

**Child Infestation with the Hard Tick *Haemophysalis flava*
(Acarina : Ixodidae) Found in Okayama, Japan
(Case Report and Bibliographical Review)**

Shigeru MIMURA and Ryo HATSUSHIKA*

*Department of Dermatology, Kawasaki Hospital,
Kawasaki Medical School, Okayama 700, Japan*

**Department of Parasitology, Kawasaki Medical School,
Kurashiki 701-01, Japan*

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ABSTRACT. A case and bibliographical review of child infestation with the hard ticks are reported. On December 4th, 1984, the tick bite was found on the skin surface of temporal region behind the right ear of a 2-year-old boy living in Okayama, Japan. The collected tick body (ideosoma) measured about 5.0 mm in length and 4.0 mm in maximum width not counting capitulum. By the acarological observation, the tick was identified as an adult female of *Haemophysalis flava* Neumann, 1897 based on morphology of scutum, coxae, internal spurs and spiracular plates. In this case, the tick infestation occurred when the boy was playing on the grass, and it seems to be a unique case because the victim was quite young and the incidence happened in less common winter season.

To our best knowledge, this report is the third human case infested with hard tick in Okayama Prefecture, Japan. Details with bibliographical data are reported.

Key words : Ixodiasis — Hard tick bite — *Haemophysalis flava* — Ixodidae — Acarina

It is well known that the hard ticks (Ixodidae) are bloodsucking ectoparasites of wild mammals, avians, reptiles and amphibians. In some cases however they are found on man as well. The tick bites on the human body are medically interested because the ticks suck out blood of the host then communicate various kinds of microbiological diseases such as tick paralysis, tick encephalitis, louping illness, forest disease, hemorrhagic fever, Colorado tick fever, Rocky Mountain spotted fever, tick typhus, Q fever, relapsing fever, tularemia and some others to man in certain areas throughout the world.

In Japan, tick bites are gradually increasing in recent years, and over 200 cases have been reported in literature. However, reports on *Haemophysalis flava* infestation are limited. The authors wish to report here the child infestation with *H. flava* found in Okayama Prefecture together with bibliographical review.

CASE REPORT

The patient (M.H.) was a healthy 2-year-old boy living in Izumi-Cho, Okayama City, Japan. The boy was enrolled to our hospital on December

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4th, 1984 because the boy complained marked swelling with mild pain on skin surface of the temporal region behind his right ear. He and his family show no medical irregularity in past, and medical examination proved the boy completely normal with an exception of moderate expansion of lymphglands in the right cervix region without tenderness.

By cutaneous findings, the lesion was confirmed with extensive reddish swelling, size of a chicken egg. The main lesion was found just upper side of the right ear, and its surrounding had been slightly elevated and a hematoma like foreign body was noted (Fig. 1). The foreign body was glossy and light-blue in color, but it turned out to be a visible tick body (Fig. 2). According to his mother, the boy made a distant walk around suburb of Okayama and played on the grass there about 20 days before the first sign of symptoms. He has never gone outdoor since until hospitalization.



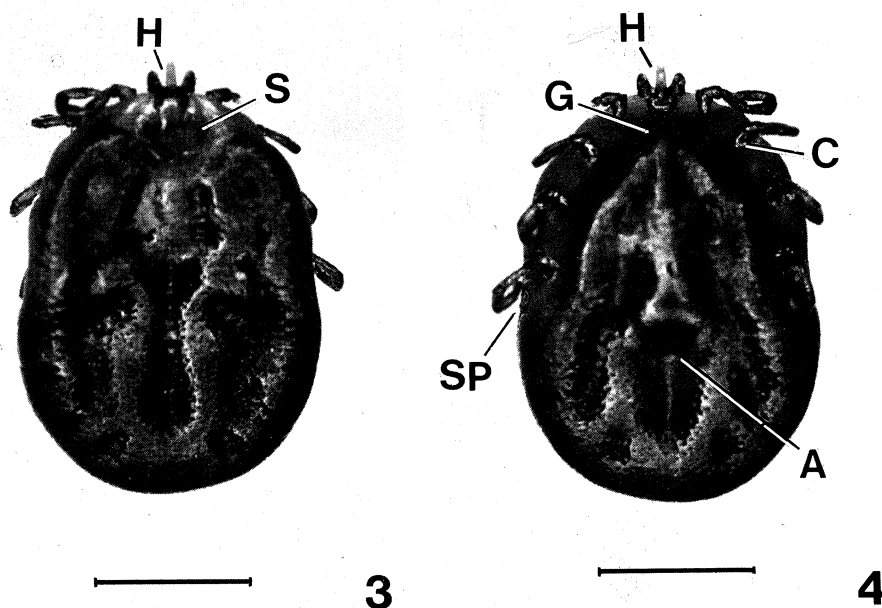
Fig. 1. Clinical photograph of the tick bite (arrow), right temporal region of the patient.
Fig. 2. High magnification of the tick, the same of Fig. 1.

