
THE RISK OF ATTACKS TICKS (ACARI: IXODIDA) ON THE TERRITORY OF SLOVINSKI NATIONAL PARK - PRELIMINARY RESEARCH

Magdalena SEMLA^{ABDEFG}, Magdalena NOWAK-CHMURA^{DEF},
Bartłomiej ZYŚK^{ABDEFG}, Włodzimierz WOJTAŚ^{ABDEFG}, Mateusz WILK^{BG}

Institute of Biology, Pedagogical University of Cracow
[magdalena.semla@o2.pl](mailto:magdalenasemla@o2.pl)

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Abstract:

Ticks are an important group of parasites attacking humans and transmitting many virus, bacterial and protozoan diseases. A ticks' faunal research has been initiated on the territory of the Slovinski National Park due to the fact that many cases of tick-borne diseases has been diagnosed in many parts of Poland. The aim of the study was to investigate the prevalence of ticks on tourist trails in the Slovinski National Park. The research was done on the select blue and red tourist trails and bicycle route. The ticks were collected from vegetation using flagging method. The collected specimens were preserved in 70% ethyl alcohol. In the research, a total number of 115 tick specimens was collected in two development stages (107 nymphs and 8 males). All collected ticks belong to *Ixodes ricinus* species. The attacks of *I. ricinus* in the Slovinski National Park are a potential threat to the health of tourists and park's employees.

INTRODUCTION

Slovinski National Park (district: Pomeranian) is one of the two seaside parks in Poland. It is situated in the middle of the Polish Baltic Sea coast (Fig. 1). It is a very attractive tourist area in the north of Poland. Dune belt sand spit of quicksand dunes, numerous lakes, marsh, peat bogs, coastal forests and meadows attract many tourists throughout the year, especially during the summer. People and animals appearing in that area could be potential hosts for ticks inhabiting the SPN. From spring to autumn, in the area of the park there is a high risk for tourists to be exposed to ticks and thereby tick-borne diseases.

Ticks (Acari: Ixodida) are an important group of parasites attacking humans and they are of great medical and veterinary meaning. They transmit many virus, bacterial and protozoan diseases. The biggest risk for humans is the tick-borne encephalitis (TBE), a virus transmitted by ticks. In addition, there are other tick-borne diseases registered in Poland such as Lyme boreliosis, babesiosis, anaplasmosis and spotted fevers [9, 3, 7].

Because the tick fauna of coastal parks is not sufficiently known, an attempt has been made to recognize the prevalence of ticks in the Slovinski National Park and to analyze the dangers resulting from it. Tourist trails and bicycle routes most frequently visited by people were under special scrutiny.

This article presents preliminary results on the prevalence of ticks on some tourist trails and bicycle routes in the Slovinski National Park. The research was conducted by a group of six biology students from the Pedagogical University of Cracow, the members of a Biologist Club in the Institute of Biology, under dr Bartłomiej Zyśk and dr Włodzimierz Wojtaś faculty care.

MATERIAL AND METHODS

The research was conducted from 2nd to 4th July 2012 on the territory of the Slovinski National Park (Fig. 1). The collection was between 9.00 - 16.00 every day, in sunny weather. We surveyed ticks at the following sites:

1. Bicycle route from school in Smołdzino (1) to Gardna Wielka (2), the length of the reserched section is about 8 km (Fig. 2).
2. Blue tourist trail Volley Łupawa, located along the valley of Łupawa river. The material was collected from Rowokół (3), hills at 115 m a.s.l. to road junction Stojcino – Siecie (4). The length of the researched section is about 3,5 km (Fig. 2).
3. Blue tourist trail Czołpino - beach - Lighthouse – Czołpino, located at the Gardnieńsko-Łebska Sand Spit. The material was collected from “Czerwona szopa” (4), an old rescue sea station, now a food corner located near the sea, to a car park in Czołpino (5). The length of the researched section is about 1,9 km (Fig. 3).
4. Red tourist trail "Seaside Road", located at the Gardnieńsko-Łebska Sand Spit. The material was collected from the area stretching from the car park in Czołpino (5), were is the red and blue tourist trail cross, to the Czołpińska Dunes (6). The length of the re-searched section is about 3,3 km (Fig. 3).

The blue and red tourist trails (point 3, 4) were researched together because they were to cover a distance as a loop from the car park in Czołpino – Czołpińska Dunes – beach (section debarred vegetation) – “Czerwona szopa” – the car park in Czołpino. The length of the re-searched loop is about 8,5 km (Fig. 3).

