



Short Communication

Rhipicephalus rossicus and not *R. sanguineus* is the dominant tick species of dogs in the wetlands of the Danube Delta, Romania



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ABSTRACT

Changes in the distribution of tick species are among the major causes for the increase in prevalence of zoonotic diseases worldwide, with tick-borne diseases' prevalence showing an emerging pattern. One of these ticks, *Rhipicephalus rossicus*, which is reported occasionally from humans, seems to be particularly interesting because of its demonstrated vectorial role for zoonotic pathogens like *Francisella tularensis*, *Coxiella burnetii*, or CCHF and West Nile viruses. Here we report a case of dominant occurrence of *R. rossicus* on household dogs in the wetlands of Eastern Europe (Romania). Ticks were collected from dogs in 5 distinct locations, with 1068 ticks of 6 species found. *R. rossicus* had a dominant occurrence in dogs in all but one location, accounting for 87.1% of all ticks (32.3–95.3% in different locations). Until this study, *Rhipicephalus sanguineus* was considered as the only important tick species on dogs in south-temperate regions of Europe, as well in Romania. The dominant presence of *R. rossicus* in dogs, its vectorial competence and broad host spectrum (including humans), make this tick species an important candidate for further analysis and highlight the paucity of our knowledge on disease vectors in this region of Europe.

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Ticks harbor more zoonotic pathogens than any other blood-feeding arthropod species globally and they are the second most important vectors of epidemic importance after mosquitoes. Ticks are known vectors for medically important viral diseases like tick-borne encephalitis, louping ill, Crimean-Congo hemorrhagic fever (CCHF), Colorado tick fever, and bacterial diseases, like Lyme disease, tick-borne relapsing fever, Mediterranean spotted fever and

Q-fever just to name a few (Dantas-Torres et al., 2012). Moreover, ticks transmit a high number of pathogens affecting livestock and companion animals (Day, 2011; Smith and Wall, 2013). Although most of these diseases have a long epidemiologic history and the importance of ticks as vectors has been widely known, tick-borne diseases' prevalence shows an emerging pattern (Chomel, 2011; Salman et al., 2013). There are two main hypotheses which explain this phenomenon: changes in geographical distribution of tick species and increased contact of human population with ticks, caused by changes in human life-style (Léger et al., 2013). Changes in the distribution of tick species are among the major causes for the increase in prevalence of Lyme borreliosis, CCHF,

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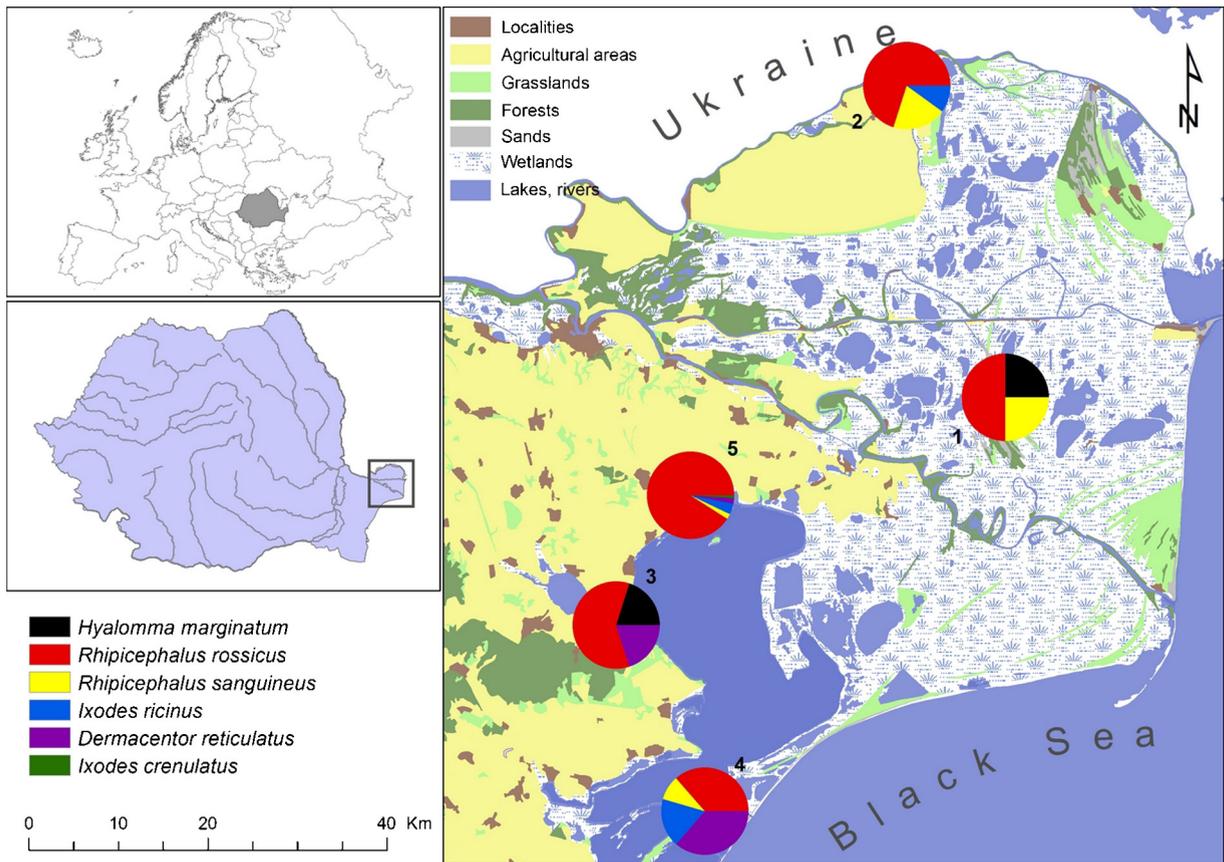


