

Survey of Rodent Parasites

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OBJECTIVE: To survey a rodent population, primarily *Bandicota indica*, and to determine what intestinal and blood parasites were present and to ascertain if *B. indica* could be acting as a reservoir for parasites which infect man.

DESCRIPTION: Traps were set in both rural and urban areas for a period of 3 months. Material for parasitological study was processed as follows:

(a) *Intestinal Contents:* The gastrointestinal tracts of rodents trapped in the field were placed in 10% buffered formalin and sent immediately to SMRL. In the laboratory the intestines were removed from the fixative and excised longitudinally to expose their contents. This material was then placed in a Kimax conical graduated cylinder. Tap water was added to the one liter mark and the material allowed to settle. The supernatant was removed and the above procedure repeated until a clear supernatant could be observed. After the last wash the supernatant was removed and the sediment placed in a petri dish and examined for adult parasites.

(b) *Cecal Contents:* Cecal material was processed according to the Ritchie modification of the formalin ether concentration technique. The resulting sediment was then treated with Lugol's iodine and examined microscopically for parasites.

(c) *Blood Smears:* Thick and thin smears were made from the blood of decapitated rodents. After air drying, the smears were fixed with methanol and shipped to the main laboratory. After staining with a 2% solution of Giemsa stain (commercial), the slides were examined microscopically for blood parasites. Fifty thick microscopic fields were examined before reporting a slide negative.

PROGRESS: Seven hundred and four rodents were trapped in two provinces in Southeastern Thailand, (Table 1a). Five hundred and fourteen (73%) were *Bandicota indica*. The parasites found in the study are shown in Table 1b and are grouped according to province in Tables 2a, 2b and 3a, 3b.

All the nematodes, which accounted for the majority of the parasites found, are routinely reported in rodents. Some have been reported in man but only rarely. One hookworm, *Cyclodontostomum sp.*, which has not previously been reported in Thailand, was found in 28.4% of the *B. indica* trapped in the Ban Thapong area. Further study is required to determine its possible relationship (if any) to man. Another organism, an acanthocephalan (*Moniliformis moniliformis*), has been reported in man before but is considered by some as an incidental parasite.

All three cestodes found in the study can be considered as being transmissible to man. One tapeworm (*Raillietina sp.*) has been discovered among infants in Thailand (Chandler and Pradatsundarasar 1957).¹ This finding is not surprising since this tapeworm presumably requires arthropods such as cockroaches as an intermediate host and some of the children infected had a history of playing with cockroaches. It's also of interest to note that all (9) nine cases of *Raillietina* infection found in Thailand up to 1960 have been children under 5 years of age (Pradatsundarasar, A. 1960)². The two remaining cestodes *H. nana* and *H. diminuta* have been reported before in man. *H. diminuta*, in fact, was reported in a study of the Thai population in Bangkok (Baughn and Morales 1971)³.

Only one fluke of the genus *Echinostoma* was found in our survey. This parasite has been previously reported in rodents in Thailand (Bhaibulaya, Manoon, 1964)⁴. This fluke requires snails as an intermediate host, and it's not unusual to see man infected with this parasite since snails are included in the diet of the local populace.

Nymphs of *Armillifer moniliformis*, an arthropod, were found encysted around the mesentery of a rodent (*B. indica*) intestine. It has been reported before in man but only rarely.

As illustrated in Table 3a, we found four kinds of amebae and flagellate protozoa during the survey. All these organisms have been reported in rodents in Thailand before. This laboratory has routinely reported these organisms before from humans and Baughn and Morales reported all but one of them during their 1971 survey in Thailand. Except for *Giardia lamblia* all the organisms encountered are commensals, although the finding of these parasites in the rodents clearly implicates their role as reservoir hosts for these parasites.

Only four blood parasites were encountered during our survey. *Trypanosoma lewisi* as shown in Table 4 was found more in other rodents than in *B. indica*, and is generally a strict parasite of its definitive host. Some mention is made of a girl being infected with this parasite in Malaya, but no description is given of the parasite. A spirochete which can cause a variety of diseases was also found. This parasite could not be identified as to species from blood smears alone. The finding of this parasite in the rodent blood smears is hardly noteworthy, since rat bite fever is caused by a spirochete, and is transmitted by rat bites. Sarcocystis, which is a parasite of tissue, was also found in the blood smears; this organism was considered a contaminant since the blood used to make the smears was taken from rodent muscle tissue. The last organism encountered was an erythrocytic protozoan of unknown species. More work is required before definite identification can be accomplished.

SUMMARY: A total of 704 rodents were examined for intestinal and blood parasites. Most rodents examined were parasitized with either intestinal parasites, blood parasites, or both. Further work is required to identify several of the parasites.

