

Research Note

A preliminary survey of ectoparasites of small mammals in Kuala Selangor Nature Park

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Abstract. Trapping of small mammals was conducted at 5 study sites in Kuala Selangor Nature Park (KSNP) from 20-24 June 2005. A total of 11 animals comprising 2 species of rodents, *Maxomys whiteheadi* and *Rattus exulans* were caught from 3 sites, i.e from an area of mixed secondary forest and mangrove swamp; an area of mangrove swamp, and from an area of *lalang* fringing mangrove swamp. From these animals, the following 7 species of ectoparasites were found: *Laelaps echidninus*, *Laelaps nuttalli*, *Ascoschoengastia indica*, *Leptotrombidium deliense*, *Hoplopleura pectinata*, *Hoplopleura pacifica* and *Polyplax spinulosa*. One of the ectoparasites found, *L. deliense* is a known vector of scrub typhus and thus may pose potential health risks to visitors to KSNP.

Ecotourism is currently being promoted in Malaysia. One of those destinations is Kuala Selangor Nature Park (KSNP) that is located at the mouth of the Selangor River about 75 km north west of Kuala Lumpur. It is well known for its firefly colonies and for bird watching. There are a number of trails for nature lovers to explore. The ecology of KSNP comprises mangrove and secondary jungle or vegetation with many brackish lakes and ponds. KSNP regularly attracts large numbers of researchers, scientists and tourists.

Some ectoparasites of small mammals in Malaysia are of known public health importance. Currently no ectoparasite survey of small mammals had been conducted in KSNP. The aim of this study is thus to identify the ectoparasite present that is of known public health importance. It is also to determine whether there is any potential public health risk in the area.

Trapping was conducted from 20-24 June 2005 at 5 study sites in KSNP (Figure 1) i.e. sites 1 (S1) and 2 (S2) in secondary

jungle; site 3 (S3) in a mixed secondary jungle and mangrove swamp; site 4 (S4) in a mangrove swamp and site 5 (S5) in an area of *lalang* fringing mangrove swamp. A total of 160 traps were set per day for 5 days' trapping. The number of traps per site was as follows: 40 traps in S1; 30 traps in S2; 50 traps in S3; 20 traps in S4 and 20 traps in S5. Wire traps were baited either with bananas, sweet potatoes or oil palm fruits.

Trapped animals were placed in cloth bags and brought back to a laboratory in KSNP for further processing. Animals were anaesthetized and removed from the traps and cloth bag, and identified to species level. Each cloth bag was inverted over an enamel tray and its contents dislodged into the tray. The fur of each anaesthetized animal was combed with a fine toothed comb to dislodge any ectoparasite into the enamel tray. The contents of the tray were examined carefully with a hand lens and any ectoparasite seen was recovered using the

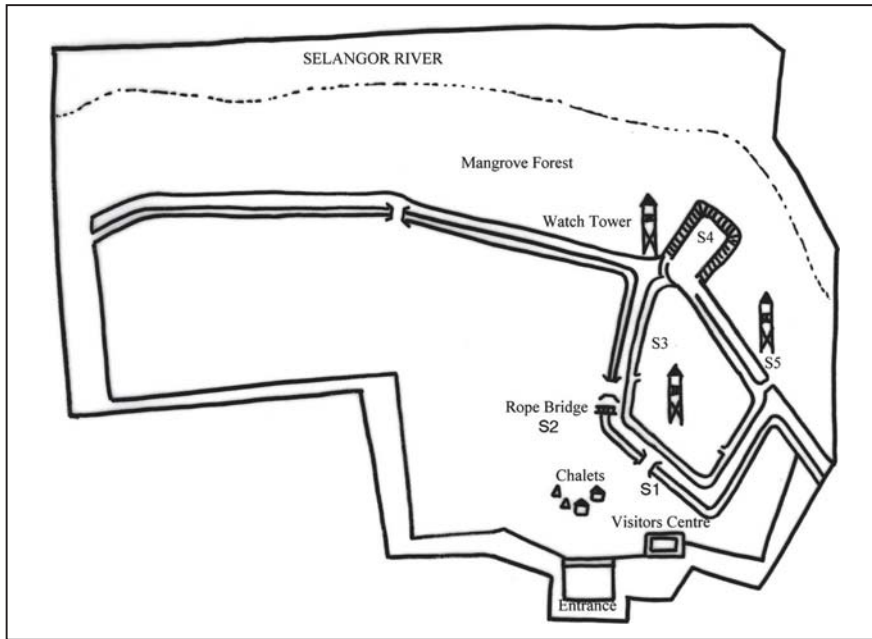


Figure 1. Locality map of Kuala Selangor Nature Park

moisten end of a sharpened wooden applicator stick and placed in a collection tube containing 70% ethanol. A separate tube was used for each animal. The animal was further examined under a dissecting microscope. Ectoparasites seen were removed using fine pointed forceps and placed in collection tubes containing 70% ethanol.

