UNIVERSITI PUTRA MALAYSIA

ECTO-AND ENDO-PARASITES IN RODENTS AND SHREWS FROM FOUR HABITATS IN SELANGOR AND NEGERI SEMBILAN, MALAYSIA

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MASTERS OF SCIENCE
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ECTO- AND ENDO-PARASITES IN RODENTS AND SHREWS FROM FOUR HABITATS IN SELANGOR AND NEGERI SEMBILAN, MALAYSIA

By

PARAMASVARAN SITHAMBARAM

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirements for the Degree of Masters of Science

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Abstract of thesis submitted to the Senate of Universiti Putra Malaysia in fulfilment of the requirements for the degree of Masters of Science.

ECTO- AND ENDO-PARASITES IN RODENTS AND SHREWS FROM FOUR HABITATS IN SELANGOR AND NEGERI SEMBILAN, MALAYSIA

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Jan 2009

Chairman : Associate Professor Dr. Rehana Abdullah Sani, D.V.M., Ph.D.

Faculty : Veterinary Medicine

The objectives of this study were to determine the rodent host species, to identify the parasites they harbor and to record those parasites that are of zoonotic importance. A total of 204 rodents were examined from four selected habitats in the states of Selangor and Negeri Sembilan, Malaysia. The rodents were captured alive from five urban sites in Kuala Lumpur, rice fields in Tanjung Karang, a coastal area in Port Dickson and a Primary Forest Reserve in Gombak, Selangor. Standard laboratory parasitological and statistical analyses were used. Fourteen different rodent species belonging to three different mammalian groups were identified. *Rattus rattus diardii* was the predominant rodent species (67%) trapped and examined. The study revealed 53.9 % of the rodents examined had at least one species of helminth. A total of 21 helminth species (7 cestodes, 12 nematodes, 1 trematode and 1 acanthocephala) were recovered. *Gongylonema neoplasticum*, *Nippostrongylus braziliensis*, *Hepatojarkus malayae*, *Heterakis supomosa*, *Capillaria hepatica*,

Raillietina sp. *Hymenolepis nana*, *H.diminuta*, *Hymenolepis* sp. and *Taenia taeniaeformis* were the predominant helminth species identified. The helminths of zoonotic importance: *Capillaria hepatica*, *Rictularia tani*, *Angiostrongylus* sp., *Taenia taeniaeformis*, *Hymenolepis nana, H. diminuta, Raillietina* sp, *Moniliformis dubius*, *Armillifer moniliformis* were also found. *Trypanosoma* sp. was the only blood parasite found in the 204 rodents examined. Fourty seven percent of the rodents were found to be infested with at least one of the 20 species of ecto-parasites recovered. The common ecto-parasites recovered were *Laelaps nuttali*, *L. echidnanus*, *L. sculpturata*, *Polyplax spinulosa*, *Hoplopleura pacifica*, *Ixodes granulatus, Dermacentor* sp. and *Haemaphysalis* sp. The ecto-parasites that are of human medical importance are *Laelaps* sp., *Gahrlepia* sp., *Walchiella* sp., *Ornthonyssus bacoti, Haemaphysalis* sp., *Dermacentor* sp., *Ambloyomma* sp. and *Ixodes* sp. and *Xenopsylla cheopis.* A total of 147 ecto-parasites (ticks, n=15, fleas, n= 31, lice, n=30 and mites, n=71) were recovered from the rodents. *Rattus rattus diardii* was found to harbour a wide range of ecto and endo-parasites some of which have been identified as zoonotic. There was no significant relationship between the sex of rodents and parasitic infestion. However, significant association was seen between ecto and endo-parasitic infection and habitats. Rodents from the urban habitats comparatively were found to harbour a wider range of parasites, some of which are of human medical importance.

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Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia, sebagai memenuhi keperluan untuk ijazah Sarjana Sains

EKTO DAN ENDOPARASIT RODENSIA DAN TUPAI DARI EMPAT HABITAT DI SELANGOR DAN NEGERI SEMBILAN, MALAYSIA

Oleh

PARAMASVARAN SITHAMBARAM

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Objektif kajian ini adalah untuk menentukan spesis rodensia perumah dan parasit yang dibawa olehnya dan seterusnya mengenalpasti parasit yang berkepentingan zoonotik. Sejumlah 204 rodensia dari empat habitat berlainan yang terpilih di Selangor dan Negeri Sembilan telah diperiksa. Rodensia ini telah ditangkap hidup dari lima lokasi bandar di sekitar Kuala Lumpur, sawah padi di Tanjung Karang, persisiran pantai di Port Dickson dan di Hutan Simpan Primer di Gombak, Selangor. Analisis makmal dikendalikan mengikut prosidur kajian parasitologi dan program statistik yang piawai. Empat belas spesis rodensia yang berlainan dari tiga kumpulan mamalia yang berbeza telah dikenalpasti. *Rattus rattus diardii* adalah spesis rodensia yang paling banyak diperangkap dan diperiksa (67%). Kajian ini mendapati 53.9% rodensia yang diperiksa dijangkiti oleh sekurang-kurangnya satu spesis helmin. Sejumlah 21 spesis helmin (7 sestod, 12 nematod, 1 trematod dan 1 akantosefala) telah ditemui. *Gongylonema neoplasticum*, *Nippostrongylus braziliensis*, *Hepatojarkus malayae*, *Heterakis spumosa*, *Capillaria hepatica*, *Raillietina* sp. *Hymenolepis nana*, *H. diminuta*, *Hymenolepis* sp. dan *Taenia taeniaeformis adalah*

