Detection of *Borrelia burgdorferi* sensu lato, *Anaplasma phagocytophilum* and Spotted Fever Group Rickettsiae in ticks from the region of Sofia, Bulgaria (Acari: Parasitiformes: Ixodidae)

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**Abstract:** The aim of this study is to determine the prevalence of a number of bacterial pathogens in ticks from the Sofia region. The data on prevalence for *Borrelia*, *Anaplasma* and *Rickettsia* in ticks can be used to assess the risk for human health of tick-borne diseases. Up to now, only a few surveys on the presence of *Borrelia* and *Anaplasma* in ticks from Bulgaria exist. Detection of *Rickettsia* spp. in ticks corresponds to the risk of tick-borne rickettsioses, because of existence of pathogenic and apathogenic rickettsiae. The high prevalence of tick-borne pathogens found revealed many cases of co-infections. Our data showed that about half of the males and one third of the tick females were simultaneously infected with two or three pathogens. Furthermore, the risk for humans to be infected becomes very high after a long stay of the tick in the skin.

**Key words:** *Ixodes*, *Rickettsia*, tick-borne diseases, co-infections

**Introduction**

Nowadays, tick-borne diseases are of great interest to the medical science. Lyme borreliosis is the most common tick-borne disease in the Northern Hemisphere. The etiological agent, *Borrelia burgdorferi* sensu lato, is transmitted by *Ixodes ricinus* Latreille, 1795 ticks in Europe. The complex *B. burgdorferi* sensu lato, has been divided into a number of genospecies: *B. burgdorferi* sensu stricto, *B. afzelii* Canic et al., 1994 and *B. garini* Baranton et al., 1992 (Baranton 1992, Canica 1993, Johnson 1984). Some other species with still-questionable pathogenicity have been found in European *I. ricinus* ticks (Wang 1997, LeFleche 1997). The anaplasmosis had been a well known disease of domestic animals until 1980, but later it became associated with human infection as well. There are many reports of granulocytic anaplasmae-infected *I. ricinus* ticks – the main vector of the disease and some polymerase chain reaction (PCR) -proved cases of HGA have been reported in patients (Karlsson 2001, Tylewska-Wierzbanowska 2001).

The etiological agents of rickettsioses belong to the genus *Rickettsia* divided into two groups: the typhus group and the spotted fever group. Mediterranean spotted fever is transmitted mainly by *Rhipicephalus sanguineus* Latreille, 1806 ticks, and presents itself with tache noire, high fever, rash, headache, myalgia and arthralgia. Prevalence data for *Rickettsia* in ticks can be used to assess the risk of tick-borne disease for public health, because of existence of pathogenic and

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