

## Additional Two Case Studies of Human Infestation with Hard Tick (Acarina: Ixodidae) Found in Okayama, Japan

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**ABSTRACT.** Two cases of human infestation with hard tick from Okayama Prefecture are additionally reported. Case 1: On April 18th, 1990, the hard tick bite was found on the skin surface of right occipital region of 3-year-old boy living in Okayama City, Japan. The removed tick body (idiosoma) measured about 3.0 mm in length and 2.0 mm in maximum width. On acarological observations, the tick was identified as an adult female of *Haemaphysalis longicornis* Neumann, 1901 based on the morphology of capitulum, scutum, coxae, internal and external spurs and spiracular plates. Case 2: On June 26th, 1990, the hard tick bite was found on the skin surface of left shoulder region of 66-year-old woman residing in Soja City, Okayama Prefecture, Japan. The collected tick body measured about 5.5 mm in length and 4.0 mm in maximum width without capitulum. The tick was identified as an adult female of *Ixodes nipponensis* Kitaoka *et* Saito, 1967. The tick bites were thought to have been occurred in hilly area (Case 1) and in a vacant house (Case 2), and none of systemic symptoms other than the tick bite wounds was recognized. To our best knowledge, the present report is 12th and 13th cases infested with hard tick in Okayama Prefecture, Japan. Details with bibliographical data in the prefecture are reported.

**Key words:** human tick bite — *Haemaphysalis longicornis* —  
*Ixodes nipponensis* — Ixodidae — Acarina

Ixodid hard ticks have so far been recorded over 600 species in some 14 genera throughout the world,<sup>1)</sup> of which 40 species collected in Japan.<sup>2)</sup> Although the hard ticks are generally ectoparasites of wild animals, viz., the amphibians, reptiles, birds and mammals, most of all ticks are known to often infest on human beings to suck blood. Recently, the cases of human infestation with the hard ticks tend to increase in number in Japan and over 500 cases have been reported in literature (Yamaguti, 1989).<sup>3)</sup> The tick bite on human bodies should particularly be studied because the ticks suck out blood of the host, and further they communicate numerous kinds of microbial diseases to man everywhere in foreign countries.

It is fortunate that nothing has so far been known of fatal diseases to humans by tick bites in Japan, but a few number of patients of Japanese

spotted fever and Lyme disease may be communicated principally from some tick bodies which have been reported by Mahara *et Fujita* (1989),<sup>4)</sup> Nakao *et Miyamoto* (1990)<sup>5)</sup> and Yamaguti (1989).<sup>6)</sup> The authors report here additional two human cases of the hard tick infestation in Okayama Prefecture together with bibliographical consideration of the prefecture.

#### CASE NOTES

Case 1: The patient (S.S.) was a 3-year-old boy living in Fukuda, Okayama City, Japan. The boy with his family had climbed to Mt. Oji-Gatake in Kurashiki City a few days before. On the evening of April 17th, 1990, his mother first noticed the presence of a small foreign body on the skin surface of his occipital region. Then the mother removed it from the skin with bare hands, and the removed foreign body was sent to Department of Dermatology, Kawasaki Hospital next day. At first sight, the foreign body turned out to be an adult tick with four pairs of legs. By cutaneous findings, the tick bite lesion was confined to the skin surface of right occipital region but the bite wound was not clear. No essential change of the systemic symptoms was found in the patient.

The removed tick body was relatively small in size, and morphological characteristics of the tick are described as follows; the body without capitulum was about 3.0 mm in length and 2.0 mm in maximum width (Fig. 1); capitulum at the anterior end was triangular in shape (Figs. 1,2); palpal segment II protruded laterally beyond the basis capituli and porous area fairly distinct (Fig. 2); scutum on the anterior back almost round-shaped in dorsal view and lacking eyes (Fig. 1a); festoons present at the periphery of posterior end of the body (Fig. 1); hypostome approximately equal in length to palps

