

## A Case Study of External Auditory Meatus Infestation with Hard Tick (Acarina: Ixodidae) Found in Okayama Prefecture, Japan

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**ABSTRACT.** A rare human case of auditory meatus infestation with hard tick (Acarina: Ixodidae) found in Okayama Prefecture, Japan is reported. On July 8th, 1995, the patient (a 45-year-old housewife) living in Kurashiki City, Okayama, presented to Ear Nose Throat Clinic, complaining of auditory discomfort and marked depression of hearing acuity of left ear. By otological examination, hard tick bite was found on the under wall of lower portion of left external auditory meatus of the patient. The removed tick body from the patient measured 8.0 mm in length and 7.0 mm in maximum width in the mounted specimen. By acarological observation, the tick was identified as an adult female of *Haemaphysalis longicornis* Neumann, 1901 based on morphological characteristics of capitulum (hypostome and palps), scutum, internal and external spurs on coxae and spiracular plates.

The tick bite was thought to have been occurred in hillside path nearby her residence. The present report is the 22nd human case of hard tick infestation in Okayama Prefecture, Japan since 1982.

**Key words:** otoixodiasis — human tick, bite — *Haemaphysalis longicornis* — Ixodidae — Okayama Prefecture

Ixodidae, or hard ticks, usually inhabit throughout their whole life in forests and grass plains. The individuals of developing stages (larva, nymph and adult) tend to attack on wild mammals and humans as occasions occur, and suck out blood and other body fluids of the host animals. It is also known that the ixodid hard tick frequently communicate various kinds of microbial diseases to humans. Recently, Japanese spotted fever<sup>1-3)</sup> and Lyme disease<sup>2-5)</sup> caused by tick bites have particularly been pointed out with special attention in Japan. Fortunately, however, severe cases of tick-associated diseases such as Colorado tick fever, Relapsing fever, Tularemia, Rocky Mountain spotted fever, Tick typhus and Q fever have not been seen in Japan. The bite site of hard tick infestation in human is mostly on the skin surface of entire body, thus infestation on ear canal is rather rare.

In the present paper, a human case of otoixodiasis found in Okayama Prefecture, Japan is described together with bibliographical consideration.

## CASE NOTE

The patient (Y. K.) is a 45-year-old housewife living in Tokubo, Kurashiki City, Okayama, Japan. She had frequently strolled through a hillside path nearby her residence. On late June, 1995, the patient first noticed the remarkable sign of spontaneous auditory discomfort and depression of hearing acuity of left ear. These disquieting symptoms were relatively mild without pain, itching and tinnitus, therefore, she did not pay any special attention for a while.

Thereafter the patient's left ear became further aggravated rapidly. On July 7th, 1995, the patient noticed outpouring of small amount of aural discharge of dark-brown color without odor, when she had poked the ear canal with an earpick to remove the foreign body. The following day, the patient presented to Ear Nose Throat Clinic, complaining of auditory discomfort and marked depression of hearing acuity of left ear.

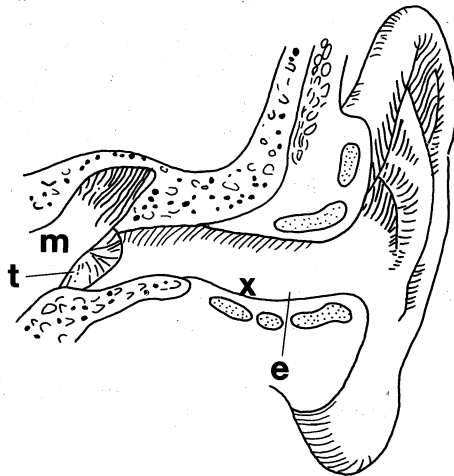


Fig 1. Schematic drawing of the left ear, showing the site of tick bite  
 e: external auditory meatus, m: medial ear, t: tympanic membrane,  
 x: site of tick bite

On examination of the left ear canal with an ear speculum, foreign body of dark-brown color which looked like impact globular cerumen, was found in the external auditory meatus (Fig 1). The foreign body was then carefully removed out. The auditory discomfort and feeling of fullness were disappeared after removal of the foreign body, and hearing acuity was completely recovered. The hearing acuity of the patient after the above treatment returned to the normal level in both ears.

