

Occurrence of sparganosis caused by the tapeworm *Spirometra erinaceieuropaei* in wild mammal populations and the zoonotic potential of the disease

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Spirometra erinaceieuropaei is a tapeworm with a complex life cycle in which the final, intermediate and paratenic hosts (so-called accidental hosts) occur. The life cycle of this parasite is associated with water-dwelling copepods in which the first stage larvae (proceroids) develop and with vertebrates (amphibians, reptiles, mammals) in which the second stage larvae (plerocercoids) are found. The larvae – which are the causative agent of the disease sparganosis – usually develop under the skin but may also be found in muscle tissue and fat. Mentioned above intermediate hosts are the source of infection for the final hosts – canine and feline carnivores, such as lynx and wolf. In these animals, the adult tapeworms develop in the intestines and their eggs are excreted into the environment, which allows the parasite to circulate in nature. Man is a paratenic host for *Spirometra* tapeworms. Plerocercoids are usually located under human's skin, but there have also been found in brain, lungs or eyes, leading to severe disease symptoms.

In Poland, the presence of this tapeworm was first recorded in the 1940s in the Białowieża Primeval Forest (BPF) in wolf and lynx. In 2013, the presence of *S. erinaceieuropaei* was confirmed in European badger, and then – in 2016 – in wild boar in the BPF. In the same year, the first case of human sparganosis in Poland was confirmed; it was the case of a person living in the region of the BPF. In the following years, approximately 600 carcasses belonging to 9 species of carnivorous mammals were dissected. The larvae found in the subcutaneous tissue were counted and preserved for genetic analysis. The prevalence and

intensity of infection were calculated and the spatial variability of the probability of wild carnivores infection with *S. erinaceieuropaei* in various forest complexes of north-eastern Poland was assessed. Genetic studies of a fragment of the 18S rRNA gene were used to confirm the species affiliation of the larvae.

Spargana (plerocercoids) were found in 4 wild boars and 172 carnivorous mammals belonging to 7 species, i.e. raccoon dog, European badger, pine marten, red fox, pine marten, American mink, river otter. Molecular analyses confirmed that all larvae belonged to the species *S. erinaceieuropaei*. 30 % of tested animals were infected, and the mean intensity of infection was 14 (range: 1–276) larvae per individual. The highest number of larvae – 276 – was found in European badger from the BPF. European badgers and raccoon dogs have the highest prevalence of infection. The spatial analysis showed the highest probability of infection in the BPF. The prevalence and infection intensity varies between the hosts and is likely to be related to the biodiversity and habitat structure favouring sparganosis transmission.

Our research indicates that many species of mammals can be a reservoir of this tapeworm in nature. The problem of sparganosis occurrence, however, is not only a scientific topic, but also has practical importance related to the safety of game consumption. Wild boar meat can be a source of sparganosis for humans, and the veterinary examinations approving wild boar meat for consumption do not include diagnosis of sparganosis.