EVALUATION OF THE EFFECT OF KAMITI RIVER VIRUS (KRV) ON THE POTENTIAL OF *Aedes aegypti* MOSQUITOES AS VECTORS OF MOSQUITO-BORNE ARBOVIRUSES

By

LUTOMIAH J.L. Joel, (B. Ed Sc.)

TM301-0003/03

A thesis submitted in partial fulfillment for the degree of Master of Science in the Jomo Kenyatta University of Agiculture and Technology (JKUAT)

2005

ABSTRACT

This study sought to evaluate the effect of Kamiti River Virus (KRV) on the competence of *Ae. aegypti* for mosquito borne arboviruses. KRV is an insect-only flavivirus which was first isolated from the wild *Ae. macintoshi* mosquitoes in 1999, and it is also known to naturally infect *Ae. aegypti*. It does not multiply in vertebrate cells.

Little is known about this virus and therefore more research needs to be done to understand its relationship with other members of the family *Flaviviridae* such as Yellow fever virus (YFV), dengue (DEN) and West Nile virus (WNV) which are of great public health importance. Also its effect on *Ae. aegypti* which are the important vectors of these viruses need to be known for possible application in the biological control of arbovirus transmission. *Ae. aegypti* were used since they are easy to handle in the laboratory while the WNV and YFV can be handled with the level 2 Biosafety facilities (BSF 2) with which our laboratory is equipped.

Two cell lines (C6/36 and Vero) were used. These cells were grown in Modified Eagle's Medium (DMEM) and Minimum Essential Medium Eagle (MEM) respectively. Mosquitoes were infected either as adults by exposure to infectious bloodmeal or as larvae by exposure to virus-infected C6/36 cells, while survival rates were determined using the Kaplan-Meier survival analysis. Virus titers were

determined by calculating the $TCID_{50}$ using the Karber formula and viruses assayed by isolation in tissue culture and IFA.

In vitro studies have shown that KRV-infected C6/36 cells were over 90% resistant to superinfection with WNV within the first six hours of primary challenge. Simultaneous inoculation of these cells with KRV and WNV yielded no statistically significant difference ($p = 0.2504$) in the number of positive cells that reacted with KRV- and WNV-specific mouse hyper-immune ascitic fluid (HIAF) while in vivo interference was not significant ($p > 0.05$).

High infection rates of KRV in *Ae. aegypti* (63 - 74%) were also demonstrated, suggesting that these mosquitoes are genetically and biochemically compatible for the complete multiplication and development of the virus. TOT of KRV in *Ae. aegypti* was also demonstrated and found to be 3.41%.

This study has also established that infection of *Ae. aegypti* with KRV had no effect on their fecundity as there was no statistically significant difference ($p = 0.0529$) between the mean number of eggs laid by KRV-infected mosquitoes (5.5) and the control (6.5) per day. Survival studies showed that KRV does not have an effect on the competence of *Ae. aegypti* mosquito vectors for Flaviviruses since it did not reduce their mosquito lifespan.