Ticks were collected from vegetation using flagging method [9]. Ground's surface, grass and the lower parts of shrubs (up to 1.5 m in height) were swept with the use of cotton flags measuring 100 cm x 80 cm (Fig. 4). The collected tick specimens were preserved in test tubes with 70% ethyl alcohol. The ticks were identified to genus and species, as well as their sex and development stage in the laboratory with the use of a stereomicroscope. The systematic affiliation was conducted with the use of a key from a monograph on ticks in Poland [9].

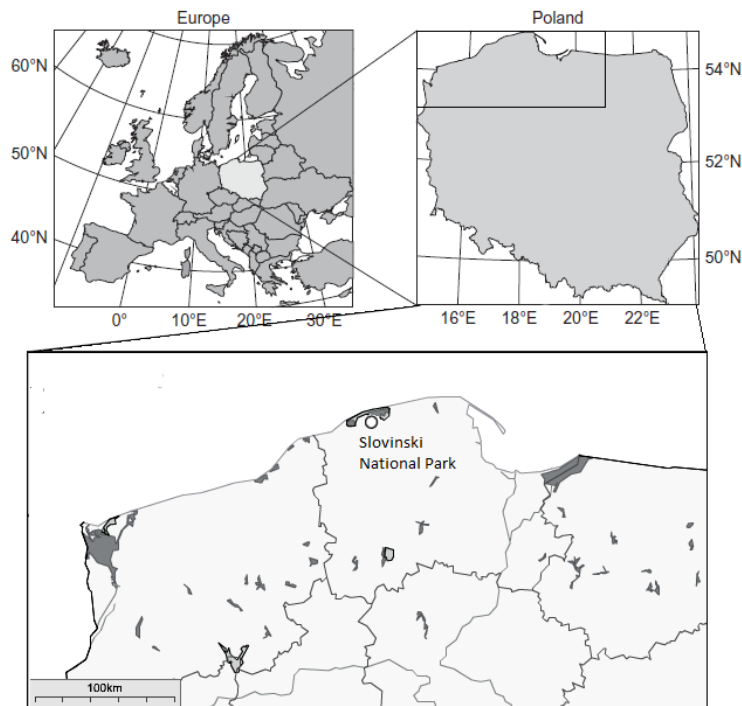


Fig. 1. Localization of the Slovinski National Park

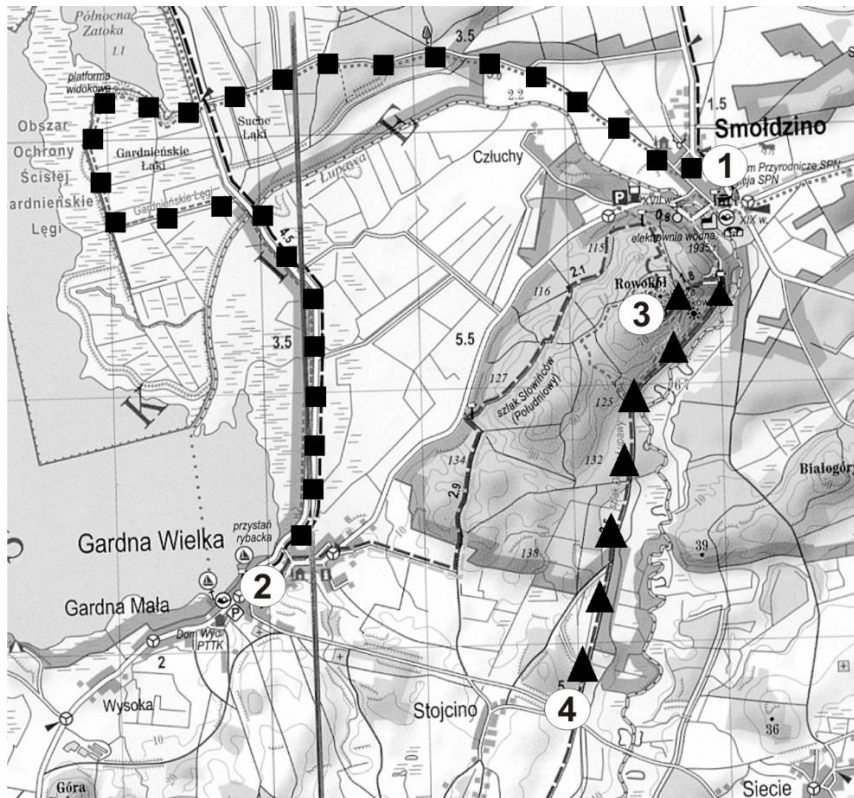


Fig. 2. The localization of the researched blue tourist trail Volley Łupawa and bicycle route in the Slovinski National Park. Numbers on the map indicate places where the research started and where it ended (1 – school in Smoldzino, 2 – Gardna Wielka, 3 – Rowokół, 4 – road junction Stojcino – Siecie)

