MAMMALS OF SAMUI ISLAND, THAILAND

by

Joe Marshall & Vandee Nongngork[1]

A small collection of mammals was gathered by Mr. Vandee during late 1968 in connection with a mosquito project of SEATO Medical Research Laboratory on Koh Samui, the largest island off the east shore of the Malay Peninsula (9°22′ to 34′ N and 99°56′ to 100°07′ E). Eighteen spirit specimens were deposited in the American Museum of Natural History for anatomical study of genitalia as an aid to taxonomy. An additional 27 study skins with skull are divided among collections of the home laboratory at Bangkok, the Applied Scientific Research Corporation of Thailand at Bangkhen, and the Smithsonian Institution in Washington. Mr. Somsak Pantuwatana and Mr. Vandee collected flying foxes and 14 live rats for chromosome study[2] in May-June 1969. The *Pteropus* are divided between the British Museum (Natural History) and ASRCT.

The purpose of this report is 1) to call attention to the uniqueness of the fauna, depauperate though it is, 2) to determine the relationships of certain peculiar rats found on Koh Samui which belong to the "*Rattus rattus* group" of species and 3) to list additional mammals not found by H.C. Robinson and C. Boden Kloss in 1913 (Jour. Federated Malay States Museum, **5**, 1915: 130-138).

An excellent ecological description of Koh Samui is provided by Robinson and Kloss, who complained of the paucity of animal life compared with islands further south. They inveighed against the relentless deforestation and persecution of native mammals such as monkeys and barking deer by the large population of 8000 souls. Virgin forest and permanent running streams still existed in 1913. Now there are 30,000 people and no original forests.

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1) SEATO Medical Research Laboratory, Rajavithi Road, Bangkok.

2) In conducting the research described in this report, the investigators adhered to the "Guide for Laboratory Animal Facilities and Care," as promulgated by the Committee on the Guide for Laboratory Animal Facilities and Care of the Institute of Animal Resources, National Academy of Sciences–National Research Council.

Table 1. **Fauna of Koh Samui, Specimens Only**

Collected by Robinson and Kloss in 1913.			*Collected by Vandee Nongngork in 1968*		
COMMON NAME	SCIENTIFIC NAME		CURRENT SCIENTIFIC NAME		HABITAT
White-toothed shrew	*Crocidura negligens*	1	–		–
Long-tailed macaque	*Macaca irus*	2	–		–
Tree-shrew	*Tupaia ferruginea operosa*	12	*Tupaia glis*	1	Orchard woods
Island flying fox	–	–	*Pteropus hypomelanus geminorum*	5	Coconut palm
Dog-faced fruit bat	*Cynopterus brachyotis angulatus*	8	*Cynopterus brachyotis angulatus*	2	Banana trees in village
Dawn bat	–	–	*Eonycteris spelaea*	1	,,
Long tongued fruit bat	–	–	*Macroglossus minimus*	1	,,
Giant squirrel	*Ratufa melanopepla decolorata*	13	–		–
Gray squirrel	*Sciurus concolor samuiensis* "very different from mainland"	40	*Callosciurus caniceps*	1	Coconut palm, orchard
Roof rat	*Epimys rattus jalorensis*	39	*Rattus rattus robinsoni*	19	Orchard, woods
Island rat	*Epimys remotus*	6	*Rattus remotus*	9	Forest
Ricefield rat	–	–	*Rattus argentiventer*	1	Ricefield
Polynesian rat	–	–	*Rattus exulans concolor*	2	House
Norway rat	–	–	*Rattus norvegicus*	2	House, market
White-bellied rat	*Epimys jerdoni pan*	5	*Rattus niviventer pan*	5	Woods, orchard
Rajah rat	*Epimys surifer spurcus*	23	*Rattus surifer spurcus*	2	Woods, orchard
Palm civet	*Paradoxurus minor*	2	*Paradoxurus hermaphroditus*	1	Purchased

Table 1 compares the two collections. Because of the rarity of their journal, we list the Robinson-Kloss species, to compare with the recent acquisition. Differences between past and present scientific names of the identical animal, shown on the same horizontal line, are due to changing styles in nomenclature. Some of the names are revised to agree with type specimens of rats studied in the British Museum by Marshall and by D.H. Johnson (*argentiventer*).