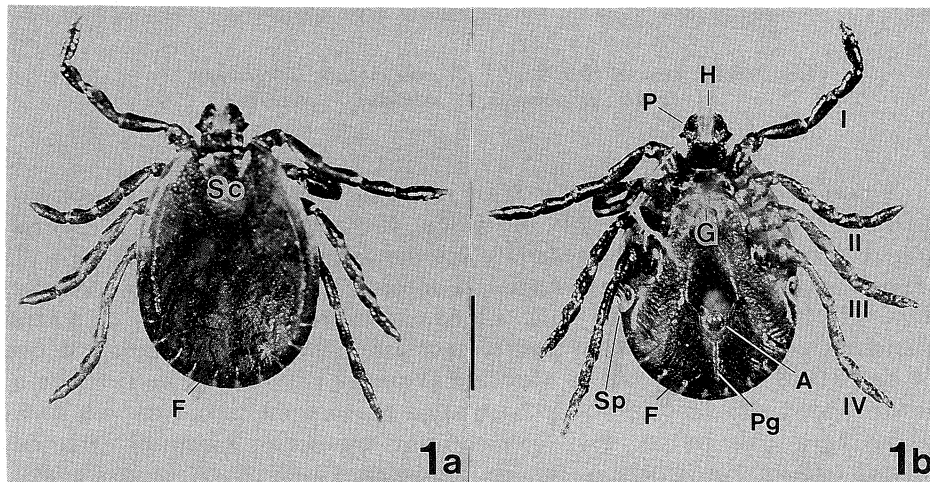
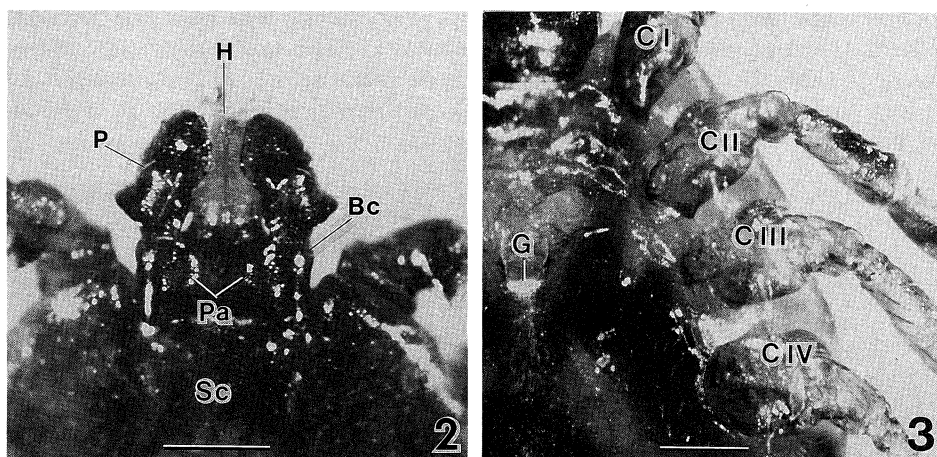


Fig. 1. An adult female of *Haemaphysalis longicornis* removed from the skin surface of right occipital region of the patient Case 1. Dorsal view (1a) and ventral view (1b) (Bar= 1.0 mm)

A: anus, F: festoon, G: genital aperture, H: hypostome, P: palp, Pg: postanal-median groove, Sc: spiracular plate, I-IV: 1st to 4th leg

(Fig. 2); genital aperture present on the antero-ventral surface and postanal-median groove present behind the anus (Fig. 1b); internal spur on coxa I sharply pointed (Fig. 3) and spiracular plates elongated anteroposteriorly. From those characteristics, the tick was identified as an adult female of *Haemaphysalis longicornis* Neumann, 1901.



