A STUDY OF COMMENSAL RODENTS AND SHREWS WITH REFERENCE TO THE PARASITES OF MEDICAL IMPORTANCE IN CHANTHABURI PROVINCE, THAILAND

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INTRODUCTION

Feral rodents are pests which caused tremendous losses and damages to crops and food stocks in Thailand, including some species of the commensal rodents (Shuyler and Ratanawaraban, 1970). They also play an important role as disease transmitter to man, and the most important disease-spreading rodents are the commensal species because of their success in colonizing in man's habitats. (Drummond, 1972; Brooks and Rowe, 1979).

One of the functions of the Department of Medical Sciences in the Ministry of Public Health includes surveillance of commensal rodents as potential reservoirs of diseases. Chanthaburi Province was selected for this initial study because of JICA (Japan International Cooperation Agency) which established a field station there for rodent activities. The aims of this study are to investigate the rodent fauna in urban and rural areas, and to study rodent parasites of medical importance.

MATERIALS AND METHODS

The trapping of rodents was carried out in two urban areas and four rural areas at Chanthaburi Province from October 1979 to September 1980. The trapped animals were brought back to the Medical Zoology Laboratory at the Provincial Chief Medical Office, Chanthaburi for processing. They were killed with chloroform and examined for parasites. Fleas collected were preserved in 70% alcohol. The dead animal was then autopsied, and organs of it were taken for culturing bacteria in The Chanthaburi Provincial Health Laboratory, and subsequently identified. Roundworms recovered were fixed in presevatives, cleared in lactophenol and identified, while the cestodes were fixed and stained before identification. Fleas were processed and mounted on slides and identified. All these were done at the Department of Medical Sciences.

RESULTS

In the urban areas 3 species of animals as compared to 6 in the rural were caught. The urban animals consisted of 55.6% *Rattus norvegicus*, 29.8% *R. exulans* and 14.6% *Suncus murinus*. In the rural areas, *R. exulans* comprised of 84.5% while 15.5% belonged to other 5 species of rodents (Table 1). *R. norvegicus*, *R. exulans* and *S. murinus* predominated in urban areas, but *R. exulans* also was found common in rural areas. The remaining 4 species are either field or forest rats, although *R. rattus* is also peri-domesticated. The overall trap success rate in urban areas was 25.1% as compared to 5.1% in the rural.

Examination for flea infestation of 622 animals from urban was 24.8% as compared to 20.0% in 110 animals from rural areas. In urban areas highest infestation was shown

Table 1

Percentage of trap success of small mammals between urban and rural areas, and their flea-index at Chanthaburi Province, East Thailand.

Animal species	2700 trap nights		2160 trap nights		Flea infestation					
	Urban		Rural		Urban			Rural		
	No. of animals	% trap success	No. of animals	% trap success	No. of animals exam.	% pos.	Crude flea-index	No. of animals exam.	% pos.	Crude flea-index
Rattus norvegicus	346	12.8	2	0.1	346	28.6	0.7	2	1*	1.0
Rattus exulans	185	6.9	93	4.3	185	22.8	0.3	93	19.4	0.3
Rattus rattus	–	–	8	0.4	–	–	–	8	–	–
Rattus surifer	–	–	3	0.1	–	–	–	3	2*	0.5
Bandicota savilei	–	–	2	0.1	–	–	–	2	0	–
Bandicota indica	–	–	2	0.1	–	–	–	2	0	–
Suncus murinus	91	3.4	–	–	91	14.3	0.3	–	–	–
Total	622	23.0	110	5.1	622	24.8	–	110	20.0	–

*less than 10 animals examined.

in *R. norvegicus*, followed by *R. exulans* and *S. murinus*, while *R. exulans* was the only rat that had high flea infestation in rural areas. The crude flea-index was highest in *R. norvegicus* with about 1 flea per animal in both urban and rural areas, while the remaining positive species, each had less than 0.5 flea (Table 1).

Examination of *R. norvegicus*, *R. exulans* and *S. murinus* from urban areas showed that 44.9% (range 15.8-86.4%) were positive for enteropathogenic bacteria. Five kinds of bacteria were observed, *Salmonella* sp. and *Plesiomonas shigelloides* were found to be more prevalent than the other bacteria among these animals (Table 2). None of the animals examined from rural areas was found positive. *Trypanosoma lewisi* was absent in all the animals examined, although Natheewattana *et al.*, (1973) observed this protozoa common among rats studied in Chiengmai, Thailand.

Examination for helminths from 615 of the same 3 animal species from urban areas, 36.6% (range 6.6-56.4%) were positive as compared to 25.5% (range 25.8-50.0%) from 110 animals which consisted of 6 species from rural areas (Table 2). In urban areas, infection rates with helminths were highest for *R. norvegicus*, followed by *S. murinus*, and lowest for *R. exulans*. In rural areas *R. exulans* was observed with a high infection rate, while there were too few *R. rattus* and *B. savilei* examined for assessment. Four species of helminths were recovered. Of these, *Angiostrongylus cantonensis* and *Raillietina siriraji* were found with higher prevalence in *R. norvegicus*, *Hymenolepis nana* in *S. murinus*, while lower infection of *H. diminuta* in all the 3 animal species from urban areas. Of the 3 species of helminths recovered from host species from rural areas, *H. diminuta* was more prevalent in *R. exulans* than that of *H. nana* and *Raillietina siriraji*.