Mesostigmatid mites were removed from 70% ethanol and washed once with distilled water. They were next placed in lactophenol, a clearing agent, for up to 1 week at room temperature. Small punctures were made with a minute pin in the lateral edges of larger specimens to facilitate entry of lactophenol into the specimens. Cleared specimens were washed once in distilled and mounted using Hoyer's medium.

Individual chiggers (larval trombiculid mites) were removed from 70% ethanol and placed in a drop of Hoyer's mounting medium on a glass slide. A cover slip was placed over the specimen. The slide was then intermittently warmed over an open flame to facilitate clearing of the chigger. At the same time, occasional light pressure was exerted using a sharpened applicator

stick, on areas of the cover slip surrounding each specimen. Linstrophorid mites and lice were processed and mounted following the technique used for mesostigmatid mites. All mounted slides were incubated at 40°C for 1 week to harden the mounting medium. All mesostigmatid mites, chiggers and lice found were identified to species level where possible using available keys, published taxonomic drawings, and reference books. Linstrophorid mites were not identified beyond the family taxa as taxonomic keys were not available.

Trapping in KSNP yielded only rodents and no other mammals. A total of 11 rodents were caught (Table 1). No animal was caught in the secondary forest. Majority (73%) of the rodents were trapped in site 5, i.e. *lalang* fringing mangrove swamp. Only 2 species of rodents were found, i.e. *Maxomys whiteheadi* and *Rattus exulans*. Sixty-four percent of the rodents were *M. whiteheadi*.

Four groups of ectoparasites were recovered from the rodents caught. The ectoparasites are mesostigmatid mites, listrophorid mites, chiggers (larval trombiculid mites) and lice (Table 1).

Table 1. Ectoparasites found on rodents caught in Kuala Selangor Nature Park (20-24 June 2005)

Site	Habitat	Rodent species	Number caught	Presence of ectoparasites			
				Mesostigmatids	Listrophorids	Chiggers	Lice
1	Secondary forest	None	None	-	-	-	-
2	Secondary forest	None	None	-	-	-	-
3	Mixed secondary forest and mangrove swamp	<i>Maxomys whiteheadi</i>	1	Yes	No	Yes	Yes
		<i>Rattus exulans</i>	1	No	Yes	No	No
4	Mangrove swamp	<i>Maxomys whiteheadi</i>	1	Yes	No	No	No
5	Lalang fringing mangrove swamp	<i>Rattus exulans</i>	3	Yes	Yes	Yes	Yes
		<i>Maxomys whiteheadi</i>	5	Yes	Yes	No	No

These ectoparasites were recovered from both species of rodents although not from every individual rodent. The species and numbers of mesostigmatid mites found are listed in Table 2. These mites were found on 9 out of the 11 rodents caught and from 3 sites only. All *M. whiteheadi* and 50% of *R. exulans* caught in KSNP had mesostigmatid mites comprising of 2 species i.e. *Laelaps nuttalli* and *Laelaps echidninus*. Ninety three (93) percent of the mesostigmatid mites collected were *L. nuttalli*. Chiggers were found on 3 rodents from 2 sites only (Table 2). Chiggers were most abundant in S5. Only 2 species of chiggers were present, i.e. *Ascoshengastia indica* and *Leptotrombidium deliense*. Out of a total of 33 chiggers collected, 94% were *A. indica*.

A total of 44 listrophorid mites were collected from 7 rodents, i.e. 4 *M. whiteheadi* and 3 *Rattus exulans* (Table 2). Those rodents were caught from S3 and S5. Six of the 11 rodents trapped were infested with lice. Those rodents, *M. whiteheadi* and *R. exulans* were from S3 and S5 (Table 2). Three species of lice were recovered: *Hoplopleura pectinata*, *H. pacifica* and *Polypax spinulosa*. *H. pectinata* and *P. spinulosa* were found on *M. whiteheadi* only whereas *H. pacifica* was only infesting *R. exulans*. The most abundant was *H. pectinata* followed by *P. spinulosa*.

