[SHORT COMMUNICATION]

Ticks (Acari: Ixodoidea) from Chiroptera (Mammalia) of the Kyushu Mainland, Japan¹

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During the years 1973 to 1974, 1977 to 1979, and 1997 to 1998, we examined five bat species, *Rhinolophus ferrumequinum*, *R. cornutus*, *Myotis macrodactylus*, *Pipistrellus abramus*, and *Miniopterus schreibersi* at four localities in the Kyushu mainland, Japan (Table 1). Then, ticks attached to bats were collected upon visual inspection of captured individuals. Ticks were preserved in 70 % ethanol and examined under a binocular microscope. The species of ticks were identified based on Yamaguti et al. (1971) and Takada (1990).

We know of few records of ticks from bats in Japan, except for three species specific to bats (Yamaguti et al., 1971). In the present study, a total of 18 ticks comprising six species were collected from bats (Table 1). However, the percentage of parasitized bats was very low, less than 2 % (Table 2). Each tick was collected from different individual bats.

The tick fauna of the Kyushu mainland has been surveyed in detail (Kakuda et al., 1989; Nakao and Takada, 1997, etc), but bats were rarely examined. Only *Argas vespertilionis* (Latreille) has been recorded from bats in this area (Kakuda et al., 1989; Yamaguti et al., 1971). Other bat ticks, *Ixodes simplex simplex* Neumann and *I. vespertilionis* Koch were therefore newly recorded from this area in the present study. The other three species, *Amblyomma testudinarium* Koch, *Haemaphysalis formosensis* Neumann and *H. flava* Neumann were collected from bats for the first time and are common in the southern part of Kyushu (Kakuda et al., 1989; Nakao and Takada, 1997; Yamamoto et al., 1995).

Host-tick relationships and previous records from bats are discussed separately under each species as follows.

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Table 1. Ticks from Chiroptera of the Kyushu mainland, Japan.

Host bat Tick species	Number & Stage	Localities (Date)
<i>Rhinolophus ferrumequinum</i> <i>Ixodes vespertilionis</i>	2 N 4 ♀	Kumamoto, Ôse-dô (26. xi. 1973; 29. vii. 1998) Kumamoto, Ôse-dô (24. xii. 1973; 12. iv. 1979; 10. v. 1979; 25. v. 1979)
<i>Rhinolophus cornutus</i> <i>Ixodes vespertilionis</i>	1 N	Fukuoka, Iharayama (11. ii. 1978)
<i>Myotis macrodactylus</i> <i>Amblyomma testudinarium</i>	1 N	Kumamoto, Ôse-dô (19. v. 1997)
<i>Haemaphysalis flava</i>	1 ♂	Kumamoto, Ôse-dô (19. v. 1997)
<i>Haemaphysalis formosensis</i>	1 N	Kumamoto, Ôse-dô (19. v. 1997)
<i>Ixodes simplex simplex</i>	1 ♀	Ôita, Ôyama-machi (17. vii. 1997)
<i>Ixodes vespertilionis</i>	1 N	Kumamoto, Ôse-dô (24. ix. 1997)
<i>Pipistrellus abramus</i> <i>Argas vespertilionis</i>	1 ♀	Fukuoka, Kashii (5. xi. 1974)
<i>Miniopterus schreibersi</i> <i>Argas vespertilionis</i>	1 ♀	Fukuoka, Iharayama (16. x. 1973)
<i>Ixodes simplex simplex</i>	3 N	Kumamoto, Ôse-dô (15. iii. 1977; 24. v. 1979)
	1 ♀	Kumamoto, Ôse-dô (12. iv. 1979)

Table 2. Infestation rate of bats with ticks from the Kyushu mainland, Japan.