On gross inspection, the removed foreign body was identified as an adult tick with 4 pairs of legs (Fig 2). Physical examination of the left ear canal revealed that the simple erosive lesion and moderate bleeding were observed on the floor wall of the external auditory meatus. However, no serious damage caused by the tick bite was recognized on tympanic membrane and the other part of the external canal. The patient was then treated with an ointment Rinderon VG®. The tick bite lesion of left auditory meatus was found to be

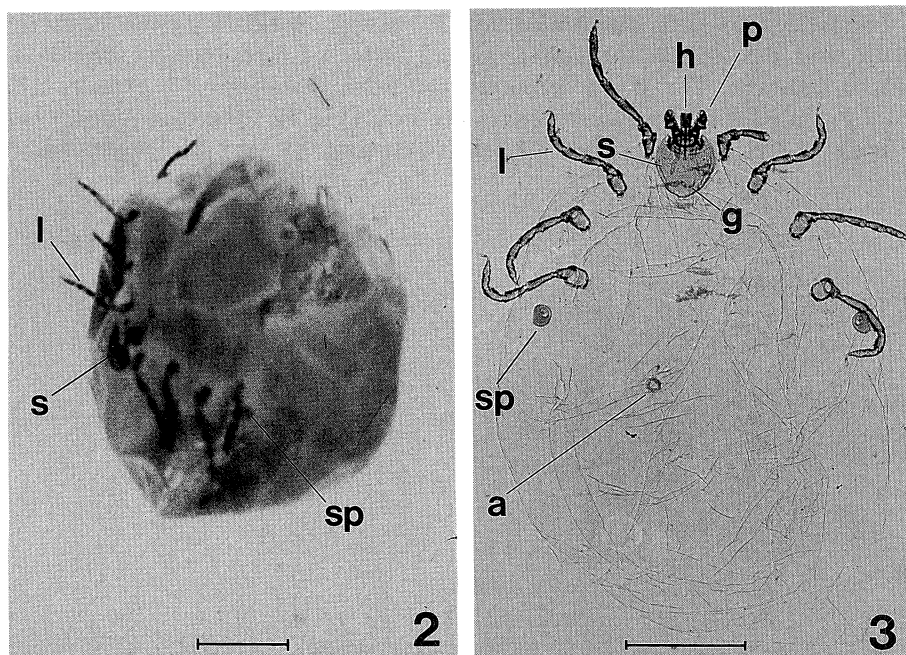


Fig 2. The tick body shortly after removed from the skin surface of left auditory meatus of the patient (scale=2.0 mm)

Fig 3. The tick body (adult female) of *Haemaphysalis longicornis* treated with a 10% solution of NaOH, ventral view of mounted specimen (scale=2.0 mm)  
 a : anus, g : genital aperture, h : hypostome, l : leg, p : palp, s : scutum, sp : spiracular plate

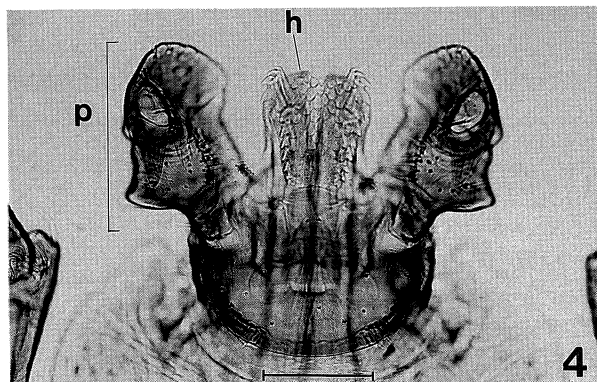


Fig 4. The anterior end (capitulum) of the adult *H. longicornis*, dorsal view (scale=0.2 mm)  
 h : hypostome, p : palp

recovered in 2 weeks after the treatment. No conspicuous change of the general symptoms was found. As far as we know this report is the 22nd human case infested with hard tick in Okayama Prefecture, Japan since 1982.

## THE TICK EXAMINED

The removed tick was boiled for 20 min in a 10% aqueous solution of NaOH and dehydrated through a graded series of ethanol, and mounted in Canada balsam. The body including capitulum measured 8.0 mm in length and 7.0 mm in width in the mounted specimen (Fig 3). The capitulum was not so long as that of the genus *Ixodes*, measuring 0.7 mm in length, and the

