

A Case Study of Nymphal Tick *Haemaphysalis longicornis* Neumann, 1901 (Acarina: Ixodidae) Infestation Found in Okayama, Japan

Ryo HATSUSHIKA, Daisuke OKA* and Tetsuya OKINO

Department of Parasitology,

*Department of Dermatology,

Kawasaki Medical School, Kurashiki 701-01, Japan

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ABSTRACT. A case of nymphal tick infestation in 62-year-old Japanese male in Tamano City, Okayama Prefecture is reported. April 5th, 1990, infested 2 hard ticks were found on the skin surface of the left posterior upper femoral and the other tick was noticed on right posterior antebrachial region of the patient. The removed ticks were almost same in size, and bodies measured about 1.6 mm in length (including capitulum) and 1.0 mm in maximum width. Each of the ticks had 4 pairs of legs with no genital apertures.

By the acarological observation, the ticks were identified as *Haemaphysalis longicornis* Neumann, 1901 at nymphal stage based on morphology of capitulum, coxae, internal and external spurs and spiracular plates. The patient was believed to be infested by nymphal ticks at bamboo bush near by his residence 3 days prior to visit hospital. To our best knowledge, this report is the 11th case of human infestation with hard ticks in Okayama Prefecture.

Key words : human tick infestation — nymphal *Haemaphysalis longicornis* — Ixodidae — Acarina — SEM

Although adults, nymphs and larvae of ixodid hard ticks are generally ectoparasitic to wild animals, such as mammals, avians, reptils and amphibians, they occasionally infest man. Recently, in Japan, the human infestation with hard ticks gradually increases and over 500 cases have so far been reported in literature.¹⁾

It is well known that hard ticks suck out blood of host animals, and frequently communicate various kinds of microbiological diseases; tick paralysis, Far Eastern Russian encephalitis, Central European tick-borne encephalitis, louping illness, Kyasanur forest disease, Powassan encephalitis, Omsk hemorrhagic fever, Crimean hemorrhagic fever, Colorado tick fever, Kemerovo tick fever, Rocky mountain spotted fever, Boutonneuse fever, Siberian tick typhus, Queensland tick fever, Query (Q) fever, endemic relapsing fever, tularemia, and others to man throughout the world. More recently, Japanese spotted fever²⁾ and Lyme disease³⁾ caused by hard tick bite have especially been pointed out with considerable attention in Japan.

In the past, case reports of the human infestation with more than 2 worms are not rich in the literature. The authors report here the human case of nymphal tick *Haemaphysalis longicornis* Neumann, 1901 infestations with 3 individual

初鹿 了, 岡 大介, 沖野哲也

worms found in Okayama Prefecture both with scanning electron microscopy of agential tick and bibliographical survey.

CASE NOTE

Patient: K. F., 62-year-old Japanese male. Tamano City, Okayama Prefecture, Japan.

Family history: None.

Main complaint: April 4th, 1990, the patient first noticed the presence of a number of verruciform substances on skin surface of his left posterior upper femoral and right posterior antebrachial regions without any particular symptom.

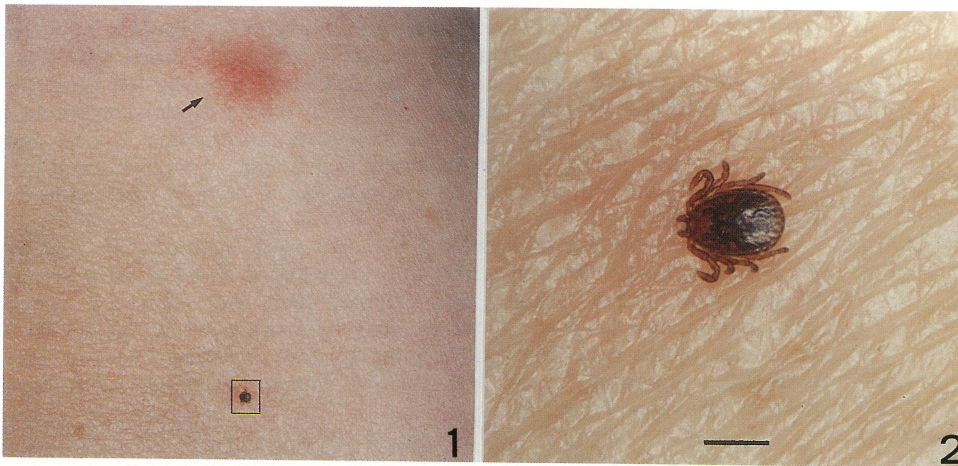


Fig. 1. Clinical photograph showing the tick bite lesion (arrow), left posterior upper femoral region of the patient

