



**GENETIC POLYMORPHISM OF *CYTOCHROME OXIDASE*
SUBUNIT 1 (COI) GENE OF *Aedes albopictus* ISOLATED
FROM ROYAL BELUM, PERAK**

By

FATIN HANNANI BINTI MOHD YUSOFF

**Thesis Submitted in Partial Fulfilment of the Requirement for
Bachelor of Medical Laboratory Technology (Hons),
Faculty of Health Sciences, Universiti Teknologi MARA**

2017

DECLARATION

I hereby declare that this thesis is my original work and has not been submitted previously or currently for any other degree at UiTM or any other institutions.

Signature :

Name : Fatin Hannani Binti Mohd Yusoff
Matric Number : 2014285634
Date : 21st July 2017

ACKNOWLEDGEMENTS

In the name of Allah, the Most Gracious and the Most Merciful

Assalamualaikum and Alhamdulillah, all praise to Allah S.W.T The Supreme Lord of the Universe. Peace and blessing to Nabi Muhammad S.A.W., all prophets and their families. I praised to Allah S.W.T. for the strength and His blessings in completing my study. First of all, my deepest gratitude and appreciation to my dearest supervisor, Dr. Siti Nazrina Camalxaman who spend her time and efforts in guiding and advising from the beginning toward the end of my research journey. I am grateful to be undergraduate student under her supervision, with her encouragement, creative and comprehensive advice until this work come to existence.

Next, I would like to thank the Dean of the Faculty of Health Sciences, UiTM Puncak Alam for providing fund and necessitate laboratory facilities for this project completion. This study was partially funded by the Fundamental Research Grant Scheme (600-RMI/FRG 5/3 (28/2014). Not to forget my special thanks to the UiTM CARE Ethics Committee that approve this ethical study.

I would like to express my extreme sincere gratitude and appreciate to all the lecturers in Department of Medical Laboratory Technology, Faculty of Health Sciences who always share their immerse knowledge and advise throughout my study in UiTM Puncak Alam. Only God can reward you all with goodness. It is a great pleasure to acknowledge my deepest thanks and gratitude my co-supervisor Mr. Mohd Fahmi Matsuki as well as Dr. Nazri Che Dom from the Department of Environment Health for their kind endless help, generous advice and support during the study.

I am extremely grateful for my respected postgraduate students, Nurul Adilah Amrannudin and Nur Mayamin Hamsidi for their assistance, sharing knowledge's, guidance and advices throughout my project. My sincere thanks and appreciation goes to my final year project mate, Nor Fadhilah Mohd Adam and my fellow colleagues Nurlina Yasmin Zulkifli and Mario Joseph for their full cooperation, share ideas and knowledge and also camaraderie in helping each other.

Last but not least, I would like to thanks my parents, siblings and all family members for their support and encouragement through thick and thin of my study. Without their love and support, I will not be able to survive all the stress for complete this study successfully.

Lastly, for those who have not been mentioned but had given directly and indirectly contribution during this study, I would like to say thank you so much and may Allah always bless you all.

TABLE OF CONTENTS

TITLE PAGE	i
DECLARATION	ii
INTELLECTUAL PROPERTIES	iii
ACKNOWLEDGEMENTS	vi
TABLE OF CONTENTS	vii
LIST OF TABLES	xi
LIST OF FIGURES	xii
LIST OF SYMBOLS	xvii
LIST OF ABBREVIATIONS	xviii
ABSTRACT	xix
ABSTRAK	xx

CHAPTER 1

INTRODUCTION

1.1	Background of the study	1
1.2	Problem statement	4
1.3	Research objective	6
1.3.1	General objective	6
1.3.2	Specific objectives	6
1.4	Significance of the study	6

CHAPTER 2

LITERATURE REVIEW

2.1	Entomology of <i>Ae. albopictus</i>	8
2.1.1	Toxonomy Classification	8
2.1.2	Morphological characteristic of <i>Ae. albopictus</i>	11
2.1.2.1	General physical characteristics of <i>Ae. albopictus</i>	11
2.1.2.2	Specific physical characteristics of <i>Ae. albopictus</i>	12
2.1.2.3	Differentiate male and female	14
2.2	Life cycle of <i>Ae. albopictus</i>	16

ABSTRACT

GENETIC POLYMORPHISM OF CYTOCHROME OXIDASE SUBUNIT 1 (COI) GENE OF *Aedes albopictus* ISOLATED FROM ROYAL BELUM, PERAK

Aedes mosquitoes had contributed to the dengue fever all around the globe. But in Malaysia, there are two species of the *aedes* mosquitoes that dominated in transmitted the dengue fever namely *Ae. albopictus* and *Ae. aegypti* which are the major vector of dengue fever whether in urban or rural area. Dengue cases are difficult to diminish as the vaccine for dengue fever and dengue haemorrhagic fever are still in unavailable for practical use. Hence, determination of the population genetics structure of vector is important to understanding about vector distribution in help for control dengue programme. Studies examining the population genetics structure of *Ae. albopictus* from different environmental area based on mitochondrial DNA *COI* gene has not been clarified from other researcher. Therefore, this study was conducted to evaluate the genetic polymorphism among *Ae. albopictus* from Royal Belum, Perak, as a representative for population from forested. The genomic DNA of three individual adult female *Ae. albopictus* mosquitoes and three USM laboratory strains (USM LS) were extracted and amplified with three different set of primers *COI* marker. The PCR product then been concatenated for obtaining the longest single fragment of *COI* genes. BLAST analysis showed high similarities with reference sequences from NCBI GenBank. Consequently, all concatenated sequences were aligned using ClustalX2.1. Genetic diversity and haplotypes generated were analyzed using DnaSP. Haplotype network was constructed in PopART software according to TCS network. Our findings revealed that *Ae. albopictus* population from urban areas has higher genetic variation than forested and urban areas, with Hd values is 1.000. Furthermore, haplotype network of urban areas (H10-H13) shows the highest number of hatch mark's line. The data obtained from this study can be used to plan and introduce more reliable and effective methods in controlling the expanding of the *Aedes* mosquito population especially *Ae. albopictus*.

Keywords: *Aedes albopictus*, Malaysia, *COI*, genetic diversity, haplotype network.