

## First Occurrence of *Paramphistomum microbothrium* (Fischöeder 1901) in Roe Deer (*Capreolus capreolus*) in Serbia

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**ABSTRACT:** *Paramphistomum* parasites identified by histology as *Paramphistomum microbothrium* were found in 18 of 34 roe deer (*Capreolus capreolus*) intestines from central Serbia, examined between 1998 and 2004. This represents the first record of *P. microbothrium* in roe deer in Serbia.

Parasitic infections caused by helminths can cause serious health problems in roe deer (*Capreolus capreolus*), and they often involve nematodes (Bernard et al., 1988; Kutzer et al., 1988; Drozd and Dudzinski, 1993; Shimalov and Shimalov, 2003). Although infections with trematodes are less frequent, they can also cause serious health problems, including fasciolosis and distomatosis (Pavlović et al., 2007). Paramphistomiasis is a seldom-reported plathyhelminth infection in ruminants, including roe deer. The development of *Paramphistomum* sp. includes an intermediate host—a snail of the genus *Bulinus*. After the ingestion of the metacercaria by the final host, the development is completed after the passage through the rumen, abomasum, and small intestine (Vujić, 1965). The disease is characterized by sporadic epizootics with acute parasitic gastroenteritis, followed by high morbidity and mortality of predominantly young animals (Seck et al., 2007). In southern and Eastern Europe, the species *Paramphistomum microbothrium*, *Paramphistomum cervi*, and *Paramphistomum ichikawai* (Horak, 1971; Vishnyakov, 1980) have been recorded in domestic and wild ruminants but not in roe deer. In Serbia, *P. microbothrium* has been found both in sheep and cattle (Vujić and Petrović, 1971), as well as in red deer (*Cervus elaphus*; Pavlović et al., 2007). We report

the first findings of this parasite in roe deer from Serbia or the western Balkans.

We examined offal from 34 roe deer shot by hunters in central Serbia during the official hunting seasons in May–June and September–October, 1988–2004. Examinations were performed in the laboratory of the Scientific Veterinary Institute of Serbia. Information on animal age or sex is not available. Trachea, lungs, heart, gastrointestinal tract, liver, kidneys, and bladder were incised or opened, and all visible parasites were removed. The content of the gastrointestinal tract was sieved. Paramphistomidae parasites were fixed in 10% buffered formalin, and other helminths were fixed in Raillet and Henry's acetic formalin (920 ml of 0.8% NaCl, 30 ml of 40% formalin, 50 ml of glacial acetic acid). Selected parasites were embedded in paraffin, sectioned medio-sagittal to 5–6 µm, and stained with hematoxylin-eosin. Species determination followed Samnaliev (1981). The acetabulum was examined for determination of genera, and the genital atrium and acetabulum were examined for determination of Paramphistomidae species.

Of 34 roe deer examined, Paramphistomidae parasites were found in 18 (53%). On average, 139 (range, 38–234; standard deviation [SD], 46.72) adult parasites per host were found. The largest number of adult parasites was found in the rumen and, to a lesser extent, in the omasum and reticulum. Young parasites were found attached in a brownish-pink cluster in the mucosa of the duodenum, just distal to the pylorus, with the wall and folds so thickened that the intestinal lumen was almost completely occluded. Erosions and minor hemorrhages were visible in the

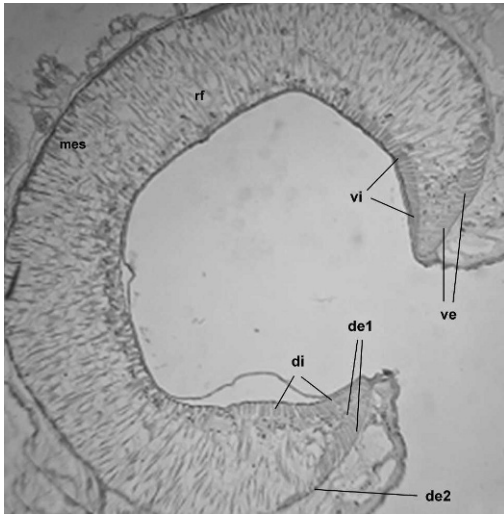


FIGURE 1. Photomicrograph of medio-sagittal section of dorsal part of the acetabulum of a *Paramphistomum microbothrium* showing the muscle series of the acetabulum (mes) and radial muscle fibers (rf). The dorsal exterior (de) and dorsal interior (di) circular muscle layers are used to identify the genus *Paramphistomum*. The number of circular muscle fibers is specific for each species of *Paramphistomum*. Dorsal external muscles are grouped into two parts: de1 contains 16–19 muscles, and de2 contains 8–14 muscles. The dorsal internal muscles contain 42–49 fibers. The number of fibers in the ventral external (ve) muscle layer is 12–16, and the number of fibers in the ventral internal (vi) layer is 45–50. The acetabulum is in a subterminal position, measuring  $0.921 \times 1.1$  mm, in proportion to body length 1:3–(3.3).

mucosa, and the intestinal content was discolored red. At the primary site of infestation, the rumen, destruction of the papillae was detected, as well as hyperplasia of the epithelium and inflammatory reaction with the lymphocytes, similar to that described by Pavlović et al. (2007) and Seck et al. (2007).

Histologic examination of nine *Paramphistomidae* parasites originating from separate hosts identified them as *P. microbothrium* (Fischoeder, 1901; Eduardo, 1982a, b). The dorsal part of the acetabulum was characteristic. The dorsal circular muscle was divided into two parts, the dorsal exterior circular muscle series 1 and the dorsal exterior circular muscle series 2. These circular muscle layers are used for the determination of the genus *Param-*

*phistomum* (Fig. 1). The ventral exterior circular muscle series, the ventral interior circular muscle series, the radial muscle fibers, the external longitudinal muscle series, and median circular muscle series of the acetabulum specifically identified the parasites as *P. microbothrium* (Vishnyakov, 1980; Samnaliev, 1981). The prepatent period is unknown for roe deer, but it is 8 wk in cattle and 10 wk in sheep (Rangel-Ruiz et al., 2003), and under normal conditions, the complete infection cycle takes 3–4 mo.

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