Figs. 2-3. An adult female of *Haemaphysalis longicornis* removed from the patient Case 1

Fig. 2. Anterior end (capitulum), dorsal view (Bar=0.25 mm)

Bc: basis capituli, H: hypostome, P: palp, Pa: porous area, Sc: scutum

Fig. 3. Left coxae, ventral view (Bar=0.25 mm)

CI-CIV: coxa I to IV, G: genital aperture

Case 2: The patient (S.O.) was a 66-year-old woman residing in Shimo-Kurakido, Soja City, Okayama Prefecture, Japan. In Autumn of 1989, the patient went into an old vacant house nearby her residence for carry the

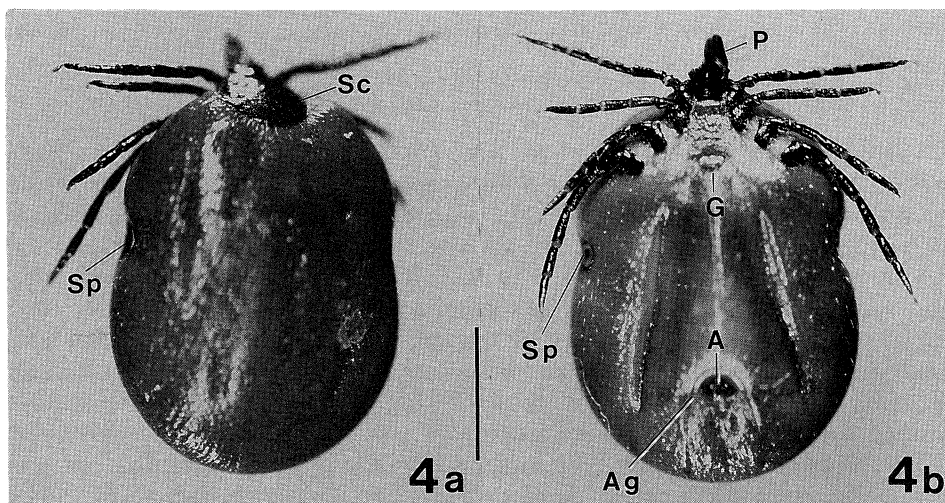
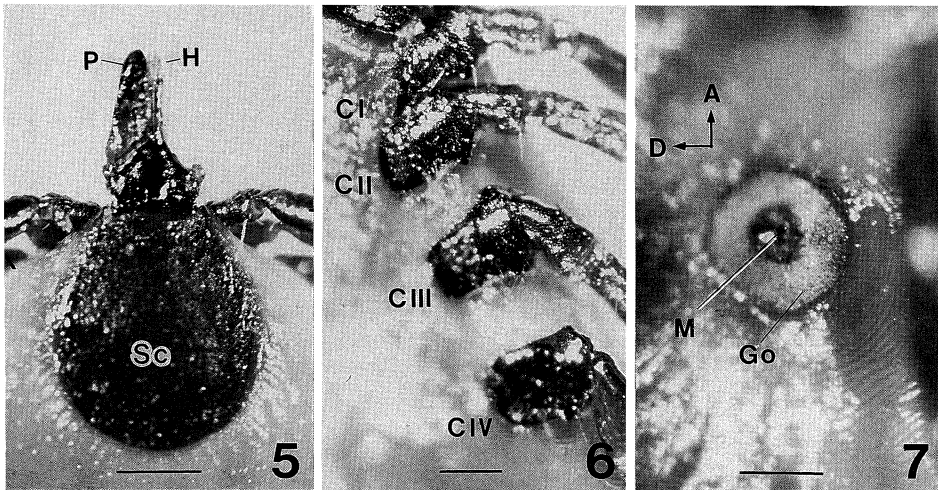


Fig. 4. An adult female of *Ixodes nipponensis* removed from the skin surface of left shoulder region of the patient Case 2. Dorsal view (4a) and ventral view (4b) (Bar=2.0 mm)

A: anus, Ag: anal groove, G: genital aperture, P: palp, Sc: scutum, Sp: spiracular plate

used clothes back to her home, which she always wore. About 6 months after, the patient noticed the presence of a foreign substance like hard verruca on the skin surface of her left shoulder region without any particular pain. She visited Department of Dermatology, Kawasaki Medical School on June 26th, 1990. The wound was easily diagnosed as hard tick bite. The tick body found on skin surface of left shoulder region was dark-gray in color and the body had slightly been distended by bloodsucking. Erythema was observed on skin surface of entire circumference of the bitten site. The tick body was removed together with surrounding cutaneous tissue because of a hypostome stuck deeply into the host skin. There was no remarkable change in systemic symptoms of the patient.



