



UNIVERSITI PUTRA MALAYSIA

**SOME ASPECTS OF THE BIOLOGY OF *LERNAEA GONIONOTI*
SP.NOV. (CRUSTACEA: COPEPODA) AND *L. CYPRINACEA*
LINNAEUS IN *PUNTIUS GONIONOTUS* (BLEEKER)**

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IN *PUNTIUS GONIONOTUS* (BLEEKER)**

by

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Thesis Submitted in Fulfillment of the
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To

My Wife Sunitha

and

Son Charitha



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LIST OF ABBREVIATIONS

cm	=	centimetre
dl	=	decilitre
EGC	=	Eosinophilic Granular Cell
ESR	=	Erythrocyte Sedimentation Rate
fl	=	femtolitre
h	=	hour/s
H & E	=	Haematoxylin and Eosin
kg	=	kilogramme
l	=	litre
MCH	=	Mean Cell Haemoglobin
MCHC	=	Mean Cell Haemoglobin Concentration
MCV	=	Mean Cell Volume
ml	=	millilitre
mm	=	millimetre
nm	=	nanometre
PCV	=	Packed Cell Volume
pg	=	picogramme
SL	=	standard length
TSP	=	Total Serum Protein



Abstract of thesis submitted to the Senate of Universiti
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Faculty : Fisheries and Marine Science

Lernaea is among the most important crustacean parasites of freshwater fish which poses a serious threat to Malaysian aquaculture. An outbreak of lernaeciosis occurred in a manmade lake in the Shah Alam recreational park in Selangor Darul Ehsan, West Malaysia during early 1991 and caused severe mortalities of Javanese carp (*Puntius gonionotus*), locally known as Lampam Jawa. The parasite involved was identified as a new lernaecid species specific to *P. gonionotus* and named as *Lernaea gonionoti* sp. nov. It was found that *L. gonionoti* sp. nov. can be differentiated from other known Malaysian lernaecid parasites during their early life, using certain larval morphometrics, especially the body length. However, on *P.*



gonionotus, *L. cyprinacea* and *L. gonionoti* sp. nov. have a similar duration for their early life stages.

The host site preference studies indicated that *L. gonionoti* sp. nov. prefers the base of the anal fin and the caudle peduncle of *P. gonionotus* for attachment. The parasite prefers the area beginning from the anterior ventral region and extending posteriorly towards the mid lateral region of the caudal peduncle. During a 67 day infection dynamics experiment, it was noted that, when the prevalence of parasitism was 100% and the mean intensity of the infection was more than 20 parasites/fish, after reaching the maximum intensity, the infection declines gradually until almost no parasites are found on the host. In contrast, when the intensity of infection is low (<3 parasites/fish) the host parasites interaction is different and both the intensity and prevalence periodically fluctuates without reaching a maximal or a minimal. Possible reasons for the observed site preference and infection dynamics are discussed.

Puntius gonionotus appeared to be incapable of mounting an effective immune response to *L. gonionoti* sp. nov. infection regardless of whether the fish had recovered from an initial infection or been injected with plasma from



recovered fish. Histopathological and haematological observations confirmed that *L. gonionoti* sp. nov. cause only a mild inflammatory response compared to that of *L. cyprinacea*. *Lernaea gonionoti* sp. nov. was found to lodge in the superficial dermal layers while *L. cyprinacea* penetrates deep down into the musculature of *P. gonionotus*. The pathology caused by *L. gonionoti* sp. nov was inadequate to induce substantial physiological changes in *P. gonionotus*, thus the blood picture of the fish remained unchanged during the infection.



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Beberapa aspek biologi *Lernaea gonionoti* sp. nov.
(Krustasea : Kopepoda) dan *L. cyprinacea* Linnaeus dalam
Puntius gonionotus (Bleeker).