REFERENCES:

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2. Pradatsundarasar, A.: Nine cases of Raillietina infection in Bangkok. *J.M.A.T.* 43: 1, 1960.
3. Baughn, R.E., and Morales, A.R.: Parasitism in Thailand: An evaluation by various concentration techniques and its importance in the United States. *Amer. J. Clin. Path.* 55: 2, 1971.
4. Bhaibulaya, M., Charoenlarb, P., and Harinasuta, C.: Report of cases of *Echinostoma malayanum* and *Hypoderaeum conoideum* in Thailand. *J.M.A.T.* 47: 12, 1964.

Table 1a: MAP SHOWING RODENT TRAPPING SITES

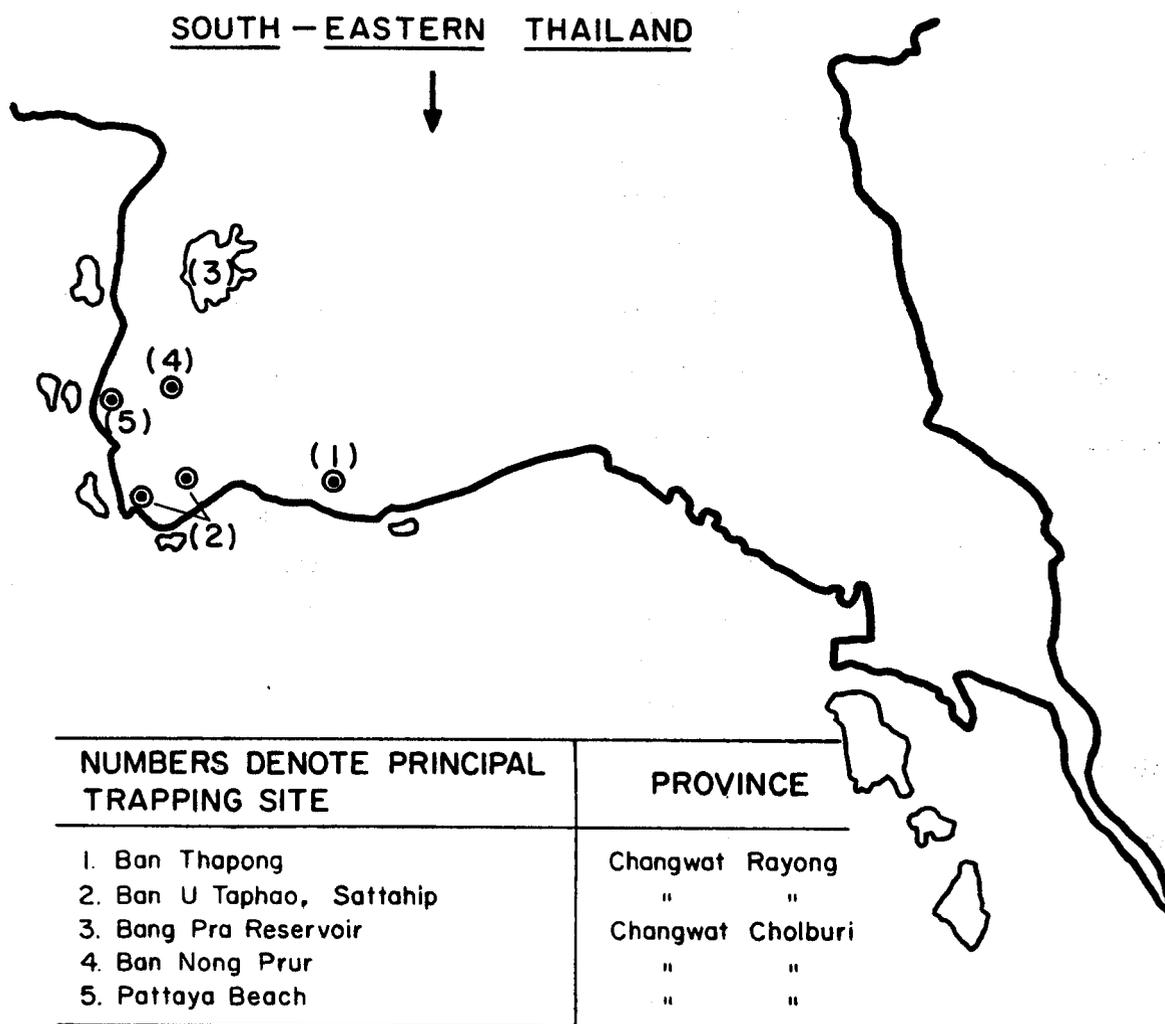


Table 1b: Parasites Found in Rodent Survey

	Genus	Species
Nematodes	Physaloptera	sp.
	Syphacia	obvelata
	Strongyloides	sp.
	Trichuris	muris
	Nippostrongylus	muris
	Rictularia	sp.
	Cyclodontostomum	sp.
	Trichosomoides	crassicauda
Cestodes	Hymenolepis	diminuta
	Hymenolepis	nana
	Raillietina	sp.
Trematodes	Echinostoma	sp.
Acanthocephala	Moniliformis	moniliformis
Protozoa	Entamoeba	coli
	Chilomastix	mesnili
	Giardia	lamblia
	Endolimax	nana
	Trypanosoma	lewisii
	Erythrocytic protozoa	
	Sarcocystis	sp.
Arthropods	Armillifer	moniliformis
Other	Spirochetes	