Figs. 5-7. An adult female of *Ixodes nipponensis* removed from the patient Case 2

Fig. 5. Anterior end (capitulum and scutum), dorsal view (Bar=0.5 mm)

H: hypostome, P: palp, Sc: scutum

Fig. 6. Left coxae, ventral view (Bar=0.2 mm)

C I-CIV: coxa I to IV

Fig. 7. Right spiracular plate, lateral view (Bar=0.2 mm)

A: anterior direction, D: dorsal direction, Go: goblet, M: macula

Although the palp of the right side was accidentally cut from the basis capituli when the tick body was partially separating from cutaneous tissue, the morphological characteristics of the removed tick may be enumerated as follows; the body excluding capitulum was about 5.5 mm in length and 4.0 mm in maximum width (Fig. 4); the body surface covered densely with tick setae; capitulum at the anterior end club-shaped and palps were fairly long stalk in form (Figs. 4,5); scutum on the back slightly long-elliptic shape and lacking eyes (Fig. 5); genital aperture present on the ventro-anterior surface and anal groove present around the anus (Fig. 4b); internal spur on coxa I pointed and overlapping anterior margin of coxa II (Fig. 6); and spiracular plates elliptical in form (Fig. 7). Judging from the characteristics, the tick was identified as an adult female of *Ixodes nipponensis* Kitaoka *et* Saito, 1967. The patient had no experience of trespassing mountainous areas for past several years.

TABLE 1. Past and present tick bite cases recorded in Okayama Prefecture

Case no.	Examined date	Patient			Lesion site	Tick species	Authors (year)	
		name	age	sex				residence
1	June 1981	S.O.	59	F	Mimasaka-Cho	Right shoulder	<i>I. ovatus</i>	Hatsushika <i>et</i> Miyoshi (1982) <sup>7)</sup>
2	June 1984	T.U.	75	M	Wake-Cho	Left axilla	<i>I. nipponensis</i>	Nakatsukasa <i>et</i> Hatsushika (1985) <sup>8)</sup>
3	Dec. 1984	M.H.	2	M	Okayama City	Right temple	<i>H. flava</i>	Mimura <i>et</i> Hatsushika (1986) <sup>9)</sup>
4	June 1987	H.H.	4	M	Kuse-Cho	Left vertex	<i>H. flava</i>	Hatsushika <i>et</i> Mimura (1987) <sup>10)</sup>
5	Apr. 1983	? (child)	?	?	Okayama City	Neck	<i>H. longicornis</i> *	Hatsushika <i>et al.</i> (1990) <sup>11)</sup>
6	Aug. 1987	S.I.	78	F	Takahashi City	Right axilla	<i>H. longicornis</i>	
7	Oct. 1987	M.S.	50	F	Okayama City	Upper shoulder	<i>H. flava</i>	
8	May 1988	I.O.	38	F	Okayama City	Right post-auricle	<i>I. nipponensis</i>	
9	May 1989	Y.S.	4	M	Okayama City	Left post-auricle	<i>H. longicornis</i>	
10	May 1989	N.K.	24	M	Okayama City	Right femur	<i>H. longicornis</i>	Hatsushika <i>et al.</i> (1990) <sup>12)</sup>
11	Apr. 1990	K.F.	62	M	Tamano City	Right femur and arm	<i>H. longicornis</i> *	
12	Apr. 1990	S.S.	3	M	Okayama City	Right occiput	<i>H. longicornis</i>	Present authors
13	June 1990	S.O.	66	F	Soja City	Left shoulder	<i>I. nipponensis</i>	

\* = nymphal stage, *I.* = *Ixodes*, *H.* = *Haemaphysalis*, F = female, M = male

## DISCUSSION

The human bite cases by ixodid hard ticks of about 15 species have so far been reported in Japan,<sup>3)</sup> namely *Rhipicephalus sanguineus* Latreille, 1806, *Amblyomma testudinarium* Koch, 1844, *Ixodes acutitarsus* (Karsch, 1880), *Haemaphysalis flava* Neumann, 1897, *H. hystricis* Supino, 1897, *I. ovatus* Neumann, 1899, *H. longicornis* Neumann, 1901, *H. campanulata* Warburton, 1908, *I. simplex simplex* Neumann, 1906, *H. japonica* Warburton, 1908, *I. persulcatus* Schulze, 1930, *I. turdus* Nakatsuji, 1942, *I. monospinosus* Saito, 1967, *I. nipponensis* Kitaoka *et* Saito, 1967 and *I. asanumai* Kitaoka, 1973.