Obviously Robinson and Kloss did not collect in houses and around villages or they would have found at least *Rattus exulans*, if not *R. argentiventer*. There is a hint to the contrary in their marvelously obfuscating statement (*op. cit.*, p. 137) "*E. remotus*... may be distinguished from *E. rattus*... also by difference of habit in that they are forest dwellers while *E. rattus* congregates only in the neighbourhood of houses and villages" which was probably said by force of habit because roof rats ought to be in houses. Actually, Mr. Vandee found both *Rattus rattus* and *R. remotus* in the forest and only *Rattus exulans* and *norvegicus* indoors. *Rattus norvegicus*, a truly non-native rat, is the only one which might have been introduced recently—on ships. As for the other rats missing from the 1913 list, it is just as unthinkable that *Rattus argentiventer* should have boated to the island in human company since 1913 as that *Rattus exulans* should not have done so thousands of years ago!

The oddity of the mammal assemblage on Koh Samui was evident to Robinson and Kloss in absence of flying lemur, flying squirrels, flying foxes (!) and others commonly found on islands they had visited. They declared the fauna to be derived from the Peninsula nine miles away. Inured to describing new species on Malaysian islands, they looked for differences instead of similarities among them. Therefore they were insensitive to the zoogeographic implications of their own *Epimys remotus*. In discussing below these and others of the so-called "genus *Rattus*" one is compelled to provide diagnoses and to cite specimens—especially type specimens. Otherwise the reader cannot know what species is being discussed, owing to the incredible confusion and multiplicity of names in the literature.

Pteropus hypomelanus. Mr. John Edwards Hill comments on the two British Museum specimens (#409, #411) as follows: "For the present I would refer them to *P. hypomelanus geminorum.* The smaller one is a subadult and does not represent a different species. These specimens are of interest, apart from being the first record of *Pteropus* from Koh Samui, Robinson and Kloss not having encountered the genus there in 1913. They are quite unlike the other *hypomelanus* from the remaining off-shore islands of the South China Sea (*lepidus, canus, condorensis*) but instead closely resemble *geminorum* from the Mergui Archipelago, on the other side of the Peninsula. The species is as yet unknown from the mainland of Lower Thailand—quite a curious piece of zoogeography." The island flying fox's restriction to islands is, of course, a matter of habitat selection, as it is a capable long distance flyer and could easily reach the mainland if so inclined.

Specimens examined: Koh Samui (5) numbers SP409 (BM), SP410 (ASRCT), SP411 (BM), SP412, SP413 (ASRCT).

Rattus rattus. A medium-sized rat with large bullae, curving skull ridges, large ears, and long blackish tail. The color is dusky-brown above, creamy white beneath with a sharp line of demarcation. Some have a grey pectoral streak or collar. Coloration of the ten study skins is remarkably uniform as contrasted with the similar but more variable mainland population. Mammae 2+3 pairs. In wild habitats only. Although Robinson and Kloss saw no difference between this rat and its mainland counterpart, Chasen described it as a new race because of its large bullae (Bull. Raffles Mus. **15,** 1940: 154). D.H. Johnson (*in litt.*) pointed out the consequent strong resemblance to the skull of *R. annandalei.* Our measurements show that the bullae average larger than those of peninsular Thailand, with considerable overlap, yet they do not exceed those in southeast Thailand (Chonburi 43 specimens, Trad 18 specimens). Accordingly we do not regard *robinsoni* as a well-differentiated race.

Specimens examined: Koh Samui (11) numbers V43, V53, V63, V64, V65, V66, V68, V76, V80, V85; type of *robinsoni* British Mu-

seum number 47.1449. Five live examples for karyotyping, one of which is a female with twinned postaxial mammae to simulate a 3+3 formula. Thailand (93), SMRL collection.

