

Multispecies reservoir of *Spirometra erinaceieuropaei* in wild European mammalian hosts in Poland

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Tapeworm *Spirometra erinaceieuropaei* is still little-known species with complicated life cycle including two intermediate hosts and various definitive host and also may include numerous paratenic host. Spirometra sp. reproduces mainly in the small intestines of felids and canids such as the Eurasian lynx (*Lynx lynx*), wolf (*Canis lupus*) and red fox (*Vulpes vulpes*). The first intermediate host is a copepod of genus Cyclops, in which coracidia develop into procercoid larvae. The second intermediate host may be amphibians and reptiles. The paratenic hosts can be vertebrates, such as birds or mammals (including human), in which spargana once more settle in the tissues after passing through the intestinal wall. These hosts are unnecessary for the cycle's completion but they may play a role in the transmission of the parasite. Spargana in intermediate and paratenic hosts cause a sparganosis – severe food- and water-borne disease.

Most of the research on sparganosis was conducted in Asia, where it is widely spread and constitute serious problem for human. European records are mainly based on incidental reports of the presence of the parasite in vertebrates such as mammals, reptiles and amphibians. In Poland the presence of *S. erinaceieuropaei* has so far been confirmed genetically in last years in four species: badger (*Meles meles*), wild boar (*Sus scrofa*), lynx and grass snake (*Natrix natrix*); however, the first reports from the Białowieża Primeval Forest (not genetically confirmed) date back to the 1940s.

We studied spread of the parasite in wild mammalian hosts in NE Poland to recognize species infected, prevalence and infection intensity. A total of 529 dead mammals including 332 raccoon dogs (*Nyctereutes procyonoides*), 117 European badgers, 30 pine martens (*Martes martes*), 23 stone martens (*Martes foina*), 13 red foxes, 4 American minks (*Neovison vison*), 4 European polecats (*Mustela putorius*), 3 lynxes and 3 river otters (*Lutra lutra*) from five localisations in north-eastern Poland: Augustów Forest, Białowieża Primeval Forest (BPF), Biebrza Valley, Knyszyn Forest and Masurian Lake District (MLD), were collected and necropsied between 2013 and 2019. We found S. erinaceieuropaei larvae in subcutaneous tissue in 165 of studied animals, general prevalence was 31.2%. All found larvae were isolated, counted, measured and preserved in 99% ethanol for genetical analyzes. To identify the species of isolated larvae 18S rRNA gene fragmentwere analyzed.

The highest diversity of infected species was in BPF (7 out of 9 examined species) where tapeworms were found in: American mink, badger, European polecat, pine marten, raccoon dog, red fox and river otter. The least variety of infected species was in MLD, where out of the 5 species studied, only raccoon dog was infected. The mean infection intensity in all studied species was 14.3 larvae per one animal (range 1-276). We observed the highest infection intensity in badgers from BPF – 82.7 larvae (range 3-276).

Our study from north-eastern Poland revealed that in Europe many mammal species are *Spirometra* sp. reservoirs. The frequency and level of infection differed between locations. The highest prevalence in BPF indicates beneficial environmental conditions for this parasite and the long-term persistence of the parasite in the area. Further research is required to confirm which environmental and biological factors have the most significant impact on the level of infection in European mammals.

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