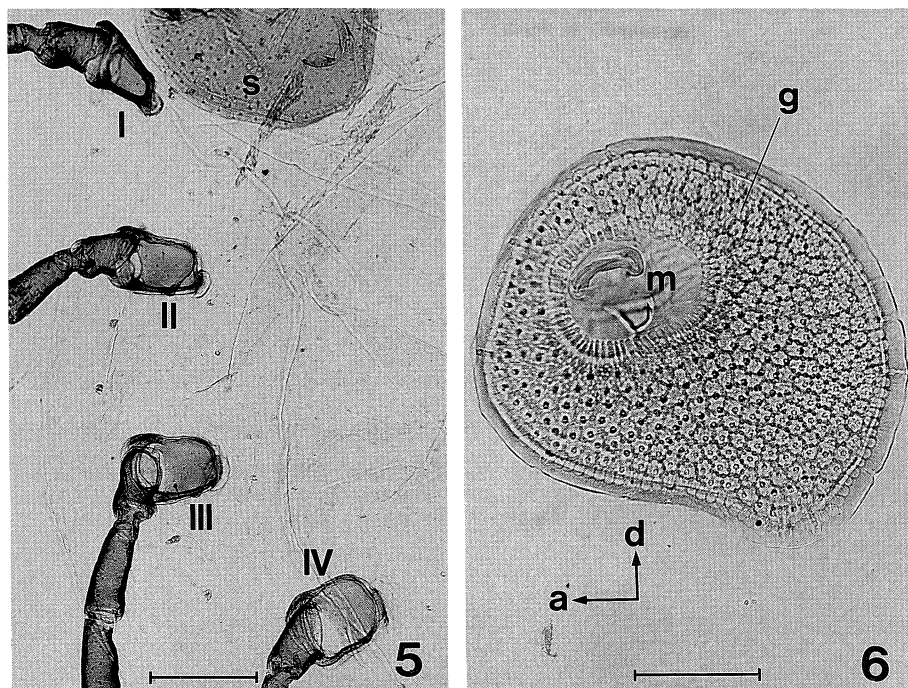


Fig 5. Right coxae of the adult *H. longicornis*, ventral view (scale=0.4 mm)

I-IV: coxae I to IV, s: scutum

Fig 6. Right spiracular plate of the adult *H. longicornis*, ventral view (scale=0.1 mm)

a: anterior, d: dorsal, g: goblet, m: macula

hypostome almost equaled to palps in length (Fig 4). The scutum on the back was elliptical in shape, measuring 1.1 mm in length and 0.1 mm in transverse diameter. The spiracular plates located on each side just behind 4th coxae measured 4.0 mm in length (antero-posteriorly) and 0.3 mm in width (dorso-ventrally) (Fig 3), and position of macula probably deviated from a center of spiracular plate (Fig 6). Internal spur of coxa I was apparently longer than those of coxae II to IV (Fig 5). Genital aperture was recognized on the ventro-anterior surface of the body, although it seemed slightly deviated from the regular position on the mounted specimen (Fig 3).

Judging from the morphological features, the tick was identified as an adult female of *Haemaphysalis longicornis* Neumann, 1901.

TABLE 1. External auditory meatus infestation with hard ticks reported in Japan

Cases	Patients		Localities infested	Hard tick species	Authors (year)
	ages	sexes			
1*	?	?	Sakhalin	<i>I. nipponensis</i>	Nakatani (1931) <sup>8)</sup>
2**	?	?	Hokkaido	"	Inukai (1952) <sup>9)</sup>
3	?	?	?	"	Nakao (1953) <sup>10)</sup>
4	10	F	?	"	Yoshioka (1959) <sup>11)</sup>
5	5	"	Hokkaido	<i>I. persulcatus</i>	Miyamoto and Takahashi (1990) <sup>12)</sup>
6	52	"	?	<i>H. longicornis</i>	] Yamaguti <i>et al</i> (1991) <sup>13)</sup>
7	47	"	Fukuoka	"	
8	54	"	"	"	] Yoneda <i>et al</i> (1992) <sup>14)</sup>
9	45	M	Oita	"	
10***	?	?	Hokkaido	[ <i>I. persulcatus</i> <i>I. ovatus</i>	Miyamoto and Nakao (1994) <sup>15)</sup>
11	45	F	Okayama	<i>H. longicornis</i>	Present authors

\*=Children 7, \*\*=Children, number of cases not reported,

\*\*\*=Children 7 (6 of *I. persulcatus* and one of *I. ovatus*) aged from 1 to 10 years old.