Rattus remotus. A much larger rat with proportionately longer tail than "*robinsoni*" but of the same coloration. Skull with curving supraorbital and parietal ridges in the usual lyre shaped outline characteristic of the "*Rattus rattus* group" but bullae smaller and teeth much larger than any other member of this group of species in Thailand. Mammae 3+3 pairs. Found only in the forest. Comparison of type specimens in the British Museum revealed that this rat is represented on islands off South-eastern Thailand and has no mainland populations. Previously, various authors have mistakenly put *remotus* in other species: *Rattus mülleri* because of the small bullae, *R. rattus* because of the dark tail, and *R. annandalei* because of the coloration. The striking identity of *robinsoni* and *remotus* in color and appearance, as well as occurrence in the same habitat, is a beautiful example of convergence in unrelated species.

Specimens examined: Koh Samui (8) numbers V45, V58, V59, V62, V67, V83, V84; type of *remotus* British Museum number 21.11. 3.31; eight live examples including litter of 5 of which a pair was sent to Dr. Yong Hoi Sen for karyotyping. Con Son (1) cotype of *germaini* British Museum number 82.6.16.12. Sipora (1) type of *mentawi* British Museum number 47.1439.

Rattus argentiventer. (Characters worked out by D.H. Johnson, MS.) Color variegated black and buff above, silvery gray beneath. Skull robust, massive, with enlarged bullae and long palatal foramina. Tail blackish, short; ears small; mammae 3+3 pairs. Heavy parietal and supraorbital ridges meet at an angle instead of a curve. This rare inhabitant of ricefields has a spotty distribution in Malaya, Thailand, Vietnam, Indonesia, and the Philippines (except Luzon–D. H. Johnson, MS.).

Specimens examined: Koh Samui (1) number V52. Sumatra (1) type of *argentiventer* British Museum number 19.11.5.89. Perak (1) type of *chaseni* British Museum number 47.1445. Thailand (10), SMRL collection.

Rattus exulans. A small edition of *R. rattus,* differing in 2+2 mammae, gray-brown underparts, and hindfoot less that 28 mm. The common "house mouse" of SE Asia.

Specimens examined: Koh Samui (2) V89, V90.

Rattus norvegicus. A large rat of buildings and nearby fields. Hind feet white, tail whitish on under surface, belly clear gray, back brown, tail and ear shorter proportionately than in *R. rattus,* mammae 3+3. Skull ridges straight, parallel, and close together. Not native to southeast Asia; carried about on ships.

Specimens examined: Koh Samui (2)–spirit only–V74, V75.

Rattus niviventer. A small spiny rat with bicolored tail, small bullae, white underparts, and 2+2 mammary formula. We have insufficient material to evaluate the race *pan* peculiar to Koh Samui, which even its authors regard as weakly differentiated from the peninsular population.

Specimens examined: Koh Samui (5)–numbers V60, V77, V78, V79; type of *pan* in the British Museum; one live example for karyotyping.

Rattus surifer. A medium sized spiny rat with tail bicolored and all white for the terminal third. Small bullae, white underparts, 2+2 mammae and very short, broad incisive foramina. The same remarks apply to the local race *spurcus* as to *pan.*

Specimens examined: Koh Samui (3) numbers V69, V70; type of *spurcus* in British Museum.

In conclusion, the native mammal fauna of Koh Samui, though few in species, has a unique juxtaposition of three full species of the "*Rattus rattus* group" (*argentiventer, rattus, remotus*) none of which is found in houses. An unexpected affinity among widespread islands is revealed by *Pteropus hypomelanus* and *Rattus remotus,* which have no mainland representatives. As stated by D. H. Johnson, island rats are more likely derived from other islands than from adjacent mainland because of the routes and capabilities of their seafaring human hosts. Island people are good navigators and they tend to travel

from island to island, whereas mainland dwellers seldom put far out to sea. Except for *Rattus norvegicus*, which could have been introduced since 1913, the difference in rat collections made by Robinson and Kloss and by Vandee is explained by lack of trapping in and around villages by the earlier expedition.

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