Bat species	No. of bats captured	Number of bats infested (Infestation rate: %)					
		AV	AT	HFI	HFo	IS	IV
<i>Rhinolophus ferrumequinum</i>	465	0	0	0	0	0	6 (1.29)
<i>Rhinolophus cornutus</i>	261	0	0	0	0	0	1 (0.38)
<i>Myotis macrodactylus</i>	228	0	1 (0.44)	1 (0.44)	1 (0.44)	1 (0.44)	1 (0.44)
<i>Pipistrellus abramus</i>	196	1 (0.51)	0	0	0	0	0
<i>Miniopterus schreibersi</i>	1734	1 (0.06)	0	0	0	4 (0.23)	0

AV, *Argas vespertilionis*; AT, *Amblyomma testudinarium*; HFI, *Haemaphysalis flava*; HFo, *Haemaphysalis formosensis*; IS, *Ixodes simplex simplex*; IV, *Ixodes vespertilionis*.

Argasidae

Argas vespertilionis (Latreille, 1802)

Argas vespertilionis exhibits host specificity to bats (Kishida, 1927; Takada, 1990; Yamaguti et al., 1971), and has been reported in Japan from the following bats.

Rhinolophus ferrumequinum: Kishida (1927). *Hipposideros turpis*: Kishida (1927). *Pipistrellus abramus*: Kakuda et al. (1989); Kishida (1927); Kumada et al. (1978); Saito (1955); Yamaguti et al. (1971). *Nyctalus aviator*: Kishida (1927). *Vespertilio orientalis*: Takada et al. (1978). *V. superans*: Kishida (1927); Yamaguti et al. (1971). *Plecotus auritus*: Kishida (1927). *P. savii*: Yamaguti et al. (1971). *Miniopterus schreibersi*: Kishida (1927).

Kishida (1927) stated that this species occurs in Honshu, Shikoku, Kyushu, Korea, the Ryukyu Islands and Taiwan, and listed seven bat species as hosts in the above areas, but did not provide details. Therefore, his host records may not be from Japan, but from Korea or Taiwan.

This argasid tick sometimes infests humans (Kamimura and Kondo, 1977; Kakuda, unpublished; Takada et al., 1978).

Ixodidae

***Amblyomma testudinarium* Koch, 1844**

Amblyomma testudinarium has been taken mainly from mid- to large-sized mammals and sometimes from birds and reptiles (Kitaoka, 1977; Yamaguti et al., 1971). The present study is the first record of *A. testudinarium* from bats.

***Haemaphysalis flava* Neumann, 1897**

This species is one of the most common species of the family in Kyushu (Yamamoto et al., 1995). Although *H. flava* has a very broad host range among mammals and birds (Asanuma et al., 1955; Yamaguti et al., 1971), the present study is the first record of *H. flava* from bats.

***Haemaphysalis formosensis* Neumann, 1913**

Haemaphysalis formosensis has been taken mainly from mid-sized animals including birds (Kitaoka, 1977; Yamaguti et al., 1971). The present study is the first record of *H. formosensis* from bats.

***Ixodes simplex simplex* Neumann, 1906**

Ixodes simplex simplex exhibits host specificity to bats (Takada, 1990; Yamaguti et al., 1971), and has been reported in Japan from the following bats.

Rhinolophus ferrumequinum: Kishida (1930). *Myotis macrodactylus*: Arthur (1956); Yamaguti et al. (1971). *Pipistrellus abramus*: Yamaguti et al. (1971). *Nyctalus lasiopterus*: Kishida (1930). *Miniopterus schreibersi*: Arthur (1956).

***Ixodes vespertilionis* Koch, 1844**

Ixodes vespertilionis exhibits host specificity to bats (Takada, 1990; Yamaguti et al., 1971), and has been reported in Japan from the following bats.

Rhinolophus ferrumequinum: Arthur (1956); Hoogstraal (1956); Keegan and Toshioka (1957); Yamaguti et al. (1971). *R. cornutus*: Keegan and Toshioka (1957); Yamaguti et al. (1971). *Pipistrellus abramus*: Keegan and Toshioka (1957).

The present study is the first record of *I. vespertilionis* from *Myotis macrodactylus* in Japan.

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