

## Helminth infections in small mammals from Ulu Gombak Forest Reserve and the risk to human health

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**Abstract.** A survey for small mammal parasites carried out in a secondary forest of Ulu Gombak, Selangor, Peninsula Malaysia yielded the following animals: *Rattus bowersi* (7), *Rattus tiomanicus jalorensis* (2), *Maxomys rajah* (12), *Maxomys whiteheadi* (3), *Leopoldamys sabanus* (13), *Sundamys muelleri* (10), *Lariscus insignis* (1), *Sundasciurus tenuis* (1) and *Tupaia glis* (2). The following nematodes: *Capillaria hepatica*, *Hepatojarakus malayae*, *Trichostrongylus* sp. and *Streptopharagus* sp., the following cestodes: *Hymenolepis* sp., *Raillietina* sp. and *Taenia taeniaformis*; and trematode, *Zonorchis* sp. from *Tupaia glis* were recovered. No parasites were observed during blood examination. No endoparasite was seen in *Maxomys whiteheadi*, *Lariscus insignis* and *Sundasciurus tenuis*. The following parasites, *Capillaria hepatica*, *Hymenolepis* sp., *Raillietina* sp. and *Taenia taeniaformis* are considered of medical importance.

### INTRODUCTION

Rodents are a key mammalian group, and are highly successful in many environments throughout the world. They are known to transmit diseases and act as reservoir host for many zoonotic pathogens that pose a health risk to humans and animals. When a rodent disease outbreak takes place, there is always high morbidity and mortality. Sylvatic species of rodents, some of which act as reservoirs of pathogenic organisms pass it onto man and animals when they intrude into their territory. Human activities that disturb the ecosystem of these rodent habitats play an important role in the epidemiology of certain zoonotic diseases. Man made activities such as establishment of land development

schemes, highways, reservoir development projects, dam development and construction of industries on ecosystems where pathogens form part of the biotic community tend to disturb the natural foci and promote new foci of the diseases (Ambu, 1996).

Endoparasites of rodents play an important role in the zoonotic cycles of many diseases, some of which are more important than others, eg. schistosomiasis and angiostrongylosis. Several studies on endoparasites of commensal and forest rodents have been carried out in Malaysia (Mulkit & Cheong, 1971; Yap *et al.*, 1977; Leong *et al.*, 1979; Krishnasamy *et al.*, 1980; Inder Singh *et al.*, 1987; Ambu *et al.*, 1996).

In the present study, efforts were made to survey rodents and their endoparasites in the secondary forest of Ulu Gombak,

Selangor. The Ulu Gombak rain forest is situated about 24 km north of Kuala Lumpur. To date no study of small mammal parasites have been conducted from this locality. Thus the opportunity is taken to publish a preliminary account of parasites from there.

## MATERIALS AND METHODS

Trapping was carried out for eight continuous weeks between June and September 2005 using 100 live traps. Fruits, coconut, dried fish and sweet potato were used as baits. The trapped animals were collected each morning and brought to the laboratory. The rodents were killed by dropping them into a cotton bag with cotton wool soaked in chloroform. The animals were dissected and helminths were recovered from various organs of the animals. The helminths were fixed, counted and preserved in 70% glycerine alcohol for identification. Nematodes were cleared in lactophenol for examination under a microscope. Cestodes and trematodes were stained in Mayer's paracarmine, dehydrated in ethanol, cleared in methyl salicylate and mounted in permount.

Blood from heart puncture was collected into EDTA tubes. Thin and thick blood films were made and the thin films were fixed in methanol and both types were stained in giemsa stain for subsequent microscopical examination.

## RESULTS

A total of 51 small mammals (43 adults and 8 juvenile) comprising of 8 rodent species *Leopoldamys sabanus*, *Maxomys rajah*, *Sundamys mullerri*, *Rattus bowersi*, *Rattus tiomanicus jalorensis*, *Maxomys whiteheadi*, *Lariscus insignis*, *Sundasciurus tenuis* and a primate *Tupaia glis* were collected and examined from the site (Table 1).