Fig. 2. High magnification of the area in the small square in Fig. 1 (Scale bar = 1.0 mm)

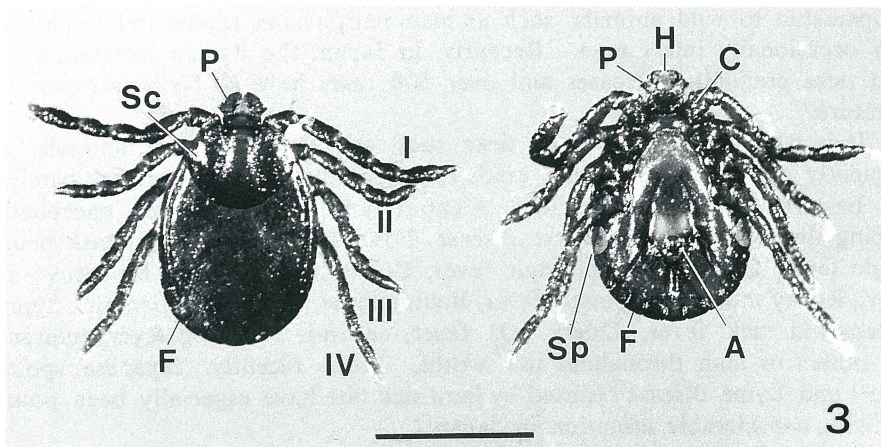


Fig. 3. A nymph of *Haemaphysalis longicornis* removed from the skin surface of left posterior upper femoral region of the patient, dorsal view (left) and ventral view (right) (Scale bar = 1.0 mm)

A : anus, C : coxa, F : festoon, H : hypostome, P : palp, Sc : scutum, Sp : spiracular plate, I-IV : 1st to 4th legs

The following day the patient visited Department of Dermatology of Kawasaki Medical School.

By the cutaneous findings, the infested lesions were found on 3 areas; the posterior side of left femur, the posterior middle portion of right antebrachium and the anterior portion of right crus. On skin surface of the left posterior femur, 2 lesions were recognized in close distance (Fig. 1). The foreign substance was glossy and dark brown in color, which was a visible tick bite (Figs. 1,2). No tick body was recognized on skin surface of the right crus. The tick body was removed by forceps and the indolent erythema was found around the lesion (Fig. 1). The patient first noticed the presence of foreign substances on his left upper posterior femoral and right posterior antebrachial regions 3 days after worked in bamboo bush.

Ticks examined: The removed 3 ticks were almost equal in size and they appeared to be at the same stage of development. All of the ticks had 4 pairs of legs (Figs. 3,4), and the capitulum processes on the anterior end equipped with palps and hypostome which were relatively short (Fig. 6). One of the ticks was boiled for 20 min in a 10% aqueous solution of NaOH and dehydrated in alcohol and mounted in Canada balsam. The other one was studied by a scanning electron microscope after treatment by routine technics. The tick body including capitulum measured about 1.6 mm in length and 1.0 mm in maximum width (Figs. 3,4). The spiracular plates are located on each lateral side just behind the 4th coxae, and the position of macula probably deviated from the center of spiracular plate (Figs. 3,4,5). The internal spur of coxa I is distinctly longer than those of coxae II to IV (Fig. 7). The anal groove and anus on the ventro-posterior surface of the body are clearly recognized, but the genital aperture is not well-developed on the ventro-anterior surface. Nearly 11 festoons are clearly recognized on the posterior periphery of idiosoma (Fig. 3).

Judging from the morphological features, the tick was identified as *Haemaphysalis longicornis* Neumann, 1901 at nymphal stage. The skin lesions

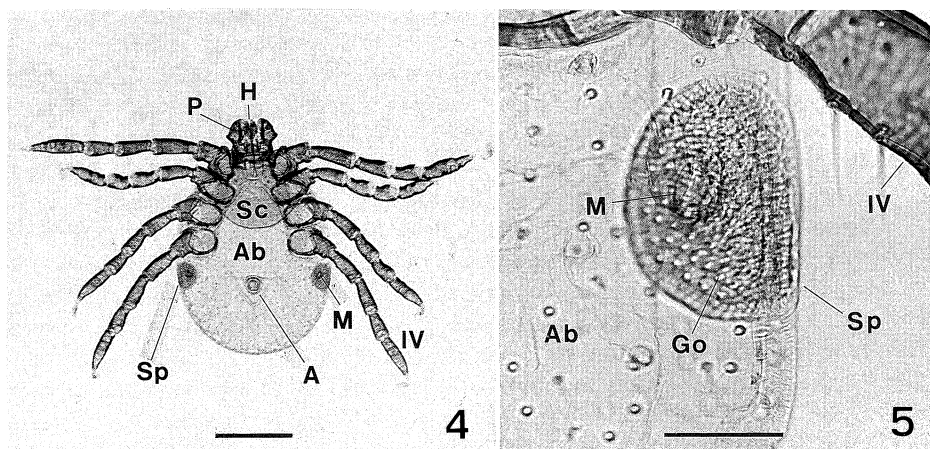


Fig. 4. A nymphal stage of *Haemaphysalis longicornis*, ventral view of mounted specimen (Scale bar = 0.5 mm)