spesis helmin yang paling dominan. Helmin yang penting dari segi perubatan: *Capillaria hepatica*, *Rictularia tani*, *Angiostrongylus* sp., *Taenia taeniaeformis*, *Hymenolepis nana, Hymenolepis diminuta, Taenia taniaeformis* juga ditemui. *Raillietina* sp, *Moniliformis dubius*, *Armillifer Moniliformis. Trypanosoma* sp. adalah satu-satunya parasit darah yang ditemui pada 204 rodensia yang diperiksa. Empat puluh tujuh peratus rodensia didapati diinfestasi oleh sekurang-kurangnya satu spesis dari 20 spesis ektoparasit yang ditemui. Ektoparasit akari yang paling banyak ditemui adalah *Laelaps nuttali*, *L. echidnanus*, *L. sculpturata*, *Polyplax spinulosa*, *Hoplopleura pacifica*, *Ixodes granulatus* and *Dermacentor* sp. dan *Haemaphysalis* sp. Ektoparasit yang penting dari sudut perubatan pula adalah *Laelaps* sp., *Gahrlepia* sp., *Walchiella* sp., *Ornthonyssus bacoti, Haemaphysalis* sp., *Dermacentor* sp., *Amblyomma* sp. and *Ixodes* sp. dan *Xenopsylla cheopis. Rattus rattus diardii* didapati membawa pelbagai ekto dan endoparasit, sesetengahnya zoonotik. Analisis statistik tidak menunjukkan hubungan yang berkeertian di antara jantina rodensia dan infestasi ekto dan endoparasit tetapi hubungan berkeertian didapati diantara habitat dan infestasi parasit. Rodensia dari habitat bandar didapati dijangkiti oleh pelbagai jenis species ekto dan endoparasit yang sebahagiannya adalah zoonotik berbanding dengan habitat lain.

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I certify that a Thesis Examination Committee has met on 11th November 2008 to conduct the final examination of Paramasvaran s/o Sithambaram on his thesis entitled "Ecto and Endo-Parasites In Rodents From Four Habitats In The States Of Selangor And Negeri Sembilan" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia (P.U.A. (A) 106) 15 March 1998.The Committee recommends that the student be awarded the Masters of Science degree.

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DECLARATION

I hereby declare that the thesis is based on my original work except for quotations and citations which have been duly acknowledged. I also declare that it has not been previously or concurrently submitted for any other degree at Universiti Putra Malaysia or at any other institution.

PARAMASVARAN S/O SITHAMBARAM

Date: 12th FEB. 2009

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cm	Centimeter
gm	Gram
kg	Kilogram
km	Kilometer
mL	Millilitre
mm	Millimeter

CHAPTER 1

GENERAL INTRODUCTION

Rodents are a key mammalian group and found in many environments throughout the world. They constitute more than 42% of the known mammalian species (Singleton, *et al*., 2003). Rodents are a major agricultural, urban and social pest across many of the developed and developing world. In Asia alone the amount of grain eaten by rodents in the rice fields each year would provide enough to feed 200 million Asians for a year (Singleton, *et al*., 2003). Many of these rodent species are also reservoirs of organisms that cause debilitating diseases in human and livestock (Singleton, *et al*., 2003). Nearly four million rats are born every day in the developing nations and they are known to spread worldwide more than 60 diseases that can infect humans (Lye Hinds, 2003). Rodent-borne diseases are spread directly to humans through bite wounds, consuming food and water contaminated with rodent faeces and urine. Diseases from rodents are also spread indirectly to humans by way of ticks, mites and fleas (Nadchatram *et al*. 1967; Salleh *et al*., 2003).

The epidemiology of many of the rodent-borne diseases in Asia and in particular Malaysia is poorly understood. For instance little is known about which species of rodents are the major reservoirs of diseases and how long does the infective stages of helminths and protozoa which originates from rodents persists in domestic and rural environments and how these agents are transmitted under natural conditions.

There is a rising concern that rodents may pose health risk to humans because of the increased movement of people between rural and urban areas and between

countries. The increased clearance of natural habitats for development further promotes rodent-human contact thus providing an ideal situation for disease transmission. The opening up of mountainous region for agricultural activities in north-eastern Tanzania brought about rodent-human interaction and the spread of plague (Makundi, *et al*., 2003).

The aim of this study is to determine the prevalence of ecto and endo-parasitic infections in rodents found in four distinct habitats (urban, rice field, coastal and forest) in the states of Selangor and Negeri Sembilan in Peninsular Malaysia to assess the potential risk of diseases that are harmful to man and domestic animals.

The four habitats were selected for their unique ecological settings. The rice field (agriculture) urban sites represent habitats in which rodents tend to live in close proximity to human activities. The coastal site of Port Dickson was selected for its popularity for picnics, camping and other water sports recreational activities which generates food waste that attracts rodents to this habitat. This closeness provides ample opportunity for rodent to contaminate the environment thus facilitating transmission of zoonotic pathogens and parasites to humans directly or indirectly via their arthropods.

The Gombak forest reserve site was chosen for its close proximity to an Orang Asli village where the increased frequency of human activities into this forest for hunting, illegal logging and other illegal activities could have disturbed the natural habitat of the wild rodents. This study will reveal whether there has been any marked changes in the forest rodent population and their parasite diversity due to

the pressure of human activities. The information obtained from this study can also be used to asses the risk of zoonotic parasite transmission to humans and animals and also to facilitate future efforts in protecting the integrity of the primary forest's unique ecosystem and animal diversity.

The specific objectives of the study are to:

1) To determine the species of rodents found in four different habitats.

2) To identify the ecto and endo-parasites from the caught rodents and to determine the parasite species distribution.

3) To determine the blood parasites in the rodents.

Comment [P1]: deleted

These objectives will be addressed using the following hypothesis:

1) Rodent species diversity is dependent on habitat.
2) Ecto and endo-parasites found in the rodents is influenced by the location where the rodent host habituate.

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