

## **Establishing a safe and effective model system for evaluating the Rift Valley Fever vector competence of North American mosquitoes**

Bradley Bates, Jonathon Garnett, and David Pledger  
Texas A&M University-Kingsville, Summer Research Program

Project Scope: Rift Valley Fever (RVF) is a zoonotic disease that is native to Africa, where it periodically kills large numbers of domesticated livestock animals and causes potentially fatal disease in humans. It represents a potential agent of bioterrorism which may pose a significant threat to our nation's health and economy. However, the ability of many North American mosquito species to vector the RVF virus is not known. Vector competence research involving the use of virulent strains of RVF virus in mosquitoes must be carried out in facilities with the highest levels of biological containment available (BSL4). With only three such facilities in the US, a bottleneck to progress thus exists in regards to assessing the threat of RVF in North America. We propose the use of a BSL2 approved attenuated vaccine strain of the RVF virus, known as MP-12, to carry out safe and effective vector competence studies of North American mosquitoes. Our studies will aid BSL4 facilities in establishing taxonomic and geographic priorities for further studies using virulent RVF virus.

Recent Progress: In preliminary studies, female *Culex quinquefasciatus* were infected orally with MP-12 by feeding from cotton pledgets soaked with a blood and MP-12 mixture. Female *Cx. quinquefasciatus* were evaluated at fourteen days post-feeding. Viral dissemination was demonstrated by the detection of MP-12 RNA in dissected salivary glands using a reverse transcription-polymerase chain reaction (RT-PCR) based method, thereby establishing the RT-PCR analysis as highly sensitive analytical tool for providing molecular evidence of the presence of MP-12 in mosquitoes.

Future Plans: Our current objectives include the evaluation of nine species of North American mosquitoes: *Culex quinquefasciatus*, *Cx. tarsalis*, *Aedes aegypti*, *Ae. dorsalis*, *Ae. melanimon*, *Ae. triseriatus*, *Ae. atropalpus*, and *Ae. epactius*, and *Ae. albopictus* (Asian). Female mosquitoes will be infected by intrathoracic (IT) injection of an MP-12 mixture, then allowed to feed on newborn hamsters one week later in order to demonstrate horizontal transmission of the virus. In vertical transmission experiments, previously mated female mosquitoes will be infected by IT injection with MP-12. Eggs will be collected, and vertical transmission will be demonstrated by the presence of MP-12 in infected offspring using RT-PCR analysis. Acquisition experiments will also be performed in which mosquitoes will be fed a blood and MP-12 mixture and viral dissemination will be assessed by RT-PCR.

Relevance to listed research areas: The use of MP-12 as a model system for studying RVF will allow vector competence studies of mosquitoes in reduced biosafety containment settings and facilitate the assessment of RVF as a potential agent of bioterrorism.

Publications: None