The skin lesion including the tick body of 10×7 mm was removed shallowly together with the cutaneous tissue because a hypostome found at an anterior end of tick body was deeply engulfed into the skin and the tick body was not easily removed from the skin surface. After removal of the tick body the skin wound was sutured. The swelling disappeared rapidly by oral administration of antibiotics, and prognosis of the patient was good.

The tick body was then carefully separated from the extirpated skin block under a dissecting binocular microscope. The removed tick body was found with capitulum at an anterior end, and the ideosoma measured about 5.0 mm in length and 4.0 mm in maximum width. The body had been slightly swollen by sucking patient's blood (Figs. 3, 4). By acarological observation, the tick

showed the following characteristics : capitulum at an anterior end of the body, relatively short hypostome, rounded scutum on back measuring about 0.8 mm in length and 0.9 mm in width, absence of eyes, and rounded spiracular plates at lateral sides posterior to fourth coxa measuring 0.22 mm in diameter. Furthermore, a genital aperture and anus are recognized on the ventral surface of abdomen (Fig. 4), and spur of the fourth coxa is somewhat longer than that of other 3 coxae (1st to 3rd). As the results the present tick was thus identified as an adult female of *Haemophysalis flava* Neumann, 1897.

Histological study of the extirpated skin tissue revealed that surface of the skin completely destroyed, and well-marked spongiosis, petechial hemorrhage and edematous erythema noted. Moreover, inflammatory cells with multiple lymphocytes and eosinophilia were found infiltrated into cutaneous dermis.



Figs. 3-4. An adult female of *Haemophysalis flava* removed from the skin surface of right temporal region of the patient, dorsal view (3) and ventral view (4) (Scale=2 mm).

A : anus, C : coxa, H : hypostome, G : genital aperture, S : scutum,
SP : spiracular plate.

DISCUSSION AND BIBLIOGRAPHICAL REVIEW

The hard tick bites on human body by 10 tick species have been reported in Japan namely, *Amblyomma testudinarium* Koch, 1844, *Ixodes acutitarsus* (Karsch, 1880), *Boophilus microplus* (Canestrini, 1888), *Haemophysalis flava* Neumann, 1897, *I. ovatus* Neumann, 1899, *H. longicornis* Neumann, 1901, *Argas vespertilionis* Kishida, 1927, *I. persulcatus* Schulze, 1930, *I. monospinosus* Saito, 1967 and *I. nipponensis* Kitaoka and Saito, 1967.

The hard ticks are taxonomically classified in Arthropoda and the ticks are differentiable from insects as the bodies are not entirely segmented, and both adults and nymphs have 4 pairs of legs, the larvae 3 pairs. The ixodid ticks develop into adult stage by incomplete metamorphosis passing through 3 developmental stages as egg, larva and nymph. The fully developed adult females usually lay eggs as many as 200 on the ground after full absorption of host blood. The ixodid eggs hatch within one to 2 weeks under the warm climate, and life duration (egg to adult) is generally one to 2 years.

According to Yamaguchi *et al.* (1971),¹⁾ adults and larvae of *H. flava* are found distributed only in Japan and Korea, yet in Japan this species has been found almost everywhere throughout the country. The individuals of *H. flava* are found from the following animals, cow, horse, bear, deer, sheep, dog, hare, wild boar, small rodents and avians, however, infestation to man of this species is extremely few.

As previously mentioned, over 200 cases of the human infestation with the hard tick have so far been reported, but among them the cases with *H. flava* are not more than 5 occasions as shown in Table 1. This reason may be explained by the fact that *H. flava* can easily be removed from human skin surface due to a hypostome of *H. flava* is much shorter than that of other ixodid species.

The first case of *H. flava* infestation of man in Japan was reported by Takada *et al.* (1978)²⁾ in Aomori Prefecture. Since then 4 cases³⁻⁶⁾ are known followed by our present finding as shown in Table 1. Four out of 6 in Table 1 were found in April to June and 4 out of 6 incidences occurred were of children. The infestation routes of these patients are not well traced. In the present case on the contrary judging from the patient's behavior, it is suspected that the tick bite happened to the patient's body while the boy was playing on the grass. It is therefore advisable to make frequent checks of children who play outdoor.

TABLE 1. Human ixodiasis of *Haemophysalis flava* infestation in Japan, previous and present cases.