The number and species of small mammals captured in KSNP is very small compared to surveys in other parts of Selangor (Shabrina, 1991; Saleh *et al*, 2003). KSNP is reported to be home to many mammals including long tailed macaques (*Macaca fascicularis*), silver leaf monkeys (*Presbytis cristata*), as well as otters. One reason for the low catch of small mammals was the presence of monkeys that disturbed and triggered the wire traps used for the survey. Many localities in KSNP could not be surveyed due to the presence of those monkeys and their disturbing habits.

In the aspect of public health importance, only one of the ectoparasites found, *L. deliense* is a known vector of scrub typhus. Murine typhus is known to occur in Malaysia (Tay *et al*, 1999; 2000) however it is not known whether *L. echidninus*, which also present in the area is involved as a vector. *L. echidninus* and *L. nuttalli* are also known to bite man and causing irritation (Azad, 1986).

The chigger *L. deliense* is one of the main vectors of scrub typhus (*Orientia tsutsugamushi*) in Peninsular Malaysia (Oaks *et al*, 1983). Unfed chiggers of this species are usually found on dead leaves or lowlying vegetation awaiting a suitable host. The presence of this vector species is only an indication of the potential risk for scrub typhus infection for humans that come into contact with the chiggers. To

Table 2. Mesostigmatid mites, chiggers, Listrophorid mites and lice found on rodents in Kuala Selangor Nature Park (20-24 June 2005)

Host Code	Host species	Site	Mesostigmatid mites			Chiggers			Listrophorid mites			Lice	
			Species	No.	Species	No.	Species	No.	Species	No.	Species	No.	
KS1	<i>Maxomys whiteheadi</i>	4	<i>Laelaps echidninus</i> <i>Laelaps nuttalli</i>	2 1	None	-	None	-	None	-	None	-	
KS2	<i>Rattus exulans</i>	5	<i>Laelaps nuttalli</i>	1	None	-	None	-	None	-	None	-	
KS3	<i>Maxomys whiteheadi</i>	3	<i>Laelaps nuttalli</i> <i>Laelaps echidninus</i>	4 6	<i>Ascoschoengastia indica</i>	9	None	-	None	-	<i>Hoplopleura pectinata</i>	6	
KS4	<i>Rattus exulans</i>	5	None	-	None	-	None	-	Listrophoridae	5	None	-	
KS5	<i>Rattus exulans</i>	3	None	-	None	-	None	-	Listrophoridae	2	None	-	
KS6	<i>Maxomys whiteheadi</i>	5	<i>Laelaps nuttalli</i>	17	None	-	None	-	None	-	<i>Hoplopleura pectinata</i>	8	
KS7	<i>Maxomys whiteheadi</i>	5	<i>Laelaps nuttalli</i> <i>Laelaps echidninus</i>	20 2	None	-	None	-	Listrophoridae	3	None	-	
KS8	<i>Maxomys whiteheadi</i>	5	<i>Laelaps nuttalli</i> <i>Laelaps echidninus</i>	21 1	<i>Ascoschoengastia indica</i> <i>Leptotrombidium delense</i>	11 2	None	-	Listrophoridae	4	<i>Hoplopleura pectinata</i>	1	
KS9	<i>Maxomys whiteheadi</i>	5	<i>Laelaps nuttalli</i>	2	<i>Ascoschoengastia indica</i>	11	None	-	Listrophoridae	8	<i>Polyplax spinulosa</i>	7	
KS10	<i>Maxomys whiteheadi</i>	5	<i>Laelaps nuttalli</i>	61	None	-	None	-	Listrophoridae	10	<i>Hoplopleura pectinata</i>	2	
KS11	<i>Rattus exulans</i>	5	<i>Laelaps nuttalli</i>	10	None	-	None	-	Listrophoridae	12	<i>Hoplopleura pacifica</i>	2	

establish actual risk, there is a need to determine whether those chiggers found in KSNP are infected with the rickettsia *Orientia tsutsugamushi*; that however was not done in the current study. Findings of the survey thus demonstrated the presence of some ectoparasites of small mammals which has potential health risk in KSNP. Visitors to KSNP should therefore be advised of the necessary steps to prevent or reduce contact with those ectoparasites of public health importance.

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