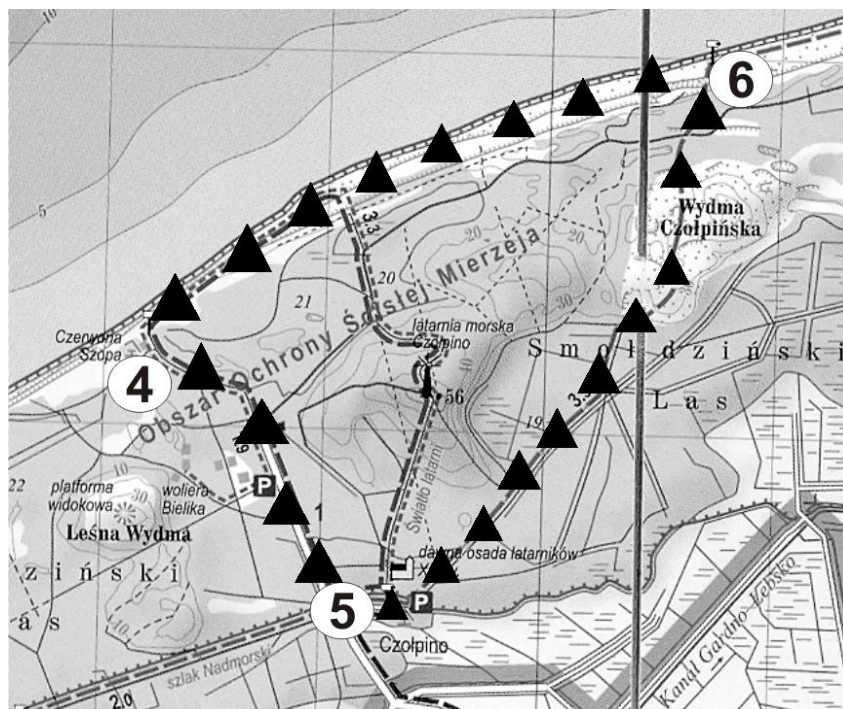


Fig. 3. The localization of the researched loop from the car park in Czołpino – Czołpińska Dunes – beach – “Czerwona szopa” to the car park in Czołpino in the Slovinski National Park. Numbers on the map indicate places where the research started and where it ended (4 – „Czerwona szopa”, 5 – car park in Czołpino, 6 – Czołpińska Dunes)



Fig. 4. Flagging method - the method of collecting ticks

RESULTS

During the research the total of 115 tick specimens was collected, including 107 nymphs and 8 males (Tab. 1). All collected ticks belong to the *Ixodes ricinus* species (Linnaeus, 1758) (Fig. 5). The characteristics of the researched the sites is as follows:

1. On the bicycle route from the school in Smoldzino to Gardna Wielka (Fig. 2) number of examined *I. ricinus* were 27 nymphs and 4 males. The ticks were observed all over the wooded terrain, particularly on grassy vegetation, growing in the center of the paths available for people and on the neighboring mid-forest meadows.
2. On the blue tourist trail Łupawa Valley (Fig. 2) 46 nymphs and 2 males collected, all over the woody area. The largest number of ticks was reported in the grassy roadsides, in damp broad-leaved forests and bushy thicket.
3. The loop the car park in Czołpino – Czołpińska Dunes – beach – “Czerwona szopa” to the car park in Czołpino (Fig. 3) 34 nymphs and 2 males collected. In this area, *I. ricinus* appeared irregularly. A large number of them were observed in wet and woody areas and meadows. No ticks were found on sandy areas, near Czołpińska Dunes and on the beach.

Of the three developmental stages common for ticks (larva, nymph and imago – female or male), the nymphs occurred most frequently (Tab. 1, Fig. 5). In the collected material there were no larva or female ticks. *Ixodes ricinus* was registered in all researched trails, which may indicate that this species spreads all over the area of the national park.

Tab. 1. The sites and the number of active *I. ricinus* ticks in the Slovinski National Park (number of tick specimens collected every half an hour using flagging in the research area)

Site	Number of <i>Ixodes ricinus</i>			
	larva	nymph	Male	female
The bicycle route school in Smoldzino – Gardna Wielka	0	27	4	0
The blue tourist trail Valley Łupawa	0	46	2	0
The loop: Car park Czołpino Czołpińska Dune – beach – „Czerwona szopa” – Car park Czołpino	0	34	2	0
Total	0	107	8	0

