

# First report of *Ixodes frontalis* (Acari: Ixodidae) in Finland, an example of foreign tick species transported by a migratory bird

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Two small and dark coloured engorged tick nymphs of 2.8 mm and 1.5 mm in length were found attached to the skin near the eyes and the beak of a Tree pipit (*Anthus trivialis* L.) captured for banding in the island of Lågskär in May 2005. The tick nymphs were morphologically identified as *Ixodes frontalis* Linnaeus. This species has not been previously reported from Finland.

## 1. Introduction

The species of the genus *Ixodes* Linnaeus are known to parasitize a wide array of vertebrates and to be important in the dispersal and transmission of many viral, bacterial and protozoan pathogens of man and animals (Hubálek 2004). Migratory birds have been suggested to influence to the dispersal of many of the tick-borne pathogens, as they are able to carry ticks for long distances. The main migratory bird routes involving Finland and the neighboring countries span from the arctic regions in the North to the tropical Africa in the South. Nomadic birds species travel irregularly to Finland from the east according to changes in seed crops. In theory, the migratory birds could carry exotic ticks within this area. During the spring migration, the migratory birds arrive to the Fennoscandia mainly from Africa and Southern Europe, but currently not much is known about the diversity of the tick species they carry (Nuorteva & Hoogstraal

1963, Jaenson *et al.* 1994, Lundqvist *et al.* 1998, Waldenström *et al.* 2007).

Nuorteva & Hoogstraal (1963) examined 1928 migratory birds captured in Signilskär, the outermost island in the southwestern archipelago of Finland. They found 38 individual birds representing 14 species to be infected by *Ixodes ricinus* Linnaeus and one specimen was infected by *Hyalomma marginatum* Koch. They also examined 691 migrant birds captured for banding in Valasaaret, a group of islands lying in the Gulf of Bothnia. In that material 18 bird individuals (five species) were infected by *I. ricinus* and one by *Hyalomma marginatum*. In their third material comprised of 1396 birds from near the city Oulu only nine individual birds (all Sand Martins, *Riparia riparia* Linné) were infected by *I. ricinus*.

European-Asiatic ticks of *Hyalomma* spp. have been found in several countries in Africa, and also tropical South African species have been reported in Palestine, Ajerbaizan, France, Bulgaria

Fig. 1. Dorsal view of two nymphs of *Ixodes frontalis* measuring 2.8 mm and 1.5 mm in length and sampled from the Tree pipit. Nymph of female *Ixodes ricinus* on the left for comparison.



and Russia (Hoogstraal & Kaiser 1961) suggesting that long distance dispersal of ticks is occurring. Jaenson *et al.* (1994) list 27 Ixodidae tick species recorded in northern Europe. Many of these are carried by migratory birds.

The epidemiological significance of exotic ticks remains, however, to be studied in the northernmost areas of Europe. The effects of the global climate change may influence the distribution areas of vector species especially in the northern areas underlining the importance of accurate baseline data on the distribution of different tick and mosquito species.

Ulmanen (1972) has reported five Ixodidae species from Finland, namely *Ixodes ricinus*, *Ixodes plumbeus* Leach (presently *Ixodes lividus* Koch), *Ixodes arboricola* Schulze & Schottke, *Hyalomma marginatum* Koch and *Ixodes trianguliceps* Birula. In addition, *Rhipicephalus sanguineus* Latreille is often recorded on pet dogs. Recently another species, *Ixodes persulcatus* was reported occurring locally in the western coast of Finland (Jääskeläinen *et al.* 2006) and also in a locality near eastern border of Finland by a researcher from the University of Joensuu (information based on pers. comm. with dr. P. Nygren). This species has traditionally been associated with Taiga habitats. Of these tick species, only *I. ricinus* is widely distributed in southern and central Finland (Öhman 1961, Peltomaa 1999). We report here the finding of an exotic tick species in a migratory passerine caught as part of pathogen surveillance in the southernmost Finland.

## 2. Material & methods

In late May 2005 migratory birds were captured (with nets) for banding by certified bird ringers in the island of Långskär, lying about 25 km to the south from the main island of the Åland archipelago in South-West Finland (59°50'N, 19° 55'E). While handling the birds for ringing, a Tree pipit (*Anthus trivialis* Linné) was noted to have two small and dark coloured engorged tick nymphs of 2.8 mm and 1.5 mm in length attached to the skin near the eyes and the beak. As the ticks appeared particular, and were found from a migratory bird returning from its overwintering grounds in Africa, they were removed for species identification. The ticks were identified first using keys by Hillyard (1996), Lundqvist *et al.* (1998) and Marquez *et al.* (1992), and later confirmed at the Insect Information Service of the National History Museum, London, UK.