Fig. 5. A left spiracular plate (Scale bar = 1.0 mm)

A : anus, Ab : abdomen, Go : goblet, H : hypostome, M : macula,
P : palp, Sc : scutum, Sp : spiracular plate, IV : 4th leg

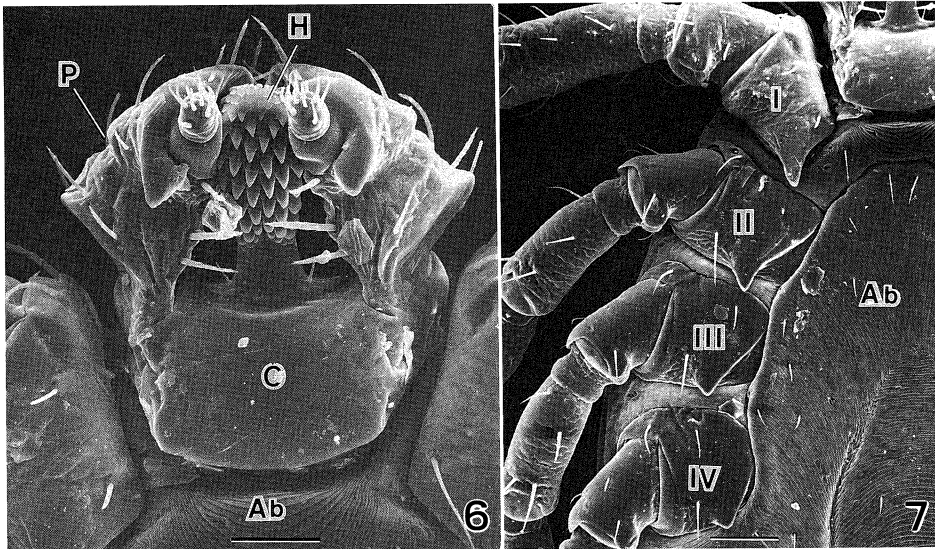


Fig. 6. SEM picture showing an anterior end (capitulum) of nymphal *Haemaphysalis longicornis*, ventral view (Scale bar = 0.1 mm)

Fig. 7. SEM picture showing an arrangement of internal spurs (right coxae) of nymphal *H. longicornis* (Scale bar = 0.1 mm)

Ab : abdomen, C : capitulum, H : hypostome, P : palp, I-IV : 1st to 4th coxae with internal spurs.

by tick bite were completely healed within several days after usual drug treatment. Morphological identification was done referring the criteria of Yamaguti *et al.* (1971)⁴⁾ and Kitaoka (1985).⁵⁾

DISCUSSION

As mentioned above, human infestation with ixodid hard ticks (Ixodidae) have recently been increasing in Japan. About 9 species of ixodids have so far been reported in Japan, namely *Ixodes ovatus* Neumann, 1899, *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 and *H. companulata* Warburton, 1908 in the order of appearing frequency.

The human infestation of *H. longicornis* in Japan was first reported by Nagahana and Matsuo (1962)⁶⁾ in Kyoto, and 23 cases have been found since as shown in Table 1. Reports of the infestations with more than 2 ticks are very few, and in fact, most cases of the *H. longicornis* infestation are by single adult females, with exception of cases 17 and 20 (Table 1). Only 5 cases of human infestation by plural numbers of hard ticks have hitherto been reported by Takada *et al.* (1978),²²⁾ Fujiwara *et al.* (1979),²³⁾ Tsunoda and Takino (1980),²⁴⁾ Takino *et al.* (1985)²⁵⁾ and Fujihiro and Maeda (1987).¹⁸⁾ Therefore, the present case is rather interesting since the patient was with the cutaneous wounds by 3 individuals of *H. longicornis* nymphs. It is almost certain that nymphal tick infestation to the patient supposed to occur 3 days ago in the bamboo bush he worked.

