HAPLOTYPE ANALYSIS OF *Aedes albopictus* ISOLATED FROM SS14 SUBANG JAYA, SELANGOR, MALAYSIA BASED ON NADH DEHYDROGENASE SUBUNIT 5 (ND5) GENE

By

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TABLE OF CONTENTS

	PAGE
TITLE PAGE	i
DECLARATION	ii
INTELLECTUAL PROPERTIES	iii - iv
ACKNOWLEDGEMENTS	vi
TABLE OF CONTENTS	vii – viii
LIST OF TABLES	ix
LIST OF FIGURES	x – xi
LIST OF ABBREVIATIONS	xii
ABSTRACT	xiii
CHAPTER	
1: INTRODUCTION	
1.1 Background of the study	1 - 2
1.2 Problem statements	2
1.3 Objectives of the study	
1.3.1 General objective	3
1.3.2 Specific objectives	3
1.4 Significant of the study	3
2: LITERATURE REVIEW	
2.1 Background of *Aedes albopictus*	4
2.2 Characteristics of *Aedes albopictus*	4 - 5
2.3 Life cycles of *Aedes albopictus*	6 - 9
2.4 Biting behaviour	9
2.5 *Aedes albopictus* as a vector	9 - 11
2.6 Ecological behaviour of *Aedes albopictus* and *Aedes aegypti*	12
2.7 Haplotype analysis on mitochondrial ND5 genes	13 - 14
3: MATERIALS AND METHOD	
3.1 Laboratory equipment	
3.1.1 Laboratory consumable	15
3.1.2 Laboratory instruments / equipment	15
3.1.3 Reagents and kits	16
3.2 Method	17
3.2.1 Study site	18
3.2.2 Sample collection	18 - 20
3.2.3 Rearing process	20 - 21
3.2.4 Morphological identification	22
3.2.5 Sample fixation	22
3.2.6 DNA extraction and quantification	22 - 23
3.2.7 Polymerase chain reaction (PCR) amplification	23

ABSTRACT

HAPLOTYPE ANALYSIS OF *Aedes albopictus* ISOLATED FROM SS14 SUBANG JAYA, SELANGOR, MALAYSIA BASED ON NADH DEHYDROGENASE SUBUNIT 5 (ND5) GENE

Dengue is an infectious disease carried either by *Aedes albopictus* or *Aedes aegypti*. *Ae. albopictus* is responsible for the transmission of dengue virus (DENV) as well as several other arboviruses such as Chikungunya viruses (CHIKV). Since no vaccine is commercially available, vector control remains the most important strategy to prevent an outbreak. Therefore the study of *Aedes albopictus* at molecular levels is significant to facilitate prevention and control strategies. This current study is utilised the mitochondrial DNA (mtDNA) of the ND5 region as a marker to study the genetic diversity at Subang Jaya SS14, Selangor, Malaysia. Ovitraps used to collect *Ae. albopictus* eggs were placed randomly in the study area and the eggs were reared until adults in the laboratory. Ten individual adult female *Aedes albopictus* mosquitoes were randomly selected and analysed for polymorphism at the ND5 region. 450 bp of amplified PCR products were obtained and sequenced and subjected to BLAST. Our findings showed high similarities with homologous reference sequences of ND5 reegion derived from the NCBI GenBank. Subsequently, the nucleotide sequences were aligned using ClustalX2.1 software. The haplotype network constructed showed the presence pf 11 haplotypes in the 49 sequences studied including reference sequences from NCBI GenBank. These findings deduced that there is low genetic variation within interpopulation as compared to populations from neighbouring countries. This information may be beneficial to construct the appropriate level of surveillance and control measures needed to prevent the future expansion of this vector and simultaneously reduce the health risks associated with dengue viral transmission.

Keywords: *Aedes albopictus*, ND5, haplotype, dengue, Malaysia

CHAPTER 1
INTRODUCTION

1.1 Background of the study

Nowadays, dengue in one of the infectious disease which has been estimated to affect 50-100 million of individuals every year either in tropical or subtropical areas. *Aedes* (Stegomyia) *albopictus* (Skuse 1894) is a vector that is able to transmit dengue virus, but it is less efficient vector compared *Aedes* (Stegomyia) *aegypti* (Linnaeus 1762), the most important vector of dengue (Da Rocha Taranto et al., 2015; Rezza, 2012). According to De Jong *et al.* (2009), *Ae. albopictus* often known as the "Asian tiger mosquito'' is one of the most invasive mosquitoes in the world. It is less anthropophilic and not well adapted to urban domestic environments and therefore considered as an inefficient vector of dengue compare to *Ae. aegypti* (Rezza, 2012). Mosquitoes can spread by means of active adult flight and passive transportation of immature stages (i.e. larvae and eggs) (Mousson *et* al., 2005) via transportation in used tires (Usmani-Brown, Cohnstaedt, & Munstermann, 2009). *Ae. albopictus* is able to colonize to new areas rapidly despite its typical lifetime flight range of 200 m (Usmani-Brown *et al.*, 2009).

Other than being a vector for dengue virus (DENV), *Ae. albopictus* can also contribute in the transmission of several other arboviruses including Chikungunya (CHIKV), Eastern Equine encephalitis, LaCrosse encephalitis, Bunyaviridae and West Nile virus (Usmani-Brown *et al.*, 2009). Since no vaccine is available either for DENV or CHIKV, vector control remains the most important strategy to prevent an outbreak (Kamgang, Marcombe, et al., 2011). Integrated vector management (IVM) techniques provide satisfying results in terms of vector prevention. Examples of IVM techniques are source reduction, pesticide application, biological control, education and public awareness, as well as personal protection (Abramides *et al.*, 2011). According to Abramides *et* a*l.* (2011), the combination of these IVM techniques shown effective results in reducing the number of eggs where in 2009 fewer eggs were detected in the re-intervention areas compared with the intervention ones. According to Rudnick, Tan,