## 3. Results

The specimen tick nymphs were smaller in size and less robust compared to *I. ricinus* (Fig. 1 and 2), and were identified as *Ixodes frontalis* Panzer based on the external and internal spurs being equal in size in coxa I. Moreover, the basis bears ventrally rear-facing angular auriculae and two spurs of coxa equal in size (Fig. 3).

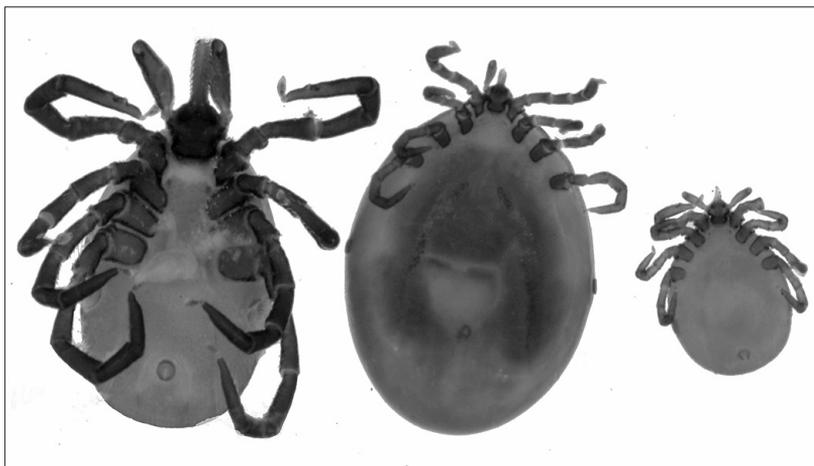


Fig. 2. As in Figure 1 but showing ventrally the two nymphs of *Ixodes frontalis* sampled from the Tree pipit. Nymph of female *Ixodes ricinus* on the left for comparison.

#### 4. Discussion

The host bird for the *I. frontalis* described in this report was a Tree pipit, known to overwinter in Africa and to nest in Finland from May to September (Hyytiä et al. 1983). The *I. frontalis* nymphs could have originated from any location on the birds migration route during resting stops. The main distribution of *I. frontalis* is south and central Europe including Russia but it is found as far east as the Philippines (Lundqvist et al. 1998).

The tick species *I. frontalis* is classified as a bird specific parasite that needs a new bird host for each life stage. Its typical hosts are swallows, tits, warblers, thrushes, pigeons, crows and rails (Hillyard 1996). It has not been reported from Finland before but it has been previously recorded on the Baltic island of Gotland in Sweden (Lundqvist et al. 1998). *I. frontalis* is a common tick infesting avian hosts in many parts of Europe including the British Isles (Pietzch et al. 2008) where it has also been associated with avian disease of tick-related syndrome (Monks et al. 2006). *I. frontalis* has also been reported to harbor *Borrelia burgdorferi* spirochetes (Estrada-Pena et al. 1995) and a novel species of *Phlebovirus* (Chastel et al. 1999). These findings raise questions about the zoonotic role of *I. frontalis* due to the fact that it has also been reported to attach to man (Gilot et al. 1997).

Variable levels of tick infestation have been reported in migratory birds, from below 0.5% in the British Isles (Pietzsch et al. 2008) to 3.4% in Sweden, where recently also tick-borne encephalitis



Fig. 3. Ventral view of external and internal spurs of coxa I and auriculae of the basis in *Ixodes frontalis* nymph.

virus (TBEV) was detected from the ticks carried by migratory birds (Waldenström et al. 2007). The numbers of tick infestation in migratory birds may seem low, but when the number of birds involved in the migration is taken into account, the total amount of transported ticks could be remarkable. Furthermore, ticks and especially the nymphs can easily go unnoticed due to their small body size.

In addition to harboring and spreading tick-borne pathogens, migratory birds provide a way for tick species to be introduced to new areas far from their permanent range. In the northern latitudes many of the southern species are not likely to be able to establish their life cycle. Occasional dispersal could, however, precede the establishment

of new populations in suitable habitats. The detection and characterization of the tick species introduced by the migratory birds require detailed studies in order to obtain comprehensive, high quality material for acarological examination and for screening of zoonotic pathogens carried by them. Until additional specimens are found, we consider *I. frontalis* as a casual visitor to the Finnish fauna.

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