*H*=*Haemaphysalis*, *I*=*Ixodes*

#### DISCUSSION

The ticks are taxonomically classified in the class Acarina, subclass Acari. Some hard tick species belonging to the family Argasidae and Ixodidae are well known as bloodsucking ectoparasites of mammals, birds, reptiles and amphibians. About 250 species of ixodid hard tick are known in the world.<sup>6)</sup> So far at present, 15 species among them have been recorded as bite ticks to man in Japan,<sup>7)</sup> namely *Ixodes ovatus* Neumann, 1901, *I. persulcatus* Schulze, 1930, *I. nipponensis* Kitaoka and Saito, 1967, *I. acutitarsus* (Karsch, 1880), *Amblyomma testudinarium* Koch, 1844, *Haemaphysalis longicornis* Neumann, 1901, *H. flava* Neumann, 1897, *I. monospinosus* Saito, 1967, *Argas vespertilionis* Kishida, 1927, *H. companulata* Warburton, 1908, *I. asanumai* Kitaoka, 1973, *H. japonica* Warburton, 1908, *H. hystricis* Supino, 1897, *Rhipicephalus sanguineus* Latreille, 1860 and *A. japonicus* Yamaguti, Clifford and Tipton, 1968 in an order of occurrence.

The class Acarina can be differentiated from insects as the bodies are not entirely segmented and develop into adult by incomplete metamorphosis passing through 3 developing stages, that is, egg, larva, and nymph. Both nymphs and adults have 4 pairs of legs while only 3 pairs in larval stage. Individuals of the larval and adult stages tend to attack owing to bloodsucking of various animals including man. Simultaneously, they frequently communicate various kinds of microbial diseases to man. Over 500 cases of human tick bites have so far been recorded in Japan since 1927,<sup>7)</sup> although the first case of auditory meatus infestation was reported by Nakatani (1931)<sup>8)</sup> of 7 children in Sakhalin (formerly Karafuto), and thereafter unequivocal 10 cases reported in Japan (Table 1). As shown in Table 1, a total number of victims appeared to be more than 23. Among them, over 17 were children under 10 year old, while

adult age victims were only 5 in all, including the present case. It is quite conceivable that the children were unaware of hard tick invasion into their auditory meatus, while it happened during rough outdoor playing.

The most of 22 patients of auditory meatus infestation with hard tick shown in Table 1 are inhabitants of Kyushu district and northern Japan mainly in Sakhalin,<sup>8)</sup> Hokkaido,<sup>9,12,15)</sup> Fukuoka<sup>13,14)</sup> and Oita<sup>14)</sup> Prefectures. All the tick bodies removed from the patients are identified as adult females including the present case. Meanwhile, a sum total of 4 ixodid species are removed from 22 patients of auditory meatus infestation (Table 1), in which the infestation with *Ixodes nipponensis* were the most (over 10 cases,<sup>8-11)</sup> followed by *I. persulcatus* (7 cases)<sup>12,15)</sup> and *H. longicornis* (4 cases),<sup>13,14)</sup> whereas *I. ovatus* was only one case.<sup>15)</sup> According to Yamaguti (1971),<sup>16)</sup> *H. longicornis* is known to be parasitic to at least 20 animals from small to large mammals and birds — those are; cattle, horse, sheep, goat, deer, bear, pig, fox, racoon, badger, cat, dog, rabbit, house sparrow, skylark, thrush, turkey, duck, chicken, pheasant, and man.

Human infestation with *H. longicornis* most frequently occurs in Okayama Prefecture.<sup>17)</sup> As stated briefly, it is known that ixodid hard ticks transmit various kinds of microbial diseases to man throughout the world.<sup>18)</sup> Those are rickettsiosis: Boutonneuse fever, Bullis fever, Maculatum disease and spotted fever; viral diseases: Powassan encephalitis, Negishi encephalitis, Langat encephalitis, Kyasuanur forest disease, Omsk hemorrhagic fever, Russian spring-summer encephalitis, central European tick-borne encephalitis, louping ill, Colorado tick fever, Q fever, Crimean-Congo fever, Kemerovo tick fever and Tribee; bacterial and spirochaetal diseases: Relapsing fever and Tularemia; and Toxicosis: Tick paralysis.

Fortunately, the infectious diseases mentioned above have not yet been known in Japan. In recent years, however, a pathogenic microbe (*Rickettsia japonica*) of Japanese spotted fever was discovered from adult body of *H. longicornis* collected both in Tokushima and Kochi Prefectures.<sup>19)</sup> Therefore, keen attention should constantly be paid to systemic symptoms of the patients, only even bearing tick bite wounds.

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