

PARASITES OF FRESHWATER EEL, *Monopterus albus*
ZUIEW 1793 IN PENINSULAR MALAYSIA AND
PATHOLOGICAL CHANGES ASSOCIATED
WITH *Trypanosoma* INFECTION

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MASTER OF SCIENCE
UNIVERSITI MALAYSIA TERENGGANU

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Parasites of freshwater eel, *monopterus albus* zuiew 1793 in Peninsular Malaysia and pathological changes associated with trypanosoma infection / Mohamad Zaim Md Desa.

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MOHAMAD ZAIM BIN MD DESA

**Thesis Submitted in Fulfillment of the Requirement for the
Degree of Master of Science in the Institute of Tropical Aquaculture
Universiti Malaysia Terengganu**

MARCH 2016

DEDICATION

This master thesis is the result of my graduation project which completes my Fish Health study at Universiti Malaysia Terengganu. The project was performed internally at the Institute of Tropical Aquaculture of Universiti Malaysia Terengganu. The project also concludes that the health status of freshwater eel has shown mild changes infected with the Trypanosomiasis.

This thesis would be incomplete without a mention of the support given me by my parents, Md Desa Bin Jusoh, Nora Binti Omar and Norsyakimah Binti Mat Saari to whom this thesis is dedicated. They taught me the importance of seeking knowledge from birth until today. They were guided and helped me indirectly, to face the joy and sorrow when I continue to learn at a higher level.

To my beloved Aishah Nur Hidayah Binti Abdullah, who always accompany me in the course of research and are willing to entertain my whims all the time. She never once complained even while attending to my attitude when I was depressed.

I also do not forget all my friends who have always been by my side to help me complete this thesis directly or not. For several semesters, we live together wade waves of the sea. These all were a valuable experience and sweet memories that I will never forget.

Abstract of thesis presented to the Senate of Universiti Malaysia Terengganu
in fulfillment of the requirement for the degree of Master of Science

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PENINSULAR MALAYSIA AND PATHOLOGICAL CHANGES
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MOHAMAD ZAIM BIN MD DESA

March 2016

Main Supervisor : Associate Professor Marina Hassan, Ph.D.

Co-supervisor : Associate Professor Safiah Jasmani, Ph.D.

Institute : Institute of Tropical Aquaculture

Due to the increasing demand for food protein, aquaculture has become a major sector of fish production industry. In Malaysia, the industry has a good potential to expand in the field of aquaculture and food processing based on the Asian market. In Asia, *Monopterus albus* has shown higher significance in commercial values. However, parasitic diseases can cause disturbances on the growth, development and reproduction in which it decreases the quality and value. Furthermore, there is lack of research regarding parasite infection on *M. albus* in Peninsular Malaysia especially on the infection of blood flagellate, *Trypanosoma* sp. which was transferred by blood sucking leech which acted as a vector. Firstly, the prevalence study of parasite infection is very important in order to examine the effect of parasite on the *M. albus*. Two hundred and three of *M. albus* were captured to examine the parasite prevalence and mean intensity. *Monopterus albus* was infected with two types of blood parasite, *Trypanosoma* sp. A and *Trypanosoma* sp. B, and larval stages of three types of helminth parasites, such as unidentified

nematoda sp. A, metacercariae of *Clinostomum* sp. and plerocercoid of *Senga* sp. Therefore, *M. albus* acted as a final host of *Trypanosoma* spp. which live extracellular of the blood and would effect the health status of *M. albus*. Secondly, the description of *Trypanosoma* spp. in *M. albus* is very important for further study because other species of trypanosoma which infected different hosts show a different pathogenicity effect. Hence, the *Trypanosoma* spp. descriptions were measured morphologically by using a compound microscope. There were two species based on morphological differences; *Trypanosoma* sp. A resembles *T. mukasai* and *Trypanosoma* sp. B resembles *T. colisi*. In this study the *Trypanosoma* spp. in *M. albus* serves as new locality and new host was recorded. Thus, the diagnosis of blood parameters and tissue changes caused by *Trypanosoma* spp. A infection is a prelude to understand whether it could change the cellular and biochemical constituents of blood and could cause high mortality. Thirdly, the effects of *Trypanosoma* spp. A infection on hematological and histopathological of *M. albus* were examined by using standard methodology in hematological and the histopathological of liver and kidney were observed by using a standard histology procedure in order to illustrate the tissue changes. The occurrence of normocytic normochromic anemia which the RBC is in normal size and contain the normal amount of Hb but there were reduction in PCV, RBC and Hb due to RBC destruction. However, WBC increased significantly due to the immune system of *M. albus* was reacting against the *Trypanosoma* spp. A. observation in the tissues showed hydropic degeneration which is considered as mild degeneration of hepatocyte and tubule. Zero mortality occurred in *M. albus* infected with *Trypanosoma* spp. A may be explained

that *M. albus* may have the ability to preserve and conserve the structural and functional capacity of the RBC membrane to varying degrees of parasitic infection and mild changes of the liver and kidney tissues. These are the evident that the *Trypanosoma* spp. A infection in *M. albus* was mildly pathogenic.