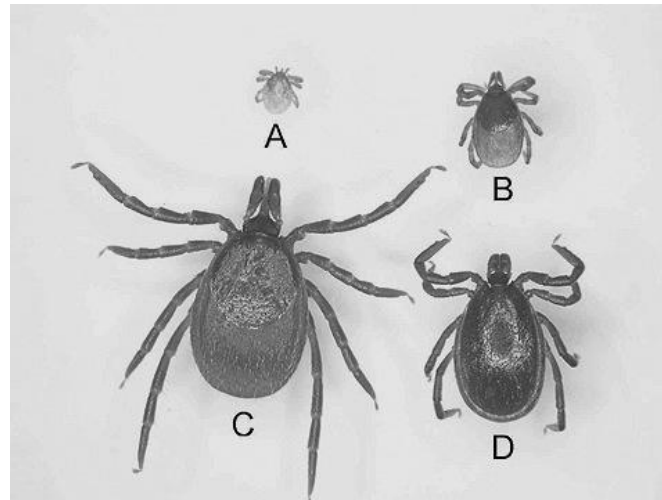


Fig. 5. Developmental stages of *Ixodes ricinus*: A - larva, B - nymph, C - female, D - male (according Siuda and Nowak[10])

DISCUSSION

Among 19 species of Polish fauna ticks appearing in Poland *I. ricinus* is the most common. *I. ricinus* is an absolute parasite species. It is characterized by lack of a host specificity. All active stages prefer warm-blooded animals as their hosts. The main targets of their attack are terrestrial vertebrates, especially mammals as well as reptiles and birds nesting in grassy vegetation. A human is also a frequent object of the attacks. Juvenile stages (larva and nymphs) choose smaller animals as their hosts while adult ticks mainly attack large mammals. The yearly rhythm of ticks' activity is especially intense in spring, it decreases in summer and increases again in the late summer and autumn [5, 7].

In Poland, currently there are few hundreds of posts of *I. ricinus* [9, 11]. Faunal studies are also conducted in tourist areas, where there is a significant increase of tourists and walkers throughout the year and consequently there is a high exposure to the attacks of the tick. These areas are: Ojcowski National Park [13,14], Magurski National Park [4], Bieszczadzki National Park [6], Beskid Wyspowy [12] and Niepołomice Forest [1].

The research has shown that *I. ricinus* is common in the Slovinski National Park. The species in the park area appears irregularly. It habits collected grassy tourist trails, bicycle routes, animals' woodland path, green fragments of forest roads, damp and often shaded meadows and forests (Fig. 6). Ticks are rarely found in the sunny and dry places. No ticks were found on sandy areas.

Wide range of food specificity allows *I. ricinus* to attack all land animals. All ticks in their active stages (mostly nymphs and females) attack humans. Such cases were registered during the study in SNP: on the blue tourist trail ticks were collected from a sand lizard (*Lacerta agilis*). It has been discovered that there were five larval *Ixodes sp.*, and 2 nymphs *I. ricinus* on its body. During the research made on the trails 7 nymphs *I. ricinus* were found on a human body. This shows ticks' high activity in looking for a host.

Preliminary studies on the prevalence of ticks in the Slovinski National Park showed the presence of one species of Polish fauna ticks. *Ixodes ricinus* is the most popular on tourist paths. The collection of ticks was not made in the period of their activity peak.

The tick seasonal activity is observed in springtime and autumn [8, 9]. Registered presence of *I. ricinus* on tourist trails indicates that the attacks of the ticks in the park are a potential threat for tourist and park's employees [2, 3].



Fig. 6. Typical area *I. ricinus* in tourist trails on Slovinski National Park

One of the ways to make people aware of the danger is to place information boards at the beginning and at the end of every tourist trail. People should remember that they ought to wear clothes which would prevent ticks from attaching to their skin, especially while walking. Before hiking it is recommended to wear light long-sleeved shirts and light trousers. The light color makes it easier for people to notice appearing ticks. Furthermore, it is important to walk in shoes which cover the feet and to wear socks which also prevent the ticks from attacking. People should also remember to cover their heads and necks during a walk. After visiting the park it is important to check if there are no ticks attached to the skin. A good way to prevent ticks from attacking is to e.g. avoid grassy areas and use ticks' deterrents available in pharmacies.

Tourist trails and bicycles routes in the SNP which are frequently visited by people should be under special scrutiny as far as the existence of ticks is concerned. There is a high probability that other species of ticks such as: *Ixodes trianguliceps* Birula, 1895, *Ixodes arboricola* Schulze et Schlottke, 1929, *Ixodes lividus* Koch, 1844, *Dermacentor reticulatus* (Fabricius, 1794) may also appear in the park.

It is necessary to carry further research connected with controlling the existence and abundance of ticks *I. ricinus* in the Slovinski National Park, especially because this species is considered as the most important in the epidemiology of disease transmission vectors of for- ceptis in Europe. Analysis of the collected material for the presence of tick-borne pathogens and continuing further research can make people aware of the risk and threats connected with these pests.

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