Effects of nutritional and physiological status on behavioral avoidance of *Anopheles minimus* (Diptera: Culicidae) to DDT, deltamethrin and lambdacyhalothrin

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ABSTRACT**:** The monitoring of behavioral responses of mosquitoes to insecticides are critical to the understanding of how chemicals function in the control of disease transmission. The excito-repellency avoidance responses of laboratory-reared *Anopheles minimus* females exposed to diagnostic concentrations of DDT (2 g/m^2), deltamethrin (0.0625 g/m^2), and lambdacyhalothrin (0.0369 g/m^2) were observed using an excito-repellency escape chamber. Insecticide contact (measuring irritancy) and non-contact (measuring repellency) behavioral assays were conducted on non-blood-fed (unfed), sugar-fed, early blood-fed (recently engorged) and late blood-fed mosquitoes. Rates of escape from the contact and non-contact chambers, regardless of chemical compounds, were most dramatic in unfed mosquitoes compared to other nutritional states ($\underline{P} < 0.05$). In general, across all 3 chemicals, slower escape response was observed in sugar-fed and early blood-fed specimens, whereas late blood-fed showed an intermediate response. Relative suppression of escape flight response in comparison to matched non-insecticide treated controls and the unfed condition is likely the result of normal reduced flight activity among recent blood and sugar-engorged mosquitoes. We conclude that nutritional states and physiological conditions of mosquitoes as a result of blood feeding can dramatically influence excito-repellency test results. Therefore, for interpretive purposes, studies on chemical irritancy and repellency must account and control for the inherent variability of avoidance responses to insecticides influenced by nutritional and physiological conditions of the mosquitoes at the time of test. ***Journal of Vector Ecology*** **26 (2): 202-215. 2001.**

Keyword Index: Excito-repellency, *Anopheles minimus*, DDT, deltamethrin, lambdacyhalothrin.

INTRODUCTION

Malaria is a major re-emerging health problem throughout the tropical and subtropical world (Campbell 1997). Many countries, including Thailand, have experienced a dramatic resurgence of malaria negating the many years of previous control progress (Baird 2000, Chareonviriyaphap et al. 2000). Historically, one of the principal success stories for malaria abatement has been through organized methods of vector control to reduce transmission risk. For decades, DDT had been the chemical of choice and until recently had been used extensively in malaria control worldwide (Brown et al. 1976). Reports of increased physiological resistance and perceived health concerns concerning insecticide use have resulted in a widespread reduction and complete withdrawal of DDT and other organochlorine and organophosphate compounds for public health use. Over a short period of time, pyrethroid chemicals have taken on greater importance in vector control worldwide (WHO 1995), despite the increased reporting of resistance to this general class of compounds (Malcolm 1988).

Interestingly, despite decades of routine successful