

New Habitats of *Dermacentor reticulatus* (Fabricius, 1794) in the Lublin Region

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Abstract

Given the progressive expansion of *Dermacentor reticulatus*, including its infiltration into urbanized biotopes, an attempt was made to verify a hypothesis on a change in this species' habitat preferences. Studies were conducted in 2004 to 2008, chiefly during the period of the tick's greatest activity. A total of 73 one-hour sessions of collecting were conducted in forests, meadows and wastelands of the Lublin region (Table 1). The marsh tick (also called the ornate cow tick) was found most regularly and in greatest numbers in open areas or young tree stands. Urban wastelands with a distinctly xerothermic character were found to be a particularly characteristic biotope (Table 2). This contradicts previous reports that wetland areas are its optimal habitat. Because this tick is a carrier of babesiosis and – probably – borreliosis (Lyme disease), the findings suggest an increased epidemiological threat right within city borders.

Keywords: *Dermacentor reticulatus*, distribution, habitat preferences, synurbization

Introduction

The marsh tick *Dermacentor reticulatus* (Fabricius 1794) is a representative of the mite fauna in Europe [1-5]. Together with the sheep tick (also known as the castor bean tick), it is a known carrier of serious diseases, including rickettsiosis and babesiosis [3, 6-15].

According to available literature, until recently the marsh tick's concentrated range was limited to areas of northeastern Poland. This species was sporadically encountered in western Poland, and when encountered in the Lublin region, it was found mainly along the eastern border [1, 15-23]. Many new sites for this species have been recently discovered during my own research, including in areas west of the Vistula River and south of the San River [24, 25].

According to Siuda [1] and Zygner et al. [15], the marsh tick in Poland is mainly found in the tree and brush growth

of river valleys and other waterways, lake shores, wetland forests, peat bogs, fields, and meadows located in forests, shrubby pastures and along forest paths. This situation is similar in other European countries [3, 4, 8]. Given this species' progressive expansion, also within cities [24], an attempt was made to verify a hypothesis on a change in its habitat preferences.

Study Area and Methods

The study sites chosen were located in two forest complexes (Kozłowiecki Forest near Lubartów and the Gułowski Forest near Łuków), the administrative boundaries of Lublin and Lubartów (wastelands and meadows) and the valleys of a few rivers. All sites were located in areas where the occurrence of the marsh tick had been confirmed earlier.

The research was conducted in three specific habitats in the forests: pine and mixed forests, high pole stands of pine, and young tree stands. Some of the young stands were sit-

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Table 1. Schedule of tick collecting.

Months	March	April	May	June	September	October
Number of censuses	2	15	34	17	4	1

uated in an agricultural habitat (self-seeded birches and pine plantation), the remaining were in a meadow habitat (young stand of alders and birches) adjacent to a forest. Most of the wastelands studied were located next to buildings, streets, and railroad tracks. Only two collecting sessions were conducted in wastelands (abandoned fields, field lanes) located among agricultural fields. A common characteristic of all the wasteland sites was their exposure to full sun and moderately developed (at times scant) vegetation. They can be characterized as distinctly xerothermic habitats. The final category included meadows found in forests, among agricultural fields, and along rivers (Wisła, Wieprz, Kurówka, Czerniejówka).

The research was carried out from May 2004 to September 2008, mainly at the height of the ticks' spring (IV-V) activity (Table 1). The parasites were captured by sweeping a flannel flag (dimensions: 70 x 60 cm) through the ground vegetation, forest groundcover, herbs, and shrubs up to 1 m in height.

The ticks were collected only on days with no precipitation, generally from morning to the early afternoon hours. A total of 73 collections (= samples) were made. Each collecting session lasted 60 minutes. The number of ticks collected was treated as their relative density. The collected ticks were placed in test tubes with 70% ethanol. A binocular magnifying glass was used to determine the number of the sample and to identify each specimen's developmental stage and sex.

Results

Forests

A total of 46 collecting sessions were conducted in various types of forests. The parasites were proportionally more frequently encountered in the ecotone zone (forest – meadow/agricultural field), where 5 of 6 sessions provided a positive result. Penetrating the interior of forest complexes

provided results in 15 of 34 cases (44%). Ticks were not found at all in tall pole stands (n=4) and dry pine stands (n=4). During one collection trial, generally only single specimens were captured (Table 2).

Young Tree Stands

All collection trials in this habitat provided positive results. However, the most numerous captures (15, 20, and 45 specimens) occurred in meadow habitats adjacent to the woods. At the same time, the highest mean value of trials (17 individuals) was observed in young tree stands (Table 2).

