[SHORT COMMUNICATION]

Three human cases of tick bite caused by *Ixodes persulcatus* at high altitude in Shikoku island, Japan

Hideo KUMAZAWA¹, Takao SARUTA² and Nobuhiro TAKADA³

¹Department of Parasitology, Kochi Medical School, Nankoku, Kochi 783-0043, Japan
²Saruta Dermatology Clinic, 4-25 Masugata, Kochi 780-0861, Japan
³Department of Immunology and Medical Zoology, Fukui Medical University, Matsuoka, Fukui 910-1193, Japan

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The tick *Ixodes persulcatus* Schulze, one of the commonest tick species and an important Lyme-Borrelia vector in northern Japan, has been found, sporadically, in some high-altitude mountains in southwestern Japan. For Shikoku island, information on this species is sparse. This manuscript aims to add to the knowledge of *I. persulcatus* in Shikoku by describing three cases of this species ectoparasitizing humans, which occurred within a very short period in the early summer of 1997.

The first case (case 1) is of a 56 year-old male living in Kochi City. He slept on the grass after lunch for about 1 hour near the apex of Mt. Tsurugi (altitude 1,955m) on June 14th. On the 16th, finding a papule-like object on the upper-medial region of his left scapula, he covered it with Ribagauze (containing 0.2% acrinol, Tamagawa Eizai, Tokyo). He then visited the Saruta Clinic on the 20th. The tick was removed simultaneously with the gauze. Prior to the 20th he felt no pain, but experienced some itching on the 18th. After the removal of the tick, there remained a nail-sized erythema with central infiltration and partial erosion. His general condition was good, without lymphadentis or pyrexia. He was given Fusidin Leo Ointment (2% Na-fusidate, Sankyo Co., Tokyo) and Minomycin Capsules (minocycline hydrochloride, Lederly: Takeda Chemical Industries Co., Osaka). Nothing of note occurred after the tick was removed. The tick obtained was an engorged female *I. persulcatus*. When it was removed from the gauze, the abdomen was disrupted and distorted.

The second case (case 2) is of a 35 year-old female living in Kochi City. She laid herself down to take a brief rest after lunch near the apex of Mt. Sasagamine (alt. 1,859m) on June 29th. On the night of the same day, she felt a sudden pain on her right breast, and found a tick on the lateral-inferior region of the apex. He visited the Saruta Clinic on the 20th. The tick was removed simultaneously with the gauze. Prior to the 20th he felt no pain, but experienced some itching on the 18th. After the removal of the tick, there remained a nail-sized erythema with central infiltration and partial erosion. His general condition was good, without lymphadentis or pyrexia. He was given Fusidin Leo Ointment (2% Na-fusidate, Sankyo Co., Tokyo) and Minomycin Capsules (minocycline hydrochloride, Lederly: Takeda Chemical Industries Co., Osaka). Nothing of note occurred after the tick was removed. The tick obtained was an engorged female *I. persulcatus*. When it was removed from the gauze, the abdomen was disrupted and distorted.

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remained. Pyrexia or any other systemic symptoms were absent. She was given the same ointment and capsule as in case 1. She remained healthy afterwards. The obtained specimen was a slightly fed female *I. persulcatus*, lacking the anterior third of the hypostome. Otherwise the specimen was intact.

The third case (case 3) is of a 32-year-old male living in Kochi City. He took a rest near the apex of Mt. Kamegamori (alt. 1896m). At about 19:00 of the same day, he found a tick on the median (inner) side of the left calf region. No pain or itching was felt by this time. He forcibly removed the tick, together with a small piece of the skin. He then put Oxydol (2.6% H₂O₂, Daiwa Chemical Co.Ltd.) and an antipyic ointment of unknown name on the injured skin. Despite this, the skin lesion remained and a secondary infection occurred which lasted for several days. The lesion healed gradually afterwards. His general condition was good without pyrexia or any other symptoms. The tick specimen obtained was an intact unfed female of *I. persulcatus*.

Since none of the three cases showed systemic symptoms, no attempts were made to detect tick-borne pathogens, or to find serum antibodies.

All tick specimens from the three cases possessed dark-colored legs, and a sharp, long internal spur on coxa I extending posteriorly to beyond the anterior margin of coxa II, and a fairly short external spur on coxae I, II, III and IV. These and other morphological characteristics distinguish this species from *I. nipponensis*, a related species, and other *Ixodes* species (Takada, 1990).

