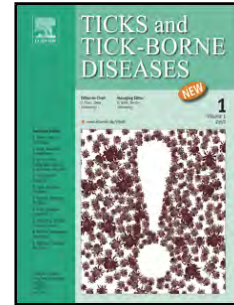


# Journal Pre-proof

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Zdenek Hubálek (Conceptualization) (Investigation) (Formal analysis) (Writing - original draft) (Writing - review and editing), Pavel Sedláček, Agustín Estrada-Peña (Investigation) (Methodology) (Writing - review and editing) (Conceptualization) (Validation), Jakub Vojtíšek (Methodology), Ivo Rudolf (Conceptualization) (Writing - original draft) (Writing - review and editing)



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"Ticks and Tick-borne Diseases"

Short Communication

## First record of *Hyalomma rufipes* Koch, 1844 in the Czech Republic, with a review of relevant cases in other parts of Europe

Zdenek Hubálek<sup>1</sup>, Pavel Sedláček<sup>2</sup>, Agustín Estrada-Peña<sup>3</sup>, Jakub Vojtíšek<sup>1</sup>, Ivo Rudolf<sup>1</sup>

<sup>1</sup>Institute of Vertebrate Biology, Czech Academy of Sciences, 60365 Brno, Czech Republic

<sup>2</sup>Protected Landscape Area "Palava", Mikulov, Czech Republic

<sup>3</sup>Department of Parasitology, Faculty of Veterinary Medicine, 500-13 Zaragoza, Spain

### Abstract

We found a male *Hyalomma rufipes* Koch, 1844 tick feeding on a horse grazing near Valtice, south Moravia, Czech Republic on October 24, 2019. The horse was born in Czechland and did not leave the country at least during the last five years. Relevant findings of *Hyalomma* ticks in other parts of central Europe are reviewed, including also records of pre-imaginal *Hyalomma marginatum* complex ticks on migrating birds all over Europe.

**Keywords:** *Hyalomma marginatum*; Czechland; central Europe; horse; migratory birds

### Introduction

*Hyalomma* ticks are important vectors of several pathogenic agents, e.g. Crimean-Congo hemorrhagic fever (CCHF) virus, Thogoto virus, Dhori virus, West Nile virus, Bhanja virus, *Rickettsia conorii*, *R. aeschlimannii*, *Anaplasma marginale*, *Theileria annulata*, *Babesia caballi* (Hoogstraal, 1979; Hubálek and Rudolf, 2011; Bakheit et al., 2012).

### Finding

We found an adult *Hyalomma* tick feeding on the hind limb (close to the anal region, under tail) of a horse (Czech warmblooded race, 24 years old) grazed at fishpond "Nesyt" (48°.766 N, 16°.727 E) near Valtice, district Břeclav (south Moravia, Czech Republic) on October 24, 2019. The horse was born in the Czech region called Czech-Moravian Highland and it did not leave Czech Republic at least during the last five years. The animal regularly grazed during the season and crossed an area between the towns Valtice and Mikulov (distance of *c.* 10 km), very close to the Czech-Austrian border.

The sampled tick was transported to the laboratory and identified under stereomicroscope. The tick was found to be a partially fed male of *Hyalomma rufipes* Koch, 1844, based on the morphology of spiracular plate and the setae around it that differentiate this species from the closely related *H. marginatum* Koch, 1844. Previously, these two taxa were regarded as two subspecies of *H. marginatum* complex, i.e., *H. marginatum marginatum* and *H. marginatum rufipes*, but have been raised to full species status (Apanaskevich and Horak, 2008). The tick *H. rufipes* has never been recorded in the Czech Republic before, either in pre-imaginal or adult stage.

Interestingly, one of us (P. S.) observed a similar, fingernail-sized adult tick with ivory-coloured bands on long legs (which could be interpreted as an adult *Hyalomma*) on hind limb of a horse in the same locality also on August 21, 2018, but the tick escaped and could not be examined in detail.