Wastelands

Ticks were captured in all trials conducted. In several cases, ticks were captured in locations directly adjacent to intensively frequented streets and paths. At times, most of the ticks in a trial were collected in the initial moments of collecting. In other instances, individual specimens were found only after several dozen minutes. An exceptional case was the site at the corner of Dożynkowa and Jałowcowa Streets in Lublin. This was a 1,200 m² lot zoned for construction and located among buildings. Between March 30 and April 26, 2007, 46 specimens were collected there.

Meadows

The average number in this habitat was close to that noted in the wastelands. The highest numbers were collected in the river valley – described to date as the typical habitat for this species (Kurówka River near Puławy). However, a comparable density was found in meadows experiencing succession within the city environs of Lublin. Noticeably fewer parasites were found in meadows located within forests, with results similar to those found in the forest ecotone zone (forest – meadow/agricultural field).

Table 2. Occurrence of ticks in selected habitats.

Habitat (number of censuses)	Positive censuses/%	Range of values (numbers of individuals in a census)	Mean number of specimens in a single sample
Forest – interior (n=34)	15/44%	0 – 12	1.0
Forests – edge adjacent to a farm field/meadows (n=6)	5/83%	0 – 6	1.8
Young tree stands (n=6)	6/100%	4 – 45	17.0
Wastelands (n=16)	16/100%	1 – 25	11.2
Meadows (n=11)	11/100%	1 – 56	12.1

Generally, marsh ticks were collected with regularity and in clearly greater numbers in open habitats (meadows and wastelands in river valley and near housing estates) than in forest complexes. In more abundant sites, parasites were distributed in aggregations. Of all the specimens collected, females were twice as numerous as males, whereas nymphs were found at only one site.

Discussion

The Lublin region has become an area where the *Dermacentor reticulatus* is regularly found. Until recently, it was concentrated along the eastern border of the region [1, 16, 17]. In my own studies, I have found many new sites where this tick now occurs, including within city environs [24, 25]. These findings suggest that this species, more distinctly than *Ixodes ricinus* [26], exhibits synurban characteristics.

The main hosts of the marsh tick in Poland are common elk (moose) and red deer [1, 27, 28]. Expansion of the marsh tick is probably linked to changes in the distribution and numbers of common elk [29], until recently the main host of this parasite in Poland [27, 30]. From 2002 to 2004 Poland's population of common elk grew by half, taking place mainly in the eastern part of the country (an almost double growth in the districts of Biała Podlaska, Siedlce, and Chełm, and a four-fold increase in the districts of Zamość and Przemyśl). During this period, Poleski National Park experienced the highest density of all national parks [29]. The common elk has recently been observed in many sites in the region, including within the urban environs of Lublin. It seems that the elk is the host "responsible" for the marsh tick's expansion in NE Poland, while the red deer plays a fundamental role in maintaining local populations of this parasite [25].

Of particular note are the marsh tick sites discovered within the administrative boundaries of Lublin and Lubartów, directly adjacent to housing estates. The populations there are comparable in number with those habitats described thus far as the most optimal for the species. The location of these sites may indicate the dog's significant role in feeding the parasite, as it is listed among the hosts of the marsh tick [1, 28]. My own observations also indicate the cat as host for the parasite. Additionally, the areas surrounding Lublin and Lubartów have a decidedly agricultural character, as opposed to the so-called Mazurian hot-spots [23], which indicates that the marsh tick has adapted to new habitats, including xerothermic ones. The spread of this tick to urban agglomerations in other countries has been observed sporadically [3, 4, 8, 13, 31].

A change in habitat preference is all the more significant given the discovery of the presence of *Borrelia burgdorferi* in the bodies of the collected specimens during my own studies [12]. This is the first confirmed finding suggesting that the marsh tick can transmit borreliosis in Poland. Until now, it was believed that it is not a carrier of this disease [19, 31]. The first time of *Borrelia* in a Eurasian *Dermacentor reticulatus* was found in Germany [33]. But

Matlova et al. [34] suggest that this species is unable to transmit borreliae. Their studies showed a gradual decline and the loss of spirochetes in *Dermacentor reticulatus* for a short time after experimental infection.

The marsh tick was primarily known as a dangerous carrier of babesiosis [2-7, 9, 11, 13-15]. This may have great significance for dogs in Lublin, where a significant increase in this disease has been noted recently (data from veterinarians). However, this requires confirmation by specific laboratory testing of the ticks themselves.

The results of my studies showing the frequent occurrence of this species in dry and sunny sites indicates that it is able to find optimal conditions for development in an urban habitat. With the greater occurrence in cities of potential hosts, including populations of fox, hare, and roe deer undergoing synurbanization, this may evolve into a serious epidemiological problem.

Additional studies are indicated on the distribution of *Dermacentor reticulatus*, especially in anthropogenic habitats where humans and house pets are particularly threatened by this parasite.

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