Research Note

Predominant species of commensal rats in rural areas in Thailand

Tatsuo YABE*

and

Mongkol CHENCHITTIKUL**

*Kanagawa Prefectural Public Health Laboratories,
Asahi-ku, Yokohama 241, Japan

**Division of Medical Entomology,
National Institute of Health,
Department of Medical Sciences,
Nonthaburi 11000, Thailand

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According to Chenchittikul *et al.* (1983), *Rattus exulans* predominates in rural areas, and both *R. norvegicus* and *R. exulans* thrive in urban areas in Chanthaburi Province in the central plains of Thailand. We found that *R. norvegicus* and *R. exulans* thrive also in an urban area in Bangkok, but only *R. rattus* in rural areas in Northern Thailand. In our previous paper (Yabe *et al.*, 1985), we have discussed the difference in predominant species between rural areas and urban areas in Chanthaburi Province. Hence, this paper is concerned particularly with the cause of the habitat segregation of rodent species among these rural areas.

STUDY AREAS AND METHODS

The rodent fauna were surveyed in Ban Nai Soy village in Mae Hong Son Province and Ban Egor Phahee village in Chiang Rai Province, in addition to an urban area, the Bang Sue district in Bangkok. Mae Hong Son Province and Chiang Rai Province are located in the mountainous areas of Northern Thailand, and Bangkok is in the central

plains. Most of the one- or two-story houses surveyed in the urban area in Bangkok were connected to watercourses or pools for sewage disposal. The villages in Northern Thailand are supplied with water from streams, wells or waterworks.

Mammals were captured with rat cage traps baited with baked coconut, or corn coated with peanut-butter. Traps were set in about 140 houses in Mae Hong Son Province, 100 houses in Chiang Rai Province and 200 houses in Bangkok, during the dry season from February to March, 1988. We also tried to catch rats in the bush and forest around the villages in Mae Hong Son Province and Chiang Rai Province using a total of 90 and 50 traps, respectively.

We calculated three renal indices involving medullary thickness approved by Geluso (1978) to compare the water requirements of rats. The indices are 1) percent medullary thickness (PMT)=medullary thickness (outer and inner zones)/cortical and medullary thickness $\times 100$; 2) ratio of medulla to cortex (M/C)=medullary thickness (outer and inner zones)/cortical thickness; and 3) ratio of inner medullary zone to cortex (IM/C)=thickness of inner medullary zone/cortical thickness. The methods used were the same as described in our previous paper (Yabe *et al.*, 1985).

RESULTS AND DISCUSSION

In rural areas, the predominant species in Northern Thailand was different from that in Chanthaburi Province, where 84.5% of mammals were *R. exulans*. Table 1 shows the summary of mammals captured. A total of 90 rats, *R. rattus*, including one from the bush, were caught in Northern Thailand. We commonly found *R. norvegicus*, *R. exulans* and the shrew, *Suncus murinus*, but not *R. rattus* in the urban area in Bangkok. The species structure in the urban area was similar to that in urban areas in Chanthaburi Province.

It is probably difficult for *R. rattus* to live in villages in Chanthaburi Province where water sources during the dry season are poor, as suggested by Yabe *et al.* (1985). In the villages, dew should sometimes become scarce because of the dry and hot climate with

* 矢部辰男: 神奈川県衛生研究所 (〒241 横浜市旭区中尾町 52)

Table 1 Number and % frequency of small mammals captured in houses in rural areas in Northern Thailand (Mae Hong Son Province and Chiang Rai Province) and Chanthaburi Province and urban areas in Bangkok and Chanthaburi Province.