### **Discussion (a mini-review)**

We searched literature for records on adult *Hyalomma marginatum* complex presence in central Europe. These adult ticks were recorded (Table 1) in Slovakia (a female climbing on man's clothes, 21 August 1981: Nosek et al., 1982), Germany (Kampen et al., 2007; Chitimia-Dobler et al., 2016, 2019; Oehme et al., 2017), Hungary (Hornok and Horvath, 2012), Poland (Cuber, 2016) and Austria (Duscher et al., 2018). Among them, adult *H. rufipes* was detected previously only in Hungary and Germany. Chitimia-Dobler et al. (2019) concluded: "These results show that exotic tick species imported into Germany were able to develop from the nymphal to the adult stage" which may be valid for the whole central Europe. Outside central Europe, Hansford et al. (2019) found an adult *H. rufipes* on a horse in England (Dorset), 2018.

The most probable mechanism for introduction of the *H. rufipes* tick into the Czech Republic could be the transport as a larva or nymph on a migratory bird, with the moulting into adult stage in south Moravia. Harry Hoogstraal and his co-workers were the first who studied the potential of migratory birds to carry ixodid ticks, vectors of several infectious agents, on a wide geographic scale (Hoogstraal, 1967; Kaiser et al., 1974; Nuorteva and Hoogstraal, 1963). For instance, Kaiser et al. (1974) examined 20,528 birds migrating northward in Cyprus during spring 1968. They found 177 birds to be infested, most often by *H. rufipes* (217 larvae and 540 nymphs). Hasle et al. (2009) captured birds migrating along the southern coastline of Norway. They found ticks on 4.2%-6.9% of the birds, and with seven nymphs identified as *H. rufipes*.

There were many records of larval and nymphal *H. marginatum* complex on migrating birds arriving into Europe in the spring (Table 2). In the Czech Republic, three nymphs of *H. marginatum* were collected on two Tree Pipits (*Anthus trivialis*) near Valtice, 8 Apr. 1953; one nymph of *H. marginatum* on a Bluethroat (*Luscinia svecica cyaneacula*) at Hodonín, 1 Apr. 1953 (Černý and Balát, 1957). Čapek et al. (2014) collected a number of larval and nymphal *H. marginatum* complex ticks on migratory birds in central Moravia and eastern Bohemia during the springs 2010-2012: infested avian host species were Great Reed Warbler (*Acrocephalus arundinaceus*), Eurasian Reed Warbler (*A. scirpaceus*), Marsh Warbler (*A. palustris*), Sedge Warbler (*A. schoenobaenus*), Savi's Warbler (*Locustella luscinioides*) and Common Nightingale (*Luscinia megarhynchos*).

Italy is a very important migratory route for many species of birds breeding in central Europe, and the findings of birds carrying *Hyalomma* immatures are there well documented. For instance, Mancini et al. (2013) and Toma et al. (2014) collected ticks on migratory birds in central Italy within ornithological surveys carried out in 2010 and 2011. A total of 137 ticks were collected from 41 migratory birds belonging to 17 species. Most ticks were nymphs, with a predominance of *H. marginatum* and *H. rufipes*. De Liberato et al. (2018) surveyed migratory birds for ticks in 13 ringing sites of Central and Southern Italy. A total of 50,325 birds were checked and 0.22% were infested by *Hyalomma* spp., involving 22 avian species with a mean number of 1.6 *Hyalomma* tick per infested bird. The high proportion of *Hyalomma* ticks indicates a potential risk for the dissemination of tick-borne pathogens through infested migratory birds.

In addition to birds and interestingly, Földvári et al. (2011) recorded one nymphal *H. marginatum* feeding on hedgehog (*Erinaceus roumanicus*) in the Budapest central city park.

## Conclusion

Our finding of one adult *H. rufipes* attached to a host does not mean that this tick species has been established in the Czech Republic. But considering the fact that *H. rufipes* is an efficient vector of, e.g., CCHF virus (Hoogstraal, 1979), the vigilance for *Hyalomma* ticks and their surveillance for exotic pathogenic agents in Europe is recommendable.

## Credit Author Statement

ZH: Conceptualization, Investigation, Formal analysis, Original draft writing, review and editing

PS: Material, Tick sampling

AEP: Investigation, Methodology, Writing (review and editing), Conceptualization, Valisation

JV: Methodology, Documentation

IR: Conceptualization, Original draft writing, review and editing

## Competing interest

None.

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Table 1. Adults of *Hyalomma marginatum* complex ticks in Central Europe.

