

The first record of *Elaphostrongylus alces* larvae in moose in Poland and their development to the invasive stage

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ABSTRACT. Background. This is the first record of the first stage larvae of *Elaphostrongylus alces* in moose in Poland. **Material and methods.** The 75 faecal samples (5 g) from moose in Kampinos National Park were examined using Baermann method. **Results.** The prevalence of *E. alces* larvae in faeces samples was 37%. The maximal intensity reached 294 larvae. 20 larvae of the first stage and 27 larvae of the third stage were measured. The comparison of their dimensions with the results obtained by Lankester, shows that they represent *E. alces*.

Key words: *Alces alces*, *Elaphostrongylus alces*, nematode, Protostrongylidae.

Introduction

Moose is a species, which is very susceptible for parasitic infections. Parasites of moose in Poland have not been recognized well enough. Some investigations were carried up only in the north of Poland [1, 2]. The lack of any data about *Elaphostrongylus alces* influences us to undertake these studies. *E. alces* belongs to the superfamily of Metastrongyloidea, family Protostrongylidae, subfamily Elaphostrongylinae. In this genus four species have been described: *E. cervi* Cameron, 1931, *E. panticola* Lyubimov 1945, *E. rengiferi* Mitskevich, 1958 and *E. alces* Steen, Chabaud et Rehbinder, 1989. So far *E. alces* has been found only in moose from Sweden, Norway and Finland [3–5].

The *Elaphostrongylus* species settle in the central nervous system (CNS) and skeletal muscles of many species of cervids. The adult worms have been found in the epidural space of the spinal cord and brain and in the sciatic nerves and in muscle fasciae [6]. *E. alces* can

cause neurological disturbance. Infected animals are weak, perform uncoordinated movements and rise with difficulty [7]. In the life cycle of *E. alces* an intermediate host occurs. These are a lot of species of terrestrial and aquatic snails. The final host infects by eating incidentally the infected snails during browsing.

The purpose of this study was to describe *E. alces* larvae, their dimensions and development in intermediate host.

Material and methods

The research material was obtained from moose from the Kampinos National Park of Poland, in the years 2004–2005. The 75 faecal samples (5 g) were examined by the usage of Baermann method. 20 larvae of first stage and 27 larvae of third stage were measured (body length, width, nerve ring distance from the anterior end, excretory pore and genital primordium distance from the posterior end, oesophagus length, tail length).

Table 1. Dimensions of first stage *Elaphostrongylus alces* larvae

No. of larvae	Length	Width	Nerve ring*	Excretory pore**	Oesophagus length	Genital primordium**	Tail length	Source
20	396.30 (368–451)	16.95 (16–18)	88.60 (75–107)	104.50 (98–140)	173.65 (167–192)	142 (122–158)	41.55 (32–50)	This study
30	417 (377–445)	19 (17–21)	90 (83–106)	112 (104–132)*	188 (173–236)	262 (204–289)*	42 (32–49)	Lankester et al. 1998

*distance from the anterior end

**distance from the posterior end

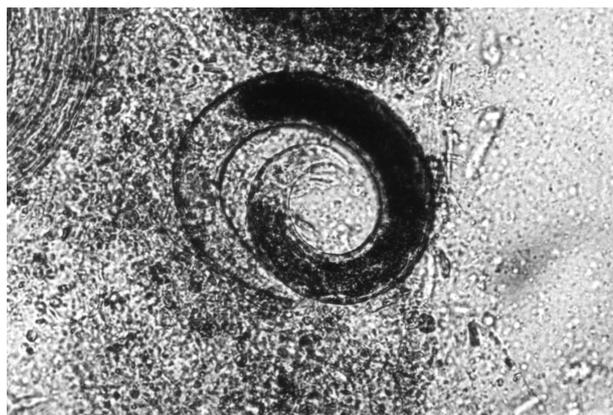
First stage larvae of *E. alces* (obtained from naturally infected moose) were used to infect *Succinea putris* snails. Snails used in the experiment came from private farm in Białowieża. 20 snails examined using the trichinoscopic compressor were free of any nematode larvae. That's why the snails from this farm were used in the experiment. Snails (45 specimens) were infected by putting them together with first stage larvae (2520) in Petri dishes.

The snails were examined by the usage of trichinoscopic compressor under stereoscopic microscope. 20 larvae of the first stage coming from the moose faeces and 27 larvae of the third stage coming from intermediate host have been measured.

Results

The results of measurement of the first stage larvae are shown in Table 1 and those of the third stage larvae are shown in Table 2.

In the first stage larvae (Fig. 1) oesophagus and intestine as well as other measured features mentioned above were easy to be observed. *E. alces* larvae have characteristic tail's ending.

Fig. 1. The first stage of *E. alces* larvaeFig. 2. The second stage of *E. alces* larvae

On the basis of this feature the discrimination between *E. alces* larvae and *E. cervi* larvae, which have similar dimensions and appearance in possible [8].

The morphometric features prove that the larvae found in moose in Kampinos National Park represent of *E. alces*.

First stage larvae were 368–451 µm long and 16–18 µm wide. Their dimensions are similar to the dimension of larvae found in Lankester's paper et al (377–445 µm length and 17–21 wide) [9].

Larvae in intermediate host have reached the

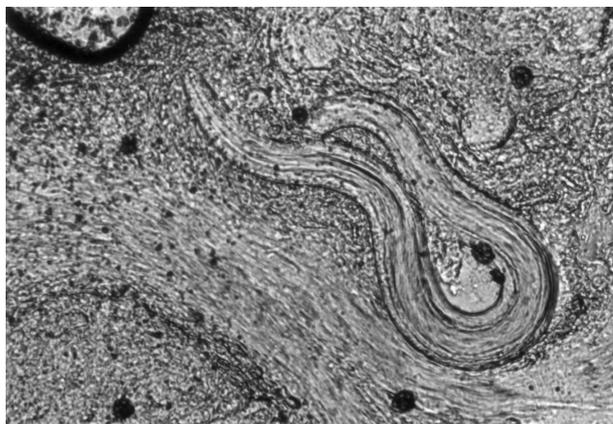
Fig. 3. The third stage of *E. alces* larvae

Table 2. Dimensions of third stage *Elaphostrongylus alces* larvae

No of larvae	Length	Width	Nerve ring*	Excretory pore**	Oesophagus length	Genital primordium**	Tail length	Source
27	749.04 (672–830)	39.78 (34–48)	108.93 (90–125)	129.67 (106–150)	240.56 (160–261)	281.44 (242–330)	41.22 (32–60)	This study
34	714 (675–756)	38 (34–43)	108 (107–110)	126 (112–136)	238 (222–258)	440 (409–468)	40 (33–47)	Lankester et al. 1998

*distance from the anterior end

**distance from the posterior end

second and the third (invasive) stage after 9 and 19 days in temperature of 24°C respectively. More than 50 invasive larvae have developed in one snail. Single larvae of the II stage have been noticed even 14 days post infection. Inflammatory reaction of tissue around the larvae has been observed after 16 days of their infection. Larvae of II stage were thicker with dark pigmented intestine (Fig. 2). Larvae of III stage were translucent (Fig. 3). They were 672–830 µm long and width 34–48 µm wide.

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