RESEARCHER'S NAME: [Faint text]
 Date: 2015

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Abstrak tesis yang dikemukakan kepada Senat Universiti Malaysia Terengganu sebagai syarat memenuhi keperluan Ijazah Master Sains

PARASIT BELUT SAWAH, *Monopterus albus* Zuiew 1793 DI SEMENANJUNG MALAYSIA SERTA PERUBAHAN PATOLOGI YANG BERKAIT DENGAN JANGKITAN *Trypanosoma*

MOHAMAD ZAIM BIN MD DESA

March 2016

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Institut : Institut Akuakultur Tropika

Peningkatan permintaan makanan berprotein, telah menjadikan akuakultur sebagai sektor utama industri pengeluaran ikan. Di Malaysia, industri ini mempunyai potensi yang baik untuk berkembang dalam bidang akuakultur dan pemprosesan makanan berdasarkan pasaran Asia. Di Asia, *Monopterus albus* mempunyai nilai komersial yang ketara lebih tinggi. Walaubagaimanapun, parasit yang membawa penyakit akan menyebabkan gangguan kepada pertumbuhan, pembangunan dan pembiakan di mana ia akan mengurangkan kualiti dan nilai. Tambahan pula, terdapat kekurangan penyelidikan mengenai jangkitan parasit pada *M. albus* di Semenanjung Malaysia terutama mengenai jangkitan flagelat darah, *Trypanosoma* sp. yang telah dijangkiti oleh lintah penghisap darah yang bertindak sebagai vektor. Pertama, kajian kelaziman jangkitan parasit adalah sangat penting bagi mengkaji kesan parasit pada *M. albus*. Dua ratus tiga ekor *M. albus* ditangkap bagi memeriksa kelaziman parasit dan purata intensiti dengan

menggunakan piawai pemeriksaan parasit. *Monopterus albus* telah dijangkiti oleh dua jenis parasit darah, *Trypanosoma* sp. A dan *Trypanosoma* sp. B, tiga jenis parasit cacing di peringkat larva, seperti nematoda sp. A yang tidak dikenalpasti, metacercariae daripada *Clinostomum* sp. dan plerocercoid daripada *Senga* sp. Maka, *M. albus* bertindak sebagai perumah terakhir bagi *Trypanosoma* spp. yang hidup di luar sel darah dan akan memberi kesan pada status kesihatan *M. albus*. Kedua, perihal *Trypanosoma* spp. dalam *M. albus* adalah sangat penting untuk kajian lanjut kerana spesies lain trypanosoma yang dijangkiti dalam perumah yang berbeza telah menunjukkan kesan kepatogenan yang berbeza. Oleh itu, gambaran *Trypanosoma* spp. perlu diukur secara morfologi dengan menggunakan mikroskop majmuk. Terdapat dua spesies berdasarkan morfologi yang berbeza; *Trypanosoma* sp. A adalah menyerupai *T. mukasai* dan *Trypanosoma* sp. B adalah menyerupai *T. colisi*. Dalam kajian ini *Trypanosoma* spp. di dalam *M. albus* merupakan penemuan baru di kawasan baru dan rekod perumah baru. Oleh itu, diagnosis parameter darah dan perubahan tisu disebabkan oleh jangkitan *Trypanosoma* spp. A merupakan permulaan bagi memahami di mana ia boleh mengubah jujuk sel dan biokimia darah dan boleh menyebabkan kematian yang tinggi. Ketiga, kesan jangkitan *Trypanosoma* spp. A pada hematologi dan histopatologi *M. albus* telah diperiksa dengan menggunakan kaedah piawai dalam hematologi dan pemerhatian histopatologi hati dan buah pinggang dengan menggunakan prosedur histologi piawai untuk menggambarkan perubahan tisu. Anemia normocytic normochromic di mana RBC adalah dalam saiz normal dan mengandungi jumlah biasa Hb tetapi

masih berlakunya penurunan dalam PCV, RBC dan Hb kerana kemusnahan RBC. Walau bagaimanapun, WBC telah meningkat dengan ketara disebabkan oleh sistem imun *M. albus* yang melawan terhadap *Trypanosoma* spp. A. dan bagi pemerhatian tisu terdapat degenerasi busung yang dianggap sebagai degenerasi ringan hepatosit dan tubul. Memandangkan tiada kejadian kematian *M. albus* yang dijangkiti *Trypanosoma* spp. A dan ini adalah mungkin bahawa *M. albus* mempunyai keupayaan untuk memelihara dan memulihara kapasiti struktur dan fungsi membran RBC untuk pelbagai peringkat jangkitan parasit dan perubahan ringan tisu hati dan buah pinggang yang menjadi bukti bahawa jangkitan *Trypanosoma* spp. A di *M. albus* adalah patogenik yang ringan.