



Short communication

Ticks of the *Hyalomma marginatum* complex transported by migratory birds into Central Europe



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ABSTRACT

Hyalomma ticks are well-known vectors transmitting infectious agents, which can result in severe and potentially fatal diseases in humans. Migratory birds may carry infected ticks over long distances. Here, we report on records of ticks of the *H. marginatum* complex in birds from Central Europe during the spring migration in 2008–2012. A total of 1172 birds belonging to 32 species, 16 families, and 3 orders was examined for ticks. Sixteen individuals of 6 passerine species were found to transport 30 ticks, identified as individuals belonging to the *H. marginatum* species complex (consisting of *H. isaaci*, *H. marginatum* sensu stricto, *H. rufipes*, *H. turanicum*, and *H. glabrum*) during 5 spring seasons. Infested bird species included the great reed warbler *Acrocephalus arundinaceus*, the Eurasian reed warbler *A. scirpaceus*, the marsh warbler *A. palustris*, the sedge warbler *A. schoenobaenus*, Savi's warbler *Locustella luscinioides*, and the common nightingale *Luscinia megarhynchos*. All of these Central European breeders are migratory species wintering in Africa. To our knowledge, this is the first study to record ticks of the *H. marginatum* complex on the great reed warbler and Savi's warbler.

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Introduction

Globally, there are over 702 ixodid tick species from 14 genera in the family Ixodidae (Guglielmone et al., 2010). They play an important role for the transmission of numerous pathogens to human and animals. Ixodid ticks parasitize wild as well as domestic animals and maintain pathogens which may lead to many hazardous diseases that pose a threat to human health (Hoogstraal and Valdez, 1980; Horak et al., 2002).

H. marginatum has recently been split into 5 species *H. isaaci*, *H. marginatum* sensu stricto, *H. rufipes*, *H. turanicum*, and *H. glabrum* that are two-host ticks occurring in various biotopes in southern Europe, South Asia, the Middle East, and Africa (Apanaskevich and

Horak, 2008; Guglielmone et al., 2010; ECDC, 2005–2013). They molt from larva to nymph on their first host, especially hares, hedgehogs, and birds (Apanaskevich and Horak, 2008; Estrada-Peña and Jongejan, 1999; Dantas-Torres et al., 2010). The immature stages stay on the host for 12–26 days which enables them to be passively transported by migrating birds. Adults infest the second host, especially cattle and other ungulates including horses, sheep, goats, camels, deer, wild boar, and humans (Gargili et al., 2010; Bursali et al., 2011; ECDC, 2005–2013). *Hyalomma* ticks have been found to be infected with *Anaplasma*, *Ehrlichia*, *Rickettsia*, *Borrelia*, and *Babesia/Theileria* spp. (Beati et al., 1997; De Michelis et al., 2000; Toledo et al., 2009; Torina et al., 2010). They are also the most important vectors of Crimean-Congo hemorrhagic fever (CCHF) virus in Europe (Apanaskevich and Horak, 2008; Kolonin, 2009). Zeller et al. (1994) who developed an experimental model for investigating the role of birds in the CCHF virus transmission showed that the cycle of virus transmission between *Hyalomma rufipes* ticks and aviremic ground-feeding birds represent a potential amplification mechanism of CCHF virus in western Africa. Migratory birds may

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Table 1
Prevalence of birds infested with ticks of the *Hyalomma marginatum* complex in Gbelce, south-western Slovakia, during spring migrations in 2008 and 2009.

Order/family/species	No. of birds parasitized	No. of birds examined	Prevalence (%)
Passeriformes			
Acrocephalidae			
Great reed warbler <i>Acrocephalus arundinaceus</i>	1	84	1.2
Eurasian reed warbler <i>Acrocephalus scirpaceus</i>	2	325	0.6
Sedge warbler <i>Acrocephalus schoenobaenus</i>	7	333	2.1
Locustellidae			
Savi's warbler <i>Locustella luscinioides</i>	1	90	1.1
Total	11	832	0.9

carry infected ticks over long distances (Hoogstraal, 1979) and may also play a role in the dissemination of this infection (Mild et al., 2009).

Here, we report on records of ticks of the *H. marginatum* complex in migratory birds from 5 locations of the Czech and Slovak Republics during the recent 5 years.