Tick species	<i>n</i> , sex	Host	Country	Reference
<i>H. marginatum</i>	1 F	man	Slovakia (south)	Nosek et al. 1982
<i>H. rufipes</i>	1 adult	cattle	Hungary	Hornok and Horvath 2012
<i>H. marginatum</i>	1 F	man	Germany (south)	Kampen et al. 2007
<i>H. rufipes</i>	1 M	horse	Germany (Mainz)	Chitimia-Dobler et al. 2016
<i>H. marginatum</i>	2 M	vegetation	Poland	Cuber 2016
<i>H. marginatum</i>	1 F	man	South Germany	Oehme et al. 2017
<i>H. marginatum</i>	1 M	horse	Austria (Melk)	Duscher et al. 2018
<i>H. rufipes</i>	8 adults	various	Germany	Chitimia-Dobler et al. 2019
<i>H. marginatum</i>	10 adults	various	Germany	Chitimia-Dobler et al. 2019
<i>H. rufipes</i>	1 M	horse	Czechland (south)	This report

Table 2. Juvenile *Hyalomma marginatum* complex ticks on migrating birds in Europe.

Tick species	<i>n</i> , life stage	Avian host(s)	Country, Year of collection	Reference
<i>H. marginatum</i>	4 N	Tree Pipit, Bluethroat, Robin	Czechland (south Moravia), 1953	Černý and Balát 1957
<i>H. marginatum</i>	1 N	Robin	Slovakia, 1953	Černý and Balát 1957
<i>H. marginatum</i>	11 N	Tree Pipit, Ortolan Bunting	Finland, 1962	Nuorteva and Hoogstraal 1963
<i>H. marginatum</i>	1 N	Tree Pipit	Sweden (Ottenby)	Brinck et al. 1965
<i>H. rufipes</i>	2 L	Wheatear, Blue-Headed Wagtail	Finland, 1964	Saikku et al. 1971
<i>H. marginatum</i>	5 juv.	Redstart, Tree Pipit, Bluethroat	Finland, 1964	Saikku et al. 1971
<i>H. marginatum</i>	few N	Marsh Warbler, Blackcap, Redstart, Whitethroat	Germany (north: Helgoland), 1975-76	Walter et al. 1979
<i>H. marginatum</i>	2 L 4 N	Marsh Warbler	Slovakia (east), 1987	Černý and Balát 1989
<i>H. marginatum</i>	5 juv.	Redstart, Hoopoe, Kestrel	Slovenia	Tovornik 1990
<i>H. marginatum</i>	1 N	Common Nightingale	Italy (Trentino)	Iori and De Felici 2000
<i>H. marginatum</i>	3 juv.	Stonechat, Eurasian Reed Warbler, Lesser Kestrel	Portugal	Silva et al. 2001
<i>H. marginatum</i>	few	migrating birds	Switzerland	Papadopoulos et al. 2001
<i>H. rufipes</i>	7 N	migrating birds	Norway (south), 2003-05	Hasle et al. 2009
<i>H. marginatum</i>	14 juv.	Wheatear, Redstart, Whitethroat, Sedge Warbler	England, 2010-11	Jameson et al. 2012
<i>H. marginatum</i> , <i>H. rufipes</i>	tens of N, L	migrating birds	Italy (central), 2010-11	Mancini et al. 2013 and Toma et al. 2014
<i>H. marginatum</i> complex	8 N	Great Reed Warbler	Czechland (Moravia, Bohemia), 2010-12	Čapek et al. 2014
<i>H. marginatum</i> complex	1 L 4 N	Common Nightingale	Czechland (Moravia, Bohemia), 2010-12	Čapek et al. 2014
<i>H. marginatum</i> complex	2 juv.	Eurasian Reed Warbler, Marsh War.	Czechland, 2010-12	Čapek et al. 2014
<i>H. rufipes</i>	3 juv.	migrating birds	Hungary 2012-14	Hornok et al. 2016
<i>Hyalomma</i> sp.	12 juv.	migrating birds	Spain (south), 2012	England et al. 2016
<i>H. marginatum</i> complex	177 juv.	migratory birds	Italy (central, southern -13 sites)	De Liberato et al. 2018

L, larvae; N, nymphs; juv., preimaginal (larvae and nymphs); *n*, number of ticks