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Research Note

***Stichorchis subtriquetru*s in two beavers (*Castor fiber*) from Slovenia**

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Summary

Intestines of two beavers (*Castor fiber*), one killed by a car accident and one drowned were examined for parasites. Examination revealed the presence of 1 and 14 adult trematodes, *Stichorchis subtriquetru*s in the caecum and colon, respectively. The flotation method revealed no ova from faecal material. The European beaver was present in the territory of Slovenia until the beginning of the 18th century. Recently, in 1998, the species reappeared in southeast of Slovenia as a result of the reintroduction of European beaver in Croatia. This is the first report of veterinary examination of beaver and the first evidence of *S. subtriquetru*s in Slovenia.

Keywords: European beaver; *Stichorchis subtriquetru*s; Slovenia

Introduction

According to the taxonomic classification there are two species of beavers. The American Beaver (*Castor canadensis*), also called Canadian Beaver is distributed in Canada, the United States and in Mexico. This species was also introduced to Argentina, Chile, Finland, France, Poland and Russia. The European beaver (*Castor fiber*) is the largest rodent native in Europe. The species was originally distributed throughout most of Europe and northern Asia, from Scotland to eastern Siberia but in last few centuries became extinct in most parts of Europe. The main cause of this dramatic reduction in the number of beavers was hunting for their pelt, meat and castoreum (a secretion from their scent glands), although habitat loss was also an important contributing factor. Since the beginning of the 20th century, beaver reintroductions have taken place in many European countries, and by the early 90's their number in Europe were recovered. The reintroduction of beaver in several European countries is now in progress and the results already indicate a rise of the population

(Hartman, 1994; Kostkan & Lehky, 1997; Macdonald *et al.*, 2000; South *et al.*, 2001; Fustec & Cormier, 2007). Slovenia had been inhabited by the beaver with absolute certainty from the interglacial Riss/Würm period until the 17 – 18th centuries, when they were eventually exterminated by man (Kryštufek, 2006). The observations in the late 90's have confirmed the presence of beaver near the border with Croatia. The data indicate that the beaver was settled in a natural way, as a consequence of the reintroduction of Bavarian beavers to Croatia in 1996. The first beaver colony was found during the winter of 1998/1999 in the lower course of the river Radulja at the confluence with the Krka river. Since then, the beaver has been constantly present in this area (Kryštufek, 2006). Only a few publications dealing with the helminth fauna of European (Rosell *et al.*, 1996; Koubková *et al.*, 2002, Mažeika *et al.*, 2003; Drózdz *et al.*, 2004; Sager *et al.*, 2005) and Canadian beaver (Erickson, 1944; Fedynich *et al.*, 1986; McKown *et al.*, 1995) are available. Therefore any information concerning this topic is significant.

Material and methods

In this work, the digestive tracts of two beavers from southeast part of Slovenia were examined at the Veterinary Faculty of Ljubljana. The digestive tracts divided into the oesophagus, stomach, small intestine, caecum and large intestine were analysed using the classic parasitological washing out method with sieves. The washing liquids were sedimented, examined and the parasites present were preserved in a fixative solution as described by Garcia *et al.* (2005). Previously fixed specimens were placed between two slides and observed under the microscope. The species was identified according to morphology described by Sprehn (1932), Olsen (1986) and Koubková *et al.* (2002). Faecal samples were collected from the rectum and examined for eggs using a flotation method

(with NaCl solution) as described by Eckert (2000).

Results and Discussion

Due to the low population number of beavers in Slovenia, the existence of the first colony was confirmed between years 1998 and 1999; only one skeleton and two carcasses were found (Kryšufek, 2006). Those were actually the first samples we were able to examine at Veterinary Faculty since the first colony was documented.

*S. subtriquetru*s was the only parasite found in the intestinal tract of the two beavers (Fig. 1). Examination revealed the presence of one adult trematode in the caecum of the beaver killed by a car accident and 9 and 5 adult trematodes in caecum and colon in the drowned beaver, respectively. The location of these parasites is usually in the caecum (Koubková *et al.*, 2002; Drózdz *et al.*, 2004) but they can be also found in the large intestine (Mažeika *et al.*, 2003; Sager *et al.*, 2005). According to McKown *et al.* (1995), the parasite appears in the large intestine especially in cases of severe infections. *S. subtriquetru*s is the most frequently determined parasite in beavers (Erickson, 1944; Koubková *et al.*, 2002; Drózdz *et al.*, 2004). Along with *S. subtriquetru*s (*Paramphistomidae*), *Travassosius rufus* (*Trichostongylidae*) is also a species-specific helminth. However this parasite was not recovered. Faecal examination using flotation methods did not reveal the presence of the ova of *S. subtriquetru*s. This could be due to the low number of parasites in the intestinal tract. From the available literature it is evident that the number of revealed parasites from the animals is higher in countries where the beaver has been present for a longer period. We believe that the reason for the low number of worms so far collected from Slovenian beavers is due to their relatively late reintroduction and consequently a low number of animals. This could be also the case in Croatia (Sager *et al.*, 2005) where similar research revealed only 28 specimens in necropsied beaver.

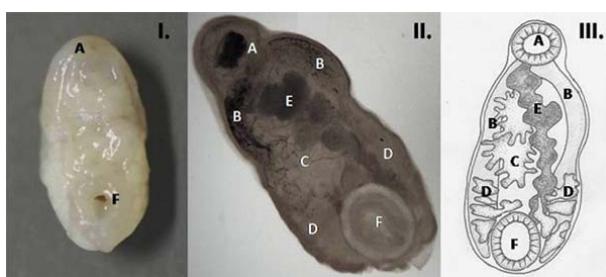


Fig. 1. *Stichorchis subtriquetru* from European beaver.

I. Native view; II. Compressed with lactic acid; III. Picture; A – oral sucker; B – caeca; C – testes; D – vitelline glands; E – uterus; F – ventral sucker

The fluke *S. subtriquetru*s is specific to the European and American beavers. The life cycle of the fluke starts with eggs passed by an infected animal. Miracidia with rediae are formed under suitable conditions such as moisture and warmth. For further development of rediae and later cercariae appropriate species of molluscs, i.e. aquatic snails

have to be present. According to research, many suitable intermediate hosts (i.e. *Bythinia tentaculata*, *Planorbis carinatus*, *Lymnaea peregra*) colonize water habitats in Slovenia (Bole, 1969). In the water milieu the metacercaria are formed, fasten to vegetation and are ingested by the definitive host. The European beaver is strictly herbivorous, its diet consisting of bark, shoots and leaves of woody plants, terrestrial herbs, forbs, ferns and aquatic vegetation (McMaster & McMaster, 2001; Haarberg & Rosell, 2006) that enables hatching of the metacercaria. Characteristic diet and population density are highly correlated with the prevalence of *S. subtriquetru*s in beavers and can be according to Drózdz *et al.*, (2004) up to 93 %.

We expect that habitat condition in future will favour the increase of parasites number with the expansion of beaver population. From the pathological aspect, infection with *S. subtriquetru*s may result as subclinical helminthosis or in cases of severe infection the disease takes an acute form and could cause death of the host (Koubková *et al.*, 2002; Drózdz *et al.*, 2004). According to available data concerning the number of flukes (Erickson, 1944; Drózdz *et al.*, 2004), lack of pathological changes on organs and negative result of flotation method we can assume that the animals were not heavily infected.

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