Chemically induced behavioral responses in *Anopheles minimus* and *Anopheles harrisoni* in Thailand

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ABSTRACT: Behavioral responses of female mosquitoes representing two species in the Minimus Complex exposed to an operational field dose of bifenthrin or DEET (*N,N*-diethyl-m-toluamide) were described using an excito-repellency test system. Two test populations of *An. minimus*, one from the field (Tak Province, western Thailand), the other from a long-established laboratory colony, and *Anopheles harrisoni* collected from Kanchanaburi Province, western Thailand, were used. Results showed that all test populations rapidly escaped after direct contact with surfaces treated with either bifenthrin or DEET compared to match-paired untreated controls. Greater escape response by exposed females to bifenthrin and DEET were observed in the *An. minimus* colony compared to the two field populations. Field-collected *An. minimus* demonstrated a more rapid escape response to DEET than to bifenthrin, whereas *An. harrisoni* showed a converse response. Although fewer females escaped from test chambers without direct contact with treated surfaces compared to contact tests, the spatial repellency response was significantly pronounced in all test populations compared to match-paired controls ($P < 0.05$). DEET was found to perform as both a contact stimulant and moderate spatial repellent. ***Journal of Vector Ecology* 36 (2): 321-331. 2011.**

Keyword Index: Behavioral avoidance, bifenthrin, DEET, *Anopheles minimus*, *Anopheles harrisoni*, Thailand.

INTRODUCTION

Although the incidence of malaria in Thailand has been significantly reduced during the past 50 years, malaria remains prevalent in some areas, especially in secondary scrub and forest hill environments along undeveloped stretches of the international borders with Myanmar, Cambodia, and Malaysia (Chareonviriyaphap et al. 2000, MOPH 2009). Over 70% of malaria cases have been recorded along the Thai-Myanmar border area, especially in Tak and Kanchanaburi provinces where high transmission periodically occurs (Manguin et al. 2010). The sustained malaria endemicity has been exacerbated by agricultural-based activity from uncontrolled cross-border population movements and recurring political unrest (MOPH 2009). Several important vectors of malaria are found in this area, including two members of the *Anopheles minimus* complex, collectively important malaria vectors in forest and scrub areas (Baimai 1989, Chareonviriyaphap et al. 2000, Kengluecha et al., 2005, Sungvornyothin et al. 2006a, Sungvornyothin et al. 2006b).

Anopheles minimus, Theobald 1901 is a widely distributed species complex in Southeast Asia (Subbarao 1998, Van Bortel et al. 1999, Theophil et al. 2002, Manguin et al. 2010), composed of at least two different sibling species, *An. minimus* (formerly species A) and *An. harrisoni* (formerly species C) in Thailand (Harbach 2004, Somboon et al. 2005, Garros et al. 2006, Sungvornyothin et al. 2006a), both of which can be easily separated using molecular methods of identification (Garros et al. 2004). *Anopheles minimus* is the predominant species found throughout most of Thailand, whereas *An. harrisoni* is restricted to the western Thai-Myanmar border, most notably in Kanchanaburi Province (Kengluecha et al. 2005). Although the geographical distribution of *An. minimus* and *An. harrisoni* in Thailand is known, important bionomic aspects of each species within the Minimus Complex remain poorly understood, especially feeding and resting behaviors, host preference, vector competence, and responses to insecticides (Chareonviriyaphap et al. 2004, Garros et al. 2006, Sungvornyothin et al. 2006b). Understanding the behavioral responses of a clearly defined species within the complex can facilitate vector control strategies by selecting and implementing the most appropriate interventions possible (Kongmee et al. 2004, Sungvornyothin et al. 2006b). Behavioral responses can be divided into two