Mammal	Rural area						Urban area			
	Mae Hong Son		Chiang Rai		Chanthaburi*		Bangkok		Chanthaburi*	
	No.	%	No.	%	No.	%	No.	%	No.	%
<i>Rattus rattus</i>	59**	100	30	100	8	7.3	0	0	0	0
<i>R. norvegicus</i>	0	0	0	0	2	1.8	42	29.0	346	55.6
<i>R. exulans</i>	0	0	0	0	93	84.5	78	53.8	185	29.7
Other rodents	0	0	0	0	7	6.4	0	0	0	0
<i>Suncus murinus</i>	0	0	0	0	0	0	25	17.2	91	14.6
Total	59	100	30	100	110	100	145	100	622	99.9

* Cited from Chenchittikul *et al.* (1983). ** One captured in the bush is excluded.

Table 2 Three renal indices* for *R. rattus* and *R. exulans* collected in Thailand.

Species	n	PMT	M/C	IM/C
<i>R. rattus</i>	37	71.7±2.4	2.56±0.32	1.92±0.27
<i>R. exulans</i> **	90	73.2±1.7	2.75±0.25	2.05±0.21

n, sample size; PMT, percent medullary thickness; M/C, ratio of medulla to cortex; IM/C, ratio of inner medullary zone to cortex.

* Mean ± S.D. ** Cited from Yabe *et al.* (1985).

monthly rain falls below 10 mm during the dry season. Other water sources such as streams, wells and waterworks are also rare. Table 2 shows renal morphologic indices for *R. rattus* and *R. exulans*. All the indices (PMT, M/C and IM/C) were significantly higher in *R. exulans* than in *R. rattus* ($p < 0.01$). The indices suggest that *R. rattus* is more prone to suffer from water shortage than *R. exulans*. Collins (1978) pointed out that also *R. rattus* in Australia is restricted mainly to coastal regions or river systems due partly to mediocre renal performance. In Northern Thailand, the drinking water supply for *R. rattus* seems to be sufficient due to dew put during the cold nights, as well as the plentiful streams, wells or waterworks, even during the dry season.

R. exulans is certainly restricted to warmer climates, whereas *R. rattus* is generally known to inhabit from temperate to tropical regions. Tomich (1986) regards *R. exulans* in Hawaii as a lowland rodent owing in part to its tropical and subtropical origins. Taylor

(1975) attributes interspecific competition of rodents mainly to the decline of *R. exulans* in New Zealand, but we found no evidence of such competition in Northern Thailand. According to meteorological reports of Thailand in 1986 and 1987, the mean minimum temperatures from December to March were sometimes below 14°C in Mae Hong Son Province and Chiang Rai Province, but were above 23°C in Chanthaburi Province and Bangkok. It is possible that *R. exulans* is unadaptable to the colder northern area of Thailand.

We conclude that minimum temperature and drinking-water supply affect the habitat segregation of rodent species among rural areas in Thailand. Probably, *R. rattus* prefers the plentiful supply of water in Northern Thailand to the limited supply in Chanthaburi Province, and *R. exulans* prefers the higher minimum temperatures in Chanthaburi Province to the low temperatures of Northern Thailand. However, further research is needed in the case of *R. rattus* in

urban areas, where only a few *R. rattus* were found (Chenchittikul *et al.*, 1983), though the drinking water supply is apparently sufficient.

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摘 要

タイ国の農家にすむネズミの優占種の地域差

中部タイの農村、チャンタブリにはナンヨウネズミ (*R. exulans*) が優占することが知られるが、北タイの農村ではクマネズミ (*R. rattus*) のみが捕れた。この優占種の地域差の原因を、水分要求の指標となる腎構造と水利条件との関係、および気温の地域差から考えた。指標の値 (たとえば腎皮質の厚さ/髄質の厚さはクマネズミ 2.56 ± 0.32 , ナンヨウネズミ 2.75 ± 0.25) からみて、ナンヨウネズミのほうが渴きに強いと推定された。クマネズミは水利の便のよい北タイの農村に生息できるが、便の悪いチャンタブリの農村には生息しにくいであろう。熱帯、亜熱帯性のナンヨウネズミは、乾季の最低気温が平均 14°C 以下になる北タイに順応できないのではないか。なおバンコクの住宅ではドブネズミ (*R. norvegicus*) とナンヨウネズミが共存したが、クマネズミは捕れなかった。