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LIPOPTENA CERVI (DIPTERA: HIPPOBOSCIDAЕ) IN ROE DEER (CAPREOLUS CAPREOLUS)

LIPOPTENA CERVI (DIPTERA: HIPPOBOSCIDAЕ) KOD SRNDAĆA (CAPREOLUS CAPREOLUS)

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Kratak sadržaj – Šumske muhe, također poznate i kao jelenške uši (Lipoptena cervi), su obligatni, hematofagni ektoparaziti cervida (Cervidae) u Evropi, Sibiru, Kini i Sjevernoj Americi. Smatra se da su ovi ektoparaziti prijenosnici potencijalno zoonotične bakterije Bartonella schoenbuchensis. Cilj ovog rada bio je da se ustanovlje vrsta ektoparazita prikupljenih s jednog srndaća (Capreolus capreolus), uistinjenog tokom lovne sezone 2011. godine, na području općine Bihać. Primjenom morfološkog ključa, svi su identificirani kao Lipoptena cervi Linnaeus, 1761.

Ključne riječi: Lipoptena cervi, srndać, općina Bihać

Abstract – Forest flies, also known as deer keds (Lipoptena cervi), are obligate blood-feeding ectoparasites that infest cervids (Cervidae) in Europe, Siberia, China and North America. These flies are vectors of potential zoonotic bacterium Bartonella schoenbuchensis. The aim of this study was to determine the species of ectoparasites found on one male roe deer (Capreolus capreolus) shot during hunting season 2011 in the area of Bihać municipality. Using the morphological keys, all adult keds were identified as Lipoptena cervi Linnaeus, 1761.

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Introduction

*Lipoptena cervi* (Diptera: Hippoboscidae; syn. deer ked, deer fly) is a common hematophagous louse fly of red deer (*Cervus elaphus*), roe deer (*Capreolus capreolus*), fallow deer (*Dama dama*), elk (*Cervus canadensis*) and sika deer (*Cervus nippon*) in Europe, Siberia and northern China and of white-tailed deer (*Odocoileus virginianus*), elk, horses and cattle in North America (4). Adult flies morphologically adapted to live on hosts possessing well developed claws, are dorsoventrally flattened, shed their wings upon finding a suitable host and become permanently associated with that host. Females are larviparous; the reached larva falls to the ground where it develops into a puparium and then adult emerge and seeks a suitable host (3, 12). In our knowledge, *Lipoptena cervi* was detected for the first time in three wild roe deers from central part of Bosnia and Herzegovina in 1965 (5). Since then, it has not been documented in print although it has been spreading towards larger areas of our country.

The incidental infestation of humans with deer keds is also possible (8). Forestry workers, hunters and other people who work in or visit forests are especially vulnerable to incidental deer ked infestation and dermatitis (7).

Deer keds as blood-feeding ectoparasites caused direct damage to the skin, inflammation, hyperemia and significant blood loss on their host (4, 8, 13). In humans may cause dermatitis, allergic reaction and allergic rhinoconjunctivitis that arise as a consequence of stimulated host immune responses (4, 7, 9). Complement, cell-mediated immune mechanisms and IgG are involved in the pathogenesis of deer ked dermatitis (11).

*Bartonella* spp. are vector-borne gram-negative bacteria that infected erythrocytes, endothelial cells and macrophages and are associated with numerous emerging infections in humans and animals. Of the 22 identified *Bartonella* species, five are known to be transmitted by lice, fleas or sandflies. Dehio et al. (4) and Halos et al. (6) detected and isolated *Bartonella schoenbuchensis*, a potential zoonotic bacterium, from *Lipoptena cervi*, and they suggested these flies to be vectors for transmission within domestic and wild ruminants. This bacterium may cause bacteremia in ruminants. Bites to humans may also transmit *Bartonella schoenbuchensis*, causing deer ked dermatitis with lesion that can persist for a year (11). According to Böse and Petersen (1), *Lipoptena cervi* may be a potential vector of *Trypanosoma* spp. (*Megatrypanum*) of deer (*Cervidae*).

The aim of this study was to determine the species of ectoparasites found on one male roe deer (*Capreolus capreolus*) shot during the hunting season 2011 in the area of Bihać municipality.

Materials and methods
According to its geographical position, Bosnia and Herzegovina is located in the western part of the Balkan Peninsula and covers the area of 51,209.2 km², of which the land includes 51,197 km² and the sea 12.2 km². The climate is predominantly continental and Mediterranean in the south.

Bihać municipality (coordinates: 44° 49' 1 N; 15° 52' 15 E; average altitude is 217 m) is situated in the northwestern part of Bosnia and Herzegovina, and it is the economic, administrative and cultural center of Una-Sana Canton. It covers the area of 900 km². The area of Bihać has a moderate mountainous type of climate, which is diverse because of the influence of air masses from neighboring and distant areas. Summers are warm and dry, and winters are cold with a high rainfall. Average annual rainfall is 1,245 mm and average monthly temperature is 10.8 °C.

Ten deer keds were collected in May 2011 from one male roe deer (*Capreolus capreolus*) shot during the hunting season in the area of Bihać municipality. Each sample was stored in 70% ethanol. Under a binocular lens at the Laboratory of Parasitology, Veterinary Faculty of Sarajevo, collected samples were identified to species by morphology using the available key (10).

**Results**

Using morphological determination key, collected samples of keds were identified as *Lipoptena cervi* Linnaeus, 1761 (Fig. 1).

**Figure 1.** Adults of *Lipoptena cervi* collected from roe deer (*Capreolus capreolus*) in Bihać municipality. (A) Dorsal view; (B) Ventral view

**Slika 1.** Adulti *Lipoptena cervi* prikupljeni sa srndača (*Capreolus capreolus*) iz općine Bihać. (A) Dorzalna strana; (B) Ventralna strana

**Discussion**
Adult deer keds are 3.5-5 mm in length and brownish in colour. The head, thorax and abdomen are flattened and leathery in appearance. The head and thorax are brown and the abdomen is a greenish yellow with light-brown plates on the posterior segments. Deer ked legs are stout with large dark claws. Overall, the ked is covered with strong, dark hairs. Adults cannot fly for long distances, but they can disperse 50-150 km during annual migration of the hosts (8).

In central Europe deer keds mostly use red deer (Cervus elaphus), roe deer (Capreolus capreolus) and fallow deer (Dama dama) as hosts. They also bite humans and other hosts but do not reproduce on them (4). Under laboratory conditions it will also feed on dogs, house mice, moles, monkeys, pigeons and domestic fowl. In Europe, Bartonella schoenbuchensis has been isolated from Lipoptena cervi and appear to be a natural reservoir of this potential zoonotic bacterium (2, 4, 6, 11). Chung et al. (2) found a very high prevalence (88%) of Bartonella DNA-positive louse flies (Lipoptena cervi and Hippobosca equina) collected from domestic cattle and wild roe deer in France.

**Conclusion**

Further studies including microbiological and molecular diagnostic techniques, are needed to identify geographical distribution of Lipoptena cervi and their potential role as reservoirs of the zoonotic pathogens in Bosnia and Herzegovina.

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