

## Vertebrate Ecology

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**OBJECTIVE:** To provide correct identification and meaningful names for wild vertebrate animals from which blood samples are taken for studies on the ecology of Japanese encephalitis virus.

**DESCRIPTION:** Identifications usually present no problems and the ecologic studies can proceed without hindrance from lack of a name. Amphibians, reptiles, and most of the birds and mammals are keyed out with the aid of the excellent reference library maintained by SMRL. However, in the recent study of the ecology of Japanese encephalitis virus at Bang Phra, difficulties were encountered with leaf-warblers, bats, and the common rats and mice. Some of the warblers and all of the species of bats and rats and mice had significant amounts of antibody to the virus. Therefore, it was evident that straightening out their names would be of value not only to the Bang Phra study, but to all future studies of arboviruses in Thailand. (Specifically, the same animals occur at Chiangmai, the site of a current study).

Accordingly, an illustrated identification aid to the leaf-warblers was devised and published. Scientific specimens of the bats were prepared and sent to specialists who provided names in due course. But the nomenclature and species limits of the common rats and mice at Bang Phra were found to be confused in the current literature. It was necessary to undertake a systematic revision of them, and the Virology Department thus inherited a project that had earlier been set up in optimistic terms as a SMRL goal by the Department of Entomology (SMRL Annual Report, April 1964: 308-310). The method was collecting and examining scientific skins and skulls and extracting information on karyotype, ectoparasitic lice, and biochemical genetics (=enzyme polymorphism involving isozymes) from collaborators who were provided pertinent material by this laboratory.

**PROGRESS:** Delineation of the species of medically important rats and mice of Thailand has been complete, on the basis of skin and skull morphology. They have also been grouped into genera and subgenera consisting of closely related forms. Data from ecology, geographic overlap, biochemical genetics, ectoparasitic lice, chromosome number and chromosome morphology substantiate the new classification proposed. This information has been widely disseminated in mimeograph form and two monographs are ready for publication, one on the rats, another on the mice. Table 1 summarizes the main points; the linear sequence reflects similarities in karyotype.

**SUMMARY:** Proper identification of animals and birds for studies of Japanese encephalitis ecology necessitated overhaul of the classification of medically important rats and mice of Thailand, using both classical and modern cytologic and biochemical methods. There are 33 species in Thailand. All but one, the Norway rat, are native to the country. No less than eleven species are specially adapted for living with man. The completion of this study now permits immediate field identification of reservoir hosts of human diseases in Thailand.

### **PUBLICATIONS:** (concerned in this particular study)

- Marshall, J.T., Jr. and Somsak Pantuwatana. Identification of leaf warblers in Thailand. Nat. Hist. Bull. Siam Society, 1969: 23, pp. 1-8.
- Somsak Pantuwatana, Somchai Imlarp and Marshall, J.T., Jr. Vertebrate ecology of Bang Phra. Nat. Hist. Bull. Siam Society, 1969: 23, pp. 133-183.
- Marshall, J. and Vandee Nongngork. Mammals of Samui Island, Thailand. Nat. Hist. Bull. Siam Society, (Accepted for publication).
- Marshall, J. T., Jr. Revision of the genus Mus (Rodentia, Muridae) in Southeast Asia. American Museum Novitates. (Accepted for publication).

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Table 1. Species of Rats and Mice of Thailand

Groups of related species based on skull	Scientific name	Chromosome Number <sup>(1)</sup>	Habitat	Distribution in Thailand	Mammary formula	Lice <sup>(7)</sup>	
						Species of <u>Hoplopleura</u>	Species of <u>Polyplax</u>
Bandicota	Bandicota Indica	46	rice field, marshy grass grassland	all	3+3	malabarica	asiatica
	Bandicota bengalensis	44		central	3+3	malabarica	asiatica
"Berylmys"	Rattus bowersi	40	forest	all	2+2	diaphora	
	Rattus mackenziei	40	forest	North	3+2?	kitti <sup>(3)</sup>	
	Rattus berdmorei	40	swampy forest and grassland	all except Central and Peninsula	3+2		
"Stenomys"	Rattus mulleri	42	evergreen forest	Peninsula	2+2	dissicula	
"Rattus"	Rattus germaini	42	evergreen forest	Koh Samui	3+3		
	Rattus rattus	42 <sup>(5)</sup>	all, incl. house	all	2+3 <sup>(6)</sup>	pacifica	spinulosa
	Rattus sladeni	42	mountain evergreen forest	North	3+3		
	Rattus nitidus	42	mountain villages, in house	North	3+3		