Fig. 1. Map of the study region with the tick community structure in dogs.

tick-borne encephalitis or other vector-borne infections of humans and domestic animals (Beugnet and Marie, 2009; Petney et al., 2012). Most of the cases of tick species known to have recently increased their geographical range are well documented in Western Europe and USA (Petney et al., 2012). However, there is a lack of knowledge on the possible expansion of ticks with a more eastern distribution in Europe. One of these ticks, *Rhipicephalus rossicus*, which is reported occasionally from humans, seems to be particularly interesting because of its important demonstrated vectorial role for zoonotic pathogens like *Francisella tularensis*, *Coxiella burnetii*, or CCHF and West Nile viruses (Walker et al., 2000).

R. rossicus is a tick with Eastern European and Western Asian distribution, considered as being “rare”, with low prevalences in most studies reporting it (Walker et al., 2000). Historically in Romania, it was recorded as an extremely rare tick, found only on small mammals with only 4 known occurrences before 2012 (Feider, 1965; Mihalca et al., 2012). Among domestic animals, dogs are probably the most important hosts, in general, for ticks and tick-borne pathogens of human importance, due to their lifestyle and close contact with people (Chomel, 2011). While *Rhipicephalus sanguineus sensu lato* (s.l.) is typically regarded as the most common tick of dogs worldwide, the related species, *R. rossicus* is reported only incidentally as a dog ectoparasite (Walker et al., 2000). We present here

data which highlight the dominance of *R. rossicus* in dogs from Romania, with importance to the possible emergence of associated pathogens.

A total of 1068 ticks were collected from 84 household dogs between February 2012 and November 2013. The collection occurred in five localities from the Danube Delta, SE Romania (Fig. 1), one of the largest wetland complexes of Europe. The region is primarily of rural character, with important urban centers to the south (Constanța) and north (Tulcea). Dogs are commonly kept in households, with most individuals freely roaming around the premises. Ticks were identified using morphological keys (Feider, 1965; Walker et al., 2000), while identification was confirmed by molecular diagnostics based on 12S rDNA sequences (Dumitrache et al., 2014). Six species of ticks were identified, with *R. rossicus* being found in all five locations. Surprisingly, the dominant tick species was not *R. sanguineus* s.l., but *R. rossicus*, accounting for 87.1% of all ticks (32.3–95.3% in different locations, see Table 1). *R. rossicus* had the highest percent of occurrence in dogs in all but one location. *R. rossicus* is a steppe and mountain steppe tick species, with a distribution from Bulgaria and Romania to the east, occurring primarily in the Eurasian steppe zone to eastern Kazakhstan and western China. It is a three-host tick, with rodents, leporids and birds hosting immature stages. Hedgehogs, hares, ungulates, horses and occasionally dogs and humans are hosts of adults. All of these hosts are

Table 1
Distribution and number of ticks collected from dogs in the Danube Delta, Romania.

Collection site	Number of sampled dogs	Total	<i>Rhipicephalus rossicus</i>	<i>Dermacentor reticulatus</i>	<i>Rhipicephalus sanguineus</i>	<i>Ixodes ricinus</i>	<i>Hyalomma marginatum</i>	<i>Ixodes crenulatus</i>
Caraorman	2	12	6		3		3	
Chilia Veche	64	104	77		26	1		
Enisala	3	9	6	3				
Grindul Lupilor	7	102	33	65	2	2		
Iazurile	8	841	802	29	2	4	3	1
	84	1068	924	97	33	7	6	1

abundantly present in the area of the study. Although previously recorded from dogs, it was primarily considered an important tick of wildlife and domestic ungulates and its vectorial importance was treated as such (Walker et al., 2000). The dominant presence in dogs from SE of Romania rises however a number of questions. Until this study, *R. sanguineus* s.l. was considered as the only important tick species on dogs in south-temperate regions of Europe (Walker et al., 2000), as well in Romania (Ioniță and Mitrea, 2003). While *R. sanguineus* s.l. is a well-known vector for a great variety of pathogens, its epidemiological importance for human pathogens is limited (Walker et al., 2000). On the other hand, *R. rossicus* is a competent vector for CCHF, a disease only recently reported from the study region (Ceianu et al., 2012). Moreover, *R. rossicus* seems to be more common on humans than *R. sanguineus* s.l. (Walker et al., 2000), including in Romania (Sándor, unpublished data).

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