction in width, indicating that the Wnt-1 signaling pathway is necessary for proper post-embryonic appendage development in *T. castaneum*. Furthermore, disruption of canonical Wnt signaling led to the complete impairment of limb regeneration in *T. castaneum*. Our findings suggest that Wnt-1 signaling is a conserved mechanism for appendage development across all holometabolous insects and indicate that the role of Wnt-1 signaling in limb regeneration has been retained across all insects as various modes of limb development evolved. Importantly, this study shows that the availability of the genome sequence and the ease of performing leg ablations make *Tribolium* an excellent holometabolous insect model for studying regeneration.