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**Abstract**

Poster Title: Quantifying the Susceptibility of Three Genera of Mosquitoes to *Aedes sollicitans* Nuclear Polyhedrosis Virus (AesoNPV)

Award: Most Innovative MPH Poster

Since the discovery of AesoNPV in 1969, an emerging field in entomology has been conducting research into the potential use of pathogens as alternatives to chemical pesticides. The first pathogen to be registered by the EPA as a larvicide was *Bacillus thuringiensis israelensis* (Bti) in 1982. Although *Bti* does not affect non-target organisms such as beneficial insects, a disadvantage of *Bti* as a pesticide is its inability to recycle in the environment. The first viral pathogen to be registered as a pesticide was *Heliothis* NPV, which spurred research into viruses as mosquito bio-control methods.

Environmental and toxicological concerns posed by chemical pesticides have propagated the need to research bio-control methods to controlling mosquito populations. Since DDT was banned in the US in 1972, research has been conducted into developing pathogens as larvicides. The efficacy and viability of viruses as bio-controls requires that the viruses are self-sustainable in the environment and have a narrow host-range as to not affect non-target species. Research into the host-range of AesoNPV has been conducted because of its ability to kill species of *Aedes* mosquitoes without posing any environmental or human health concerns.

As part of a larger study identifying the host-range of AesoNPV, the objective of my study was to ascertain the susceptibility of *Anopheles albimanus*, *Anopheles quadrimaculatus*, and *Uranotaenia lowii* to AesoNPV by performing exposure bioassays. Exposure to AesoNPV was performed using standard bioassays. Confirmation of AesoNPV infection required patent examination, dissection and PCR analysis followed by genetic sequencing. One-way ANOVA was performed to test for differences in the mean per cent (%) infection among species.

*An. albimanus* and *An. quadrimaculatus* never developed characteristics of AesoNPV infection when exposed. In contrast, the midgut and gastric caeca of *Ur. lowii* became a white opaque color from the accumulation of occlusion bodies. According to the ANOVA, the differences in the mean % infection between *Ae. triseriatus* (positive control) and the *Anopheles* mosquitoes was p <0.001 and thus statistically significant. However, the difference in the mean % infection between *Ur. lowii* and *Ae. triseriatus* was p=0.464 and thus was not statistically significant. PCR analysis and genetic sequencing confirmed AesoNPV infection in *Ur. lowii*.

Future research opportunities of this study include performing molecular techniques such as RNA sequencing to discern which genes can affect viral transmission and susceptibility. Identification of genes which influence viral transmission is essential to performing genetic engineering of the virus to enhance viral transmission. Further host-range studies using *Ur. lowii* include discerning the susceptibility of *Ur. lowii* to other mosquito baculoviruses including CuniNPV and *Ur. sapphirina* nuclear polyhedrosis virus (UrsaNPV). Mapping the genomes of these baculoviruses will aid in understanding the similarities and dissimilarities between the mechanisms of viral transmission and host specificity of these viruses.

The public health relevance of this project is that although no species of *Uranotaenia* have been documented to vector diseases to humans, West Nile virus has been isolated in *Ur. sapphirina*. As cold-blooded feeders, there is the potential that *Ur. sapphirina* infected with West Nile can transmit the virus to reptiles and amphibians. Confirming that *Anopheles* mosquitoes were resistant to infection by AesoNPV indicates that although *Aedes* mosquitoes are susceptible to AesoNPV, *Anopheles* mosquitoes are not. This is a public health concern because *An. albimanus* and *An. quadrimaculatus* can vector malaria. Implications of this project included expanding knowledge about the host-range of AesoNPV in addition to evaluating the efficacy of AesoNPV as a bio-control. Research into AesoNPV as a larvicide is beneficial because *Ae. triseriatus* mosquitoes which vector La Crosse Encephalitis are very susceptible to AesoNPV. Additionally as a larvicide, AesoNPV does not pose the environmental or human health risks which are posed by chemical pesticides such as DDT and malathion.