Table 1. (Continued)

Groups of related species based on skull	Scientific name	Chromosome Number (1)	Habitat	Distribution in Thailand	Mammary formula	Lice (7)	
						Species of <u>Hoplopleura</u>	Species of <u>Polyplax</u>
"Rattus"	<i>Rattus exiguus</i>	42	rice field, truck garden	North, NE, SE	2+3		
	<i>Rattus exulans</i>	42	house	all	2+2	<i>pacifica</i>	<i>spinulosa</i>
	<i>Rattus argentiventer</i>	42	rice field	Peninsular, and Central	3+3	<i>pacifica</i>	
	<i>Rattus norvegicus</i>	42	buildings	Local (4)	3+3	<i>pacifica</i>	<i>spinulosa</i>
"Leopoldamys"	<i>Rattus edwardsi</i>	42	evergreen forest	Northeast	2+2		<i>insulsa</i>
	<i>Rattus sabanus</i>	42	evergreen forest	all	2+2	<i>malaysiana</i>	<i>insulsa</i>
"Lenothrix"	<i>Rattus surifer</i>	52	forest	all	2+2	(2)	
	<i>Rattus rajah</i>	36	evergreen forest	Peninsula	2+2		
	<i>Rattus whiteheadi</i>	36	evergreen forest	Peninsula	2+2		
"Maxomys"	<i>Rattus niviventer</i>	46	forest	all	2+2	(2)	<i>pricei</i>
	<i>Rattus fulvescens</i>	46	mountain forest	Peninsula and North	2+2		
	<i>Rattus cremoriventer</i>	46	evergreen forest	Peninsula and East	2+2	<i>sicata</i>	
"Leggadilla" and "Coccomys"	<i>Mus shortridgei</i>	48	grass in deciduous forest	West, Northeast	3+2	new species	
	<i>Mus pahari</i>		mountain forest?	North	3+2		

Table 1. (Continued)

Groups of related species based on skull	Scientific name	Chromosome Number (1)	Habitat	Distribution in Thailand	Mammary formula	Lice (7)	
						Species of <u>Hoplopleura</u>	Species of <u>Polyplox</u>
"Mus"	<i>Mus famulus</i>	40	grass in pine forest	North	3+2		
	<i>Mus nitidulus?</i>		grass in deciduous forest	Northeast	3+2		
	<i>Mus cervicolor</i> ,	40	grass in deciduous forest	all except Peninsula	3+2	Johnsonae	
	<i>Mus caroli</i>	40	rice field	all except Peninsula	3+2	Johnsonae	
	<i>Mus musculus castaneus</i>	40	warehouse	Thonburi, Trang	3+2	capitosa	serrata
	<i>Chiromyscus chiropus</i>		forest (arboreal)	Northeast	2+2		
	<i>Vandeleuria oleracea</i> 28	28	cane	North and Northeast	2+2?		
	<i>Chiropodomys gliroides</i>		bamboo in forest	all	0+2		
	<i>Hapalomys longicaudatu</i>		bamboo in forest	West and Peninsula	2+2		

## Footnotes:

- (1) Diploid number—data of Amara, Yong Hoi Sen, Selander, Duncan.
- (2) *Pectinata* has been found.
- (3) About the same as *diaphora*.
- (4) In cities of Prachinburi, Bangkok, Bang Phra, Trad, Chumporn, and village on Samui Island.
- (5) Polymorphic 42-48 at Suriporn Hotel, Chiangmai, data of Gropp.
- (6) Post-axial pair twinned in North.
- (7) Data of Emerson.