Case No.	Examined date	Locality (Prefecture)	Patient		Lesion site	Author (year)
			age	sex		
1.	June 1974	Aomori	29	M	forearm	Takada <i>et al.</i> (1978) ²⁾
2.	" 1981	Shimane	3	F	vertex	Tohgi <i>et al.</i> (1981) ³⁾
3.	Mar. "	Fukuoka	8	"	occiput	Yoneda <i>et al.</i> (1982) ⁴⁾
4.	Apr. "	Kanagawa	51	M	neck	Ozawa <i>et al.</i> (1982) ⁵⁾
5.	? ?	Fukuoka	8	F	vertex	Yasukawa <i>et al.</i> (1984) ⁶⁾
6.	Dec. 1984	Okayama	2	M	temporal	Present authors

* M=male, F=female

Table 2 summarizes cases of hard tick infestation of 4 years old or under reported in Japan. Besides 16 cases shown in Table 2, 7 children aged from 6 to 10 years old are present, and of which 4 of them are 8 years old. The most patients in Table 2 are in ages 2,^{8,9,12-14,16)} 3^{3,8,9,11)} and 4^{7,8,10,17)} years old, and judging from the past it seems that the most ixodiasis in children are happened to infants who had just began walk. The wounds by the tick bites

TABLE 2. Child ixodiasis (4 years old or under) in Japan, previous and present cases.

Case No.	Patient age sex	Locality (Prefecture)	Examined date	Lesion site	Hard tick species	Author (year)
1.	4 M	Miyagi	Oct. 1971	ear lobe	<i>I. persulcatus</i>	Maie <i>et al.</i> (1972) ⁷⁾
2.	2 F	Akita	May 1972	eyelid	<i>I. ovatus</i>	Takada and Yamaguchi (1974) ⁸⁾
3.	4 M	"	" "	"	"	
4.	2 F	Aomori	Aug. "	auricula	"	
5.	3 M	"	Mar. 1973	eyelid	"	
6.	2 "	Akita	May 1972	"	"	Sakai <i>et al.</i> (1976) ⁹⁾
7.	3 F	"	" "	"	"	
8.	4 M	Tochigi	June 1977	"	"	Fukuzaki and Kobono (1978) ¹⁰⁾
9.	3 F	?	" "	neck	?	Tanaka and Iketani (1978) ¹¹⁾
10.	2 "	?	" 1978	occiput	<i>I. nipponensis</i>	Matsubara and Yamada (1979) ¹²⁾
11.	2 "	Miyagi	? ?	abdomen	?	Nagao (1980) ¹³⁾
12.	3 "	Shimane	June 1981	vertex	<i>H. flava</i>	Tohgi <i>et al.</i> (1982) ³⁾
13.	2 "	Fukui	Aug. "	neck	<i>H. longicornis</i>	Kondo and Yoshimura (1982) ¹⁴⁾
14.	1 M	Ibaragi	Apr. 1982	ear lobe	<i>I. nipponensis</i>	Kato <i>et al.</i> (1983) ¹⁵⁾
15.	2 F	Ishikawa	" 1983	eyelid	<i>I. ovatus</i>	Yotsuka <i>et al.</i> (1984) ¹⁶⁾
16.	4 "	Akita	May 1981	"	?	Okabe <i>et al.</i> (1984) ¹⁷⁾
17.	2 M	Okayama	Dec. 1984	temporal	<i>H. flava</i>	Present authors

**H.* = *Haemophysalis*, *I.* = *Ixodes*, M = male, F = female

occur on skin of head, particularly around eyes and ear lobes. The bite wound in the present was found on skin surface of the temporal region, whereas the most common infestation sites in 16 children are on eyelid,^{8-10,16,17)} ear lobe,^{7,15)} auricula,⁸⁾ neck,^{11,14)} occiput,¹²⁾ vertex³⁾ as well as abdomen.¹³⁾ Meanwhile, 5 ixodid species were removed and identified from 16 children ixodiasis (Table 2), in which infestation with *I. ovatus* was definitely frequent, followed by *I. nipponensis* and *H. flava*. Furthermore, with *I. persulcatus* and *H. longicornis* are so few.

The sex ratio of 16 infested children is even. The most of 16 patients shown in Table 2 are inhabitants of eastern Japan mainly in Akita,^{8,9,17)} Aomori⁸⁾ and Miyagi^{7,15)} Prefecture. There are only 2 cases in Chugoku district³⁾ where Okayama belongs. Although child infestations are more frequent in 2 months period of May^{8,9,17)} and June,^{3,10-12)} the present case happened in December. This fact suggests that the *H. flava* is capable of infest to man even in the winter season with sufficiently low temperature.

In Okayama Prefecture besides the present report 2 cases have previously reported by Miyoshi and Hatsushika (1982)¹⁸⁾ and Nakatsukasa and Hatsushika (1985).¹⁹⁾ Therefore, the present report is the third finding of this kind in Okayama Prefecture, and it seems to be a unique case because the victim was quite young and the incidence happened in less common winter season.

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