A total of twenty one rodents (11 males and 10 females) were infected with helminths thus giving an overall infection rate of 41%. The infection rates in males was 44% and females 38%. Eight species of helminths were identified from all the infected rodents. The helminths were recovered from the liver and small intestine only. Four species of nematodes *Capillaria hepatica*, *Hepatojarakus malayae*, *Trichostrongylus* sp. and *Streptophagus* sp. were identified. Three

Table 1. Prevalence of helminths of rodents trapped in Ulu Gombak Forest Reserve, Selangor, Peninsula Malaysia.

Species of rodents identified	Number of rodents examined		Number of rodents infected with Nematodes	Number of rodents infected with Cestodes	Number of rodents infected with Trematode
	Males/	Females			
<i>Maxomys rajah</i>	12	6/6	3 (25%)	0	0
<i>Sundamys muelleri</i>	10	6/4	8 (67%)	2 (3.9%)	0
<i>Rattus bowersi</i>	7	3/4	3 (43%)	0	0
<i>Leopoldamys sabanus</i>	13	5/7	6 (46%)	1 (1.9%)	0
<i>Rattus tiomianicus jalorensis</i>	2	1/1	0	1 (1.9%)	0
<i>Maxomys whiteheadi</i>	3	2/1	0	0	0
<i>Lariscus insignis</i>	1	1/0	0	0	0
<i>Sundasciurus tenuis</i>	1	0/1	0	0	0
<i>Tupaia glis</i>	2	2/0	0	0	1
Total	51	26/25	20 (39.2%)	4 (7.84%)	1 (1.9%)

species of cestodes identified were *Taenia taeniaformis* (larval stages) *Raillietina* sp. and *Hymenolepis* sp. Only one mammal *Tupaia glis* was infected with the trematode *Zonorchis* sp.

Blood Results. All the 51 thin and 51 thick blood stains examined were found to be negative for blood protozoa, microfilaria and trypanosomes.

## DISCUSSION

The predominant rodent species examined in this study were *L. sabanus* (13), *M. rajah* (12), *S. mullerri* (10) and *R. bowersi* (7). Among the 8 species of helminths identified only 4 species have been incriminated as zoonotic and of medical importance. They are *C. hepatica*, and the cestodes, *T. taeniaformis*, *Hymenolepis* sp. and *Raillietina* sp. The predominant species of helminths recovered in this study are *C. hepatica* and *H. malayae* and both were found in the liver. There was no major difference in the infection rate among the males and females

The first human infection of *C. hepatica* was in a soldier in India and to date twenty three cases have been reported (Sinniah *et al.*, 1979). The parasite can cause an acute or subacute hepatitis with marked eosinophilia and persistent fever. Hepatomegaly (which is non-specific on radiography or sonography) may develop, with eggs in the liver parenchyma inducing necrosis and abscess formation in humans.

Other helminths of potential medical importance include species of *Hymenolepis*, *Raillietina* and *T. taeniaformis*. *Hymenolepis nana* and *Hymenolepis diminuta* reported from rodents have been recovered from humans (Sinniah *et al.*, 1978). *Raillietina* (*Raillietina*) *celebensis*, a parasite of rodents and recovered from the large Bamboo rat (*Rhizomys sumatrensis*) from peninsular Malaysia is of zoonotic importance (Jeffery *et al.*, 1986/87). It has been found in

humans from several countries (Baer & Sanders, 1965)

There were no blood parasites from the mammals examined. This could be due to the small number of mammals (51) examined or it could have been missed during the examinations due to light infections. A similar blood parasite study conducted on small mammals in the forest fringes of Bukit Komondol in Selangor, Malaysia did not show any blood parasites either (Paramasvaran *et al.*, 2003). The traditional microscopical examination of whole blood and stained blood smears are not reliable for blood parasite studies of this nature. There is a need to employ other reliable and sensitive test such as the PCR to detect blood parasites in wild animal populations.

It was observed during the study that there has been an increase of human activities in the Ulu Gombak secondary forest. Dogs and cats were also seen in this area, its likely that these animals may pick up zoonotic parasites and introduce it to humans in the nearby villages. More studies should be conducted to evaluate the risk of zoonotic disease transmission to humans in this locality in view of the increased human encroachment into this region.

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