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Macracanthorhynchosis in Wild Boars from a Mountainous Area of Serbia

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Abstract

Wild boars are common wild animals in hunting grounds in Serbia. Due to their way of life parasitic infections are common in them. Infections with Acanthocephalans parasites are often present in mixed infections with other helminths, but they are rarely found in central Serbia.

The infection is most commonly present in plains hunting grounds, especially in northern parts of the country (Vojvodina, Mačva), where there are a large number of bugs of Scarabaeidae family acting as intermediate hosts. For the above reasons the presence of the Acanthocephalans parasites is very rare in hilly hunting grounds. In this paper we present, for the first time, the infection with *Macracanthorhynchus hirudinaceus* in wild boars from a mountainous area of Serbia.

Keywords: wild boars, *Macracanthorhynchus hirudinaceus*, Serbia

Introduction

Wild boars are widespread populations of wildlife that is seen around the world. They live in packs around moist forests and water. They feed on a variety of foods: roots, fungi, larvae, fallen acorns, hazelnuts, chestnuts, etc. [1, 2]. Diet and lifestyle allow wild pigs have contact with intermediate hosts of parasites (worms, coleopterans, mollusk and arthropods) so that when they frequent parasitic infections. There are many papers on the parasites of the wild boar in various continental regions, like Central Europe where hunting represents a significant economic activity, Middle East and other part of world [2, 3, 4, 5, 6, 7, 8].

From the abundance of parasites species found of wild board Acanthocephalans parasites are so often present in relation to other helminths, most usually parasites from that genus in Europe was *Macracanthorhynchus hirudinaceus* [9, 10]. Usually, this parasite infection is happening to pigs in habitats where we meet skarabids – fields and pastures. It is realistic to expect that their biggest infestations in the fields fertilized with pig feces or on pasture where the pig herds [10]. On the other hand, their presence in free-range pigs and wild boars at higher altitudes (over 1000 m) is not a common finding. From these reason in our work we present a case of infection of wild boars caught on a highland hunting ground L.U. "Srebrnica Stragari" with *M. hirudinaceus*.

Methodology

The study was carried out on 24 wild boars, shot by authorized hunters, collected during the hunting period from 01.12.2012 to 31.01.2013 in hunting ground "Srebrnica" in Stragari, a village and municipality situated in the central part of Šumadija District in Serbia. This hunting area is managed in the territory of 13.000 hectares, mostly mountainous hunting ground, where they are most represented beech and oak forests. It is situated the slopes of Rudnik a mountain in central Serbia (44°07'53"N, 20°32'25"E). Its highest peak Cvijićev vrh, named after geologist and biologist Jovan Cvijić, has an elevation of 1,132 meters above sea level. It has several other peaks over 1000 m: Srednji Sturac, Mali Sturac, Molitve, Paljevine and Marijanac. This area is swarming with wild game, thus offering excellent hunting conditions. In addition to the indigenous populations of wild boar hunting in this are and roe deer, fallow deer, rabbit, pheasant, grouse, wolves, foxes, jackals, and are permanent residents of the hunting grounds [11].

During our examination, wild boars were necropsy immediately after death. Thoracic and abdominal viscera were isolated, ligated, removed, placed into plastic bags, labeled, and brought to the laboratory in refrigerated containers. Data recorded at sampling time included site of shooting and sex and age of wild boars. Host age was estimated according to Saenz-de-Buruaga *et al.*, [12] and three age-groups were established based on tooth development.

Collected helminths were kept in buffered 10% formalin. Identifications of helminths were based on keys and descriptions by Soulsby [13] and Barron [14].

At found acanthocephala were use worm size and characteristic measures together with the number and arrangement of the hooks on the probochis were analysed to confirm the identification of *M. hirudinaceus* [15, 16, 17].

Results and Discussions

Parasitological examination of internal organs revealed only the presence of Acanthocephala *Macracanthorhynchus hirudinaceus* while other types of parasites were not found. Parasites were identified in 4 of 24 wild boars (16.6%). The degree of infection was low and ranged from 3-5 parasites. A total of 17 parasites were collected, of which 5 were males and 12 females (Table 1).

Table 1. Occurrence of *Macracanthorhynchus hirudinaceus* in wild boars

Wild boars	Number of parasites		
	total	male	female
1	4	1	3
2	3	1	2
3	5	2	3
4	5	1	4
total	17	5	12



Fig. 1. Reddish-brown bumps on the outside of the intestinal wall

Animals in which was found *M. hirudinaceus* were aged between one and two years. At autopsy, we observed dark yellow in them and sometimes reddish-brown bumps on the outside of the intestinal wall, which indicated the place of fixation of parasites. Around each of the nodules were observed bright red hyperaemic areas causing the bowel wall at these locations were callous. In the interior of the tubes is observed, and sometimes haemorrhagic catarrhal enteritis, and parasites that were attached to the mucous membrane of the intestines (Fig. 1 and Fig. 2). These pathological changes should be answered the description of these infections in domestic and wild pigs [18, 19, 20, 21].



