Salinity tolerance of the aquatic stages of *Anopheles funestus* group

By

Kelebogile Waniwa

A research report submitted to the Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, in partial fulfillment of the requirements for the degree of Master of Science (Med).

Johannesburg, February 2011

ABSTRACT

Introduction: Members of the African malaria vector *Anopheles funestus* group are found occupying a variety of breeding sites. There is only limited information on the biology of the early stages of this group and the factors affecting their survival are poorly studied. According to unpublished Vector Control Reference Unit data, while *Anopheles funestus* is a freshwater breeder, rearing other members of this group in the laboratory in distilled water has proved to be difficult. The present study aimed to determine the effects of different salt concentrations on survival rates of the aquatic stages of members of this group.

Methods: A baseline salinity tolerance range was established using FUMOZ, laboratory colonized *An. funestus*. *Anopheles* mosquitoes were collected using standard techniques from different sites in Mpumalanga Province and held for egg-laying. Wild-caught mosquitoes were morphologically identified to species groups and further identification to species level was by PCR assay. Eggs from each family identified as a member of the *An. funestus* group were reared in different salt concentrations until they reached the adult stage. The concentrations used for this study were 0% (distilled water), 5% (0.145% NaCl), 10% (0.29% NaCl) and 15% (0.435% NaCl) seawater.

Results: Of 315 wild-caught specimens, 244 (77.5%) were identified as *An. funestus* group. Out of the 244 *An. funestus* group, 223 (91.4%) belonged to *An. rivulorum*, 19 (7.8%) were *An. leesoni* and 2 (0.8%) were *An. vaneedeni*. Statistically, there were significant negative trends for the hatch rate (P= 0.0029) and larval survival (P=0.007) for *An. funestus* as the salt concentrations increased, with no larvae

surviving to pupae above 15% seawater. *Anopheles rivulorum*, on the other hand, showed no significant trends in hatch rate (P=0.773) or larval survival (P=0.6809). More than 80% of the pupa emerged as adults for both species indicating that salinity had no effect on pupal eclosion.

Conclusion: Both *An. funestus* and *An. rivulorum* exhibited some degree of tolerance to saline water, but *An. funestus* survived best in freshwater (distilled water). *Anopheles rivulorum* on the other hand, exhibited better tolerance to saline water. More work should be done on this species regarding its ability to survive in different salt concentrations and other members of this group should be similarly tested. A basic understanding of these variations in salinity tolerance provides vital information on the biology, ecology and rearing of members of the *An. funestus* group.