[SHORT COMMUNICATION]

A Survey of Ixodid Ticks (Acari: Ixodidae) Including a List of All Known Species in Okinawajima Island, Japan

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Okinawajima is a major island of the Nansei Islands of Japan. It has a subtropical climate and is in the Oriental Region zoogeographically. It is well known that the fauna of this island is extremely specific with many endemic species.

The earliest report on ticks of this island was by Kishida (1929), who recorded *Boophilus microplus* (Canestrini, 1887) as *B. annulatus caudatus* Neumann, 1897 from cattle without detailed collection data. The following tick investigations, especially by Yamaguti et al. (1971), Kitaoka (1977) and Henna et al. (1989), resulted in considerable data from the island. At present, 11 species belonging to six genera are known from the literature. We now add two species in the present survey.

Our survey was made on December 4 to 8, 1996 at 12 sites in the northern part of the island (Fig. 1). These sites were located at forests consist of evergreen leaved trees (mainly *Castanopsis cuspidata* var. *sieboldii*), but one site (No. 12) was in a town. These sites are administratively located at Kunigami-son. Unfed ticks were collected by flagging vegetation at 11 sites (Nos. 1-11). Fed ticks parasitizing one land tortoise, *Geoemyda spengleri japonica*, at site No. 9 and one domestic dog at site No. 12 were collected directly from the host body surfaces.

A total of 157 ticks comprising three genera and four species were collected, and most were larval specimens (Table 1).

***Amblyomma geoemydae* (Cantor, 1847)**

Twenty-nine larvae were collected from vegetation at seven sites (Nos. 3-7, 9, 11). One ♀ and 1 ♂ were also collected from one land tortoise captured at the shore forest of Lake Hungah (No. 9).

After the earliest report by Keegan and Toshioka (1957), whose first collection record was

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沖縄本島のマダニ類調査とこれまでに本島で記録された全マダニ種リスト

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Fig. 1. Location of collecting sites in the northern part of Okinawajima Island.

1, Ginama; 2, Oku; 3, West of Ie; 4, Mt. Nishimedake; 5, Gachigawa; 6, Mt. Terukubi; 7, Mt. Fuenchiji; 8, Yonagawa; 9, Lake Hungah; 10, Peak 383; 11, North of Lake Arakawa; 12, Hentona.

2♀ from a turtle (probably land tortoise) west of Arakawa, 18.V.1955, Hubert, several collection records have been reported from the northern part of the island. Although many specimens were collected from the land tortoise, Suzuki and Noboru (1974) and Asato and Suzuki (1985) collected this species from soil samples. Hasegawa (1986) reported finding parasitic larvae and nymphs of *A. sp.* on a snake, *Entechinus semicarinatus*, collected at Mt. Yonaha. We reexamined his specimens, and identified the larvae as *A. geoemydae* and the nymphs as *A. testudinarium*. *A. geoemydae* seems to be the predominant tick in this area depending on the population of land tortoise.

***Haemaphysalis flava* Neumann, 1897**

From vegetation, 12 larvae were collected at Ginama (No. 1) and one nymph at Peak 383 (No. 10).

H. flava is known as a common tick in Japan, and almost all previous records outside of Japan are doubtful (Kitaoka, 1977). *H. flava* from southeastern Asia described in previous literature seems to be *H. indoflava* Dhanda et Bhat, 1968. In the Oriental Region of Nansei Islands, Amamioshima is the only island known to date to harbor *H. flava* (Kitaoka and

Table 1. Tick collection in the northern part of Okinawajima Island.

Number of ticks				Collecting sites	Site no.	Date
Larva	Nymph	♀	♂			
From vegetation						
<i>Amblyomma geoemydae</i>						
1	-	-	-	West of Ie	3	5. XII. 1996
1	-	-	-	Mt. Nishimedake	4	8. XII. 1996
2	-	-	-	Gachigawa	5	8. XII. 1996
15	-	-	-	Mt. Terukubi	6	4. XII. 1996
5	-	-	-	Mt. Fuenchiji	7	6. XII. 1996
1	-	-	-	Lake Hungah	9	6. XII. 1996
2	-	-	-	Lake Hungah	9	7. XII. 1996
2	-	-	-	North of Lake Arakawa	11	6. XII. 1996
<i>Haemaphysalis flava</i>						
12	-	-	-	Ginama	1	7. XII. 1996
-	1	-	-	Peak 383	10	7. XII. 1996
<i>Haemaphysalis formosensis</i>						
2	-	-	-	Oku	2	4. XII. 1996
1	1	-	-	Mt. Nishimedake	4	8. XII. 1996
4	-	-	-	Mt. Terukubi	6	4. XII. 1996
1	-	-	-	Mt. Fuenchiji	7	4. XII. 1996
41	-	-	-	Yonagawa	8	4. XII. 1996
21	-	-	-	Lake Hungah	9	6. XII. 1996
11	-	-	-	Peak 383	10	7. XII. 1996
From <i>Geoemys spengleri japonica</i>						
<i>Amblyomma geoemydae</i>						
-	-	1	1	Lake Hungah	9	6. XII. 1996
From dog						
<i>Rhipicephalus sanguineus</i>						
-	1	7	23	Hentona	12	4. XII. 1996

-, not collected.