Table 2

Percentage of infection with bacteria and helminths of animals examined between urban and rural areas in Chanthaburi.

Parasites	Urban			Rural			
	Rattus norvegicus (% pos.)	*Rattus exulans* (%)	*Suncus murinus* (%)	*Rattus exulans* (%)	*Rattus rattus* (%)	*Bandicota savilei* (%)	3 other spicies
Bacteria							
Salmonella sp.	16.3	2.6	27.3	–	–	–	–
Vibrio parahaemolyticus	8.2	2.6	31.8	–	–	–	–
So-called NAG Vibrio	7.1	–	–	–	–	–	–
Campylobacter sp.	2.0	–	–	–	–	–	–
Plesiomonas shigelloides	23.5	10.5	68.2	–	–	–	–
Total no. examined	98	38	22	30	1	–	–
% positive	46.9	15.8	86.4	–	–	–	–
Helminth							
Angiostrongylus cantonensis	26.2	3.3	1.1	–	–	–	–
Hymenolepis diminuta	8.7	2.2	–	20.4	25.0	–	–
Hymenolepis nana	3.8	–	34.4	4.3	–	–	–
Raillietina siriraji	35.2	1.7	2.2	3.2	12.5	50.0	–
Total no. examined	344	181	90	93	8	2	7
% positive	56.4	6.6	21.1	25.8	37.5	50.0	0

DISCUSSION

In the present study, a total of seven species of small mammals were found inhabiting the urban and rural areas of Chanthaburi Province. Of these, 4 species are commensal which comprised of 3 species of house rats *(R. norvegicus, R. exulans, R. rattus)* and a house-shrew *(S. murinus)*. The other 4 species are either field or forest rats. Harinasuta *et al.*, (1974) reported 4 feral rat species in the mangrove areas of Chanthaburi Province. *R. norvegicus* was the predominant rat inside houses, but this species was reported to invade ricefields (Shuyler and Ratanawaraban, 1970).

The prevalence of *A. cantonensis* among the commensal rats support the findings of Harinasuta *et al.*, (1974). The findings of adult lungworms in the house-shrews *(S. murinus)* was an interesting record. The high prevalence of *H. diminuta* and *R. siriraji* including *A. cantonensis* in all these commensal animals suggest they are potential reservoirs as all these parasites have been reported in man in Southeast Asia (Sinniah *et al.*,

1978; Pradatsundarsar, 1968; Punyagupta *et al.*, 1975). Similarly, the high prevalence of *Salmonella* sp. and *P. shigelloides* among the enteropathogenic bacteria which are also common infections of man (Belding., 1952) indicate that the commensal animals can also play an essential role in the transmission of bacterial diseases. The Oriental rat-flea (*X. cheopis*) the common vector of plague and murine typhus in plague endemic areas was prevalent among the commensal rats, and house shrews. Although the crude index was less than 1 flea per animal, however study is needed to continue surveillance of flea indicies and rat-fall for potential outbreak of these diseases due to plague endemic foci areas in neighbouring countries.

The parasitofauna of medical importance in urban and rural rodents and shrews found in the present survey indicate a need for further investigations of the zoonotic potential of these animals in urban areas throughout Thailand.

SUMMARY

A total of 622 and 110 commensal and forest rodents and shrews was examined in the urban and rural areas of Chanthaburi Province, Thailand. A higher density of commensal animals was found in urban than rural areas. Five enteropathogenic bacteria, and four helminth species of significant medical importance were collected. The Oriental rat-flea, *X. cheopis* was found prevalent among these animals. The findings of adult *A. cantonensis* worm in *S. murinus* the first reported case of the parasite developed into adult in an abnormal host.

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REFERENCES

BELDING, D.L., (1952). *Clinical Parasitology*. (2nd Ed) Appleton-Century-Crofts Inc. U.S.A.

BROOKS, J.L. and ROWE, E.P., (1979). Commensal rodent control. *WHO/VBC/79.726*.

DRUMMOND, D., (1972). Biology and control of domestic rodents. Vector control in international health. *W H O*, Geneva, 46-49.

HARINASUTA, C., GUPTAVANIJ P. and VASUVAT, C., (1974). Studies on the medical ecological epidemiology in mangrove areas in Thailand. *Southeast Asian J. Trop. Med. Publ. Hlth., 5* : 105.

NATHEEWATTANA, N., HONGSBHANICH, L. KHAMBOORUANG, C. and THITASUT, P., (1973). Preliminary study of *Trypanosoma lewisi*-like parasite of rats in Chieng Mai, Thailand. *Southeast Asian J. Trop. Med. Publ. Hlth., 4* : 322.

PRADATSUNDARSAR, A., (1968). Nine cases of *Raillietina* sp. in Bangkok. *J. Med. Asso. Thailand, 43* : 56.

PUNYAGUPTA, S., JITTIJUDATA, P. and BUNNAG, T., (1975) Eosinophilic menigitis in Thailand. Clinical studies of 484 typical cases, probably caused by *Angiostrongylus cantonensis*. *Amer. J. Trop. Med. Hyg., 24* : 921.

SINNIAH, S., SINGH, M. and POON, G.K., (1978). Prevalence of parasitic infections in Malaysian oilpalm estate workers. *Southeast Asian J. Trop. Med. Publ. Hlth., 9* : 272.

SHUYLER, H.R. and RATANAWARABAN, S., (1970). Rodent as pest of rice in Thailand. *Instit. Rice Comm., Newsl., 19* : 20.