The two species *Ixodes nipponensis* Kitaoka and Saito, and *I. persulcatus* have been recognized as separate species since 1967 (Yamaguti et al., 1971). Therefore we will refer only to records published since 1967.

In Japan, *I. persulcatus* occurs widely in Hokkaido and in the central and more northern mountains of Honshu island (Takada et al., 1994; Nakao and Miyamoto, 1994). By contrast, the distribution of this species is much restricted in southwestern Japan. In Okayama Prefecture, for example, no record of this species can be found except for older literature published before 1967 (Hatsushika and Miyoshi, 1994). Neither has this species been found in Kagoshima Prefecture despite extensive surveys (Yamamoto et al., 1995). However, it was found, in surveys performed in 1991 and 1992, that *I. persulcatus* does exist and is distributed in some of the major mountain areas in southwestern Japan (Takada et al., 1994). Thus, in Kinki-Chugoku district (western part of Honshu island), *I. persulcatus* was found on Mt. Horai (Shiga Prefecture), Mt. Gozaisho (Mie Prefecture), Mt. Odaigahara (Nara Prefecture), Mt. Hyonosen (Hyogo Prefecture) and Mt. Daisen (Tottori Prefecture), but not on Mt. Kongo (Osaka Prefecture) or Mt. Osorakan (Hiroshima Prefecture). In Kyushu island, the Kuju mountains (Oita Prefecture) are the only place *I. persulcatus* has ever been found, marking the southern-most recorded locality of this species in Japan (Takada et al., 1994; Nakao and Miyamoto, 1994; Nakao and Takada, 1997). In summary, so far as it is known, *I. persulcatus* occurs only in high altitude mountainous areas in the Kinki-Chugoku and Kyushu districts (Takada, 1995).

Little information is available about *I. persulcatus* in Shikoku (Fig. 1). Kimura (1987) reports that eight out of 10 students who had walked in the Ishizuchi mountains were parasitized by the tick. Only two of the eight students went to hospital, and in both cases the
tick was identified as *I. persulcatus* by the late Dr. Noboru Yamaguti of Saitama Medical School. Virtually no information is available concerning other cases (mentioned by Yamaguti (1994) and Mahara (1994)) of tick bites in humans by *I. persulcatus* in Shikoku (not shown in Fig.1). Takada et al. (1994) collected this species on Mt. Tsurugi at elevations higher than 800m above sea level. Of the present cases, case 1 is from Mt. Tsurugi, and cases 2 and 3 are from high peaks belonging to the Ishizuchi mountains. This indicates that the previously known records from the two mountainous areas are by no means incidental, and *I. persulcatus* does occur in these areas, possibly in considerable numbers in favorable seasons. In other words, there seems to be an established, native population(s) of *I. persulcatus* in Shikoku.

Moreover, the above-mentioned distribution of this species in the southwestern part of Japan suggests that *I. persulcatus* in Shikoku may also be restricted to high mountainous areas as represented by the Tsurugi and Ishizuchi areas. Although Suzuki et al. (1990) mentioned a human case parasitized by *I. persulcatus* near Tokushima City, this was based on a personal communication, and we have not been successful in tracing this information back to its source. In contrast to this species, *I. nipponensis* occurs widely throughout Shikoku (Suzuki et al., 1990). However, there is no record of *I. nipponensis* in the Tsurugi or Ishizuchi mountains.
Seasonal occurrence of *I. persulcatus* peaks between May and June in both Nagano Prefecture (Uchikawa, 1993) and Hokkaido (Miyamoto and Nakao, 1991). The fact that the present cases occurred in a very short period between middle June and early July suggests that a similar peak is present in the high-altitude mountains of Shikoku.

Lyme disease *Borrelia* has been detected at a low percentage in *I. persulcatus* from the Kuju mountains in Kyushu (Nakao et al., 1996), but not from Shikoku (Takada et al., 1994). None of the present cases showed any symptoms suggesting the presence of tick-borne diseases. However, it is still possible that *Borrelia* may be maintained in some individuals of *I. persulcatus* in Shikoku as well. Further studies are needed.

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REFERENCES