Material and methods

The major part of the field work was carried out from 12 April through 3 May 2008 and from 18 April through 2 May 2009 at Gbelce located in south-western Slovakia (47°52' N, 18°30' E). Other collections of ticks were made in 4 locations of the Czech Republic: Knezmost (50°49' N, 15°04' E) on 27 April 2010, Zahlinice (49°28' N, 17°47' E) on 20 May 2010, Zabrodi (50°46' N, 16°10' E) on 20 May 2011, and Dolni Bousov (50°45' N, 15°12' E) on 8 May 2012, respectively. All the sites were in lowlands and included marshes and fish ponds overgrown with marsh vegetation dominated by the common reed (*Phragmites australis*) (Gbelce, Zahlinice, Zabrodi) or various bushes (Knezmost, Dolni Bousov). The major research was carried out at Gbelce, where dawn-to-dusk mist netting was conducted to capture as many bird species and individuals as possible to collect *Hyalomma* ticks. A line of about 100 m of nets was checked at least once an hour. In the Czech Republic, ticks were collected during mist-net capturing, the main purpose of which was for bird ringing. During examination, ticks were collected and sent to our laboratory for further identification.

Every individual bird was first identified using Svensson (1992) and Svensson et al. (1999), ringed, and then examined for the presence of ticks visible to the naked eye. Using fine-tipped tweezers, all ticks were removed from birds and later stored in 96% ethyl alcohol before being determined in the laboratory and classified according to their developmental stage and sex. *Hyalomma* ticks collected were identified using morphological characteristics as described by Apanaskevich and Horak (2008). *Hyalomma isaaci*, *H. marginatum* sensu stricto, *H. rufipes*, *H. turanicum*, and *H. glabrum* have recently been classified as species split from *H. marginatum* (Apanaskevich and Horak, 2008; Guglielmone et al., 2010), however, the identification of immature engorged *Hyalomma* ticks based on morphological characters is practically impossible with confidence. We therefore identified *Hyalomma* ticks collected as individuals belonging to the *Hyalomma marginatum* complex, which includes the 5 species mentioned above.

Results and discussion

A total of 1167 birds belonging to 31 species, 16 families, and 3 orders was examined at Gbelce (Slovakia). Eleven birds (0.9%) of 4 species representing the families Acrocephalidae and Locustellidae were infested with ticks of the *H. marginatum* complex

(Tables 1 and 2). Ticks of the *H. marginatum* complex were not found in 27 bird species belonging to 3 orders and 15 families (numbers of individuals of birds examined are in parentheses): Gruiformes, Rallidae – water rail (*Rallus aquaticus*) (1); Piciformes, Picidae – great spotted woodpecker (*Dendrocopos major*) (1), Syrian woodpecker (*D. syriacus*) (2); Passeriformes, Paridae – great tit (*Parus major*) (1), blue tit (*Cyanistes caeruleus*) (1), Panuridae – bearded reedling (*Panurus biarmicus*) (66), Hirundinidae – barn swallow (*Hirundo rustica*) (95), sand martin (*Riparia riparia*) (46), Acrocephalidae – moustached warbler (*Acrocephalus melanopogon*) (15), aquatic warbler (*A. paludicola*) (5), Sylviidae – blackcap (*Sylvia atricapilla*) (2), lesser whitethroat (*S. curruca*) (3), common whitethroat (*S. communis*) (2), Troglodytidae – winter wren (*Troglodytes troglodytes*) (1), Sturnidae – common starling (*Sturnus vulgaris*) (22), Turdidae – song thrush (*Turdus philomelos*) (2), Muscicapidae – European robin (*Erithacus rubecula*) (1), bluethroat (*Luscinia svecica*) (1), common stonechat (*Saxicola torquatus*) (1), whinchat (*S. rubetra*) (2), Passeridae – Eurasian tree sparrow (*Passer montanus*) (3), Motacillidae – white wagtail (*Motacilla alba*) (2), yellow wagtail (*M. flava*) (1), Fringillidae – European greenfinch (*Chloris chloris*) (35), common linnet (*Linaria cannabina*) (5), European serin (*Serinus serinus*) (1), and Emberizidae – reed bunting (*Emberiza schoeniclus*) (18), respectively. Moreover, examinations of birds in 4 other places (Czech Republic) revealed the infestations of 5 birds of 4 species representing the families Acrocephalidae and Muscicapidae (Table 2).

All the host species were Central European breeders, of which the great reed warbler, the Eurasian reed warbler, the marsh warbler, the sedge warbler (Fig. 1), and the common nightingale are long-distance migrants wintering in sub-Saharan Africa, whereas Savi's warbler winters in the northern tropics of Africa (Collar,



Fig. 1. Sedge warbler *Acrocephalus schoenobaenus* infested with nymphs of ticks of the *Hyalomma marginatum* complex. Gbelce, SW Slovakia, May 2008. Photo by Petr Podzemny.

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