The ixodid hard ticks belong to the order Acarina and they develop into adult by incomplete metamorphosis passing through 3 developing stages; those are, egg, larva and nymph. In general, almost all ixodid ticks inhabit in hills and fields, and many species of them have a wide range of hosts. Individuals of larval to adult stages are bloodsucking ectoparasites of numerous wild animals and man. It is well known that the hard ticks induce bite wounds on human skin and also inject various kinds of agential organisms of microbial diseases into the skin. The diseases related are Far Eastern encephalitis, Central Europe tick borne encephalitis, Louping ill, Kyasanur forest disease, Powassan encephalitis, Omsk hemorrhagic fever, Crimean hemorrhagic fever, Colorado tick fever, Kemerovo tick fever and Russian spring-summer encephalitis (viral diseases), Rocky mountain spotted fever, Routonneuse fever, Queens-land tick fever, Siberian tick typhus and American tick fever (rickettsial

diseases), Tularemia and Relapsing fever (bacterial diseases) and others.

Although those infectious diseases are rare in Japan, at present, the rickettsial agents of Japanese spotted fever is confirmed in an appreciable number of Japanese hard ticks including the adults of *H. longicornis* and *I. nipponensis* assayed by the indirect immunoperoxidase test (Mahara *et Fujita*, 1989).<sup>4)</sup> Therefore, the particular attention should constantly be paid to systemic symptoms of the patient, even though chief complaint is only with bite wounds.

As shown in Table 1, the first human case of hard tick infestation in Okayama Prefecture was reported by Hatsushika and Miyoshi (1982),<sup>7)</sup> then 11 cases have so far been known since, of which the 11th case was by 3 nymphal tick infestation.<sup>12)</sup> It is quite conceivable that many of unreported cases of the hard tick bites may remain. The hard tick infestation occurs frequently in a 3 month period of April to June except for cases 3, 6 and 7. This fact gives clear evidence that frequency of outdoor activities of humans corresponds with activation period of the hard ticks as emphasized by Yamaguti (1989).<sup>3)</sup> All of the victims were in ages between 2 and 78 years old, and the highest incidence occurred in the age groups above 50 years old and children under 10 years old. The distribution of sex of the patient is higher in men than in women. All the tick bodies removed from 11 patients were identified as adult females excluding 2 cases of nymphs,<sup>11,12)</sup> and the infested portion of the patients were predominantly skin surfaces of the upper body, such as, head,<sup>9-11)</sup> shoulder,<sup>7,11)</sup> axilla<sup>8,11)</sup> as well as forearm.<sup>12)</sup> The infestation routes of hard tick in 11 patients are not traced but one half the patients appeared to be infested at mountain area.<sup>7,8,11,12)</sup>

Meanwhile, the sum total of 4 ixodid species are removed and identified from 11 patients in Okayama Prefecture, in which the infestation with *H. longicornis* were most abundant,<sup>11,12)</sup> followed by *H. flava*<sup>9-11)</sup> and *I. nipponensis*,<sup>8,11)</sup> whereas *I. ovatus* infestation was rather rare as shown in Table 1. Although the human cases of *I. ovatus* infestation are most common in Japan,<sup>3)</sup> so far, only one case of *I. ovatus* infestation is known in Okayama Prefecture. The reason for this possible discrepancy is not yet clear. Moreover, no definite statement can be made to elucidate relationship between location of infestation occurred and species of the removed tick bodies, though the habitat specificity is known among several species of ixodid ticks in Japan.<sup>3)</sup> The severe cases of Japanese spotted fever and other fatal diseases by tick bites are not well-defined in Japan although utmost care must always be taken.

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