Table 2a: Results Obtained After Examination of Gastrointestinal Contents

Parasites Found	RAYONG PROVINCE			
	Ban Thapong Area (1)		Utapao-Sattahip Area (2)	
	B. indica	Other	B. indica	Other
<i>Physaloptera</i> sp.	22.9%	5.0%	2.3%	26.9%
<i>Syphacia obvelata</i>	4.7%	—	0.4%	3.1%
<i>Strongyloides</i> larvae	—	—	0.2%	1.6%
<i>Nippostrongylus muris</i>	—	—	—	13.7%
<i>Rictularia</i> sp.	0.2%	3.1%	—	1.6%
<i>Trichuris muris</i> *	15.7%	3.2%	2.0%	12.8%
<i>Cyclodontostomum</i> sp.	28.4%	2.5%	1.0%	—
<i>Hymenolepis diminuta</i>	20.2%	5.8%	1.3%	23.2%
<i>Hymenolepis nana</i>	—	—	—	0.5%
<i>Railletina</i> sp.	—	—	—	1.5%
<i>Echinostoma</i> sp.	0.6%	—	—	—
<i>Trichosomoides crassicauda</i>	—	—	0.4%	—
<i>Moniliformis moniliformis</i>	—	—	—	5.8%
<i>Armillifer moniliformis</i>	—	—	—	—

* Only ova recovered.

Table 2b: Results Obtained After Examination of Gastrointestinal Contents

CHOLBURI PROVINCE						
Parasites Found	Bang—Pra Reservoir Area (3)		Ban—Nong Prur Area (4)		Pattaya—Beach Area (5)	
	B. indica	Other	B. indica	Other	B. indica	Other
Physaloptera sp.	5.0%	1.6%	—	2.1%	1.7%	5.0%
Syphacia obvelata	16.7%	0.5%	—	—	1.5%	2.1%
Strongyloides larvae	—	—	—	—	—	—
Nippostrongylus muris	0.2%	—	—	—	—	—
Rictularia sp.	—	—	—	0.5%	—	7.4%
Trichuris muris*	3.3%	0.5%	—	—	0.4%	1.6%
Cyclodontostomum sp.	0.6%	—	—	—	—	—
Hymenolepis diminuta	10.3%	5.0%	—	0.5%	0.2%	7.4%
Hymenolepis nana	—	—	—	—	—	—
Raillietina sp.	—	—	—	—	—	1.6%
Echinostoma sp.	1.9%	—	—	—	1.0%	0.5%
Trichosomoides crassicauda	—	—	—	—	—	—
Moniliformis moniliformis	—	—	—	0.5%	—	1.6%
Armillifer moniliformis	0.2%	—	—	—	—	—

* Only ova recovered.

Table 3a: Protozoans Recovered from Formalin—Ether—Concentrated Fecal Material.

RAYONG PROVINCE				
Parasites Found	Ban Thapong Area (1)		Utapao—Sattahip Area (2)	
	B. indica	Other	B. indica	Other
Entamoeba coli	8.4%	1.0%	2.1%	8.5%
Chilomastix mesnili	8.8%	2.1%	0.4%	4.8%
Giardia lamblia	—	—	—	—
Endolimax nana	—	—	—	—

Table 3b: Protozoans Recovered from Formalin-Ether-Concentrated Fecal Material.

CHOLBURI PROVINCE						
Parasites Found	Bang-Pra Reservoir Area (3)		Ban-Nong Prur Area (4)		Pattaya-Beach Area (5)	
	<i>B. indica</i>	Other	<i>B. indica</i>	Other	<i>B. indica</i>	Other
<i>Entamoeba coli</i>	3.9%	1.6%	—	1.0%	0.8%	1.6%
<i>Chilomastix mesnili</i>	2.7%	1.0%	—	1.0%	0.2%	0.5%
<i>Giardia lamblia</i>	0.2%	—	—	—	—	—
<i>Endolimax nana</i>	0.4%	—	—	—	—	—

Table 4: Incidence of Blood Parasites

	<i>B. indica</i>	Other
1. <i>Trypanosoma lewisi</i>	1.0%	8.0%
2. <i>Sarcocystis</i>	19.0%	3.4%
3. Erythrocytic protozoa	17.4%	0.5%
4. <i>Spirochetes</i>	0.8%	0.0%