Fig. 2. Parasites attached to the mucous membrane of the intestines

Found specimens of the males were long 7 to 12 cm (Fig. 2). Females were long 9 to 15 cm to long which corresponded to the size of these parasites described by Lidndquist [22] and Dunn [23]. In both, males and females the front part of the body is thicker than the last and for females it is the rear end was blunt that fits the description of these parasites [8, 24]. In table 2 are morphometric data of the parasites were found.



Fig. 3. Male *Macracanthorhynchus hirudinaceus*

Table 2. Extreme values and mean measure of distinctive features (in mm)

measurements	female			male		
	min	max	mean	min	max	mean
Total body length	90.1	150.6	120.3	70.3	120.1	95.2
Width at mid-body	3.00	4.75	3.94	2.95	3.67	3.32
Præsona length	1.25	1.39	1.32	1.21	1.28	1.22
Proboscis length	0.69	0.81	0.76	0.71	0.77	0.74
Proboscis row No.	5	6	5.41	5	6	5.60
Hook No. per row	6	8	5.50	6	9	7.80
Hook length	0.161	0.179	0.17	0.141	0.159	0.14

Infection of wild boar with *Macracanthorhynchus hirudinaceus* established in several hunting areas in Serbia. In the Belgrade area prevalence of infection with *M. hirudinaceus* amounted to 1.9% [25]. In the swamps character hunting grounds in the territory of Mačva (Posavina nad Podrinje – western part of Serbia), the prevalence was 3.31%. In the hunting areas in the southeast of Serbia (Branicevo and Timok districts) were predominantly a mountain hunting grounds prevalence was 2.42% [26]. In the hunting grounds at northern Serbia this parasite found sporadic, less than 0.1% [27]. In north part of Serbia, in Vojvodina hunting grounds nearby Subotica we no data about occurrence of *M. hirudinaceus* [28] but at lowland hunting grounds at north-west Vojvodina we established moderate level of infection greater than 17% (Pavlović – unpublished data).

This type of parasite is established in domestic pigs too. In some lowland and semi swamps district areas (Posavina, Podrinje, upper parts of Bačka nearby Danube) where swine herding is permanent and number of *Scarabidae* big, prevalence of infection with *M. hirudinaceus* amounts even 30% [20, 21, 28]. Considering habitats where we can meet *Scarabidae* – fields and pasture grounds, it is real to expect that biggest grade of infection is on fields manure with swine faeces, or in grassland with swine herd [1, 30]. *Scarabidae* are most frequently insects in these areas, especially *Melolontha melolontha* and *M. vulgaris*, rose vermin – *Cetonia aurata*, marble insect – *Polyphylla fulva*, May's vermin – *Anomala vitis*, rolling insect – *Scarabeus (Ateuchus) sacer*, shaggy insect – *Tropinota (Epicometis) hirta* Poda, grain-vermin – *Anisoplia segetum*, *Amphimallon solstitialis*, *Phyllophaga vehemens*, etc. [20, 23, 30]. Infection of *Scarabidae* happens in larval stage [31].

When larvae of *Scarabidae* eat macracanthorhynchus eggs excreted into ground with faeces of swine, they release larvae (acantor) that hitch on intestinal wall soon, with their hooklets [11]. Acantor is completely developed in 5-20 days, becoming evolutive form well known as acanthela [17]. In this shape it becomes parasite of *Scarabidae*'s larva, feeding, growing and developing until stage infectious for original – real hosts [20, 33]. In this stage they stay during whole metamorphosis of *Scarabidae* [16, 34, 35]. *Macracanthorhynchus* larvae – acanthelas stay vital during whole life cycle of coleopteras, so we can find them in larval as well as in doll stage, and in adults of *Scarabidae* also [34]. In some larval and doll examples, especially may's coleoptera's belonging to *Melolontha*, *Cetonia* and *Polyphylla* ordo, up to 130 acanthelas can be encountered [20, 30]. High prevalence of infection of *Scarabidae* certainly correlates with large extension of swine infection, length of parasite life and great resistance of parasite eggs in external environment. Besides, long life of *Scarabidae* larvae in soil (3-4 years) maintains permanent degree of contamination in above-mentioned region, and this is the main reason of continuous infection of wild and domestic swine in this region [29, 31].

Detection of infections of wild boars with *M. hirudinaceus* in central part of Sumadia District indicates that there are intermediate host of this parasite and that further research is needed to establish his presence in the mountainous areas of Serbia. At same time that data had epidemiological importance if he knows that *M. hirudinaceus* presented zoonotic species of hookworm [36, 37].

Conclusions

Wild boars are common wild animals in hunting grounds in Serbia. Due to their way of life parasitic infections are common in them. Infections with Acanthocephalans parasites are often present in mixed infections with other helminths. The infection is most commonly present in plains hunting grounds, especially in northern parts of the country and is very rare in hilly hunting grounds. In this paper we present, for the first time, the infection with *Macracanthorhynchus hirudinaceus* in wild boars from a mountainous area of Serbia.

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