Oleh

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Januari 1993

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Lernaea adalah di antara parasit krustasea yang paling penting dalam ikan air tawar yang menyebabkan ancaman serius kepada akuakultur di Malaysia. Satu jangkitan lernaea berlaku di sebuah tasik buatan taman rekreasi Shah Alam, Selangor Darul Ehsan, Malaysia Barat pada awal tahun 1991 dan menyebabkan beberapa kematian ikan Lampam Jawa (*Puntius gonionotus*). Parasit tersebut dikenali sebagai spesies lernaeid baru, yang khusus terhadap *P. gonionotus* dan dinamakan *Lernaea gonionoti* sp. nov. Didapati bahawa *L. gonionoti* sp. nov. boleh dibezakan dari lain-lain parasit *Lernaea* yang dikenali di Malaysia semasa kitaran awal hidup dengan menggunakan beberapa morfometrik larva, terutama panjang badan. Bagaimanapun, *L. cyprinacea* dan *L. gonionoti* sp. nov. mempunyai jangkamasa yang sama bagi peringkat awal hidup pada *P. gonionotus*.



Kajian pemilihan kawasan jangkitan terhadap perumah menunjukkan bahawa *L. gonionoti* memilih kawasan dasar sirip anal dan pedunkel kauda *P. gonionotus* untuk pelekatan. Parasit ini memilih kawasa dan berlanjutan secara posterior ke arah pertengahan kawasan lateral pedunkel kauda. Ketika eksperimen dinamik jangkitan 67 hari, dicatatkan bahawa semasa prevalens parasit adalah 100% dan min intensiti jangkitan adalah lebih dari 20 parasit/ikan, setelah mencapai intensiti maksimum, jangkitan menjadi kurang secara beransur-ansur sehingga hampir tiada parasit didapati pada hos. Sebaliknya, apabila intensiti jangkitan adalah rendah (<3 parasit/ikan) interaksi hos parasit adalah berbeza dan kedua-dua intensiti dan prevalens turun naik secara berperingkat tanpa mencapai satu tahap maksimum atau minimum. Sebab-sebab kemungkinan kawasan yang diutamakan dan dinamik jangkitan telah dibincangkan.

Puntius gonionotus didapati tidak boleh menghasilkan imun yang berkesan terhadap jangkitan *L. gonionoti* sp. nov. tanpa mengira samada ikan tersebut telah pulih dari jangkitan pertama atau telah disuntik dengan plasma dari ikan yang telah pulih. Pemerhatian histopatologi dan hematologi mengesahkan bahawa *L. gonionoti* sp. nov. hanya menyebabkan kesan pendarahan ringan berbanding dengan *L.*



cyprinacea. *Lernaea gonionoti* sp. nov. telah dijumpai di lapisan superfisial dermal manakala *L. cyprinacea* menembusi jauh ke dalam hingga ke otot *P. gonionotus*. Patologi yang disebabkan oleh *L. gonionoti* sp. nov. adalah tidak memadai untuk mempengaruhi perubahan fisiologi yang berkesan dalam *P. gonionotus*, dengan itu gambaran darah ikan kekal, tidak berubah semasa jangkitan.



CHAPTER I

GENERAL INTRODUCTION

Background

Malaysia ranks among the highest fish consuming nations in the world. Fish are the main source of protein for Malaysians, having an annual per capita consumption over 40 kg (Shariff and Subasinghe, 1990). The need for the development of aquaculture has been emphasised during the last two decades, as a response to the increasing demand for fish to compensate for the population growth and declining fish catches from natural resources. The Government of Malaysia presently promotes the expansion of aquaculture to meet the growing demand for fish.

The commonly cultured freshwater fish in Malaysia include: common carp, *Cyprinus carpio* Linnaeus; bighead carp, *Aristichthys nobilis* (Richardson); Javanese carp, *Puntius gonionotus* (Bleeker); walking catfish, *Clarias batrachus* (Linnaeus); snake skin gourami, *Tricogaster pectoralis* (Regan); grass carp, *Ctenopharyngodon idellus* (Valenciennes); silver carp, *Hypophthalmichthys molitrix* (Cuvier and Valenciennes); tilapia, *Oreochromis niloticus*