Suzuki, 1974). However, an unnamed subspecies of *H. flava* is known to occur on Tokunoshima Island (Kitaoka, 1985a). This was previously recognized as a new species and designated tentatively as *Haemaphysalia* sp. T by Kitaoka (1977). The present specimens were distinguishable from *H. sp. T*, because the body size of *H. sp. T* is relatively larger than that of *H. flava* (Kitaoka, 1985a). We found no differences between the specimens from the present survey and *H. flava* from the mainland of Kagoshima Prefecture. This is the first record from this island and the southernmost distributional record of *H. flava*.

***Haemaphysalis formosensis* Neumann, 1913**

From vegetation, 80 larvae and one nymph were collected at seven sites (Nos. 2, 4, 6-10).

Although this species has been recorded from Iriomotejima (Kitaoka, 1977), Teramajima (Kitaoka, 1985b) and Akajima (Henna et al., 1989) of Okinawa Prefecture, we find no previous collection record from Okinawajima Island. *H. formosensis* seems to be the predominant species mainly associated with wild boar, *Sus riukiuanus*, in this area.

***Rhipicephalus sanguineus* (Latreille, 1806)**

One nymph, 7 ♀ and 23 ♂ were collected from a domestic dog at Hentona (No. 12).

This species is not a native tick in Japan, although now this tick is very common on dogs in Okinawa (Kitaoka, 1977). Yamaguti et al. (1971) supposed that it may have been

introduced to Japan on pets of U.S. Forces personnel or in household effects. This tick is primarily a parasite of dogs. However, Higa et al. (1991) reported a case of human tick bite involving 1 ♀ at Ginowan in the southern part of this island in 1990.

LIST OF ALL KNOWN TICK SPECIES IN OKINAWAJIMA ISLAND

We now recognized six genera and 13 species of ticks on Okinawajima Island. A list of tick species with references of collection record is as follows.

1. *Amblyomma geoemydae* (Cantor, 1847) Keegan and Toshioka (1957), as *A. malayanum*; Kawashima (1963), as *A. malayanum*; Yamaguti et al. (1971); Suzuki and Noboru (1974); Oonaka et al. (1975), as *A. malayanum*; Kitaoka (1977); Asato and Suzuki (1985); Hasegawa (1986), as *A. sp.*; Fujita and Tsuboi (present report).
2. *A. testudinarium* Koch, 1844 Oonaka et al. (1975); Hasegawa (1986), as *A. sp.*; Henna et al. (1989); Higa et al. (1991).
3. *Boophilus microplus* (Canestrini, 1887) Kishida (1929), as *B. annulatus caudatus*; Nakamura and Yajima (1937), as *Uroboophilus caudatus*; Yamaguti et al. (1971); Kitaoka (1977); Henna et al. (1989).
4. *Dermacentor taiwanensis* Sugimoto, 1935 Kitaoka (1977); Kitaoka and Suzuki (1981).
5. *Haemaphysalis flava* Neumann, 1897 Fujita and Tsuboi (present report).
6. *H. formosensis* Neumann, 1913 Fujita and Tsuboi (present report).
7. *H. hystricis* Supino, 1897 Hoogstraal et al. (1965); Yamaguti et al. (1971); Oonaka et al. (1975); Kitaoka (1977); Henna et al. (1989).
8. *H. longicornis* Neumann, 1901 Nakamura and Yajima (1937), as *H. bispinosa*; Yamaguti et al. (1971).
9. *H. megalaimae* Rajagopalan, 1963 Hoogstraal and Wassef (1973).
10. *H. phasiana* Saito, Hoogstraal et Wassef, 1974 Kitaoka (1977).
11. *Ixodes granulatus* Supino, 1897 Keegan and Toshioka (1957); Kawashima (1963); Yamaguti et al. (1971); Oonaka et al. (1975); Kitaoka (1977).
12. *I. turdus* Nakatsuji, 1942 Kitaoka (1977).
13. *Rhipicephalus sanguineus* (Latreille, 1806) Yamaguti et al. (1971); Oonaka et al. (1975); Kitaoka (1977); Henna et al. (1989); Higa et al. (1991); Fujita and Tsuboi (present report).

REMARKS

B. microplus was not found in the current study, although it was a common parasite of cattle in this island until 1970s. Henna et al. (1989) considered that this species was exterminated from this island by tick control efforts.

The nymphal *Dermacentor* sp. was collected from range cattle at Sosu, Kunigami-son, in 1983 by Henna et al. (1989). This specimen seems to be *D. taiwanensis*. Kitaoka and Suzuki (1981) reported the collection of *D. taiwanensis* at Mt. Ibudake near Sosu.

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