

Allozyme Patterns of *Aedes albopictus*, a Vector of Dengue in Thailand

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ABSTRACT Isozyme frequencies in six wild-caught populations of *Aedes albopictus* (Skuse) from various parts of Thailand were compared using starch gel electrophoresis. Four populations were sampled from the south of the country, one from Samui Island and three from the mainland. The remaining two populations were obtained from central (Bangkok) and northern (Tak) Thailand. There were large differences in allele frequencies at two of 22 loci: Glutamate oxaloacetate transaminase-2 (*Got-2*) and Hexokinase-1 (*Hk-1*). *Got-2* (allele 100) was absent from the Bangkok population, whereas it was observed in high frequencies in all other populations. The Bangkok population showed the highest percentage of polymorphic loci (63.6%), whereas the population from Tak demonstrated the smallest percentage of polymorphic loci (18.2%).

KEY WORDS *Aedes albopictus*, isozymes, dengue vector, Thailand

DENGUE HEMORRHAGIC FEVER is one of the most important arthropod-borne viral diseases and commonly occurs throughout Asia and Southeast Asia. Approximately 50,000–200,000 cases are reported annually in Thailand (Communicable Disease Control 1978–2003). During the past two decades, large dengue outbreaks in Thailand have occurred at 1- or 2-yr intervals. The rate of spread of dengue virus in Thailand has increased, and disease transmission remains prevalent over the entire country (Communicable Disease Control 1978–2003 [Bangkok, 2003]). Additionally, there has been a significant growth in the human population combined with demographic movement to the urban residential areas and an increase in tourism-based facilities. These changes influence the densities of *Aedes albopictus* (Skuse), an outdoor biting mosquito, by creating more larval breeding habitats (Chareonviriyaphap et al. 2003).

Ae. albopictus is native to Southeast Asia and is involved in the transmission of human arboviruses in several parts of the world (Pant et al. 1973, Mitchell 1995, Urbanelli et al. 2000). The species, first recorded in India, is found throughout most of tropical Asia, Hawaii, and the South Pacific (Kambhampati et al. 1991). This species has further expanded its geographical range to successfully invading the Americas, Australia, Europe, South Africa, New Zealand, Barbados, and Bolivia (Mitchell 1995, Urbanelli et al. 2000). In Thailand, *Ae. albopictus* is restricted to the fruit or-

chards and rubber plantation areas in the south and is especially prevalent along the east coast. Natural breeding habitats such as plant axles, coconut floral spathes, and outdoor artificial habitats containing organic debris have been identified as breeding sites of *Ae. albopictus* (Communicable Disease Control 1978–2003 [Thailand 1995–2003], Rattarithikul and Panthusiri 1994, Thavara et al. 2001, Chareonviriyaphap et al. 2003). Recent reports indicate *Ae. albopictus* is now invading many towns and suburban residential areas of the larger urban zones, especially Bangkok, one of the areas of greatest dengue transmission in Thailand (Communicable Disease Control 1978–2003 [Thailand 2000–2003], Thavara et al. 2001, Chareonviriyaphap et al. 2003).

Presently, little is known about the distribution of *Ae. albopictus* in Thailand, including two isolated geographical areas of Samui Island and Mae Sot Valley. In this study, we analyzed genetic relationships among six *Ae. albopictus* populations in Thailand in an attempt to estimate rates of gene flow among populations and to identify barriers to and corridors of gene flow.

Materials and Methods

Mosquito Populations. *Ae. albopictus* was sampled from six areas (Fig. 1). Four collections were obtained from southern Thailand, three from the mainland (Chumporn, Surattanee, and Songkhla), and one from Samui Island. Two other populations were from Bangkok (Bangkean) and Tak (Mea Sot) in central and northern Thailand, respectively. Details of all six field-collected populations are given in Table 1.

All *Ae. albopictus* samples were collected as larvae or pupae and reared to adults. Approximately 70–100

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