TABLE 1. *Haemaphysalis longicornis* infestation reported in Japan

| Case no. | Patient | | Examined date | | Region (Prefecture) | Lesion | Author (year) |
|----------|---------|-----|---------------|------|---------------------|----------------|--|
| | age | sex | | | | | |
| 1. | 6 | F | July | 1961 | Kyoto | occiput | Nagahana, Matsuo (1962) ⁶⁾ |
| 2. | 43 | " | ? | ? | ? | forearm | Fuchi <i>et al.</i> (1980) ⁷⁾ |
| 3. | ? | ? | ? | ? | ? | ? | Yamaguti, Suzuki (1981) ⁸⁾ |
| 4. | 57 | M | Aug. | 1974 | Yamagata | femur | Yamaguti, Takada (1981) ⁹⁾ |
| 5. | 41 | " | Sept. | 1980 | Nagasaki | penis | |
| 6. | 70 | F | " | " | " | axilla | |
| 7. | ? | ? | July | 1977 | Fukuoka | abdomen | Yoneda <i>et al.</i> (1982) ¹⁰⁾ |
| 8. | 62 | F | June | 1980 | Kyoto | loin | Mitsudo, Kamimura (1982) ¹¹⁾ |
| 9. | 77 | " | Aug. | 1981 | Fukui | right knee | Kondo, Yoshimura (1982) ¹²⁾ |
| 10. | 2 | " | " | " | " | neck | |
| 11. | ? | ? | ? | ? | ? | ? | Kumada (1983) ¹³⁾ |
| 12. | ? | ? | ? | ? | ? | ? | |
| 13. | 64 | F | July | 1981 | Kumamoto | femur | Nogita <i>et al.</i> (1984) ¹⁴⁾ |
| 14. | 5 | " | ? | ? | Chiba | under auricula | Oka <i>et al.</i> (1986) ¹⁵⁾ |
| 15. | 75 | M | Sept. | 1985 | Mie | abdomen | Taniguchi <i>et al.</i> (1987) ¹⁶⁾ |
| 16. | 28 | F | June | 1985 | Aichi | " | Sanda <i>et al.</i> (1987) ¹⁷⁾ |
| 17.* | 71 | " | Jan. | 1986 | Gifu | trunk | Fujihiro, (1987) ¹⁸⁾ |
| 18. | 67 | " | July | 1985 | Nagasaki | left crus | Maeda <i>et al.</i> (1988) ¹⁹⁾ |
| 19. | 45 | M | Aug. | 1988 | Shimane | femur | Yamane <i>et al.</i> (1989) ²⁰⁾ |
| 20.* | child | | Apr. | 1983 | Okayama | neck | Hatsushika <i>et al.</i> (1990) ²¹⁾ |
| 21. | 78 | F | Sept. | 1987 | " | axilla | |
| 22. | 4 | M | May | 1989 | " | post auricula | |
| 23. | 24 | " | " | " | " | femur | |
| 24.* | 62 | " | Apr. | 1990 | " | femur forearm | Present authors |

* = nymphal stage, F = female, M = male

As evident from Table 1, human cases of the *H. longicornis* infestation are widely distributed in Japan with exceptions of Hokkaido, Shikoku and Ryukyu Islands, and relatively high incidence is known mainly in Okayama,²¹⁾ Nagasaki^{9,19)} and Fukui¹²⁾ Prefectures. In fact, the present report is the 5th finding with *H. longicornis* in Okayama Prefecture. All of the victims indicated in Table 1 were in ages between 2 and 78 years old, and the highest incidence was in seventies and children under 10 years old. Regarding the sex distribution, females are about twice as many as male.

The cases of human infestation with adult *H. longicornis* are of most frequently occur in summer period of May to September. This is interesting that frequency of outdoor activities of humans matches with the active season of the hard ticks. It is well known that adult female of the ixodid hard ticks lay eggs on ground surface after full sucking of blood of wild animals and humans. The individuals of all developmental stages; larvae, nymphs and adults suck blood of various animals. According to Yamaguti *et al.* (1971),⁴⁾ *H. longicornis* are known to be parasitic on the skin surface of at least 13 animals

from small to large; cattle, horses, sheep, goats, deer, bears, pigs, foxes, raccoons, badgers, cats, dogs, rabbits, 7 birds; sparrows, skylarks, thrushes, turkeys, ducks, chickens, pheasants; and humans.

As described in Introduction, it has been known that the ixodid hard ticks are transmitted various kinds of microbial diseases to man. In recent years, a pathogenic microbe (*Rickettsia japonica*) of Japanese spotted fever is discovered from the adult body of *H. longicornis* collected in Tokushima and Kochi Prefectures. Although there is no proof confirming tick bite-related diseases in Japan, the utmost care in Japanese spotted fever is cautioned as Mahara and Fujita indicated.²⁾

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