

Abstract

How speciation occurs and the forces driving these processes are key questions in evolutionary biology. New species arise from ancestral lineages due to selective forces acting on the genetic variation of individuals in a population. Insect host races or host strains are populations of the same species that are genetically differentiated and exhibit partial reproductive isolation. In plant-feeding insects, the adaptation of host strains to different plants has been claimed to promote reproductive isolation leading to diversification. This project aims to identify specific phenotypic adaptations of insect strains to their host plants that may help explain the evolution of host shifts during incipient speciation. Preliminary results indicate evidence of physiological and morphological plastic adaptations of the fall armyworm (*Spodoptera frugiperda*) strains to their host plants, corn and rice. This project focuses on the factors driving this phenotypic plasticity while applying a variety of cutting edge research techniques in materials science and engineering. The findings of this project highlight the importance of plasticity in evolving insect-plant ecological associations and contribute to the understanding of insect host-race formation in sympatric populations.