

GENETICS OF *Anopheles paraliae*

KRITSANA TAAI



**DOCTOR OF PHILOSOPHY
IN PARASITOLOGY**

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

**GRADUATE SCHOOL
CHIANG MAI UNIVERSITY
NOVEMBER 2014**

GENETICS OF *Anopheles paraliae*

KRITSANA TAAI

**A THESIS SUBMITTED TO CHIANG MAI UNIVERSITY IN PARTIAL
FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY
IN PARASITOLOGY**

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

**GRADUATE SCHOOL, CHIANG MAI UNIVERSITY
NOVEMBER 2014**

GENETICS OF *Anopheles paraliae*

KRITSANA TAAI

THIS THESIS HAS BEEN APPROVED TO BE A PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY
IN PARASITOLOGY

Examination Committee:

Sorawat Thongsahuan.....Chairman

(Dr. Sorawat Thongsahuan)

Atiporn Saeung.....Member

(Dr. Atiporn Saeung)

U. Chith.....Member

(Assoc. Prof. Dr. Udom Chaithong)

Pongsri Tippawangkosol.....Member

(Assoc. Prof. Dr. Pongsri Tippawangkosol)

Narissara Jariyapan.....Member

(Assoc. Prof. Dr. Narissara Jariyapan)

Anuluck Junkum.....Member

(Asst. Prof. Dr. Anuluck Junkum)

Advisory Committee:

Atiporn Saeung.....Advisor

(Dr. Atiporn Saeung)

U. Chith.....Co-advisor

(Assoc. Prof. Dr. Udom Chaithong)

Pongsri Tippawangkosol.....Co-advisor

(Assoc. Prof. Dr. Pongsri Tippawangkosol)

Narissara Jariyapan.....Co-advisor

(Assoc. Prof. Dr. Narissara Jariyapan)

Anuluck Junkum.....Co-advisor

(Asst. Prof. Dr. Anuluck Junkum)

20 November 2014

Copyright © by Chiang Mai University

I would like to dedicate this thesis and express my deepest gratitude to the late Professor Dr. Wej Choochote, for his excellent instruction, constant encouragement and support, which enabled me to complete this thesis.



ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved

ACKNOWLEDGEMENT

I am deeply indebted to my advisors, Professor Dr. Wej Choochote and Dr. Atiporn Seaug of the Department of Parasitology, Faculty of Medicine, Chiang Mai University, Thailand, for their ideas on initiating my research, excellent instruction, guidance, constructive criticism, constant encouragement, patience and most importantly, the opportunity to study both in Chiang Mai and the UK. Their understanding during various stages of this study enabled me to complete my research.

I would like to express my sincere gratitude to my co-advisors: Associate Professor Dr. Udom Chaithong, Associate Professor Dr. Pongsri Tippawangkosol, Associate Professor Dr. Narissara Jariyapan and Assistant Professor Dr. Anuluck Junkum of the Department of Parasitology, Faculty of Medicine, Chiang Mai University, for their supervision, encouragement, guidance, criticism, helpful, invaluable comments and suggestions for this thesis.

I would like to express deep thanks to my international supervisor, Dr. Ralph E. Harbach of the Department of Life Science, Natural History Museum, UK, for providing me with the precious opportunity of researching with him, and for his patience, generous and emotional support, and warm hospitality. Thanks also go to my colleagues at the Department of Life Science, Natural History Museum, UK, for their kindness, friendship, and making me feel at home, while I was in London. I would also like to thank Associate Professor Dr. Yasushi Otsuka of the Research Center for the Pacific Islands, Kagoshima University, Japan, for his kindness and valuable guidance on molecular genetics study in my research.

I greatly appreciate Dr. Sorawat Thongsahuan of the Faculty of Veterinary Science, Prince of Songkla University, Songkhla, Thailand, for being my examiner and giving his valuable suggestions, and comments that strengthened my thesis.

I would like to acknowledge the Thailand Research Fund through the Royal Golden Jubilee Ph.D. Scholarship (Grant No. PHD/0297/2551), and Faculty of Medicine Research Fund, Chiang Mai University, for their financial support throughout my graduate study.

I would like to thank the instructors at the Department of Parasitology, Faculty of Medicine, Chiang Mai University, for providing me with basic and advanced Parasitology knowledge, and also facilitating my research work. Unforgettably, I would like to thank all my friends at the mosquito laboratory and Department of Parasitology for their friendship, help, encouragement and joyful moments during my graduate study.

Finally, I would like to express my heart-felt gratitude to my hard-working parents and lovely sister for their unwavering love, patience, understanding, and support throughout my life.

Kritsana Taai



ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
Copyright© by Chiang Mai University
All rights reserved