Tropical Biomedicine 24(1): 7–15 (2007)

Biochemical studies of insecticide resistance in *Aedes (Stegomyia) aegypti* and *Aedes (Stegomyia) albopictus* (Diptera: Culicidae) in Thailand

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Received 21 November 2006; received in revised form 10 December 2006; accepted 15 January 2007.

Abstract. Biochemical analysis was performed on field caught *Aedes (Stegomyia) aegypti* and *Aedes (Stegomyia) albopictus* (Diptera: Culicidae) mosquitoes to determine activities of enzymes including mixed function oxidases (MFO), nonspecific esterases (α- and β-), glutathione-S-transferases (GST), and insensitive acetylcholinesterase (AChE). Biochemical tests were performed on F1 generation of *Ae. aegypti* field caught mosquitoes, while in *Ae. albopictus* F2 progenies were used. Twenty-six samples of *Ae. aegypti* mosquito were collected from areas across different parts of Thailand including Bangkok (central), and the provinces of Chiang Rai (north), Nakhon Sawan (north-central), Nakhon Ratchasrima (northeast), Chonburi (east), Chanthaburi (east), and Songkhla (south). Eight wild caught samples of *Ae. albopictus* were from Songkhla, Nakhon Sawan, Nakhon Ratchasrima and Kanchanaburi (west) provinces. The susceptibility to pyrethroids (deltamethrin, permethrin), organophosphate (fenitrothion) and carbamate (propoxur) insecticides were revealed in these samples. The biochemical test results were compared with those of the susceptible Bora (French Polynesia) strain. There was significant enhancement of MFO in pyrethroid resistant *Ae. aegypti* samples, except those from Songkhla and Hauykwang district in Bangkok. Biochemical assay results suggested that nonspecific esterases conferred fenitrothion resistance in *Ae. aegypti* in Nakhon Sawan, while insensitive AChE and/or nonspecific esterases could play role in fenitrothion resistance in Nakhon Ratchasrima. There was no consistent association of GST with pyrethroid resistance in *Ae. aegypti*. Low enzyme activities found in *Ae. aegypti* in Songkhla and in *Ae. albopictus* corresponded to their insecticide susceptibility status. The increased enzyme activity in field samples reflecting local history of insecticide employment was discussed.

INTRODUCTION

Dengue and dengue haemorrhagic fever (DHF) remain a serious transmitted disease in Thailand by which *Aedes (Stegomyia) aegypti* (Diptera: Culicidae) is incriminated as primary vector and, in recent years, *Aedes (Stegomyia) albopictus* (Diptera: Culicidae) as a secondary vector. Vector control in Thailand is implemented using environmental management through decrease of potential breeding sites and insecticide-based control methods, by fogging or applying larvicides. For decades organophosphates (i.e. temephos, fenitrothion, malathion and chlorpyrifos) and carbamate (i.e. propoxur, bendiocarb) had been heavily used for vector control before being replaced by pyrethroids in 1992 for use in agriculture